

# Breakthrough ACTION Guyana

## Evaluation Report

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# Acronyms

AOR	Adjusted odds ratio
CI	Confidence interval
GGMC	Guyana Geology and Mines Commission
GMP4	Guyana Malaria Public Private Partnership Platform
HCD	Human-centered design
IR	Intermediate result
LLIN	Long-lasting insecticidal nets
LMBP	Lil Mosquito, Big Problem
M&E	Monitoring and evaluation
MOH	Ministry of Health
NMP	National Malaria Programme
PAHO	Pan-American Health Organization
PR/HPU	Public Relations/Health Promotions Unit
RDT	Rapid diagnostic test
SBC	Social and behavior change
USAID	United States Agency for International Development
VCS	Vector Control Services
VMT	Volunteer malaria tester
WHO	World Health Organization

# Executive Summary

The report is the result of collaborative efforts between Breakthrough ACTION Guyana, the Guyana National Malaria Programme (NMP), Vector Control Services (VCS), and a local research firm, The Consultancy Group.

The authors would like to specifically acknowledge the VCS/NMP staff, including Dr. Reza Niles-Robin, Director acting; Dr. Kashana James, National Malaria Coordinator; Dr. Olivia Valz, Deputy National Malaria Coordinator; Dr. Helen Imhoff, former Assistant National Malaria Coordinator; and Dr. Horace Cox, former VCS Director acting; and Dr. Jean Alexandre, Advisor, Malaria Prevention, Control and Elimination, Dr. Fabu Moses, and Dr. Rainier Escalada, Advisor, Health Surveillance, Disease Prevention and Control, Pan American Health Organization/World Health Organization for their contributions to the project and this report. In addition, we appreciate the efforts of the regional Ministry of Health teams in Regions 7 and 8, led by Ms. Nathalie Griffith and Ms. Charmaine Semple, respectively.

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# Executive Summary

The World Health Organization (WHO) recommends early diagnosis and prompt effective treatment as vital components of malaria elimination. Reducing malaria prevalence within difficult-to-reach remote areas is challenging in countries throughout the world, including Guyana. The burden of malaria in Guyana is concentrated within remote gold-mining communities where malaria is endemic. In response, the Ministry of Health (MOH) Vector Control Services (VCS)/National Malaria Programme (NMP) has implemented a volunteer malaria tester (VMT) program to increase malaria prevention, testing, and treatment among mining communities in Regions 1, 7, 8, and 9, where malaria is endemic. This comprehensive community-based case management program holistically tackles malaria prevention and treatment through complementary individual, social, and structural interventions.

The United States Agency for International Development (USAID)-funded Breakthrough ACTION Guyana project works in collaboration with MOH and the Pan American Health Organization (PAHO)/WHO to implement innovative evidence- and theory-based social and behavior change (SBC) interventions to achieve two sets of intermediate results: (1) the development and implementation of targeted, innovative, and effective solutions to high-priority social and behavioral challenges, and (2) increased SBC coordination and collaboration at national and subnational levels.

To achieve these results, the project includes audiences and interventions at different levels across the social ecological model to support various MOH initiatives including a national long-lasting insecticidal net (LLIN) distribution campaign and the VMT program. The government led VMT program involves training members of mining communities to use rapid diagnostic tests for malaria, provide treatment for individuals with uncomplicated cases of malaria, and conduct ongoing monitoring of stocks and treatments via client records. SBC activities complementing the VMT efforts include training on the SBC and interpersonal communication components, job aids (i.e., rapid counseling cards, treatment adherence regimens), branding their service delivery sites with free malaria testing and treatment available signs, and recognizing them through certificates. The core SBC effort comprises a multichannel campaign, Little Mosquito Big Problem (LMBP), that uses context- and culture-specific print and audio-visual messaging to increase miners' malaria risk perception and self-efficacy to sleep under LLINs, test for malaria, and complete treatment.

A comprehensive mixed methods evaluation of the VMT efforts and the complementary SBC campaign included multiple data sources: VMT monitoring data and data on pre-intervention malaria knowledge, attitudes, and practices and post-intervention changes in them among gold miners in the study areas. The latter data was collected using cross-sectional surveys administered to approximately 1,685 and 1,252 adult miners in 2019 and 2022, respectively. Additional validation came from qualitative interviews with key stakeholders and two SBC capacity assessments in 2018 and 2022.

The VMT monitoring data from miners who visited a tester during the Breakthrough ACTION Guyana project period of 2020 to 2022 showed that the use of LLINs among miners increased notably in Region 8 from 37% to 82%. This spike corresponded with MOH's LLIN distribution in Region 8. In Region 7, despite initial challenges, LLIN use increased from 15% to 46% within six months, specifically with the involvement of private partners who supported LLIN distribution. Additionally, the monitoring data highlight an increase in prompt care-seeking and a decline in self-medication. The evaluation was guided by the ideation model, a theory-based framework that incorporates multiple cognitive, emotional, and social constructs from various behavioral theories to examine the effectiveness of SBC interventions. The model includes multiple psychosocial

variables, and ideation scores were calculated to examine knowledge, attitudes, self-efficacy, interpersonal communication, and social support associated with malaria behaviors around prevention, testing, and treatment. The analysis included bivariate comparisons and multiple logistic regression controlling for background variables to examine the links between ideation factors and behaviors associated with exposure to the program.

Results show that miners were predominantly male (85%) and Christian (81%) with a primary level of education (71%). In addition, about a quarter of the miners worked year-round (24%) or had a prior episode of confirmed malaria in the 12 months preceding the surveys (29%). A few significant differences in miners' characteristics were observed across the 2019 and 2022 surveys, reflecting their transitory nature. By 2022, fewer miners were 35 years or older, were married, had five years of experience or more, or were year-long miners. At post-test, 77% of the miners recalled at least one LMBP campaign component and one-third knew about the VMT program.

For purposes of the analysis, miners were categorized into three groups according to the extent of their exposure to the intervention: no exposure, exposure to either LMBP or VMT, and exposure to both LMBP and VMT.

Miners exposed to both LMBP and VMT components of the program demonstrated a significantly greater mean ideation score around malaria prevention, testing, and treatment than those who were exposed to one or the other of the two components (i.e., LMBP or VMT) or those exposed to neither intervention. The measure for malaria prevention behaviors was the use of LLINs. The LLIN distribution program was a government initiative not linked directly with the LMBP campaign and VMT; however, significantly more miners who were exposed to the campaign reported that they owned an LLIN. Despite this higher level of ownership, LLIN use did not differ significantly by levels of exposure.

Regarding testing behaviors, over half of the miners had been tested for malaria regardless of exposure to LMBP or VMT. Exposure to both LMBP and VMT was associated with appropriate and prompt care. Self-medication was highest among miners not exposed to either component (66%), followed by the miners who were exposed to both LMBP and VMT (51%), whereas miners exposed to either the LMBP or the VMT were significantly less likely to report self-medication (46%). While most miners (81%) unexposed to malaria interventions were prescribed treatment, prescription rates were slightly higher among miners exposed to either or both interventions (88% each). Almost all miners completed their prescribed medication, regardless of exposure to the interventions.

Multivariable logistic regressions were used to explore the interrelationship between exposure to malaria interventions, malaria-related ideation (prevention, testing, and treatment) as well as malaria behaviors including LLIN use, prompt care-seeking for fever, nonuse of self-medication, and malaria testing. The regression analysis controlled for miner's sociodemographic characteristics and mining context. Both exposure to malaria interventions and positive ideation were associated with improved malaria-related behaviors among miners. Exposure to malaria interventions was directly associated with prompt care-seeking (adjusted odds ratio [aOR]: 2.18; 95% confidence interval [CI]: 1.14–4.16) and nonuse of self-medication (aOR: 1.80; 95% CI: 0.96-3.36) among miners with fever in the past 12 months. In addition, miners' malaria prevention ideation was associated with increased odds of LLIN.

use among miners with nets (aOR: 1.44; 95% CI: 1.23–1.69). Miners' malaria testing ideation was associated with increased odds of prompt care-seeking (aOR: 1.17; 95% CI: 1.04–1.33) and malaria testing (aOR: 1.17; 95% CI: 1.03–1.32) among miners with fever in the past 12 months.

These quantitative findings were complemented by overwhelmingly positive perceptions regarding the Breakthrough ACTION Guyana project from monitoring data and interviews with various stakeholders. Most participants lauded the SBC campaign, finding the multichannel approach of the project as valuable for reaching diverse audiences. The qualitative data based on participants' reports indicated that the SBC project improved miners' awareness of malaria-related issues such as severity, prevention, and treatment, as well as their malaria-related behaviors. Interviews with camp managers and MOH staff found that SBC communication increased visibility of the VMT program making services more accessible to miners, saving them both time and money, and participants especially noted improved access in remote locations. According to the interviewees, appreciation for and the success of the Breakthrough ACTION Guyana project were evident in the increased number of people interested in becoming VMTs. Despite the many positives, interview participants also expressed concerns about the achievements of Breakthrough ACTION Guyana lasting beyond the lifetime of the project, as well as the lack of SBC-related funding.

Overall, this evaluation found positive results supporting the implementation of multilevel interventions for malaria elimination by including innovative SBC interventions promoting malaria prevention, testing, and treatment.



# Introduction

## Overview

The Guyana Ministry of Health (MOH), Pan-American Health Organization (PAHO)/World Health Organization (WHO), and Global Fund have been working together to introduce malaria rapid diagnostic tests (RDTs) and treatment into mining camps and surrounding communities in Guyana. These efforts are concentrated in the remote areas of Guyana, particularly in Regions 1, 7, and 8, where malaria is endemic, high rates of transmission occur, and mining activity has increased in recent years as the price of gold has risen. In light of these factors, MOH has implemented a volunteer malaria tester (VMT) program, conducted a national long-lasting insecticidal net (LLIN) distribution campaign, and updated the national malaria social and behavior change (SBC) strategy.

## Geographic Context

Figure 1 depicts Regions 7 and 8 and the locations of mining camps and malaria services. Region 7 covers an area of 47,650 square kilometers with two main rivers, Cuyuni and Mazaruni, traversing the length of the region. Access to Region 7 is mainly by unpaved road and by waterways. The network of trails (roads) and rivers is difficult to traverse, leading to issues in transportation, particularly during the rainy seasons. In addition, communication via telephone and access to the internet are unreliable. According to the Guyana Geology and Mines Commission (GGMC), approximately 2,353 gold-mining camps were licensed to operate within Region 7 in 2021. The gold-mining camps are dispersed throughout the region, particularly along and set back at various distances from the rivers. Supervisory field visits conducted by Breakthrough ACTION and the regional MOH health team confirmed the presence of 26 VMTs and 25 health facilities where miners can access malaria services. Twenty-five percent of gold-mining camps in Region 7 are within five kilometers of a VMT or a Health Post.

Region 8, which is less than half the size of Region 7, covers an area of 20,051 square kilometers, with two main rivers, Potaro and Siparuni. Access to Region 8 is mainly by unpaved road or by air. While Region 8 is also remote, intraregional transportation and access to communication is better than in Region 7. Region 8 is mountainous, with gold mining focused on the northeast corner of the region south of the main mountain range. The Region had about 825 gold-mining camps licensed by GGMC in 2021, and according to the Regional Health team at the time of the 2022 survey, there were 13 VMTs and four health facilities where miners can access malaria services. Fifty-three percent of gold-mining camps in Region 8 are within five kilometers of malaria services provided by a VMT or Health Post.

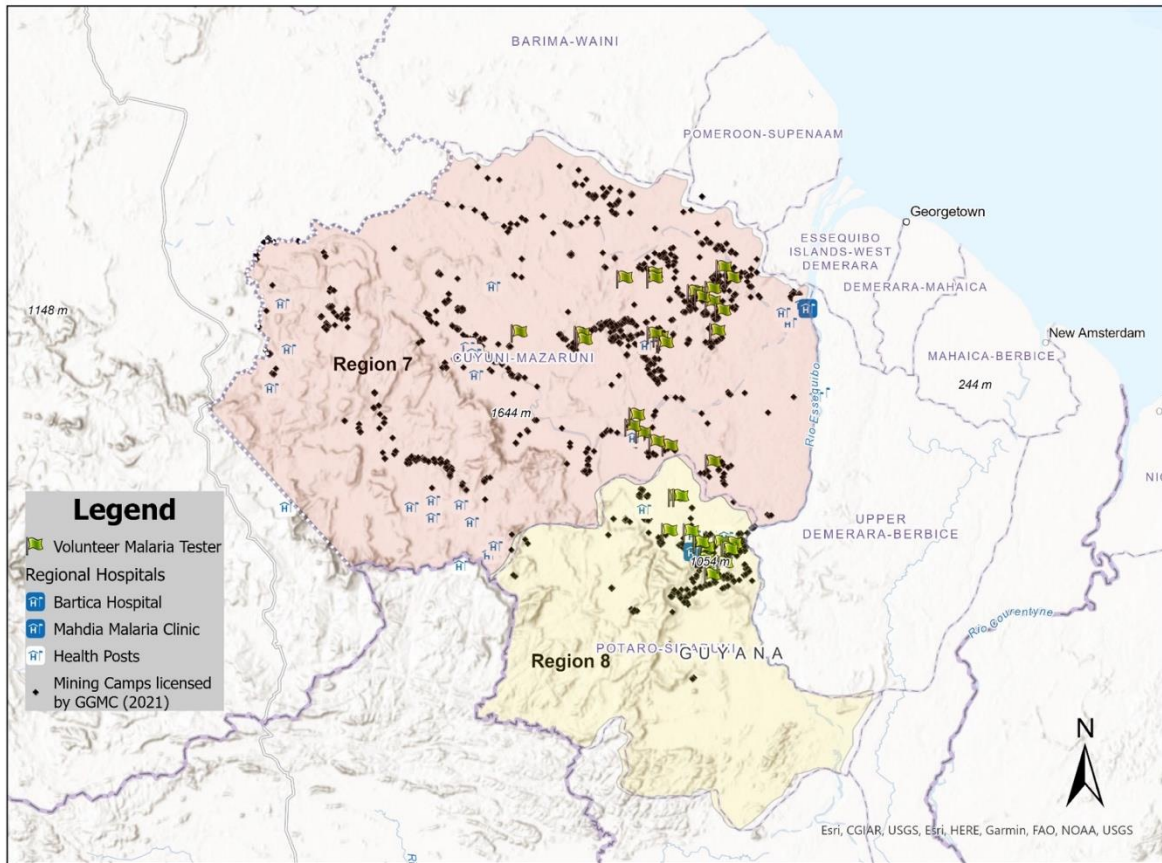


Figure 1: Map of Regions 7 and 8 showing location of Gold mining camps and malaria services

## Malaria Interventions

MOH distributes LLINs every three to five years in malaria endemic hinterland regions to improve malaria prevention in these areas. MOH has also developed a community case management program that uses VMTs to support greater access to malaria services by miners in hinterland regions. This initiative was first piloted in Region 8 in April 2016 and then officially rolled out in Regions 1, 7, 8, and 9 in 2017. The program focuses on recruitment and training of volunteers from among stable workers such as cooks, camp managers, and shop owners in the mining communities. Volunteers were trained to use RDTs to test for malaria and provide treatment for individuals with uncomplicated cases of malaria, with the exception of children and pregnant women. Additionally, testers were trained to monitor their stocks of RDT kits and malaria treatments and to maintain client records. Prior to 2017, MOH activities focused on social and behavioral changes related to malaria were minimal.

## Breakthrough ACTION Guyana Project

Breakthrough ACTION Guyana (2017–2024) is an initiative funded by the United States Agency for International Development (USAID) in collaboration with the Guyana MOH and PAHO.

Breakthrough ACTION Guyana’s vision is to promote collective action using next-generation and proven behavior change approaches to empower households and communities to become healthier and more prosperous. Breakthrough ACTION Guyana harnesses the power of communication—from mass media campaigns to community outreach—to inspire long-lasting change. It takes advantage of innovative approaches, such as behavioral economics and human-centered design (HCD), to drive progress toward improved outcomes in health and other development areas.








