

# Catalyzing the Commercial Market for LLINs in Ghana

## A Market Analysis, 2018



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## About This Report

This report presents findings of a market analysis study conducted for the Private Sector Malaria Prevention project and the Johns Hopkins Center for Communication Programs.

All references to:

- Long-lasting insecticide-treated nets (LLINs) in this report refers to all insecticide-treated nets (ITNs)
- Bed nets refers collectively to both long-lasting insecticide-treated nets (LLINs) and untreated nets. For this study, the term **'bed net'** was frequently used as this is a term that is familiar to the study stakeholders
- Focal regions refer to the Ashanti, Greater Accra, and Western regions of Ghana where we collected data for this study

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## Abbreviations

ANC	antenatal care
CCP	Johns Hopkins Center for Communications Programs
DCE	discrete choice experiment
DFID	U.K. Department for International Development
ECOWAS	Economic Community of West African States
EPI	Expanded Programme on Immunization
GH¢	Ghanaian cedi
Global Fund	The Global Fund to Fight HIV, Tuberculosis and Malaria
GMF	Ghana Malaria Foundation
GMIS	Ghana Malaria Indicator Survey
GTS	<i>Global Technical Strategy for Malaria 2016–2030</i>
HCD	human-centered design
HS	harmonization system
LLIN	long-lasting insecticide-treated net
NMCP	National Malaria Control Program
PMI	U.S. <b>President’s Malaria Initiative</b>
PSMP	Private Sector Malaria Prevention project
US\$	United States dollar
USAID	United States Agency for International Development
VAT	value-added tax
WHO	World Health Organization
WHOPES	World Health Organization Pesticide Evaluation Scheme
WTP	willingness-to-pay

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## Executive Summary

Finding sustainable ways to maintain access to long-lasting insecticide-treated nets (LLINs) is essential to maintaining gains in malaria prevention in Ghana. The commercial market is an important channel for sustained access to LLINs. With the aim of catalyzing the LLIN market, the U.K. Department for International Development-funded Private Sector Malaria Prevention (PSMP) project commissioned this market analysis. This study was designed to gain insights into the existing commercial market for LLINs, identify opportunities to increase customer demand for LLINs from the retail market, and get private sector players—manufacturers, distributors, wholesalers, and retailers—to participate in the LLIN value chain. We conducted the market analysis study from March to December 2017 in the Ashanti, Greater Accra, and Western regions of Ghana, using a combination of qualitative (focus groups, a human-centered design study, and key informant interviews) and quantitative (discrete choice experiments, household surveys, and retail audits) approaches.

Overall, our findings show that:

- Very few retail outlets stocked and sold bed nets (LLINs and untreated nets) at the time of the study. Only 7% of retailers across the three study regions sold bed nets during the study period. Bed nets sales are predominantly limited to two types of retail outlets, namely pharmacies and mothercare shops, even though they make up only 13% of retail outlets in the study areas. Very few convenience shops and supermarkets sell bed nets (5%), even though they make up 82% of retail outlets and are more widely accessible to the public.
- The majority of households acquired their LLINs through national free distribution channels. Only 2% of households acquired their bed nets (LLINs and untreated bed nets) from retail markets, even though 92% of bed net owners said they could afford to buy one. Additionally, findings from the discrete choice experiment (DCE) show that consumers are willing to pay a premium for a LLIN that meets their preferences.
- The study identified the Ghanaian middle class as the primary target audience for LLINs sold through retail channels. To revitalize demand for LLINs in the retail market, LLIN sales must primarily target the middle-class population. These consumers have an average per capita income of at least 4 U.S. dollars (US\$) per day and are willing to pay for an LLIN that meets their design preferences.
  - The middle-class consumer wants to buy LLINs that meet their preferences. Currently, only 14% of middle-class households use LLINs. Evidence from the study shows that the key reasons for low use are that current designs are not conducive to their lifestyle—as they lack convenience, comfort, and appealing aesthetics.
  - The middle-class consumer wants an LLIN that is easier to use, more convenient, comfortable, and aesthetically attractive. A convenient LLIN must be easy to hang, easy to enter and exit, and easy to reach nearby personal items. A comfortable LLIN must be spacious inside, have the right texture of material (polyester), and the insecticide treatment must not cause discomfort. An aesthetically pleasing LLIN must not distract from the décor of **the user's bedroom**. The middle-class consumer wants an aesthetically pleasing LLIN that, when hung, does not make the bedroom look cluttered, has a pleasing

shape and design that does not compromise the amount of space inside the LLIN, and has more color options than the usual white and blue.

- The middle-class consumer uses mosquito-control products, other than LLINs, to prevent malaria. Because the current LLINs types available to middle-class customers do not fit their lifestyles or meet their aesthetic preferences, the majority (82%) use alternative mosquito-control products such as insecticide sprays, coils, and repellents, with insecticide sprays being the most commonly used.
- The middle-class consumer is willing to pay for an LLIN that meets their preferences. Findings from the discrete choice experiment (DCE) show that the average probability of buying an LLIN among study participants is 43.8% and the average willingness-to-pay is 34 Ghanaian cedi (GH¢). Additionally, while price increases do not change demand significantly and they do increase profits.
- Changing LLIN attributes from the least to most attractive combinations increases the average demand. The study estimates that by changing the shape, size, and mode of entry of LLINs—such as the shape from rectangular to conical, size from double to queen, and mode of entry and exit from lift overhead to zipper entry design—demand increases from 41.2% to 50.7%. With these types of changes, the average willingness-to-pay per LLIN increases from GH¢13.73 to GH¢26.01, depending on the attribute change. Also, by targeting males, low middle-income populations, and the Ashanti and Western regions, larger than average profits can be made.
- There is a market for a differentiated LLIN within the three focal regions. The study estimates that the market size for a differentiated LLIN in the three focal regions of this research—Ashanti, Greater Accra, and Western—may conservatively be about 106,000 LLIN sales in 2018, increasing to 1.4 million by 2022. Moderate estimates for the differentiated LLINs will be about 643,000 sales in 2018, increasing to 3.7 million by 2022; and aggressive estimates about 1.3 million sales in 2018, increasing to 6.2 million by 2022.
- There is a national market for a differentiated LLIN. The study estimates that the national market size for a differentiated LLIN may conservatively be about 190,000 LLIN sales in 2018, increasing to reach 2.5 million sales by 2022. Moderate sales estimates for the differentiated LLINs will be about 1 million in 2018, increasing to 6.6 million by 2022; and aggressive sales estimates will be about 2.3 million in 2018, increasing to 11.0 million by 2022.

Overall, this market analysis shows that there is great potential to catalyze a commercial market for LLINs that target middle-class consumers, as this target population is willing to pay a premium for LLINs that meet their functional and aesthetic preferences.

## Background

This section of the report discusses the context in which this research is situated and provides the overarching and specific objectives for why this research was commissioned.

### The Context of the Research

In 2016, an estimated 216 million malaria cases and 445,000 malaria deaths were recorded globally, about 90% of which were in sub-Saharan Africa.<sup>1</sup> As malaria is endemic in all areas of Ghana, its population of 29.6 million (2018) remains at risk of infection each year.<sup>2</sup> In 2016 alone, the World Health Organization (WHO) estimated that Ghana had eight million cases of malaria and 12,880 malaria-related deaths.<sup>1</sup>

Despite substantial successes achieved in malaria prevention in Ghana, there is still a long way to go, and efforts to control malaria in the country continue relentlessly. Since 2002, the government of Ghana has prioritized ensuring access to and increasing use of LLINs to reduce malaria-associated morbidity and mortality. One of the key objectives of the National Malaria Control Programme (NMCP) is to reach and sustain universal LLIN coverage, which is defined as one LLIN for every two persons. To achieve this, the government distributes free LLINs nationally through point mass distribution campaigns as well as through continuous distribution through antenatal care (ANC) clinics, Expanded Programme on Immunization (EPI), and primary schools. Between 2014 and 2016, LLIN manufacturers reported delivering 19.6 million LLINs to Ghana.<sup>1</sup> This study estimates that about 98% of the LLINs delivered during this period went to free distribution programs.

The strategy of free LLIN distribution as the primary means of malaria control has proven to be largely successful in increasing ownership and use of LLINs, which in turn has reduced malaria-related morbidity and mortality over time.<sup>3</sup> For example, in 2008 only 31% of households in Ghana owned at least one LLIN, compared to 2016, when 73% of households owned at least one LLIN.<sup>4</sup> Currently, more than 91% of LLINs owned by households were obtained from free distribution channels—mass distribution campaigns, ANC or EPI distributions, and school distributions—compared to only 2% nationally who obtained bed nets commercially from retail outlets.<sup>4</sup>

In recent years, concerns about sustaining long-term funding for malaria control programs, particularly for the free LLIN distribution model, have increased. International and local stakeholders coordinating the fight against malaria expect funding for malaria control programs, especially the provision of free LLINs for distribution, to be substantially reduced. A lack of adequate funding could jeopardize the country meeting future malaria prevention and elimination targets.

The following examples illustrate how urgent it is for Ghana to take action toward creating a sustainable pathway to achieve its goal of a malaria-free Ghana by 2030.

- The WHO *Global Technical Strategy for Malaria 2016–2030* (GTS)<sup>5</sup> sets out the agenda for malaria elimination globally. For countries to reach their first milestone goal of reducing malaria incidence and mortality by at least 40% (compared to 2015 levels) by 2020, the GTS states that the total annual funding for malaria control and elimination programs would need to reach US\$6.5 billion by 2020. To meet the 2025 milestone goal of reducing malaria incidence and mortality by at least 75% (compared to 2015 levels), more than US\$7.7 billion would be needed. For countries to meet the GTS 2030 goal of decreasing global malaria morbidity and mortality by 90% and eliminating malaria in 35 countries, global funding would need to reach US\$8.7 billion by 2030.<sup>6</sup> To achieve

these GTS goals, higher levels of funding are needed than are currently available. In 2016, the total global funding for malaria control programs was estimated to be US\$2.7 billion per year—just 41% of the 2020 funding requirement of US\$6.5 billion. Funding for malaria has not increased significantly since 2010 (US\$2.84 billion),<sup>7</sup> though it has remained relatively stable. If this trend continues, countries are unlikely to achieve their respective GTS malaria prevention and elimination goals by 2030.<sup>1</sup>

- The government of Ghana outlined its own malaria prevention targets in the **NMCP's 2014–2020 National Strategic Plan (NSP)**.<sup>8</sup> In the NSP, the NMCP aims to reduce the incidence of malaria and its associated deaths by 75% by the year 2020. Increasing and sustaining free LLIN distribution through mass and continuous distribution channels is crucial to achieving NSP targets. However, if the NMCP is not proactive about securing funds to fill anticipated gaps in funding, the country will not be able to meet these targets. The funding situation is further compounded by Ghana's new categorization as a lower middle-income country, which will lead to a decrease in international **donor support for the NMCP's strategic goals. This expected shortfall in funding** is actually already being felt. In its funding eligibility policy for 2017–2019, the Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund), **the primary source of funding for Ghana's malaria control programs**, has requested that Ghana, as a lower-middle-income country, contribute 20% as counterpart funding before the Global Fund will release any approved funds to support the **country's malaria control programs for this period**.<sup>9</sup> The latest available figures also indicate that funding contributions from key external donors—the Global Fund, **U.S. President's Malaria Initiative (PMI)**/U.S. Agency for International Development (USAID), and the U.K. Department for International Development (DFID)—fell by about 15% from US\$83.3 million in 2015 to US\$70.5 million in 2016.<sup>1</sup> In Ghana, Global Fund funding allocations alone for the 2018–2020 funding cycle fell by 22% for all three diseases, and by 18% for malaria alone.<sup>10</sup>
- The imminent challenge with external funding for malaria control programs is exacerbated by the difficulty that governments of endemic countries have experienced over the years in providing the domestic funding needed for malaria control programs in their own countries, making these programs heavily donor dependent. To provide perspective, in 2016, of the US\$2.7 billion total global funding for malaria control and elimination programs, governments of endemic countries contributed only 31%.<sup>10</sup>

To address these and other concerns, various stakeholders have been working toward creating a more sustainable approach to malaria control programs in Ghana.

One such effort is the development of the 2015 Resource Mobilization Plan<sup>7</sup> and establishment of the Ghana Malaria Foundation (GMF) in 2017. The GMF is private-led public-private sector partnership tasked with the goal of building a sustainable resource base for the fight against malaria.<sup>11</sup>

Another key effort aimed at providing a sustainable pathway for access to LLINs in Ghana is to re-establish a private sector market for LLINs to supplement public-sector efforts. The Private Sector Malaria Prevention (PSMP) project, funded by DFID and implemented by the Johns Hopkins Center for Communications Programs (CCP), aims to do just that. PSMP is a three-year pilot project intended to stimulate private sector involvement in malaria control through the facilitation of a functioning supply chain and competitive market for LLINs, complemented by promotion of institutional and corporate LLIN purchases for workplace

programs and active advocacy efforts. PSMP hopes to catalyze a self-sustaining distribution model for access to LLINs that is driven by commercial retail sales of LLINs through the private sector.

The PSMP commissioned this research study to provide the commercial sector with reliable and current market information, with the aim of fostering private sector involvement and investment in stimulating a commercial retail LLIN market in Ghana.

## The Business Challenge

- Determine how to catalyze a self-sustaining commercial retail market for LLINs in a way that is attractive and profitable for private sector players, such as manufacturers, distributors, and retailers.
- In 2016, manufacturers of WHO Pesticide Evaluation Scheme (WHOPES)-recommended LLINs reported that only 1% to 2% of their exports to Ghana go to the retail market.<sup>a</sup> What can be done to increase the volume of LLINs delivered to the retail market in Ghana?

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<sup>a</sup> "As of 2017, this process is called PQT-VC" [http://www.who.int/pq-vector-control/resources/transition\\_WHOPES\\_PQT.pdf?ua=1](http://www.who.int/pq-vector-control/resources/transition_WHOPES_PQT.pdf?ua=1)

## Key Questions

What does the current commercial market for bed nets (insecticide-treated and untreated) look like?



- Which brands of bed nets are currently on the market?
- What are the attributes (shape, size, insecticide treatment) of bed nets currently on the market?
- What are the prices of bed nets currently on the market?

What are the target customers' attitudes, knowledge, and behaviors about malaria?



- Do target customers worry about malaria?
- What do target customers know about the causes of malaria?
- What kind of messages do target customers hear about malaria?
- What is the current ownership level of bed nets among target customers?
- How do target customers currently get their bed nets?

Is there a commercial market potential for LLINs? If so,



- Who are the target customers?
- What is the level of bed net use among target customers?
- How do target customers care for their bed nets?
- What are the functional and aesthetic preferences of target customers?
- How big is the market for LLINs?

## Research Design

This section of the report discusses the research approach, highlighting the three study areas where data were collected for the market analysis and providing details of the qualitative and quantitative research methodologies applied in this study.

### The Study Area

The market study was conducted from March-December 2017, in three regions in Ghana: Ashanti, Greater Accra, and Western. These regions were selected as the focal areas because:

- A sustainable commercial market for LLINs will only thrive if the potential target customers have the purchasing power to buy their own LLINs. In Ghana, poverty rates are generally lower in urban than in rural areas. These three regions are the least poor and most urbanized regions in Ghana.
  - Out of the ten regions in Ghana, Greater Accra has the lowest poverty incidence (5.6%) and is the most urbanized region in the country, with 92% of its households in urban areas.<sup>12</sup>
  - The Ashanti Region follows with a poverty rate of 15% and 64% of its households in urban areas.
  - The Western Region is the fourth least-impoverished region in Ghana, with a poverty rate of 21% and 45% of its households in urban areas.
- To have potential to capture market share, the study focused on areas with the lowest saturation of household LLIN ownership. The 2016 Ghana Malaria Indicator Survey reported the LLIN penetration—households that own at least one LLIN—as 61% for Greater Accra, 67% for Western, and 70% for Ashanti, compared to the Upper East Region of Ghana, for example, where penetration is as high as 94%.<sup>5</sup> Since these three regions have the lowest penetration of LLINs across the country, this could mean that there is room to sell LLINs and capture market share in these regions.

### The Research Methodology

To develop a comprehensive understanding of whether a vibrant commercial market for LLINs in Ghana was a viable proposition, the research design focused on understanding the potential target customer, the supply chain, mosquito-control product competition, and the potential market size for LLINs.

The study used the generic term ‘bed nets’ to refer collectively to both LLINs and untreated bed nets. This is because bed net is the term commonly understood by the study population and also because the study team could not independently verify the accuracy of **respondents’ references to** LLINs or untreated nets. Thus, in certain circumstances it was more appropriate to use the all-encompassing term ‘bed nets’ instead of the specific terms ‘LLINs’ or ‘untreated bed nets.’

The research design employed a mixed-methods approach to provide rigor and rich insight. The four qualitative and quantitative methodologies used to gather information on potential customers and the supply chain in this market analysis are summarized below.

Approach	The Potential Consumer	The Supply Chain
Qualitative	Human-centered design consumer preference study	Key informant interviews with LLIN manufacturers, wholesalers, and distributors
Quantitative	Household surveys and discrete choice experiments	Retail audits

### 1. Human-Centered Design Consumer Preference Study

To meet one of PSMP's primary project goals of facilitating a functioning and competitive market for LLINs in Ghana, it was imperative to gain a rich understanding of local customer preferences as well as the facilitators and inhibitors to net use.

To that end, the market analysis design used a human-centered design (HCD) approach to better understand customer's needs and preferences. HCD is a creative problem-solving process that emphasizes direct engagement with key stakeholders to gain insights that may be crucial to designing products that are both novel and useful to a given market or audience.

HCD was incorporated into the prospective customer focus group discussions in order to better understand the potential target customer by capturing existing customer preferences and identifying latent, potential preferences for an LLIN design that may not exist yet. In other words, to create demand for LLINs on the retail market, we first had to understand the reasons why potential target customers would or would not purchase a bed net.

The HCD process is inherently dynamic and interactive. Table 1 summarizes key parts of the HCD work done as part of the market analysis.

