

Breakthrough ACTION Brief

Effect of Social and Behavior Change Activities on Malaria Behaviors in Guyana

Introduction

In 2019, the USAID-funded Breakthrough ACTION project, led by Johns Hopkins Center for Communication Programs and other partners, collaborated with Guyana's Ministry of Health (MOH) National Malaria Program (NMP) to develop a social and behavior change (SBC) program to improve priority malaria-related health behaviors among gold miners within Regions 7 and 8 of Guyana (Figure 1).

The SBC program strategy was based on the ideation model of behavior change,¹ which shows how different ideas, i.e., "ideational factors," about a behavior impact whether individuals practice the behavior. These ideational factors include knowledge, attitudes, and perceptions of social norms about the behavior, among others. The more positive ideational factors about the behavior individuals have, the more likely they are to practice the behavior. Breakthrough ACTION Guyana developed its specific SBC program activities using a human-centered design (HCD) approach. The resulting Lil' Mosquito Big Problem multi-component campaign launched in February 2020, which not only promotes positive malaria behaviors but also supports the MOH case management system.

From 2019 to 2022, Breakthrough ACTION Guyana conducted a rigorous mixed-methods, theory-based evaluation of the project to assess the reach and behavioral impact of the SBC activities. This

research brief highlights the primary findings from the triangulation of these research activities and summarizes key learnings about the work to improve malaria-related behaviors among the highly mobile gold mining populations in Guyana. Where sample sizes allow for making comparisons or correlations using multivariate logistic regression, statistically significant (at the $p < 0.05$ level) results appear in bold below. The comprehensive [Breakthrough ACTION Guyana Evaluation Report](#) contains the full results and details of this analysis.

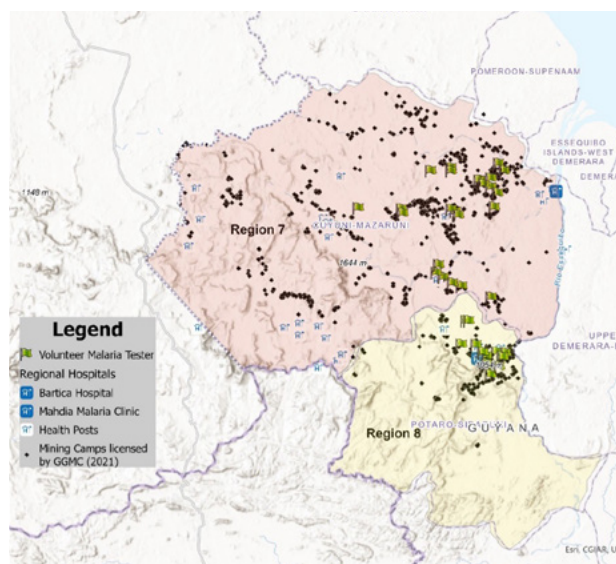


Figure 1. Map showing the gold mines and Volunteer Malaria Testers (VMT) of Regions 7 and 8 in Guyana

Data Sources

This brief describes the results of a mixed method evaluation of the SBC program, drawing on data from the following sources:

Continuous monitoring of priority health behaviors among miners from 2020 to 2022. Volunteer malaria testers (VMTs), who provide malaria testing and treatment services to miners as part of the MOH case management system for miners, conduct exit interviews with each miner after providing testing services.

Qualitative interviews with VMTs, camp managers, and supervisors, as well as national level NMP and MOH staff.

Cross-sectional pre and post quantitative surveys, conducted in 2019 and 2022 respectively, measured key results from the two primary interventions: (1) support to the VMTs and (2) implementation of the Lil Mosquito Big Problem campaign. Analysts compared them with changes in ideational variables expected to influence behavior according to the conceptual framework of the program.

SBC capacity self-assessments conducted in 2018 and 2022 with MOH staff from both the NMP and the Public Relations/Health Promotion Unit (PR/HPU) through workshops facilitated by Breakthrough ACTION.