Strategic Objective	Increased practice of priority health behaviors in targeted regions					
Intermediate Results	 Targeted and effective solutions designed and implemented			 Increased capacity of Guyanese institutions		
Sub Intermediate Results	 Increased understanding of problem	 Reduced individual and social barriers	 Increased malaria diagnosis and treatment	 Increased SBC collaboration	 Strengthened SBC capacity of institutions	

Figure 2: Breakthrough ACTION Guyana Strategic Objectives and Intermediate Results

Breakthrough ACTION Guyana’s overall goal is to improve malaria testing and treatment outcomes among priority populations. A secondary goal is to provide support to MOH to design and implement SBC solutions. Outlined in Figure 2 are the outcomes of increased practice of priority health behaviors in targeted regions. The connection between outcomes and priority health behaviors such as prompt care-seeking, treatment adherence, and consistently sleeping under an LLIN, is described in Table 1. All activities support this result by contributing to the project’s intermediate results: (1) targeted, innovative, and effective solutions to high-priority SBC challenges designed and implemented, and (2) increased capacity of Guyanese institutions to coordinate, design, implement, and evaluate high-quality SBC.

Breakthrough ACTION’s support advances the objectives of both the Guyana MOH and USAID. The overall strategic goal of the ministry’s National Malaria Programme (NMP) Strategic Plan 2021–2025 is “to reduce malaria burden in affected populations in the country towards elimination of local transmission.”

## Stakeholders and Priority Outcomes

In its inception, Breakthrough ACTION Guyana identified key stakeholders and prioritized collaboration across multiple levels as summarized in Figure 3. Stakeholder groups included miners who were responsible for engaging in relevant malaria prevention, testing, and treatment behaviors; VMTs who provided the malaria testing and treatment services; and regional and national Vector Control Services (VCS)/NMP staff who provided regional and national oversight of the VMT program, respectively.





Miners	Volunteer Malaria Testers (VMT)	Regional VCS staff	National VCS staff
			
<ul style="list-style-type: none"> <li>• Seek care promptly</li> <li>• Get tested</li> <li>• Adhere to treatment</li> <li>• Use LLIN</li> </ul>	<ul style="list-style-type: none"> <li>• Provide counseling, testing and treatment services</li> <li>• Collect monitoring data</li> <li>• Report stock-out</li> </ul>	<ul style="list-style-type: none"> <li>• Supportive Supervision of VMTs</li> <li>• Manage supplies</li> <li>• Report to National VCS.</li> <li>• Collect/ process monitoring data</li> <li>• Data-informed decision making</li> </ul>	<ul style="list-style-type: none"> <li>• Supportive supervision of regions</li> <li>• Provide relevant resources</li> <li>• Use data to inform implementation of VMT program</li> </ul>

Figure 3: Stakeholder Groups and Priority Outcomes

## Project Implementation

Specific activities of the Breakthrough ACTION Guyana’s program aligned with the project objectives and intermediate results are presented in Table 1.

INTERMEDIATE RESULTS	IMPLEMENTED ACTIVITIES
IR1: TARGETED, INNOVATIVE, AND EFFECTIVE SOLUTIONS TO HIGH-PRIORITY SOCIAL AND BEHAVIORAL CHALLENGES DESIGNED AND IMPLEMENTED	
1.1. Increased understanding of problem	Implemented the SBC Flow Chart, including (1) literature reviews and landscape analyses to mine existing knowledge; (2) qualitative Define Phase research and insights generation; and (3) Design & Test Phase process, piloting seven theory-driven prototype interventions.
1.2. Reduced individual and social barriers to adoption of priority behaviors	Developed and disseminated SBC materials for VMTs, including rapid counseling cards, treatment regimen cards, treatment adherence leaflets, redesigned malaria treatment envelopes, branding materials including water-resistant toolkits, training curriculum and certificates, and testing referral cards.
1.3. Increased use of malaria diagnosis and treatment and prevention	Implemented the Lil Mosquito Big Problem (LMBP) campaign to address several barriers among miners and promoted key malaria prevention, testing, and treatment behaviors among miners.

IR2: INCREASED CAPACITY OF GUYANESE INSTITUTIONS TO COORDINATE, DESIGN, IMPLEMENT, AND EVALUATE HIGH-QUALITY SBC	
2.1. Increased SBC coordination and collaboration at national and subnational levels	<p>Coordinated 20 meetings on malaria/SBC with VCS/NMP.</p> <p>Instituted five Malaria SBC subcommittee meetings. Jointly developed seven tools with VCS/NMP.</p> <p>Jointly developed the 2020–2025 National Malaria SBC Strategy.</p> <p>Jointly developed the Sustainability Action Plan.</p> <p>Jointly planned and coordinated activities for World Malaria Day, Malaria Day in the Americas, and Mining Week with MOH.</p> <p>Created interactive maps of mining camps and malaria services (VMTs and health posts) in Regions 7 and 8.</p> <p>Jointly developed the Guyana Malaria Public Private Partnership Platform (GMP4) Framework 2022–2025 with the VCS/NMP and primarily private mining organizations.</p>
2.2. Strengthening SBC capacity of priority institutions	<p>Jointly authored 20 abstracts, oral/poster presentations, and publications on malaria/SBC.</p> <p>Sponsored VCS/NMP attendance at six international malaria/SBC-related conferences.</p> <p>Fostered interpersonal communication and counseling capacity and supportive supervision of VMTs.</p> <p>Held 10 capacity strengthening and capacity assessment workshops.</p>

**IR1: Targeted, Innovative, and Effective Solutions to High-Priority Social and Behavioral Challenges Designed and Implemented**

Breakthrough ACTION Guyana used the [SBC Flow Chart](#)—the project’s iterative theory-driven design process that leverages participatory approaches such as HCD thinking as well as the rapid testing and scale-up of viable interventions, to increase understanding of the problem (Phase 1: Define); translate problems into solutions through iterative cycles of design (Phase 2: Design & Test); and implement, monitor, adapt, scale, and evaluate interventions (Phase 3: Apply)

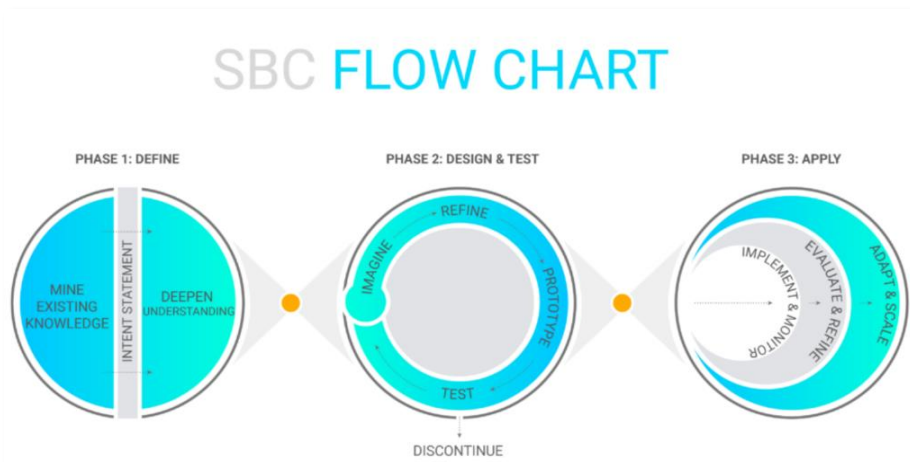


Figure 2: SBC Flow Chart

Activities conducted under each phase include:

**Define:** The first step in the process included literature reviews and landscape analyses to mine existing knowledge, workshops to establish shared intent with relevant stakeholders, qualitative research in mining communities in Regions 7 and 8<sup>1</sup>, triangulation of research, and synthesis of findings to generate insights and create empathy tools (personas and journey maps) representative of the priority audiences for the intervention.

**Design & Test:** In the second phase, insights from the Define Phase were used to brainstorm possible solutions, co-create low-fidelity prototypes, test prototypes with the priority audience in Regions 7 and 8, refine prototypes based on user feedback, conduct a desirability/feasibility analysis, develop and pilot high-fidelity prototypes, and finalize the solutions for implementation based on findings from the pilot.

**Apply:** In the third phase, the team produced final SBC interventions; implemented interventions at scale; monitored interventions through continuous monitoring forms, supportive supervision visits, and media monitoring platforms; used monitoring data to improve interventions; and conducted a mixed methods evaluation to assess the impact of the interventions.

Details on the targeted, innovative, and effective solutions designed and implemented using the SBC Flow Chart process are outlined below.

#### Volunteer Malaria Tester Program

Breakthrough ACTION supported the development and implementation of the VMT training curricula to increase testers' capacity to provide high-quality malaria services. The project rolled

out training and counseling materials, including rapid counseling cards, a treatment regimen guide, and treatment adherence handouts in Spanish and Portuguese to assist testers in providing accurate information to clients. Treatment envelopes for clients package the appropriate medications for each type of malaria (*Plasmodium vivax*, *Plasmodium falciparum*, and mixed infections) together in one place, clearly indicate how and when to take the medications, and depict parasites being

eliminated from the body as the medications are taken to encourage adherence. The project provided branded materials, such as flags, testers' toolkits, and certificates, to testers in Regions 1, 7, and 8 to increase their visibility. Breakthrough ACTION Guyana also trained VMTs to conduct exit interviews with miners who sought malaria services. In addition, the project supported regional MOH supervisors to conduct supportive supervision field visits to VMTs using standardized monitoring tools. Regional MOH teams were trained to analyze the monitoring data from exit interviews and standardized monitoring tools to inform the restocking of test kits, treatment drugs, and counseling aids during quarterly field visits and to provide needed feedback.

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<sup>1</sup> At the inception of the project in 2019, the HCD process was conducted in Regions 7 and 8 and scaled up to Region 1.

### Lil Mosquito, Big Problem Campaign

Using a mutually reinforcing approach, the multichannel LMBP campaign aims to increase miners' malaria risk perception and self-efficacy to sleep under LLINs, test for malaria promptly, and complete treatment.

Campaign materials include a catchy theme song and accompanying music video; dramatic radio spots; an animated miniseries "Jungle Feevah" based on a fictional mining community; live actor television spots; social media posts; print materials such as posters, banners, and laminated handouts and

brochures; flash drives that integrate malaria messages and popular music; and DVDs that contain all the campaign's audiovisual materials. The campaign uses a mix of animated characters, mainly Mike the Miner, and live actors and real miners in the local mining context to appeal and relate to miners.

## IR2: Increased Capacity of Guyanese Institutions to Coordinate, Design, Implement, and Evaluate High-Quality SBC

Key activities implemented by the Breakthrough ACTION Guyana project on SBC coordination and capacity strengthening at national and subnational levels included coordination of the volunteer malaria testing and other SBC-related activities as well as the development of key strategies to address SBC and the sustainability of malaria interventions.

### SBC Coordination

Breakthrough ACTION Guyana coordinated the development of the Guyana National Malaria SBC Strategy (2021–2025) with the Guyana MOH. This novel strategy incorporates intervention-specific plans for LLINs;



malaria case management; and surveillance, monitoring, and evaluation.

Within these plans are situation, behavior, root cause, and audience analyses, as well as strategic communication approaches and SBC plans. For every intervention, the SBC plans include specific behavior objectives, which entail considerations for the promotion of behaviors, such as behavioral and communication objectives, key benefits, key messages, and strategic approaches. The project also coordinated several meetings on malaria SBC with VCS/NMP and instituted malaria SBC subcommittee meetings to jointly develop tools with VCS/NMP. To facilitate timely access to relevant data for evidence-based decision making, the project worked with VCS/NMP and

GGMC to produce interactive maps of gold-mining camps in Regions 7 and 8 overlaid with available malaria services, including the locations of VMTs and health posts.

In addition to the strategy, MOH, Breakthrough ACTION, and private sector entities (primarily mining organizations) worked together to develop and launch the Guyana Malaria Public Private Partnership Platform (GMP4) to foster collaboration and enhance sustainability of national malaria programming. Objectives of the platform include advocacy for increased government financial allocation to malaria elimination, mobilized private sector resources to cover the national gap for malaria financing, and increased private sector capacity to support market-based approaches for malaria prevention.

### Capacity Strengthening

Breakthrough ACTION Guyana has consistently used "learning by doing" approaches to build the capacity of VCS/NMP and the Public

Relations/Health Promotions Unit (PR/HPU) to implement the phases of the SBC Flow Chart. Staff from national and regional VCS and PR/HPU have benefited from hands-on training in conducting qualitative

interviews and formulating insights during the Define Phase; prototyping, pretesting, and piloting during Design & Test phase; and developing an SBC campaign during the Apply

Phase. Breakthrough ACTION Guyana also improved SBC capacity at the national level by jointly authoring three publications and several abstract/poster presentations with VCS/NMP staff on malaria SBC as well as sponsoring attendance at SBC-related conferences. At the subnational (regional) level, the project fostered supportive supervision of VMTs through structured and regular monitoring visits. Breakthrough ACTION Guyana conducted repeat capacity strengthening assessments with VCS/NMP and the PR/HPU of MOH. The project also held several capacity strengthening workshops with regional staff on malaria SBC implementation and monitoring and evaluation. Additionally, the project facilitated a SMART Advocacy workshop aimed at building capacity of VCS/NMP and PR/HPU to conduct strategic advocacy for increased resource mobilization for malaria and SBC interventions.



# Project Evaluation

## Objectives

Breakthrough ACTION Guyana conducted a rigorous mixed-methods, theory-based evaluation of the project to assess the reach and behavioral impact of SBC activities implemented across key audiences. The study objectives were as follows:

1. Determine pre- and postintervention changes in malaria knowledge, attitudes, and practices among gold miners in the study areas.
2. Explore changes in technical and other relevant skills among VMTs and camp managers and supervisors providing support to the program.
3. Assess the perceptions of relevant VCS/NMP staff regarding the VMT program and the accompanying LMBP campaign to assess perceptions of changes in, improvements to, and challenges of the VMT program and the accompanying campaign.

## Theoretical Framework

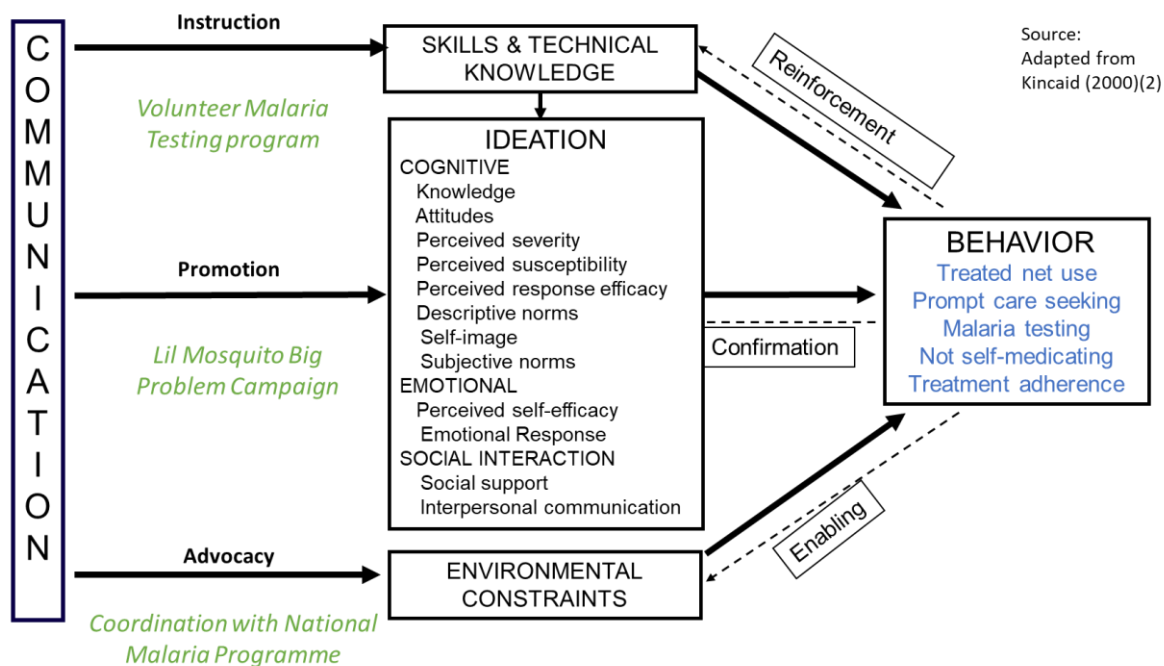


Figure 4: Theoretical Framework Based on Ideation Model of Strategic Communication and Behavior Change

This evaluation is guided by a conceptual framework, the Ideation Meta-Theory of Communication (Kincaid et al., 2007) which posits that most behavioral decisions are driven by multiple psychosocial variables, often simultaneously. This framework incorporates cognitive, emotional, and social constructs from various behavioral theories. Those constructs include knowledge of disease symptoms, transmission, and prevention;

beliefs, values, and attitudes related to proposed action; emotional variables, such as perceived severity and susceptibility to disease; perceived social norms around proposed actions; perceived self-efficacy and belief in the efficacy of proposed actions; and cognitive variables, such as social support, social influence, spousal/partner communication, and personal advocacy via interpersonal communication. The combination of variables that explain behavior in a particular context are determined by the sociocultural setting and social interactions within a given community. Ideation analysis identifies the unique combination of variables that inform decision making in a particular place, while also having optimal generalization to a population of interest, in this case, gold miners in specific regions of Guyana.

