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Evolving Vector Control to Fight Malaria

The PMI Evolve Project Mozambique 2023 End of Spray Report

SPRAY CAMPAIGN:

November 20–December 23, 2023



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Acronyms

DPS	<i>Direcção Provincial de Saúde</i> (Provincial Directorate of Health)
FMSBC	Fighting Malaria with Social and Behavior Change
G2G	Government-to-Government
IEC	Information, Education, and Communication
IRS	Indoor Residual Spraying
ITN	Insecticide-Treated Net
MOH	Ministry of Health
NED	<i>Núcleo de Estatística Distrital</i> (Center for District Statistics)
NMCP	National Malaria Control Program
PIRCOM	<i>Plataforma Inter-Religiosa de Comunicação para a Saúde</i> (Interreligious Communication Platform for Health)
PMI	U.S. President's Malaria Initiative
PPE	Personal Protective Equipment
PSECA	Pre-Season Environmental Compliance Assessment
SBCC	Social and Behavior Change Communication
SDSMAS	<i>Serviços Distritais de Saúde Mulher e Acção Social</i> (District Services for Health, Women and Social Welfare)
SEA	Supplemental Environmental Assessment
SIIM	<i>Sistema Integrado de Informação de Malária</i> (Integrated Information System for Malaria)
SPS	<i>Serviço Provincial de Saúde</i> (Provincial Health Services)
TOT	Training of Trainers
USAID	U.S. Agency for International Development
WHO	World Health Organization

Executive Summary

The U.S. President’s Malaria Initiative (PMI) Evolving Vector Control to Fight Malaria Project (PMI Evolve), funded by the U.S. Agency for International Development (USAID), provides technical assistance on indoor residual spraying (IRS) and entomology activities in Mozambique. The objective of PMI Evolve is to support the planning and implementation of IRS programs and other proven life-saving malaria vector control interventions. As part of USAID’s goals of localization and capacity strengthening of host countries, PMI Mozambique signed a Government-to-Government (G2G) agreement with the province of Zambezia to cover operational costs for IRS and entomology in 2023. PMI Evolve provided technical assistance to the National Malaria Control Program (NMCP) in campaign planning, implementation, and demobilization for the 2023 IRS campaign in five districts in Zambezia Province (Maganja da Costa, Mopeia, Milange, Molumbo, and Morrumbala). The NMCP targeted 350,172 structures using three insecticides—organophosphates in Maganja da Costa and Mopeia, carbamates in Milange and Molumbo, and pyrethroids and neonicotinoids in Morrumbala. The spray campaign took place from November 20 to December 23, 2023, and lasted 30 operational days in each district (see Table ES-1).

Table ES-1: 2023 IRS Campaign Summary

Number of districts covered by PMI-supported IRS	Five districts of Zambezia Province: Maganja da Costa, Milange, Molumbo, Morrumbala, Mopeia
Insecticide	Pirimiphos-methyl CS (Actellic 300CS), bendiocarb 80WP-SB (Ficam), deltamethrin/clothianidin (Fludora Fusion 56.25% WP)
Number of structures sprayed by PMI-supported IRS	373,452
Number of structures found by PMI-supported IRS	377,986
Spray coverage	98.8%
Population protected by PMI-supported IRS	1,955,852
Dates of PMI-supported IRS campaign	November 20–December 23, 2023
Length of campaign	30 days
Number of people trained with U.S. government funds to deliver IRS*	1,471

*Based on the PMI indicator definition, this indicator includes only spray operators, team leaders, and supervisors.

1. Country Background and Activity Summary

Since 2006, PMI has protected millions of people in Africa from malaria through IRS, where spray operators kill the mosquitoes that transmit the malaria parasite by spraying insecticide on the walls, ceilings, and other indoor places, such as eaves, where those mosquitoes rest. On December 19, 2022, Abt Global was awarded the contract for PMI Evolve. The purpose of this contract is to support PMI, as well as USAID missions and bureaus, in the planning, implementing, and monitoring of malaria vector control programs, including entomological monitoring, IRS, insecticide-treated mosquito nets (ITNs), and larval source management.

In 2023, Mozambique implemented IRS in select districts in five provinces: Maputo, Gaza, and Inhambane (supported by a public-private partnership program called Tchou Tchou Malaria funded by the Global Fund), Nampula (funded by the government of Mozambique), and Zambezia (funded by USAID/PMI) (Figure 1).

PMI has supported the NMCP to implement IRS in Zambezia Province since 2007. From 2007-2011, RTI International implemented PMI-supported IRS in the province. The Africa Indoor Residual Spraying (AIRS) Project supported annual IRS campaign from 2012–2017, followed by PMI VectorLink from 2018–2022. In 2023, PMI provided technical assistance through the PMI Evolve project to the Serviço Provincial de Saúde (SPS, Provincial Health Services) and Direção Provincial de Saúde (DPS, Provincial Directorate of Health) in planning and implementing IRS in five districts of Zambezia Province (Morrumbala, Mopeia, Milange, Molumbo, and Maganja da Costa). The operational costs of the 2023 IRS in these districts are being funded by USAID/PMI through a Government-to-Government (G2G) agreement signed with the Province of Zambezia in April 2023. PMI Evolve also provided technical and logistical assistance in IRS in Nampula Province. In both Zambezia and Nampula provinces, PMI Evolve supported entomological monitoring to assess the quality of spray, residual efficacy of insecticides used during the spray campaign, and insecticide resistance to support the selection of insecticides for vector control in the future.

