Social and behavior change considerations for areas transitioning from high and moderate to low, very low and zero malaria transmission

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Introduction

A 37% reduction in malaria cases and 60% reduction in mortality due to malaria in the past 15 years have saved an estimated 6.2 million lives and increased the life expectancy among those in the World Health Organization (WHO) African Region by almost ten years [1]. The global community has called for even greater progress among the remaining 3.2 billion people at risk of infection. To this end, the WHO *Global Technical Strategy* (GTS) goals include reducing malaria incidence and mortality rates by at least 90%, eliminating malaria in 35 countries, and preventing re-establishment in all malaria-free countries.

In areas with high, moderate, low, and very low transmission alike, use and uptake of malaria interventions rely heavily on community awareness, demand, and acceptance of essential commodities and services. While the WHO has recently developed a malaria elimination framework and has a number of established policies, manuals, and recommendations, detailed guidance does not yet exist for social and behavior change (SBC) in different transmission settings. While the Roll Back Malaria *Strategic Framework for Malaria Social and Behavior Change Communication* provides standard approaches, best practices, and indicators, it does not do so in malaria elimination contexts. This document describes the landscape of current SBC programming in such contexts and provides a number of considerations for future inquiry and research.

This document describes ways in which program planners and implementers might tailor their efforts to specific malaria transmission strata and suggests a number of operational research questions. Three case studies exemplify considerations raised and describe the role of SBC in strengthening the fight against malaria:

- The first case study from Zambia describes a successful interpersonal communication (IPC) approach paired with community-owned surveillance.
- The second case study from the Greater Mekong sub-Region describes multi-channel, cross-border initiatives.
- The third case study from South America describes the Amazon Malaria Initiative's regional coordination.

This landscape document is an important first step in understanding how to scale-up and maintain coverage of proven interventions in all areas and support countries to effectively transition from high or moderate to low, very low, or zero levels of malaria transmission.

Background

The world has made astonishing gains in the fight to end malaria. These gains are not evenly distributed, however, and may prove reversible without renewed commitment and innovation. A changing epidemiological landscape demands new global strategies and goals that transition SBC approaches from areas of high or moderate to low, very low, or zero malaria transmission, while simultaneously preventing reintroduction in areas that have already achieved malaria elimination. The first pillar of the WHO GTS is ensuring universal access to malaria prevention, diagnosis, and treatment for all populations at risk [2]. The cornerstone of the GTS assumes

adequate and sustained demand and use of available services. Evidence suggests current demand and use of malaria interventions is far from universal.

Only half of sub-Saharan Africans at risk of malaria slept under an insecticide-treated net (ITN) in 2015. Just a third of eligible pregnant women received WHO recommended doses of sulphadoxine-pyrimethamine (SP) for intermittent preventive treatment of malaria in pregnancy (IPTp). Only 14% of children under five with evidence of recent or current *Plasmodium falciparum* infection and a history of fever were treated with an artemisinin-based combination therapy (ACT) [3]. While it is important to note that ITN use, ACT prescription, and IPTp uptake are heavily influenced by access (which is increasing), the importance of generating demand for and building trust in these life-saving commodities cannot be overstated. If intervention coverage remains at levels achieved between 2011 and 2013, a moderate *rise* in malaria incidence will occur by 2030. On the other hand, increasing coverage of multiple interventions to 80% could result in a 40% *drop* in mortality by 2030 compared to 2015 levels [4].

> *"Service delivery in malaria is not only about delivering products; it is also about ensuring they are used properly. Communication methodologies are essential to ensure the appropriate use of interventions."* - Global Malaria Action Plan

Overview of SBC Considerations

Malaria SBC considerations in this document are organized according to the categories of transmission intensity outlined by the Framework for Malaria Elimination (Figure 1). Shifts in SBC focus are described as a transition from areas of high and moderate transmission to areas of low, very low, and zero transmission. Where applicable, suggestions for SBC operational research are provided, and followed by a general discussion about the importance of strengthening integration across all interventions.