## Study Methodology

### Study Design

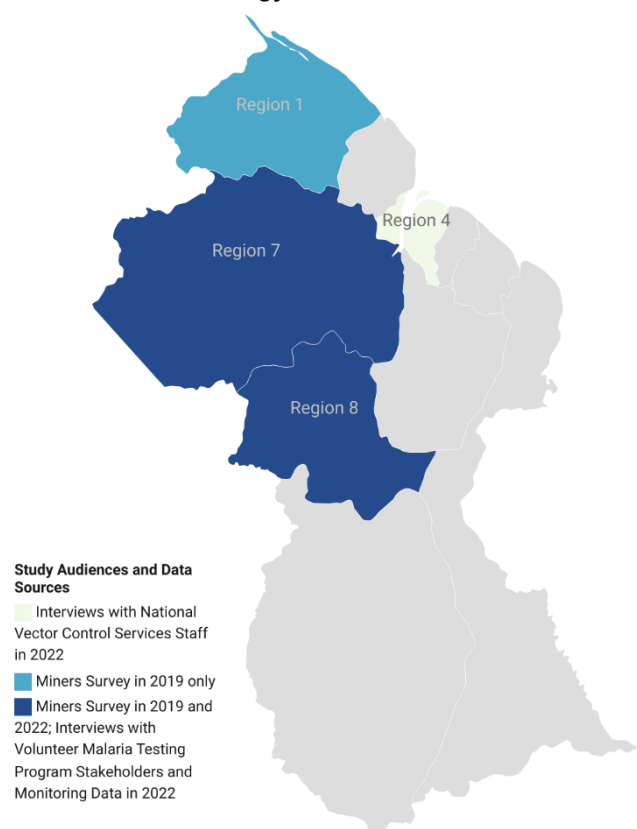
The evaluation was conducted from August to November 2022 and included the following data sources as highlighted in Figure 6:

1. Assessment of VMT program monitoring data (2020–2022) from Regions 7 and 8.
2. Interviews with VMTs and their supervisors and mining camp managers in Regions 7 and 8 as well as with VCS/NMP staff at the national level in Region 4 in 2022.
3. Cross-sectional surveys in 2019 and 2022 administered to miners 18 years and above from mining camps in study regions. In 2019, surveys were conducted in Regions 1, 7, and 8, while 2022 surveys were conducted in Regions 7 and 8 only.
4. This evaluation also references results from MOH SBC Capacity Assessments conducted in 2018 and 2022.

The 2022 gold miners’ survey received institutional review board approval from the Johns Hopkins Bloomberg School of Public Health (IRB # 9884) and the Guyana Ethical Review Committee (#135/2021).

Breakthrough ACTION Guyana contracted a local research firm, The Consultancy Group, to conduct the sampling verification and data collection in 2019 and 2022.

### Evaluation Methodology and Data Sources



Source: Breakthrough ACTION Guyana, 2022 • Created with Datawrapper

## Study Population, Sampling, and Data Collection

Table 2: Evaluation Study Populations and Sample Size

METHODOLOGY	REGION 1	REGION 7	REGION 8	REGION 4	TOTAL
VMT monitoring data from 2020–2022 (miners seeking malaria care from VMTs)	0	4,085	1,006	0	5,091
Qualitative interviews <sup>1</sup> in 2022	0	7	7	5	19
Gold miner surveys					
2019	390	819	476	0	1,685
2022	0	818	433	0	1,252
<sup>1</sup> Interviews included regional malaria volunteer testers, camp managers, and supervisors, as well as national level VCS/NMP staff.					

### VMT Monitoring Data

VMT program monitoring data was collected by VMTs with supportive supervision from VCS/NMP and Breakthrough ACTION Guyana. Breakthrough ACTION Guyana created the monitoring system to track miners’ behaviors including miners’ use of LLINs, prompt care-seeking, self-medication, and treatment adherence. To collect this data, Breakthrough ACTION Guyana and regional VCS trained VMTs to conduct interviews and administer a very brief questionnaire with all miners seeking malaria services.

### Qualitative Interviews

For the qualitative component, Breakthrough ACTION Guyana prepared a list of VMTs, supervisors, and camp managers working in Regions 7 and 8 and national VCS/NMP staff in Region 4. Three VMTs, three supervisors, and one camp manager from each region were purposively selected based on their involvement with the VMT program. A total of five national VCS/NMP staff were also purposively selected based on their job or responsibilities. All interviewees were first approached by phone and consented into the study using standardized recruitment and consent forms, respectively. In-person interviews were conducted following consent, and their location was de-identified to protect respondents’ anonymity. Key themes explored during the interviews included participants’ roles and responsibilities, training, and skills (assessed using role-plays), as well as their perceptions regarding miners’ behaviors and the malaria interventions.

### Gold Miner Survey

The study sample size is summarized in Table 2. Due to funding constraints, the 2022 evaluation was conducted only in Regions 7 and 8. The detailed methodology is available [here](#). In summary, due to the transitory nature of gold mining, a verification exercise was conducted prior to both surveys to identify camp locations and numbers. The information from this exercise was used to compile the final sample listing of mining camps. The survey cluster unit was the mining camp and the sample size calculation accounted for the lack of data on the size and distribution of the hard-to-reach mining population. Upon arrival at the sampled mining camps, trained data collectors identified and approached gold miners to inform them of the purpose of the study, using a standardized recruitment and consent script. If the

miner verbally consented to participate; the interviewer then continued with the survey. Interviews were conducted face-to-face in the mining camp in a quiet location where responses could not be overheard. The interviews lasted about 20 minutes, on average. The survey questionnaire included the following sections:

- Mining camp identification

- Personal information
- Knowledge about malaria
- Malaria testing and treatment attitudes and behavior
- Use of LLINs
- Exposure to malaria interventions

The overwhelming majority of gold miners consented to participate in the survey. Only five miners in the 2019 survey and 25 miners in the 2022 survey declined participation. The total sample of miners included in the 2019 survey was 1,685 (1,295 from Regions 7 and 8), while 1,251 miners were recruited for the 2022 gold miner survey from Regions 7 and 8. This evaluation focuses on Regions 7 and 8, where both the 2019 and 2022 gold miner surveys were conducted. The collective analytical sample size was 2,546 miners.

#### SBC Capacity Assessment

This report briefly references results from capacity assessment workshops implemented by Breakthrough ACTION Guyana in 2018 and 2022 for VCS/NMP and PR/HPU. Capacity assessment workshops were designed to assess and improve the capacity of VCS/NMP and PR/HPU to design, implement, and evaluate SBC communication programs. The workshops consisted of an overview of the Breakthrough ACTION HCD approach and a review of the capacity skill sets required to conduct the HCD approach in each phase from the Define Phase to the Apply Phase. In the Define Phase, for example, one parameter is the situational analysis that requires skills such as engaging partners in defining the problem and ideation, performing reviews of formative research, and gathering data. Self-assessment was conducted in small discussion groups, whereby each group assessed their skill sets and ability to achieve the capacity requirements for each phase and arrived at a consensus score using a standardized score sheet as guidance. An average of the group scores formed the scores. Once the self-assessment was complete, an action plan was developed by the participants to prioritize the skill sets identified during the workshop to strengthen capacity, identify the change leader, and agree on the post-workshop assistance required from Breakthrough ACTION Guyana. The same workshop held in 2018 was repeated in 2022 to determine the extent of strengthened capacity.

#### Data Analysis

Once the gold miners' survey data collection was completed, the quantitative data was cleaned and analyzed using Stata software. Fisher's chi-square, t-tests, and analysis of variance were used for bivariable tests of association and exploratory analysis. Multivariable linear and logistic regressions were employed to explore factors associated with the key outcomes of the study. Key outcomes included malaria prevention, testing, and treatment behaviors as well as exposure to the LMBP campaign.

Analyses sought to identify trends and interrelationships between exposure to Breakthrough ACTION Guyana activities, the VMT program, malaria-related ideation, and malaria prevention, testing, and treatment behaviors. Qualitative data was transcribed. A priori codebooks were revised based on emerging themes and inductive analysis was used to explore the key outcomes and perceptions noted above. Dedoose software was used for the qualitative analysis.

# Evaluation Results

This section presents the results, triangulating findings from the gold miners' survey, VMT monitoring data, and qualitative analyses for each of the project's intermediate results. The results presented are in the following subsections: Lil Mosquito Big Problem Campaign, Volunteer Malaria Tester Program, and Breakthrough ACTION Coordination and MOH SBC Capacity.

As noted earlier, a key strength of this evaluation is the use of multiple methodologies. The subsections reference study findings from interviews with key stakeholders regarding the VMT program, the LMBP campaign, and the project capacity strengthening activities; VMT monitoring data; cross-sectional gold miners surveys; and MOH SBC capacity assessments.

## IR 1: Targeted, Innovative, and Effective Solutions to High-Priority Social and Behavioral Challenges Designed and Implemented

This section presents the results related to the LMBP campaign and the VMT program. Qualitative interview results are presented first, followed by findings of the VMT program and gold miners surveys.

### Lil Mosquito, Big Problem Campaign

Qualitative interviews showed overwhelmingly positive perspectives regarding the LMBP campaign. Respondents shared their sentiments regarding the strategy, channels, reach, and impact of the campaign.

#### Content and Design

Respondents noted how the campaign strategy was aligned with the objective of improving miners' behaviors related to malaria. The project's focus on both demand-side and supply-side interventions facilitated its success and sustainability. On the demand side, the signs produced by Breakthrough ACTION Guyana indicating malaria testing locations were crucial in increasing awareness about where miners can get tested. The supply-side interventions, which included training, job aids, and counseling tools, ensured that the VMTs were able to deliver quality services.



**Supervisor**

*"The testing sign to me, that's what we had wanted. So, everyone could see the sign so they know they could access treatment, but everyone have their own benefits in their own way. ... the little pamphlets that we give to them, that's also important because it's made work easier for us and also the tester so they can understand the medication better."*

Some respondents were really pleased with the design phase of the campaign and were happy with the inclusion of miners in the planning of the SBC campaign, which incorporated HCD concepts.

*"We had a design phase to go out and do interviews with miners to find out what they know about malaria, what could change with regards to treating, to testing, and stuff like that. And then we went back again, and we started to create a prototype, like create mini posters and then go back and test them to see how people like them. So, these end results are from what we went out and test and people like."*



**Supervisor**

Another positive aspect of the LMBP campaign as noted by respondents was the use of multiple languages in several campaign materials. English materials were translated into both Spanish and Portuguese to reach

Venezuelan and Brazilian miners and other audiences. Respondents were also happy with the use of images in many campaign materials, which helped people who were not literate. Other respondents liked the colors used in the posters and flags and noted they grabbed the attention of viewers.



*“It [translated materials] makes it easier for us. Because we don't know so much Portuguese and seeing as we have so many Venezuelans and Brazilians when you giving them the treatment remember we have all*

The musical contents of the SBC campaign were also well received by many respondents. People were able to clearly understand the severity of malaria from the LMBP jingles and theme song, and many respondents liked the catchy LMBP jingle. One tester noted that when they approached miners, the miners typically broke into the jingle once they saw the tester.

*“<Laughs> Sometimes they come out here and if they see me testing, they holler ayy lil mosquito big problem <laugh>. So, they know, they aware.”*



One respondent really liked the use of real-life experiences in the radio drama series, feeling that this approach resonates with miners. The respondent also appreciated the content of the radio drama as it explicitly discusses malaria severity, prevention, testing, and treatment from the miner's perspective.



*“I like that they have done is actually use real-life scenarios in the radio ... the video and posters on the radio and the video shows you can see and hear what are the effects of actually contracting malaria. Also, you can hear what are the effects of not using the treatment or not going to see a tester.... That's why I love it and I know the testers love it as well.”*

Other respondents noted that the treatment packaging depicting the parasites being removed from the body was very good as it prompts miners to understand and continue the full course of medication to ensure that parasites are gone. Some respondents would have preferred to see the treatment envelopes in multiple languages, while others wanted it to be waterproof, similar to the treatment regimen, which is laminated and thus durable under all weather conditions



*Like I said, I think the most useful or the most outstanding would be the placards with the diagrams and the parasite. I think most persons bought into that and understood it or related to that.”*

*“They like the whole idea that the instructions are clearly there and you can see the parasite in the body and the material used to create it because remember when we were creating it, we tried to get it as waterproof and durable as possible.....Some people were complaining that it was too big because you know patients, especially miners—they like to push things in their pockets.”*





**Supervisor**

*“I would’ve been glad if this new treatment envelope if they had it in Spanish and Portuguese.”*

### Channels

Respondents had mixed preferences regarding the campaign channels, which included print and mass media executions such as posters, banners, flyers, radio, TV, and Facebook, among others. It was clear that the multichannel approach of the project served to reach various audiences according to their needs. Respondents noted that the radio was impactful.

*“I think the radio initiative was good because radio is mostly used in the interior. There’s a lot of radio usage, and to be honest, every time we go in the interior at some point in time wherever we are we hear it; we hear a Little Mosquito Big Problem. We hear the ads; we hear the different drama sometimes you go in the backdam, and you find persons who have taped it.”*



**Tester**

Other respondents thought that print messaging worked better than radio or TV messages because many miners do not own a TV or radio. With the print messages, testers could distribute posters and flyers directly to miners, helping to spread the word in mining camps. Some respondents felt that the flags were good to help people identify the testing sites and go to the testing location.

*“But somehow especially you find some of the miners [...] don't listen to radio.... I think we always need to be giving out [flyers] when we go out in the fields. We leave poster regular[ly], try to educate them as much as possible....”*



**Supervisor**

Many respondents remembered the flash drives and CDs that were distributed within mining camps. Some respondents appreciated the flash drive and CDs as they also announced where miners could get tested. The respondents also liked the creative use of catchy music. The songs were helpful as they depicted malaria messages, presenting a fun way to learn about malaria and what to do to prevent and treat it.



**Supervisor**

*“Everybody just liked that flash drive ... taxi drivers, bus drivers and everybody coming ‘we want one of the same thing, we want, we want’ ... so I don't know if they'll print more of that because people like it very much. The songs and everything where they could get tested in the different regions and they giving the localities too.”*

### Reach and Reception

Respondents had mixed perceptions regarding the reach of the campaign. The majority of respondents were aware of the LMBP jingle and tagline “Little Mosquito Big Problem” and the print materials. Some respondents were not too familiar with the radio, TV, or Facebook messages, while others knew of these campaign channels.



*"Yeah, we does see it on Facebook too, Little Mosquito Big Problem."*

Tester

*"I saw it on my phone, but I don't know much about it."*



MOH Staff

Some respondents noted that the campaign materials, particularly the jingle, were popular among children, who liked the catchy tune. This observation implies that the LMBP campaign was able to reach secondary audiences, such as miners' family members.



Supervisor

*"Yes, even to the smallest child could sing the song for you too. I get some home too, one of them boys does laugh he brother cause he said his brother went going back dam, because they get taxi, when the song playing, the brother like the song, and he's a big boy but he can't say mosquito so he say...he sing... maquito, they make laugh off of he."*

Respondents who felt that the campaign was reaching the miners also thought that the messages were well received by miners. This perception was shown by the increased demand for the materials from testers.

*"So now that they have the help of the promotions, it's better for them, and I know they love it because they gon call a lot sometimes call and say man y'all ain't get none of them flash drive so we could plug-in. It's not a case with we telling them and they gotta believe what we say."*



Supervisor

### Impact and Sustainability

Many respondents attested that the program has served to improve miners' awareness of malaria- related issues such as severity, prevention, and treatment. They noted that Breakthrough ACTION Guyana improved the level of malaria knowledge within the public.



MOH Staff

*"Sensitization, awareness, and I think important is showing value for money. Everyone's interested in value for money, and this is one good way ... in which for example we've had this project and you need to build awareness this project has been on. It was a good opportunity to build awareness."*

Other respondents alluded to the role of Breakthrough ACTION Guyana in improving miners' malaria- related behavior, including increased prompt care-seeking and reduced self-medication. Another respondent referenced the positive results from the VMT monitoring data demonstrating improved malaria-related behaviors among miners.