DATA SOURCE	REGION 7	REGION 8	REGION 4/ NATIONAL	TOTAL
Continuous monitoring data from miners seeking malaria care at VMTs (2020–2022)	4,085	1,006	n/a	5,091
Qualitative interviews (2022)	7	7	5	19
Cross-sectional pre and post quantitative surveys with gold miners				
2019	819	476	n/a	1,295
2022	818	433	n/a	1,252
SBC capacity self-assessments				
2018	n/a	n/a	13	13
2022	n/a	n/a	15	15

Guyana Gold Miners in Regions 7 and 8

Most gold miners in Regions 7 and 8 of Guyana are male. Compared with the cross-section of miners interviewed in 2019, miners interviewed in the 2022 survey were more likely to be:

- Unmarried (**58%** in 2022 and **49%** in 2019).
- Under 35 years of age (**55%** in 2022 and **51%** in 2019).
- Working seasonally (**76%** in 2022 and **66%** in 2019) and with less than five years' experience (**58%** in 2022 and **39%** in 2019).

Exposure to Malaria Interventions

Overall exposure to malaria interventions varied by the type of intervention, but no significant difference appeared per region:

- **77%** of miners knew about the Lil Mosquito Big Problem campaign.
- **32%** of miners knew about the VMT program.
- **26%** of miners knew about both the Lil Mosquito Big Problem and VMTs.

- **18%** of miners were not aware of either Lil Mosquito Big Problem or VMTs.
- One-quarter (**25%**) of miners in Region 7 and **52%** in Region 8 reported access to a VMT in a five kilometer radius.

The top three most recognized Lil Mosquito Big Problem materials were the posters, the jingle, and its character, Mike the Miner. Recall two of these items was significantly higher in Region 8 than in Region 7.

	OVERALL	REGION 7	REGION 8
Posters	48%	50%	46%
Jingle	35%	27%	43% ***
Mike the Miner	38%	33%	43%**
*p ≤ 0.05 ** p ≤ 0.01 ***p ≤ 0.001			

Reactions to the Lil’ Mosquito Big Problem Campaign

Qualitative interview participants appreciated the multi-channel, mixed material approach of the campaign, which expanded reach in remote locations.

“ I think the radio initiative was good because radio is mostly used in the interior. There’s a lot of radio usage; every time we go in the interior, at some point in time, wherever we are we hear it—we hear a Lil 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.”

— Malaria Volunteer Tester

“ Yeah, we does see it on Facebook too, Lil Mosquito Big Problem.”

— Malaria Volunteer Tester

“ Everybody just liked that flash drive ... taxi drivers, bus drivers, and everybody coming. ‘We want one of the same thing, we want, we want.’”

— Supervisor

Participants also found the Lil Mosquito Big Problem campaign materials both relevant and realistic.

“ I like that they have done is actually use real-life scenarios in the radio [...]. The video and posters and ... radio [all show ...] the effects of actually contracting malaria [... and] 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.”

— Supervisor

Access to and Use of Long-Lasting Insecticidal Nets

- Ownership of a long-lasting insecticidal net (LLIN) among miners increased from **41%** in 2019 to **48%** in 2022 ($p \leq 0.05$).
- LLIN use the night prior to the survey among miners increased from **83%** in 2019 to **85%** in 2022 (*not statistically significant*).
- Consistent LLIN use (every night during the week prior to the surveys) increased from **81%** in 2019 to **83%** in 2022 (*not statistically significant*).

Despite a **clear and positive relationship between LLIN ownership and exposure to the interventions (Figure 2)**, consistent use of LLINs (miners that used LLINs nightly during the previous week of the survey) showed a negative dose response, with fewer miners exposed to the interventions consistently using their LLIN.

Continuous monitoring found an immediate increase in ownership of LLINs once the MOH's mass distribution of nets commenced in 2021, achieving **82%** ownership in Region 8 and **46%** in Region 7, which later increased further as the distribution of LLINs continued.

