

Social and Behavior Change for Insecticide-Treated Nets 2019



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Scaling Up Vector Control for Malaria Prevention

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Abbreviations

ANC	antenatal care
BE	behavioral economics
DHS	Demographic and Health Survey
DRC	Democratic Republic of the Congo
EPI	Expanded Programme on Immunization
HCD	human centered design
IPC	interpersonal communication
IPTp	intermittent preventive treatment in pregnancy
IRS	indoor residual spraying
ITN	insecticide-treated nets
MIS	Malaria Indicator Survey
NMCP	National Malaria Control Program
PBO	piperonyl butoxide
PMI	President's Malaria Initiative
PSMP	Private Sector Malaria Prevention
RBM	Roll Back Malaria
SBC	social and behavior change
SBCC	social and behavior change communication
SMS	short messaging service
UAR	use-to-access ratio
USAID	United States Agency for International Development
WHO	World Health Organization

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Cover photo credit:

Azza Idd with her children under a mosquito net at their home in Buhigwe district, Tanzania.

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OVERVIEW

Introduction

Since 2000, more than 1.7 billion insecticide-treated nets (ITNs) have been distributed, and current trends suggest they will continue to remain a vital malaria control intervention in the years to come [1]. To maximize their potential for malaria control, social and behavior change programs (SBC) promote households' participation in ITN distribution programs, ensure all household members use them every night, care for the ITNs so they last as long as possible, and use old ITNs in ways that continue to provide some protection from malaria.

ITN use tends to be the main emphasis of net-related SBC programs. However, as Part B shows, ITN use is generally high among individuals with access to an ITN, as is the knowledge that ITNs prevent malaria. This may indicate that ITNs have become a valued and mainstream component of a healthy lifestyle during the past two decades. This guide illustrates other dimensions of ITN use, such as ITN acquisition, care, outdoor sleeping, repurposing, and seasonal variation that may help SBC programs reinvigorate their approach and optimize ITN use and access.

For the purpose of this guide, SBC is defined as the coordinated use of a range of approaches to achieve individual and collective behavior change. While most SBC activities rely on communication-based approaches combining mass and social media, community-level programming, and interpersonal communication; non-communication-based approaches, informed by behavioral economics and design thinking are increasingly incorporated, as well.

To be effective, SBC programs need to be tailored to each context. For example, populations in low and high transmission areas may have a different attitude to ITN use; the distribution strategies for ITNs may differ from one area to the next (and year-by-year); and priority groups may have distinct lifestyle characteristics (such as mobility, urbanicity, or livelihood) that influence their access to ITNs and the perceived relevancy of ITNs.

ITNs also provide protection from other vector-borne diseases, such as lymphatic filariasis and Chagas disease. A description of SBC activities and considerations regarding these neglected diseases are outside the scope of this document, but this guide may be useful for planners of these programs as well.

Net behaviors

Figure 1 illustrates the range of ITN-related behaviors from acquisition to end-of-life. First, a household must acquire an ITN, either through a mass campaign or through a continuous distribution channel. ITNs may be *pushed* to households (i.e., at antenatal care [ANC], immunization, or through a mass campaign) or households may *pull* them from a channel (i.e., retail sector or requesting via a community channel).

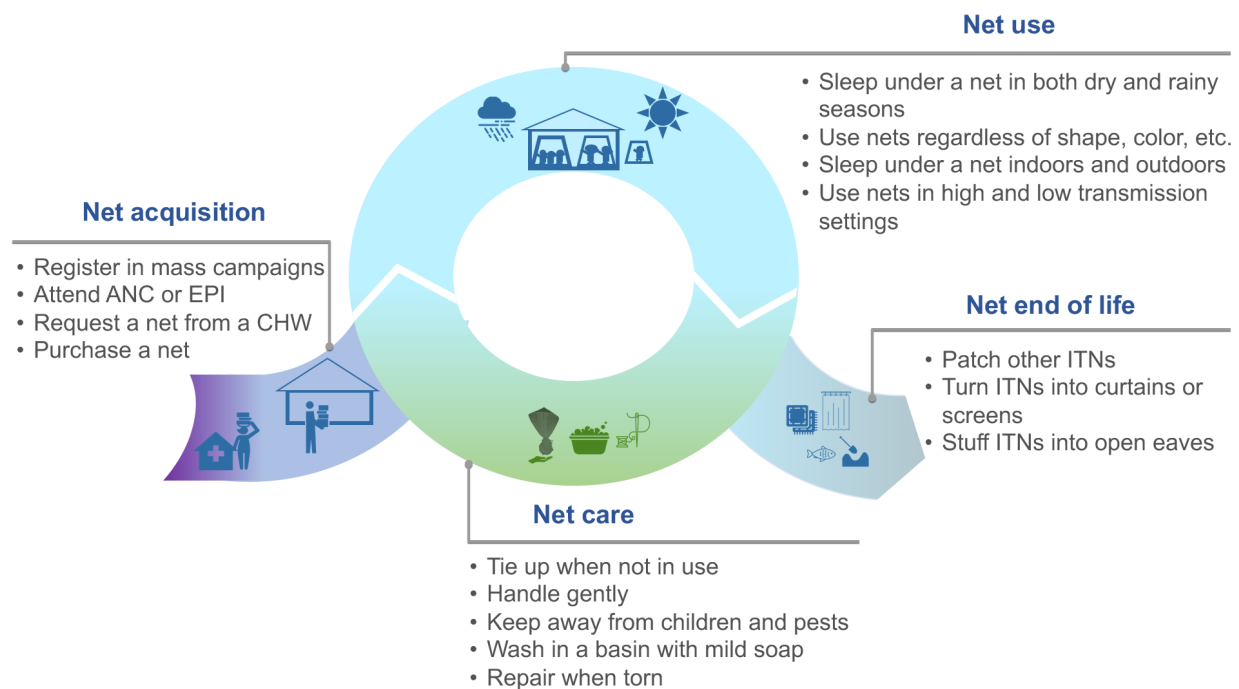
As obvious as it may seem, access to an ITN is the primary determinant of ITN use. Multiple surveys have shown that having enough ITNs for the household's size is the most important predictor of ITN use [2–5]. From a behavioral perspective, ITN access can be improved by using SBC to boost acquisition behaviors, encouraging households to register during mass campaigns, promoting ANC and immunization service uses, stimulating demand for ITNs where community-distribution programs are in place, and promoting the purchase of ITNs, where applicable.

After a household member has access to an ITN, ITN use becomes the primary behavior of interest. Whether or not all household members use the ITNs they have throughout the year is driven by social norms, self-efficacy, having a positive attitude toward ITNs, perceiving of malaria risk (rainy or dry season), the presence of mosquitoes, access to fans and window screens, repellents and indoor residual spraying), and lifestyle (such as the feasibility of using a net when sleeping outdoors, or how easy it is to hang in that type of home).

As ITNs age, they become worn and torn from use, necessitating good net care. Households should tie up the ITN or fold it when not in use to keep it away from dirt, snagging objects, children, stored crops, and rodents. ITNs need to be handled carefully and washed in a basin with gentle soap, dried in the shade, and mended when holes begin to appear. Because households generally have few options for replacing their ITNs until the next mass campaign, keeping ITNs functional for as long as possible allows households to maximize malaria protection in circumstances where they cannot control access to new ITNs.

As an ITN gets dirty and torn, households may consider replacing it or reusing it for other purposes. Net acquisition behavior becomes relevant again and questions may arise as to the appropriate uses for old ITNs. Households repurpose all kinds of home goods when they break or disintegrate; ITNs are no exception. Local officials may be called to respond to instances of ITNs being used for fishing or gardening. In these situations, clear yet pragmatic messaging about beneficial, neutral, and harmful uses for old ITNs will be key.

Figure 1. Desired household net behaviors across the net lifecycle



SBC Strategy Development for ITNs

Choosing behaviors to promote

Figure 2 outlines how available data can be used to assess the four key areas of an ITN program: net acquisition, net use, net care, and net end-of-life. Guidance is given for different thresholds/levels of population access, net use, net care attitudes, and residual transmission. Programs can choose to assess one, two, three, or all areas, depending on the data available. The resulting combination of actions from the areas assessed can be used to guide ITN SBC strategies.

This approach is based on the idea that net SBC strategies should be tailored to the context and, to improve resource targeting and strengthen the potential effectiveness of SBC programs, should be based on data. For example, blanket ITN use messaging may not be needed everywhere when the use-to-access ratio is high. Rather, other dimensions/ITN behaviors may need to be emphasized instead—such as net care when the mean attitude score is <1.0, or net acquisition when population access is <80%. Those who want to further strengthen ITN use rates are directed to conduct additional analysis to understand areas to emphasize, such as seasonality and managing in inconvenient situations that include heat, outdoor sleeping, etc.

Figure 2 can be applied at the national, provincial, or district levels. Some data is available for most areas (such as population access and the use-to-access-ratio); in these situations, it is probably best to use area-specific data. However, for net care and residual transmission, data may only be available for a few districts. Some extrapolation to province or national levels may be valid, especially if the results in the different sites are very similar.

Indicators in the decision tool:

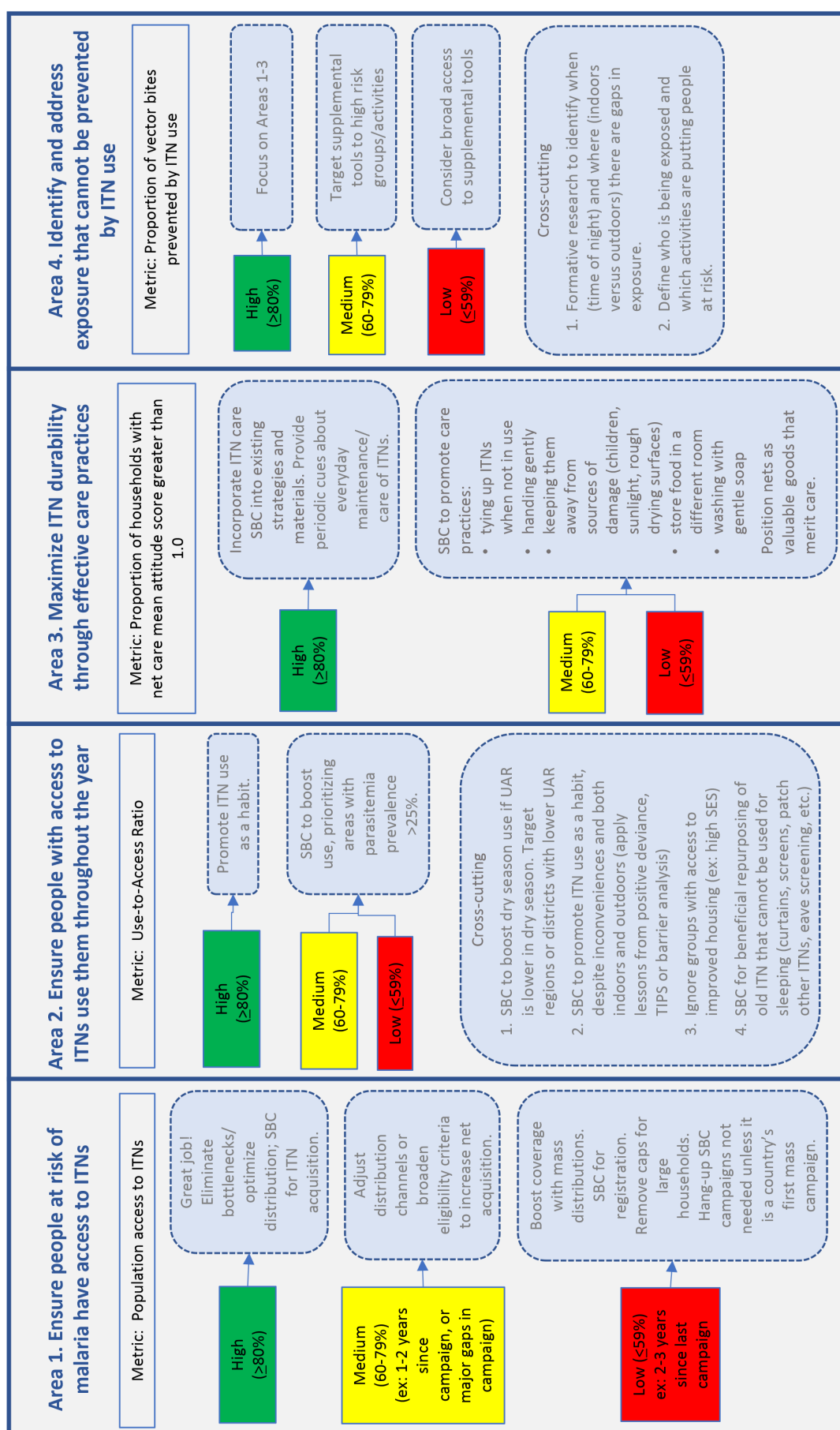
Population access to ITNs. The proportion of the household population that could have slept under an ITN, assuming two people use each ITN.

Use-to-access ratio. An estimate of the proportion of the population that used a net the previous night, among those with access to a net.

Net care mean attitude score. An index based on eight questions that measure beliefs about the effectiveness of net care and repair, the value of ITNs, whether it is a social norm, and one's ability to practice net care and repair.

Protection conferred by ITNs. The proportion of human exposure to malaria vectors that ITN use prevent, out of total exposure (i.e., compared to a non-user).

Figure 2. Decision tool for selecting net behaviors to promote



[Alliance for Malaria Prevention Toolkit](#)
[Continuous Distribution Toolkit](#)

[ITN Access and Use Report](#)
[Consensus statement on repurposing ITNs](#)
 ITN SBC Toolkit

[Durabilitymonitoring.org](#)
[Net Care SBC Strategy Guide](#)

[Literature review on human-vector interaction](#)

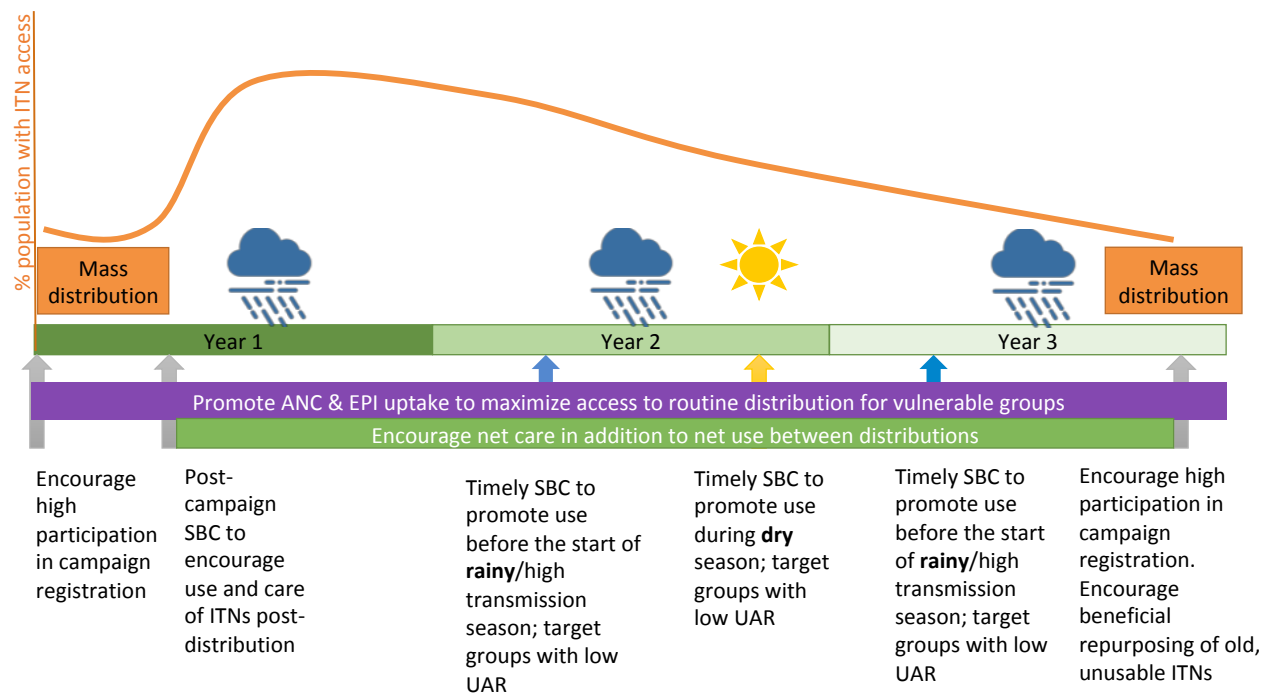
Resources

Timing of messaging

A comprehensive SBC strategy for ITNs will have both continuous and discrete elements. Continuous SBC activities will include promoting ITN use and care throughout the year. Where continuous distribution through routine health services and other channels exists, messaging to promote these services should also be ongoing. Discrete activities will include SBC activities related to the mass campaign, school distribution; and, where needed, communication around net misuse, repurposing, or disposal.

Figure 3 is an example of timing of messaging. The SBC program will be implemented in a setting with three-yearly mass campaigns and routine distribution through ANC and Expanded Programme of Immunization (EPI) services. At any given time, the behaviors being promoted will vary, depending on where the country (or target geographic area) is in the mass distribution cycle, rainy/dry season, and net age. ITN distribution messages are planned before and after distribution; then, to slow the decline in ITN access as nets wear out, ITN care and use messages are targeted to improve retention, care, and use.

Figure 3. SBC strategy for ITNs featuring continuous and discrete elements, based on three-yearly mass campaigns and routine distribution through ANC and EPI



A Note on Implementation Quality

This guide describes many aspects of ITN-related behaviors and the implications for SBC. However, do not use it alone. Roll out the guidance in the ITN SBC toolkit with other SBC best practices. High-quality SBC is grounded in behavioral theory and informed by data on the behavior, context, and behavioral drivers, particularly as these differ among different audience segments. Design all approaches and messages with careful consideration of target audiences and, often, with their participation. Also, execute SBC programs methodically, following a systematic and proven process informed by implementation experience and fine-tuned by monitoring and evaluation.

Individuals need more than information to adopt and maintain behaviors. Initially, informative approaches may be appropriate for areas where there is much confusion or misinformation about best practices, such as net care or repurposing. However, individuals also need confidence in their abilities and in the benefits of the behavior, social support, and access to commodities/services. Using emotion—humor, aspiration/hope, sympathy, fear—and giving individuals an opportunity to observe people like themselves increases the personal resonance of messages. Apply best practices, like lifecycle or psycho-demographic audience segmentation and role modeling, to ITNs. SBC programs across all health areas (including malaria) are most effective when people see or hear messages echoed in multiple sources/channels. This means combining community activities with mass media to create a layering, reinforcing effect. Leverage opinion leaders—who can include traditional and religious leaders, as well as peer group leaders—whenever possible. Insights from highly participatory methods, such as human-centered design or the mental shortcuts revealed by a behavioral economics lens, may further strengthen ITN SBC. There are many guides to SBC best practices; key ones are listed in the resources in Part E.