*"We're seeing from the mining camps they're getting the right care; the right medication and the feedback is that they're complying. Adhering to the treatment, and it's not that they just following it because somebody says. They understand the reasoning behind it."*



MOH Staff





*“Thank you, even now as we're examining the data, we do see that there have been some behavior changes.”*

In addition, several respondents noted that the VMT program has made services more accessible to miners, saving miners time and money in accessing care. This sentiment was noted by many camp managers. In addition, the role of Breakthrough ACTION Guyana was evident in the increased number of people interested in becoming volunteers.

*“You find more persons buy-in now. For example, in terms of the volunteer system, you find more persons willing to work it, cooperating towards it even though it's not giving you a monetary something, but they still willing to work towards it because they saw the end line towards it. They saw the bigger picture of it... and I think Breakthrough ACTION had a lot to play ....”*



Breakthrough ACTION was also noted to have helped improve malaria-related behaviors including appropriate care-seeking as well as adherence to test results and treatment. Respondents also alluded to the positive results of the VMT monitoring data.

We have seen miners complying more and I think the last survey we did or the last time they actually do a supervisory visit and visit these places, you have seen them be more appreciative towards what is being done both from the Ministry of Health as well as the materials being produced by Breakthrough ACTION

Camp managers were happy with the VMT program, noting that it led to some miners being able to prevent malaria and to others being able to recover from malaria quickly and get back to work. Miners were therefore able to continue earning a living for themselves and their families.



*“But is a good thing we doing testing in there because a lot of people recover very quickly with the treatment and these kinda things ... because the treatment really work, you know. It work fast. People get back to work within couple of days.”*

Supervisors noted that the testing program enabled MOH to connect with the remote regions and communities.

*“Yeah, it's a very good help to us because it actually eases our work a whole lot. It gives us the opportunity to ... get to know the areas and to get to know the personnel in the interior. And when you actually get to know these persons, it's easier for them because most of the interior located persons are skeptical when it comes to anyone that they don't know coming into the interior.”*



MOH staff noted how the program served to systematically structure a malaria elimination program that aligned with government guidelines. Miners were aware of the VMT program, initiated by MOH, and could access testing promptly. They also understood that completion of treatment could be lifesaving. Altogether, these factors improved the chances for malaria elimination.



*“What we did was, we’ve structured it ... we help them. They’ve allowed us but we’ve helped them to better structure it and align it with our policies and say use this test before you treat because you might not have malaria and if positive, this is how you treat in alignment with the Ministry of Health guidelines.”*

Many respondents hoped that the achievements of Breakthrough ACTION Guyana would last beyond the lifetime of the project. They implied that MOH would have to assume additional responsibility in implementing activities.

*“If we could keep them for a lifetime that would be nice but unfortunately, we know it's a project <pause>. .... we can't wholly and solely depend on them because obviously, they would need some transition period. But for the time and the period that they're here then yeah...I think we can have that collaborative effort.”*



However, some respondents were skeptical that the impact achieved by the Breakthrough ACTION Guyana project could be sustained beyond the life of the project.



*“<laughs> You know right, and they've changed our perspective on certain things these people come and create all these things and now they have to leave it in the hands of vector control, and I know for a fact, .... that it's gonna go straight to the ground.”*

*“If they leave now and nothing ain't happen, it's like we gone back to square one because the Ministry not gonna take that responsibility!”*



This skepticism was also shared by MOH staff who admitted that VCS/NMP needs to act intentionally to sustain the program beyond the life of Breakthrough ACTION Guyana. They also noted the key challenge is consistently obtaining funds for SBC.



*“If I were to be honest, I’d say that we could do better from our [MOH] end, and I know that one of the points we’ve been discussing is the sustainability of what they've be doing and it’s something we haven’t quite wrapped our heads around fully as yet. ... It is to help us in terms of thinking through how we can make it sustainable, and I know they're possibly looking at additional funding also.”*

*“Well one of the things [challenges] is that social behavior change is not exactly something tangible.”*



As the LMBP campaign activities and Breakthrough ACTION’s activities progressed, VCS/NMP recognized the value of Breakthrough ACTION’s input and demonstrated a desire to sustain the program. One respondent noted that VCS/NMP was taking more responsibility in malaria SBC and might make budgetary allocations in the future to implement interventions.



*“I know that we have placed some of the materials or some of printing of the materials into our budget, so we have started with it, and I hope that whoever is here after myself that they can also help to implement these things into our budget so we can continue to absorb and begin to produce.”*

## Volunteer Malaria Tester Program

Several insights were gleaned from the qualitative interviews regarding the successes, challenges, and opportunities within the VMT program. These insights are discussed in the following subsections.

### Training

Several VMTs, supervisors, and national MOH staff attested to the quality of the VMT training. Their perceptions were reinforced by the successful demonstration of technical and interpersonal communication skills by the VMTs during a role-play using a simulated client. All the testers collected a detailed history on the simulated client’s presenting symptoms, correctly demonstrating the RDT procedures. They then counseled the clients on appropriate next steps, stressing the importance of treatment adherence for those who tested positive for malaria. All testers demonstrated appreciable use of the provided job aids and reporting forms. A number of respondents also credited Breakthrough ACTION for developing high-quality training manuals and job aids to strengthen interpersonal communication skills.



**Supervisor**

*“Remember Breakthrough ACTION, they have these new things that they created, these pamphlets and... materials so that’s included in the training.”*

Many VMTs noted that they needed additional or refresher training. They felt that such training ensures that volunteers know the relevant content well and remain confident in their ability to perform their duties. A few respondents said that supervisors would also benefit from additional training on supervision skills, rather than just training on how to teach testers how to conduct malaria tests.



**Tester**

*“So, what I’m saying is they need a little bit more (training), more topping up again because sometimes like maths if you don’t follow up with maths you go forget all of it.”*

Meanwhile, testers appreciated the job aids developed by Breakthrough ACTION, particularly the rapid counseling cards and the treatment envelopes, because they served to remind them of key information regarding the dosages of malaria medications.

*“Yes, the cassettes does try to improve if you forgetting the dosage, they got cards like these <refers to the Treatment Regimen Guide displayed in shop> that you can always refer to it and get back on track.”*



**Tester**

### Recognition

An emerging theme that surfaced throughout the interviews related to the recognition of VMTs. Several testers referred to their certificates with gratitude, some placing it in a conspicuous place for everyone to appreciate. Others noted that they were easily identified as VMTs because of the “Free Malaria Test” signage at their testing location as well as the fact that they were near mining camps and miners.



**Tester**

*“Any and everybody does come! There is a sign out there <refers to branded flag>, so as long as they see malaria, they tell themselves this is the hospital they have to come to. Free testing, you will have Brazilians, you will have Spanish, you will have any and everybody. Persons doing logging would come too.”*

Many respondents, including VMTs and supervisors, also expressed that testers were appreciated within their communities. Nevertheless, a notable number of respondents clearly desired some token of appreciation and recognition. Some examples included T-shirts, stipends, public acknowledgement as malaria champions or acknowledgement and participation in World Malaria Day, mobile phone airtime credit, Christmas hampers, and appreciation dinners.



**Supervisor**

*“...they would also ask if they could get like a T-shirt, or a water bottle. A few have been asking me for that.”*

*“You can have, for example, a dinner where we take everybody out and we do a nice kinda presentation thing on a dinner front. Things like these and I think if you do that then it would take away from the monetary incentive itself that you actually have to give them so that is one way”*



**Supervisor**

## Communication

While some testers noted an appreciable level of communication with their supervisors, several supervisors expressed some dissatisfaction with the VMT communication from the regional to national levels. This report is important because the testers need to call the supervisors to seek information about what should be done in certain instances, while supervisors need to discuss reports with the testers. In particular, the lack of communication resources such as internet, phone signal, and airtime credit were seen as hampering regular communication as demonstrated in the following quotes.



**MOH Staff**

*“You can't call, definitely, you can't call in, cause the cellular infrastructure, phone lines don't reach the places that majority of our workers”*

*“The thing is with that, it's got nothing to do with the data, it's the reports. We're not getting the reports, that's the issue. We don't get the reports and it's not my fault to blame the volunteer....”*



**Supervisor**

Despite the noted communication challenges, the use of WhatsApp has proven invaluable for communication in some locations where cellphone access is available. This use highlights opportunities for near real-time

communication where there is internet signal, and it also suggests that testers and supervisors might benefit from airtime tokens.



Supervisors

*“Through WhatsApp, all who have connections, we would get, some of them you could call direct.”*

*“But I know they doing work because I communicate by WhatsApp. I ask them at least give me a flash [picture] and let me see what's going on.”*

## Logistics

Several respondents in Region 7 and a few in Region 8 were satisfied with their supply of VMT materials, including gloves, test kits, medications, and necessary forms. In some locations, supervisors and testers relied on truck drivers to help them transport materials, often at a cost to the testers. However, some supervisors noted challenges getting supplies from the national office, and thus, some testers were without supplies. These challenges were acknowledged by MOH, which attributed them to inadequate financial support to facilitate a structured and systematic supply chain management mechanism.



Camp Manager

*“No, we get full supply of everything, we never get no shortage, everything for supply is adequate. As I said whenever something short, I would just notify them. I wouldn't wait til it finish.”*

*“With the same cruisers or trucks that come in supplying the area, I might synchronize with somebody, to get the truck people's number, call them and ask them to pass and collect it.”*



Tester



MOH Staff

*“We still bogged down with issues of getting these resources and these things to the people, and that's not dependent on us. That is a major cost: to move people and resources, it sucks up, and we depend on other entities to help us with that.”*

## Collaboration

A few testers highlighted an opportunity to further bolster the VMTs by coordinating with GGMC. They felt that GGMC could prove useful in helping with transportation, reporting of cases, distributing nets, and ensuring malaria prevention and environmental protection within mining camps.



Tester

*“Why not work along with GGMC or GGMC working along with us? In these areas that is the only way you would know how they using the nets, you can easily help the GGMC officers ... why they don't have you enforce the environmental bond that GGMC has. When you finish work[ing] this area you must fill it back. Because what happens now is each mining area they work and it left open so what you have? A breeding site for mosquitoes!”*

Another respondent identified missed opportunities for collaboration across other line ministries in Guyana. They highlighted examples where MOH can coordinate with the Ministry of Education to gain some ideas to address existing logistical and structural challenges. They also mentioned how working with the postal system could be useful in transporting malaria-related reports. Another respondent identified how better collaboration with the Ministry of Environment or GGMC could help ensure malaria prevention within mining sites.



*“We have a postal system, for example, across Guyana in most major towns. Why don’t we use that structure to move, for example, the daily case reports? Why don’t we use it, nobody thinking about that? If education could remove reports every month because they’re very strict with their reports! Why can’t the same vehicle or the same set- up also take reports for health?”*

### Motivation

VMTs’ motivation was a universal theme throughout the interviews. Several testers attested to the severity of malaria and the need to make sure that communities were protected. Some testers either had a close relative who died from malaria or personally had the disease but survived. Despite their full- time jobs, long hours, late nights, seemingly endless reporting, demands for personal and family time, and suboptimal remuneration, the majority of testers remained wholly committed to their duties and saw huge value in their roles.

*“So, a person comes even in the middle of the night and says, ‘Sir I’m having fever can you please help me.’ I am there to help ... I’m doing my part. Even if I have to born again and come back into the world, I would still do it.”*



Tester

## Supporting Insights from VMT Monitoring Data



As described above, trained VMTs conducted brief interviews with all miners who sought care for fever from 2020 to 2022, collecting data related to their malaria-related behaviors. These interviews included questions about the timeliness of the miners' care-seeking for their current fever episode, use of any self-medication prior to seeking care, and whether they slept under an LLIN the night before. In addition, the miners were also asked if they completed their medication the last time they had a confirmed case of malaria.

The following figures depict the results of 5,091 miners interviewed by VMTs when they sought care from October 2020 until December 2022. Of note, these indicators are among miners who sought care with a VMT as compared with randomly selected miners in the 2019 and 2022 surveys (data presented further below).

### LLIN Use

The VMT monitoring data showed that, among miners who visited a tester during the Breakthrough ACTION Guyana project period of 2020 to 2022, the use of LLINs increased notably in Region 8 from 37% to 82%. This spike corresponds with MOH's LLIN distribution in Region 8. Of note, LLINs reached the majority of mining camps in Region 8 within six months of commencing distribution in 2021, which is reflected in the steep rise in LLIN use, from 37% to 80% over the same time period. In Region 7, LLIN distribution commenced in 2022, with limited distribution due to transportation challenges; however LLIN use increased appreciably from 15% to 46% within six months when private partners assisted with distribution.

Anecdotal evidence from miners and MOH staff suggest that the LLINs distributed in Region 8 were too small. This prompted revisions to the net specifications as well as delays procuring and distributing better sized nets in Region 7.

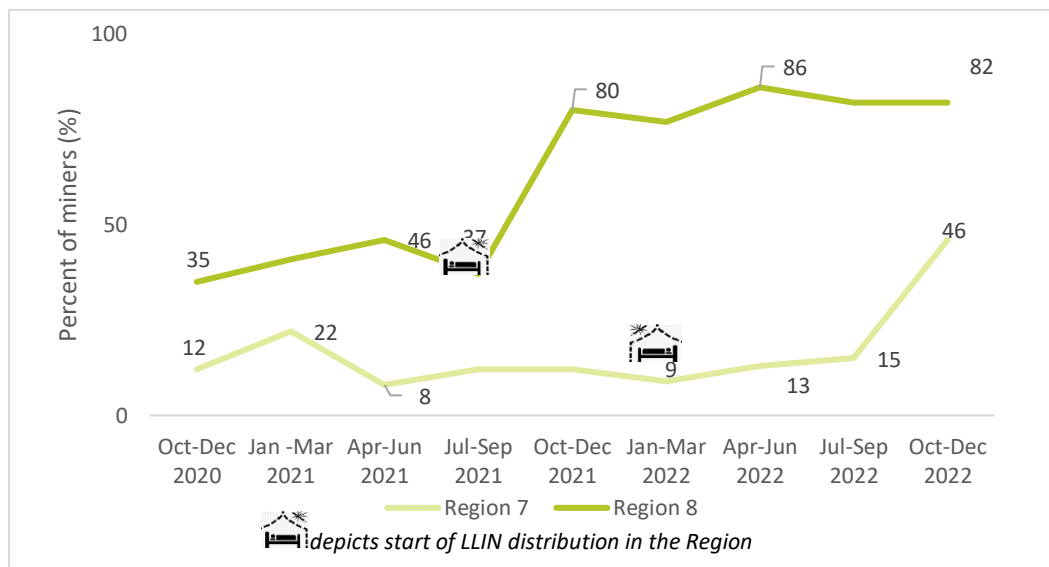


Figure 7: Use of LLIN Among Miners Who Visited a Tester (2020-2022)

## Prompt Care-Seeking

The proportion of miners who sought care promptly increased notably from 49% and 36% in Regions 7 and 8, respectively, and stabilized at approximately 70% in both regions from April 2021 to March 2022. After March 2022, both regions experienced a decline in prompt care seeking to 54% in Region 7 and 30% in Region 8. These decreases may be due to a consistent loss of VMTs offering malaria services from March 2022 by one-third in Region 7 and one-half in Region 8.

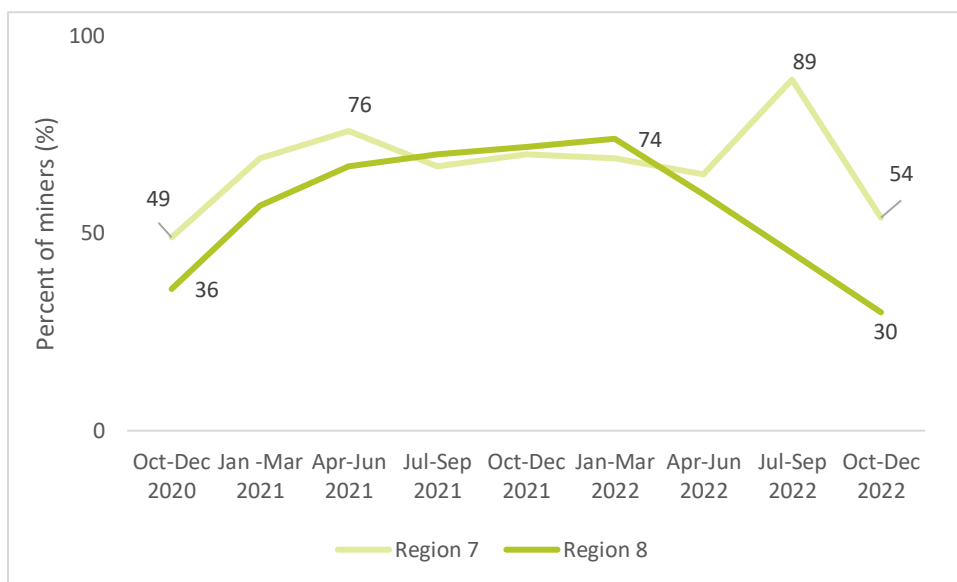


Figure 8: Prompt Care Seeking Among Miners Who Visited a Tester (2020–2022)

## Self-Medication

Between October 2020 and December 2022, most miners who sought care from a VMT did not self-medicate prior to their visit. In 2020, 86% of miners in Regions 7 and 8 reported that they did not self-medicate. By December 2022 none of the miners in Region 8 reported self-medication, and miners who did not self-medicate in Region 7 increased to 93%.