Geography may provide useful context for interpreting LLIN access: mines in Region 8 are clustered in the northeast corner. Region 7 is twice the size of Region 8, and mines are dispersed throughout the region. **However, with assistance from private sector partners, Region 7 saw a threefold increase in ownership, from 15% to 46%.**

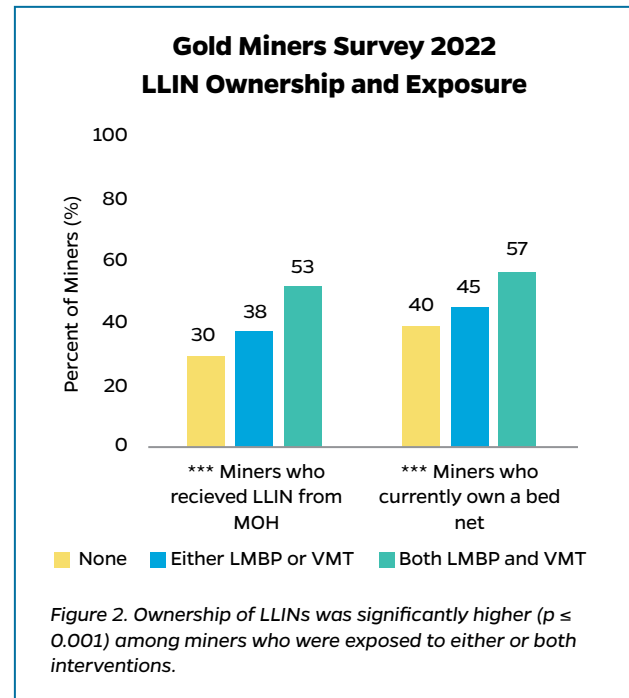


Figure 2. Ownership of LLINs was significantly higher ($p \leq 0.001$) among miners who were exposed to either or both interventions.

Breakthrough ACTION Guyana supported the MOH in the LLIN mass distribution by assisting with the development of promotional materials for LLIN acquisition, use, and care. The MOH acknowledged the project's support:

“ I know that [Breakthrough ACTION Guyana] assisted in designing the brochure and in creating messages like radio ads and television ads [...]. They did play a great role in the promotion and [education] for the campaign of the mass distribution. ”

— MOH staff

Ideational Factors Related to LLIN Use

Comparing survey results from 2019 with 2022 showed the following five ideational factors significantly associated with LLIN use:

- **Knowledge of malaria prevention measures:** Miners reporting knowledge of ways to prevent malaria increased from **35%** to **39%** ($p \leq 0.05$).
- **Discussion about malaria with others (interpersonal communication):** Miners who reported discussing malaria prevention with others increased from **18%** to **22%** ($p \leq 0.05$).
- **Knowledge about LLIN acquisition:** Miners who stated they know where to get a free LLIN if they need one increased from **65%** to **71%** ($p \leq 0.001$).

- **Community norms about LLIN ownership:** Miners who perceived other miners own an LLIN increased from **48%** to **61%** ($p \leq 0.001$).
- **Response efficacy of LLINs:** Miners who believed that LLINs are effective for preventing malaria increased from **59%** to **72%** ($p \leq 0.001$).

Further, increased exposure to program activities was associated with **significantly higher mean ideation scores**. After controlling for miners' socio-demographics and their mining context, miners with higher ideation scores were **1.4 times more likely to use LLINs** ($p \leq 0.001$).

Recommendations for Future Activities

Breakthrough ACTION found a significant association between exposure to the campaign/access to VMTs and LLIN ownership. Although ideation scores were significantly associated with LLIN use, since most miners with access to an LLIN report using it, no significant difference appeared over time in reported LLIN use. MOH distribution of LLINs contributed to ownership. However, challenges persist with distributing LLINs through difficult terrain to more remote corners of the regions. Assistance from private partners helped overcome certain geographical challenges related to LLIN distribution within Region 7. The MOH, with support from Breakthrough ACTION Guyana, developed a draft strategy, the Guyana Malaria Public Private Partnership Platform, which provides a strategic focus to support public/private sector actions aimed at the prevention and elimination of malaria. Partners have also signed a memorandum of cooperation (MOC) which outlines both public and private sector partner roles and responsibilities surrounding malaria elimination.

Prompt Care-Seeking, Malaria Testing, and Self-Medication Behaviors

Rates of prompt care-seeking—defined as seeking care the same or the next day of fever—and testing behaviors were significantly higher according to the 2022 the post-intervention survey (Figure 3).

Prompt Care-Seeking for Fever

- Miners with fever who promptly sought care increased from **37%** to **48%** ($p \leq 0.001$).