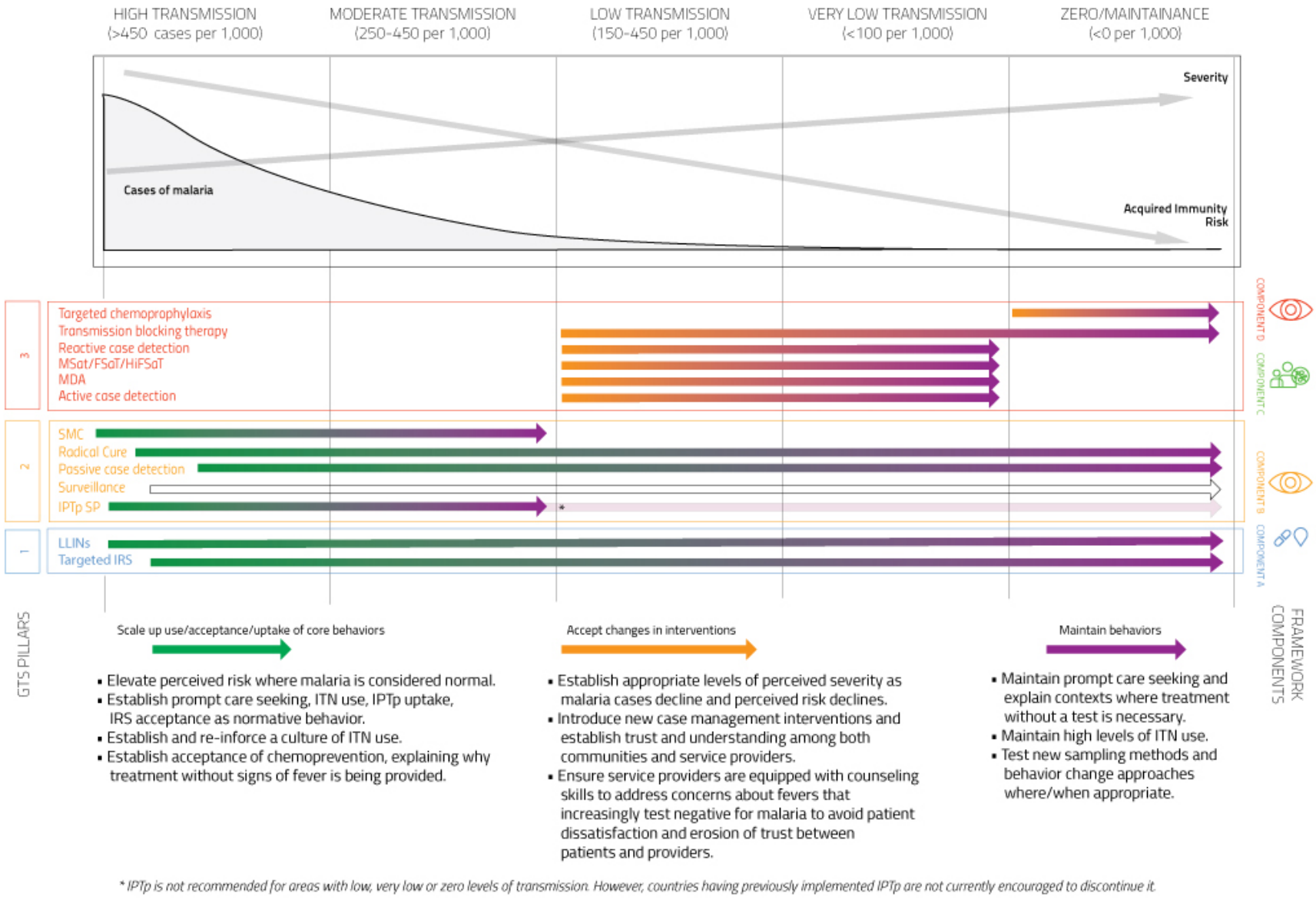


Figure 1: Malaria Transmission Intensity and SBC Focus

Transitioning from Areas of High and Moderate Transmission to Areas of Low, Very Low, and Zero Transmission

"The first priority for all countries where transmission rates of malaria are high or moderate is to ensure maximal reduction of morbidity and mortality through sustained provision of universal access to quality-assured and appropriate vector control measures, diagnostics and antimalarial medicines, together with the implementation of all WHO-recommended preventive therapies that are appropriate for that epidemiological setting. These activities must be backed up by efficient disease surveillance systems, robust entomological and drug efficacy surveillance, as well as strong public health communication and behavioural change programmes." -GTS 2016-2030

Enhance and optimize vector control

While ITNs and IRS reduce mosquitoes' capacity to transmit malaria, they are most effective when ITN use and/or IRS acceptance is high. Research data shows that exposure to malaria SBC can increase net use, net longevity (Box 1) and IRS acceptance (Box 2).

Box 1: Evidence-based ITN SBC – Measuring the effect of SBC on ITN behaviors

A number of studies have demonstrated that combining SBC with vector-control programs had a positive effect on use of bed nets [5, 6, 7, 8]. In Cameroon, net use was 10-15 percent higher among those exposed to malaria messages [7]. A study in Nigeria found that SBC encouraging net care and repair can significantly prolong the lifespan of ITNs [9]. The methods used to determine the impact of SBC on net use and longevity in these studies include propensity score matching and intervention-control design. These examples demonstrate that SBC can have a measurable impact on ITN use and longevity and that the methods of measuring impact may not be prohibitively complicated or expensive.

Box 2: Evidence-based IRS SBC – Community engagement

The RBM *Action and Investment to Defeat Malaria* calls for a human-centered approach to malaria elimination that begins with those most affected by malaria, not simply treating them as recipients of aid. Atkinson, Whittaker and Smith have published a number of articles on community participation in malaria and other health programs including lessons learned from a systematic review of community participation in infectious disease control programs [10, 11]. They argue that the most compelling reasons to engage with communities will be the need to address declining perceptions of risk. The authors also advise not to claim malaria is the most pressing health concern, as this will not likely be the case, but rather to include messaging about the benefits and positive effects malaria reduction has had on communities and to demonstrate what can be done to sustain this. These authors describe community engagement on a sliding scale beginning with community non-compliance or rejection, on to passive acceptance, moderate participation, and finally active community participation and community ownership. Atkinson and colleagues describe those with active participation and ownership as "competent communities [11]."

The WHO's *A Framework for Malaria Elimination* articulates the following objectives of community participation:

- Encouraging appropriate health-seeking behavior
- Strengthening community access to malaria testing, treatment and reporting
- Promoting acceptance and appropriate use of vector control tools
- Empowering communities to strengthen self-monitoring and decision-making about malaria
- Building community and local political support for eliminating malaria
- Increasing active community participation in elimination activities, including a surveillance system linked to district and other systems up to national level.

Promising Practice: Horizontal participatory practices to stimulate community contributions [12]. The "open space" approach, a means of engaging with communities to determine their willingness to contribute to malaria reduction efforts, was employed in the Ruhuha sector of Rwanda. Workshops were held to learn from and collect community feedback. The outcomes of this activity were mutually agreed upon actions to reduce malaria and planning for future activities. This approach was applied among communities that had seen recent reductions in malaria (from 60% to 20%). Used as part of an integrated malaria elimination strategy, the "open space" workshops yielded two local solutions: the establishment of a rewards system and malaria clubs. A subsequent Community Malaria Action Teams intervention was conducted. At the end of 2014 these teams reported a reduction of presumed malaria cases, attributing gains to increases in use and acceptance of IRS spraying and community-based health insurance membership [13]. Local health data indicated a malaria burden reduction of 15.5%. A household survey conducted 6 months after the intervention found an increase in IRS acceptance from 94.5% to 98.7%, and a 47% increase in prompt care seeking for fever.

In high transmission and moderate transmission areas, focusing on individual behavior change is necessary but insufficient. Social change, shifts in behavior by whole communities, is necessary to establish and maintain a culture of net use and IRS acceptance– and coverage rates that bestow a community protective effect [14]. SBC that encourages maintained net use should be ongoing, not simply relegated to ITN promotion during mass distributions. Considerations for keeping coverage and use/acceptance of both ITN and IRS high may change as communities transition to low, very low, and zero malaria transmission intensity areas. For example, the duration of time communities spend in each level of malaria transmission intensity will likely contribute to behavioral determinants like risk and severity (both real and perceived). Use of behavioral theory, program design, and the framing of messages about

malaria severity in areas where high malaria transmission has existed for decades should look very different than SBC in areas where malaria has recently been eliminated or re-introduced.

SBC considerations for transitioning to low, very low and zero transmission: The impact of ITNs and IRS is temporary, and gains may be quickly reversed if use or acceptance falls. From an SBC standpoint, the mere adoption and scale up of behavioral practice is not enough: acceptance of IRS spraying and use of ITNs must be maintained at high levels. While behavior maintenance theory is not yet commonly used to inform malaria SBC programming, its focus on the role of motives, self-regulation, resources, habits, and environmental and social influences [15] may prove useful where ITNs and IRS have been implemented for a number of years.