*Table 1. Key activities in the human-centered design work*

Session	Participants	Description of Activities
Personae Creation (Virtual Collaboration Accra, Ghana and Baltimore, Maryland, USA)	PSMP project team members in Accra, Ghana and in Baltimore, USA	A group of local stakeholders developed personae of potential target consumers for commercially available LLINs. A persona is a tool used in HCD to represent a stakeholder group. Typically, a bio is created for an individual stakeholder that includes personal information (e.g., name, age, gender), information about the person's interests (e.g., hobbies), and some insight into their psychology (e.g., personality, motivations, challenges faced). Creation of personae facilitates perspective-taking and helps team members better understand the population they are designing for.
Journey Mapping (Virtual Collaboration, Accra, Ghana and Baltimore, Maryland, USA)	PSMP project team members in Accra, Ghana and in Baltimore, USA	The local stakeholder group created journey maps that showed the path of a stakeholder through an experience related to the challenge. For instance, team members could have map the major steps and problem points related to purchasing and installing a bed net.
Ideation Sessions (Face-to-Face, Baltimore, Maryland, USA)	PSMP project team members, malaria prevention experts, and human-centered design consultant	A series of ideation (brainstorming) sessions were conducted to generate ideas for creating a desirable LLIN to be sold in retail outlets. These ideas were analyzed and used to guide the design of future activities. For instance, many participants focused on creating a more comfortable experience of sleeping under an LLIN.
Ideation and Prototyping Sessions (Face-to-Face, Accra, Ghana)	PSMP project team members (Accra, Ghana and Baltimore, USA), and local citizens recruited from Accra, Ghana	The local stakeholder group was instructed to brainstorm ideas and build low-fidelity prototypes of their most promising LLIN design solutions. These ideas were analyzed and used to guide the design of future activities. For instance, many participants focused on creating a more convenient experience of hanging an LLIN.
Focus Group Discussions	A total of nine focus groups, involving 78 participants (51 adults and 27 boarding school students) across rural and urban areas in the Greater Accra, Western, and Ashanti regions	Each focus group session involved discussions and activity-based exercises that allowed the research team to illicit insights that explain consumer attitudes and behavior about malaria, in general, as well barriers and facilitators to bed net use. The focus group exercises involved an interaction with three prototype bed nets, a coloring exercise on bed net designs, and a card-sorting exercise on possible accessories for bed nets. These exercises helped to validate consumer preferences on the types of bed nets that appeal to them.

## 2. Household Surveys and Discrete Choice Experiments

Household surveys and discrete choice experiments (DCE) were deployed to capture quantitative data so that the findings from this study could be generalizable across the three study regions. The aim of the household surveys was to understand customer attitudes and behaviors about malaria and bed nets, and the purpose of the DCE was to determine demand and gauge willingness-to-pay for LLINs with different design attributes.

A sample of 1,075 households from 28 non-poor districts across urban and rural areas in the three focal regions was selected, using a stratified two-stage cluster sampling design, to take part in the household surveys. The 28 non-poor districts were selected because they have poverty rates lower (ranging from 0.7%

to 9.6%) than the average poverty rate (11.6%) of all districts in the three regions of interest.<sup>13</sup> As mentioned previously, non-poor districts were chosen because the aim of the market analysis was to determine how to sustainably stimulate the commercial sale of LLINs, therefore, the study had to focus on areas where the population was more likely to have disposable income to afford LLINs from the retail market.

Given that the total number of households in the three regions (estimated at 2,943,183 in 2017)<sup>14</sup> and the proportion of people using LLINs in each region (Ashanti, 50%; Greater Accra, 26%; Western Region, 46%),<sup>15</sup> the sample size of 1,075 household surveys produced results estimated at a 95% confidence level within a +/-3 percent margin of error. The sample size of 1,075 was statistically large enough to produce estimates that can be generalizable to the true population of the three focal regions for this study.

Of the 1,075 households, a subsample of 628 (58%) households were randomly selected to take part in the DCE.

For both household and DCE surveys, only adult household members ages 18 years and older, with **knowledge about the household's bed net ownership and use and the household's finances (income and expenditure)**, were qualified to participate in the survey.

### 3. Key Informant Interviews with Supply Chain Members

In-depth interviews were conducted with 12 supply chain members: two LLIN manufacturers, two distributors, and eight wholesalers (sub-distributors). The interviews were conducted to understand how the LLIN supply chain was currently set up and to gather insights into activities of channel members involved in the commercial sales of LLINs in Ghana.

### 4. Retail Audit

A retail audit (interviews with retailers) was conducted across a sample of 271 retail outlets in the Ashanti, Greater Accra, and Western regions. The retail outlets were selected using random and quota sampling from a sample frame of 2,814 retail outlets.

The retail audit provided information on which type of retail outlets currently sell bed nets (LLINs and untreated bed nets), their stock levels, their pricing structure, and how they operate within the supply chain.

The retail outlets visited included:

- Pharmacies/chemical shops (54%)
- Convenience shops/corner shops/mini supermarkets (38%)
- Supermarkets (6%)
- Mothercare shops (2%)

## Limitations of this Study

- The study was conducted in only 3 out of 10 regions in Ghana. Therefore, the findings are generalizable only to the three study regions.
- The lack of previous comprehensive market research on customer preferences for LLINs and the retail market for LLINs in Ghana resulted in minimal context within which these research findings could be situated and compared.
- Limited research was available on the target market (middle class) in Ghana, particularly about how they access public health services.

## The Existing Commercial Market for Bed Nets in Ghana

This section of the report presents findings of the market analysis that answers the question: What does the current retail market for bed nets look like? Analysis of the retail market, via a retail audit in the three focal regions, provided information on the current market for bed nets—such as the brands of bed nets stocked by retailers, features (e.g., shape, size, insecticide treatment) of bed nets available for purchase, and price of bed nets—as well as the supply chain, from manufacturer to customer. The analysis looks at a population of 221 nets.

### Brands of Bed Nets on the Retail Market

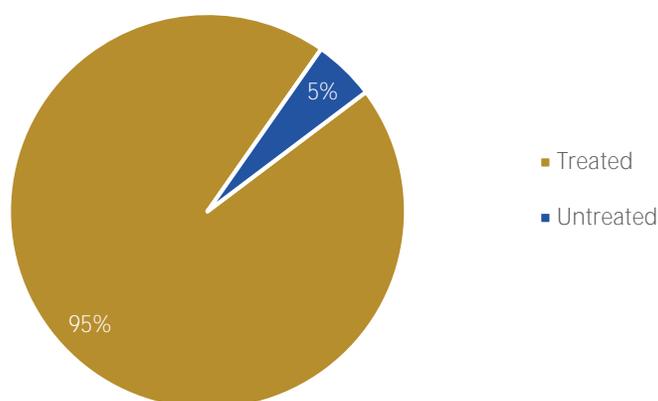
*Table 2. Brands of bed nets on the retail market*

WHOPES-Recommended Brands <sup>b</sup>		Brands Without WHOPES Recommendation	
DawaPlus 2.0	Netprotect	AAA	Kingsway
Interceptor	PermaNet	Deltanet	Oker
LifeNet	Yorkool	Deluxy	On-Green
		Easier	Saors
		Golden Net	Sunbird

A total of 16 different brands of bed nets were identified on the retail market. More than one-third (38%) of the brands identified were recommended by WHOPES, while less than two-thirds (62%) of the brands did not have a WHOPES recommendation. Less than a tenth (9%) of the bed nets stocked in retail outlets had no brand names or inscriptions on them.

### Attributes of Bed Nets on the Retail Market

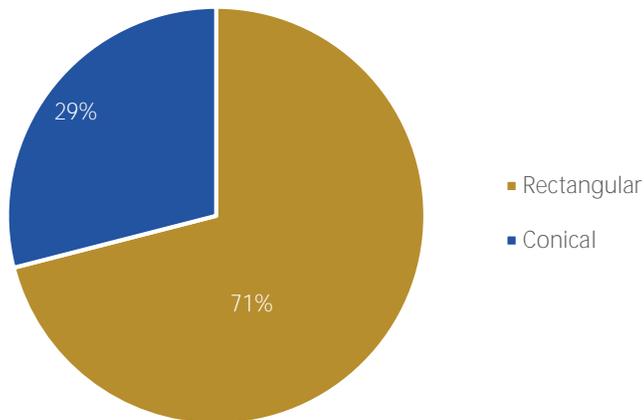
*Figure 1. Proportion of insecticide-treated bed nets on the market*



<sup>b</sup> WHOPES-recommended brands refer to brands of LLINs that are recommended by the WHO Pesticide Evaluation Scheme for use by the public. These brands of LLINs have received full or interim approval from WHO.

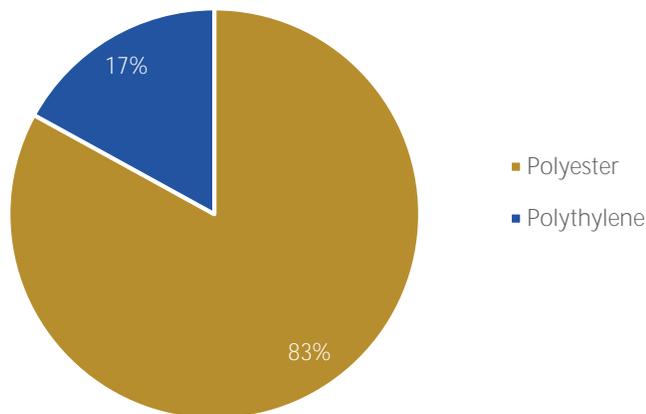
Almost all (95%) of the bed nets available in retail stores were labeled as treated. The majority (76%) of the bed nets in retail stores were WHOPES-recommended LLINs, while only a small percentage of bed nets in retail outlets that were labeled as treated did not have WHOPES recommendation (12%) or were untreated and did not have WHOPES recommendation (5%).<sup>c</sup>

*Figure 2. Proportion of bed nets by shape on the market*



Over two-thirds (71%) of bed nets on the market were rectangular shaped, and almost a third (29%) of bed nets were conical shaped. The majority (82%) of conical-shaped bed nets were brands without WHOPES recommendation. PermaNet was the only WHOPES-recommended brand that had a conical-shaped bed net on the market and represented 18% of conical bed nets found in retail outlets.

*Figure 3. Proportion of bed nets by material type on the market*



<sup>c</sup> The market study could not independently verify if the non-WHOPES bed nets described as treated nets by retailers was indeed correct. It was outside the scope of this study.

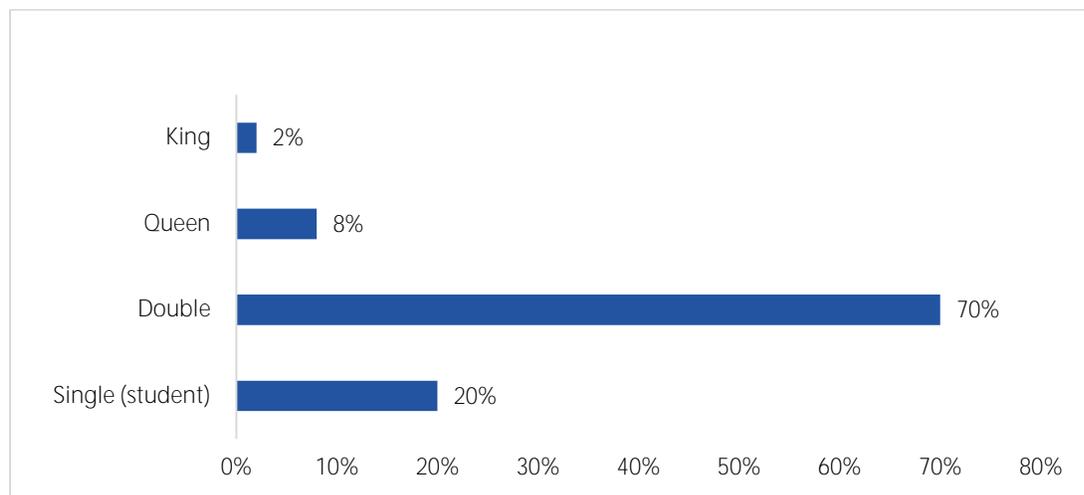
Of the bed nets in retail outlets, 83% were made of polyester material (soft material) and 17% were made of polyethylene (stiff material). All of the bed net brands without WHOPES recommendation found on the market were polyester.

The material texture of the bed net is a very important consideration for customers. Customers in the household study considered material texture as the third most important characteristic when choosing a bed net. Insecticide treatment (the most important characteristic) and durability/longevity of bed net (the second most important characteristic) were the two characteristics considered more important than material texture when choosing a bed net. Material texture was also ranked higher than bed net shape, size, and color.

From the focus group discussion, material texture was a high priority issue for customers because softer polyester bed nets were perceived as cooler to sleep under than polyethylene bed nets, which were perceived to be hard, rough, and hot.

The most common size of bed net on the market was double size and it accounted for 70% of all bed nets found in retail outlets (Figure 4).

*Figure 4. Sizes of bed nets on the market*



Note: The retail audit only looked for bed nets student sized and larger. The study did not include baby nets. In this figure, the following dimensions correspond with the bed net sizes: King [Rectangular: Approx. 190 × 180 × 180] [Conical: Approx. 1050 × 56/65 × 220/250], Queen [Rectangular: Approx. 190 × 180 × 170] [Conical: Approx. 1050 × 56 × 220], Double [Rectangular: Approx. 190 × 180 × 150] [Conical: Approx. 850 × 56 × 220], Single [Rectangular: Approx. 100/130 × 180 × 150]

## Market Share of Bed Nets on the Retail Market

We found that the combined market share for WHOPES-recommended brands was 74%, while the combined market share for brands without WHOPES recommendation was 26%. PermaNet was the most dominant brand on the market, with a market share of 65%. LLINs had a 95% market share and untreated bed nets had a 5% market share.

*Table 3. Market share of bed nets, based on stock levels at retail outlets visited*

Brand	Number of Nets Found	Market Share	WHOPES-Recommended	Insecticide Treatment <sup>d</sup>
PermaNet	143	65%	Yes	Treated
Unbranded	19	9%	No	Treated
Deltanet	15	7%	No	Treated
Dawa Plus 2.0	5	5%	Yes	Treated
AAA	10	4%	No	Treated
Interceptor	5	2%	Yes	Treated
Oker	5	2%	No	Treated
Easier	3	1%	No	Untreated
On-Green	2	1%	No	Untreated
Sunbird	2	1%	No	Treated
Deluxy	1	<1%	No	Untreated
Golden net	1	<1%	No	Treated
Kingsway	1	<1%	No	Untreated
LifeNet	1	<1%	Yes	Treated
Net protect	1	<1%	Yes	Treated
Saors	1	<1%	No	Untreated
Yorkool	1	<1%	Yes	Treated

## The Pricing Structure of Bed Nets on the Market

Average price calculated is based on the prices of 221 bed nets found in retail outlets visited during the retail audit. The average price of a bed net in a retail outlet was US\$4.38 (GH¢19.0). Retail prices ranged from US\$3.46 (GH¢15.0) to US\$10.14 (GH¢44.0) depending on the size of the bed net. Profit margins for retailers of bed nets ranged from 19% to 29%, with an average profit margin of 24% for each unit of bed net sold.

*Table 4. Retail pricing structure of bed nets in U.S. dollars*

Types of Bed Net by Sizes	Retail Prices US\$			Wholesale Unit Prices Cost of Goods US\$			Profit Margins US\$			
	Ave	Min	Max	Ave	Min	Max	Ave	Min	Max	% Ave
Student	3.46	1.61	5.76	2.53	0.92	4.61	0.92	0.46	1.61	25%
Double	4.15	1.84	10.37	3.23	1.38	8.06	0.92	0.23	3.46	24%
Queen	5.99	3.46	8.06	4.84	2.53	7.83	1.15	0.23	3.46	19%
King	10.14	5.76	14.98	6.91	4.61	9.22	3.23	1.15	5.76	29%
Overall Average Pricing	4.38	1.61	14.98	3.23	0.92	9.22	1.15	0.23	5.76	24%

<sup>d</sup> Treatment status of bed net is based on what was reported by retailer.

*Table 5. Retail pricing structure of bed nets in Ghanaian cedi*

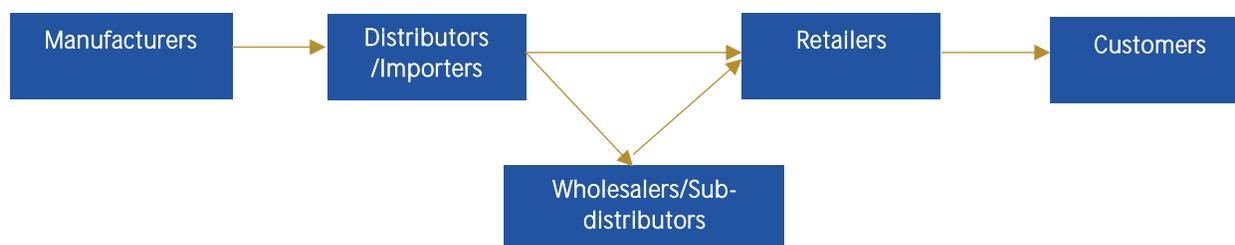
Types of Bed Net by Sizes	Unit Retail Prices (GH¢)			Wholesale Unit Prices Cost of Goods (GH¢)			Unit Profit Margins (GH¢)			
	Ave	Min	Max	Ave	Min	Max	Ave	Min	Max	% Ave
Student	15.0	7.0	25.0	11.0	4.0	20.0	4.0	2.0	7.0	25%
Double	18.0	8.0	45.0	14.0	6.0	35.0	4.0	1.0	15.0	24%
Queen	26.0	15.0	35.0	21.0	11.0	34.0	5.0	1.0	15.0	19%
King	44.0	25.0	65.0	30.0	20.0	40.0	14.0	5.0	25.0	29%
Overall Average Pricing	19.0	7.0	65.0	14.0	4.0	40.0	5.0	1.0	25.0	24%

Note: Number of bed nets found by size: student (n=44), double (n=155), queen (n=18), king (n=4)

## The LLIN Supply Structure

The route to market for the commercial sales of LLINs in Ghana is shown in Figure 5.

*Figure 5. Route to market for commercial sales of LLINs*



## LLIN Manufacturers

There are no known manufacturers of LLINs in Ghana. Every bed LLIN in Ghana is imported. At the time of this study, the retail audit found bed nets from six manufacturers of WHOPES-recommended LLINs on the market. These manufacturers were:

- Vestergaard Frandsen (PermaNet)
- TANA Netting (Dawa Plus 2.0)
- BASF (Interceptor)
- Bestnet Europe (Netprotect)
- Yorkkool International Limited (Yorkkool)
- Bayer (LifeNet)

Of the six WHOPES-recommended LLINs manufacturers, only two at the time of the market analysis had formal local distributorship arrangements in Ghana. All other manufacturers, both WHOPES-recommended

LLINs and bed nets without WHOPES recommendation, had no formal distributor relationships on the ground.

The two WHOPES-recommended LLIN manufacturers, with local distributorship arrangements, reported that only about 1% to 2% of their total exports to Ghana over the last five years went to the retail market. The majority went to large institutional buyers who, in turn, used them for free distribution programs.