Malaria Testing

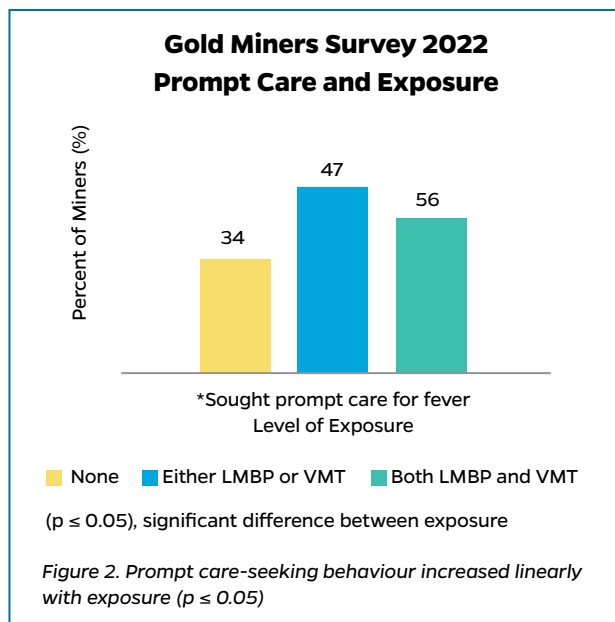
- Miners with fever who sought a test for malaria increased from **47%** to **58%** ($p \leq 0.01$)

Self-Medication

- Miners with fever who reported not self-medicating increased from **45%** to **49%** (*not statistically significant*).

Continuous monitoring results show prompt care-seeking was at its height when more VMTs operated and when regional malaria teams were actively training VMTs and providing supportive supervision to them. At its peak, prompt care-seeking was **89%** in Region 7 and **74%** in Region 8. Reports of **not self-medicating** before going for a malaria test were at **100%** of the miners.

The significantly higher levels of prompt care-seeking and not self-medicating in **continuous monitoring compared with the survey data** likely results from the difference in sampling, with continuous monitoring covering miners who already seek care for malaria by visiting a VMT. The surveys randomly sampled a selected cross-section of all miners in Regions 7 and 8.



Qualitative Interviews with Supervisors Validated the Findings About These Behaviors



The testing sign [was] 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.”

— Supervisor



... 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

Ideational Factors Related to Prompt Care-seeking, Self-Medication, and Testing

Comparing survey results from 2019 with 2022 showed two ideational factors that were significantly different.

Knowledge of causes and symptoms of malaria increased from **35%** to **39%** ($p \leq 0.05$).

- Region 8: Increased from **28%** to **41%** ($p \leq 0.001$).
- Region 7: Remained at **38%**.

Perceived response efficacy of VMTs, i.e., the miners' confidence in VMTs' ability to test and treat for malaria, increased from **51%** to **58%** ($p \leq 0.001$).

- Region 8 increased from **43%** to **63%** ($p \leq 0.001$).
- Region 7 declined from **55%** to **53%** (*not statistically significant*).

Additionally, the project found an association with **higher levels of exposure to the interventions and an increasingly positive mean ideation score** ($p \leq 0.001$). Regression analysis, after controlling for miners' socio-demographic and mining region, found the following:

- Miners exposed to both interventions (Lil Mosquito Big Problem and the VMT program) were **2.2 times more likely** to report prompt care-seeking behavior ($p \leq 0.05$).
- Miners exposed to either Lil Mosquito Big Problem or the VMT programs were **1.95 times less likely** to report self-medication before going for a malaria test ($p \leq 0.05$).
- Miners with positive ideation scores were **1.17 times more likely** to report prompt care-seeking ($p \leq 0.01$) as well as 1.17 times more likely to report being tested for malaria ($p \leq 0.05$).