Establishing or reinforcing ITN use in mobile, migrant, and vulnerable populations during the transition from high and moderate to low, very low, and zero malaria transmission will require new measurement tools and approaches. Established social norms in fixed or sedentary communities may function differently than in smaller, more mobile, more heterogeneous groups. In addition to using routine health facility data collection, the process of assessing behavioral, environmental, and social influences among those who engage in risky behavior (not using ITNs, for example) may require new surveys and sampling techniques (explored further in the *population-wide parasite clearance and additional new interventions* section). Information gleaned from these new techniques may uncover behavioral influences that differ from those common among sedentary groups.

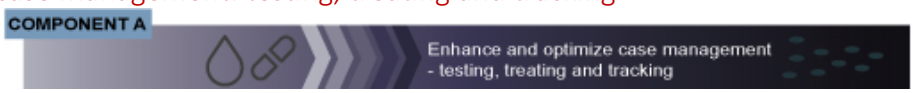
Box 3: Evidence-based Vector Control SBC – Community-owned vector control in the Philippines
A program initiated in the community of Simbalan in the Philippines exemplifies the kind of community ownership that will eliminate malaria in the face of shrinking resources [16]. The mountainous area has been relatively free of malaria for quite some time, with a single pocket of stable transmission. A combination of ITN distribution, IRS coverage, and use of RDTs reduced malaria significantly. These approaches are considered successful because of community ownership. Community action committees on malaria were established with the help of local officials, health workers, teachers, and community-based groups that planned and coordinated malaria activities. These committees oversaw an anti-malaria brigade of volunteers who helped implement vector control at monthly intervals. These brigades assisted in health promotion, ITN surveys, diagnostic testing and in some instances helped with IRS. A small-scale public-private partnership with local motorbike-taxi associations was established to provide transportation, usually for free, in support of malaria control. This included transport for patients and movement of blood slides and reports. House-to-house visits were carried out by "personal sellers", individuals trained by a provincial health officer who promoted use, care and repair of ITNs in their communities. Finally, education on malaria transmission and vector control was incorporated into school lessons. A community action committee developed their own vision statement, which included the goal of self-sufficiency – independent of external resources. Widespread community-driven malaria prevention and control that mimics the Simbalan community motivation and enthusiasm will be an important element of malaria elimination in Latin America, SSA, and Asia.

Operational Research Questions:

1. Almost all standard malaria SBC indicators measure individual behavior change. Even those that measure social norms are enumerated at the household level. Would the development of **an indicator that measures acceptable ITN and IRS attitudes and behaviors at the community level** prove to be a more meaningful way of determining if social norms have actually been established?

2. Current ITN and IRS SBC efforts are often informed by behavior change theory that focuses on adoption of new behaviors. Would the **development of programs designed with behavior maintenance theory** prove to be more effective in areas where ITN and IRS use have already been established?
3. Monitoring shifts in human attitudes, perceptions, and behaviors will remain important as countries transition to moderate and low transmission strategies. Can interactive voice response (IVR) and short message service (SMS) be used to **quickly and inexpensively determine shifts** in these important behavioral antecedents?

Enhance and optimize case management: testing, treating and tracking



The cornerstone of malaria case management SBC is increasing the proportion of those who seek care for fever quickly, particularly pregnant women and children under five. Program implementers who have used the positive deviance approach (Box 4) have found that leveraging local voices and modeling behavior can have positive impact on prompt care seeking in high transmission areas.

Box 4: Evidence-based Case Management SBC - Positive Deviance
In the Greater Mekong Sub-Region, the "positive deviance" approach was successfully used to increase knowledge about malaria and increase prompt care seeking for fever. The approach identifies people who are already demonstrating positive behaviors and turns these "positive deviants" into role models for the rest of the community. This approach relies on realistic modeling of behaviors by individuals that community members consider to be similar to themselves. The approach has been used to improve behaviors in a variety of contexts and population groups, including mobile and migrant workers [17].

SBC considerations for transitioning to low, very low and zero transmission: While raising awareness about the broad spectrum of causes of fever is important in areas of all transmission intensity, it is even more important among communities transitioning from high and moderate to low, very low and zero transmission intensity to avoid confusion and concern about the increasing number of fevers testing negative for malaria [18]. Establishing trust in test results is equally important among community members and service providers alike. Service provider SBC activities should encourage adherence to national malaria case management guidelines in the event of a negative test result, and ensure adequate counseling for febrile patients who do not receive treatment for malaria when presented with a negative RDT. This will avoid patient dissatisfaction and prevent erosion of trust between patients and providers. The U.S. President's Malaria Initiative (PMI) guidance recommends "diagnostic testing be closely linked with SBC activities that focus on changing the expectations and practices of patients and caregivers [19]."

As communities experience fewer and fewer cases of malaria, it may be more effective to maintain levels of perceived severity than perceived risk, as risk will, in fact, decrease but decreased natural immunity will make imported cases more severe.

Epidemiological changes in malaria transmission will also shift demographic importance from pregnant women and children under five to include adults and men as all ages and both sexes lose acquired immunity. SBC interventions will need to focus increasingly on new parasite reservoirs (adolescents and adults) to control seasonal outbreaks and epidemics [20]. The Amazon Malaria Initiative case study (page 25) includes tools and materials developed for SBC in Central and South America, where adult mobile and migrant populations, such as miners, are a target audience.

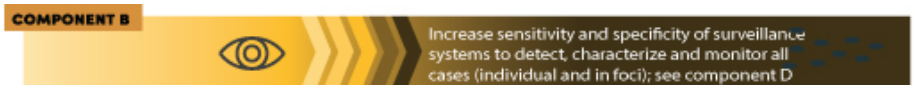
Seasonal malaria chemoprevention (SMC) involves the occasional administration of a full treatment course of antimalarial medicine to children in areas of highly seasonal transmission during season(s) of higher precipitation. In areas where SMC is implemented, community SBC interventions have focused on raising awareness of the safety and efficacy of medicines and encouraged community acceptance to maximize protection and minimize drug resistance (Box 5). PMI has identified community health workers as particularly well placed to identify households with eligible children as a key group of SBC agents. Reinforcing trust between community health workers and service providers and those they serve will ensure doses given for later consumption are completed.