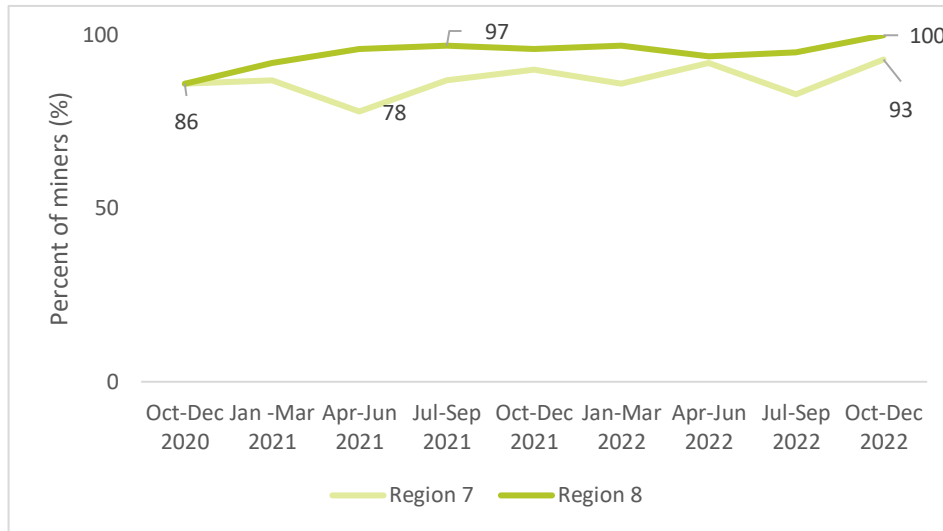


Figure 9: Percentage of Miners Who Did Not Self-Medicate (2020-2022)

#### Adherence to MOH Medication

During their visit to a VMT, miners were asked about their last confirmed malaria episode and whether they completed their prescribed malaria treatment. Between October 2020 and 2022, the percentage of miners who stated that they completed their malaria treatment during their last episode of fever increased from 35% to 55% in Region 7. In Region 8, the percentage increased to 89% in April 2022 but declined to 70% by October 2022.

## Supporting Insights from the Gold Miners Surveys



### Description of Study Population

Table 3 highlights the description of the study population. A total of 2,546 miners participated in the 2019 and 2022 surveys. Most miners were male (85%) and Christian (81%) and had a primary level of education (71%). Approaching half of the miners had been mining for five years or more (42%), were 35 years or older (45%), or were married (42%). About a third of miners were of mixed ethnicity (32%), while less than one-third were Afro-Guyanese (30%) or Amerindian (30%).

In addition, about a third of miners worked year-round (27%) or had a prior episode of confirmed malaria in the 12 months preceding the survey (29%).

#### On average, miners are:


- Male
- Less than 35 years old
- Christian
- Primary educated
- Not married
- Working seasonally


A few significant differences in miners' characteristics were observed across the 2019 and 2022 surveys, reflecting their transitory nature. By 2022, fewer miners were 35 years or older, were married, had five years or more experience, or were year-long miners. Additional differences within regions can be seen in Table 3.


Table 3: Description of Study Population


MINERS' CHARACTERISTICS	REGION 7		REGION 8		TOTAL	
	2019	2022	2019	2022	2019	2022
	N=819	N=818	N=476	N=433	N=1,295	N=1,251
Male	90	86	84	83	88	85
≥35 years old	51	42***	47	47	49	45
Christian	81	82	78	80	80	81
Married	51	40**	52	44*	51	42***
Primary education or more	72	74	62	68	69	71
≥5 years of mining experience	65	56*	51	27***	61	42***
Works as a miner year-round	37	16***	26	31	34	24***
ETHNICITY						
Afro-Guyanese	25	25	32	36	27	30
Amerindian	20	30**	28	30	23	30**
Mixed	39	35	30	29	36	32
Other	15	11**	11	4**	14	7**
Notes: Values in the table are percentages. *p<0.05, **p<0.01, *** p<0.001 significant difference from 2019 to 2022.						


Exposure to Malaria Interventions

 **77%** of miners knew about the LMBP campaign.

 **32%** of miners knew about the VMT program.

 **56%** of miners knew **either** LMBP and VMT.

 **26%** of miners knew **both** LMBP and VMT.

 **18%** of miners knew **neither** LMBP nor VMT.

Overall, 77% of miners could recall at least one LMBP campaign feature, including the poster (48%), characters Mike (38%) and Fox (20%), jingle (35%), logo (30%), LMBP phrase (18%), and TV banner (14%). About one-third of miners (32%) knew about the VMT program. A composite measure of exposure was created based on exposure to or recall of the VMT program and LMBP campaign. Over half of the miners (56%) reported exposure to one or the other of the interventions, 27% were exposed to both interventions, and just under a fifth (18%) were not exposed to either the VMT program or LMBP campaign. Recall of specific LMBP campaign features was higher in Region 8 than in Region 7. Further details are highlighted in Table 4.

Table 4: Miners’ Exposure to Malaria Interventions

MINERS’ RECALL OR EXPOSURE IN 2022	REGION 7 (N=818)	REGION 8 (N=433)	TOTAL (N=1,251)
Knows about VMT program	33	30	32
Recalls any LMBP campaign message, logo, or character	75	79	77
Recalls the phrase “Lil Mosquito Big Problem”	11	26	18***
Recalls LMBP logo	23	37	30***
Recalls LMBP jingle	27	43	35***
Recalls the LMBP character Mike	33	43	38**
Recalls the LMBP character Fox	15	26	20***
Recalls LMBP poster	50	46	48
Recalls LMBP TV banner	9	19	14***
Overall exposure to malaria interventions			
One intervention (either LMBP or VMT)	56	56	56
Both interventions (LMBP and VMT)	26	27	26
No interventions (neither LMBP nor VMT)	18	17	18

Notes: Values in the table are percentages. \*p≤0.05, \*\*p≤0.01, \*\*\*p≤0.001 significant difference from 2019 to 2022.



**39%** of miners had high malaria knowledge.\*



**58%** of miners thought malaria tests were effective.\*



**71%** of miners felt they could prevent malaria.\*



**22%** of miners perceived support family and friends to prevent malaria.\*



**61%** of miners perceived their camp to have favorable norms on malaria prevention.\*

*\*Significant increase from 2019 to 2022*

Psychosocial ideation factors are known to affect behavior as described above under Theoretical Framework (see page 18). Ideation scores were created for malaria prevention, testing, and treatment as a composite measure of the total number of ideation factors present. The ideation scores for malaria prevention, testing, and treatment were cross tabulated by exposure to malaria interventions. The ideation variables, behaviors and assessment are described in the appendices.

#### Cross-Cutting Ideation Factors

Of note, some ideation factors are cross-cutting and thus used in the creation of prevention, testing, and treatment ideation scores. These include the following:

- **High malaria knowledge**, defined as knowledge of malaria cause, symptoms, and primary preventive measures.
- **Positive attitudes about malaria transmission**, defined as miners' attitudes towards malaria parasites being eliminated from the body, or whether they think a person can diagnose the kind of malaria that they have based on their symptoms only.
- **Perceived severity of malaria**, a composite measure of how serious a malaria infection would be for them, whether they worry about malaria, whether they think malaria could be potentially deadly, or whether they think people generally recover easily.
- **Perceived susceptibility of malaria**, a measure of how likely a miner thinks they may be infected in the next six months with malaria.
- **Perceived positive self-image**, a composite measure of the degree to which miners perceive themselves as healthy, strong, determined decision makers, and able to change their behaviors.

Table 5 summarizes the trends in these cross-cutting ideation factors from 2019 to 2022. Some statistically significant increases in these factors were seen. Specifically, high malaria knowledge increased from 35% in 2019 to 39% in 2022 ( $p \leq 0.05$ ). Among miners in Region 8 only, high malaria knowledge increased from 28% in 2019 to 41% in 2022 ( $p \leq 0.001$ ), while perceived susceptibility to malaria increased from 35% to 44% ( $p \leq 0.001$ ). Perceived positive self-image was not assessed in 2019, but almost three-quarters of miners (71%) held a positive self-image of themselves in 2022.

Table 5: Cross-Cutting Ideation Factors

IDEATION FACTOR	REGION 7		REGION 8		TOTAL	
	2019	2022	2019	2022	2019	2022
	N=819	N=818	N=476	N=433	N=1,295	N=1,251
High malaria knowledge <sup>1</sup>	38	38	28	41***	35	39*
Positive attitudes about malaria transmission	16	14	18	12	17	14
Perceived severity of malaria	34	35	39	31	36	33
Perceived susceptibility of malaria	43	40	35	44***	40	42
Perceived positive self-image	—	67	—	77	—	71

Notes: Values in the table are percentages. Dashes indicate questions that were not asked in the survey round; \*p≤0.05, \*\*p≤0.01, \*\*\* p≤0.001 significant difference from 2019 to 2022. <sup>1</sup>This factor includes knowledge of malaria cause, symptoms, and primary preventive measures.

### Malaria Prevention Ideation

Malaria prevention ideation refers to psychosocial factors related to miners’ malaria prevention behavior and LLINs specifically. It includes cross-cutting ideation factors as mentioned above as well as the following:

- **Positive descriptive community norms on LLIN**, that is, the miners’ perception of what their peers and other miners think about the use of LLINs.
- **Positive attitudes about LLIN**, whether a miner thinks that the smell of the insecticide makes it uncomfortable to sleep under a mosquito net.
- **Perceived self-efficacy to obtain LLIN**, whether a miner knows where to get an LLIN for free if they need one.
- **Perceived response efficacy of LLIN**, whether they think that sleeping under an insecticide- treated mosquito net every night will prevent a person from getting malaria.
- **Interpersonal communication on malaria prevention**, whether they talked with someone about the best ways to prevent malaria in the past month.
- **Social support of LLIN use**, whether the most important people in the miner’s life would approve of sleeping under an LLIN.

Miners’ malaria prevention ideation significantly increased from 2019 to 2022 in terms of their knowledge, descriptive norms, social support, self-efficacy, and response-efficacy. Positive descriptive community norms increased from 48% in 2019 to 61% in 2022 (p≤0.001). Miners’ interpersonal communication on malaria prevention increased from 18% in 2019 to 22% in 2022 (p≤0.05). Self- efficacy, or miners’ confidence in their ability to obtain a treated net, increased from 65% in 2019 to 71% in 2022 (p≤0.05). Response efficacy, or miners’ recognition of the effectiveness of sleeping under an LLIN in preventing malaria, increased from 59% to 72% between 2019 and 2022 (p≤0.001).

While social support regarding malaria prevention was not assessed in 2019, the majority (89%) of miners noted a high level of social support in 2022.

Table 6: Malaria Prevention Ideation

IDEATION FACTOR	REGION 7		REGION 8		TOTAL	
	2019	2022	2019	2022	2019	2022
	N= 819	N=818	N=476	N=433	N=1,295	N=1,251
High malaria knowledge	38	38	28	41***	35	39*
Positive attitudes about malaria transmission	16	14	18	12	17	14
Perceived severity of malaria	34	35	39	31	36	33
Perceived susceptibility of malaria	43	40	35	44***	40	42
Perceived positive self-image	—	67	—	77	—	71
Positive descriptive community norms on LLIN	50	61*	44	62***	48	61***
Positive attitudes about LLIN	56	47	46	40	52	43
Perceived self-efficacy to obtain LLIN	61	67	72	76	65	71*
Perceived response efficacy of LLIN	60	65*	58	79***	59	72***
Interpersonal communication on malaria prevention	18	22	18	22	18	22*
Social support of LLIN use	—	87	—	90	—	89

Notes: Values in the table are percentages. Dashes indicate questions that were not asked in the survey round. \*p≤0.05, \*\*p≤0.01, \*\*\* p≤0.001 significant difference from 2019 to 2022.

#### Malaria Prevention Ideation by Exposure to Malaria Interventions

Figure 13 highlights the relationship between malaria interventions and miners’ ideation related to malaria prevention, with the mean score ranging from 0 to 11. Malaria prevention ideation scores showed a linear and statistically significant increase across each level of exposure to interventions.

Miners exposed to both LMBP and VMT interventions demonstrated a significantly greater mean ideation score than those who were exposed to either LMBP or VMT and those who had no exposure to either intervention. In all behaviors there was a linear increase from no exposure to LMBP or VMT and to LMBP and VMT

The greatest increase is evident from no exposure to both LMBP and VMT. In the case of malaria prevention, the linear increase was significant between each level of exposure.

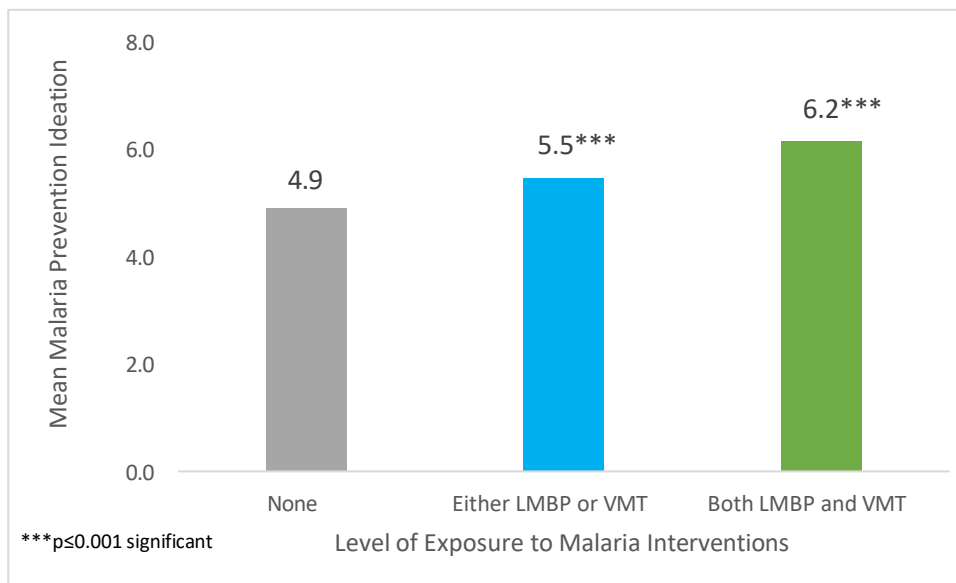


Figure 11: Miners' Malaria Prevention Ideation by Exposure to Malaria Interventions.

#### Malaria Testing Ideation

Malaria testing ideation refers to miners' psychosocial factors related to malaria testing and care-seeking. This includes cross-cutting ideation factors as mentioned above as well as the following:

- **Positive descriptive community norms on testing**, the perception that most peers seek advice or treatment for fever promptly and/or get tested for malaria before using any treatment.
- **Positive subjective community norms on testing**, the perception that most peers would not mock but instead praise the miner if they got tested before using malaria medication.
- **Positive attitudes about malaria testing**, that a person with fever should always get tested promptly and before taking malaria medication, and that a person should only use malaria medication after being diagnosed by a health provider.
- **Perceived self-efficacy to test for malaria**, a miner's confidence in their ability to get tested promptly.
- **Perceived response efficacy of malaria tests**, the understanding that testing is the only way to know that one has malaria and that the test results from a VMT can be relied upon.
- **Interpersonal communication on malaria testing**, whether they talked with someone about malaria testing and care-seeking in the past month.
- **Social support of malaria testing**, that the most important people in the miner's life would approve of them seeking care promptly or getting tested for malaria before using malaria medication.

Response efficacy increased from 51% in 2019 to 58% in 2022 ( $p \leq 0.001$ ). Among miners in Region 8 only, perceived susceptibility to malaria (35% to 44%) and perceived self-efficacy—miners' confidence in their ability to seek testing—also increased significantly from 2019 to 2022 (81% to 88%,  $p \leq 0.001$ ). In addition, some ideation factors assessed only in 2022 were high among all miners, including positive descriptive community norms at 55%, subjective community norms related to malaria testing at 62%, and social support for malaria testing at 86%. These findings are summarized in Table 7.