Part A: Net Acquisition

Festus Akun, eight-years-old and a class two student at Amanhyia Catholic Primary School in Ghana, shows how to use his long-lasting insecticide-treated mosquito net (ITN) to prevent malaria transmission. © 2016 Sarah Hoibak/VectorWorks, Courtesy of Photoshare



SBC for ITN Distributions

The World Health Organization (WHO) recommends that both large-scale mass distribution campaigns and continuous distribution be part of a multi-channel strategy to achieve and maintain universal access with ITNs [2]. Most countries currently implement mass campaigns every three years, including routine distribution of ITNs through antenatal clinics and immunization visits. Some countries also implement additional continuous channels between mass campaigns, including continuous distribution in schools, community-based programs, and retail sales—including social marketing. Some countries are moving away from implementing mass campaigns, and currently conduct annual school distributions in addition to routine distribution, while others distribute ITNs through community agents and health facilities all year. Often, some regions or provinces use one combination, while some regions use others. The choice of distribution channels depends on the capacity and reach of the institutions involved, as well as other contextual factors.

SBC programs for ITN distribution should take an integrated, yet contextualized, approach. SBC messages for different distribution channels should be harmonized; in other words, SBC for mass and continuous distribution channels should use the same umbrella brand, and encourage consistent ITN use and net care. However, messages should also be tailored for each channel, mainly by emphasizing how beneficiaries can obtain ITNs through that distribution method.

Each channel also presents unique opportunities for interpersonal communication: health workers for routine distribution, community volunteers for mass and community distribution, and teachers for school distribution. Mass media and community engagement activities can complement these.

Mass Campaigns

SBC is an essential activity before, during, and after a mass distribution. The primary SBC objectives will vary by stage. During the pre-distribution phase, SBC will be vital to mobilizing households to attend and participate in registration. During the distribution phase, SBC will inform households about the locations of distribution points, encourage ITN hanging, and raise awareness about ITN use and care. The presence of community mobilizers and publicity about the ITN distribution help cultivate the sense that ITN use is widely valued. After the distribution, SBC priorities will shift to promoting and solidifying good ITN use practices, including net care.

A clear communication plan is essential, including well-coordinated partners, and communication incorporated into all phases of a distribution, especially training. It is important to establish a standing national SBC working group to oversee these activities. For more information on all aspects of mass campaign planning, including communications, the [Alliance for Malaria Prevention Toolkit](#) provides a comprehensive resource.

Pre-distribution

Several important tasks should occur during the pre-distribution period: (1) coordinate partner efforts and develop materials, (2) engage stakeholders, (3) mobilize the population to register for nets, and (4) train volunteers and other influencers involved in supporting the distribution.

Coordinate partner efforts and develop materials

To avoid confusion, ensure that communication about the campaign, stakeholder roles, and ITN use is clear and consistent. Convene a standing national SBC committee frequently and early in the planning stage to develop a communication plan, coordinate the activities of different partners, avoid duplication of effort, and ensure the design of communication materials and activities follow the communication plan. Develop all communication materials early to allow time for pretesting and printing. Ideally, the communication plan, materials, indicators, and monitoring and evaluation tools should be used by all parties—donors, partners and government agencies—to reduce duplication of effort and facilitate smoother distribution planning.

It is vital to focus resources on materials and activities that will have the greatest impact. Generally, radio and local communicators, such as town criers, are good partners because of their low cost, reach, and ability to be brought on board quickly. This is important because distribution dates frequently shift. The registration agents can also tailor SBC messages to the specific needs of households and they should be well trained. Television can be expensive and may not reach all areas; but, when it does, it can be an excellent way to visually model the behaviors the campaign is promoting. Some print materials are necessary, such as coupons and supervision forms. Consider other print materials carefully. Flyers often end up littered around distribution points and rarely have any impact because of low literacy rates or poor dissemination. Posters are usually only good for identifying sites, and not useful for changing behavior.

As stated above and based on best practices for mass campaigns, key communication materials for the SBC committee to develop and review may include:

- radio spots
- radio DJ talking points, mentions/announcements
- training materials for volunteers
- frequently asked questions sheets for volunteers
- banners for distribution sites
- net coupons
- forms for supervising volunteers conducting interpersonal communication activities and for monitoring SBC activities at distribution sites
- where possible, short messaging service (SMS) messages—this will require early and strong collaboration with mobile companies
- key talking points for community leaders.

Mobilize the population to participate in the campaign

Community mobilization is critical at this stage to ensure households and communities are aware of the dates, locations, and process for registration and distribution. It is also the time to communicate the health benefits of ITNs. This will prime households to take full advantage of the ITN distribution during and after issuing.

Household registration takes place during the pre-distribution phase; it is one of the most critical components of a mass distribution. Registration has been found to be the key determinant of whether a household gets a net [6]. Most countries use door-to-door visits to register beneficiaries for the campaign; they give out a voucher, coupon, or wristband that can be redeemed for nets during the distribution phase.

Prior to registration, channels of communication might include:

- local radio: for example, talk shows with local health official, DJ mentions/announcements, or radio spots
- markets, religious gatherings, sporting events, and other community activities
- neighborhood meetings with opinion leaders or community health workers
- talks or meetings held with providers at health facilities.

Content should cover:

- mass distribution objectives
- process for household registration visits, what they entail, and why they are needed
- timing of the registration, to ensure someone is present at the home
- if known at the time, timing and location of the eventual distribution in their catchment area
- common myths and misconceptions about nets and about the mass distribution.

Door-to-door registration visits are often quick, leaving time for only a few key messages. During these visits, messaging should, ideally, emphasize:

- purpose of the registration visit
- what to bring to the distribution (i.e., coupon/wristband)
- importance and benefits to the whole family when they use their ITNs every night, throughout the year.

During distribution

All beneficiaries should be reminded of key information via mass media, town criers, or community announcements during the distribution phase:

- dates and venues of the distribution
- what to bring to the distribution (i.e., coupon/wristband)
- motivation to participate: this can include a reminder that nets are free, the protective benefits of nets, and normative cues, such as “everyone is going to pick up their nets.”

ITN hanging demonstrations and interpersonal communication (IPC) at distribution points should include the following:

- Provide general malaria messages, such as airing ITNs in the shade for 24 hours after removal from packaging, and the need for all household members to sleep under them all year.
- Where outdoor sleeping is common, ITN hanging demonstrations can provide examples of ways to hang ITNs outside for use at night.
- Offer ITN use and care messages (see Part B: ITN Use).

IPC should continue specifically focused on households that face barriers to obtaining nets or to accessing information about the distribution. Identify these households during microplanning and follow up during the distribution phase.

Post-distribution

(also see Part B: ITN Use)

After ITNs are issued to beneficiaries, mass distribution organizers should prioritize SBC for promoting and solidifying good ITN use practices. SBC is especially important at this stage because the impact of ITNs on malaria prevention will be low unless households consistently use the ITNs they received.

Continue post-distribution SBC for three to four months to encourage the consistent use of ITNs. Activities can include periodic radio and TV spots; IPC activities, such as through religious and traditional sermons/activities; group discussions, etc.

While hang-up campaigns were once widely implemented, the most recent evidence is mixed regarding their effectiveness in increasing ITN use. A study in Togo found a modest, but significant, increase in ITN use among pregnant women [7]. However, in Uganda, ITN use increased at the same rate in control and intervention sites [8]. We have observed that as countries implement their second, third, and fourth rounds of mass campaigns, people are familiar with ITNs and they know how to hang and use them. In general, more than 80% of those with an ITN are using it already. The money needed for a hang-up campaign can be better spent improving the thoroughness of household registration, improving net care practices, or conducting formative research to understand barriers to use in specific audience segments.

Key messages should include:

- Household members use nets all year (in both dry and rainy seasons).
- Net care: tie up the net when not in use; keep it away from children, rats, and sharp objects; only when dirty enough to require washing, wash the net with gentle soap in a basin; and dry the net in the shade, away from bushes.
- Use motivational cues, such as the benefits of net use and care; establish a social norm that everyone is expected to use nets.

- During activities when there is more time for discussion (such as during group discussions, talk shows, or dramas), it is particularly helpful to respond to general malaria questions and address concerns about side effects or myths and misconceptions. Use this opportunity to talk about repurposing old nets for beneficial purposes and discussion of other less commonly discussed benefits (a better night's sleep, free from nuisance bites, etc.).

Gender in the context of universal coverage campaigns

As countries shift from targeted to universal coverage campaigns, it will be important for them to update their SBC materials, not just reissue old materials from campaigns targeting pregnant women and children under five. Years of targeted campaigns have (appropriately) led populations to prioritize these groups in situations where households don't have enough nets for everyone in the household (see Part B: ITN Use) [9,10]. However, universal coverage campaigns create an opportunity to increase perceptions that *everyone* is at risk and *everyone* should use and care for ITNs. Expand messaging to include men and boys and to model positive gender norms [11]. Engaging men in the context of net use can be very important because of the role men have as decisionmakers in many communities. It is also important to understand the gender dynamics at the community and household levels when designing effective SBC.

The 2018 Liberia communication plan is one example of how gender can be integrated into SBC during and pre- and post-distribution:

- Liberia's 2014 Knowledge, Attitudes, and Practice survey found that while 85% of men felt they were involved in the decision on which sleeping space should use nets, only 57% of women felt the same. Similarly, only 50% of couples had discussed malaria prevention with their spouse. As a result, the communication plan included promoting shared decision making to ensure that all family members—women, men, boys, and girls, and the most vulnerable—sleep under an ITN.
- The plan specified that all graphics should portray women, men, girls, and boys as heroes and champions for preventing malaria in households and communities.
- The plan specified that vouchers list female adult members' name with the male household members, and that messaging should clearly state that a female adult household member can collect an ITN on behalf of the household and she does not need permission from her male partner.
- The plan specifically called for engaging both male and female leaders in advocacy and social mobilization.
- For areas with significant amounts of outdoor sleeping, the plan called for demonstrations of outdoor net hanging, with particular targeting to men and boys, because they are more likely to sleep outside.
- The plan specified equitable depictions of men and women, and girls and boys in conducting net care and repair.

The communication plan includes an annex with a checklist for identifying gender considerations affecting access and use of ITNs and planning SBC approaches.

Continuous Distribution

Use the same umbrella brand for SBC for continuous distribution as SBC for mass campaigns and also encourage ITN use and care. However, tailor the brands to each channel, mainly by emphasizing who is eligible for ITNs through that distribution method and how beneficiaries can obtain an ITN. While all distribution channels can use mass media, provider, and community engagement activities, SBC for continuous distribution should also leverage the unique opportunities presented by each channel.

Routine distribution through antenatal and immunization services

Routine distribution at health facilities usually involves distributing nets to pregnant women and children receiving routine antenatal or vaccination services. When coupled with mass distribution campaigns, routine distribution of ITNs through ANC and EPI vaccination clinics is a cost-effective way to help countries protect pregnant women and children under five from malaria [12]. Sometimes, routine distribution is also combined with school or community distribution.

ANC and EPI beneficiaries are targeted because pregnant women and children are biologically vulnerable to severe consequences from malaria infection. Pregnant women and caregivers are, therefore, the primary target audiences; their partners and other individuals who may influence the decision and ability of a pregnant woman and caregiver to travel to the health facility—for example, mothers-in-law—are important target groups, as well.

SBC for health-facility based ITN distribution can take various forms, from building facility-based staff IPC skills to radio and television communication, SMS reminders, community-based interventions that encourage ANC and EPI clinic visits and ITN usage, and efforts that encourage a supportive role for men. In general, SBC efforts that combine mass media with other approaches—such as IPC, community engagement, and information and communication technologies—are strongly associated with more positive attitudes about ITNs [12]. From an operational perspective, SMS messages can create a more enabling environment within clinics by reminding and motivating service providers to deliver key messages to ITN beneficiaries [13].

Regardless of the channel, community members should be informed about the following:

- The importance of starting ANC and EPI services as early as possible and completing the schedule of services.
- Who is eligible to obtain an ITN from ANC and EPI, and why they are prioritized.
- The importance and benefits to the whole family when they use their ITNs every night, throughout the year (rainy and dry seasons) for malaria prevention, a comfortable night's sleep, etc.
- How to care for ITNs—handle carefully; keep away from the sun; roll up when not in use; keep away from fire, children, food, and sharp objects; and repair when torn.
- Beneficial repurposing of old ITNs.

Training packages for providers or volunteers engaged in ANC/EPI distributions can include—

- How to organize health talks and demonstrations for beneficiaries waiting to receive services. This can include identifying knowledge gaps or misinformation about ITN use and care, in addition to managing group discussions and answering questions.
- How to provide one-on-one counseling during consultations.
- How to respond to challenges during health facility outreach, such as crowd control, informing beneficiaries of ITN shortages, or managing expectations for ineligible individuals.
- How to use counseling job aids (such as flip charts) to illustrate key points and serve as reminders for key messages to deliver.
- How to address provider attitudes about clients (such as biases against unwed or teenage mothers) that may deter these groups from obtaining ANC/EPI services.
- How to clarify provider misconceptions about the effectiveness of environmental sanitation as a malaria prevention method and encouraging them to emphasize ITN use and care, instead of intermittent preventive treatment in pregnancy (IPTp).

Currently, it is unknown whether routine distribution encourages earlier and more complete ANC and EPI attendance; however, this is a common hope shared by malaria, EPI, and ANC staff across countries. Where possible, for SBC for routine distribution, use similar umbrella branding as other malaria, ANC, and EPI platforms.

In Tanzania, the Wazazi Nipendeni (Love Me, Parents): Safe Motherhood campaign was developed to promote safe motherhood, including increasing early ANC attendance, sleeping under a treated net every night, and other critical behaviors. This effort complemented the National Malaria Control Program (NMCP)'s distribution of nets through ANC/EPI clinic visits. The campaign included radio and TV spots, text messaging, and print media, including client/provider materials that referred users to an SMS number for more information. Both clients and providers used the SMS service. Those exposed to the campaign (35.1%) were more likely to attend more ANC visits and sleep under a mosquito net, including other optimal behaviors.

In Rwanda, SBC programming for ITN distributions through clinics included community outreach featuring dramas, as well as videos and documentaries shown in ANC/EPI clinics, markets, and other public areas. Education sessions were held in high-traffic areas, such as markets and schools, using mobile video units; while other community sessions motivated beneficiaries to seek services. Community mobilizers also conducted IPC sessions in the mornings, complemented with home visits in the afternoons. Community health workers were trained to promote and monitor ITN usage.

School distribution

School distributions typically happen once a year. They are intended to maintain overall population ITN access after access has been scaled up to high levels. Unlike a mass campaign, nets are distributed to pupils in several targeted grades of primary school. Because school distribution is designed to be implemented in areas with high enrollment rates, most households in the targeted areas should receive multiple nets through this channel as their children age through the school system.

Tanzania has implemented large-scale school distribution for more than five years, and they implement SBC messages and activities for each annual school distribution in three phases: pre-distribution, during distribution, and after distribution.

- Pre-distribution messages focus on describing the program and which classes are targeted.
- Messages during distribution remind schoolchildren to keep their ITN safe and to take it home to their parents, including messages on net use.
- After distribution, messages focus on proper ITN use, net care, and sharing of any extra nets with family or neighbors who do not have school-age children.

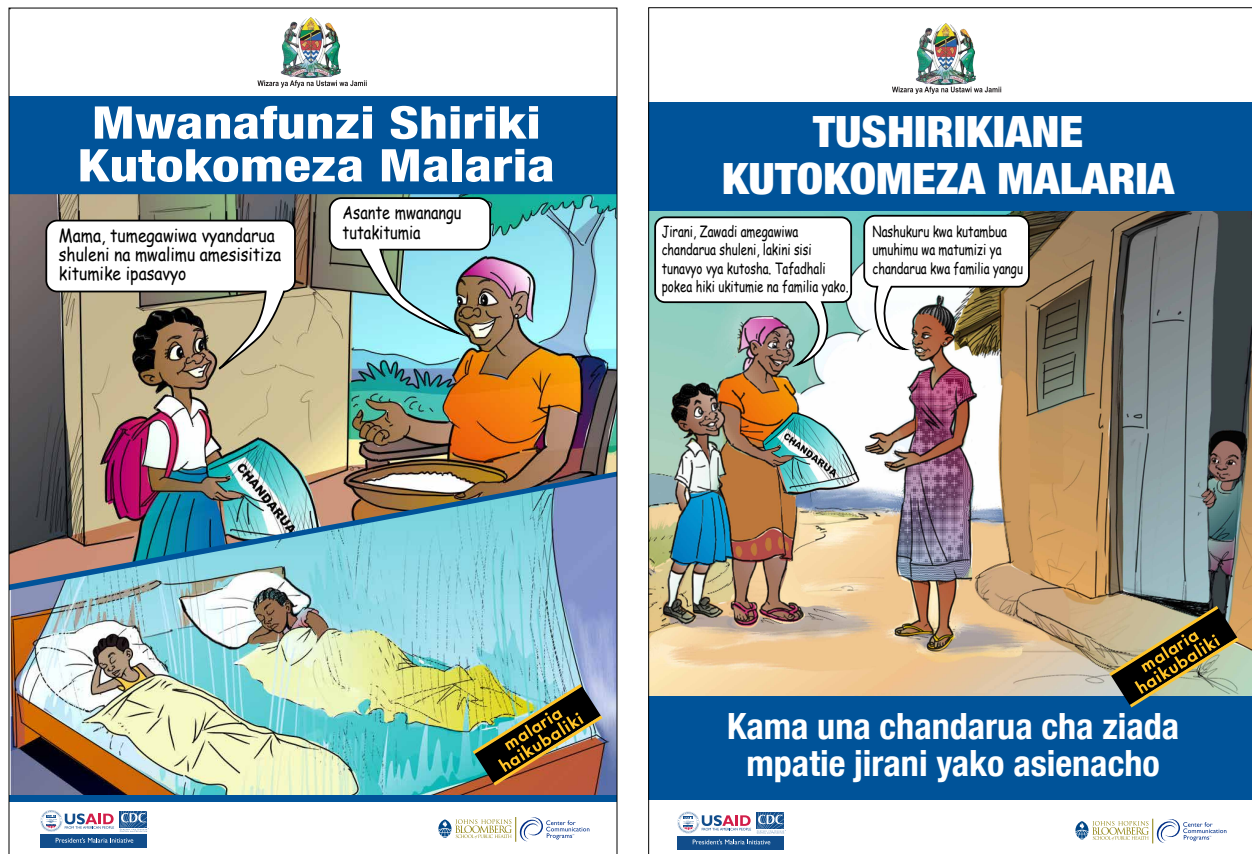
Messaging should indicate that the ITN is for the household, not necessarily the pupil who received it. Pilot programs have found that students often feel the ITN they receive is *theirs*, even if the student already has access to an ITN. As with other types of distribution, the household decides how its ITNs should be allocated. Data shows that school-age children are generally some of the lowest users of nets across all age groups. It is not yet known whether the source of a net (in this case, school) and being the bearer of the net to the household is associated with higher net use rates among school children; other analyses have found that gaps in net use rates across age groups tend to disappear when the household has enough nets [14].

Households that are left out may have sensitivities. In areas accustomed to mass campaigns, concerns may arise about making ITNs available for families with children in other grades, as well as households without school-age children. While most countries have tried to ensure communities understood why only some classes were included, none have cited it as a significant problem. Following are two examples of how this issue has been handled:

- Nigeria's Cross River State implemented a three-year pilot that distributed 50,138 ITNs to 1st, 4th, and 7th grades. Implementers explained that because of this selection of classes, most homes with children would receive at least one ITN every two to three years. Children entering those classes in future years will receive ITNs as well, so all school children will eventually get their turn [15].
- Tanzania has delivered 2.5 million ITNs to schoolchildren since 2013 [16]. As early as the first round, Tanzania focused on framing ITNs as community resources that should be shared, not only with family members, but with neighbors and community members that might not have a net. By distributing multiple ITNs to the same schoolchildren during consecutive years, many families may have ended up with more ITNs than they needed, and they were encouraged to share those ITNs with families that did not have children in school. ITN sharing messages were creatively developed by drawing on popular *sharing* beliefs in Tanzania, such as *kanzuri kula na mwenzio*: "sharing is caring." ITN sharing increased from 1% to 18% during four rounds of distribution [17].