Where recommended, SBC should be paired with IPTp interventions to increase uptake at the community level. IPTp delivery at the community level has been piloted [23] and is in the process of being scaled up in several Sub-Saharan African countries. SBC interventions should encourage ANC attendance in all areas, but particularly those where IPTp is being delivered at the community level. Increased delivery of IPTp should not come at the cost of lower ANC attendance. A growing body of evidence suggests that service provider attitudes, biases, and behaviors are a key determinant of IPTp uptake, implying that SBC interventions that include supportive supervision or participatory learning approaches may increase service provider adherence to IPTp guidelines (see SBCC for Malaria in Pregnancy: Strategy Development Guidance Implementation Kit). The 2016 WHO recommendations on antenatal care for a positive pregnancy experience recommend participatory learning action cycles with women's groups to encourage regular ANC contacts and address questions or concerns they might have as well.

Box 5: SBC for SMC: The ACCESS-SMC initiative rolled out SMC across seven countries in the Sahel region between 2015-2017. Knowledge, attitude and practice surveys conducted in the Gambia, Guinea, Mali and Niger found high community acceptability of SMC. Expressed intent to accept SMC in the future was almost universal. Barriers to acceptability included the taste of the medicine and confusion with other health campaigns, while perceived treatment efficacy was often listed as a facilitator to acceptability. Communication channels used to reach community members and encourage acceptance included door-to-door visits, community dialogues, and radio programming. Those surveyed overwhelmingly preferred nurses, doctors, and community health workers as message agents [21].

The WHO *Seasonal Malaria Chemoprevention with sulfadoxine–pyrimethamine plus amodiaquine in children: a field guide* provides direction on advocacy for community and social mobilization and behavior change communication: "*Delivering key messages about SMC should reduce the risk of misunderstanding and any negative perceptions about the strategy. Community members can be involved in advocacy for community and social mobilization*." A complete list of points to emphasize are included in the guidance [22].

Increase sensitivity and specificity of surveillance systems to detect, characterize and monitor all cases



Component B of the Framework for Malaria Elimination involves testing all individuals with suspected malaria. At times, malaria case detection and reporting will involve the assent and participation of asymptomatic community members. This represents a necessary shift in messaging at the community level, requiring attention from SBC programs and practitioners. As areas transition to treat individuals with malaria who are asymptomatic, SBC activities must substitute emphasizing exclusive test-before-treat messaging with calls to action that encourage trust of health workers and their new treatment regimens.

Active case detection* will be employed in low, very low and zero transmission areas. Communities used to activities promoting care seeking and testing for fever may now need messaging to raise awareness and knowledge about why testing and treatment is necessary in the absence of fever. This sensitization should take place before roll-out and continue until active case detection activities cease. As active case detection is highly focalized, training health workers to effectively communicate with surrounding families, neighbors, and community members is important. As countries begin to use preventive treatment more selectively, among smaller target groups, ensuring service providers are equipped as agents of behavior change is increasingly important as well. Patient counseling may replace much of the work formerly done by community health workers at the community level in zero transmission areas.

Lessons Learned: As malaria cases decreased in Swaziland, the NMCP conducted yearly knowledge attitudes and practices surveys to determine which communication channels to prioritize. Based on these surveys, the NMCP is able to adjust messages and campaigns from year-to-year. The current SBC strategy includes activities to encourage use of chemoprophylaxis when traveling to areas of malaria transmission [24].

Population-wide parasite clearance and additional or new interventions

Applying lessons learned from other infectious diseases and human movement

A shift in how we conceptualize those at risk of malaria will require changes not only in demographic focus, but the application of lessons learned about infectious diseases and human movement including how to locate, track and influence behaviors of mobile populations. Smith

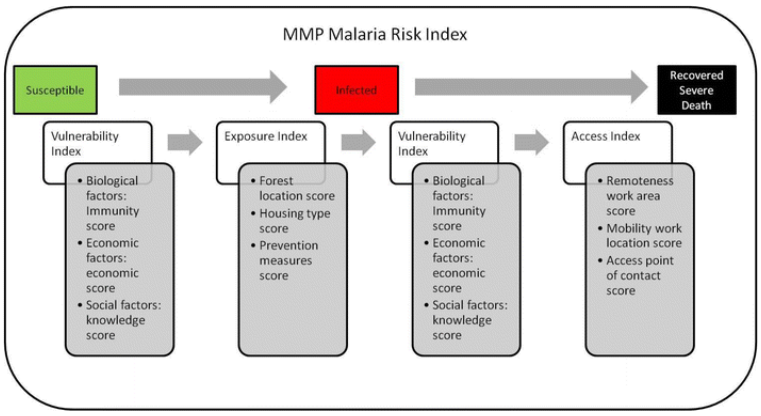
*Detection by health workers of malaria cases at community and household levels, sometimes in population groups that are considered high risk. Active case detection can consist of screening for fever followed by parasitological examination of all febrile patients or as parasitological examination of the target population without prior screening for fever.

and Whittaker describe three ways malaria SBC practitioners and NMCP program planners might re-conceptualize and respond to mobile populations [25].

First, mobile populations are not as difficult to access as previously imagined and the risk their travel poses is often misunderstood. Second, regardless of how difficult it may be to reach a particular group, working with each population as participant agents in their own health is more successful than treating them as recipients of outside interventions. And finally, a necessary shift in focus from mobile populations as demographic groups, to mobility as a system is important. The case study on cross-border SBC interventions in the GMS illustrates the first point in a tangible way (page 21).

The lesson about accessibility can be understood by examining rural farms and plantations in Thailand and Cambodia that attract migrant workers. These areas are not isolated, but accessible and connected to roads and easily traced transportation routes [23]. It would be a mistake to assume that because migrants are mobile, and move between rural areas that are difficult to travel to, that they cannot be effectively reached with SBC. Rather than focusing on the demographic and geographic difficulties, planners can examine points of interconnection: where migrants move, where they congregate, and who comes into contact with them most often. Migrants in the GMS travel and stay for different periods of time and with varying frequency. Reaching those who have changed residence permanently, who travel periodically or seasonally, who travel for a short term, or those who travel routinely, is possible, but may require different approaches. This requires re-thinking previous assumptions about risk and the timing, frequency, speed and duration of human mobility between malaria transmission zones. One such example is a study of malaria transmission between mainland Zanzibar and mainland Tanzania.