#### *Perspective of Supply Chain Players: Reasons for Low Patronage of LLINs on the Retail Market*

Manufacturers, distributors, wholesalers, and retailers in the supply chain reported customer demand for LLINs in the retail market as weak. The manufacturers interviewed reported that because of this low demand, they tend to focus their sales efforts on large institutional buyers like the Ministry of Health and nongovernmental organizations. Overall, the players in the supply chain primarily attributed the low demand for LLINs on the retail market to the availability of free LLINs to potential customers.

Customers who participated in this study, however, contradicted this position. From their perspective, low patronage of bed nets (purchase, ownership, or use) was primarily due to the fact that the bed nets available in Ghana do not meet their preferences or fit their lifestyle, not because they have had access to free LLINs.

Overall, while manufacturers were enthusiastic about being engaged in a vibrant and profitable commercial retail market for their products in Ghana, they were cautious about their initial involvement in stimulating such a market and expressed some concerns. The key concerns for manufacturers were:

- Having to compete with counterfeit LLINs on the market. Manufacturers want regulatory restrictions on imitations of their products. Some manufacturers believe that there are more counterfeit LLINs on the market than genuine LLINs, the former of which are sold at below-market rates.
- Mass-distributed LLINs from both Ghana and neighboring countries leaking into the commercial retail market.
- Difficulty finding local partners with the financial, logistical, and technical capacity to adequately represent them as sole distributors.

#### **LLIN Distributors and Wholesalers (Sub-Distributors)**

Distributors are at the top of the local supply chain. They are the primary importers of LLINs into Ghana for the retail market. Wholesalers are at the second level of the supply chain locally and perform the role of sub-distributing the imported LLINs they receive from their distributors to retailers across various geographical areas.

The supply chain for WHOPES-recommended LLINs is slightly different from that of bed nets without WHOPES recommendation. For WHOPES-recommended LLINs, distributors predominantly use wholesalers/sub-distributors as intermediaries to get their LLINs to retailers. In contrast, distributors of bed nets without WHOPES recommendation do not rely as much on wholesalers. They often sell their bed nets directly to retailers by either getting the retailers to come to them to pick up stock or by delivering the stock directly to the retailers without the involvement of an intermediary wholesaler (sub-distributor).

- The distributors of WHOPES-recommended LLINs mainly use pharmaceutical wholesalers to sub-distribute their products to retailers. This may account for why pharmacies and chemical stores overwhelmingly stock WHOPES-recommended LLINs.
- Non-pharmaceutical retail outlets such as supermarkets, convenience shops, and mothercare shops stock twice as many bed nets without a WHOPES recommendation (19%) than they do WHOPES-recommended LLIN brands (10%).
- WHOPES-recommended brands of LLINs are, therefore, more commonly found in limited types of retail outlets (mainly pharmacies and chemical stores) compared to non-WHOPES-recommended brands, which are easier to find in supermarkets, convenience shops, and mothercare shops.

## Retailers

Retailers are at the lowest level in the supply chain, and they serve as the single most crucial touchpoint for a customer to buy a bed net. Understanding the activities of bed net retailers is, therefore, integral to any efforts to stimulate the commercial retail of LLINs in Ghana. The market analysis, using combined data from the retail audit and household surveys, sheds light on the activities of retailers by answering the following questions:

- Which types of retailers sell bed nets?
- How widely available are bed net retailers?
- What levels of bed net stock do retailers carry?
- How do retailers get their bed net stock?
- What are the sales trends for bed net retailers?

### *Which Retailers Sell Bed Nets?*

The retail audit and household survey findings revealed that bed nets are not widely available across different types of retail outlets. Indeed, only 7% of the retail outlets across the study area sold bed nets. Table 6 summarizes the proportion of retail outlets that sell bed nets compared to the total number of the different types of retail outlets in the study area.

**Table 6. Proportion of retail outlets that sell bed nets**

Type of Retail Outlets	Proportion of Type of Retail Outlet	Percentage of Specific Retail Outlets that Sell Bed Nets
Pharmacies and chemical shops	12%	36%
Convenience shops/mini supermarkets	78%	2%
Supermarkets	4%	3%
Mothercare shops	1%	13%

Note: Based on a total of 2,814 retail audit listing of all retail outlets in the study area. 5% of the retail outlets listed are outlet types that do not sell bed nets (e.g. hardware shops), hence are not included in this table.

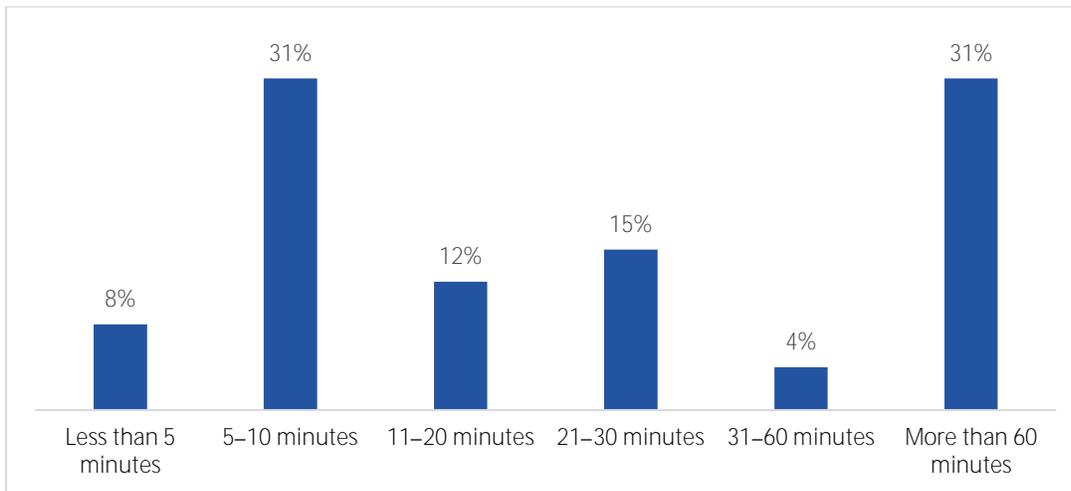
Even though they make up only 13% of retail outlets, the sale of bed nets is concentrated to two types of shops: pharmacies and chemical shops and mothercare shops. Pharmacies and chemical shops are the most common (36%) places where bed nets are sold, even though they make up only 12% of retail outlets. Mothercare shops, which sell maternity and baby products, are the second most common (13%) place a

customer can find a bed net to buy. They make up only 1% of retail outlets and sell primarily baby nets. The primary reason why mothercare shops sell more bed nets than more widely available retail outlets, such as convenience shops and supermarkets, may be because of the high levels of awareness created among the public over the last several years about protecting pregnant women and children under five years old against malaria.

### How Widely Available Are Bed Net Retailers?

About three-quarters (75%) of target customers said they do not know of a place in their community where they could purchase a bed net. Figure 6 shows the breakdown of time taken by target consumers to travel to a retailer that sells bed nets.

*Figure 6. Travel time to the closest retail outlet selling bed nets among target customers*



On average, target consumers travel 33 minutes to find a retail outlet that stocks bed nets. More specifically, about half (51%) of target customers can find a bed net retailer within an average of 20 minutes and about 31% of target customers have to travel more than one hour to find the closest retailer of bed nets.

One option for addressing a lack of convenient access to bed net retailers is the internet. Distributors have yet to tap the potential of the internet to reach a broader customer base and increase sales. Even though internet penetration has grown rapidly over the last few years (currently 35%),<sup>16</sup> anecdotal evidence suggests online purchases by customer are still limited. As of 2016, statistics from the United Nations Conference on Trade and Development estimated that only 2% of the Ghanaian population shops online.<sup>17</sup>

### *What Levels of Bed Net Stock Do Retailers Carry?*

A majority (78%) of the retailers who sold bed nets had stock at the time of the retail audit. However, overall, the market analysis study found that there was low visibility of bed nets across the retail space due to low stock levels. The average stock level per retailer was 1.7 bed nets.<sup>e</sup>

When checking the assortment of bed nets that were in stock for customers to buy—by brand, shape, color, and whether treated or untreated, over half (52%) of retailers only stocked one kind of bed net, over a third (38%) stocked at least two kinds, and only 10% stocked three or more kinds.

The limited variety of bed net stock carried by retailers, means that customers have limited options to choose from when they visit a retailer to buy a bed net. Table 7 shows the last time retailers replenished their stock before the retail audit was conducted.

**Table 7. Last time a retail outlet replenished stock**

Last time a retail outlet replenished stock*	Percentage of retailers
Less than 3 months ago	32%
4 to 6 months ago	45%
7 to 12 months ago	11%
More than 12 months ago	12%

Note: The average number of bed nets a retailer bought the last time it replenished stock was 18 pieces. At the time of the retail audit, on average, retailers had sold 61% of their last stock order.

### *How Do Retailers Get Their Bed Net Stock?*

About a third (34%) of retailers get stock delivered to them by wholesalers or distributors: 27% of these retailers get free delivery at no cost to them and 8% pay an average of US\$3.3 (GH¢15) for stock delivery. Two-thirds (66%) of retailers go to pick up stock themselves from wholesalers or distributors: 45% of these retailers use public transport and 19% use company or personal vehicles. These retailers incur an average transportation cost of US\$5.7 (GH¢25.3) when they pick up their stock.

### *What Are the Sales Trends for Bed Net Retailers?*

The majority (83%) of retailers sell an average of one bed net per month. Table 8 shows the average length of time to sell at least one bed net as reported by retailers.

**Table 8. Length of time for a retailer to sell at least one bed net**

Frequency of Bed Net Sales	Percentage of Retailers
Every day	4%
Every week	20%
Every 2 weeks	15%
Every 3 weeks	3%
Every month	41%
Every 2 months	5%
Every 3 months	5%
Every 4 months or more	7%

<sup>e</sup> 221 bed nets total were found in 133 retail outlets that sold bed nets (out of 271 interviewed).

Of the retailers interviewed, 14% reported they sold bed nets in the past but have since stopped selling them. Of those who stopped selling bed nets, 31% stopped more than a year ago and 69% stopped within the last 12 months before the retail audit.

*Table 9. Main reasons given by retailers for not selling bed nets*

Reason for Not Selling Bed Nets	Percentage of Retailers
It is not profitable for the business	19%
Challenges in finding a supply	35%
Poor demand for bed nets	45%

Note: Percentages are rounded to the nearest whole number and may not add up to 100%.

A majority (88%) of the retailers who had stopped selling bed nets said they would consider selling bed nets again if demand increases and customers start asking for bed nets. Additionally, 86% of retailers said they found the average profit (24% average profit, range from 19% to 29%) they currently make from selling bed nets to be adequate.

### Key Takeaways

Players in the LLIN supply chain need to expand their distribution efforts beyond pharmaceutical channels so LLINs are more widely available in different types of retail outlets.

Although convenience shops and supermarkets together account for about 82% of retail outlets, only 5% sell bed nets. Currently, bed nets are predominantly found in less widely available retail outlets (e.g. pharmaceutical and mothercare shops). In order to catalyze the market of LLINs, this will need to be addressed. To reach more target customers, different kinds of retail outlets, especially convenience shops, need to be encouraged to stock LLINs. Convenience shops have the strongest visibility among retail outlets in the study area; they make up 78% of retail shops. With 75% of potential customers saying that they do not know a place in their community to purchase a bed net, the approach of expanding sales channels by including more widely available retail channels would make it easier for target customers to find an LLIN to buy.

## The Target Customer

This section of the report identifies and describes the target customer for a commercial LLIN marketplace in Ghana. It describes the socioeconomic characteristics of target customers as well as the attitudes and behaviors related to methods they use to protect themselves against malaria, the kinds of bed nets they currently own and use, and how they care for those bed nets.

### Profile of the Target Customer

As with any product, it is imperative that LLINs meet the preferences of target consumers, and that corresponding marketing and sales efforts be targeted to reach that segment of the population. One of the main objectives of the market analysis study was to clearly identify the primary target market for LLINs sold on the retail market.

The study identified the middle class as the primary target group for commercial retail of LLINs because of three main factors:

- They have the purchasing power
- They have cultivated an established behavior of protecting themselves against malaria
- They have an interest in purchasing LLINs

The middle class in Ghana, in monetary terms, has generally been defined as the population segment with a starting per capita income of at least US\$2 (GH¢9) per day. However, for this study, the benchmark for the middle-class target customer is defined as a person with a per capita income of at least US\$4 per day. This definition is used to exclude customers **considered to be in the “floating middle class,”** who are described as having a daily per capita income of US\$2 (GH¢9) to US\$4 (GH¢18) per day and are therefore at a higher risk of falling back into poverty if they experience any financial shock.<sup>17</sup> The primary target group, therefore, consists of the population segment that have a per capita income of at least US\$4 (GH¢18) per day.

The identified middle-class group has stronger purchasing power than the average Ghanaian. This study found that the primary target group has an average yearly household income of US\$7,775 (GH¢34,445) compared to the yearly national average of US\$3,757 (GH¢16,645).<sup>11</sup> Also, their average annual per capita income is US\$2,622 (GH¢11,615), which is two times more than the national average per capita income of US\$1,207 (GH¢5,347).<sup>11</sup>

The African Development Bank and PwC<sup>18,19</sup> estimate the size of the identified primary target group who have a per capita income of at least US\$4 (GH¢18) per day to be about a fifth (16% to 20%) of Ghana's population,<sup>18</sup> which translates to about 5.8 million nationally and 2.6 million in the three focal regions of this study.

## Other Characteristics of the Target Middle-Class Group

Consumption and income levels capture only one dimension of our middle-class target group. Other characteristics—such as education, employment, family composition, geographic location, and aspirations and lifestyle—all help to establish who this middle-class target customer group is. The following statistics are from the PSMP market analysis study.

### *Education*

A majority (71%) of the middle-class respondents reported having at least a secondary (12 years) education. Almost a quarter (24%) stated they attained at least a tertiary education, which is either a university, polytechnic, or non-degree postsecondary education in teaching and nursing.

### *Employment*

Almost all (92%) of the target middle-class respondents in this study were employed. Of those employed, 75% reported being involved in occupations or professions that require some skill. Table 10 summarizes the occupations of persons in the middle-class target group from the PSMP household survey.

*Table 10. Occupations of middle-class target group*

Occupation	Percentage of Respondents
Semi-skilled workers (e.g., shop assistants, waiters)	25%
Skilled workers/artisans (e.g., mechanics, carpenters)	30%
Junior professionals (e.g., nongraduate teachers, nurses, support staff)	27%
Fully qualified professionals (e.g., doctors, architects, graduate teachers, managers, small business owners)	16%
High-tier professionals (e.g., medium-to-large business owners, heads of departments, managing directors)	3%

Note: Percentages are rounded to the nearest whole number and may not add up to 100%.

### *Family Composition*

The average number of people in a middle-class household was three. Over half (52%) of respondents were married and 23% had children ages five years or less, 48% had children ages 15 years or less, and 51% had children ages 18 years or less.

### *Geographic Location*

The majority (89%) of the identified middle-class target customers for LLINs live in urban areas.

### *Asset Status*

Asset ownership is a relevant indicator of how firmly rooted the target group is in the middle class, and it indicates their potential spending power. Forty-one percent of the middle-class target customers in this study own their own houses, and 59% rent the houses they live in. For renters, 38% pay less than US\$34 (GH¢150) per month, 50% pay between US\$35 (GH¢151) and US\$70 (GH¢300) per month, 10% between US\$71 (GH¢301) and US\$225 (GH¢1,000), and 2% pay above US\$225 per month for rent.

Other assets or services the middle-class households in this study reported owning include:

- 100% households have electricity supply in their homes
- 69% have running water
- 98% have a color TV at home, and 33% have pay-tv (cable/satellite) services
- 98% have a radio at home
- 94% have electric fans in their homes
- 19% have air conditioners in their homes
- 32% have cars

### *Lifestyle and Psychographic Characteristics*

The information from the PSMP market analysis study indicates that the identified middle-class target group can be described as people energized and motivated by the prospect of higher achievement. Not surprisingly, their customer preferences align with this spirit. The pace of modernization in urban Ghana is rapid, and the middle-class are increasingly paying attention to local and foreign (e.g., American and European) influences and trends. As a result of this salient, shared experience, certain related themes continued to emerge throughout the market analysis study, including a desire for convenience and comfort, in addition to function, and aesthetic considerations in the products they buy and use, such as a desire for personalized or customized products. Their preference for a modern customer experience, and shifts in the national culture **reflect people's motivation for achievement.**

The overall description of the middle-class target customer in the study areas shows that they are more financially secure than the average Ghanaian and, therefore, are not economically vulnerable to the point that they cannot afford to buy their own LLINs. Indeed, among middle-class families who took part in this study, only 8% said they did not own a bed net because they could not afford one. The identified middle-class target consumer has an average per capita income of US\$4 (GH¢18) a day, which is significantly higher the national poverty line of US\$0.81 (GH¢3.6) per day<sup>13</sup>; thus, most target middle-class customers are likely to have the disposable income to afford the LLINs from the retail market.

### *Malaria Protection Behaviors and Interest in LLINs*

Besides the ability to afford, two other factors—a demonstrated behavior to protect themselves against malaria and an interest in buying LLINs that meet their preferences—also reinforce why the middle class is the most appropriate target group for the retail market for LLINs in Ghana. The vast majority (87%) of middle-class households, who participated in this study, take some measure to protect themselves against mosquito bites, whether they use LLINs or other mosquito-control products, such as insecticide sprays or coils. Two-fifths (42%) of middle-class respondents said they were likely to buy a bed net within the next 12 months. Over half (53%) of respondents said they would consider buying a spare bed net to carry along with them when they visit their hometowns or other rural areas, and 53% also said they would consider buying a bed net as a gift to give to a relative when they visit their hometown.

## Key Takeaways

This study regards the middle-class segment as the primary target group for an LLIN retail market. These individuals have a per capita income of at least US\$4 (GH¢18) per day, with an average yearly household income of US\$7,775 (GH¢34,445), which is two times the yearly national average of household income of US\$3,757 (GH¢16,645).<sup>12</sup> They have a cultivated an established behavior of protecting themselves against mosquito bites, and have shown interest in purchasing LLINs for personal use, for travel, and for relatives.