SBC channels and activities for school distribution vary according to countries' existing school malaria activities. Tanzania, for example, built on a malaria children's radio show, called *Pata Pata*, which was accompanied by school and community activities led by community change agents and teachers. To support the school distribution program, Tanzania created additional materials (posters, radio spots, as well as cue cards for community change agents and teachers) specifically about the school net program, bringing the net home from school, and using it every night.

Figure 4. Posters from the Tanzania school distribution program



Translations:

Poster on the left: "Let's cooperate to eliminate malaria." Mother on the left: "Zawadi, my child received this net in school, but we are gifting it to you because we have enough. Please receive this for your family." Neighbor: "Thank you for recognizing the importance of net use for my family."

Poster on the right: "Students work together to eradicate malaria." Student: "Mother, we were given mosquito nets at school, and the teacher emphasized it be used properly." Mother: "Thank you, my child, we will use it." Note the use of the national malaria brand, "malaria haikubaliki – malaria is unacceptable in both posters."

Sensitization of leaders, students, beneficiary households, and communities about school distributions has been done primarily through parent-teacher associations, students and, at times, through radio spots or community meetings. Ghana has used school dramas successfully for several years; students are given scripts and school performances are held for the community. Most countries consider the parent-teacher associations as helpful in clarifying questions from parents and encouraging families to spread the word. This sensitization approach appears to have worked well in many settings [18].

Job aids for teachers are the primary print material for school ITN distributions. Simple and short frequently asked questions laminated cards are reported as extremely useful. Ghana and Nigeria produced teachers' guides, booklets describing key messages and activities teachers can include in assemblies, class lessons,

and during school distribution. Nigeria also created a “malaria protection pledge,” which is taught in class and reinforced with a wall poster; students promise to use a net every night and encourage others to do the same. Given the limited supervision and monitoring, it is unclear how often teachers conduct SBC about malaria prevention before, during, and after school distribution; although supervision visits have found that most teachers tend to hold a short educational session about malaria and/or teach a song about malaria even without SBC materials on hand. While mass media provides greater control over the quality of messaging, the influence teachers have on students is extremely valuable, so SBC interventions aimed at improving the accuracy and appropriateness of messaging by teachers can be very important [18].

Community-based distribution

In a community distribution program, household members typically request a coupon from a community health worker or local leader, who then validates the household’s eligibility for a new ITN. The household member can exchange the coupon for an ITN at a health center or other pre-established distribution site. Unlike a mass campaign (which may also use ITN coupons), not all community members are eligible at the same time. Eligibility criteria can include having a pregnancy or new birth in the household, being newly arrived in the area, having an ITN that is too torn to use, or having had a fire or other disaster, among others. Community distribution is a flexible distribution channel because the eligibility criteria can be modified based on current coverage levels and other unique contextual factors (such as refugee returnees in South Sudan) [19].

Generating demand is critical because community members must request a coupon to initiate the sequence of community distribution. To achieve high program effectiveness, informing the population about the distribution scheme and carefully explaining how it works should be emphasized during roll out. In the endline evaluation of a pilot in Nigeria, only 32% of households surveyed had heard of the program, and the proportion of households who received ITNs was extremely low. Part of the reason was that, among the households who had heard of the program, 41% said they didn’t understand how the program worked [20].

Happily, pilot projects show that communities are generally pleased by the idea of a community-based distribution model. Enthusiasm is particularly high in areas where ITNs have previously been available only intermittently (through campaigns) or only to the traditional target groups of pregnant women and children under five. The novelty or relief at being able to obtain a generally expensive and hard-to-find commodity often results in a secondary diffusion of information. In the Nigeria pilot, 59% of survey participants who had heard of the program said that they had informed others about it.

Community health workers or community leaders are often the ITN coupon holders. In addition to sensitizing the community about the service, to encourage ITN use and care, they should ideally provide IPC when visiting the household to verify eligibility and coupon issuing or when following up on the household.

Mass media should be considered case-by-case, based on data about the local population’s mass media utilization and radio coverage. In a community distribution pilot in Madagascar, radio spots were aired across the implementation district. While one radio spot focused on boosting participation in the program, the second spot focused on ITN use, care, and repair. In hard-to-reach areas without radio coverage, IPC was the main channel. Because poorer households are less likely to own a radio (23% among the poorest quintile compared to 72% among the richest quintile in Madagascar), community health workers may also need to target these households/villages [21].

Similarly, leverage traditional and religious leaders. Their support is crucial in obtaining community acceptance of the eligibility criteria and net acquisition process. In the Madagascar pilot, these individuals were responsible for issuing ITNs to households that had ITN coupons, so they also had a unique opportunity for IPC during net issuing.

Messaging for community distribution should include [22]:

- Who is eligible to receive an ITN coupon? Heavily emphasize the criteria prior to distribution to ensure the communities are aware. Repeat the criteria throughout the distribution to remind the community of the availability of ITNs.
- How to obtain and redeem a coupon? Sensitize the communities about the process for receiving a coupon and then an ITN. Community members should understand that only one ITN per coupon will be issued.
- Other ways community members can obtain ITNs are through mass campaigns every three years, retail sales, ANC, or EPI, etc.
- Explain the importance and benefits to the whole family when they use an ITN every night, throughout the year (rainy and dry seasons): malaria prevention, a comfortable night's sleep, etc.
- How to care for ITNs? Handle carefully; keep away from the sun; roll up when not in use; and keep away from fire, children, food, and sharp objects; and repair when torn.
- What to do with old nets? This is particularly relevant to community distribution because "nets are too torn to use for sleeping" is often a criterion for eligibility.

SBC strategies should promote equity across socioeconomic levels. The lowest socioeconomic quintile (67.2%) in the South Sudan pilot was significantly less likely to hear about community distribution than the richest quintile (88.3%) [23]. In contrast, in Madagascar, the highest socioeconomic quintile was the least likely to use the community distribution channel and request an ITN coupon. It is not known what factors led to these outcomes and what could be done to ensure more equitable outcomes in the future. However, to ensure audiences across the socioeconomic spectrum have equitable access to messaging and ITNs, community distribution organizers should conduct formative research and analyze existing data for each of the potential audiences [22].

High awareness about the community distribution program, especially when it has been some time since the previous distribution, leads to high early demand for ITNs. Some early stockouts may result, because the distribution will likely fill gaps in coverage from recent campaigns; for example, households may not have received enough ITNs due to a cap or shortage of nets, or households were missed by the campaign entirely [19]. Prepare ITN coupon holders and issuers to manage community expectations and maintain trust. Advance planning for an early resupply will be key, as is training ITN coupon holders and issuers to respond to such potential concerns, as well as ample coordination and communication about resupply timelines.

Private sector

At best, campaigns have only been able to raise population access to around 80% [24]. As a result, demand for ITNs still remains after a mass campaign. The private sector can play a role in filling gaps from campaigns: replacing old ITNs through retail sales, systems like workplace programs, or social marketing schemes. Customers with disposable income can have their choice of size, shape, color, etc. [25]. However, most households cannot afford full-price ITNs, so retail schemes tend to focus on urban, higher-income customers.

An assessment of a social marketing program in Senegal primarily targeting urban residents in the capital, Dakar, found that ITNs from the program were as likely to be used as ITNs from the mass campaign (see figure 5) [26]. The ITNs were positioned as providing a good night's sleep (no explicit mention of malaria) for a thousand nights, or one franc a night; and aspirational marketing materials featured comfortably well-off men. There was still some room for improvement in the overall net culture in Dakar, however, as 81–87% of nets from any source were in use. The design of the materials and the study findings echo results from other studies that have found lower net use rates in urban areas, likely due to lower perceived visibility of mosquitoes (see Part B: ITN Use). Those who were exposed to the SBC campaign were more likely to own a socially marketed net, and SBC exposure and ownership of socially marketed nets were positively associated with the wealth quintile.

Figure 5. Poster from Senegal social marketing campaign



Translation: “Are mosquitoes invading your nights? MILDA, (the brand name and acronym for long-lasting insecticide-treated net) the net that kills mosquitoes.”

A study in Tanzania on consumer preferences and willingness-to-pay for ITNs sheds some light on the rural side of net demand [27]. Results indicated that access was a greater predictor of people’s willingness to purchase ITNs than income. Rural households (who tended to have larger families and were more likely to have pregnant women and small children) had greater coverage gaps and were, therefore, more likely to purchase nets, compared to urban households. Although higher prices reduced demand, the effect was small.

Consumers overall had very high rates of awareness about malaria prevention and their families’ perceived risk of contracting malaria, as well as high rates of exposure to SBC in the preceding six months. These factors, however, did not predict the decision to purchase nets.

Both poor and less poor households were willing to pay more for certain net options, such as larger (most desired), treated, and rectangular nets. Approximately 20–25% of participants were more likely to pay the higher price when presented with identical nets, perhaps due to a belief that expensive nets were more likely to be effective, as well as the suspicion that cheap nets may be counterfeit/fakes.

The study suggests that, in Tanzania, perceptions of risk and knowledge of malaria are at such normative levels that they do not predict the choice of net purchase. Rather, net attributes are more instrumental to this purchase for all customers, including and—especially—rural ones.

A three-country study found significant leakage (illegal sales) of campaign ITNs in Tanzania, Nigeria, and Ghana, and a significant amount of sales of counterfeit nets in Nigeria and Ghana. According to retailers, leaked ITNs were, by far, the best moving products, suggesting that mass campaign SBC influences brand preference. Counterfeit ITNs can have a detrimental effect on the markets (which are intended to complement the public sector efforts of sustaining high levels of coverage), but they also provide limited protection if they do not contain insecticide or the insecticide is not long-lasting, as claimed. As this issue becomes further studied and understood, SBC may be needed to assist governments and household with identifying counterfeit ITNs [28].

Part B: ITN Use

On a home visit during an anti-malaria campaign in Senegal, a healthcare provider explains to a woman the necessity of sleeping under mosquito nets and their proper use.

© 2012 Diana Mrazikova/ NetWorks, Courtesy of Photoshare



For many years, the malaria community’s understanding of ITN use was based on a misleading comparison of “people who used an ITN the previous night” with “households that owned one or more ITNs.” This comparison was flawed because it ignored the fact that these *households did not necessarily have enough ITNs to cover all family members*. People can’t use a net if they don’t have one.

In 2013, however, indicators and analysis approaches became available to explore ITN use in the context of ITN access—that is, looking at how many people have a net available to them to use in their own household (access) compared to people who actually used a net. This comparison is called the “ITN use-to-access ratio.” This section describes the ITN use-to-access ratio, how it is calculated, and how it can be used to measure behavioral gaps in net use. Trends in the ratio over time, by country, age and gender, and by season are also presented. The ITN use-to-access ratio is a powerful indicator that helps program managers identify groups who are not using available nets, and should, therefore, be targeted for net use messaging.

Other dimensions of ITN use include net care, as well as outdoor sleeping and management of old nets (whether repurposing or disposal). The determinants of these behaviors and implications for SBC are also discussed in this section.

Measuring the Net Use Gap: the Use-to-Access Ratio

When planning SBC activities, to improve ITN use, it is crucial to understand how many people have an ITN to use. While it may seem obvious that no one can use an ITN if one is not available, the way ITN indicators have traditionally been reported has obscured this fact. The proportion of households that own at least one ITN includes households that may only have one or two ITNs, and may not be nearly enough for all their household members. Large households (seven or more), especially, seldom have enough ITNs to cover all household members, so not all household members can use an ITN [24].

To improve net use rates, SBC programs must understand ITN use levels among those with access to an ITN: or the use-to-access ratio. This is because different SBC activities are needed to increase access (i.e., more nets) versus ITN use among people who have access.

The use-to-access ratio comprises two indicators that, together, calculate how many people who have a net are using one.

1. Calculate “the proportion of people with access to an ITN within their household.” This indicator is reported in the Demographic and Health Survey (DHS) and Malaria Indicator Survey (MIS) reports. If we assume that each ITN can protect two people, we can add up the number of ITNs in the household, multiply that number by two for the number of potential *net spaces* in the household; then relate that sum to the number of individuals in the household. The number of individuals in the household divided by the number of potential *net spaces* available gives the proportion of people with access in that household. This is then calculated across all individuals in the dataset to obtain the national estimate.

The use-to-access ration: What proportion of people are ACTUALLY using an INT out of people who COULD use one?

Calculation:

$$\frac{\% \text{ people who used a net the previous night}}{\% \text{ of people with access to an ITN}^*}$$

**Not the proportion of households that owns an ITN. This indicator is not comparable with net use because households are different from people.*

2. The second indicator is the proportion of people who used an ITN the previous night. Divide the proportion of individuals who used an ITN by the proportion of individuals with access.

The use-to-access ratio tells SBC programs about the “culture of net use” in a given country or geographic area. When the use-to-access ratio is higher than 0.80 (consider this as about 80% of those using an ITN, among those who have access to one), most people are using nets if they have them. In many cases, the ratio can exceed 1.00, when more than two people share an ITN, on average. For example, in Madagascar, the use-to-access ratio ranges (over time and surveys) from 1.01 to 1.19—reflecting that people in Madagascar use ITNs at high rates, and more than two people sleep under an ITN (often children).

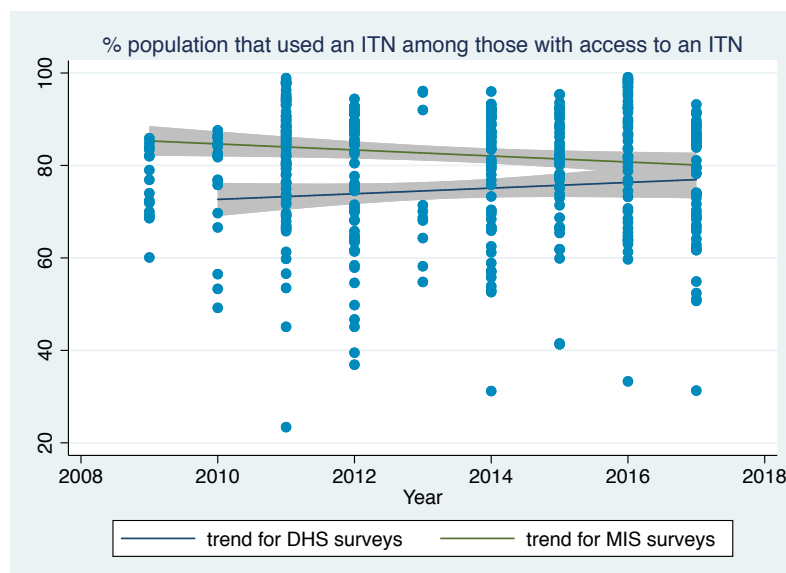
The [ITN Access and Use Report](#) reports on each of these indicators—the proportion of households owning at least one ITN; the proportion of the population that has access to an ITN within their home; the proportion of the population that used an ITN the previous night; and then the use-to-access ratio. The report provides this data for every DHS, MIS, and Multiple Indicator Cluster Survey where datasets are publicly available and are updated once every one–two months as new datasets are released [19].

General trends in ITN use among those with access

Trends over time

Globally across malaria endemic countries, the use-to-access ratio has remained stable and high (mean=80%) during the last decade or so (both globally and in PMI-supported countries), indicating that net culture may be stronger than previously thought. Figure 6 shows the use-to-access ratio plotted for 89 surveys, calculating regional mean use-to-access ratio (391 data points); there is no statistical change in the mean use-to-access ratio during this period, although there is a wide range of values.

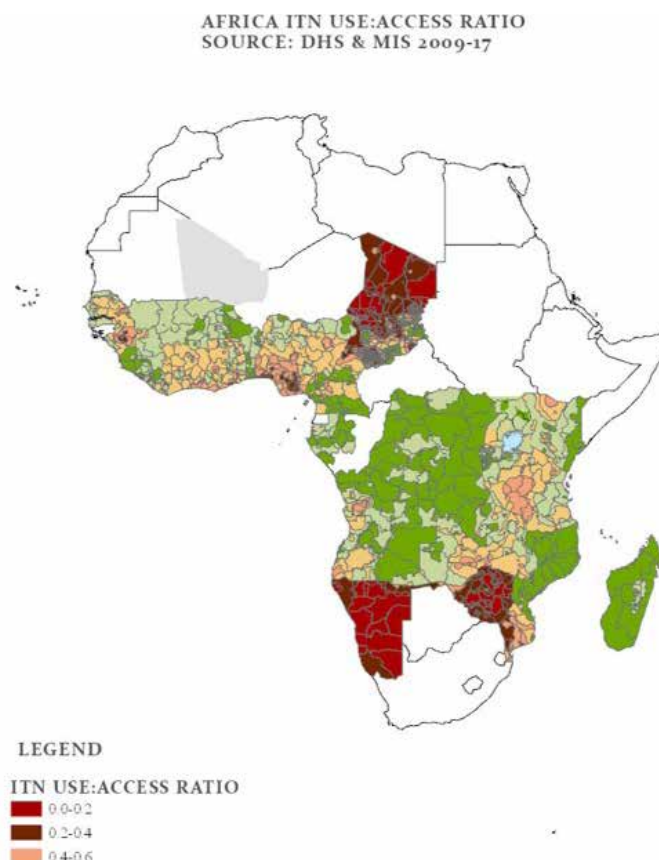
Figure 6. Percentage of population using an ITN among those who have access to an ITN (regional/provincial mean), 2009–2016



Trends over geography

The map in Figure 7 shows the color-coded ITN culture across malaria-endemic areas where survey data and geospatial data are available. Large parts are light green (use-to-access ratio >0.80) or dark green (use-to-access ratio above 1.00), indicating strong ITN use behaviors in these zones. The yellow color indicates areas with medium levels of net use, and red areas indicate quite low use-to-access ratio. These yellow and red areas tend to concentrate in urban areas (e.g., Lagos, Accra, and Maputo), as well as areas of higher elevation (Fouta Djallon region in Guinea; parts of Kenya and Tanzania) and/or lower malaria risk (Zimbabwe; southern Mozambique). However, in several areas the map is yellow or red where malaria risk is still high, as in Ghana, Nigeria, Côte d'Ivoire, and parts of Guinea. In some cases, this may reflect data collection conducted in the dry season, a time when individuals may not consistently use their ITNs.