Table 7: Malaria Testing Ideation

IDEATION FACTOR	REGION 7		REGION 8		TOTAL	
	2019	2022	2019	2022	2019	2022
	N=819	N=818	N=476	N=433	N=1,295	N=1,251
High malaria knowledge	38	38	28	41***	35	39*
Positive attitudes about malaria transmission	16	14	18	12	17	14
Perceived severity of malaria	34	35	39	31	36	33
Perceived susceptibility of malaria	43	40	35	44***	40	42
Perceived positive self-image	—	67	—	77	—	71
Positive descriptive community norms on testing	—	43	—	67	—	55
Positive subjective community norms on testing	—	64	—	59	—	62
Positive attitudes about malaria testing	80	75	75	78	79	76
Perceived self-efficacy to test for malaria	78	76	81	88***	79	82
Perceived response efficacy of malaria tests	55	53	43	63***	51	58***
Interpersonal communication on malaria testing	—	12	—	18	—	15
Social support of malaria testing	—	83	—	89	—	86

Notes: Values in the table are percentages. Dashes indicate questions that were not asked in the survey round. \*p≤0.05, \*\*p≤0.01, \*\*\* p≤0.001 significant difference from 2019 to 2022.

Malaria Testing Ideation by Exposure to Malaria Interventions

Figure 14 shows the relationship between malaria interventions and miners’ ideation related to malaria testing with the mean score ranging from 0 to 11.

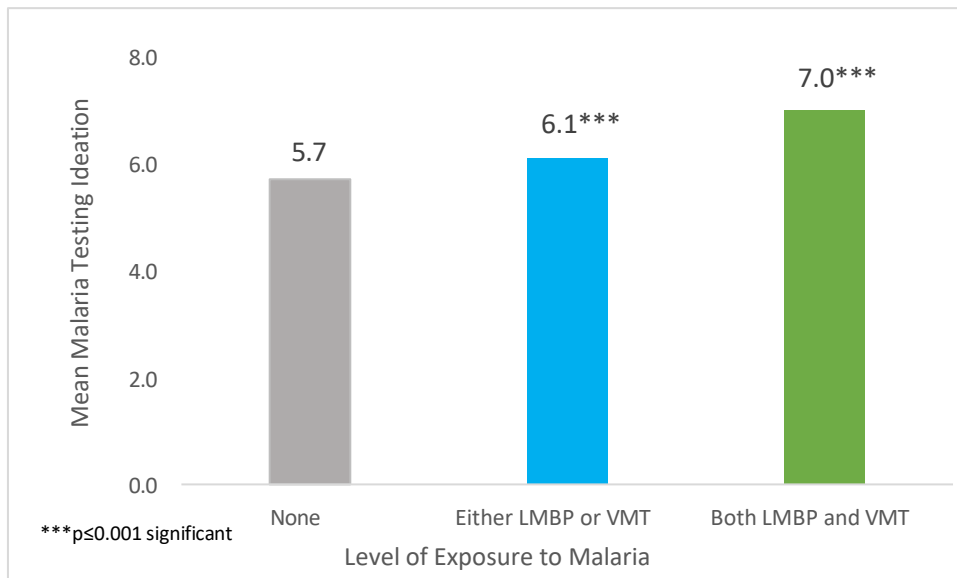


Figure 12: Miners' Malaria Testing Ideation by Exposure to Malaria Interventions



Ideation scores showed a statistically significant increase by level of exposure to malaria interventions. Mean malaria testing ideation scores were lowest among miners not exposed to any interventions, higher among miners exposed to one of the interventions, and highest among miners exposed to both LMBP and VMT.

#### Malaria Treatment Ideation

Malaria treatment ideation refers to miners’ psychosocial factors related to malaria treatment and adherence. This includes cross-cutting ideation factors as mentioned above as well as the following:

- **Positive descriptive community norms on treatment**, the perception that most peers would not stop taking their malaria medication before the end of treatment.
- **Positive subjective community norms on treatment**, the perception that most peers would not mock but instead praise the miner if they finished all their medication after they were diagnosed with malaria.
- **Positive attitudes about malaria treatment**, that a person with fever should only use MOH- approved medicine for malaria and only use the treatment approved for the type of malaria they have.
- **Perceived self-efficacy to complete treatment**, a miner’s confidence in their ability to complete their malaria medication if infection with *P. falciparum* or *P. vivax* is diagnosed.
- **Perceived positive emotions related to treatment**, the degree to which a miner thinks treatment adherence is for weak or foolish people.
- **Social support of malaria treatment**, that the most important people in the miner’s life would approve of them finishing their malaria medication even if they were feeling better.

Significant increases in ideation factors from 2019 to 2022 were observed in Region 8 only, where perceived self-efficacy related to malaria treatment increased from 76% to 85% ( $p \leq 0.001$ ).

Table 8: Malaria Treatment Ideation

IDEATION FACTOR	REGION 7		REGION 8		TOTAL	
	2019	2022	2019	2022	2019	2022
	N= 819	N=818	N=476	N=433	N=1,295	N=1,251
High malaria knowledge	38	38	28	41***	35	39*
Positive attitudes about malaria transmission	16	14	18	12	17	14
Perceived severity of malaria	34	35	39	31	36	33
Perceived susceptibility of malaria	43	40	35	44***	40	42
Perceived positive self-image	—	67	—	77	—	71
Positive descriptive norms on treatment	34	29	23	27	30	28
Positive subjective community norms on treatment	—	74	—	84	—	79
Positive attitudes about malaria treatment	69	71	73	77	70	74
Perceived self-efficacy to complete treatment	78	75	76	85***	77	79
Perceived positive emotions related to treatment	—	23	—	30	—	26
Social support of malaria treatment	—	87	—	96	—	91

Notes: Values in the table are percentages. Dashes indicate questions that were not asked in the survey round. \* $p \leq 0.05$ , \*\* $p \leq 0.01$ , \*\*\*  $p \leq 0.001$  significant difference from 2019 to 2022.

### Malaria Treatment Ideation by Exposure to Malaria Interventions

Figure 15 shows the relationship between exposure to malaria interventions and miner's ideation scores, with a range of 0–11, related to malaria treatment.

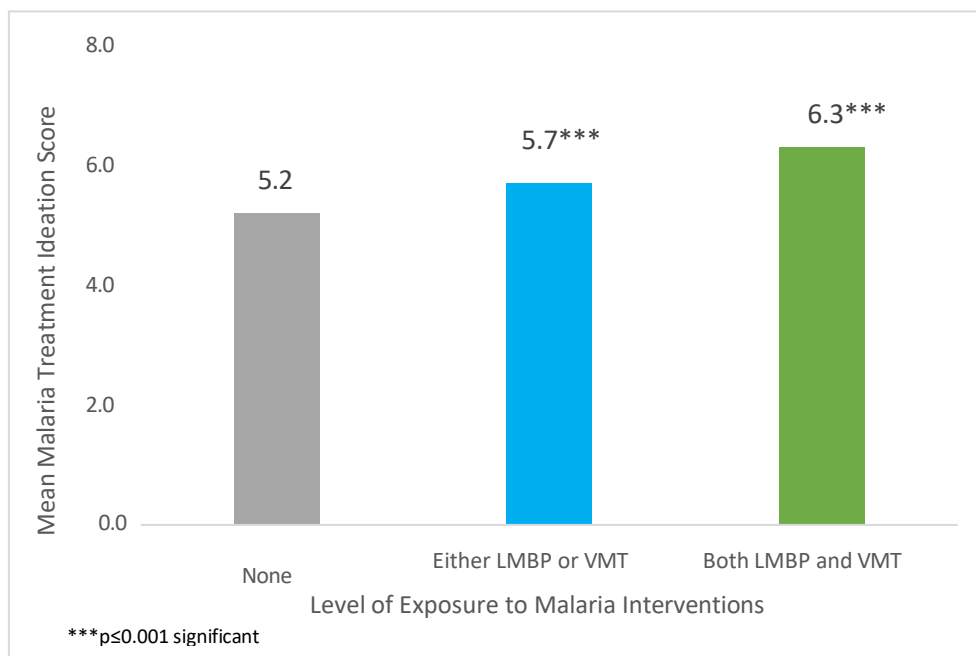


Figure 13: Miners' Malaria Treatment Ideation by Exposure to Malaria Interventions

Ideation scores showed a linear and statistically significant increase by level of exposure to malaria interventions. Mean ideation scores were lowest among miners not exposed to any interventions and highest among those exposed to both VMT and LMBP malaria interventions.

### Malaria Prevention, Testing and Treatment Behaviors



**85%** of miners with bed nets used them.



**48%** of miners sought care for fever promptly.\*



**94%** of miners with malaria completed their treatment.

*\*Significant increase from 2019 to 2022*

### Malaria Prevention Behavior: LLIN ownership and use

Key malaria prevention behaviors explored in the survey include receipt, current ownership, and use of an LLIN. Of note, LLIN access and ownership were somewhat low throughout the project timeline as only about four-tenths of miners claimed that they received an LLIN from the MOH distribution campaign (with a notable increase from 2019 to 2022 in Region 8). Less than half of miners currently owned a net at the time of the

2022 survey. However, most miners who had an LLIN used it. Specifically, 85% of miners with an LLIN noted that they used their nets the previous night, while 83% of miners with LLINs used their nets consistently the preceding week.

Table 9: Malaria Prevention Behaviors

MINERS' CHARACTERISTICS	REGION 7		REGION 8		TOTAL	
	2019	2022	2019	2022	2019	2022
<b>Among all miners</b>	N=819	N=818	N=476	N=433	N=1,295	N=1,251
Received LLIN from MOH	35	35	37	46*	36	40
Currently owns a net	39	42	46	53	41	48*
<b>Among miners with LLIN</b>	N=303	N=344	N=216	N=230	N=519	N=574
Used a net the previous night	81	87	87	84	83	85
Used a net nightly the previous week	78	85	86	82	81	83

Notes: Values in the table are percentages. \*p≤0.05, \*\*p≤0.01, \*\*\* p≤0.001 significant difference from 2019 to 2022.

Malaria Prevention Behaviors by Exposure to Malaria Interventions

Miners' ownership and use of LLIN differed considerably by exposure to malaria interventions. As level of exposure increased, the percentage of miners who received an LLIN from MOH or currently owned a net increased notably, with the percentages being highest among miners exposed to both the LMBP campaign and the VMT program. In addition, LLIN use the previous night or the previous week was consistently high across the levels of exposure to malaria interventions.

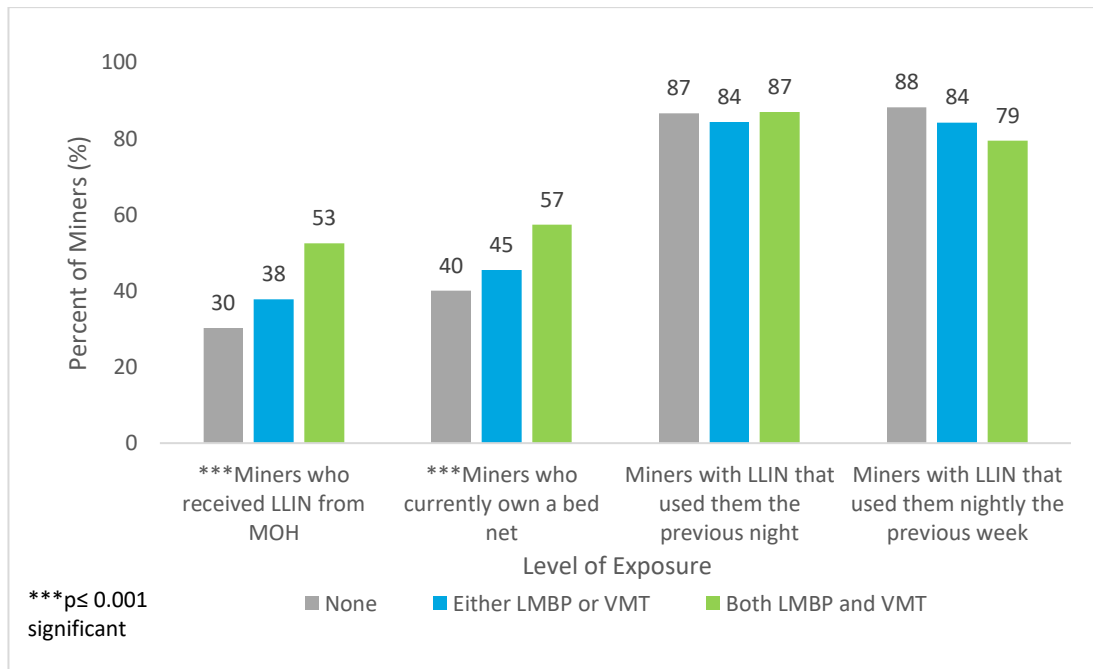


Figure 14: Miners LLIN Ownership and Use by Exposure to Malaria Interventions

### Malaria Testing Behavior

Ideal malaria testing behaviors for miners with fever include seeking care from appropriate sources such as health clinics, hospitals, and VMTs. Miners should also seek care within the first day or next day of fever onset. In addition, miners should not self-medicate with antimalarials prior to seeking care. Finally, miners should get tested for malaria when they have a fever.

Table 10 summarizes malaria testing behaviors among miners across both surveys. In 2022, 74% of miners with fever in the past 12 months sought any care for their last fever episode. This percentage was significantly higher than in 2019 (66%,  $p \leq 0.05$ ). Of note, 61% of miners with fever in the last 12 months sought appropriate care in 2022 compared with 55% of miners in 2019 ( $p \leq 0.05$ ). Almost half (48%) of miners with fever in the past 12 months sought care promptly in 2022. This proportion was significantly higher than the 37% of miners in 2019 ( $p \leq 0.001$ ). In addition, 58% of the miners with fever got tested in 2022, which was significantly higher than the 47% of miners in 2019 ( $p \leq 0.001$ ).

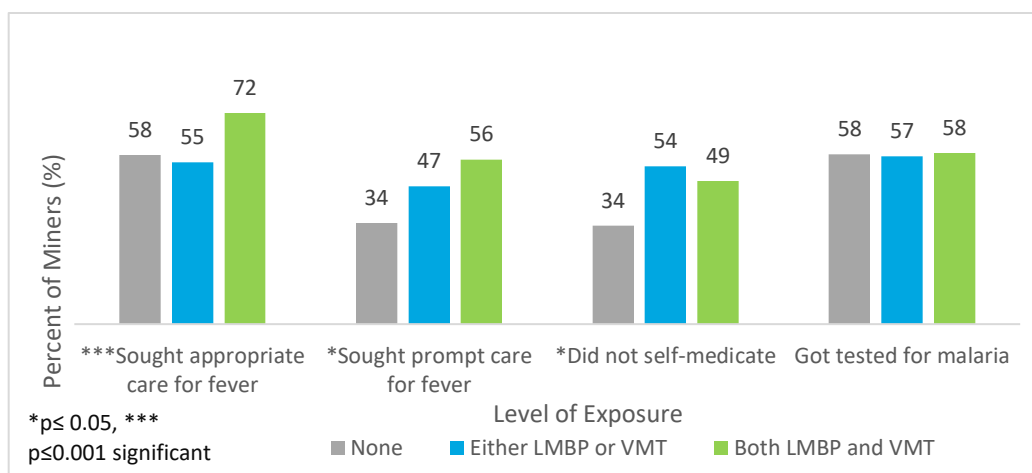
Table 10: Malaria Testing Behaviors

MINERS CHARACTERISTICS AMONG ALL MINERS WITH FEVER	REGION 7		REGION 8		TOTAL	
	2019	2022	2019	2022	2019	2022
	N=386	N=264	N=202	N=176	N=588	N=440
Sought any care for fever	65	69	66	78*	66	74*
Sought appropriate care for fever	54	51	56	70***	55	61*
Sought prompt care for fever	38	39	36	56***	37	48***
Did not self-medicate	41	43	54	54	45	49
Got tested for malaria	43	51	54	63	47	58**

Notes: Values in the table are percentages. \* $p \leq 0.05$ , \*\* $p \leq 0.01$ , \*\*\*  $p \leq 0.001$  significant difference from 2019 to 2022.