Using cell phone records to measure the number of travelers and duration of their stays, researchers determined that the majority of traffic from Zanzibar was to low transmission areas on the mainland. Most travelers returned within a week. This travel pattern was not found to pose a significant transmission threat [26]. While it would be easy to assume travel between transmission zones would facilitate imported cases of malaria, it isn't the travel itself that is important, but specific origins, destinations, and respective transmission levels, malaria receptivity, and vulnerability. This has been clarified using research on how different data points can be used to track human movement to develop malaria elimination strategies.



Guyant et al. Human Population Movement Risk Index

A clearer picture of where and when human population movement causes imported cases of malaria is pioneered by Pindolia and colleagues [27]. Their work, supported by other research [28], suggests SBC practitioners should focus efforts on potentially infected individuals or groups moving from

low transmission, high receptivity areas to high transmission areas and back, as well as those moving permanently from high to low transmission areas. These travelers pose a greater concern for elimination than infected travelers moving to high transmission, high receptivity areas or low transmission, low receptivity areas. Data collection tools useful in determining groups among mobile populations that pose the greatest risk include indices of vulnerability, exposure, and access [29]. This data will help SBC practitioners compare malaria vulnerability among groups and prioritize efforts and resources accordingly [16].

Finally, just as many HIV programs work through social networks and peer educators, and involve those they are attempting to reach, malaria elimination efforts should work with those who engage in high-risk behaviors to influence and recruit individuals in their social networks, focusing not on demographic groups but on high-risk situations [30, 31, 32].

SBC considerations for transitioning to low, very low and zero transmission: SBC practitioners should shift from measuring fixed geographically and demographically defined populations to examining mobility as a system, and looking for ways of reaching and interacting with people in that system who share risk-taking behavior. Evidence suggests that encouraging them to take an active role in their own well-being will yield positive results. Monitoring human movement, and determining what effect the direction of that movement will have on different areas, will involve understanding and use of malaria vulnerability and receptivity indexes. This will necessitate use of routine data, collected with greater frequency.

The Greater-Mekong Sub-Region case study (page 21) describes SBC interventions such as net lending programs, training non-registered medicine vendors, and IPC with travelers at multiple points on known trade routes. Programs designed for low and very low areas of malaria transmission should build on lessons learned in this region.

Operational Research Questions:

1. In areas transitioning from high and moderate transmission to low, very low and zero malaria transmission, **might snowball sampling [33], a form of respondent driven sampling, be used to obtain representative sampling of hard to reach populations** and determining risk factors?
2. Time sampling is an approach that has been used to reach groups with common risk-taking behaviors. This approach involves sampling at a set time and location where risk-takers gather, such as clubs, bars, market stalls, or bus stops [34]. As countries expand pockets of very low, low, and zero malaria transmission, **could time sampling be used to reach groups with common malaria risk behaviors**?

Investigate and clear individual cases, manage foci and follow up

Component D of the Framework to Eliminate Malaria involves close investigation of every single malaria case, and the development of a system to follow up with each case. Risk of re-establishment of malaria can be defined as the combined effect of an area's receptivity and

vulnerability, which in turn are functions of ecological, climatic, socio-demographic, epidemiological, entomological, and health system factors [1]. Receptivity and vulnerability must both be present for re-establishment to occur. If either one or the other is considered zero, re-establishment is not possible. Use of routine data at health facilities, traveler movement, and surveillance data about all malaria cases will become increasingly important for program planners, particularly at in lower transmission intensity areas.

Channel selection and prioritization will become increasingly important. As vectors of the parasite decrease rapidly, mass communication channels like radio and TV will become less and less relevant as will wide-spread use of health workers to communicate with communities about malaria.

Points of entry, including country borders, will become increasingly important focal points of malaria communication. From an SBC standpoint, coordinating with neighboring countries will also become increasingly important. This can be accomplished through participation in regional strategy development and sharing of best practices through SBC communities of practice, such as the Roll Back Malaria Social and Behavior Change Communication Working Group.

Strengthening Integration

The case burden of malaria strains public and private health systems. In high transmission settings, malaria comprises 50% of hospital visits and admissions, and can account for 40% of public health spending, time and resources at peak times [33]. However, in areas of low and very low transmission, even as malaria cases persist at lower frequency, SBC efforts to address them may have to be paired with other competing illnesses. Reported cases of malaria will become the most important indicator of progress towards elimination and service providers will become the chief means of communicating with patients about malaria. As this happens, it will be increasingly important to prioritize messages and promote malaria, emphasizing actions to avoid more than one disease or illness. In fact, the WHO recommends taking advantage of opportunities to communicate about multiple vector-borne diseases (those currently posing a risk as well as malaria) when possible. In areas where other vector borne diseases are present it may be possible to package SBC messaging and materials in a way that provides a set of behaviors families can take to avoid multiple illnesses.

While tight integration between NMCP and maternal and child health and reproductive health units is important in areas of every transmission intensity, as malaria budgets are adjusted, so too will the number of those employed by the government to focus exclusively on the disease. It will become increasingly important for SBC officials to work with multiple MOH units. Inroads with education and tourism ministries and private sector companies may prove beneficial as well.

The first section of this document has reviewed malaria interventions, categorized by WHO-defined malaria transmission levels, discussing SBC recommendations for each. In the next section, three case studies illustrate SBC activities in different pre-elimination contexts. Each

case study highlights challenges and promising practices, each prepared with the input of the responsible implementing partners.

Recent Malaria SBC in Moderate, Low, and Very Low Areas of Transmission Intensity

The following three case studies have been selected because the different approaches span the range of malaria transmission, each offering unique insights. The Zambia case study describes a highly participatory intervention that may prove effective in high, moderate, and low transmission settings, making it a pragmatic choice for countries in transition. The Greater Mekong provides a detailed description of challenges involved in reaching and influencing mobile and increasingly heterogeneous groups of those at risk. Finally, a description of collaboration between the governments of Latin American countries illustrates the degree of cohesion necessary to sustain gains in an interconnected region.

Case Study 1: Zambia

General Malaria Landscape: As a country with moderate to high malaria transmission, Zambia fits the WHO designation of a high burden country. Ninety percent of Zambia's 15 million inhabitants are at risk of malaria infection. Located in a region with both high burden and pockets of lower and zero transmission, Zambia is a signatory of the Elimination 8 (E8) regional cross-border initiative and has set a country elimination goal by 2020. While still largely focused on malaria control, Zambia's parasite prevalence and transmission varies widely throughout the country, necessitating strategies tailored for different regions.