Figure 7. Map of use-to-access ratio interpolated across sub-Saharan Africa; data are taken from the most recent survey in each country [29]



Key determinants of ITN use among those with access

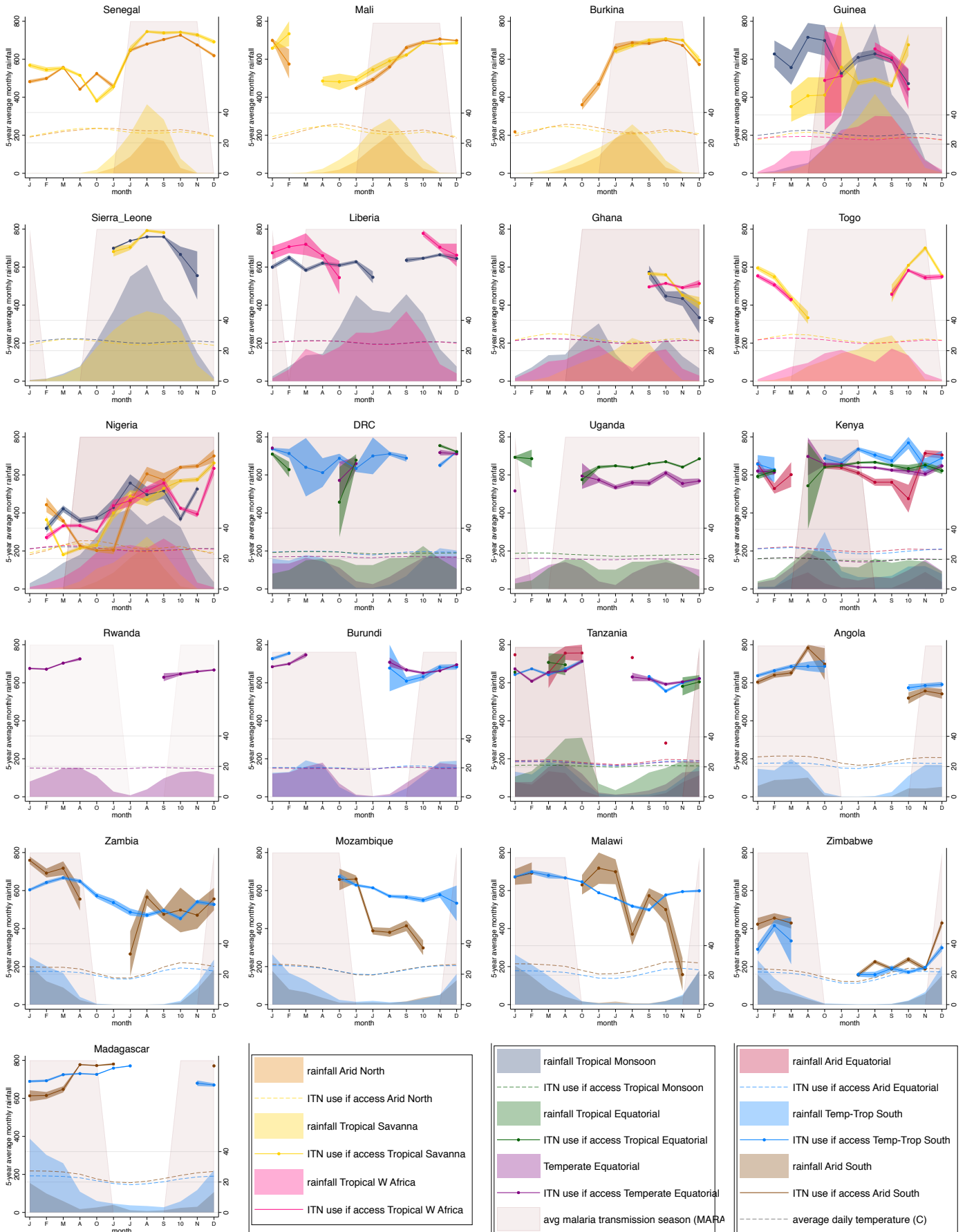
Research conducted using data from 89 MIS and DHS surveys has shown that after people have an ITN to use, key determinants of use are the season of data collection, urban/rural residence, and wealth quintile. All determinants appear to be related to perceived malaria risk. The ITN use tends to drop off in the dry season in areas that have one rainy season a year, because they have fewer mosquitoes. Similarly, ITN use tends to be significantly lower in higher wealth quintiles (particularly in urban areas), because these households may have improved housing or even air conditioning, making their homes more mosquito-proof. Wealthier and urban households may also feel that they have easier access to diagnosis and treatment for malaria [30].

Other studies that assessed self-reported reasons for not using a net when one is available found that a perceived lack of mosquitoes, as well as discomfort due to heat; these were the most common reasons given for not using a net [31]. These findings tie into seasonal trends.

Seasonality

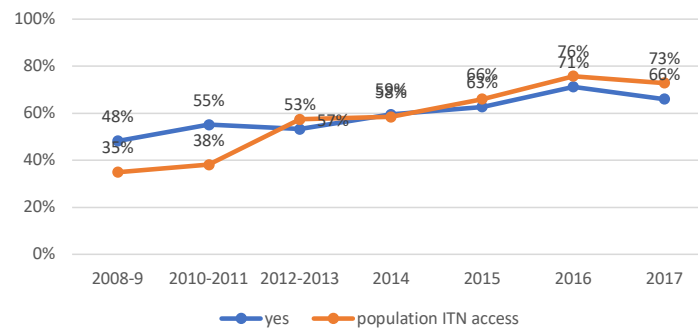
Figure 8 shows seasonal trends for ITN use among those with access in countries that have a seasonal rainfall pattern. Calculating ITN use among those with access for each month that DHS or MIS survey data was collected, it is clear that ITN use dips as the dry season progresses, then it appears to climb as the rainy season progresses, into the high transmission season toward the end of the year. Moreover, ITN use tends to peak during the average transmission season in each country. This data strongly suggests that ITN use is triggered by increased mosquito density as the rains begin, as well as increased perception of risk from malaria. In countries like the Democratic Republic of the Congo (DRC), Rwanda, and Uganda where rainfall occurs year-round, mosquito density (and ITN use behaviors) are more stable throughout the year.

Figure 8. Proportion of people using an ITN the previous night, among those with access, in different climate zones across sub-Saharan Africa (see legend). Pooled data from 31 DHS MIS datasets, 2006-2017.



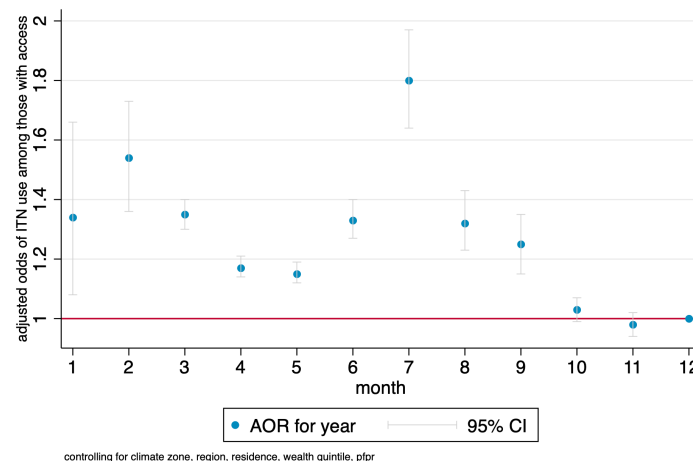
Programs need to consider (1) whether the country has a significant seasonal issue; and, if that is the case, (2) how to address the seasonal use of ITNs. Senegal has implemented an SBC campaign since 2009 called *Trois Toutes* (Three alls). In addition to the usual messaging about the benefits of the ITN use, the campaign was distinctive for its brand and slogan. *Trois Toutes* emphasized net use for all family members, all night long, all year-round. The proportion of survey respondents that said members of their household use mosquito ITNs all year rose consistently from 2008 to 2016 (see figure 9). However, the wording of the question is unclear whether households are not using nets all year because they do not have a net to use, or because they choose not to use their nets during parts of the year. The fact that the trend in the yes answer to this question tracks with levels of population ITN access indicates that the former might be correct. This illustrates the importance of how the question is constructed.

Figure 9. Senegal MIS and DHS surveys 2008–2017: Do household members use nets all year long?



However, we can assess changes over the years with the odds of ITN use among those with access, controlling for background factors and looking at each month of the year differently. Since 2012, when Senegal began implementing continuous DHS surveys, there has been a wealth of data on ITN use from different parts of the country for most months of the year. Changes over years may indicate the impact of SBC interventions. Figure 10 suggests that the greatest gains in ITN use behaviors over time were in February and July, with positive increases in all months of the year except October, November, and December. Because the October–December period was already peak, it appears that there is some evidence to suggest that ITN use has increased in both the dry and rainy season during the past several years.

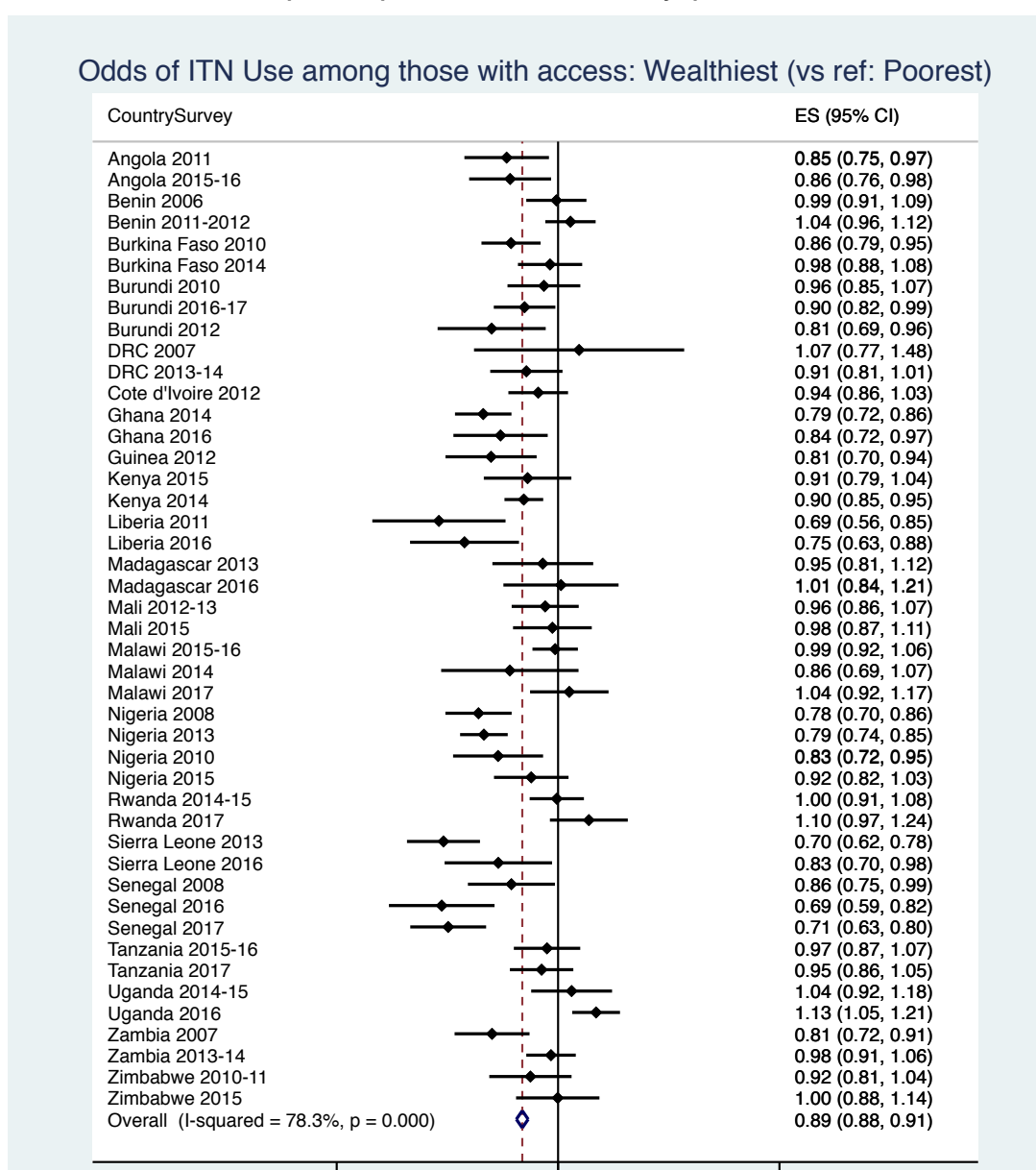
Figure 10. Yearly changes since 2012 in adjusted odds of ITN use among those with access in Senegal, by month of the year



Socioeconomic status

The use-to-access report shows use-to-access ratio (UAR) rates by wealth quintile in each country. In almost all the countries, UAR levels are generally the same across all wealth quintiles, although some past surveys have shown slight dips in UAR among the wealthiest quintile (i.e., Angola, Côte d'Ivoire). Ghana and Nigeria, however, are starkly different. The richest quintiles have (by far) the lowest UAR rates. In Nigeria, for example, the UAR from the 2016 Multiple Indicator Cluster Survey was 0.68 for the wealthiest versus 0.91 for the poorest. It improved from 0.49 versus 0.82 in the 2015 MIS. In Ghana, the ratio was 0.40 for the wealthiest versus 0.81 for the poorest, according to the 2016 MIS. Figure 11 shows that this association holds when examining the odds of ITN use among those with access, controlling for background factors (residence, month of survey, region) and comparing the wealthiest to the poorest wealth quintile. Over several surveys from PMI-focus countries, the odds of ITN use by those in the highest wealth quintile were 20% lower, on average, than for the poorest wealth quintile.

Figure 11. Forestplot of odds of ITN use among those with access wealthiest vs poorest quintile. MIS and DHS surveys post-2010.



Implications for SBC: Programs need to consider whether it is worth targeting wealthier urban individuals who are not using the available ITNs, particularly because these populations generally have few malaria episodes per year; and, when they do fall ill, they have better access to treatment. These populations may have other bite-prevention strategies they prefer over ITNs. On the other hand, some messaging could apply to all, including the wealthier quintiles. For example, it may be worth promoting that it is better to avoid malaria completely rather than pay for treatment, even if it is once in a while; especially because malaria can quickly develop into a deadly disease for children, with potentially debilitating effects.

Associations with levels of parasite prevalence

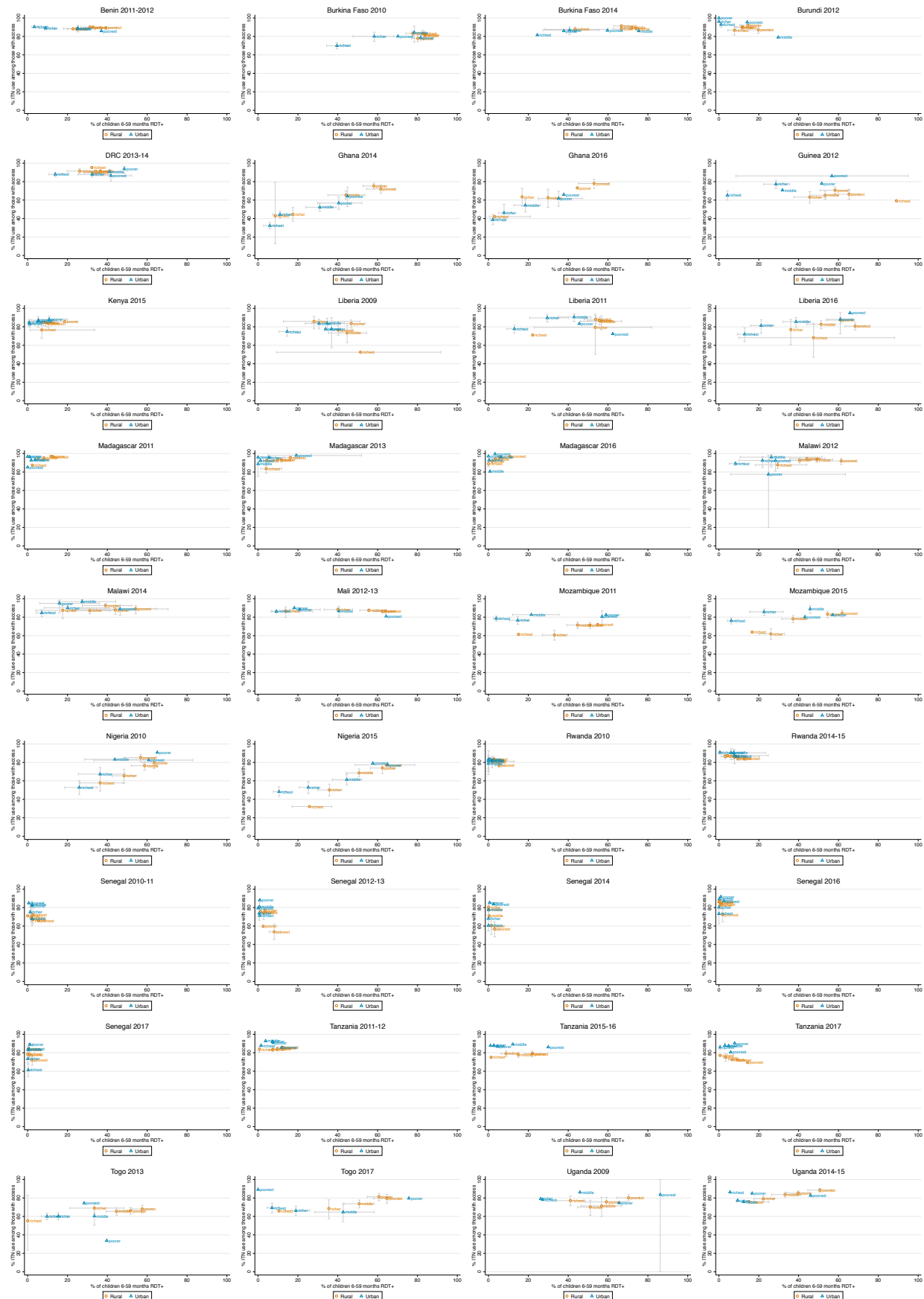
In some countries, as the level of transmission declines, clear patterns are often seen in available data, indicating reductions in ITN use behaviors. In Figure 12, both Ghana and Nigeria show declining rates of ITN use among those with access as the proportion of children with a positive rapid diagnostic test also declines. This does not mean that ITN use increases prevalence—it means that where malaria is common, people are using their available nets. Where malaria is less common, people are not using their nets as much. In Ghana and Nigeria, wealth quintile and residence (urban/rural) mediate this relationship—richer quintiles use ITNs less and also have lower rates of parasitemia. This trend is less pronounced, but still apparent, in Liberia, Mozambique, Togo, and Uganda. However, in other countries, ITN use behaviors are all high and seem unrelated to the level of parasitemia, wealth quintile, or urban/rural status. It's important to note that wealth quintiles in the DHS and MIS surveys are not consistent across countries—that is, the *richest* quintile in DRC is not as rich as the *richest* quintile in Nigeria. Our hypothesis is that a significant number of households in Ghana and Nigeria are so well-off that they have little risk of malaria and perceive little need for ITNs. These households exist in other countries, but may comprise a smaller proportion of households.

Strong cultures of ITN use provide an aspirational example for other countries, but SBC resources may not be placed at the best (or most politic) use if they are spent on wealthy, urban residents at low risk of malaria (as in Ghana and Nigeria). Figure 2 (decision tool) illustrated that areas with low UAR and parasite prevalence over 25% should receive SBC attention, due to the risk of malaria. Analyses like this may be helpful for identifying potential target populations and segmenting further.



A community change agent (CCA) shows children in Tanzania a flipchart about malaria. CCAs work through the USAID-funded COMMIT project. © 2010 JHUCCP/USAID COMMIT Project, Courtesy of Photoshare

Figure 12. Plots for PMI-focus countries of ITN use among those with access against parasitemia in children 6-59 months as measured by RDT, stratified by wealth quintile and residence.