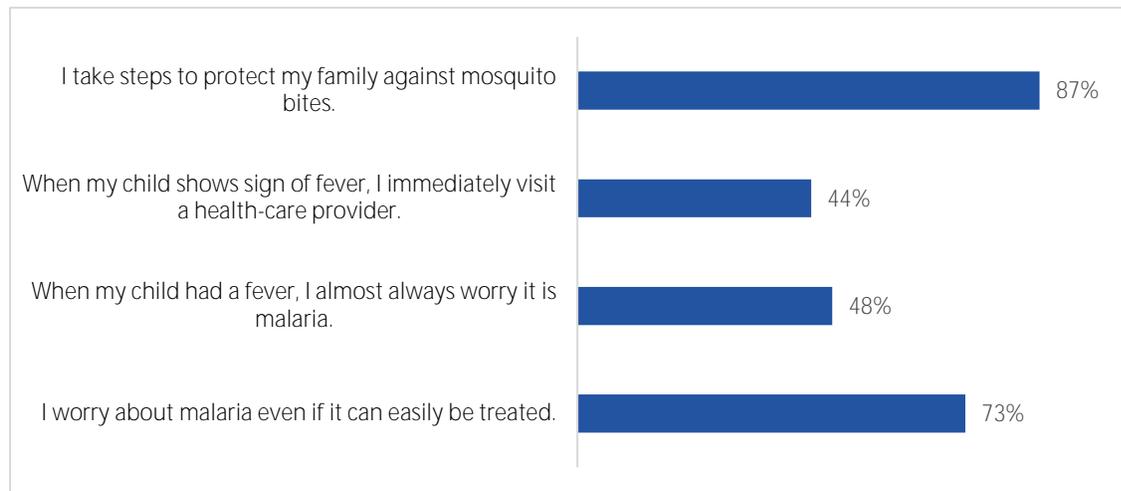
The majority (87%) of middle-class households act to protect against mosquito bites by buying and using mosquito-control products, and have reported an interest in buying LLINs that meet their preferences, demonstrating this population's dedication to malaria prevention and potential interest in buying LLINs from the retail market.

## Does the Middle-Class Worry About Malaria?

The study also **assessed the target customer's concern about malaria** in order to understand how the target market perceives their risk of getting malaria and what influences their actions on whether to protect themselves against it or not. If the target group does not worry about malaria, then they are less likely to take steps to protect themselves against mosquito bites and, consequently, are less likely to purchase and use LLINs.

The middle class feels susceptible to and worries about malaria as shown in Figure 7.

*Figure 7. Indicators that show the middle class worries about malaria*



The study found that 73% of the middle-class adults interviewed worry about malaria, even if they know it can easily be treated.

Caregivers, in particular, reported worrying about malaria when it comes to children. While fever is a symptom of many illnesses, including malaria, 48% of caregivers worry their children have malaria when

they show signs of a fever, and 44% indicated they will visit the health care provider immediately when their children presents with a fever.

That sense of worry about malaria was expressed in some of the statements made by participants during focus groups discussions. The following comments highlight some of these concerns:

- **“Malaria has no boundaries or limit to the person it can attack.”** —Male, adult, urban, Greater Accra Region
- **“It is one of the diseases that kills most children and I get frightened anytime I hear of it.”**—Female, adult, rural, Western Region
- **“The first thing that comes to mind when I hear malaria is that someone is about to die.”**—Male, adult, rural, Western Region

### Key Takeaways

Considering that malaria is a common illness in Ghanaian society, it is easy to assume that multiple exposures to the disease and subsequent successful treatments might create a low perceived risk of malaria, especially among middle-class adults who have the disposable income to easily access better-quality health care. However, the market analysis study found that target customers *do* worry about malaria, and this creates an opportunity for LLINs to be marketed as an effective protection against malaria.

## How Do Middle-Class Households Protect Themselves Against Malaria?

As malaria is a source of worry for the middle class, we expected to find that they would take steps to protect themselves from mosquito bites. The study found that 87% of the middle class do indeed take measures to protect themselves against mosquito bites.

### Ownership and Use of LLINs

The study found that ownership of LLINs among the middle-class target population is generally low compared to the national average.

- Among the middle-class target population only 29% of households own a LLINs compared to 73% nationally, and only 19% have enough LLINs—households with at least one LLIN for every two household members—compared to 51% nationally.<sup>4</sup>
- The average number of LLINs owned per household among the middle-class target population is 0.5 compared to 1.7 nationally.<sup>4</sup> The target population has an average household size of three people. Therefore, at least two LLINs are needed for every middle-class household.
- This study found that 28% of middle-class households living in urban areas own a LLIN compared to 33% of middle-class households in rural areas. This is in line with the general trend of LLIN ownership across the urban and rural areas of Ghana, where ownership levels are higher in rural areas (83%) than in urban area (66%).<sup>4</sup>

Various reasons were given by middle-class customers who did not own a LLIN as to why their households did not own even at least one LLIN at the time of the study. The top two reasons were because they use other methods of malaria control (58%) or that the weather was not conducive (too hot) to use a LLIN (32%). Table 11 summarizes the top reasons given for not owning a LLIN.

*Table 11. Reasons for not currently owning a LLIN*

Reasons Given for Not Currently Owning a LLIN	Percentage of Respondents
Use other means of mosquito control	58%
Weather too hot to use LLINs	32%
Did not get a LLIN during the mass campaign (2015–2016)	17%
Cannot afford a LLIN	8%
LLIN is worn out	7%
LLIN feels restrictive	7%
Have adverse bodily reaction when LLIN is used	6%

Note: Findings are based on only the 71% of households who reported not owning a LLIN at the time of the study.

While gauging LLIN ownership is **important, assessing the target customer's** current level of LLIN use is even more crucial. The study found LLIN use—defined as the percentage of households where at least one member of the household slept under a LLIN the night before the survey—among the middle-class to be low.

- Only 14% of middle-class households across the three focal regions of this study use LLINs.
- Only 5% use LLINs exclusively without using any other mosquito-control method.

About half (51%) of the middle-class respondents in this study who owned LLINs were not using them even though LLINs were available in the household to use. Instead, they often opted to use other methods to protect against mosquito bites.

Ownership and use of LLINs among the target market of middle-class customers has implications for the LLIN retail market. Lower ownership levels could indicate there is potential to increase penetration (ownership) of LLINs among middle-class households. On the other hand, the current pattern of behavior reflected among the target group, where there are high levels of non-ownership (71%) combined with low levels of use (14%) and a preference for other methods of mosquito control, points to an issue of customer needs not being met by existing LLIN styles.

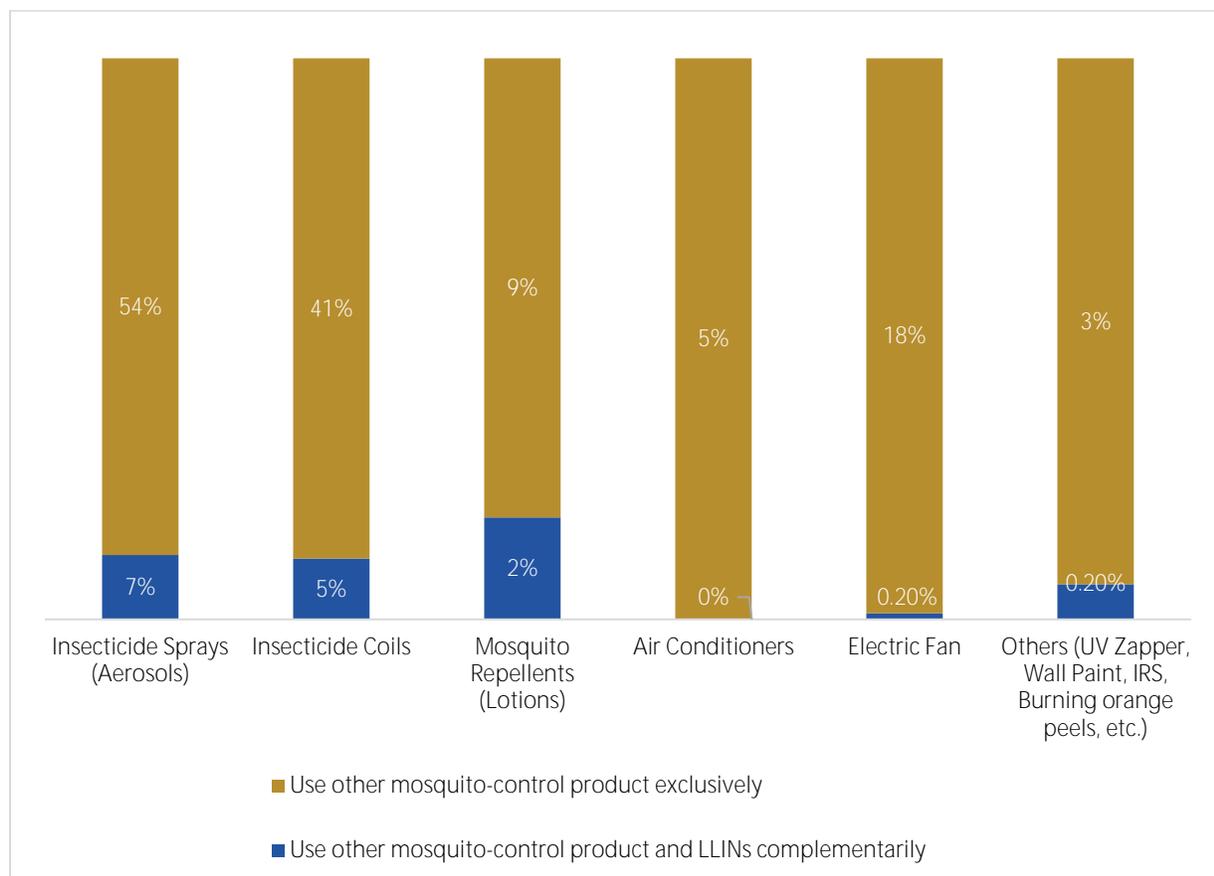
### Use of Other Mosquito-Control Methods

Use of other mosquito-control products, such as insecticide sprays, coils, repellents, and even substitute products, such as electric fans and air conditioners, described in our study as ‘other mosquito-control products,’ are the most common methods used by the middle class to protect against mosquito bites.

- 82% of middle-class households use other mosquito-control products
- 73% of middle-class households use ONLY other mosquito-control products (do not use LLINs)
- 9% of households use both LLINs and other mosquito-control products
- 5% of households use LLINs exclusively

Figure 8 shows the percentage of middle-class target households that use other mosquito-control products and households that use LLINs and other mosquito-control products complementarily.

*Figure 8. Percentage of middle-class households that use other mosquito-control products*



The most widely used non-LLIN malaria control products are aerosol insecticide sprays, which are used by 61% of middle-class households. Of those who use insecticide sprays, 54% of households use them exclusively and 7% use them along with LLINs.

For households that use air conditioners and electric fans, they generally do not use LLINs as a complementary malaria control method. About one-fifth (19%) of target middle-class customers have air conditioners in their household, 5% of which use the air conditioners exclusively to protect against mosquito bites and none of these households use LLINs. While 94% of the target middle-class customers have electric fans in their households, one-fifth (18%) use electric fans exclusively, with a very small percentage (0.2%) using both LLINs and electric fans complementarily, to protect against mosquito bites.

## Key Takeaways

For entrants into the LLIN retail market, it is important to consider the strong competition of other mosquito-control products, such as aerosol insecticide sprays and coils. While positioning LLINs as a direct substitute for these products is a possibility, consider positioning those products as complementary. Currently 9% of middle-class households use both LLINs and other mosquito control products. Using the complementary angle can provide a strategic pathway to increase sales and use of LLINs among the middle-class target group.

## How the Middle-Class Views Bed Nets Versus Other Mosquito-Control Products

A majority (82%) of middle-class households in this study believe that bed nets are an effective way to protect against malaria, yet only 14% reported using them. Table 12 shows the perceptions of customers who use other mosquito-control products and think that those products are “better than,” the “same as,” or “worse than” bed nets.

*Table 12. Consumer perceptions of how other mosquito-control products compare with bed nets (LLINs and untreated bed nets)*

Mosquito-Control Product	Percentage of Households that Use Other Mosquito Products	Better than Bed Nets	Same as Bed Nets	Worse than Bed Nets
Aerosol insecticide spray	61%	27%	38%	36%
Mosquito (insecticide) coils	46%	11%	37%	52%
Mosquito repellents	9%	19%	39%	42%
Air-conditioner	5%	100%	0%	0%
Electric fan	18%	55%	39%	6%

Note: Findings are based only on target customers who have used “other” mosquito-control products in the 6 months prior to the household surveys. Percentages are rounded to the nearest whole number and may not add up to 100%

Overall, the study findings show that target customers view bed nets favorably even though they do not use them. The exceptions are air conditioners (100%) and electric fans (55%) as they are considered to be better malaria control methods than bed nets. However, when it comes to aerosol insecticide sprays, mosquito coils, and repellents, the middle-class population does not always consider them as better than bed nets. For instance, over half (52%) of those who use mosquito coils believe that they are “worse” than bed nets, yet 46% of the target population still use them compared to 14% who use bed nets.

## Why Are Positive Perceptions About Bed Nets Not Translating into Increased Ownership and Use Among the Middle-Class Target Group?

As shown in Table 13, ease of use is the single biggest driver of customer choice to use other mosquito-control products instead of bed nets.

*Table 13. Why consumers use other mosquito-control products instead of bed nets*

Mosquito-Control Product	More Effective	Easier to Use	More Affordable
Aerosol Insecticide Spray	24%	56%	20%
Mosquito (Insecticide) Coils	12%	42%	46%
Mosquito Repellents	20%	49%	31%
Air-conditioner	50%	50%	0%
Electric Fan	34%	61%	5%

Even though the majority of middle-class target customers do not see other mosquito-control products as better than or more effective than bed nets, other mosquito-control products are still purchased and used more than bed nets, primarily because they are **considered “easier to use.”** For instance, 56% of middle-class households that use aerosol insecticide spray instead of bed nets do so because they believe sprays are easier to use than bed nets.

### Key Takeaways

Overall, the study findings show that the majority of target customers believe that bed nets are better and are more or equally effective in protecting against malaria when compared to other mosquito control products (with the exception of air conditioners and electric fans). Despite this, bed nets are still not the preferred choice for malaria prevention among the middle class. This could point to the theory that bed nets available through current channels do not meet the preferences of customers beyond the function of protecting them against mosquito bites. Any effort to stimulate the retail market for LLINs **will need to address the perceived challenges around “ease of use” to encourage purchase among the primary target market.**

### Cost of Protecting Against Mosquito Bites

Generally, the cost associated with purchasing various mosquito-control products was not a major deterrent for target customers. This could be because the current average cost for mosquito-control products is not considered prohibitive by the middle-class target population. Mosquito coils were the only mosquito-control product that had affordability as a driver of choice, with 46% of households saying they use them over bed nets because they consider them more affordable. Table 14 shows the average price of mosquito-control products on the market at the time of the study.

*Table 14. Prices of mosquito-control products on the retail market*

Mosquito-Control Products	Retail Price (US\$)	Retail Price (GH¢)
Aerosol insecticide spray (300 ml)	2.2	9.4
Aerosol insecticide spray (750 ml)	4.3	18.7
Mosquito coils (1 pack of 10 pieces)	1.0	4.20
Mosquito repellents	1.1	4.7
LLINs	4.7	20.6

Note: Retail prices were current at the time data was collected in September 2017.

The study found that over time, customers who buy and use other mosquito-control products spend substantially more money to protect against mosquito bites than those who buy and use commercially sold LLINs. Assuming an LLIN bought from a retail outlet lasts for the entire three-year median life span, customers who buy and use other mosquito-control products during that same three-year period will spend more to protect against mosquito bites than those who bought and used LLINs. For example, despite the 46% of middle-class households that use mosquito coils, stating that they use them because they are more affordable than LLINs, it is actually 22 times more expensive in the long-term for them to use mosquito coils than LLINs. The study also found that customers of other mosquito-control products will spend 17 times more on aerosol insecticide spray and 8 times more on insecticide repellents.

### Key Takeaways

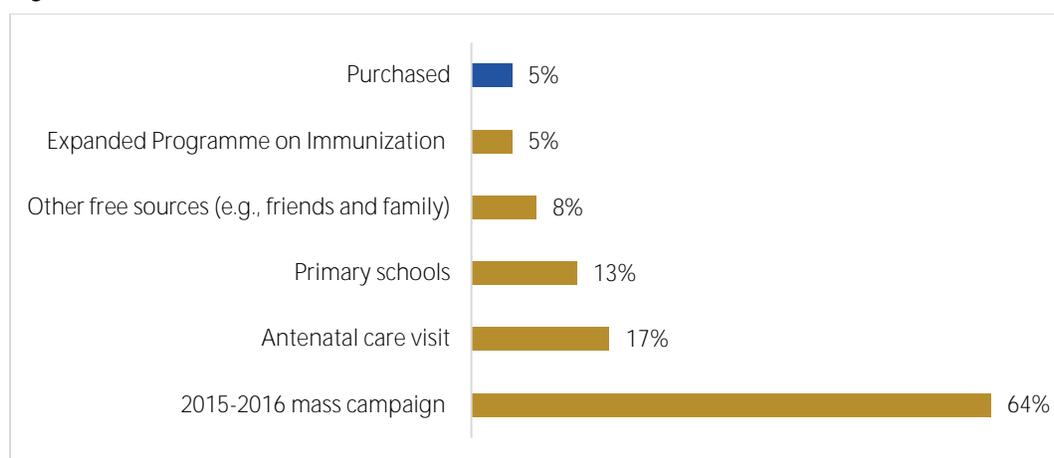
To encourage purchase and use of LLINs, brands should consider quantifying the cost saving of using LLINs versus other mosquito-control products over time.

## How and Where Do the Middle Class Currently Get Their Bed Nets?

Currently, 98% of middle-class households in this study that own bed nets got them for free, even though 92% of households indicated that they could afford to buy their own bed nets.

Figure 9 shows the sources of bed nets found in middle-class households.