### Malaria Testing Behaviors by Exposure to Malaria Interventions

Miners' malaria testing behaviors were considerably different by level of exposure to malaria interventions. While 58% of miners unexposed to malaria interventions sought appropriate care for their fever, significantly



more (72%) who were exposed to both the LMBP campaign and the VMT program did so; however, exposure to either the VMT program or LMBP did not affect seeking appropriate care. About one-third (34%) of miners

unexposed to malaria interventions sought prompt care for their fever compared with 47% of miners exposed to either the LMBP campaign or the VMT program and 56% of miners exposed to both interventions. Similarly, one-third (34%) of miners unexposed to malaria interventions did not self-medicate for their fever compared with significantly more miners exposed to either the LMBP campaign or the VMT program (54%) or to both interventions (49%). Malaria testing behaviors were unaffected by exposure to the VMT program and/or LMBP campaign.

#### Malaria Treatment Behavior

Among all miners who tested for malaria during their last fever episode, 64% and 71% of miners in 2019 and 2022 tested positive for malaria, respectively. Among all miners that tested positive for malaria, 93% in 2019 and 87% in 2022 were prescribed treatment. Significantly, the overwhelming majority of miners (99% in 2019 and 100% in 2022) took the prescribed treatment after testing positive. Similarly, 90% and 94% of miners in 2019 and 2022, respectively, completed their prescribed treatment.

Table 11: Malaria Treatment Behaviors

MINERS' CHARACTERISTICS AMONG ALL MINERS WITH MALARIA	REGION 7		REGION 8		TOTAL	
	2019	2022	2019	2022	2019	2022
	N=115	N=96	N=62	N=79	N=177	N=115
Prescribed treatment	95	84	89	89	93	87
Took prescribed treatment	99	100	98	100	99	100
Completed prescribed treatment	87	92	96	96	90	94

Notes: Values in the table are percentages. \*p<0.05, \*\*p<0.001 significant difference from 2019 to 2022.

#### Malaria Treatment Behaviors by Exposure to Malaria Interventions

Miners' behaviors differed by level of exposure to malaria interventions. While most (81%) miners unexposed to malaria interventions were prescribed treatment, prescription rates were slightly higher among miners exposed to either or both interventions (88% each). Similarly, most miners that were prescribed malaria treatments completed their medication (91%, 96%, and 93% of miners who were unexposed or exposed to either or both interventions, respectively).

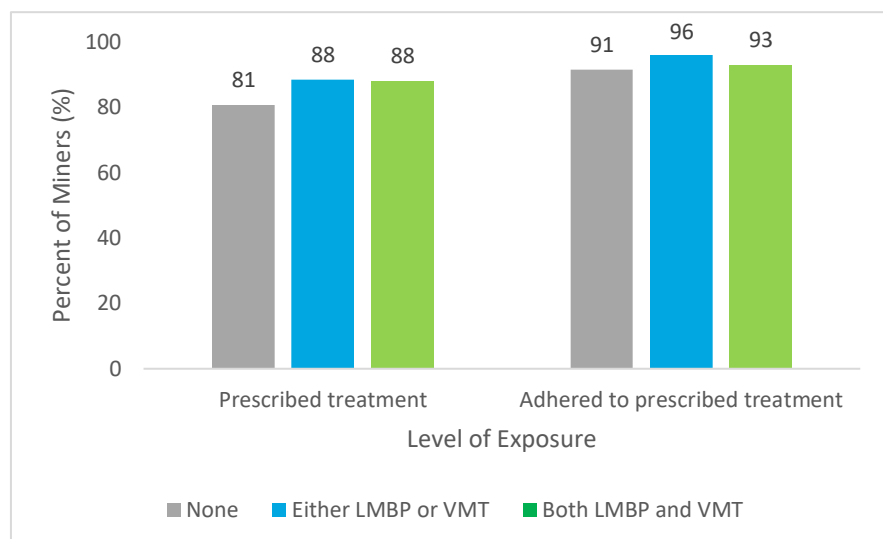


Figure 16: Malaria Prescribed Treatment and Adherence Among Miners'

### Interrelationship Between Exposure, Ideation, and Behavior

Breakthrough ACTION Guyana posits that its project activities may improve miners’ behaviors directly through exposure to its SBC interventions as well as indirectly through influencing miners’ ideation.

Earlier sections have already detailed the significant association between miners’ exposure to malaria interventions and their ideation. Here, multivariable logistic regressions were used to explore the interrelationship between exposure to malaria interventions, malaria-related ideation (prevention, testing, and treatment), and miners’ malaria behaviors including LLIN use, prompt care-seeking for fever, nonuse of self-medication, and malaria testing. The regression analysis controlled for miners’ sociodemographic characteristics such as sex, age, region, marital status, religion, education level, and mining context, including years of experience as a miner and prior episodes of malaria.

As summarized in Table 12, exposure to malaria interventions and increased ideation were associated with improved malaria-related behaviors among miners. Exposure to malaria interventions was directly associated with prompt care-seeking (adjusted odds ratio [aOR]: 2.18; 95% confidence interval [CI]: 1.14–4.16) and non-use of self-medication (aOR: 1.80; 95% CI: 0.96–3.36) among miners with fever in the past 12 months.

In addition, miners’ malaria prevention ideation was associated with increased odds of LLIN use among miners with nets (aOR: 1.44; 95% CI: 1.23–1.69). Miners’ malaria testing ideation was associated with increased odds of prompt care-seeking (aOR: 1.17; 95% CI: 1.04–1.33) and malaria testing (aOR: 1.17; 95% CI: 1.03–1.32) among miners with fever in the past 12 months.

Table 12: Factors Associated with Malaria-Related Behavior Among Miners

MINERS’ BEHAVIOR	LLIN USE		PROMPT CARE-SEEKING		NO SELF-MEDICATION		MALARIA TESTING	
	N=574 MINERS WITH LLIN		N=440 MINERS WITH FEVER IN THE PAST 12 MONTHS					
Prevalence of behavior (%)	85		48		49		58	
<b>Characteristics</b>	<b>aOR<sup>1</sup></b>	<b>95% CI</b>	<b>aOR<sup>1</sup></b>	<b>95% CI</b>	<b>aOR<sup>1</sup></b>	<b>95% CI</b>	<b>aOR<sup>1</sup></b>	<b>95% CI</b>
Exposure								
None (reference)	1.00	N/A	1.00	N/A	1.00	N/A	1.00	N/A
Either LMBP or VMT	0.63	0.30–1.32	1.84	0.98–3.43	1.95*	1.07–3.56	1.11	0.61–2.04
Both LMBP and VMT	0.66	0.29–1.50	2.18*	1.14–4.16	1.80	0.96–3.36	0.83	0.44–1.57
Ideation score	1.44***	1.23–1.69	1.17**	1.04–1.33	0.99	0.88–1.12	1.17*	1.03–1.32
Notes: <sup>1</sup> Adjusted for miners’ sex, age, religion, marital status, education, mining experience, ethnicity, whether the miners work year-round, and prior episode of malaria in the past 12 months. Significant difference at *p≤0.05, **p≤0.01, ***p≤0.001.								

## IR2: Increased Capacity of Guyanese Institutions to Coordinate, Design, Implement, and Evaluate High-Quality SBC

This section presents findings related to Breakthrough ACTION coordination and SBC capacity strengthening activities. Results of the qualitative interviews are first presented, followed by key findings from the SBC capacity assessments conducted with MOH.

### Breakthrough ACTION Coordination

Breakthrough ACTION Guyana’s coordination of the SBC aspect of the VMT program was lauded by some respondents. One respondent highlighted how supplies provided by Breakthrough ACTION helped improve testers’ efficiency. Other respondents were particularly enthused by the way Breakthrough ACTION Guyana collaborated with VCS/NMP as the project implemented several activities, providing opportunities for VCS/NMP to coordinate with Breakthrough ACTION Guyana and conduct supportive supervision of the VMTs.



MOH Staff

*“Breakthrough ACTION might be going in to do piloting of a treatment card or so and you use that as a joint trip to do a supervisory. So, you kinda do a collaborative effort.”*

*“When Breakthrough ACTION do the supervisory thing, that's how we get to go out, otherwise we don't get to go anywhere. Till let's say they sponsor us, that's the only way we get to go out.”*



Supervisors

Another respondent extolled Breakthrough ACTION Guyana’s coordination of the LLIN distribution campaign. They noted how the project coordinated the design of SBC print materials and mass media messages in addition to the distribution logistics.



MOH Staff

*“They [Breakthrough ACTION Guyana] did, in terms of collaboration and coordination because I know that they assisted in designing the brochure and in creating messages like radio ads, and television ads. In terms of the care and usage of the nets and this was distributed in the different regions via mainly E-networks or radio. ... They did play a great role in the promotion and educational wise for the campaign of the mass distribution.”*

Breakthrough ACTION Guyana’s coordination of the LLIN distribution was particularly noteworthy as another respondent noted that the project was initially tasked with case management and not necessarily LLIN distribution and use, showcasing the project’s flexibility to expand its scope of work and address other contextually relevant issues.

*“[When] Breakthrough ACTION started, the intention was never really to expand to nets. So, this was a project that was designed to focus on what we call case management which is diagnosis and treatment. Nets fall under vector control however, because the project was receptive and they understood that the project had some gaps they were willing to integrate components of it.”*



MOH Staff

## MOH SBC Capacity

Respondents noted that prior to the Breakthrough ACTION Guyana project, SBC was not really appreciated or implemented when it came to malaria. Despite the limited value ascribed to SBC, the project made noteworthy gains in not only promoting the utility of SBC but also improving the capacity of MOH to incorporate SBC into the design, implementation, and evaluation of malaria-focused interventions.



MOH Staff

*“One is that this social behavior change is something new I don’t think we use it in the Ministry... perhaps HIV has used it but I’m not sure.”*

Some respondents recalled the SBC trainings and workshops that they attended, and how they were able to operationalize the insights learned in the field as they met with miners. They also noted how Breakthrough ACTION Guyana facilitated collaborations across different stakeholders in the country.



Supervisors

*“The training ... has improved drastically.... For example, in 2017 we only did ... a little bit on malaria and how to do the test, treatment ... Breakthrough ACTION came in and they incorporated social behavior change, they’re also teaching them why we’re doing these things. We incorporate more knowledge on malaria, more knowledge on them communicating with patients and social behavior change stuff like that.”*

*“We had a design phase ... because we had to go out and do interviews with miners to find out what they know about malaria, what could change with regards to treating, to testing and stuff like that. And then we went back again, and we started to create a prototype, like create mini posters and then go back and test them to see how people like them. So, these end results are from what we went out and test and people like.”*



Supervisors



MOH Staff

*“Because they were using a human-centered approach, we brought different stakeholders together at different times and we were looking at how we can, for example, pull out common themes of where gaps were in terms of health-seeking behaviors. And from there we also sought to see what are some good interventions that could mitigate these risks that were associated with these bad behaviors.”*

A respondent noted the role of Breakthrough ACTION Guyana in providing technical expertise and thought leadership when it came to SBC.

*“Correctly said most of the technical side of the SBCC would come from Breakthrough ACTION. The program of itself does not have a technical or that aspect of SBCC and it's something we're looking to develop. Even something we can work with Breakthrough ACTION to create a movement or something of the sort before they phase out.”*



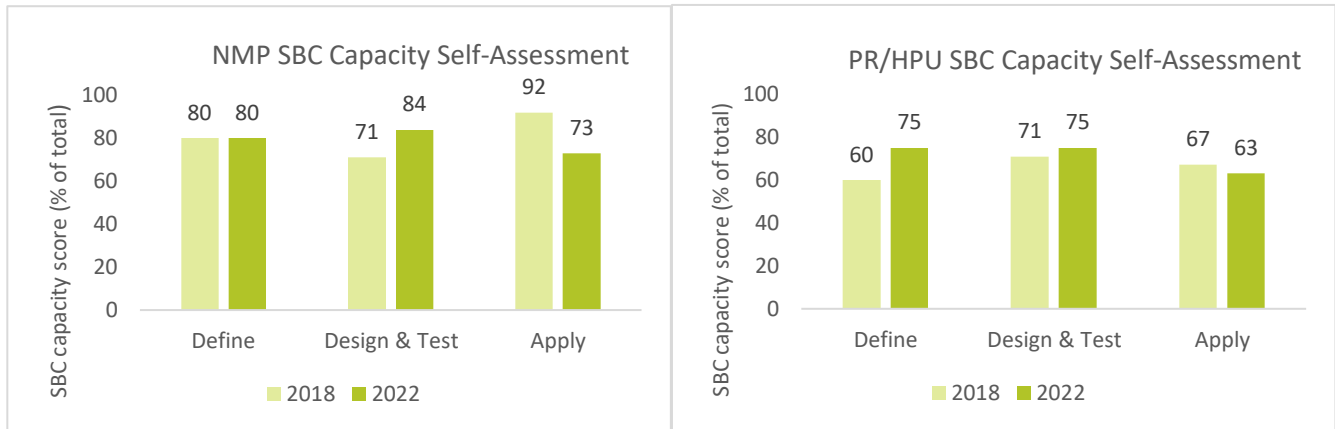
MOH Staff

## Supporting Insights from MOH SBC Capacity Assessment

In 2018 and 2022, Breakthrough ACTION Guyana facilitated capacity assessment workshops with MOH VCS/NMP and PR/HPU. The full report can be accessed at BA-Guyana-Capacity-Endline- 2022JULY29.docx. The workshops described in the method section above took participants through a discussion of specific skill sets and indicators involved in the implementation of the SBC Flow Chart and the SBC processes supported by Breakthrough ACTION.



It may be instructive to note that, except for one member of staff from PR/HPU, no other MOH participant was involved in the 2019 capacity assessment. Over the years, both departments have been affected by staff turnover for various reasons. Despite this key challenge, VCS/NMP and PR/HPU identified areas of achievement that can sustain the implementation of the SBC process in their respective departments, and areas that require Breakthrough ACTION Guyana support for improvement.



## Recommendations

Some of the quantitative findings show a lack of significant differences between behaviors by level of exposure. This could be a function of ceiling effects. For example, many behavioral outcomes were highly skewed; almost all miners with recent malaria reported they were prescribed antimalarials and that they adhered to the treatment guidelines. Given this, and the previously highlighted limitations, with Region 8 showing higher levels of change compared with Region 7, refocusing and refreshing the SBC activities is recommended.

Some LMBP promotional materials were better recognized by the miners than others; for example, posters were better recognized by miners from both Region 7 and Region 8 than the jingle or TV banner. These differentials point to the need to examine exposure as a composite of different messages and materials but also gain nuanced understanding of the effectiveness of specific messages and materials, so that these can be repeated or repackaged in future iterations of the program. Feedback on improvements to specific materials includes, for example, a recommendation to laminate treatment envelopes to extend the durability of materials. The findings also highlight the importance of continuing to create and disseminate all materials in different languages (English, Spanish, and Portuguese).

While the mining community is transient, miners report being influenced by health workers, family members, and partners who are potential secondary audiences. Based on this, a next step for the program could involve creating and tailoring activities and messages for secondary audiences. Some respondents noted that the campaign materials, particularly the jingle, is already reaching secondary audiences, such as miners' family members.

As noted earlier, only one-third of the miners were aware of VMTs in their specific communities, which may upon first glance seem low. It is worth reiterating, however, that the sites selected for the evaluation surveys were included through a random selection process, not purposively selected based on proximity to a VMT. This survey methodology, in combination with the fact that only 25% of mines in Region 7 and 52% of mines in Region 8 are located within five kilometers of a VMT, renders this finding unsurprising. Most likely the availability of trained VMTs was disproportionately lower in the sampled sites. VCS's continued expansion of the VMT program to increase access to free malaria testing and treatment, therefore, remains critical. The program could also explore additional creative ways to increase VMT visibility. One suggestion is to train engaged year-long miners to become peer educators for their transient colleagues. Additionally, qualitative feedback from VMTs supports the need for refresher trainings as well as mechanisms to provide appreciation and recognition to the VMTs for their service.

Another set of recommendations centers around implementing interventions that are in tune with the cultural context within each region. For example, materials in both regions were distributed in the same manner, via the same channels, focused in areas where VMTs and health facilities offering malaria services are located. However, significantly more miners in Region 8 recognized six out of the seven SBC LMBP campaign materials compared with Region 7. Greater recall of LMBP in Region 8 may be due to better access to media, such as the

radio and television, than in Region 7. Region 8 miners scored significantly higher than Region 7 miners across ideation elements including malaria knowledge, perceived susceptibility to malaria, self-efficacy, and response efficacy. All these ideation factors were associated with improved prevention, care-seeking and treatment behaviors. In line with higher levels of LMBP recall, the evaluation showcased significantly greater improvement in behaviors among miners of Region 8, compared with Region 7. For example, more miners in Region 8 used LLINs, sought care appropriately and promptly for malaria, and took the prescribed medication. A review of maps of the two regions shows that Region 7 not only covers a larger land mass than Region 8 but also has many more mines distributed throughout areas without VMTs or health posts providing malaria services. These findings suggest that distribution and dissemination of SBC materials should be region specific, with different channels for distribution investigated for Region 7. The provision of more trained VMTs in areas where none currently exist would also be beneficial to the program. Successful uptake of behaviors is closely related to access to VMT services. The program therefore requires the creation of a critical mass of VMTs to provide testing services to all miners.