MIS and DHS survey datasets with RDT testing, 2009-2017

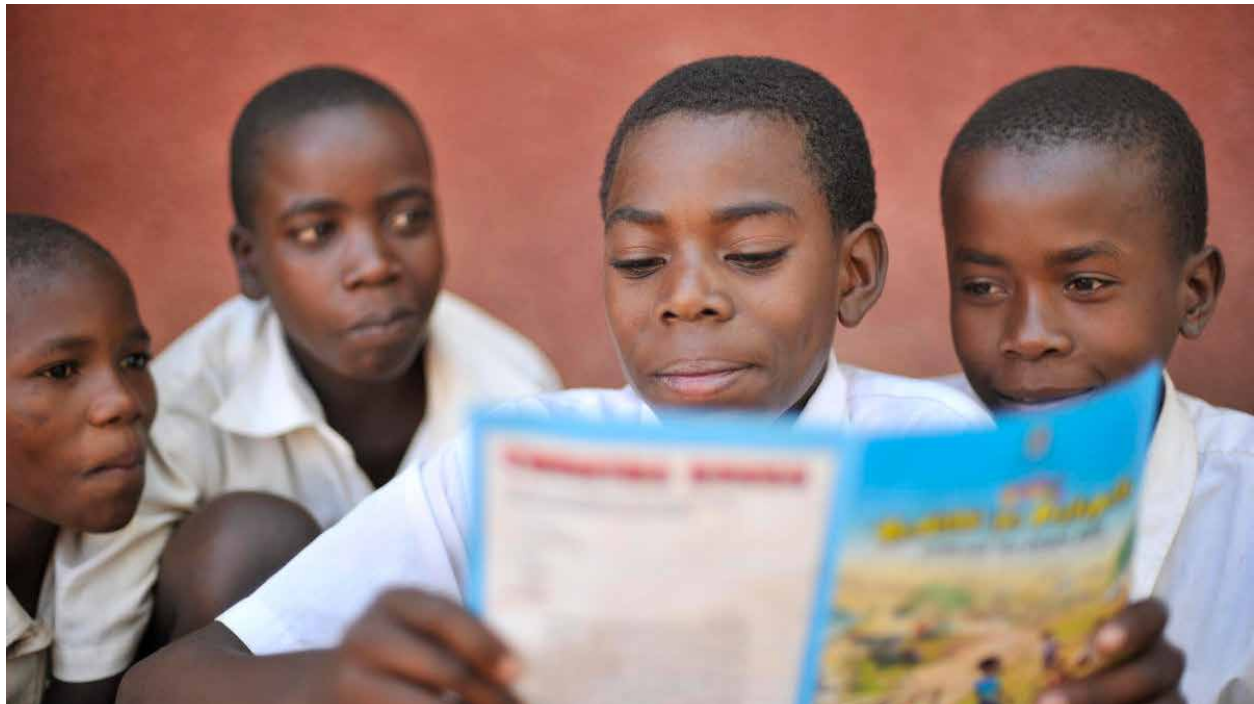
Age and gender

Studies show that women and children under five, in all settings, continue to be prioritized for ITN use [10]. School-age children are commonly the least-prioritized and have the lowest rates of ITN use compared to other age groups. Figure 13 illustrates this pattern across nine different countries. For the most recent DHS or MIS in each country, the authors calculated the percentage of people sleeping under an ITN, disaggregated by age group, gender, and household ITN supply [9]. Two categories of household ITN supply were included: households that own at least one ITN for every two people (full coverage; solid line in graphs) and households that own at least one ITN, but not enough to have one for every two people (partial coverage; dotted lines). The y-axis shows the percentage of people who slept under an ITN the previous night (not accounting for access), and the x-axis shows the age groups.

There are a few key trends:

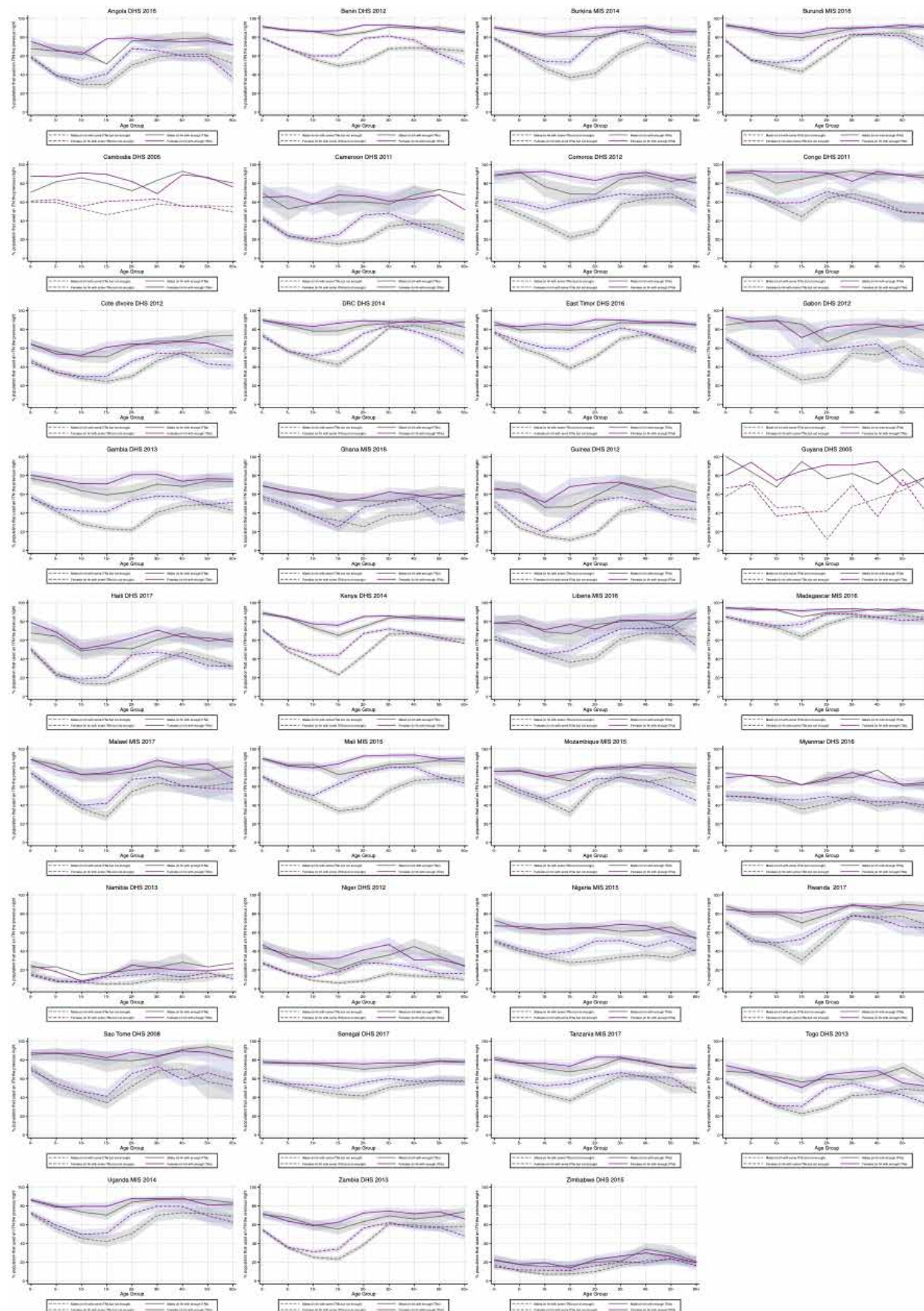
1. Young children (0–5) and women of reproductive age are prioritized when the household doesn't have enough ITNs.
2. In households with not enough ITNs, older children are least likely to have used an ITN the previous night.
3. These age and gender differences in ITN use almost always disappear when the household has enough ITNs.

Note that MIS surveys are generally conducted in the rainy/high transmission season, and DHS surveys are done more often in dry season; therefore, there are higher overall ITN use rate in MIS versus DHS. It should be kept in mind that demographics of the different households (with enough versus not enough nets) are quite different—households with enough ITNs are generally much smaller (3–4 people/household) and may be more urban.



Students read an educational comic book about malaria given out with the mosquito nets at Ilemela Primary School in Tanzania. © 2016 Riccardo Gangale/VectorWorks, Courtesy of Photoshare

Figure 13. Percent of individuals using an ITN, stratified by age, gender, and household supply of ITNs (enough and some-but-not-enough), for 35 malaria endemic countries' most recent DHS or MIS survey, 2005-2016)



Social and Psychological Determinants

The *Malaria Behavioral Survey*, a comprehensive survey measuring various social and psychological determinants of net use (sometimes referred to as ideational variables), found that these determinants vary from country to country. Besides having enough ITNs for the number of household members, no social or psychological factor was predictive of ITN use in every setting. Significant factors included—

- **Madagascar:** The two most significant ideational predictors of ITN use were the caregiver's perception that ITN use was a norm in her community and her awareness of where to procure a bed net.
- **Mali:** The most important caregiver's ideational variables were her perceived self-efficacy for obtaining ITN and her malaria-related knowledge.
- **Nigeria:** Perceiving ITN use as a community norm, having a positive attitude toward nets, believing in one's ability to use nets, and believing in the effectiveness of nets was associated with net use on most nights compared with rarely/never.
- **Liberia:** Perceptions about the severity of a malaria infection and perceptions in one's own ability to detect a malaria infection emerged as predictors [2–5].

These studies suggest two things. First, integrating multiple determinants, such as social norms and self-efficacy, into SBC strategies could result in more effective SBC programs. Second, formative research is needed to understand these determinants among people who have access to ITNs, but are not consistently using them.

Other factors, such as heat, feelings of suffocation from the smell of the insecticide, and/or the size or shape of the net have also been documented as barriers to net use [31,32]. As the following sections show, households have been surprisingly adaptable. Despite stated preferences for net shape, size, and color—on the whole—they use the nets they are given. Similarly, concerns about heat can be managed by sleeping outdoors. Demonstrating how to set up nets for various types of outdoor contexts, as well as social acceptability and encouragement, may be useful to model for households during SBC activities.

Preferences for ITN Characteristics

Preferences for shape

In sub-Saharan Africa, a recent analysis showed that individuals with preferences for a certain shape of ITN (conical/rectangular) do not use their ITNs less if they have the *less preferred* shape [33]. Overall, ITNs of different shape were used at the same rates. Users do have preferences, not just for shape, but also for size and texture, but these do not appear to influence overall rates of ITN use at a population level to the point that special procurements need to be made. It is crucial to point out that very few households have an excess of ITNs from which to choose, and households must use the ITNs provided to them. It is, thus, nearly impossible in this context to observe differences in use that are driven by preferences. Reported preferences for conical shape increased with increasing wealth quintile, suggesting that these households may be able to afford to buy the net they prefer. Although an expressed preference for conical nets has been documented in several countries, rectangular nets are significantly less expensive, allowing countries to procure more nets with the available resources.

NMCPs in Guinea, Senegal, and Zimbabwe knew conical ITNs were often preferred, but they did not have proof that ITN preference affected use rates. As a precaution, however, they introduced rectangular ITNs by teaching households about the importance of using ITNs and how to transform a rectangular net into a conical net. Zimbabwe's communication plan emphasized that rectangular nets are as good as conical nets.

Importantly, the plan emphasized the key benefit of flexibility: rectangular ITNs can be used anywhere (circular hut; modern house; room used for multiple purposes, like sleeping and cooking; outdoors; in temporary shelters used for guarding fields) and they showed pictures of conical and rectangular transformed nets for both indoor and outdoor uses (see Outdoor Sleeping). By positioning ITN use as possible in all situations, including challenging ones like outdoor sleeping, and regardless of ITN shape, the plan ultimately aimed to increase the overall culture of net use in Zimbabwe (also see the case study on Zimbabwe in Part C. Indoor Residual Spraying and ITNs).

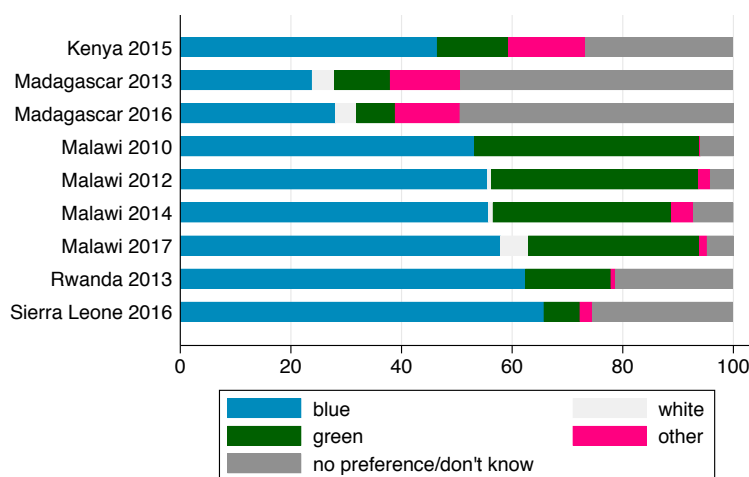
[Instructional video](#) from Senegal on how to turn a rectangular net into a conical net [34].



Preferences for color

As with shape, color preferences have not been widely assessed (see figure 14). Limited surveys ask respondents about their color preferences. The majority of respondents across the nine surveys where this question was asked prefer blue nets. White is the least preferred major color.

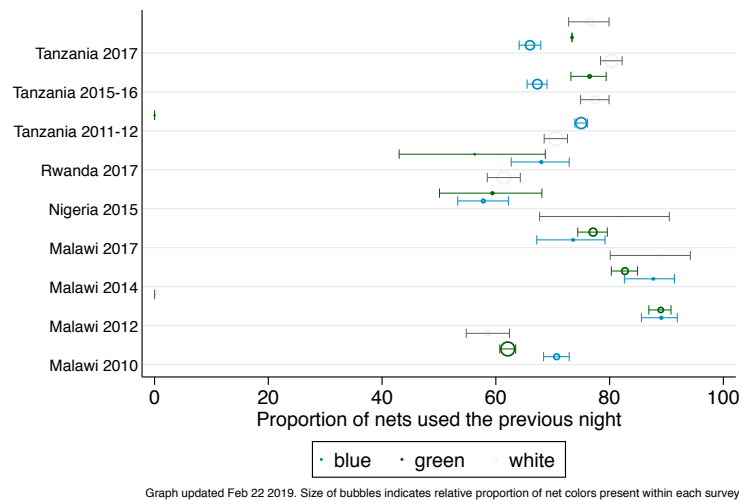
Figure 14. Reported net color preferences from available surveys



Graph updated Feb 22 2019 with available MIS and DHS data, Hannah Koenker PMI VectorWorks

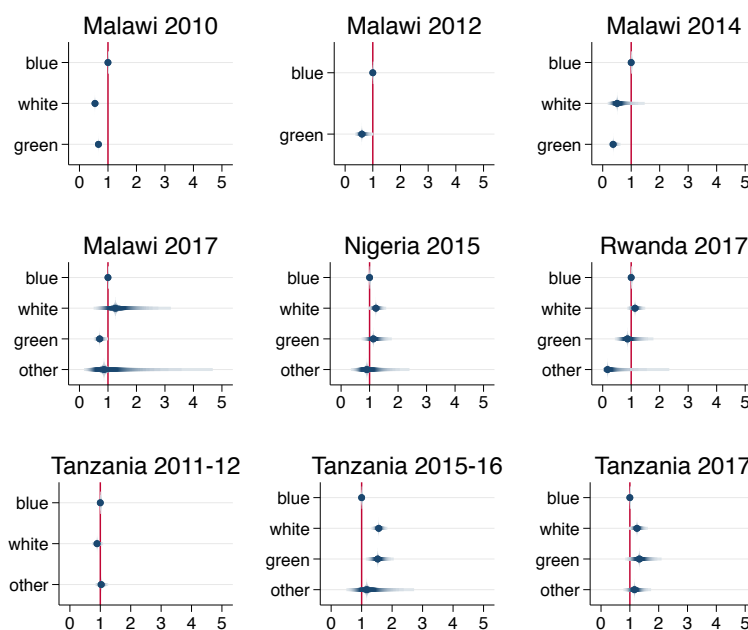
A separate small set of surveys observe the color of nets in households, which can be used to calculate the proportion of nets used of different colors (see figure 15). Note that only Malawi 2014 and 2017 have both questions. The differences are not large in the overall proportion of nets of particular colors used. Differences in net use rates are influenced by background variables other than color—distributions may provide blue nets in one area and white in another, depending on the campaign net shipment timing. These other factors should always be explored.

Figure 15. Proportion of nets used the previous night, stratified by color



To examine the influence of background factors on the odds of an ITN being used, we ran a multilevel logistic regression to control for net brand (proxy for textile), net age, household net supply level, region, residence, wealth quintile, month of survey, and treatment with insecticide (see figure 16). We observed that after controlling for these factors, no significant differences in the odds of a net being used based on its color, except in Malawi (2010 and 2014) and Tanzania 2015–16 surveys.