Recommendations for Future Activities

Just under one-half of the miners surveyed in 2022 reported prompt care-seeking behavior, posing an ongoing challenge for the program. However, continuous monitoring information suggests that, of those miners who are already seeking care from a VMT, prompt care-seeking is much higher. This suggests SBC interventions aiming both to influence care-seeking ideational factors and to ensure VMTs are accessible to miners would contribute to prompt care-seeking. None of the miners included in the continuous monitoring data reported self-medication. The survey data indicated no significant decline over time in self-medication, although miners exposed to the interventions report significantly lower levels of self-medication. As described above, any disparity between the survey and continuous monitoring data may be related to sampling differences in the two data sources. These results suggest future SBC interventions could continue to emphasize not self-medicating and testing for malaria first.

Treatment Behaviors

- Miners being prescribed treatment for malaria decreased slightly from **93%** in 2019 to **87%** in 2022 (*not statistically significant*).
- Adherence to the full course of treatment for malaria by miners increased from **90%** in 2019 to **94%** in 2022 (*not statistically significant*).

No statistically significant differences appeared between the pre- and post-intervention surveys regarding the total number of miners prescribed treatment and those reporting completing that treatment. At the same time, data reviewers observed no discernable relationship between exposure to the interventions or treatment prescription and completion behaviors.

According to the continuous monitoring data, **completion of treatment** varied over time and regions. In Region 8, adherence to treatment was the same (70%) when continuous monitoring began in 2020 and in 2022. By contrast, in Region 7, **35%** of miners stated that they completed their malaria treatment during their last episode in 2020 and this increased to **55%** by 2022.

Ideational Factors Related to Treatment Behaviors

Treatment Self-efficacy: In 2019, **77%** of miners were confident they could complete the full course of malaria treatment; this increased to **79%** in 2022 (*not statistically significant*).

- Region 8 increased from **76%** to **85%** ($p \leq 0.001$).
- Region 7 declined from **78%** to **75%** (*not statistically significant*).

A greater ideation score in treatment behaviors correlated with exposure to the SBC program, showing a clear linear and statistical relationship between ideation and exposure to the program ($p \leq 0.001$).

Recommendations for Future Activities

The high levels of prescription and treatment behaviors from the survey data could indicate a ceiling effect such that significant improvements in the future are not probable. Also, individual ideation variables, with the exception of perceived self-efficacy, did not show any significant change from pre- to post-intervention. On the other hand, continuous monitoring of treatment data shows variation, which means treatment behaviors can continue to improve, especially keeping in mind changing demographics and high mobility in the miner populations.

Capacity Building and Future Sustainability

SBC Capacity Assessment

Breakthrough ACTION offered workshops, learning by doing, and training opportunities to the MOH Regional and National Malaria Programs to foster sustainability of the SBC program. In 2018 and 2022, the project conducted baseline and follow-up capacity self-assessment workshops, in which facilitators asked MOH personnel from the NMP and PR/HPU to assess their skills to implement the [Breakthrough ACTION SBC Flow Chart](#), a 3-stage HCD process (Define, Design & Test, and Apply) for the development of SBC activities. The 2018 self-assessment was conducted after Breakthrough ACTION, NMP, and PR/HPU jointly used this HCD process and from which the Lil Mosquito Big Problem campaign emerged. During qualitative interviews, respondents spoke positively of their experience using the HCD process.



We had a Design Phase [where we did] 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 [tested to see what] people like.”

— Supervisor

The assessment found that NMP personnel had different levels of confidence in their ability to undertake the entire HCD process. Specifically, they mentioned being comfortable with the Define Phase and reported improvement in their ability to implement the Design & Test Phase, but they felt less confident about implementing the Apply Phase. While this assessment shows gaps in HCD-related capacity, frequent turnover of staff may be contributing to the results. For example, only one staff member present during the first HCD activity in 2018 was still employed in PR/HPU by the time of the second assessment. The capacity assessment has also helped those involved identify and prioritize future training activities.

Conclusions

The SBC program comprising the Lil Mosquito Big Problem campaign and support for the MOH's VMT program shows that exposure to the program contributed to more positive ideational scores and improvements in two key malaria prevention behaviors: prompt care-seeking and testing. A notable finding is that a multichannel and layered approach was particularly well suited for remote locations. While this mixed method evaluation allows us to measure the associations between the interventions and malaria-related health behavior, it also helps identify gaps associated with scarcity and distribution of resources. Finally, the evaluation also surfaces clear recommendations for ideational factors and behaviors that need emphasis in future programming.

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