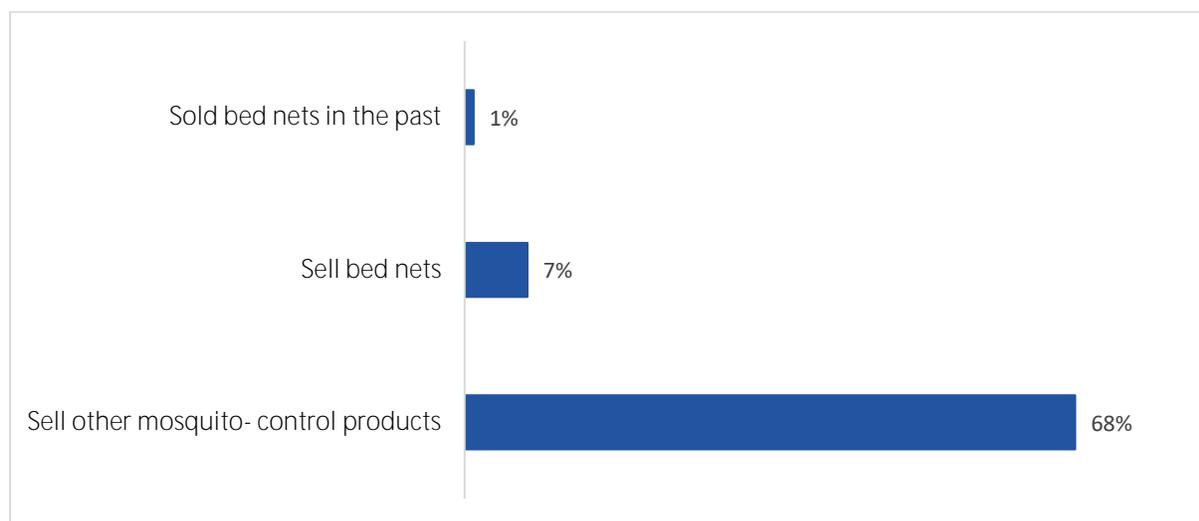
*Figure 9. Sources of bed nets in middle-class households*



Even though 95% of bed nets found in the middle-class households were acquired for free, only slightly over half (53%) of the bed nets were in use. To safeguard resources, it may be important for free distribution campaigns to consider a more targeted approach to LLIN distribution so to reduce waste and focus declining resources on more vulnerable populations who use freely distributed LLINs.

For bed nets that were purchased, the prices ranged from US\$1.1 (GH¢5) to US\$10.2 (GH¢45), with an average price of US\$5.50 (GH¢24). Of the bed nets that were purchased, 54% were bought from pharmacies and chemical shops; 42% were bought from shops, the market, or the street; and 4% were bought from private health facilities. Compared to bed nets, other mosquito-control products are more widely available for purchase than bed nets. Figure 10 shows the proportion of retail outlets that sell bed nets compared to other mosquito-control products.

*Figure 10. Proportion of retail outlets that sell other mosquito-control products versus bed nets*



Note: Number of Retail Outlets = 2,156 (PSMP retail audit)

Across retail outlets in the three focal regions, only 7% sell bed nets, 1% have sold bed nets in the past but no longer sell them, and 68% sell other mosquito-control products.

### **How Does the Middle-Class Care for Their LLINs?**

How middle-class households handle their LLINs before first use and how they care for them thereafter is important for two main reasons:

- Improper handling of LLINs before the first use could result in adverse reactions from the insecticide and lead to a dislike for using LLINs.
- How users maintain their LLINs affects the effective life span of the LLINs, potentially increasing the frequency they may need to be replaced.

The study found that the majority of middle-class households do not handle their LLINs properly. Proper care for LLINs requires that before first use, the LLIN is aired out in the shade for at least 24 hours. While

LLINs should be kept clean, insecticide efficacy of LLINs is diminished after 20 washes or after three years of use.

The study found that:

- Less than half (45%) of the households aired their LLINs in the shade before first using them. Even when LLINs were aired out in the shade, only 16% reported airing them for the full recommended 24 hours.
- Almost half (47%) of users reported washing their LLINs at least once a month. With such frequency of washes, LLINs can lose their efficacy in less than the three-year median life span.

### Key Takeaways

How middle-class households care for their LLINs can affect purchase decisions. Negative perceptions about LLIN use can develop if users experience adverse reactions to the insecticide in the LLIN because they did not air the LLIN properly before first use. A bad experience can mean that the consumer will no longer use the product, which translates to isolated rather than repeat sales.

To reach the expected three-year median life span of an LLIN, it must be cared for properly. Washing LLINs too frequently can cause the insecticide to diminish at a faster rate causing it to be less effective for repelling and killing mosquitos. The potential reduced efficacy of LLINs may fuel a perception that LLINs have shorter longevity than the known three-year median life span and, thus, target customers may doubt the durability of LLINs. On the other hand, the need to replace LLINs sooner than three years could result in more frequent repeat sales for the retail market.

# Opportunities for Creating a Sustainable Market for LLINs in Ghana

This section of the report discusses the opportunities identified around what middle-class customers want in LLINs, how to serve this need with a differentiated LLIN, the market potential in terms of estimated sales volume, and the gaps in the market that can be exploited to create strong LLIN brands.

## Customer Preferences

As part of the consumer preference study, the market analysis employed a systematic qualitative approach, a human-centered design (HCD) study including focus group discussions with target consumers, to gain a comprehensive understanding of their attitudes and behaviors surrounding malaria and use of mosquito-control products as well as their preference for bed nets. This approach targeted the middle-class population who are the group most likely to afford buying LLINs from the commercial market, but currently tend to prefer using other mosquito-control products as they better suit their lifestyles.

The consumer preference study dove deep into the customer context to understand their experiences about bed net purchase, ownership, and use. Four main barriers to bed net use were found through the study. Additionally, findings from the focus group discussions specifically suggest that these barriers point to some of the reasons why middle-class customers do not like using the current bed nets available to them.

### Barrier 1: The Inconvenience of Hanging

The majority of the participants in the consumer preference study reported not using their bed nets because they find hanging the nets to be cumbersome. Two main challenges to hanging bed nets were described by consumers:

- Difficulty hanging a net. Focus group participants mentioned that the traditional four-point hang rectangular net was too tedious to hang. This created difficulty in finding spots on their walls or bedframes to which they can attach the four hanging points. Additionally, some customers who are tenants said that landlords often do not permit them to drill nails into the walls making it impossible to hang their bed nets.
- Lack of needed hanging accessories. Focus group participants indicated that without the necessary accessories (e.g. nails and string) to hang the bed net, they cannot use their nets properly and, because of this, often choose not to use them at all.

As one participant put it: “Bed net installation is stressful.” —Male adult, rural, Ashanti Region

### Barrier 2: The Inconvenience of Entering and Exiting the Bed Net

For most of the participants in the consumer preference study, how they enter or exit their bed nets is an important consideration, as it influences whether they find the bed net convenient to use or not.

At bedtime, users want to be able to go in and out of their bed nets easily. They find it distressing that each time they want to enter or exit their bed nets, they must untuck a portion of the bed net, then lower (bend) their body, and then lift the bed net over their head just to enter or exit it. For instance, items on a bedside table such as phones, books, etc. are no longer within an arm’s reach; the simple things such as getting up

during the night to use the bathroom or even drink water becomes a considerable inconvenience because of the untucking-bending-tuck-in process they must go through. As a student participant stated:

**“In the middle of the night when I have to pee, I have to think hard about it: should I wait until morning or should I go through the stress of getting out of my net?”** —Female student, urban, Greater Accra Region

### **Barrier 3: Discomfort from Hot Weather, Insecticide Treatment, and the Feeling of Being Closed In**

#### *Hot Weather*

A common theme from the consumer preference study was that the weather in Ghana is too hot to use a bed net. A majority believed that bed nets trap heat, resulting in night sweats, which makes getting a good **night’s sleep difficult**. In the household surveys, one-third (32%) of respondents reported that one of the reasons why their household did not own a bed net was because the weather was simply too hot to use one. As one adult male participant in the focus group put it:

**“The weather, the weather, the weather. It is just hot for bed nets! Especially when you use those hard nets (polyethylene).”** —Male adult, rural, Western Region

#### *Insecticide Treatment*

When household survey respondents were asked about the three top bed net features that mattered to them most, insecticide treatment of the bed net was ranked number one (46%). Even though insecticide treatment of bed nets was the highest feature priority for users, a common expressed theme by participants in focus groups sessions was the discomfort they experience because of the chemicals in the bed net. The majority perceived the insecticide treatment in the bed net as too strong. They suggested that manufacturers should find a way to reduce the chemical content or its negative effects on users **without affecting the bed net’s efficacy to repel and kill mosquitoes**. If this was possible, users said it would be a **“great plus” in getting people to use bed nets**. Many people recounted stories of the first time they or close friends and family used a bed net and the discomfort the insecticide treatment in the bed nets caused. They talked about experiencing skin rashes, swellings, numbness, burning sensations, stuffy nose, itching, and so on. While for some, these adverse reactions did not persist and only occurred during the first few times they used the bed net, for others having the reactions once was enough for them to stop using their bed nets all together. As one adult female participant stated:

**“The real problem is the chemicals in the net. If we use it and it makes us uncomfortable, then we stop using it. The chemical is too much. They need to reduce it.”** —Female adult, urban, Greater Accra Region

#### *The Feeling of Being Closed In*

Some users also expressed a feeling of being closed in. They would like to have more space inside their bed nets. In the household surveys, 8% reported not owning a bed net because they feel trapped when they sleep under bed nets. The consumer preference study revealed that people want more space inside their bed nets, so they do not have the sensation of being closed in.

Another related often-occurring theme was the perception that bed nets are not suitable for couples. There was a commonly held belief that bed nets get in the way of couples having sexual intercourse. The space inside the bed net is seen as restrictive, and this perception was often described in connection with the size of the bed net. Bed nets given during free distribution campaigns appear to be predominantly double size.

Currently, if customers want bigger size nets, they have to buy them from the retail market. Even then, the bigger queen- and king-size bed nets make up only 10% of current retail stock, while smaller single and double-size nets dominate (90%) the retail market. As one married adult male participant in the focus group said:

**“I am married, and I can’t see myself playing games with my wife in a bed net. Even when I was single the bed net was not spacious for me alone, imagine now that I am married, it won’t work unless it is made spacious, so we can feel free in it.”** —Male adult, urban, Ashanti Region

#### **Barrier 4: Aesthetically Unattractive**

The overwhelming majority of the focus group participants perceived bed nets as dull and unattractive and feel that the nets detract from the look and feel of their bedrooms. People care about the look and feel (ambiance) of their bedrooms, and bed nets are viewed as part of their bedroom décor. For customers, mounted bedposts, nails on walls, strings hanging from multiple points, and the shape and color of the net all affect the look and feel of their bedrooms. Bed nets are, therefore, not just seen as a functional product that should protect them against mosquito bites but also seen as an accessory that affects the aesthetics of their bedrooms. The study found that customer decision to use other mosquito-control products, such as sprays, repellents, and coils, is also influenced by the fact that they do not want a cluttered hanging bed net that makes their bedrooms look aesthetically displeasing. The two related attributes that were found to influence the aesthetic preferences of customers were style (shape) and color of the net. As one adult female participant in the focus group put it:

**“The nets make your room look ugly. We are forced to use it because it protects us against mosquito bites. We need fancy nets with variety of colors we can chose from and one that nice to hang so we can do away with all the poles or nails in the wall.”** —Female adult, rural, Greater Accra Region

Overall, customer preferences centered around the four barriers discussed above. For the target middle-class customers who took part in this market research study, these barriers make bed nets inconvenient, uncomfortable, and aesthetically unpleasing. The majority of the focus group participants strongly suggested that they are more likely to consider using bed nets once bed net designs overcome these barriers to use.

### **A Differentiated LLIN to Meet Customer Preferences**

As part of the consumer preference study, participants came up with bed net design concepts to address the barriers to use. The research team used the suggested design concepts to develop three simple prototypes that incorporated various design solutions suggested by the participants. The three prototypes had some improved design features that were different from freely distributed LLINs or bed nets currently available on the retail market. (See the [Appendix](#) for details on the features of the three simple prototypes.)

These improved design features were related to:

- Hanging (different numbers of hanging points and shapes)
- Entry and exit (overlapping flaps)
- Tuck-in and untucking (reinforced weighted bottoms that allowed bed nets drape onto the floor to create a seal)
- Pockets for storing small items

Nine focus group discussions were conducted across urban and rural areas of the three focal regions. In these focus groups discussions, potential target customers were given the opportunity to physically interact with three prototypes and to share their thoughts and feelings on features they liked or disliked about the prototype design concepts.

Table 15 summarizes improvements to bed net features that focus group participants suggested in response to barriers to use and interactions with the prototypes. Manufacturers can use these improved bed net design concepts to come up with a differentiated LLIN style that will meet the preferences of the Ghanaian middle-class target customer for the retail market.

*Table 15. Decision drivers for bed net use*

Decision Driver	Barrier	Suggested Improvements
CONVENIENCE	Hanging: <ul style="list-style-type: none"> <li>• Tedious to hang a bed net from multiple points (e.g., four-point rectangular bed net).</li> <li>• Challenging to find hanging accessories such as nails and strings.</li> <li>• Home renters not allowed to put holes in walls to hang their bed nets.</li> </ul>	Bed net with minimal hanging points (e.g. single-point hang).  Adhesive hooks for hanging as an add-on accessory when customers buy bed nets.
	Net entry and exit: <ul style="list-style-type: none"> <li>• Generally, users prefer their nets to be tucked in because it gives them a sense of security.</li> <li>• They do not want to have to untuck the net when they get in and out of bed.</li> </ul>	A secured closing mechanism that does not require the bed net to be untucked to get in or out: <ul style="list-style-type: none"> <li>• bed nets with a maximum of one overlapping flap.</li> <li>• bed nets with zipper. An overwhelming majority prefer a zipper over overlapping flaps because they view zippers as creating a better seal with less risk of mosquitoes entering the net.</li> </ul>
	Access to nearby personal items: <ul style="list-style-type: none"> <li>• When inside the bed nets, users are restricted from reaching nearby personal items (e.g., phone, glasses on a bedside table).</li> </ul>	Bed net with reinforced opaque pocket(s): <ul style="list-style-type: none"> <li>• The pocket should be reinforced to avoid easy tearing.</li> <li>• The pocket should be made of an opaque non-net material, so people cannot easily see what is stored in the pocket.</li> <li>• The pocket should be positioned low enough to <b>be within the arm's reach of users when they are lying down inside the net.</b></li> </ul>
COMFORT	Restrictive space: <ul style="list-style-type: none"> <li>• The feeling of being closed in.</li> </ul> Not suitable for couples, especially while engaging in sexual intercourse.	Rectangular bed nets were desired because they are considered more spacious than conical nets. Results from the household study showed that 49% of target customers prefer the rectangular shape, 40% prefer the conical shape, and 11% do not have a preference.
	Heat and material texture: <ul style="list-style-type: none"> <li>• Weather is too hot to use bed nets. 55% of households reported not using their bed net because the weather</li> </ul>	Bed nets made from polyester. <ul style="list-style-type: none"> <li>• Polyester bed <b>nets perceived as "softer" and "cooler."</b></li> </ul> 82% of target customers prefer polyester bed nets,

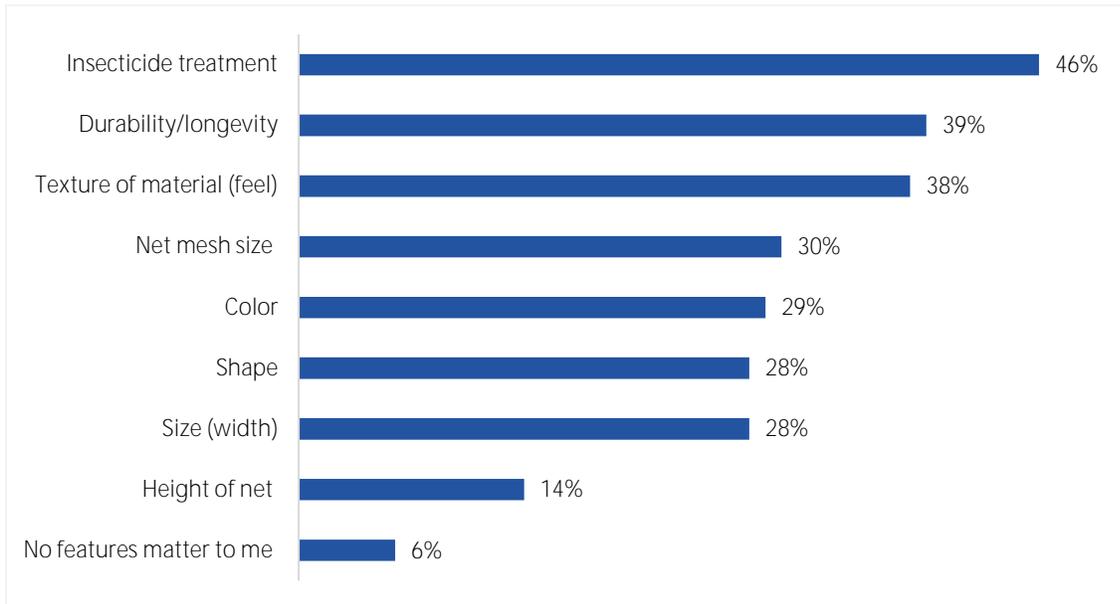
Decision Driver	Barrier	Suggested Improvements
	<p>was too hot.</p> <p>Polyethylene bed nets are perceived as <b>both “rough” and “hot.”</b></p>	<p>and 18% prefer polyethylene bed nets.</p>
	<p>Perceived discomfort caused by insecticide treatment, especially during first-time use.</p>	<p>Improved messaging on how to properly use and care for LLINs.</p>
AESTHETICS	<p>Bed nets detract from bedroom décor because of:</p> <ul style="list-style-type: none"> <li>• The cluttered look of mounted bedposts, nails on walls, and strings hanging from multiple points.</li> <li>• Limited options of style and color of the net.</li> </ul>	<p>Improved bed net style with:</p> <ul style="list-style-type: none"> <li>• Minimal hanging point (one-point hang nets).</li> <li>• More color options besides white and blue: 33% of target customers would like other colors, even though there was no consensus on the colors they would prefer. In general, customers want colors that match their tastes. Colors mentioned include green, pink, purple, yellow, red, and orange.</li> </ul> <p>Aesthetically, the majority of participants found the conical net more appealing than rectangular nets. However, they want a conical shape without compromising on the space inside the bed net. They would like the look of a conical net but the spaciousness of a rectangular net.</p>

The study found that the middle-class target group are not using bed nets because of evolving customer preferences that involve making small trade-offs on functional effectiveness and affordability for an easier-to-use mosquito-control product. This is the reason why even though a majority (82%) target customers consider bed nets to be more effective than other malaria-control products, they still prefer to use other malaria-control products because they consider them **as easier to use. For the target market, an “easier-to-use” bed net must be convenient, comfortable, and aesthetically attractive.**

Overall, even though convenience, comfort, and aesthetics are key drivers that provide the edge needed to drive bed net use, these drivers are only important to users if the functional attributes of the bed net are satisfied first. An easier-to-use bed net that is convenient, comfortable, and attractive, but is not functionally effective in protecting against mosquito bites, is not what customers want.

In the household survey, respondents were asked to rank the features of a bed net that mattered to them the most. The findings show that basic functional attributes are still very important even though convenience, comfort, and aesthetic attributes were still necessitated.