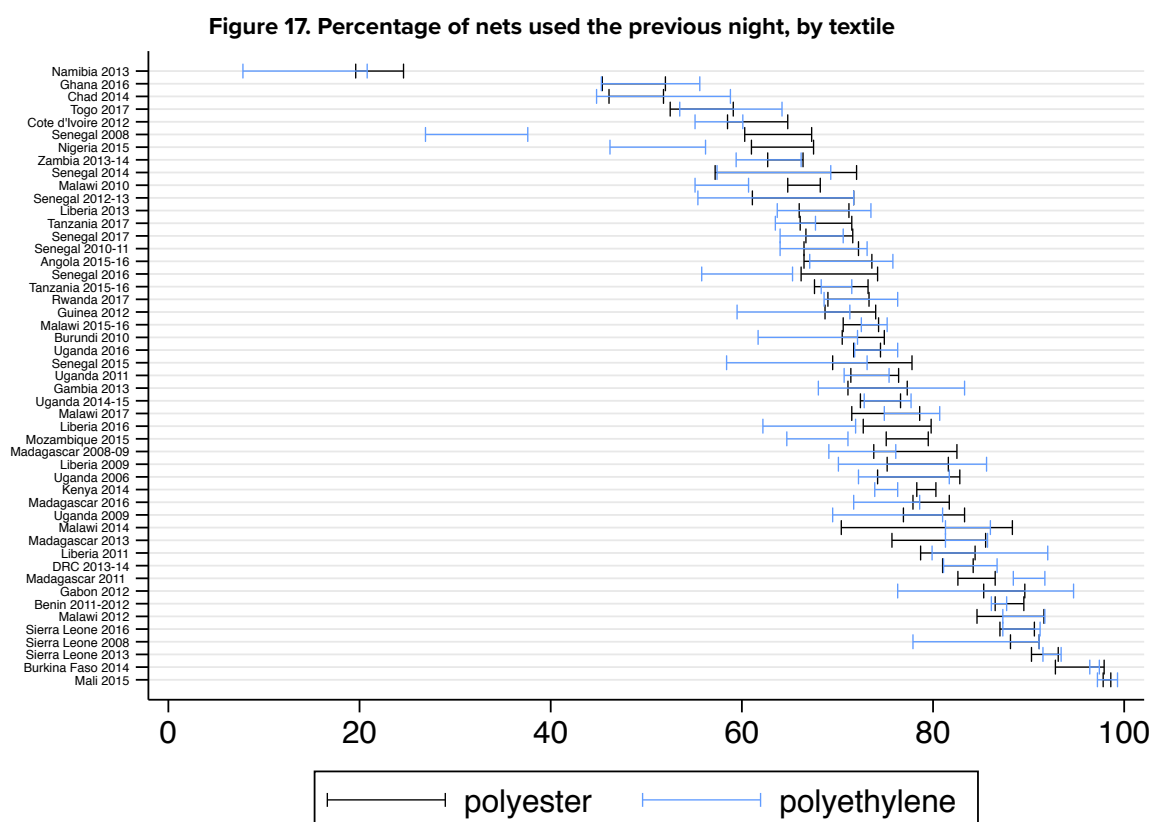
Figure 16. Adjusted odds of ITN being used the previous night for color (ref: blue) controlling for household net supply level, brand, net age, residence, region, survey month



Preferences for textile

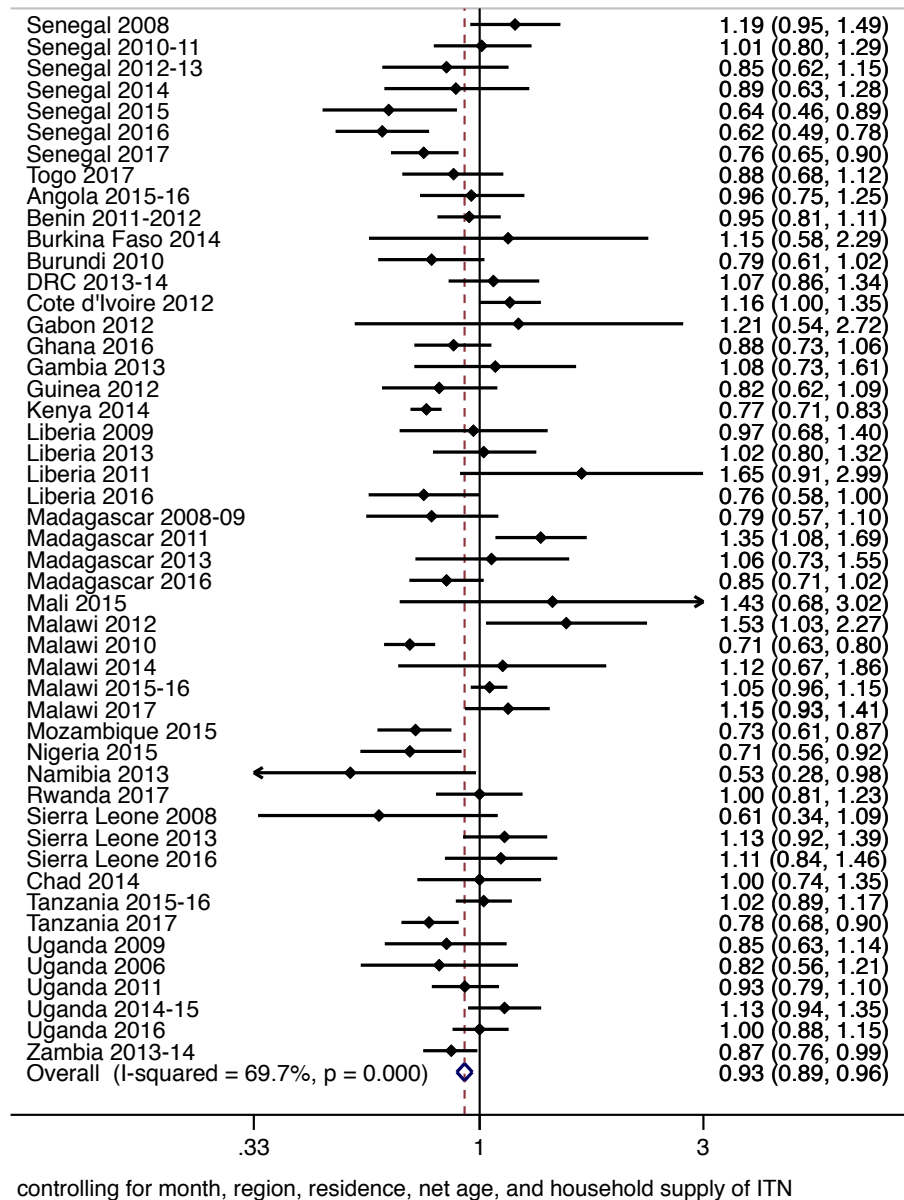
Only a few surveys assessed user preferences for textile (*hard* versus *soft*—e.g., polyethylene versus polyester). In the Madagascar MIS 2013, 85% of respondents said they have preferences about net texture; they preferred softer textile (polyester) over *hard texture* polyethylene nets. There was no trend by wealth quintile ($p=0.445$), but more respondents in the sub-desert (30%) preferred *hard* nets compared to those in the other zones (where 82–95% preferred *soft*). In the Liberia MIS 2016, 70% of all respondents stated they preferred *soft* nets, with 10% stating they didn't have a preference. As with shape preferences, wealthier families had stronger preferences, and more of them preferred *soft* nets ($p=0.001$). In Rwanda MIS 2017, however, 63% of respondents stated they preferred polyethylene nets, particularly in urban areas.

On a population level, in only a few surveys is the proportion of polyester nets used the previous night significantly higher than the proportion of polyethylene nets used the previous night: Senegal 2008, Nigeria 2015, Malawi 2010, Senegal 2016, Liberia 2016, Mozambique 2015, Kenya 2014, and Madagascar 2011.



However, when controlling for other background factors, polyethylene nets are associated with lower odds of being used the previous night. Across 49 MIS and DHS surveys that contain information on the brand of the nets found in households (from which it is possible to determine the textile), polyethylene nets were 30% less likely to have been used the previous night, controlling for survey month, region, residence, wealth quintile, age of the net, and household level of net supply (some/enough/too many). See Figure 18.

Figure 18. Forestplot of the adjusted odds of a net being used, polyethylene vs polyester texture.



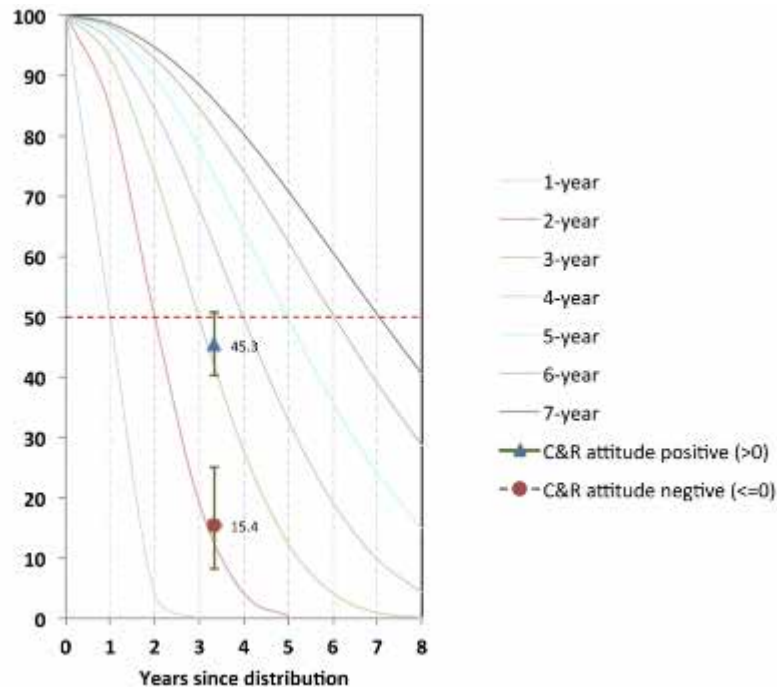
Net Care and Repair

Net distribution strategies often assume ITNs will last three years. Research has shown, however, that the life of ITNs can vary widely (from 2+ to 4+ years), primarily depending on how households care for them [35]. ITNs begin to suffer wear-and-tear as soon as they enter the home. Physical damage is accelerated by rough handling and the presence of children, rodents, food, or fire (such as for cooking). Insecticidal effectiveness is compromised by frequent and vigorous washing and the use of harsh detergents. Helping households maintain ITNs in usable condition can contribute to sustaining universal coverage.

Results from ITN care and repair SBC program evaluations in Nigeria and Uganda found that exposure to multiple channels of a comprehensive SBC intervention improved attitude scores, and with improved ITN condition at endline. While these programs promoted both ITN care and repair behaviors, results indicated that preventive ITN care behaviors play a bigger role in maintaining ITNs in usable condition. In contrast, ITN repair behaviors seemed to have no impact on net condition. People may detect holes too late and

they may repair them too late or incompletely. Moreover, it may be easier to cultivate a ITN care routine than to mend nets intermittently. Despite this, both studies found that an overall positive attitude toward net care and repair was significantly associated with better condition of ITNs [36, 37]. See Figure 19.

Figure 19. Proportion of campaign nets at 3 years after distribution, by net care attitude score, plotted against various median lifespan curves for nets.¹ [36].



Based on these findings, current guidance says that SBC activities should use comprehensive ITN care messages that emphasize preventive behaviors, ideally as soon as they receive their ITN, such as—

- Tie up the net every day to keep it away from foot traffic and dirt.
- Keep children away from the net.
- Avoid storing food or crops in the same room.
- Fold and store the net safely when not in use.

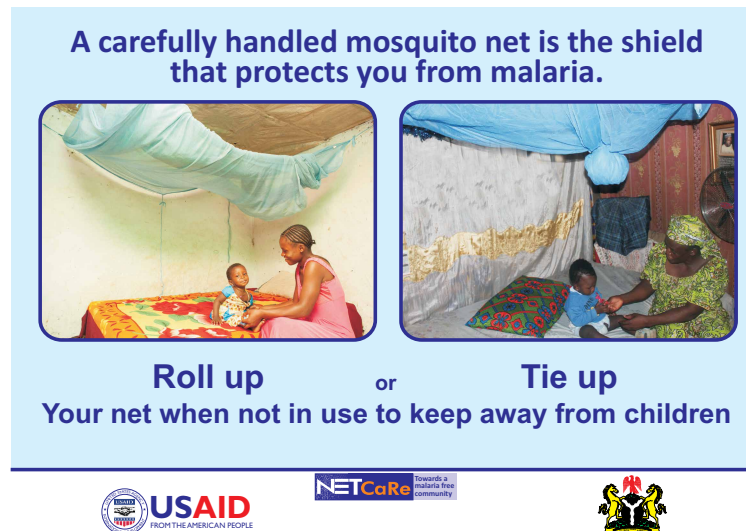


Pupils sit with their ITNs during issuing at Medi English Medium Primary School in Mtwara, Tanzania. © 2015 Claire Gillum, Courtesy of Photoshare

¹ Decay curves are labeled according to where each curve hits the median survival time (dotted red line at 50%); (e.g., the green curve crosses the median at 3 years because distribution as is therefore the curve for a 3-year net)

The strategy can include messaging to promote repair of ITNs as a remedial action when holes do appear; however, these messages should remain secondary to the overall goal of preventing holes from developing in the first place (see Figure 20).

Figure 20. Nigeria poster on putting the net away when not in use² [38].



When the ITN is distributed, include messages and communicated continuously to ITN users. Integrating care messages into existing malaria communication platforms would incur minimal cost. The primary messages—“be careful” and “tie it up”—can be integrated by adding a radio spot and updating content within job aids; also, include the messages during trainings with community health workers already working on malaria.

Figure 21. Example of integration: A job aid for community volunteers in Uganda incorporates net care into routine ITN messaging [38].



² The main target areas for placement were public areas in the specific villages where we held the campaign. Public areas could have been a market, a community center, the village leader/chief's palace, and others.

ITN care messaging can help make long-standing ITN use communication feel fresh again [39]. As ITN damage starts to accumulate—especially toward the end of the first year after a mass distribution and throughout the second and third years—repeat net care activities to provide ongoing cues for these maintenance behaviors. See Figure 21.

Qualitative research in Mali, Senegal, Nigeria, Tanzania, and Uganda found that a desire for cleanliness and aesthetics of the ITN motivated care and repair behaviors, as well as avoiding mosquito bites, protecting one's family, and not being perceived as lazy or unkempt. The consistency of the findings across the five studies indicates that attitudes and practices are likely to be similar elsewhere in sub-Saharan Africa, making message design more straightforward for other countries. In Uganda and Tanzania, women were overwhelmingly reported as responsible for ITN care and repair; while in Nigeria, members of both sexes reported that they felt responsible for ITNs. Responsibilities for ITN care and repair were linked to traditional gender roles, such as shouldering financial burdens (for men) and housekeeping (women) [40-44]. When designing ITN care messaging, programs should carefully consider how gender norms are incorporated.

Both campaigns used mass media, home visits, community discussions, and, in Uganda, school-based activities. However, as mentioned above, integrate messages on net care into ongoing communication activities around net use as part of building the overall culture of net use.

Although both programs used informational, and at times, humorous approaches to net care, neither explicitly leveraged social norms around cleanliness. The cleanliness angle—promoting net care as part of maintaining a proper and tidy home (specifically tying up the net after use)—may be worth pursuing in future SBC programs. It capitalizes on an insight from behavioral economics, which states that immediate benefits (tidy appearance) often carry greater weight than long-term gains (a.k.a. malaria protection or cost/effort savings in net replacement).

Studies examining net durability—specifically, how long different nets last in different countries—are currently ongoing; many have been completed. The standard protocol for PMI-supported countries includes data collection on net care and repair behaviors and perceptions. Where net care attitudes are poor, countries should take prompt action to promote net care behaviors. A risk index is currently being developed that would predict ITN performance based on net care attitudes, housing conditions, and net handling practices [45].

A comprehensive toolkit—which includes SBC materials from several countries—research tools, as well as more detailed guidance on developing net care SBC, are listed in Resources.

Outdoor Sleeping and Nighttime Activities

ITNs are primarily intended to protect people when they are indoors and sleeping. However, people could be exposed to malaria vectors while sleeping outdoors or when active during hours when malaria vectors bite. Residual malaria transmission, defined by the WHO as, “persistence of parasite transmission even with good access to and usage of LLINs or well-implemented indoor residual spraying (IRS), as well as in situations where ITN use or IRS are not practical,” represents a critical challenge for malaria control and elimination efforts [46-50].

A small body of evidence on nighttime activities and sleeping patterns shows that it can make ITN use challenging or unfeasible. Common activity categories across settings include household chores, routine social events, large-scale socio-cultural and religious events, and livelihood activities [44-46]. In addition to nighttime activities, outdoor sleeping is common in some areas (see Figure 22). It can happen routinely, such as sleeping outside in an open-air compound, and/or during large-scale events, such as weddings or funerals. Outdoor sleeping can last for all or part of the night. ITN use can be challenging in these contexts because of the logistical and social barriers [51].

Figure 22. Outdoor human activities during vector biting times when ITNs do not offer protection [47].

VECTOR BITING



All-night activities



- Livelihood activities e.g. security, fishing
- Socio-cultural events e.g. weddings, funerals, religious ceremonies
- Visiting family and friends (travel)

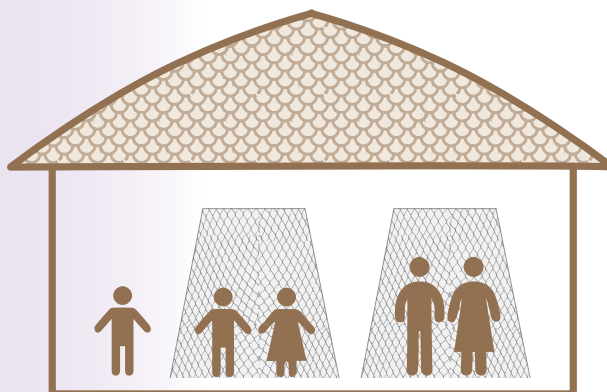


Evening activities

- Household chores
- Socializing
- Children playing
- Entertainment e.g. watching television
- Buying and selling at shops
- Evening prayer
- Preparing and eating dinner



Safe zone - ITN use



Early morning activities

- Household chores
- Prayer
- Farming
- Preparing and eating breakfast
- Small business activities
- Grooming
- Caring for animals



However, instances of outdoor ITN use have been observed and reported. Examples of approaches to hanging an ITN outdoors include tying an ITN to poles that are hammered into the ground or secured in buckets filled with dirt or sand; hanging the ITN over four chairs; and hanging the ITN from tree branches and/or household structures.



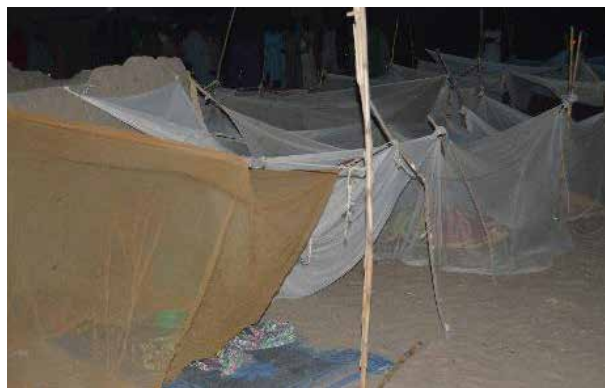
Example of outdoor net use in northern Ghana. The net was hung using two metal poles stuck into the ground, and two nails attached to the wall of the compound. PMI NetWorks Project ©2014



Example of a net hung in the peri-domestic space, straddling indoor and outdoor net use in Makeera, Kebbi state. PMI HC3-Nigeria Project ©2015



Pregnant woman and child nap inside an ITN in Makeera, Kebbi state. PMI-HC3 Nigeria Project ©2015



Children sleeping at night inside community pooled nets in Yarbudda village, Kebbi state. PMI-HC3 Nigeria Project ©2016

The SBC planners must recognize that ITN use is not always feasible for all individuals during all nights of the year. Human centered design (HCD) or Trials of Improved Practices may help identify ways to use ITNs outdoors or in group settings (such as during funerals). If ITN use is not feasible, as with nightshift workers and others, planners should encourage the use of alternative bite prevention tools, such as repellents or treated clothing. A holistic approach to prevention that provides people with the information they need to protect themselves during all vector biting hours is important. Research that integrates data on human and vector behavior can be useful in prioritizing specific times, places, and groups that are at the greatest risk of exposure to malaria vectors.

Adopting a gender lens by demonstrating the specific situations in which men and women face these risks will strengthen the resonance of SBC approaches. For women, with their traditional duties as homemakers, household chores—cooking outside, fetching water, or washing clothes—create opportunities for exposure to malaria, because many women wake before sunrise to complete tasks or cook at dusk [52]. Men's work outside the home, which can occur early in the morning or late at night, presents difficult to prevent exposures to malaria vectors. In many countries, it is common for men to sleep outside away from home for work; this puts them at particular risk for malaria. Presenting the same malaria prevention messages to both men and women may ignore these unique risks, so messages should demonstrate them, as well as the behavioral adaptations men and women can practice. At the same time, programs should balance such approaches with the need to avoid reinforcing inequitable gender norms.

As evidence on the effectiveness of new supplemental tools for vector control becomes available, additional strategies for prevention can and should be considered in messaging.