SBC Implementation: Zambia NMCP's strategies and activities reflect the needs of different transmission intensities. SBC implementation by the USAID-funded Communication Support for Health (CSH) project exemplifies an approach with benefits for areas of high and low malaria transmission intensity.

Champion Communities

Intervention: Interpersonal communication
Formative Research: Assessment of barriers and influencing factors related to ANC services and ITN use
SBC approach: Behavior-Centered Programming (BCP) & Community Champions

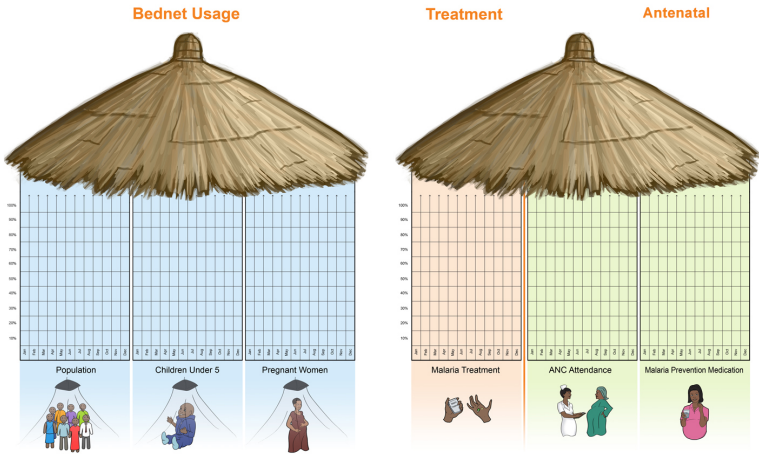
- Key elements include use of research to determine program strategy, tailored media messages to address specific barriers identified by formative research, multi-channel approach, use of message pre-testing, active community participation.
- Six steps of BCP: 1) Situational assessment 2) Behavioral analysis 3) Program definition 4) Strategic behavioral change activities 5) Communications plan 6) M&E plan
- Working with communities as agents of behavior change increases the likelihood of ownership.

CSH implemented multi-component SBC activities in Zambia from 2010-2014. Implemented by Chemonics International, Manoff Group, and ICF International, CSH built the Zambian government's institutional capacity to influence HIV, nutrition, maternal health, and malaria

behaviors. CSH's BCP approach focused on bringing about change at the individual, community, and organizational levels. Families, health workers, and community members were included in a participatory process that ensured beneficiaries of SBC played an active role in the design and testing of health promotion activities. Among a number of successes detailed in the project's final report is a 10-percentage-point increase in regular use of ITNs. CSH's success highlights a means with which to implement targeted IPC. The Champion Communities' use of community-generated data, self-surveillance, and sense of ownership resulted in positive behavioral outcomes.

Formative research indicated that malaria was so pervasive in the lives of many Zambians that it was often viewed as an unavoidable part of life. To address this issue, CSH set out to instill a sense of urgency among those affected by malaria with the STOP Malaria campaign. Working with five local civil society organizations (CSOs) and community leaders, CSH used an approach they called Community Champions. Community Champions combined one-on-one counseling, community meetings, and mothers' groups with a form of household data gathering that helped measure increases in behaviors like regular ITN use. Community malaria counseling agents (CMAs) made monthly visits to households and used visual aids to speak about ways to prevent malaria. The program ran from April 2013-September 2014 in eight districts. One or two CMAs worked in each participating community, each responsible for IPC to 30 households.

After each visit, CMAs recorded behaviors reported by those interviewed on scorecards. Behaviors recorded included care-seeking and appropriate testing at the first sign of fever, regular ANC attendance, and uptake of IPTp. Scorecards indicated what issues to prioritize in each household on subsequent visits. Using this locally collected community data, Zambian government partners and CSH more effectively monitored the program and made necessary programmatic adjustments. For example, several communities discovered that many were seeking care for fever, but were not regularly sleeping under ITNs. In response, communities like Mweendu in Mongu District shifted the focus of household counseling sessions to further emphasize ITN use. Communities in the Western Province that once used ITNs to fish were encouraged to reflect on the practice and come up with an action plan to change the unhealthy behavior. As communities met their own behavior change goals, their success was celebrated by naming them Champion Communities.



Champion Communities Performance Score Card

Potential efficacy in low and very low malaria transmission settings: The participatory nature of CSH's Champion Communities initiative ensured that communities set their own goals and created local solutions to health issues like malaria. The notion of communities collecting and using their own data was powerful because reductions in morbidity were noticeable.

Collecting data is an important consideration given the scalability of the Champion Communities initiative, as it requires a sufficient number of motivated community health workers. While results were promising in smaller communities, bringing such an approach to scale could be difficult. This challenge might be mitigated by using a data cohort model, where different groups of people would be surveyed during different time periods. Community meetings would still involve everyone, but house-to-house IPC could be staggered, limiting the number of community health workers needed and the time required of them.

Replicating this initiative's success in low or very low malaria transmission areas might mean limiting the activity to a short, introductory phase among groups not yet convinced ITNs are an effective means of preventing malaria. The approach would be difficult to sustain over a 5-year project cycle in one area, but might be successful if implemented in different communities over time.

The Champions Communities approach might also complement integrated community case management (iCCM) implementation, as volunteers are often frustrated by having to conduct information dissemination without the tools, services, and medicines to do anything about the illness itself, particularly as many communities where this intervention was implemented are located far from health centers with tests and treatment. Pairing this approach with iCCM would empower health workers to play a role in treating febrile cases that test positive for malaria, or refer those with severe symptoms. Additionally, using passive case detection, would address both volunteer work load and provide a sampling mechanism in intervention areas. If the intervention area moved, the area where implementation previously took place could be covered with active case detection, maintaining volunteer activity without demanding excessive or unrealistic amounts of work.

The Champion Communities approach illustrates several considerations previously described. This participatory approach combines frequent data collection on community behaviors with IPC. The application of this approach in low and very low malaria transmission settings could rely on frequent data collection and dissemination at the community level, not to show dramatic case reductions (as changes at lower levels of transmission would not likely be as dramatically noticeable), but as prompts and reminders to maintain healthy behaviors.