This evaluation also emphasizes the need for improved collaboration. Although MOH and VCS/NMP staff were very receptive to collaboration with Breakthrough ACTION, the fact that only slightly more than half of the miners reported being provided or owning their own LLIN requires improved coordination with regional and national partners. Given the presence of a young and transient population in the gold-mining regions, repeated and/or continuous distributions of LLIN are required. Improving the functionality of an SBC subcommittee would help create a structure to provide governance and coordination of SBC for malaria. Collaboration with other stakeholders, such as academic institutions and GGMC, may be needed to improve the sustainability of the program. Another sustainability issue that needs to be addressed is that current program activities are largely funded by donors. This model is not sustainable in the long run and efforts to transfer ownership to the Government of Guyana need to be integrated into program implementation. For this transfer to be successful, a crucial recommendation relates to strengthening local capacity, including conducting individual pre- and post-tests of all capacity building efforts.

Another key recommendation addresses challenges around access and reporting. The difficulties associated with communication and transportation infrastructure require establishing more informal communication channels such as WhatsApp. Collaboration, for example, with the education sector and postal service, as well as establishing guidelines for the role of the GGMC would help generate a cohesive government response. Another avenue for improvement could include enhanced public private partnerships to address supply chain issues.

Overall, this mixed methods evaluation highlights important gains made in Guyana to address malaria, especially in remote areas where it continues to be endemic. Multilevel programs continue to be needed to help prevent, seek care, test for, and treat malaria, such as additional efforts to improve prompt care-seeking. While many miners sought appropriate care, this behavior lags behind the national treatment guidelines. Malaria prevention, care-seeking, testing, and treatment are not one-time behaviors; therefore, the need to maintain currently successful initiatives is critical.

## Discussion

This report presented results from the evaluation of the USAID-funded Breakthrough ACTION Guyana project. The project works in collaboration with MOH and PAHO/WHO to implement innovative evidence- and theory-based SBC interventions to complement a comprehensive community-based malaria prevention and case management program individual, social, and structural interventions. This mixed methods evaluation of the VMT efforts and accompanying SBC campaign included multiple data sources and found that the project was mostly successful in achieving its objectives vis à vis reach and impacts on ideation factors and key malaria prevention and treatment-associated behaviors.

The results highlighted several strengths of the LMBP program, including a holistic approach addressing both demand and supply aspects of malaria prevention, testing, and treatment. The explicit focus on hard-to-reach locations and audiences was designed to have direct and lasting impact on malaria incidence and prevalence in regions where malaria is endemic. The program team used a participatory HCD approach for program design, which ensured that the program was contextually relevant. Given that SBC materials were well-received by both testers and miners, the HCD participatory approach appeared to meet the goal of implementing activities that resonated with the intended audiences. Additionally, the initial efforts in creating low-fidelity prototype materials allowed the project to identify what works well and what does not, allowing for adaptive management and mid-course corrections as needed. The evaluation showcased the use of entertainment as a useful way to address a public health problem; for example, the creative use of easy-to-remember jingles was mentioned during qualitative interviews and discussions. Finally, the tested theoretical framework and rigorous mixed methods evaluation were useful for understanding multilevel factors influencing behaviors.

Despite the overall positive results, several areas of the program need improvement. While increase in exposure was associated with higher ideation scores, comprising higher knowledge, favorable attitudes, self-efficacy, positive self-image, and availability of social support, the results around the relationship between exposure and malaria prevention, testing, and treatment are somewhat ambiguous. For example, noteworthy among these results is the rate of consistent use of LLIN, which was lowest among miners exposed to both LMBP and VMT (79%) compared with 88% consistent use reported by miners with no exposure. Further, there were no significant differences by program exposure with regard to specific behaviors: use of LLINs, testing for malaria, and prescription of and adherence to treatment. Despite their positive relationships with exposure, other behaviors that are already higher among exposed miners could be further improved; for example, slightly more than half of all miners reported malaria testing behaviors such as prompt care-seeking, self-medication, and testing. The small yet steady improvement in outcomes merits further strengthening of program activities.

The evaluation also highlighted the contextual and environmental challenges of implementing interventions among hard-to-reach populations. For instance, the transient nature of the mining population means that messages about prevention, testing, and treatment need to be repeated constantly to reach different waves

of migrant miners who work on a seasonal basis. Additionally, the monitoring data highlights gaps in the LLIN distribution and retention of VMTs. For example, the distribution of LLINs has not proceeded as smoothly as planned. Only a third of the miners reported they were aware of the VMT program. The absence of essential program inputs, such as the LLINs or the availability of VMTs to provide testing and treatment, has hindered malaria prevention, testing, and treatment in specific regions. This issue is especially true for Region 7, where the mines are dispersed throughout a large geographic area. Given these challenges, establishing systems of cross-sectoral collaboration, such as the GMP4 initiative, may be necessary so that the positive gains made can be sustained by the Government of Guyana and their partners. Finally, an effort to “refresh” the LMBP messages would be helpful to retain saliency and also focus the campaign on the most important factors associated with the behaviors of interest.

Finally, one limitation of this evaluation framework was the lack of qualitative interviews with miners themselves. Interviewing miners who have sought testing and treatment to understand their motivations for doing so and comparing to similar interviews with miners who have not been practicing the recommended testing and treatment behaviors could provide useful information to further enhance and tailor efforts.

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# Appendices

1. Variables used to construct Prevention, Testing, and Treatment Ideation
2. Derivation of Ideation Scores
3. IR1 and IR2 Tables summarizing key results.

<b>Variables used to construct the ideation indices (correct responses)</b>
<b>Knowledge</b>
What causes malaria? (Mosquito bites only)
What signs or symptoms would lead you to think that a person has malaria? (fever)
What are some things that people can do to stop them from getting malaria? (Use of an LLIN, repellent, prophylaxis, spray the environment with insecticide)
<b>Descriptive Norms</b>
<b>Malaria Prevention:</b> Generally, among people in your camp who have a bed/hammock net how many sleep under them every night? (most/all people)
<b>Malaria Testing:</b> Generally, how many of your friends and coworkers seek advice or treatment for their fever the same day or net after the fever starts? (most/all people)
<b>Malaria Treatment:</b> Generally, how many of your friends and co-workers stop taking their malaria medicine before the end of the treatment? (most/all people)
<b>Subjective Norms</b>
<b>Malaria Testing:</b> People in my camp would make fun of me if I got a malaria test before using treatment. (disagree/strongly disagree)
<b>Malaria Treatment:</b> People in my camp would praise me if I had malaria and finished all my medication. (agree/strongly agree)
<b>Perceived Self-Efficacy</b>
<b>Malaria Prevention:</b> If I need an insecticide treated mosquito net, I know where to get one for free. (agree/strongly agree)
<b>Malaria Testing:</b> I am confident that I can get a test for malaria within 24 hours after I start to feel symptoms. (agree/strongly agree)
<b>Malaria Treatment:</b> I am confident that I could complete a full three-day treatment if I were diagnosed with <i>P. falciparum</i> . I am confident that I could complete a full 14-day treatment if I were diagnosed with <i>P. vivax</i> .
<b>Perceived Response Efficacy</b>

**Malaria Prevention:** Sleeping under an insecticide-treated mosquito net every night will prevent me from getting malaria. (agree/strongly agree)

<p><b>Malaria Testing:</b>  The results of the tests given by volunteer testers are always accurate. (agree/strongly agree)  A blood test for malaria is the only way to know if someone really has malaria. (agree/strongly agree)</p>
<p><b>Attitudes</b></p>
<p><b>General Malaria Attitudes:</b>  Malaria parasites may be completely removed from the body. (agree/strongly agree)  A person can know if they have malaria and what kind of malaria they have based on how they feel. (disagree/strongly disagree)</p>
<p><b>Malaria Prevention:</b> The smell of insecticide makes it uncomfortable to sleep under a mosquito net. (disagree/strongly disagree)</p>
<p><b>Malaria Testing:</b>  A person sick with fever should always receive a blood test to confirm that the sickness is malaria before taking drugs. (agree/strongly agree)  A person should go for a malaria test the same day they start to feel symptoms. (agree/strongly agree)  A person should only take malaria medicine if a health provider or tester says that a fever really is malaria. (agree/strongly agree)</p>
<p><b>Malaria Treatment:</b>  A person can only use MOH-approved medicine for malaria. (agree/strongly agree)  A person with malaria should only use the treatment approved for the type of malaria you have. (agree/strongly agree)</p>
<p><b>Perceived Severity</b></p>
<p>If you became infected with malaria, how serious would that be for your health and well-being? (Extremely/somewhat serious)  I do not worry about malaria because it could be easily treated. (disagree/strongly disagree)  Every case of malaria can potentially lead to death. (agree/strongly agree)  When someone I know gets malaria, I usually expect them to completely recover in a few days. (disagree/strongly disagree)</p>
<p><b>Perceived Susceptibility</b></p>
<p>How likely do you think it is that you will become infected with malaria within the next six months? (Extremely/somewhat likely)</p>
<p><b>Emotional Response</b></p>
<p><b>Malaria Treatment</b>  Only a weak person seeks treatment at the first sign of a fever. (disagree/strongly disagree)  It is smart to stop taking your malaria medicine as soon as you begin to feel better and save the extra pills for another time. (disagree/strongly disagree)  Wise people who think they have malaria will treat themselves first and only go to the hospital if you continue to feel sick. (disagree/strongly disagree)</p>
<p><b>Self-Image</b></p>
<p>I think of myself as a healthy man/woman. (agree/strongly agree)  I think of myself as a strong man/woman. (agree/strongly agree)</p>



Once my mind is made up about something, I always stick to my decision. (agree/strongly agree) It is easy for me to change my behavior if I want to. (agree/strongly agree)
<b>Social Support</b>
<b>Malaria Prevention</b> Would [insert name of three important people in your life] approve or disapprove if you sleep under an insecticide-treated net every night. (approve)
<b>Malaria Testing</b> Would [insert name of three important people in your life] approve or disapprove if you go to a health center as soon as you have a fever. (approve) Would [insert name of three important people in your life] approve or disapprove if you get tested for malaria before you use any malaria medication. (approve)
<b>Malaria Treatment:</b> Would [insert name of three important people in your life] approve or disapprove if you finished taking all of your malaria medication even if you are feeling better. (approve)
<b>Interpersonal Communication</b>
<b>Malaria Prevention:</b> In the past month, have you talked with anyone about the best ways to prevent malaria? (Yes)
<b>Malaria Treatment</b> In the past month, have you talked with anyone about the importance of getting care for fever quickly? (Yes) In the past month, have you talked with anyone about malaria testing? (Yes)

## Ideation Scores

The ideation scores are used as a measure to predict behavior. A positive/correct ideation response from each miner in the survey, for individual ideation variables shown in the above indices, was given a score of 1, while an incorrect response was coded as zero. Next an average of the total score was calculated for each behavior. These averages were then correlated with exposure to the LMBP campaign and knowledge of a VMT, resulting in the mean scores shown in figures, 13, 14 and 15 demonstrating prevention, testing and treatment ideations by exposure. The higher the ideation score the more likely the miner is to exhibit the desired behavior. For example, Figure 13, shows significantly higher ideation scores for the preventative behavior of sleeping under a bed net after exposure to the LMBP campaign or/and VMT program.

### IR1: Targeted, innovative, and effective solutions to high-priority social and behavioral challenges designed and implemented.

Key Findings	Discussion
Sub-IR 1.1. Increased understanding of problem.	

<ul style="list-style-type: none"> <li>• Understanding of the personal and contextual factors influencing miners' behaviors was increased.</li> <li>• Prototypes co-created with end users informed the design of interventions.</li> </ul>	<ul style="list-style-type: none"> <li>• The use of a theoretical framework proved useful in understanding multi-level factors influencing behaviors.</li> <li>• HCD and a participatory approach made the understanding of behaviors more contextually relevant.</li> <li>• Prototyping allowed the project to identify what works well and what does not, allowing for adaptive management and mid-course corrections as needed.</li> </ul>
<b>Sub-IR 1.2. Reduced individual and social barriers to adoption of priority behaviors.</b>	
<ul style="list-style-type: none"> <li>• Miners' exposure to interventions was associated with improved prevention, testing and treatment ideation.</li> <li>• Exposure to LMBP was seen among secondary audiences.</li> <li>• Regional differences were observed in miners' exposure to interventions and level of ideation.</li> <li>• Exposure to the VMT program was lower than the LMBP.</li> <li>• While many improvements were observed, some ideation factors were still low in 2022.</li> </ul>	<ul style="list-style-type: none"> <li>• SBC materials were well-received by both testers and miners due to HCD and participatory approach.</li> <li>• Explore relevant interventions among secondary audiences to complement LMBP exposure.</li> <li>• Contextual/environmental factors influenced the project implementation and results in Regions 7 and 8.</li> <li>• Additional research may highlight ways to improve the visibility of the VMT program.</li> <li>• Need for continued focus on some ideation factors such as knowledge, attitudes, and interpersonal communication (e.g., the use of miners as peer educators).</li> </ul>
<b>Sub-IR 1.3. Increased use of malaria diagnosis and treatment and prevention</b>	
<ul style="list-style-type: none"> <li>• Monitoring data suggests somewhat high fidelity of VMT implementation.</li> <li>• Increased malaria care-seeking and testing behaviors observed from 2019 to 2022, particularly in Region 8, in spite of the COVID-19 context.</li> <li>• Miners' exposure to interventions was associated with increased prompt seeking and non-use of self-medication.</li> <li>• LLIN use among miners was driven by access to nets, which was affected by challenges in the LLIN distribution.</li> </ul>	<ul style="list-style-type: none"> <li>• The project's supportive supervision approach proved beneficial.</li> <li>• The use of complementary structural and behavioral interventions presumably contributed to the success of the project. Additional qualitative research may be needed among miners in Region 7 (e.g., doer, non-doer, journey mapping).</li> <li>• Opportunities to address challenges in LLIN distribution should be explored.</li> </ul>

Key Findings	Discussion
<ul style="list-style-type: none"> <li>• Opportunities to improve the testers' commitment were identified.</li> </ul>	<ul style="list-style-type: none"> <li>• Continued training and improved recognition of testers may increase tester motivation.</li> </ul>

**IR2: Increased capacity of Guyanese institutions to coordinate, design, implement, and evaluate high-quality SBC**

Key Findings	Discussion
<b>Sub- IR 2.1 Increased SBC Coordination and collaboration at National and Subnational Levels</b>	
<ul style="list-style-type: none"> <li>• Breakthrough ACTION changed the malaria SBC landscape in Guyana.</li> <li>• VCS/NMP better appreciate the role of SBC in malaria.</li> <li>• VCS/NMP started to absorb some of the costs of SBC materials.</li> <li>• SBC subcommittee was nonfunctional.</li> <li>• Efforts to ensure sustainability of Breakthrough ACTION/MOH activities and GMP4 are needed.</li> </ul>	<ul style="list-style-type: none"> <li>• Project inception and the Define phase were key, setting the stage for the project.</li> <li>• VCS/NMP staff were very receptive to collaboration with Breakthrough ACTION.</li> <li>• Continued funding at the government level is key to sustainability.</li> <li>• SBC subcommittee nonfunctional, therefore, need to determine at a policy level, who or what (structure) will provide governance and coordination for SBC for malaria.</li> <li>• Collaboration with other stakeholders and advocacy for funding may be needed to improve the sustainability of the program (e.g., academic institutions and GMMC).</li> <li>• Continued workshops and collaboration with GMP4 stakeholders must continue.</li> </ul>
<b>Sub IR 2.2. Strengthening SBC capacity of priority institutions</b>	
<ul style="list-style-type: none"> <li>• Improved individual and institutional capacity related to SBC, including testers, supervisors, regional coordinators, M&amp;E staff, and central VCS/NMP staff.</li> <li>• High turnover was a limitation for the SBC capacity assessments at the institutional level.</li> </ul>	<ul style="list-style-type: none"> <li>• Funding to ensure implementation of capacity strengthening activities such as sponsorship at conferences is needed.</li> <li>• Individual pre- and posttests might be useful in addition to institutional capacity assessments.</li> </ul>