Figure 11. Bed net features that matter to consumers

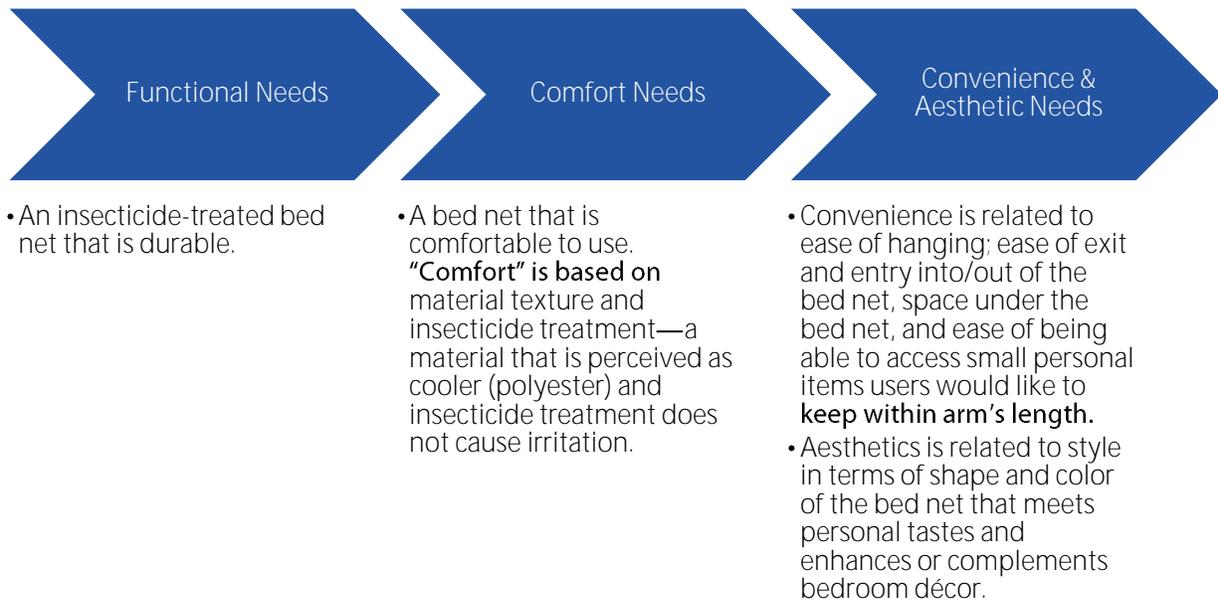


As can be seen from the user ranking, the:

- Top two ranked features (insecticide treatment and durability) relate to the functional features of the bed net.
- Third- and fourth-ranked features (material texture and size of mesh size) relate to the comfort needs of wanting a bed net that is not perceived to “trap heat” and, thus, is cooler to sleep under.
- Fifth- to seventh-ranked features (color, shape, and size) of bed net relate to convenience and aesthetic features.

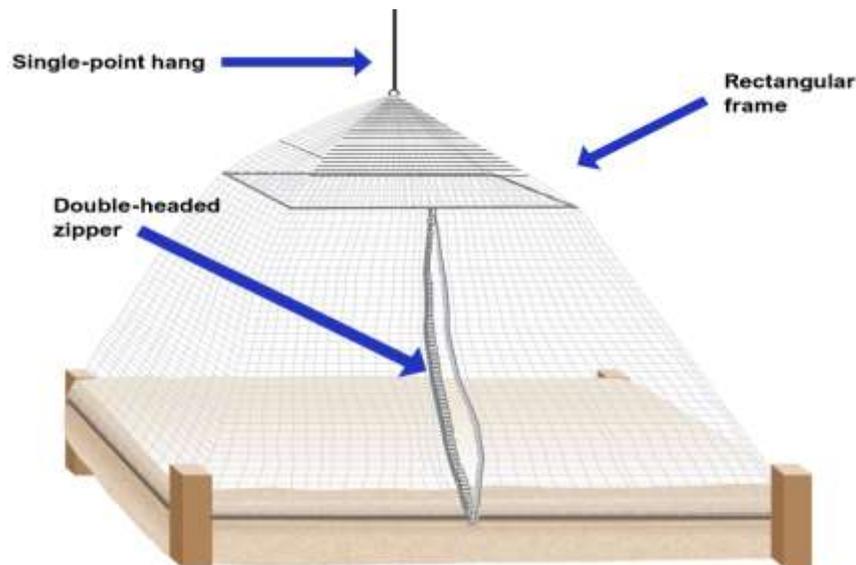
Consumer preferences in order of importance is summarized in Figure 12.

Figure 12. Consumer preferences in order of preference



In order to drive LLIN acquisition and use among the middle class, changing or tweaking features where possible, could lead to LLINs not just being considered as functional but also as desirable for use. A differentiated LLIN design that combines all of the suggested features is illustrated in Figure 13.

Figure 13. Differentiated LLIN design that combines attributes desired by customers



Overall, this market analysis study found that the designs of LLINs currently available through free distribution campaigns and on the market do not meet the preferences of target customers. For the middle-class customer with upwardly mobile values, functionality is not the only consideration when deciding to buy or use a bed net. With increasing wealth levels, consumption patterns and preferences change and start to include “nice-to-have” products.<sup>20</sup> The middle-class target group desire more than function alone—convenience, comfort, and aesthetics of the bed net are now also essential priorities. If the bed net does not meet all of these priorities, then the customers gravitate toward other mosquito-control methods that are more convenient, comfortable, and aesthetically pleasing.

To successfully stimulate the retail market for LLINs, a differentiated bed net that incorporates design attributes that overcome barriers to usage is necessary.

### Key Takeaways

One of the key objectives of the PSMP project is to conceptualize an LLIN retail market to complement the free distribution model and avoid any cannibalization between the two. A differentiated LLIN design is, therefore, vital if a distinction is going to be created between free campaign LLINs and retail LLINs that customers would want to pay for. In the absence of this differentiation, there will be no added incentive for potential customers to pay for an LLIN if they can get it for free. This differentiation will also make it more difficult for free campaign LLINs leaked into the retail market to compete.

## Demand and Willingness-to-Pay for LLINs in Ghana: Discrete Choice Experiment

The goal of the Discrete Choice Experiment (DCE) was to evaluate the demand and willingness-to-pay (WTP) for LLINs, in general, as well as for different net attributes among the middle-class population in Ghana. The objectives of the LLIN DCE were to:

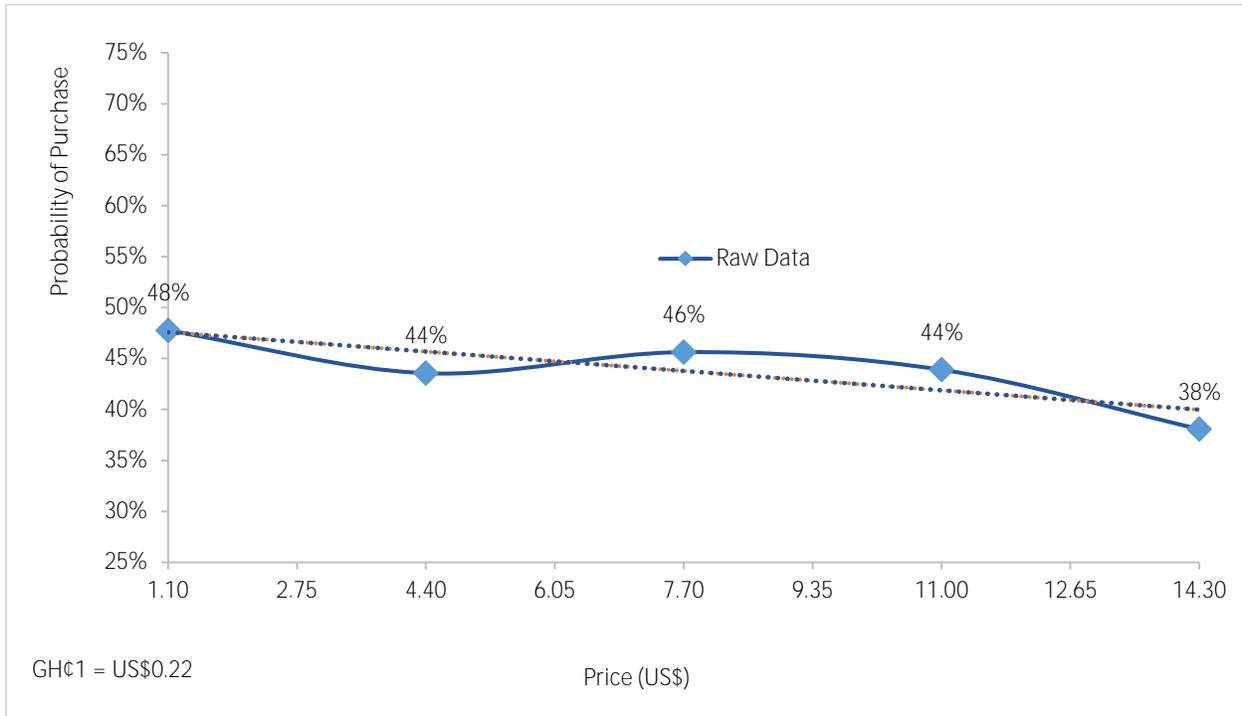
- Assess whether there is a statistically significant demand for buying LLINs among middle-class Ghanaians in the three study areas
- Determine what LLIN traits (attributes) consumers find most attractive and what consumer characteristics influence demand
- Estimate the demand (probability of purchase) and WTP for LLINs with different attributes for subpopulations of different demographic characteristics
- Estimate the shift in the demand curve (change in the probability of purchase and WTP) for LLINs with a combination of the most and least attractive traits.

The current average price of bed nets in the private market (i.e., local retailers) is about US\$4.4 (GH¢19.0), and most local retailers do not sell LLINs. Only 7% of retailers in the study area sell LLINs. Yet, based on the 514 middle-income Ghanaians with valid responses to the DCE, there is statistically significant demand for LLINs in Ghana in the study areas.

Findings from the DCE show that this population has an average probability of purchase of 43.8% and, at this demand level, is willing to pay an average of US\$7.48 (GH¢34.0) for an LLIN. The range of prices tested in the DCE was US\$1.10 (GH¢5) to US\$14.30 (GH¢65). For this price range, the price elasticity of demand is inelastic (-0.111), meaning that when LLINs' price is raised (e.g. by GH¢1), the total demand will not

decrease significantly, thus revenue will increase and vice versa. For instance, a similar proportion of the respondents (39.5%) are willing to pay the highest price tested in the analysis, US\$14.30 (GH¢65.0), to buy an LLIN. The probability of purchase is most inelastic between US\$4.40 (GH¢20) and US\$11.00 (GH¢50) price points. At price points lower than US\$4.40 (GH¢20.0), the average demand increases slightly more [e.g., at US\$2.20 (GH¢10) probability of purchase is 44%], and at price points higher than US\$11.00 (GH¢50.0), the average demand decreases slightly more but still remaining substantially inelastic. See Figure 14 for details.

**Figure 14. Demand curve of long-lasting insecticide-treated nets**



Changing LLIN attributes from the least attractive levels (e.g., rectangular four-point hang, double size, lift or overlapping flaps entry designs) to the more attractive levels (e.g., conical or rectangular one-point-hang shape, queen size, and a zipper entry design) also statistically increases the average demand and WTP. See Table 16 for estimates on the average change in the demand for LLINs per attribute change.

*Table 16. Estimates on average change in demand for LLINs per attribute change*

Average Change in the Demand for LLINs When:	Demand Change	Statistical Significance
<ul style="list-style-type: none"> <li>Price increases by 1 GH¢</li> </ul>	-0.13%	***
The shape attribute changes from		
<ul style="list-style-type: none"> <li>Rectangular four-point hang to rectangular one-point hang</li> </ul>	2.22%	**
<ul style="list-style-type: none"> <li>Rectangular four-point hang to conical</li> </ul>	3.56%	***
<ul style="list-style-type: none"> <li>Rectangular one-point hang to conical</li> </ul>	1.33%	
The size attribute changes from		
<ul style="list-style-type: none"> <li>Double to queen</li> </ul>	3.31%	***
The entry design attribute changes from		
<ul style="list-style-type: none"> <li>Lift overhead to overlapping flaps</li> </ul>	-0.39%	
<ul style="list-style-type: none"> <li>Lift overhead to zipper</li> </ul>	3.83%	***
<ul style="list-style-type: none"> <li>Overlapping flaps to zipper</li> </ul>	4.22%	***
No. of unique respondents	541	
No. of observations (questions)	16,230	
No. of clusters (person-question ID. obs.)	8,115	

Note: Asterisks mean that the demand change estimate is statistically different than the average demand (43.8%), \*\*\* is a value with a 99% confidence interval (CI), \*\* is a value with a 95% confidence interval, \* is a value with a 90% confidence interval, and no asterisk means the value is not statistically different. Findings are based on a multivariate logistic regression with random effects controlling for respondents' sociodemographic characteristics, the other LLIN choice attributes, interviewer, and for participant exhaustion.

Likewise, changing all the LLIN's attributes from the least to most attractive increases the average probability of purchase for those LLINs from 41.2% to 50.7%, respectively, and the average WTP from US\$3.30 (GH¢15) to above the US\$14.30 (GH¢65) mark, predicted at US\$18.48 (GH¢84). Likewise, individual attribute changes can change the average WTP between US\$3.02 (GH¢13.73) and US\$5.72 (GH¢26.01). Details about the Ghana LLIN DCE design, analysis methods, and findings will be provided in an upcoming peer-review publication.

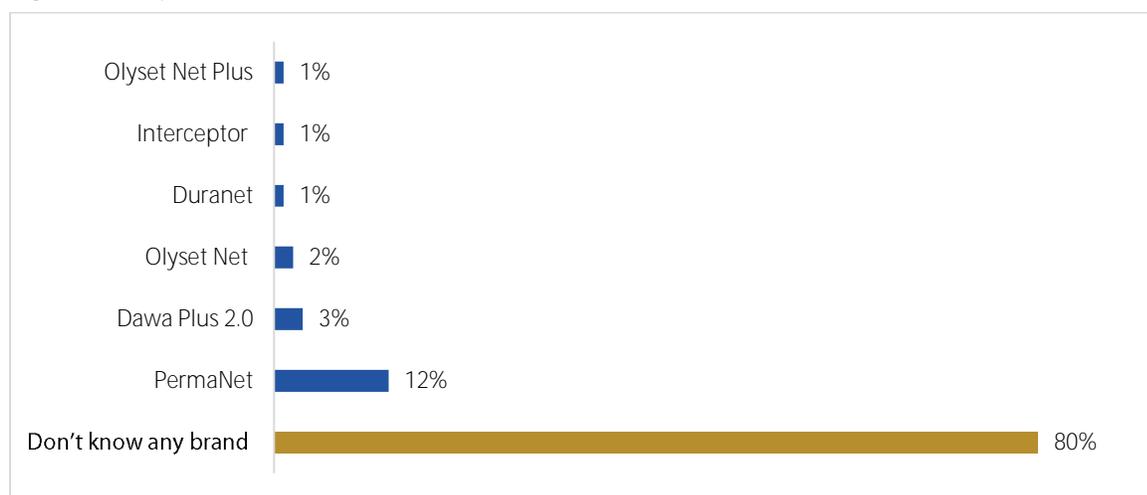
### Key Takeaways

Stimulating the retail market for LLINs will require that manufacturers bring to market differentiated LLINs that meet the preferences of consumers. Consumers are currently willing to pay an average of US\$7.9 (GH¢34.0) for a differentiated LLIN of their choice. This information is a critical pricing indicator for manufacturers interested in making differentiated LLINs, so they can control for manufacturing cost while taking into consideration other build-up costs that will affect the supply chain.

## Brand Awareness

The current retail market for LLINs in Ghana lends itself to a latent brand-building opportunity that market players can capitalize on to establish strong LLIN brands. LLIN brands can be cultivated to become the trusted and go-to brands for customers who want to buy LLINs. However, among the middle-class target group, there is currently very little knowledge of bed net brands (brand awareness). Indeed, 80% of target customers could not recall even one bed net brand. Despite their limited brand awareness, the target group could more commonly identify WHOPEs-recommended LLINs than non WHOPEs-recommended bed net brands. Together, the WHOPEs-recommended LLIN brands had a 20% brand awareness. In contrast, bed net brands without WHOPEs recommendation had no (0%) brand awareness, as no respondent in the study could recall even one brand without WHOPEs recommendation top-of-mind. Overall, PermaNet had the strongest brand awareness with a top-of-mind recall of 12%.

*Figure 15. Top-of-mind brand awareness for bed nets*



Note: Based on a total of 1,100 brand name mentions by respondents in the household survey

The limited bed net brand awareness can be attributed to the lack of media messaging that explicitly mentions bed net brands on the market. Media messaging about bed nets is generally limited to generic public health campaigns on LLINs, not the sale of bed nets.

Forty-six percent of target customers said they had been exposed to messages on malaria in the last six months before the household survey. However, 44% of the messages they were exposed to were directly related to sales of other mosquito-control products (e.g. aerosol insecticide sprays and coils), and 2.2% were related to general information on LLINs.

Television (69% of target customers) and radio (50% of target customers) were the top two channels through which customers were exposed to malaria messaging in the last six months. Another 2% of target customers were exposed to malaria messaging through posters, billboards, and flyers, and 1% through newspapers. All the messages that target customers saw on TV or heard on the radio were information on other mosquito-control products. Overall, target customers were 73 times more exposed to information on other mosquito-control products than they were to information on LLINs.

Initial entrants into the retail market can benefit from a first-mover advantage to establish strong brands to help them capture significant market share early and to hold on to that share when the competition stiffens as the market evolves.

### **Key Takeaways**

Beyond using the current lack of brand awareness to enter the market and create strong brands, new entrants can shape how LLINs are positioned relative to other mosquito-control products on the market. They can take advantage of the opportunity to position LLINs as complementary to other mosquito-control products, as that may resonate well with target customers, especially considering their preference for other mosquito-control products currently on the market. Entrants into the LLIN retail space can suggest through their marketing communications that other malaria control products are more suitable for non-sleeping spaces in the household, while LLINs are preferred for sleeping spaces.

### **Market Size**

The study has identified opportunities in the LLIN commercial market based on the need of satisfying customer preference as well as exploiting the latent opportunity to build strong brands that could capture market share and command premium pricing. However, the most important question for this study to answer, particularly for potential manufacturers, distributors, and retailers, is whether these opportunities would be profitable. Determining the economic feasibility for the commercial retail sales of LLINs in Ghana is crucial for any entrant into the market. An estimate of the market potential answers the question whether the market is large and profitable enough to merit investment by private sector participants.

### **Model for Estimating Market Size for Differentiated LLINs**

The model for estimating the market size for the commercial retail of LLINs in Ghana is based on triangulating data from multiple reliable primary and secondary sources. It follows a series of steps refining the input data at each stage to arrive at the estimated market in volume (number of LLINs). The model for estimating the market size triangulates data using six variables described in Table 17.