Case Study 2: Greater Mekong Sub-Region

CAP-Malaria's Approaches for Reaching Mobile and Migrant Populations
Interventions: Twin-cities approach, net lending programs, training non-registered providers, transit media, mass media, IPC/community mobilization with village and mobile malaria workers and health staff
Formative Research: Baseline assessment, Burma, Cambodia, Thailand gender assessments, Assessment of ITN Lending Scheme: Perceptions on access to and utilization of ITNs among migrant workers
SBC approach: Addressing mobility as a system by initiating Interpersonal communication with travelers at multiple points on known travel routes, as well as in destination work places.

General Malaria Landscape: As countries with high, moderate, low, and very low malaria transmission, China,Thailand, Cambodia, Laos PDR, Vietnam, and Myanmar fit the WHO designation of high burden countries. Fifty-five percent of malaria cases and most deaths in the GMS are due to *Plasmodium falciparum*. In response, GMS countries committed to the goal of an Asia-Pacific free of malaria by 2030 at the 9th East Asia Summit, held in Myanmar in November 2014. *The Strategy for Malaria Elimination in the Greater Mekong Sub-Region 2015-2030* outlines priorities and objectives to achieve this goal [35].

Over the past decade, malaria prevention and control efforts in the GMS have resulted in a significant decline in cases. With an estimated 450,000 confirmed cases across the region annually, health practitioners are designing their strategies for malaria elimination, with an ultimate goal of eliminating *P. falciparum* by 2025 and all malaria by 2030 [36, 37, 38].

However, progress to date is severely threatened by the development of resistance to artemisinin. While the Thai-Cambodian border is considered the epicenter of artemisinin resistance [37], prolonged parasite clearance, an early warning sign of resistance, has been identified along the Thai-Burmese and Burmese-Chinese borders, as well as in southern Vietnam and Lao PDR. The vast number of mobile and migrant populations (MMP) living in the region complicate national containment efforts, as they move through high-risk transmission areas and are difficult to diagnose, treat, and track due to routine traveling. Not only are MMPs difficult to medically track and follow, they also often avoid interaction with public services because of undocumented status or the informal or illegal nature of their work. Additionally, frequent movement often leads to increased risk-taking behaviors, which - along with language barriers, legal status issues, and lower socio-economic status – prevent MMPs from receiving ITNs and prompt treatment for fever.

In response, health practitioners, country leadership and nontraditional partners have come together around the idea of elimination and containment to develop innovative communication strategies for MMPs and ensure consistent malaria messages for those who reside on either side of the border.

SBC Implementation: Control and Prevention of Malaria (CAP-Malaria), a USAID-supported project that implemented malaria prevention and treatment interventions in the border regions of Thailand, Cambodia and Burma, describes several ways understanding mobility as a system has been used to engage with at risk mobile and migrant populations. Implemented by

the University Research Co. LLC (URC), Save the Children, and the Kenan Institute Asia, the CAP-Malaria project ran from 2016-2017, with cross-border activities continuing into 2017. CAP-Malaria focused on improving MMPs' access to health information and services.

As mentioned earlier, MMPs are often considered hard to reach because they are not as easily identified or accessed through traditional SBC approaches. CAP-Malaria activities demonstrate that it is possible to effectively communicate with these groups by designing activities around specific sub-groups and their characteristics, social networks, points of contact and migration patterns.

CAP-Malaria identified and worked with hot spots and touch points to communicate with its prioritized groups. For example, to reach populations connected to the agriculture sector, CAP-Malaria developed partnerships with private sector companies. ITN lending schemes were developed to encourage farms and plantations to expand net coverage to highly mobile employees for the duration of their stay, expanding coverage to those not reached by universal coverage campaigns. ITN lending activities also provided an opportunity for employees to receive tailored malaria messages through IPC, a channel that does not require the audience to overcome common hurdles like reading pamphlets or billboards. As MMPs in Myanmar have been found to self-medicate and delay treatment seeking due to stigmatization, lack of financial resources, and long distances to health centers, engaging with them in prevention activities is particularly important.

CAP-Malaria activities engaged mobile groups not only in places of work, but in touch points throughout their journey to and from areas of employment. One such activity involved working with bus and taxi drivers. CAP-Malaria provided 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. Through this approach, nearly 20,000 passengers (5,000 of them estimated to be MMPs) were exposed to malaria messages each month [39]. The Raks Thai Foundation and the American Refugee Committee (ARC) used a similar approach where they created bilingual SBC materials that promoted malaria health-seeking behaviors. These messages were worn by motorcycle drivers and used as fabric covers for boats.

Beyond prevention, CAP-Malaria activities focused on expanding access to testing and treatment as well. CAP-Malaria accomplished this by designing activities that coordinated between sedentary populations and MMP sub-groups they interact with. With the encouragement of the Myanmar National Malaria Control Program, CAP-Malaria worked with employers to identify and train non-registered private health providers, locally referred to as 'quacks,' who were often the first people MMPs or villagers would go to for treatment. Using this model, employers were asked to identify nearby quacks or other volunteers. CAP-Malaria provided training and quality-assured rapid-diagnostic tests and ACTs to those selected to ensure continuous and quality coverage to communities. They also recruited and trained mobile malaria workers and clinics in remote communities and provided them with the supplies to test and treat malaria cases. Mobile clinics were scheduled once or twice a month, depending on the specific sub-group's malaria prevalence. By leveraging these established

social networks, CAP-Malaria was not only able to reach their target audience but also formed partnerships with leaders who could help sustain message delivery, monitor cases and evaluate program impact [39, 40, 41].

Successes detailed in CAP-Malaria's fifth year work plan include a decrease in incidence, from 22.3 cases per 1,000 in 2011 to 11.4 in 2014 for CAP-Malaria's target areas [42]. CAP-Malaria's work, consistent with the WHO strategy for the sub-region, used human movement patterns to determine where to provide treatment before and after travel, as well as in places where MMPs work.

Case Study 3: Amazon Malaria Initiative

Regional Malaria SBC Strategy Coordination and Support

Interventions: Strategy development, coordination, resource mobilization, systems strengthening

Formative research: Country assessments consisting of in-depth interviews with NMCPs and validation of approaches with PAHO/WHO.

SBC approaches:

- Cross-border collaboration, key population engagement, multi-sectoral engagement, technical assistance
- Lessons learned about collaboration and collective work planning will benefit other regions looking for best practices.

As shown in the previous case study, an individual country's potential to eliminate malaria is often dependent on the success of its neighbors. The Amazon Malaria Initiative's (AMI) illustrates the necessity of strengthening communication strategies and SBC implementation through systems strengthening and regional coordination.