PMI Evolve collaborates with the Mozambique Ministry of Health (MOH) through the NMCP, Zambezia's DPS, relevant Serviços Distritais de Saúde Mulher e Acção Social (SDSMAS, District Services for Health, Women and Social Welfare), and SPS. Specific objectives of PMI Evolve's support to IRS in 2023 included:

- Achieve at least 85% spray coverage of targeted structures in the five districts of Zambezia Province.
- Provide IRS technical assistance in Nampula Province.
- Carry out a logistics assessment in all districts. Support shipment and customs clearance of internationally procured gloves and nose masks, and ensure timely delivery and secure storage of spray equipment, spare parts, and personal protective equipment (PPE).
- Support the NMCP on the insecticide quantifications
- Strengthen planning and execution of IRS through weekly meetings with SPS and DPS.
- Provide TA for training the IRS seasonal workers
- Support safe and correct insecticide application, thus minimizing human and environmental exposure to IRS insecticides.

2. Implementation of IRS Activities

2.1. IRS Planning and Partner Collaboration

Planning for the 2023 spray campaign began with PMI Evolve Mozambique conducting initial planning and insecticide quantifications and submitting a budget and work plan for five districts to PMI on March 1, 2023. In the same month, PMI provided guidance for revising the budget. The guidance affected the proposed scope of work and available funding and suggested executing a G2G agreement. PMI Evolve Mozambique used this guidance to generate the 2023 budget that included technical assistance for IRS implementation by the MOH in Zambezia Province under a G2G agreement.

PMI Evolve Mozambique, together with the DPS, SPS, and SDSMAS, conducted microplanning meetings at the district and provincial levels in July and August 2023 respectively. The district-level meeting, which took place on July 26–27, focused on the following issues:

- Zambezia Province leadership of 2023 IRS campaign through G2G agreement.
- Targeted number of districts and structures in each district. Rather than use the number of eligible structures found by spray teams during the 2022 IRS campaign as the target, the number of structures found by spray operators in 2019 was used for 2023 IRS campaign planning for the five districts. This decision was made to stay within the available budget. The total number of structures targeted across the five districts was 350,172 (45,934 in Maganja da Costa, 106,537 in Milange, 56,762 in Molumbo, 104,179 in Morrumbala, and 36,760 in Mopeia).
- Length of spray campaign.
- Human resources requirements (recruitment, trainings, and involvement of women as spray personnel).
- Spray team performance and target setting.
- Quantification of logistical and transportation needs.
- Preparation of spray calendars, considering diverse geographical challenges.
- Monitoring and supervision plans.
- Seasonal worker contracts with stricter disciplinary actions to curb insecticide theft and data falsification.
- Official launch of the 2023 spray campaign.

At the provincial-level microplanning meeting, which was held August 5–6, 2023, PMI Evolve Mozambique and the DPS, SPS, and SDSMAS made the following key decisions:

- The 2023 spray campaign would start on October 17, 2023, and last for 30 operational days.
- The 2023 provincial spray campaign launch would be held in Maganja da Costa District.
- The clauses in the seasonal worker contract, which include specific penalties for insecticide fraud and data falsification, would be retained.

During the budgeting process for the Year 1 PMI Evolve Mozambique work plan, the pre-spray environmental compliance assessment (PSECA) activity was removed from the PMI Evolve budget, and not included in the G2G budget because of the timing, since the G2G agreement had already been signed by the mission. To help ensure compliance, PMI Evolve, in coordination with the DPS, SPS, and SDSMAS, conducted a virtual training for the district teams on how to conduct PSECAs. Afterwards, district malaria focal persons visited the operations sites and took pictures showing the status of each site. PMI Evolve facilitated a meeting

to review the results of these visits, and then prepared a summary report including a work list for each site and shared with SPS, DPS, and SDSMAS for their action. The report served as a guide for the vendors engaged by SPS to conduct rehabilitation across the operations sites.

PMI Evolve also coordinated weekly meetings leading up to the start of the campaign to support the procurement teams on item specifications to procure for rehabilitations, IRS implementation, and follow-up of IRS preparations.

PMI Evolve Mozambique is part of the country's IRS and entomology technical working groups, both of which the NMCP formed and chairs. The major objectives of the IRS technical working group are to finalize the IRS manual and continue to harmonize trainings and the implementation of IRS in Mozambique. PMI Evolve Mozambique participates in the working group meetings, and supports the group's work toward achieving its objectives. Where necessary, the project has adjusted to meet those objectives. For 2023, the Zambezia DPS was responsible for ensuring adherence to all NMCP technical working group recommendations, since all local procurement was under the G2G mechanism.