**Table 17. Market potential for differentiated long-lasting insecticide-treated nets**

<p><b>1. Market Area: Where the target markets are located?</b>                  The market potential for the differentiated LLINs was estimated for two market areas: the focal market consisting of the three target regions and the expanded market consisting of seven regions.</p>		
<p>Focal market area based on three regions in Ghana:</p> <ul style="list-style-type: none"> <li>• Ashanti Region</li> <li>• Greater Accra Region</li> <li>• Western Region</li> </ul>	<p>Expanded market area<sup>f</sup> based on seven southern regions in Ghana:</p> <ul style="list-style-type: none"> <li>• Ashanti Region</li> <li>• Brong Ahafo Region</li> <li>• Central Region</li> <li>• Eastern Region</li> <li>• Greater Region</li> <li>• Volta Region</li> <li>• Western Region</li> </ul>	
<p><b>2. The Target Customer: Who are the potential customers?</b></p>		
<p>Primary Market</p> <ul style="list-style-type: none"> <li>• Middle-class households with per capita income of at least US\$4 per day</li> <li>• Mostly urban (roughly 89% urban and 11% rural)</li> <li>• Fall within the third wealth quintile and above</li> </ul> <p>Most do not currently use bed nets (LLINs and untreated bed nets), with only 14% currently using one.</p>	<p>Secondary Market</p> <ul style="list-style-type: none"> <li>• Middle-class households with per capita income of US\$2 to US\$4 per day</li> <li>• Urban households</li> <li>• Fall within the second wealth quintile</li> </ul> <p>Households that need replacement LLINs or need to fill gaps because they did not receive any or a sufficient number of nets during last mass campaign</p>	
<p><b>3. The Number of Target Customers Within the Market Area: How many target customers are within the identified market area(s) of interest (primary and secondary markets)?<sup>g</sup></b></p>		
	Primary Market	Secondary Market
Focal (3 Regions) market area	892,100 households	1,459,000 households
Expanded (7 Regions) market area	1,620,000 households	2,651,000 households
<p><b>4. Market Penetration: What proportion of the target market can reasonably be expected to buy LLINs from the retail market based on conservative, moderate or aggressive market scenarios?</b></p>		
	Primary Market	Secondary Market
Conservative scenario	For the first year, <sup>h</sup> the conservative estimate is that about 4.3% of the primary target market will buy the differentiated LLINs. <sup>i</sup>	For the first year, the conservative estimate is that of the secondary target market 1% will buy the differentiated LLINs. <sup>j</sup>

<sup>f</sup> The three regions in the north of Ghana (Northern, Upper East, and Upper West) were excluded from the expanded market area because their market potential is not expected to be strong. Compared to other regions in Ghana, these three regions have the highest percentage of population in the lowest wealth quintile (Upper East 68%, Upper West 60%, and Northern 54%),<sup>4</sup> thus, the number of people with purchasing power to buy LLINs from the retail market is expected to be limited. Households in these three regions also have the highest ownership of LLINs compared to all other regions in Ghana, with ownership at 94% in the Upper East Region, 90% in the Upper West, and 84% in the Northern Region.<sup>4</sup>

<sup>g</sup> The table has estimates of the number of households in the market area for 2018. (Source: Ghana Statistical Service Population Projection from 2015–2020).

<sup>h</sup> First-year market penetration estimates are for 2018 and form the baseline for market size projections from 2019–2022

<sup>i</sup> The penetration rate of 4.3% is based on middle-class households (third to fifth wealth quintile) in the primary target market that reported in the GMIS 2016 that they bought LLINs for their household.<sup>4</sup>

Moderate scenario	For the first year, the moderate estimate is that 23.6% of the primary target market will buy the differentiated LLINs. <sup>k</sup>	For the first year, the moderate estimate is that 7.6% of the secondary target market will buy the differentiated LLINs. <sup>l</sup>
Aggressive scenario	For the first year, the aggressive market estimate is that 43.9% of the primary target market will buy the differentiated LLINs. <sup>m</sup>	For the first year, the aggressive market estimate is that 12.6% of the secondary target market will buy the differentiated LLINs. <sup>n</sup>
<b>5. Consumption Rate: How often will the target market buy LLINs and how many LLINs will a household buy?</b>		
<p>The model used to calculate the market size factored in the expected consumption rate of target customers. The consumption rate was based on two variables:</p> <ol style="list-style-type: none"> <li>1. The life span of an LLIN. An LLIN has a median life span of about three years. Therefore, repeat purchases can be expected every three years. The consumption rate is, therefore, affected by a three-year repeat purchasing cycle.</li> <li>2. Universal Coverage Target. This study found that the average number of people in a middle-class household is three. To achieve universal coverage, it means households within the target group will need to buy at least two LLINs per household.</li> </ol> <p>In summary, the consumption rate (how many nets customers will buy at and how often they will buy them) used in the computation of the market size factored in two LLINs bought per household once every three years.</p>		
<b>6. Projection Factors: How will population growth among the target group and the rate at which they adopt the new differentiated LLIN affect market size projections beyond 2018 (2019–2022)?</b>		
To compute estimated market size projections for the differentiated LLINs beyond 2018, the model factored in population growth rates of 2.3% per annum, <sup>o</sup> and an average rate of LLIN adoption of 12% every year for the next five years. <sup>p</sup>		

Using the six variables explicated above, the total estimated market size by volume for the differentiated LLINs was computed for the two market areas: the focal market area (three regions of Ashanti, Greater Accra and Western) and the expanded market area (seven regions of Ashanti, Brong Ahafo, Central, Eastern, Greater Accra, Volta and Western). Figures 16 and 17 show the projected total estimated market sizes from 2018 to 2022.

<sup>J</sup> The penetration rate of 1% is based on the number of households in secondary target market (urban households in second wealth quintile) of the focal market area (three regions) that reported in the GMIS 2016 that they bought LLINs for their household.

<sup>k</sup> The penetration rate of 23.6% is based on the 19.3% of middle-class households in this study that reported that are “very likely” to buy an LLIN in the next 12 months plus the 4.3% penetration rate of the primary market conservative scenario.

<sup>l</sup> The penetration rate of 7.6% is based on the 6.6% of households in the secondary target market (urban households in the second wealth quintile) of the expanded market area (7 regions) plus the 1% penetration rate in the secondary conservative market scenario.

<sup>m</sup> The penetration rate of 43.9% is based on the 20.3% of middle-class households in this study that reported that they are “somewhat likely” to buy an LLIN in the next 12 months plus the 23.6% penetration rate of the primary market moderate scenario.

<sup>n</sup> The penetration rate of 12.6% is based on the 7.6% penetration rate in the secondary market moderate scenario plus a 5% increase to account for an aggressive scenario in the secondary market.

<sup>o</sup> Population growth rate is based on Ghana Statistical Service projections for 2015–2020; extrapolated to cover 2021 and 2022.

<sup>p</sup> The rate of adoption for the differentiated LLIN is premised on the diffusion of innovation theory (Rogers, 2003), which states that customers’ purchase of the differentiated LLINs is expected to increase over time as people get used to the product based on experiences of earlier users. The rate of adoption used in the computation of the market size projections is average of 12% increase year-on-year starting from the second year (2019) till the fifth year (2022). The 12% cumulative rate of adoption per year is based on data from the DCE conducted as part of this study, which estimated that demand for the differentiated LLINs would be 44%. Since demand is expected to rise over time based on the diffusion theory of innovation, we assume a 12% yearly increase until demand reaches 44% in 2022.

Figure 16. Total market size by volume for the focal market area (three regions)

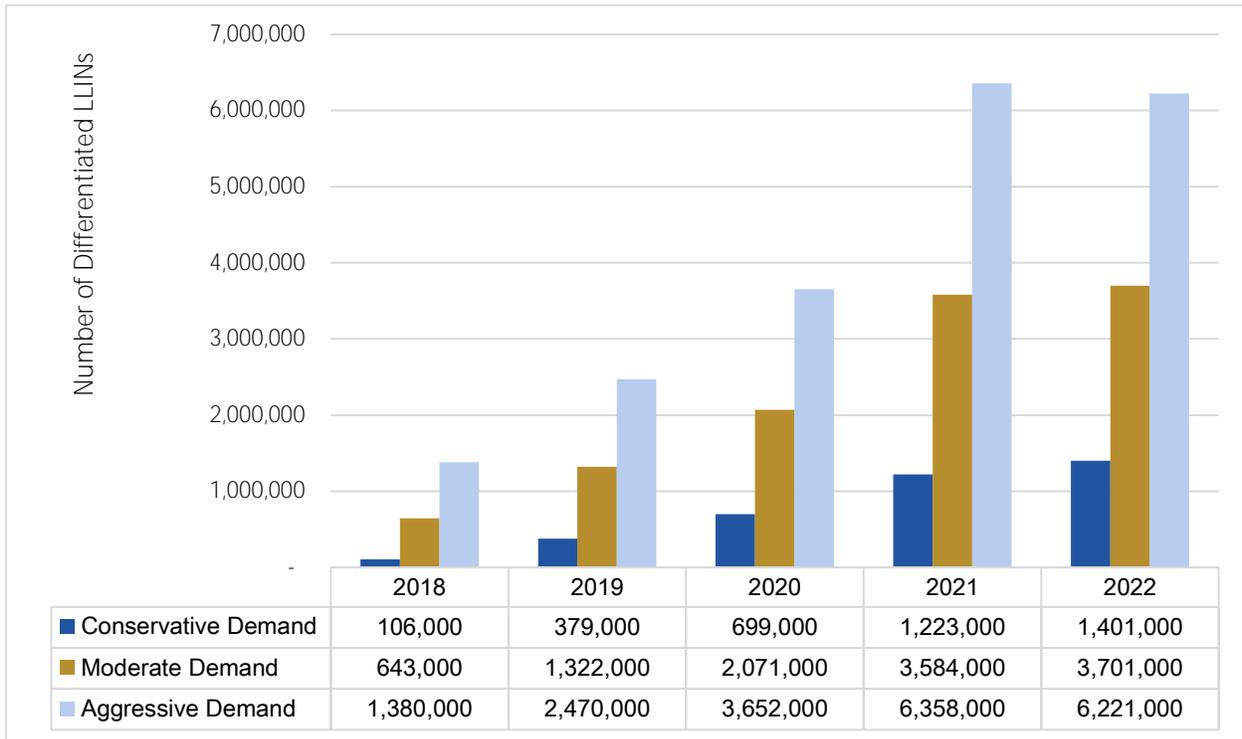
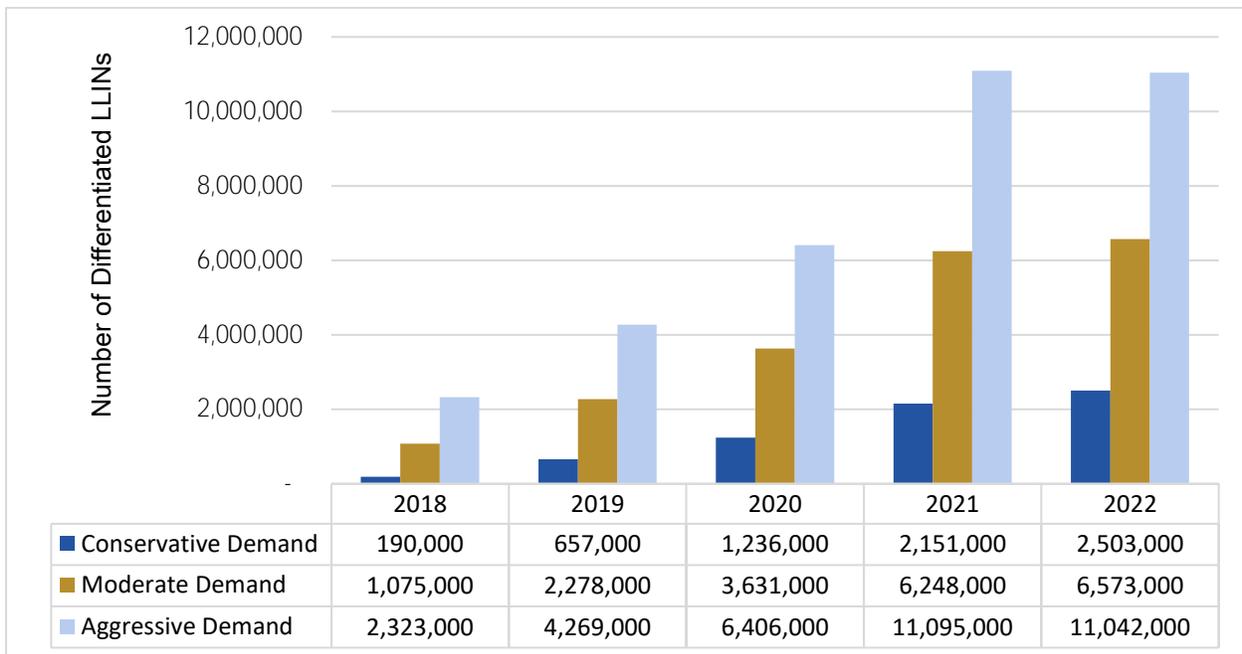


Figure 17. Total market size by volume for the expanded market area (seven regions)



## Macro-Environment Considerations

As with any other business activity, the macro-environment will have an impact on the retail market for LLINs in Ghana. It is important that entrants into the commercial market for LLINs consider the impact of these external factors on their business operations.

The study highlights three macro-environmental factors that will provide an enabling environment for market players interested in coming to market with differentiated LLINs:

- **Ghana's economic growth trends since the start of national free mass LLIN distributions in 2008**
- Competitive import tariffs
- Change in how LLIN imports are classified under the new harmonization system (HS) code nomenclature for ITNs

### Economic Growth Trends in Ghana

The primary approach to malaria prevention across Africa to date has been free distribution of LLINs funded mainly by development partners such as Global Fund, USAID, DFID, and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ). The first free distribution of LLINs in Ghana started in 2002 and covered only 20 districts.<sup>21</sup> In 2008, it was expanded to cover the whole country, when Ghana adopted the global policy of universal coverage. The government believed that the large segments of the population who were poor and vulnerable to malaria could not afford to pay for LLINs, which necessitated the rolling out a free mass distribution campaign nationwide.

Since Ghana began implementing free LLIN distributions to the public, the country has shown some remarkable economic growth. This economic growth has created a rising resilient middle class, with a minimum per capita income of US\$4 per day,<sup>18</sup> who no longer need to rely on freely distributed LLINs because they now have the purchasing power to buy their own from the retail market. Some indicators that show Ghana is in a better economic position than it was when free distribution of LLINs started, include:

- Attainment of **"middle-income" country status in 2010**.<sup>22</sup>
- Strong gross domestic product (GDP) growth rates with an average of 6.4% per annum (2002–2016) reaching a high of 14% in 2011 as one of the fastest growing economies in the world. **Ghana's economic growth rate of 6.4%, over 2002–2016 period**, out-performs the sub-Saharan average of 4.9%.<sup>23</sup> For 2018, the World Bank has forecasted that Ghana will experience the highest economic growth among all African countries, with a growth rate of 7.8% compared to the sub-Saharan average of 3.2%.<sup>24</sup>
- A fivefold increase in GDP per capita from US\$309 in 2002 to US\$1,513 in 2016, and real GDP increased from US\$6.17 billion in 2002 to US\$42.69 billion in 2016.<sup>25</sup>
- Meeting the first Millennium Development Goal (MDG 1) of halving poverty by 2015, reducing poverty from 52.7% in 1991 to 24.2% in 2012. The poverty rate in 2016 was estimated at 11.1% of the population.<sup>12</sup>

In addition to the economic progress that Ghana has made as a country since free distribution of LLINs started in 2002, the government of Ghana now has a new focus of empowering the private sector to further spur growth in the economy by launching the **"Ghana Beyond Aid" campaign**.<sup>26</sup>

The positive growth of Ghana's economy signals that there will be increasingly more Ghanaians in position to purchase LLINs from the retail market than was the case in past years. This creates very good prospects for potential entrants into the commercial market for LLINs, since malaria is still an endemic disease in Ghana and the rising middle-class will seek better ways to protect themselves against malaria. A differentiated LLIN that meets their preferences could be that better way.

## Competitive Import Tariffs

The various tariff policies across sub-Saharan Africa on the importation of LLINs affects demand for the product across the region. It is estimated that between 2011 and 2015, tariff policies across sub-Saharan Africa have reduced demand for LLINs by about seven million, which is equivalent to roughly 3.1 million LLINs and contributed to 2.9 million cases of malaria and over 5,000 deaths.<sup>27</sup>

Since 2002, Ghana has implemented a zero-import tariff waiver on imported LLINs. Ghana is one of the few countries—1 out of 16 countries—across the 46 countries in sub-Saharan Africa that practices zero-import tariffs.<sup>28</sup> The zero-import tariff waiver on LLINs waives import duties and value-added tax (VAT). This eliminates a total 35% taxes (constituting 20% import tax plus 15% VAT) on the customs value of LLINs imported into the country.<sup>28</sup>

Importers are still required to pay some other costs and levies, which this study estimates to be around 11.6% of the declared customs value of the bed nets imported into Ghana.<sup>29</sup> The 11.6% covers costs, such as processing fees at the ports and levies from non-Economic Community of West African States (ECOWAS) member states.

Ghana is, therefore, one of the most competitive places to enter the commercial market for LLINs, compared to approximately 30 other sub-Saharan African countries that do not have a zero-tax waiver. Overall, entrants into the market should expect to pay about 11.6% in levies to clear their LLINs from the port. This competitive import tariff is expected to have a positive impact on stimulating a commercial LLIN market.

## New Harmonization System Code for ITNs

Until 2017, global exports and imports of ITNs (LLINs) were done under the customs harmonization system (HS) code 630491.<sup>9</sup> This classification categorized imports of ITNs under the broad category of products described as “crocheted or woven textile articles, tablecloth, and other decorative items.” This classification meant that, in Ghana, imports of untreated bed nets and counterfeit nets enjoyed the same zero-import tariff waiver as treated nets.

However, from January 2017, the World Customs Organization introduced a new HS classification (HS 630420) specifically for ITNs, which now narrowly defines ITNs as “articles made from fabrics, impregnated or coated with antimalarial chemicals (alpha-cypermethrin, Chlorfenapyr, deltamethrin, lambda-cyhalothrin, permethrin, or pirimiphos-methyl).”<sup>27,29</sup>

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<sup>9</sup> HS code is a six-digit code known as the harmonization system of nomenclature developed by the World Customs Organization—an internationally standardized system of names and numbers to classify and describe traded products. Every product or commodity that crosses or enters international borders is described to customs by means of this HS code, and it is the worldwide guide for describing a commodity in a standardized way.