Misuse, Disposal, and Repurposing

Misuse

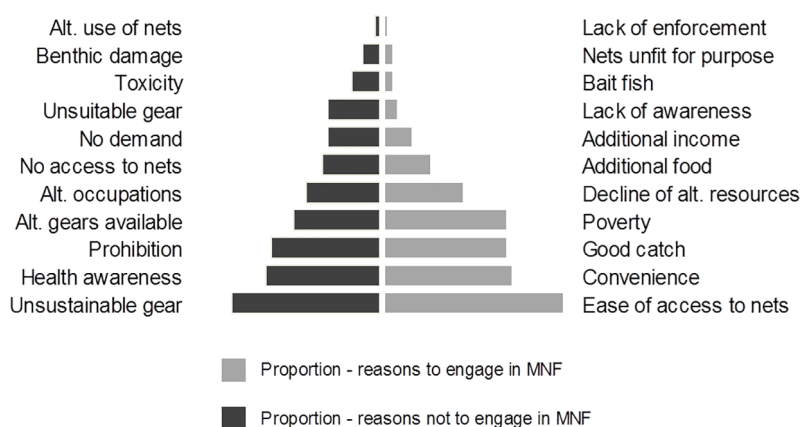
The misuse of ITNs for fishing is an emerging topic, especially in waterside communities. Misuse is defined as the use of a non-expired ITN for purposes other than its intended use as a bed net to protect against malaria infection; fishing with an ITN is the prime example [53]. Misuse of ITNs is not acceptable under any circumstances; it not only defeats the public health purpose of providing protection from malaria, but can also have negative environmental outcomes [54].

While there is no indication that widespread misuse is occurring across Africa [55-56], a recent qualitative study in Malawi showed that the drivers of mosquito net fishing are a combination of a struggling economy and food insecurity, as people are forced to sell their belongings for money and/or food [57]. Other studies, such as those from lakeside communities in Lake Tanganyika and a refugee camp in the DRC reinforce the drivers identified in Malawi; ITNs are being sold to generate income to support immediate food needs [58-59]. While anecdotal reports of mosquito net fishing are growing, the magnitude of the problem remains

unknown. The small cohort of specialists working on this issue have been unable to create a tool to measure how many people across lakeside communities, or across the world, are misusing ITNs for fishing.

An online poll of 93 stakeholders in fisheries management, public health, conservation, and development found that poverty, with the convenience of mosquito net fishing and amount of catch, and a decline in alternative resources, were driving net misuse. On the other hand, people may decline from mosquito net fishing because of the perception that nets are not durable enough as fishing gear, and the awareness of malaria, prohibition, and preference for alternative occupations (see Figure 23). This poll, however, reflects the perceptions of stakeholders, not those involved in the practice [60].

Figure 23. Proportion of observations citing various drivers for people engaging and factors that may influence people not to Mosquito Net Fish (MNF)



Some projects have used SBC to mitigate the problem. In Malawi, the Support for Service Delivery Integration, the Fisheries Integration of Society and Habitats projects—with [Ripple Africa](#)—created posters, pamphlets, and radio programs. In an area within the Tamatave II district of Madagascar, the mayor implemented monthly discussions with each village. Through these discussions, a communal law was initiated: a fine of 25,000 Ariary (equivalent to U.S.\$12.50) for fishing with an ITN. Of the 25,000 Ariary, 10,000 is given to the person who identified the misuse; 10,000 is given to the fokontany (village); and 5,000 is given to the commune. The village watch team take those caught misusing an ITN to the commune. If the person caught misusing the ITN cannot pay upfront, they are given two weeks to pay in full. For those who cannot ever afford to pay, they are asked to publicly apologize at the commune level. The ITNs that have been misused are then collected at the commune and burned [61]. While it may seem counterproductive to impose fines for (potentially) poverty-driven misuse, this is an example of a community taking ownership of the issue, deciding on appropriate punishments (factoring in affordability of the fine), and sending a clear normative message about the acceptability of misuse. Supporting communities to develop their own locally specific ways to address misuse may be a worthwhile strategy, particularly if it is paired with a way to identify households at especially high risk who may need additional food/livelihood support.

A significant opportunity remains for implementing partners to create SBC interventions to address ITN misuse. Efforts to-date have focused on traditional malaria messages on continuing to correctly and consistently sleep under an ITN every night, but have also expanded to show the shrinking sizes of fish species that may result from fishing with small mesh ITNs. Opportunities also exist through collaboration with fishery conservation programs, as they can help enforce laws against illegal fishing gear (of which there are many types), and work to educate fisherfolk about the threats to fisheries caused by small mesh nets [62].

Countries should continue to investigate the drivers behind ITN misuse within their borders. Programs can refer to and use the [Identifying and Mitigating Misuse of Insecticide-Treated Nets for Fishing Toolkit](#) to help determine these drivers. If they are similar to Malawi's results, the opportunity to work across

sectors to develop messages or other behavioral interventions relating to climate change, economics, food insecurity, and health may help reduce the misuse. However, until the core issues of economics and food security improve, approaching the matter from the health perspective alone will not resolve the problem.

Repurposing and disposal

In 2014, WHO's Global Malaria Programme issued recommendations on sound management of old ITNs [63]. Globally, these recommendations encourage net owners to continue sleeping under nets, even old nets or those with holes, until a newer net is available; they also encouraged owners to repair nets. In addition, these recommendations discuss the need for proper disposal of both nets and packaging by incineration, or without proper incineration facilities, underground burial. Non-incineration burning of either ITNs or their packaging releases toxic dioxins that are harmful to humans. The following text box summarizes the key messages from the WHO guidelines.

WHO's ITN Management Recommendations

- Do's
 - Encourage households to maintain their nets for as long as possible
- Don'ts:
 - Don't burn mosquito nets – toxins are released
 - Don't collect old mosquito nets for disposal or recycling
 - Don't dispose of mosquito nets in water bodies
 - Don't use any mosquito nets for fishing

However, observation shows that ITNs do not go directly from being used over sleeping spaces to disposal or burial. In the time between, households are repurposing ITN material for a variety of uses. Access to and use of ITNs has increased with the introduction of universal coverage and repeated mass ITN distributions, continuous distribution of ITNs in some areas, and private sales of nets. Older ITNs accumulate in households as they are replaced with new ITNs. Given the lack of easily accessible, environmentally sustainable disposal options—as well as households' natural tendency to put old or broken household goods to new useful purposes—ITNs are being used for other purposes after they become too old or worn out.

Anecdotally, households have demonstrated countless ways to repurpose old ITNs, including protecting seedlings, creating screening for window and doors, or placed under mattresses as pest control. There are also reports of community leaders instituting fines or penalties for families who have repurposed or misused ITNs. [The Consensus Statement on Repurposing ITNs](#) provides NMCPs with guidance so communities can effectively address misuse while, at the same time, households can repurpose ITN material appropriately and without fear of undue reprisal [53].

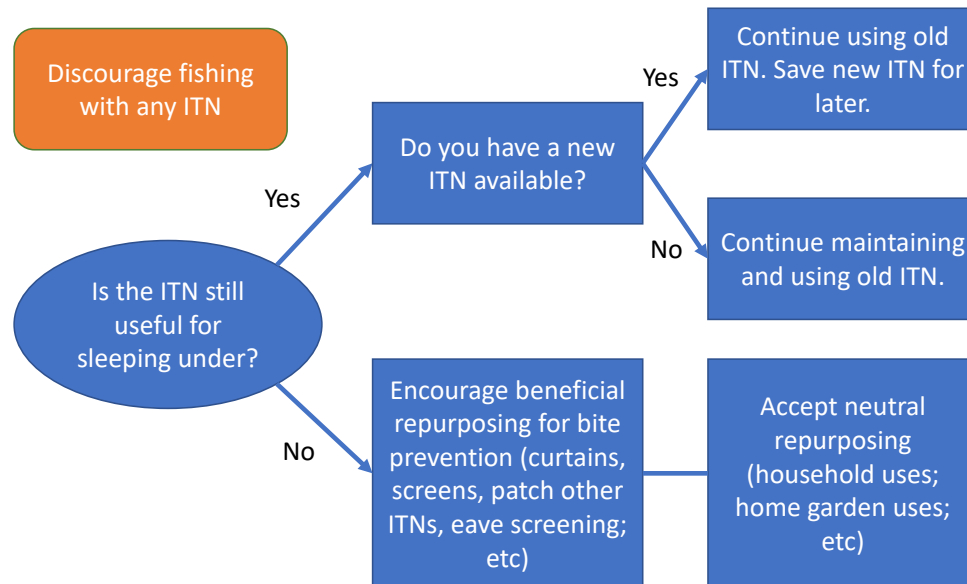
Key definitions for repurposing of ITNs

Beneficial repurposing is defined as the use of old ITNs for purposes other than as a bed net to protect against malaria infection. This repurposing is termed beneficial because the ITN material continues to act as a barrier against mosquitoes. Examples of beneficial repurposing include using old ITNs as curtains, patches for holes in viable nets, stuffing eaves, and constructing window or door screening.

Neutral repurposing is defined as the use of old ITNs for household uses that do not prevent mosquito bites. Unlike beneficial repurposing, neutral repurposing is not a barrier against malaria infection. This is a large and varied category. Examples include covering latrines, protecting seedlings, fencing, transporting/storing crops, screening of poultry or animal enclosures, soccer goals, tearing into strips for tying objects, and other household uses.

Because households have autonomy over their ITNs and how they are used, they ultimately decide if an ITN is still useful for sleeping under. Figure 24 is an easy tool for decision makers to understand when ITNs can and cannot be repurposed and for what beneficial uses.

Figure 24. Decision tree for household ITN use and repurposing



Following are the proposed messages for the NMCPs to use when creating SBC tools to encourage correct and consistent use, accept repurposing when an ITN is being used, and reduce misuse.

- Households should continue to maintain and use their ITNs for as long as possible and follow recommendations for effective care to prolong useful life. Any ITN is better than no ITN.
- After an ITN is no longer useful for sleeping under, beneficial repurposing should be encouraged.
- Neutral repurposing of expired ITNs is acceptable.
- Repurposing new ITNs is never acceptable.
- Fishing with any ITN is never acceptable.
- New ITNs can be stored for a period of time while older nets are still useful for sleeping under.

These messages would ideally be incorporated into opportunities for in-depth discussion, such as during interpersonal activities or longer format mass media (for example, a drama or talk show, but not a radio spot). This can occur during the post-distribution phase of a mass distribution, during ongoing net care, or as part of an ongoing net use/net care SBC campaign.

Part C: Situational Considerations

Therese, a mother with her two babies, reads bed net instructions at Janda Health Centre in Buhigwe District, Tanzania. © 2017 Magali Rochat/VectorWorks, Courtesy of Photoshare



Next-Generation Nets

To combat the rise in resistance to pyrethroid insecticide-treated nets, new chemical formulations for ITNs are being developed, referred to as next-generation nets [58]. One formulation, pyrethroid with synergistic piperonyl butoxide (PBO), increases the susceptibility of mosquitoes to pyrethroid insecticides. Another new type of net, G2, uses chlorfenapyr, a new class of insecticide that disrupts mosquitoes' ability to produce energy.

Next-generation ITNs have demonstrated effectiveness in areas with prevalent pyrethroid resistance and are distributed on a limited basis, in accordance with WHO guidelines [59-60]. While next-generation ITNs are being rolled out in some settings, minimal evidence to-date shows the best SBC approaches to accompany their distribution.

So far, countries distributing next-generation ITNs are not creating next-generation ITN-specific SBC messaging. Several risks are associated with crafting SBC just for next-generation ITNs. Underlying factors, such as political or religious sensitivities, may mean that issuing a different type of ITN to a certain area is seen as favoring one group over another. There is also the risk of creating distrust—and ultimately lower rates of use—about pyrethroid-only nets. Longstanding concerns about side effects, such as infertility, linger in some areas and may be reignited. Last, but significant, the expected benefits of developing and disseminating next-generation ITN-specific messaging may not outweigh the time and costs involved.

It is crucial to consider the following when deciding whether SBC specific to next-generation ITNs is warranted:

- Are there any unique physical or chemical characteristics of the next-generation ITN that would require special messaging for use, care, or other behavior for the recipient? With either ITN, the physical barrier remains vital to malaria protection and net care messaging should continue to be prioritized.
- Would messaging for next-generation ITNs conflict with messages for pyrethroid-only nets? Would it be confusing or raise distrust (and lower use) of pyrethroid-only nets?
- Will households have both next-generation and pyrethroid-only nets?
- Will recipients of pyrethroid-only nets receive next-generation net messages? It is very difficult, if not impossible, to prevent SBC messages from spilling over into other areas, so potential differences in SBC messaging may cause confusion or distrust.
- As more and more new nets are distributed, it is important that programs exchange on the results from distributions of next-generation ITNs and share lessons learned from communication activities.

Indoor Residual Spraying and ITNs

In areas where IRS has been implemented planners may be concerned that ITN use behaviors are lower, as people may feel they are fully protected by IRS. Households served by both IRS and ITN programs may use nets less due to lower perceived susceptibility. In places where IRS has been withdrawn, households may need to reestablish an ITN use culture. In both situations, SBC can play a valuable role in explaining what vector control programs are being implemented, encouraging population participation in IRS and ITN distribution, and promoting net use.

Recent experience suggests that ITN use in the context of IRS is very situation-specific. A secondary analysis of the 2016 Zimbabwe MIS data comparing households with both IRS and ITNs to households with ITNs found no indication that ITN use was influenced by whether the household had been sprayed [64].

On the other hand, an analysis of the 2011 Uganda DHS data found a significantly lower ITN use in IRS households: 73% versus 81% in selected Northern districts (rainy season). However, this difference had narrowed and was non-significant by the time of the 2014/2015 MIS, suggesting a strengthening of the ITN use culture during that period (85 versus 88%). These areas received SBC promoting ITN use even under IRS, but no published data attributes this improvement in the net use culture to SBC [65].

Concerns about malaria resurgence in IRS withdrawal areas led Benin [66] and Uganda to include SBC as part of a broader package of interventions. This included distributing ITNs, making enough rapid diagnostic tests (RDTs) and artemisinin-based combination treatments (ACTs) available to address the expected surge in cases, rapid action plans to resupply facilities affected, enhanced surveillance through weekly monitoring, and SBC to promote prompt care seeking and net use.

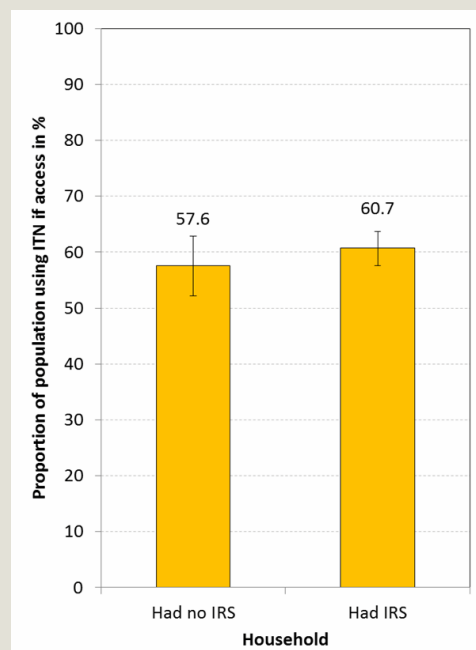
Consider the broader ITN use culture, not just IRS

Using both ITNs and IRS is usually justified in areas with both high transmission and profound pyrethroid resistance. In these environments, ITNs are mainly a physical barrier; non-pyrethroid IRS is needed to achieve community protection and manage insecticide resistance. Similarly, non-pyrethroid IRS can be used with ITNs to drive down transmission in high-burden areas [12,64].

SBC for areas with both IRS and ITNs should include IRS considerations in an analysis of the broader ITN use culture. In some districts of Zimbabwe, the proportion of households with both ITNs and IRS coverage ranges from 22%–64%. A secondary analysis of the 2016 MIS data found no indication that ITN use was influenced by the IRS status of the household. As Figure 25 shows, ITN use rates among those with access was not significantly higher in households with and without IRS (58 versus 61%).

However, the overall ITN use culture was only at medium-low levels (~60% or less in both types of households). Further analysis found that ITN use peaked during the rainy season, and the most common reason for non-use (42.5% of all nets not used) was that households did not use a net mainly because they thought there was no malaria. In this situation, instead of addressing IRS specifically, SBC programs should focus on raising perceptions of malaria risk throughout the year, as well as the perceived benefits, such as a good night's sleep.

Figure 25. Population ITN use among those with access by IRS coverage status, Zimbabwe MIS 2016 [64]



Low-Transmission Settings

The WHO recommends sustaining high levels of vector control (ITN or IRS) for all people living in areas with ongoing malaria transmission, even as the burden of malaria declines [67]. They warn that the scale-back of vector control will result in malaria resurgence in areas where transmission has been very low or interrupted [68]. Even areas with less than one local case per 1,000 are considered at risk of resurgence if vector control is scaled back. Because ITNs protect humans from mosquito bites and kill mosquitoes, ITNs will remain vital to reducing vectorial capacity and human transmission. Any country or area considering the scale-back of ITN distribution and promotion should make the decision based on a detailed analysis of the vulnerability of the area and its capacity for active disease surveillance and response [69-72].

SBC programs in low-transmission areas should consider how declining transmission will affect perceptions of malaria risk and the perceived need for sustained use of ITNs. Other benefits of ITNs beyond malaria protection may take priority. Efforts could focus on maintaining a sense of risk or on sustaining the motivation to progress toward the shared goal of elimination. More attention will be paid to mobile groups—specifically, to the systems of mobility and decision/action points that inhibit net acquisition and use. Because they often lack access to services, they are at higher risk of contracting malaria and of bringing malaria back to low-transmission areas/foci.

Sustaining the perceived need for ITNs

Just as ITN use declines in the dry season, reduced malaria transmission levels can lead to decreasing risk perceptions of the disease among international donors, policymakers, and local communities alike [42,64]. For example, UARs are worse in certain high-altitude areas, such as the South West region of Uganda (0.70 versus .82 and above in the rest of Uganda) and Mamou and Labe in Guinea (0.71 and 0.83 versus 1.01 and above). However, the UAR in the pre-elimination zone of Southern province, Zambia is 0.85 (compared to 0.88 nationally), showing that a high culture of ITN use can be maintained even in low-transmission settings [73]. ITN use may also decline when other interventions, such as IRS or seasonal malaria chemoprevention, are prioritized in lower transmission areas, although this is very time- and location-specific (see section on IRS and ITNs) [74]. When designing SBC interventions for ITN use in low-transmission settings, it is important to consider the entire package of interventions that are implemented in these settings and plan accordingly.

One way to maintain vigilance in ITN use is to remind people that malaria is always present, and that the risk could be severe. This should be balanced with messaging about efficacy—that ITN use is feasible in most situations and it is effective. A qualitative study in Zanzibar found that residents understood that malaria transmission rates were low, but they still feared getting malaria and they valued ITN use as a result. Some participants (mainly the health care providers) were aware that Zanzibar had eliminated malaria before, and that it returned; they expressed concerns about population vulnerability given reduced levels of immunity, while residents said that “malaria has killed a lot before” and that there were now fewer cases [75].

As areas phase into low and very low transmission, health worker–based reporting and follow up of malaria cases will be very important, and they will be a primary channel for at-risk individuals. Health workers should, therefore, understand the risk of malaria resurgence and severity of cases and be able to counsel patients about this risk and the importance of sustaining ITN use. This can be supplemented by other channels reminding people of the continuing risk of malaria.