General Malaria Landscape: Malaria is endemic in 21 Central and South American countries, endangering an estimated 132 million people [38]. With 24% of the region's malaria cases, Brazil bears the highest malaria burden, followed by Peru (19%) and Colombia (10%) [43]. *Plasmodium vivax* makes up the majority of malaria infection in South America, although *Plasmodium falciparum* cases make up a significant portion as well. Since 2010, malaria case incidence in the Americas has fallen by 31%. Mortality has been reduced by 37%. Between 2000 and 2012, Belize, Ecuador, Guatemala, Honduras, Nicaragua, and Suriname reduced malaria incidence by over 75%. However, special populations like migrants and indigenous groups face a disproportionate disease burden and represent a larger proportion of cases.

To address this, an eleven-country regional program called AMI was introduced and supported by USAID. AMI was launched in 2001 with a focus on geographic areas consisting of 88% of Latin America's *Plasmodium falciparum* infections. Participating countries and technical partners came together in a collaborative decision-making model with the goal of eliminating malaria in Central and South America. The group was made up of Brazil, Colombia, Ecuador, Guyana, Peru, Suriname, Belize, Guatemala, Honduras, Nicaragua, and Panama (as well as former participants Venezuela and Bolivia).

SBC Implementation: AMI's framework of six interventions included antimalarial medicine resistance, diagnostic quality assurance and access to diagnosis, antimalarial medicine quality, antimalarial medicine access and use, vector control and entomology and communication and information dissemination. LINKS MEDIA supported the development, adoption and implementation of AMI SBC activities from 2013-2016. Responsibilities included communication strategy development and coordinating SBC efforts between the Pan American Health Organization (PAHO), PMI, the Amazon Network for the Surveillance of Antimalarial Drug Resistance (RAVREDA) and NMCP offices in each country.

AMI's structure was designed to combine independent organizations and their work plans under the direction of PAHO's Directing Council. Using this model, each organization developed work plans for their particular domain (laboratory improvement, policy, leadership and governance, systems strengthening, communication etc.) before coming together to combine those plans under a single, aligned work plan. Bordering countries met twice a year in person to discuss opportunities for integration and coordination. The AMI mandate for each group to work with the others can be credited with much of its success.

Under PAHO, LINKS MEDIA worked to increase the evidence base for malaria SBC by building countries' capacity to share experiences through peer-reviewed literature and exchanging ideas at semi-annual in-person meetings. LINKS MEDIA's portfolio also included assessing the SBC needs of the 11 participating NMCPs in the region, facilitating the development of national and regional malaria communication strategies, creating tools and guidance for malaria resource mobilization, coordinating NMCPs, MOHs, donors and implementing partners under PAHO's Directing Council, and fostering regional sharing of best practices and resources.

The 2015-2020 Strategic Malaria Communication Guide for Central America included regional SBC sub-strategies to address issues like targeting programs to at risk mobile populations and ensuring stakeholder buy-in [44]. The strategy included communication objectives and messages for MMPs, including tourist, indigenous and migrant populations. It also advocated for improved communication between health service providers and indigenous and migrant populations, and encouraged improved cross-border coordination and information sharing to avoid missing cases and double counting (especially data on residents of border countries who travel frequently and may have been diagnosed in either country). The strategy suggested leveraging and establishing regional forums and meetings to coordinate efforts and create communication materials for migrant populations.

In addition to regional SBC strategy development, LINKS MEDIA worked with national representatives from six countries to develop country-specific communication strategies for Brazil, Colombia, Ecuador, Guyana, Suriname and Peru, several of which included strategies focused on specific, local migrant groups at risk for malaria. To facilitate country ownership, LINKS Media provided technical support through webinars, materials development, meetings, and internal monitoring opportunities, such as asking countries with higher staff capacity to supervise other lower-capacity teams.

Regional strategy development and systems strengthening was paired with work at the national level as well. In 2014, LINKS MEDIA worked with Guyana's Vector Control Services and PAHO to develop a national strategy that focused on miners and their rational drug use [45]. They also worked with Vector Control Services to develop SBC materials for use by health providers in remote locations. LINKS MEDIA also collaborated with Suriname's Bureau of Public Health (BOG) and PAHO to create a strategy to improve malaria management among artisanal migrant gold miners working in areas on Suriname's borders (French Guyana and Brazil) [46]. Messages were designed around the group's particular characteristics and behaviors (e.g., they were not completing their treatment to save doses for future instances and lacked awareness of free malaria testing and treatment). The team based their strategy on a 2013 KAP survey, which found that "geographic influences were more powerful than individual beliefs in determining the use of health facilities and proper treatment among this population." The Suriname strategy also featured a sub-strategy for those in routine contact with miners (e.g., accompanying spouses, sex workers and cooks), audiences that should be considered by other pre-elimination countries communicating with mobile populations. In addition, both Guyana and Suriname included advocacy messaging to government decision-makers to advocate for continued surveillance, plan to coordinate common issues and share data through meetings with bordering countries.

The AMI case study describes how to combine systems strengthening, strategy development, resource mobilization, and regional coordination to effectively fight malaria in a region with highly stratified transmission. An intermediate performance evaluation of AMI activities found that the initiative played a major role in the decline of malaria incidence in Latin America and the Caribbean [47]. This decline was described as the result of improved treatment and diagnosis of malaria, the introduction of ITNs, more efficient management of national programs and work with high-risk populations.

Conclusion

Over the past 50 years, malaria prevention and control has been defined largely in terms of provision of medical commodities, insecticides, and clinical guidance on case management. More recently, significant strides have been made in putting preventive tools including ITNs in the hands of communities at risk. This has increased the degree to which those who suffer from malaria infection are able to participate in and contribute to their own well-being. Country-wide SBC campaigns, the high visibility of malaria infection, and resulting social understanding and community norms evolves as transmission is further reduced. At the same time, economies of scale and cost savings inherent in population-level SBC activities, such as mass-media campaigns and nationally representative household survey measurement tools, will be rendered an inappropriate means of measuring and reaching increasingly homogenous at-risk groups. The RBM AIM calls for human-centered approaches to malaria prevention and elimination. This landscape document explored a number of ways to ensure that on the road to global malaria eradication, provision of medical commodities and clinical services are adequately paired with a human-centered SBC response within specific malaria transmission strata and suggested a number of operational research questions for further exploration.

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