Countries generally take a couple of years to implement new HS classifications introduced by the World Customs Organization; however, checks reveal that the Customs Division of the Ghana Revenue Authority has adopted HS 30420 for ITNs, as seen in its latest document on classification of imports and exports into Ghana: *Harmonized System: ECOWAS Common External Tariff and Other Schedules, Ghana 2017*.<sup>30</sup> The commissioner-general of the Ghana Revenue Authority announced **in February 2018 that Ghana's Customs Division commenced the implementation of the new HS code on March 1, 2018.**<sup>28</sup>

The implementation of this new HS code means that the zero-import tariff waiver previously applied to any bed net imported into the country, whether treated, untreated, or counterfeit, is now restricted to only LLINs. Thus, untreated and counterfeit bed nets will no longer enjoy competitive advantages that tax waivers bring for LLINs coated or impregnated with insecticide.

Since the new HS code has taken effect, at the time this report was written in September 2018, importers have not yet used this new HS code for their LLIN imports. Advocacy efforts are needed to encourage Ghana to enforce the use of the new HS code classification system for LLINs. If this happens, it is expected that only importers of LLINs will continue to enjoy the zero-import tariff waivers, while importers of untreated bed nets will no longer be able to enjoy these tax waivers. This will, in turn, provide a significant competitive advantage regarding the cost of importation of LLINs; an opportunity that entrants into the retail market for differentiated LLINs can exploit to further strengthen their position against untreated bed nets on the retail market in Ghana.

## Conclusion

There is an increasing push by stakeholders leading efforts to eliminate malaria in Ghana and around the world to find more sustainable ways to achieve prevention and elimination targets, especially in light of stagnating and reducing donor funding. It is crucial that the country finds ways to support, sustain, and surpass the tremendous gains malaria control activities have made over the years in reducing malaria-related morbidity and mortality around the world.

As part of efforts to find sustainable ways to maintain access to LLINs, exploration of the commercial market as a distribution channel is crucial. This research was designed to gain insights into the existing commercial market for bed nets and to identify opportunities to increase customer demand for LLINs from the retail market.

The study revealed some interesting and useful findings:

- The existing retail market for bed nets in Ghana has been neglected by both consumers and supply chain actors (manufacturers, distributors, and retailers).
  - Only 7% of retailers sold bed nets (LLINs and untreated bed nets) at the time of the study. Sales of bed nets are predominantly limited to pharmacies and mothercare shops, even though these two types of retail outlet make up only 13% of available retail outlets. Convenience shops and supermarkets make up 82% of retail outlets yet only 5% sell bed nets. The lack of widespread retailing of bed nets through different types of retail outlets creates constraints for those seeking to buy bed nets from the retail market. Seventy-five percent of respondents in this study said they do not know a place in their community where they could buy a bed net; for those who purchased bed nets from the retail market, they had to travel an average of 33 minutes to find one to buy.
  - LLIN manufacturers and distributors are paying more attention to sales prospects from large institutional buyers (who, in turn, distribute LLINs for free) than the retail market. For manufacturers of WHOPEs-recommended LLINs brands that export to Ghana, this study found that only 1% to 2% of their total exports into Ghana over the last five years were for the retail market; the overwhelming majority went toward free distribution.
  - Consumers are not buying bed nets from the retail market. Only 5% of bed nets found in the households that took part in this study were from the retail market. This pattern is reflected across the country, 85% of LLINs owned by households nationally were obtained from mass distribution campaigns.<sup>4</sup>
- Despite the current lackluster state of the retail sector and the limited interest by both consumers and supply chain players, there are opportunities to increase demand for LLINs on the retail market.

### Opportunity One: The Middle-Class Target Customer

The middle-class consumer is a ready primary target market that can serve as a profitable customer base for the LLIN retail market if their consumer preferences for LLINs are met. The size of this primary target market is estimated to be about 5.8 million people across the country and 2.6 million in the three focal regions of this study.<sup>2</sup> The middle-class consumer is the most viable customer base for differentiated styles of LLINs because they have the purchasing power (daily per capita come is at least US\$ 4) to afford LLINs

from the retail market; they perceive a risk of malaria, so an overwhelming majority (87%) of them actively protect against mosquito bites; and they have shown an interest in buying LLINs if they meet their preferences.

## Opportunity Two: The Need for a Differentiated LLIN

Current bed nets on the retail market or LLINs available through free distribution channels do not meet the needs and preferences of the middle-class consumer. For this reason, 82% use other mosquito-control products—such as aerosol insecticide sprays and coils—to protect against mosquito bites, and only 14% currently use LLINs. The primary drivers that tend to influence which mosquito-control product that a consumer uses are the effectiveness, ease of use (convenience), comfort, and aesthetics of the method. Consumers are willing to make small trade-offs on perceived effectiveness and affordability for an easier-to-use mosquito-control product.

For the middle class, their customer preferences for a LLIN center around three decision drivers: convenience, comfort, and aesthetics. A convenient LLIN must be easy to hang, easy to enter and exit, and easy to reach nearby personal items. A comfortable LLIN must be spacious inside, have the right texture of material (polyester) that is perceived to be cooler to sleep under, and the insecticide treatment in the LLIN must not cause any discomfort while also being effective. An aesthetically pleasing LLIN must not distract from the décor of a **user's bedrooms**. The **middle-class** customer wants an aesthetically pleasing LLIN that looks clutter-free when hung; has more color options they can choose from, apart from white and blue; and has a shape that is attractive, yet does not compromise the amount of space inside the LLIN.

Based on the customer preferences expressed by middle-class target customers, a differentiated LLIN that incorporates design modifications to traditional bed net styles are fundamental to driving demand in the retail market for LLINs, especially among the target group. Our research shows that a differentiated LLIN should, ideally, be a single-point hang with a zipper and rectangular shaped.

Additionally, the middle-class consumer is willing to pay for an LLIN that meets their preferences. Findings from the discrete choice experiment (DCE) show that the average probability of buying an LLIN among study participants is 43.8% and the average willingness-to-pay is 34 GH¢ (US\$7.48), and this price is inelastic—while price increases do not change demand significantly and they do increase profits.

## Opportunity Three: The Market Size

If a differentiated LLIN(s) is brought to market, the volume of LLINs that can potentially be sold in the primary and secondary market combined is estimated as follows:

Three focal regions of Ashanti, Greater Accra, and Western:

- Conservative estimate: 106,000 in 2018 and expected to reach 1.4 million by 2022
- Moderate estimate: 643,000 in 2018 and expected to reach 3.7 million by 2022
- Aggressive estimate: 1.3 million in 2018 and expected to reach 6.2 million by 2022

Expanded market (7 regions): Ashanti, Brong Ahafo, Central, Eastern, Greater Accra, Volta and Western:

- Conservative estimate: 190,000 in 2018 and expected to reach 2.5 million by 2022
- Moderate estimate: 1 million in 2018 and expected to reach 6.5 million by 2022

- Aggressive estimate: 2.3 million in 2018 and expected to reach 11 million by 2022

There is limited bed net brand awareness among target consumers. Eighty-percent of the middle-class target group could not recall top-of-mind a bed net brand. Investing in brand development, therefore, provides an opportunity for LLIN manufacturers and distributors to capitalize on a market with very little brand awareness to establish strong differentiated LLIN brands in the retail space that can be leveraged for premium pricing.

The study also identified other external factors that could help create an enabling environment for the commercial sales of LLINs. These external factors are:

- **Ghana's economy is experiencing positive growth.** For 2018, the World Bank estimates that it will be the fastest growing economy among all African countries with an average growth rate of 7.8% compared to the sub-Saharan average of 4.9%.
- Ghana has a zero-import tariff policy on LLINs, which saves importers of LLINs into the country an average of 35% taxes on the customs value of LLINs imported. The only cost that importers can expect to incur is estimated to be about 11.6% in port processing fees and levies on the value of the items they import. This tariff regime for LLINs makes Ghana one of the most competitive places for players who want to enter the retail market for LLINs.
- The new customs code HS 630420, introduced by the World Customs Organization in January 2017, was adopted by Ghana in March 2018 means that the zero-import tariff waiver previously applied to any bed net imported into the country, whether treated, untreated, or counterfeit, is now restricted to only LLINs. If used, this will curb competition from untreated bed nets on the market, as they would no longer be able to enjoy the same tax tariff waivers as importers of LLINs.

## The Way Forward

Opportunities exist in the retail market for LLINs, but it cannot be business as usual. The way forward must:

- Appreciate the changing consumer taste and bring to market a differentiated LLIN(s) that meets consumer preferences regarding convenience, comfort, and aesthetics, as consumers are willing to pay a premium for LLINs that meet their preferences. Targeting middle-class customers with a differentiated LLIN can segment the market and allow growth and product diversity in the commercial market while retaining access to free LLINs to households that cannot afford to buy them.
- Diversify the types of retail outlets that sell LLINs from the traditional focus on pharmacies, chemical shops, and mothercare shops to more widely accessible convenience shops and supermarkets. There is also potential to consider online sales as a complementary channel for retail of LLINs.
- Intensify media exposure on LLIN purchase and use by designing marketing campaigns that highlight the improvements in the differentiated LLINs compared to the freely distributed LLINs. Middle-class consumers are exposed to media messages about other mosquito-control products significantly (73 times) more than they are exposed to messages about LLINs. Any serious effort to encourage the purchase of the differentiated LLINs would need both above-the-line and below-the-line media campaigns to increase consumer awareness and purchase.

- Consider positioning the differentiated LLINs as complementary to the other mosquito-control products instead of competing directly with them. The differentiated LLINs can be positioned for use in sleeping spaces while other mosquito-control products can be positioned as more appropriate for non-sleeping spaces. Another useful point of differentiation to emphasize is the long-term cost savings LLIN users accrue compared to users of other mosquito-control products.

Overall, the market analysis shows there are viable opportunities for manufacturers, distributors, and retailers to profitably benefit from participating in the retail market for LLINs, so long as LLIN designs are improved to maximize appeal and meet consumer preferences.

A viable retail market for LLINs in Ghana will serve as an alternative continuous distribution channel to sustainably complement the free distribution model and provide additional assurance that households can access LLINs when needed.

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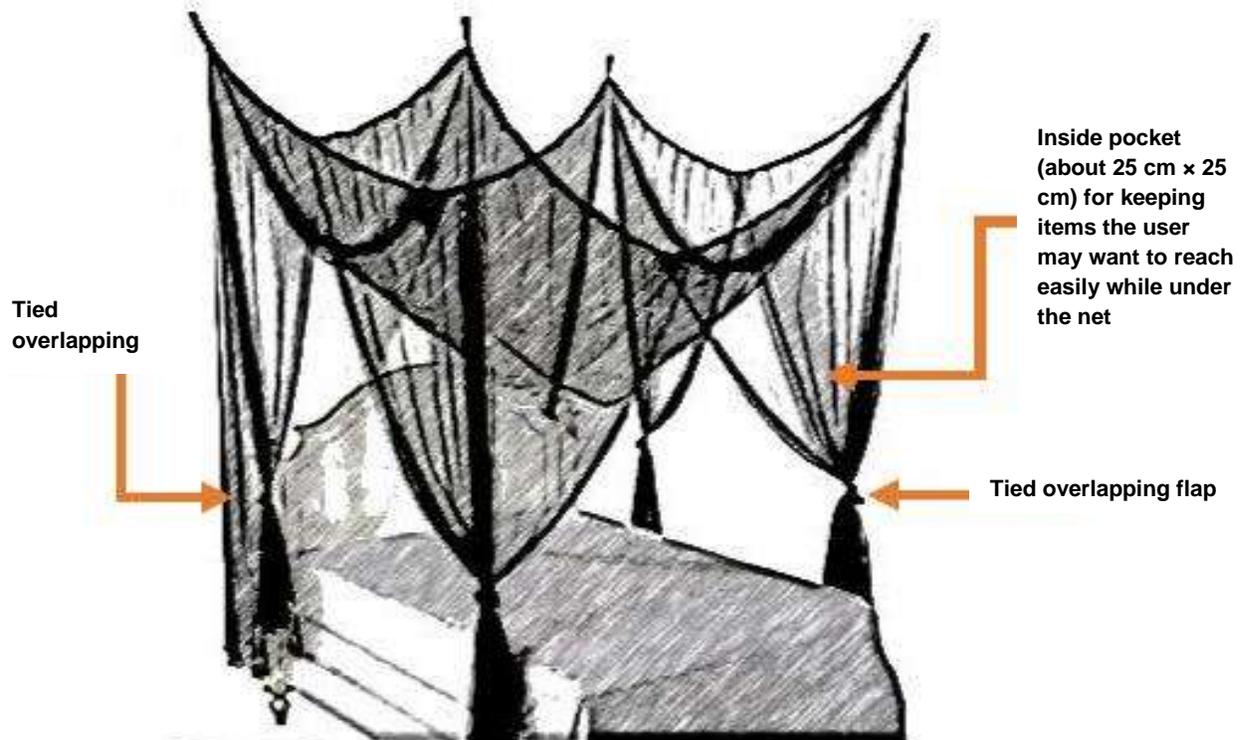
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## Appendix: Prototypes

### Prototype One: Canopy Style

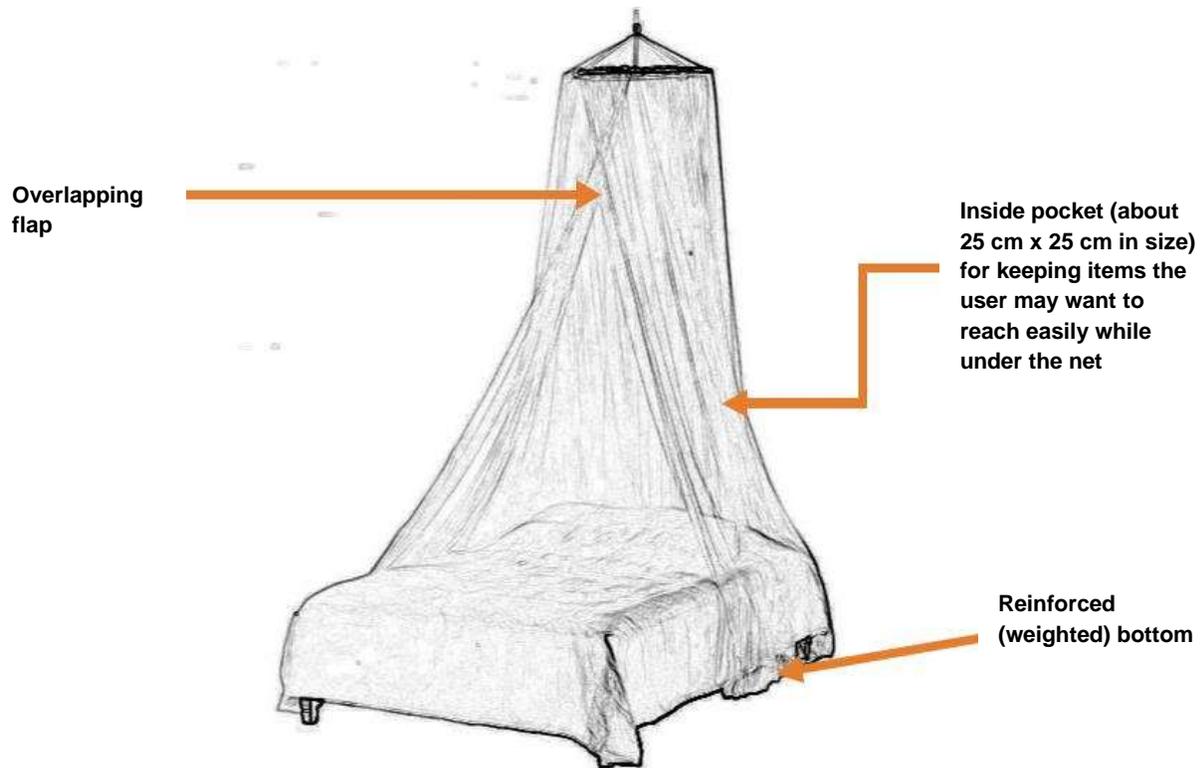
Designed as a four-point hang rectangular net with overlapping flaps on all four sides for entering and exiting the net. At night, the overlapping flaps are untied to create a complete barrier without gaps for potential mosquito entry. During the day if the net is not in use, the overlapping sides can be tied together.



The canopy net has a longer height (about 200 cm) than the usual double-size bed nets on the market. The longer height design allows for a reinforced and weighted bottom, so that the net extends beyond the bedframe and creates a seal with the floor, thus avoiding the need to tuck the net under the mattress.

## Prototype Two: Conical Overlap

Designed as a conically shaped net with a single-point hang with an overlapping flap at the front for entering and exiting the net.

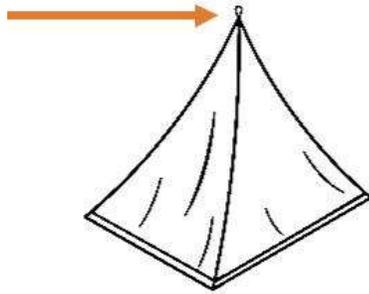


The conical net with the single overlapping flap has a longer height than the usual double-size conical bed net on the market. Even though the net is double size, its height is similar to a queen-size conical net (220 cm). The longer height design allows for a reinforced/weighted bottom, so that the net extends beyond the bed frame and creates a seal with the floor, thus avoiding the need to tuck the net under the mattress.

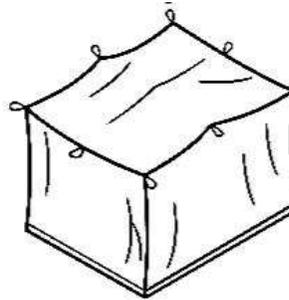
### Prototype Three: Multi-Loop Net

The multi-loop net was designed to give the user the flexibility to hang the net in four different shapes and sizes. The multi-loop net had a lift-overhead entry and exit design with no reinforced bottom. This prototype could be hung as a one-point conical hang style, two-point hang style, and a six-point rectangular hang style.

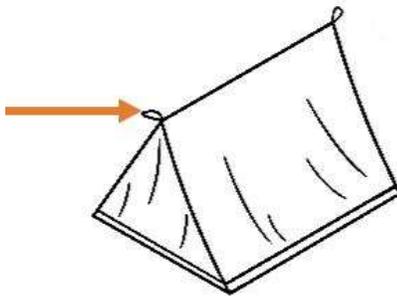
**one-point  
hang style**



**six-point  
rectangular  
hang style**



**two-point  
hang style**



**two-point  
hang style**