Another study with respondents from both Zanzibar and mainland Tanzania found that non-malaria benefits could be leveraged. Perceptions of comfort (such as a good night’s sleep and avoiding nuisance biting from other pests) and discomfort (heat) were tied to the development of ITN use as a daily habit [76]. Messages around the immediate benefit of comfort can be extended to other medium- and long-term benefits, like feeling great in the morning and performing well at various life endeavors, such as work, school, athletics, and home.


Once established as a habit and as a valued intervention (for malaria or non-malaria reasons), ITN use can persist, despite inconveniences. In Senegal, a qualitative study found that people use ITNs even though they complained in focus groups of feelings of suffocation, difficulty breathing, bad smell, etc., from the insecticide [77].

In areas where other vector-borne diseases are present, it may be possible to position ITN use as part of a set of behaviors families can take to avoid multiple illnesses. The WHO recommends taking advantage of opportunities to communicate about multiple vector-borne diseases (those currently posing a risk, as well as malaria), whenever possible.

Community ownership will grow increasingly valuable as transmission declines. In the Zanzibar example above, residents (especially the older ones) were aware of the decline in malaria incidence. Capitalizing on a sense of progress toward a shared goal (not just of zero malaria but also to broader goals such as national pride/development) can sustain communities' commitment to malaria prevention, case detection, and response. In 2017, Zambia rebranded its malaria SBC activities in line with a new political commitment to elimination. The "Malaria-free Zambia: malaria ends with me" brand unites the activities of all public and private sector partners and extends the recall rates of communication activities. At the village level, it makes malaria activities appear part of a broader national initiative, lending credibility [78].

Introducing messaging about community protection may help refresh individuals' commitment to ITN use, even when they do not perceive themselves to be at risk. Zambia's National Communication Strategy for Malaria Elimination 2018 matches messages to transmission intensity [78]. As the excerpt, Table 1 shows, in low transmission areas, messages include explaining that not using an ITN puts others at risk because mosquitoes can transmit malaria from infected individuals to others: ITN use stops the cycle of malaria infection in a community. The emphasis on neighbors and community is what distinguishes these messages from high-transmission intensity areas.

Table 1. Net messaging matched to control and pre-elimination areas

	Priority audiences	Behavioural objective	Communication objective	Example messages
 <p>High</p> <p>RANGE OF TRANSMISSION INTENSITY</p> <p>Low</p>	VECTOR CONTROL (Component A: IRS/LLINs/LSM)			
	Pregnant women & children under five	All pregnant women have LLINs and sleep under them every night, all year-round	To increase knowledge on importance of sleeping under LLINs every night	<ul style="list-style-type: none"> • IRS and LLINs prevent malaria by killing or repelling mosquitoes. LSM prevents malaria by decreasing the local mosquito population. • IRS, LLINs, and larvicides are safe; the insecticides are not harmful to children or adults.
	All household members	All household members, including adolescents, have access to LLINs and use them appropriately/allow their households to be sprayed/clear stagnant water in surroundings	<p>To increase understanding of LLINs/IRS/LSM activities, and increase the awareness of the benefits of vector control</p> <p>To communicate the community benefit of vector control</p>	<ul style="list-style-type: none"> • IRS/LLINs are free. Sleep under a net every night, throughout the year. • Prevention is better than cure. • Mosquitoes know no boundaries. Mosquitoes breeding in your area can infect your neighbours with malaria. Keeping your surroundings clean keeps your community safe from malaria. • If you are infected with malaria, mosquitoes can transmit the malaria parasites from you to others. Sleeping under a net every night and allowing your house to be sprayed stops this cycle. • Encourage your neighbours/community to have their houses sprayed, sleep under LLINs • You can import malaria anywhere you travel. Not sleeping under an insecticide treated net puts you <i>and</i> others at risk of malaria.
	Migrant workers/mobile populations	Migrant populations carry LLINs wherever they go/have a responsibility to allow their homes to be sprayed		

Population mobility

Mobile populations are a priority group for SBC, as they may bring malaria parasites from higher transmission areas into low-transmission settings. These groups include forest workers, miners, military personnel, farmers, people living along porous borders, persons displaced by civil unrest, mobile ethnic groups, traders, fisherfolk, and migrant workers. A recent literature review concluded that mobile populations have generally been assumed to be homogenous, hard-to-reach, and a major contributor to malaria transmission in pre-elimination settings; however, these claims may be overstated [79]. These findings have several implications for ITN SBC programs.

First, to be effective, SBC programs should target the groups at significant risk of malaria transmission. This requires formative and baseline research on the malaria burden, whether mobile populations truly go to high-transmission hotspots, the duration of their stay, their access to prevention and treatment, ITN use rates among those with access, and factors influencing ITN use.

Formative research should examine not just ITN use, but also ITN access/acquisition behaviors. The very nature of mobility may limit access to ITNs in the first place. Mobile groups with short-term stays may not be able to participate in mass or continuous distribution programs; others may have difficulty using ITNs in temporary shelters or while guarding crops and livestock [80]. Agricultural workers, miners, and others may work for employers who provide (or could provide) nets through workplace programs.

Researchers should identify the specific high-risk situations (or decision points) that affect ITN acquisition, retention, and use. Mobile groups share many characteristics with their sedentary counterparts that allow them to be reached through traditional means, but SBC programs will resonate more when they reflect the specific risk context. For example, an SBC program for forest workers in Cambodia used positive deviance to identify promising behaviors. One behavior that emerged was for wives to pack ITNs in their husband's bags; another was having landowners keep extra ITNs on-hand for short-term workers [81]. The program used positive deviants as role models, as well as extensive community engagement. During the qualitative evaluation, forest workers reported fewer cases of malaria due to increased use of insecticide-treated hammock nets and long-sleeved clothes when working in the forest, "Respondents noted that the positive deviance process opened their eyes to behaviors being conducted [by] their own people, [providing] 'social proof' that they could also conduct these behaviours." [82].

Assumptions that they are hard to reach belie the fact that mobile groups can be accessed through multiple networks: social (families, friends, and community and social structures at the place of origin and destination, peer educators), economic (employers, workers groups), and transport (border towns, market towns, transit stops, rest stops, etc.). In less remote settings, social media and mobile phones may also be viable channels. Political (national or subnational) borders may introduce a layer of complexity, as they may create bureaucratic and financial hurdles, so it is even more important to use advocacy and community engagement to foster cross-border collaboration.



Signboard in Cambodia that warns residents and mobile/migrant workers who are in identified malaria hotspots in a pre-elimination area. Key message: Malaria transmission is occurring in this village, always sleep under an ITN [81].

Figure 26. Poster from Cambodia targeting mobile/migrant workers ³



Tying it all together: Table 2 is an excerpt from a longer table segmenting the types of mobile workers along the Thai-Burma-Cambodia border. Each segment's profile includes an analysis of the migratory pattern (example: duration of stay); and concludes with potential interventions, such as using mobile malaria workers (peer educators), and ITN lending schemes [84]. ITN lending activities also create an opportunity for employees to receive tailored malaria messages through interpersonal communication. Other interventions targeting migrant and mobile workers have included providing bus and taxi drivers with training about malaria prevention, treatment, and local services; as well as promotional material like CDs, DVDs, stickers, seat covers, and brochures with malaria messages [85]. See figure 26.

Table 2. Example of segmentation for mobile groups

MOBILE GROUP	AUDIENCE PROFILE	OUTREACH POSSIBILITIES
Semi-mobile employee	<ul style="list-style-type: none"> • Works in endemic areas for an employer (hydroelectric dams, Food processing (cassava), rubber or palm oil plantation) • Often from a neighboring province • No close relationship with employer • Less immune to malaria 	<ul style="list-style-type: none"> • Mapping of farms and other employers. Outreach is possible when address at employer is known. • SBCC training and promotional materials for mobile malaria outreach workers or bus or taxi drivers • Introduce or scale-up ITN lending programs with employers. • Retail sale of ITNs and hammocks.
Seasonal farm worker	<ul style="list-style-type: none"> • Planting or harvesting (2-4 months) • Often from other provinces • Mutually beneficial relationships with farm owners, repeat service each season • Often non-immune 	<ul style="list-style-type: none"> • Advocacy to employers to purchase ITNs at bulk rates and distribute to employees. • Trials of new products (such as repellants, treated clothing) • Dipping campaigns where untreated nets are widespread.

³ Key message: Sleeping under an ITN consistently can prevent malaria and save you a lot of money since you will miss fewer work days [77].

Part D. Emerging Areas

In celebration of the national school-based mosquito net distribution campaign, Class 2 and Class 6 students march and dance through the streets of Odumase, Eastern Region, Ghana, to the sounds of a live band while holding placards with malaria prevention messages. © 2016 Sarah Hoibak/VectorWorks, Courtesy of Photoshare



Human-Centered Design

HCD is a creative process for problem solving that focuses on direct stakeholder engagement; it is iterative and non-linear. HCD begins with learning from and working with the target population(s) to identify the behaviors that need changing and how best to promote that change [86]. This gives the design team a better sense of the needed behavior change and barriers to that change from the perspective of the target population(s), rather than through traditional research methods where users are merely subjects for data collection, not involved in data synthesis and design. HCD naturally lends itself to audience segmentation and, subsequently, to messages/interventions that are specifically aimed at and speak to the unique behavioral nuances of a target population. Like traditional SBC approaches, HCD uses audience profiles, in the form of personas, to cultivate empathy among design team members for the life experience of the target groups. HCD also relies on rapid prototyping and iteration of ideas. During the SBC design process, this enables ideas to be tested early and often to determine utility, so only the most effective ideas are implemented.

While a stand-alone HCD process is a useful method for creating human-centered programs, it should be noted that it is not intended to replace statistically powered research. When possible, it is ideal to blend insights from both HCD and statistically significant and representative research studies.

The UK Department for International Development (DFID)-funded Private Sector Malaria Prevention (PSMP) project used HCD to understand facilitators and inhibitors to ITN use among middle-class urban and rural dwellers in Ghana. One aim was to devise messages for demand creation for these products through retail outlets.

PSMP's HCD process comprised a review of secondary research related to the topic, interviews with local malaria experts to contextualize the secondary research, a stakeholder analysis, ideation, prototype development and testing, and HCD focus groups/workshops with members of the target population.

The outcome included a comprehensive understanding of the target populations' behaviors and attitudes towards bed net use, and ideas from the commercial sector for generating demand for ITN.

Behavioral Economics

Behavioral economics (BE) draws on insights from psychology, microeconomics, and other social sciences to understand human behavior [87]. According to BE, humans have limited cognitive processing capacity, which gets used up as problems and choices become more complex and as each day progresses. Therefore, much of people's behavior is influenced by subconscious biases, context, and psychological or mental "shortcuts" that benefit them immediately, rather than by rational deliberation of long-term gains. Health programs need to anticipate these cognitive shortcuts and create environments, processes, and products that make decision making for optimal health easier.

Below are a few BE principles and some examples of how they can be applied to ITNs.

- **Framing.** The way options are presented affects human behavior. People are drawn to what seems novel and relevant, and to choices that seem easier, either by default—because they are presented first—or because they have immediate benefits. Formative research, audience segmentation, and pretesting can be very useful in understanding what the audiences care about and how they react to how options are presented. In Ghana, for example, a risqué TV spot targeting urban men positioned ITNs as the best choice for mosquito bite prevention so the men can have the lifestyle they want. The spot shows a man getting ready for romance, but his girlfriends are each bothered by the mosquitoes in the room, as well as the coils and sprays the man attempts to use. At the end of the spot, he prepares the bed with a treated net, and the couple appear much happier. Even though audience members are likely aware that nets prevent malaria, the immediate benefit (in this case, sex) catches their attention [88].

- **Reminders.** Reminders can help decrease the *mental burden* required for tasks. In 2011–2012, the *Ko Palu NightWatch* campaign in Cameroon sent text messages reminding households to use their nets every night. It was part of a broader set of mass media activities promoting ITN use [89]. The paper concluded that exposure to the campaign was associated with some improvement in ITN use, though it did not identify the contributions of each campaign element, nor fully account for ITN access. Nonetheless, evidence suggests that text reminders are helpful for behavioral maintenance on the part of clients receiving malaria treatment, or providers administering IPTp or case management services [90–91]. Because net care and repair are also maintenance behaviors, periodic reminders—perhaps, initially post-distribution and then with increasing frequency at one and two years post-distribution—may be useful.
- **Recency bias.** Research in northern Ghana found that recent illnesses are associated with malaria prevention spending. Respondents whose children had been ill in the past two weeks reported a higher perception of malaria risk, suggesting that recent episodes of illness may raise an individual's perception of risk and increase spending on malaria prevention [92]. SBC programs may wish to frame malaria as an ever-present risk by featuring malaria cases from various times throughout the year.
- **Endowment effect.** People often value a good they already possess more than one they do not yet already own [93]. By depicting current ITNs as more valuable than potential replacement ITNs (either due to present costs/hassles averted and immediate benefits), SBC programs can encourage households to care for their ITNs for as long as possible. Another approach is to position ITN care as necessary, because ITN replacement is uncertain due to cost or availability. This leverages the principle of scarcity, but it is a tricky balancing act, because SBC programs should also avoid decreasing trust in health systems.

Behavioral economics mainly provides another way to look at behavioral issues. There is little data on its effectiveness as applied to ITN behaviors, mainly due to its novelty and questions about the costs of having a sample size big enough to compare different *tweaks* or *nudges* tested, and how to assess BE approaches when they are part of complex/multi-level SBC interventions performed at scale. However, BE can assist with fine-tuning designs and help explain the behavioral patterns seen during formative research and evaluation.

Part E. Resources

Children in a classroom at Kamunyonge Primary School during a school bed net distribution event in Musoma, Tanzania. © 2016 Riccardo Gangale/USAID, Courtesy of Photoshare



General SBC

- [P-Process](#). One of the most respected tools used to design SBCC programs. The P-Process is a step-by-step roadmap that can guide programs from a loosely defined concept about changing behavior to a strategic and participatory program that is grounded in theory and has measurable impact.
- [How to Guide for Audience Analysis](#). Step-by-step instructions on how to identify and understand the priority and influencing audiences to ensure that messages and approaches are more likely to resonate with the target groups.
- [Integrated SBCC Programs Implementation Kit](#). The I-Kit focuses on the aspects of SBCC unique to integrated programming and avoids basic SBCC content that would be applicable to any SBCC program. The emphasis of this I-Kit is health, but the concepts and tools can be applied to a range of development issues.
- [SBCC Check-In: Quality Standards for SBCC](#). A checklist for assessing the quality of SBCC programs.

Malaria SBC – General

- [Strategic Framework for Malaria SBC, 2nd Edition](#). Best practices for designing and implementing malaria SBC programs. Available in English, French, and Portuguese
- [Malaria SBCC Indicator Reference Guide, 2nd Edition](#). Indicators and survey questions for malaria SBC. Available in English, French, and Portuguese
- [Malaria Evidence Review](#). A searchable online database, factsheets and infographics that compile and highlight key SBCC successes on malaria outcomes. The database below presents a collection of 80+ articles describing interventions or studies that address malaria challenges through SBCC approaches. Articles can be automatically filtered by country, malaria technical area, type of communication intervention, study design and/or audience segment, as well as by specific search terms.
- [SBCC for Malaria in Pregnancy: Strategy Development Guidance I-Kit](#). This implementation kit was developed to SBCC and malaria in pregnancy (MiP) program managers and improve SBCC strategies and interventions for MiP.
- [Communication for Malaria Diagnostic Testing Toolkit](#). A compendium of communication materials designed to promote testing for malaria and adherence to test results. This site includes radio and print materials aimed at parents and the general public. It also contains materials designed to improve providers' skills in managing fever cases and communicating with patients and caregivers.

Net Acquisition SBC

- [AMP toolkit](#). A range of topical briefs/chapters covering all aspects of designing and implementing mass distribution of ITNs, including SBC.
- Examples of mass distribution SBC from other countries:
 - [Nigeria HC3 mass campaign materials](#)
 - [Zambia ITN distribution communication strategy](#)
 - Liberia ITN distribution communication strategy and gender integration checklist
- [ContinuousDistribution.org](#). Guidance and sample materials touching on all aspects of designing and implementing continuous distribution of ITNs (including SBC) through health facilities, schools, and community agents

Net Use, Care, and Repurposing SBC

- [ITN Access and Use Report](#), and [webinar](#). The use-to-access ratio (UAR) is a powerful tool for understanding the true extent of the net use behavioral gap. The report provides a detailed breakdown of the UAR in each Global Fund and PMI-supported country; the accompanying webinars include details on trends observed across countries.
- Net use messaging case study series. Case studies showing best practices and innovations in net use messaging, including the [use of a national brand](#), [keeping messaging fresh](#), [advocacy](#), and [school-aged audiences](#).
- [Net Care and Repair Online Toolkit](#). Contains materials from both campaigns, as well as the data collection tools used in formative research and evaluation.
- [Incorporating Net Care and Repair into Malaria Social and Behavior Change Communication Strategies](#). This document takes readers through each step of the P-Process and emphasizes net care and repair considerations and lessons learned from the Nigeria and Uganda pilots.
- [DurabilityMonitoring.org](#). Data collection tools and practical guidance for conducting net durability monitoring surveys, including measurement of net care practices and attitudes.
- [Social and behavior change considerations for areas transitioning from high to moderate to low, very low and zero malaria transmission](#)
- [CAP-Malaria SBCC Materials Catalogue](#). Examples of SBCC materials created for the Mekong region.
- [Consensus Statement on Repurposing ITNs: Applications for BCC Messaging and Actions at the Country Level](#). Provides National Malaria Control/Elimination Programs (NMCPs) and implementing partners with clear recommendations and key messages on three categories of repurposing: beneficial repurposing, neutral repurposing, and misuse.
- [Zimbabwe communication strategy for rectangular nets](#). In 2017, Zimbabwe moved to procuring rectangular nets from conical, this document puts together a strategy for that transition.
- [Senegal net transformation demonstration videos](#). How to turn a rectangular net into a conical net, and how to add a reinforced border.

Behavioral Economics and Human Centered Design

- [Design for Health](#). A compendium of resources for global health practitioners who are interested in using design in their work. Includes a primer, glossary of terms and project examples.
- [The Field Guide for Human-Centered Design](#). Developed by a design firm, Ideo, it explains Ideo's processes on using design for the social sector, and provides 57 design methods for new and experienced practitioners, as well as case studies of human-centered design in action.
- [Behavioral Economics in Reproductive Health](#). This white paper outlines the major behavioral challenges in reproductive health and identifies behavioral economics tools that may be applied to reproductive health challenges. The paper highlights both existing evidence and current gaps in the research.
- [Thinking Automatically](#). This World Bank Report provides an overview of behavioral economics concepts and how paying attention to subconscious mental processes can improve the design and implementation of development policies and interventions.

Vector Control with ITNs

- [Vector-Works.org](#). Links to multiple research, policy and implementation resources on net use, continuous distribution, net care, outdoor biting, IRS, and most of the topics covered in this guide.
- [U.S. President's Malaria Initiative Technical Guidance FY2019](#). This document provides technical guidance and is a reference tool for PMI country teams, NMCPs, and other partners implementing PMI-funded malaria activities. The guidance is updated annually to reflect the most recent global policies and the state-of-the-art of malaria control.
- [WHO malaria elimination framework](#). Guidance on the tools, activities, and strategies required to achieve malaria elimination and prevent re-establishment of transmission in countries, regardless of where they lie across the spectrum of transmission intensity.

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