Table 1 presents the group's major decisions on IRS harmonization and actions taken by the Zambezia SPS and PMI Evolve Mozambique.

In addition to the NMCP, PMI Evolve collaborated with two other PMI-funded projects on IRS mobilization activities: Fighting Malaria with Social and Behavior Change (FMSBC) and Plataforma Inter-Religiosa de Comunicação para a Saúde (PIRCOM, Interreligious Communication Platform for Health).

Table 1: Mozambique IRS Technical Working Group: IRS Implementation Recommendations and SPS/PMI Evolve Mozambique Actions

Decision Area	Technical Working Group Recommendation	Action Taken by SPS/PMI Evolve Mozambique
Spray operator bags	Cylindrical canvas bags with no internal divisions are recommended. Regular rectangular backpacks with multiple internal compartments are not recommended because spray operators could put personal items in the compartments, which is not allowed.	The SPS did not follow this recommendation in 2023. The procurement manager confirmed that the selected vendor was not able to provide the recommended bags in time. SPS instructed them to buy normal backpacks.
Spray operator and team leader data collection forms	<p>Inhambane Province has many structures made of metal sheets. The NMCP wanted to know how many such structures exist and the number of people who were not protected by IRS since such structures are ineligible for spray. The NMCP was also interested in similar information for Zambezia. The NMCP therefore proposed two columns be added to the Daily Spray Operator Form (where information for eligible structures is recorded) to capture:</p> <ul style="list-style-type: none"> (a) the number of structures that were ineligible for IRS (e.g., structures made of metal sheets) (b) the type of materials used to construct structures that were sprayed 	<p>PMI Evolve Mozambique reviewed the proposed modifications and offered the following suggestions:</p> <ul style="list-style-type: none"> (a) The primary use of the Daily Spray Operator Form is to record data on eligible structures only. Inserting the additional columns would confuse the spray operators, leading to complications in data interpretation. (b) To collect this information appropriately, the data could be recorded either on a separate form or the reverse side of the Daily Spray Operator Form (currently blank). <p>The NMCP reviewed the suggestions and agreed to record information on the ineligible structures on the reverse of the Daily Spray Operator Form. The form was modified for use by all IRS implementing partners. Zambezia SPS in coordination with PMI Evolve used the modified forms for the 2023 campaign.</p>
Reporting spray data into the Sistema Integrado de Informação de Malária (SIIM, Integrated Information System for Malaria)	To allow all spray data from all IRS campaigns conducted in Mozambique to exist in a single database, the NMCP requested that Núcleo de Estatística Distrital (NED, Center for District Statistics) staff be responsible for entering the 2023 IRS data into the SIIM.	The NED staff were part of training of trainers (TOT) to allow them to understand IRS activities. The data for the five districts in Zambezia was transported from operations sites and delivered to the NED every other day and then entered into the system.

2.2. Training

To support 2023 IRS activities in Zambezia, the Zambezia SPS and DPS trained a cadre of seasonal workers, with PMI Evolve technical support. The training curriculum used nationwide is the PMI Mozambique IRS training curriculum. The PMI Evolve Mozambique Vector Control Manager played a key role in updating all training materials and drafting the agendas, and served as key trainer during a five-day TOT on October 23–27, 2023. Table 2 shows the number of people trained to support the 2023 IRS campaign in the five districts in Zambezia, disaggregated by gender.

Table 2: Number of People Trained by Zambezia DPS to Support 2023 IRS Campaign in Five Districts, by Gender and Job Cadre

Vector Control Cadre: IRS	# of People Trained		
	Male	Female	Total
Mobilization, IEC, and social and behavior change communication (SBCC)	1,255	275	1,530
Spray operations (spray operators)	911	299	1,210
Data and monitoring, evaluation, and learning (NED)	3	2	5
Operations site/logistics and supply/warehousing (storekeepers, sprayer technicians, and washers)	44	165	209
Other (site supervisors, team leaders)	186	75	261
TOTAL	2,399	816	3,215

2.3. Spray Operations and Supervision

2.3.1. Seasonal Worker Recruitment

Table 3 summarizes the personnel hired by the Zambezia DPS in the five districts to support the 2023 IRS campaign.

Table 3: Number of People the Zambezia DPS Hired to Support the 2023 IRS Campaign in Five Districts, by Gender and Job Cadre

Category	# Male	# Female	Total (% Female)
Spray operators	911	299	1,210 (24.7%)
Team leaders	167	75	242 (31.0%)
Site supervisors	19	0	19 (0%)
Information, Education, and Communication (IEC) workers	18	1	19 (5.3%)
Storekeepers	22	6	28 (21.4%)
Washers	3	159	162 (98.1%)
Security guards	38	0	38 (0%)
Mobilizers	1,237	274	1,511 (18.1%)
Sprayer technicians	19	0	19 (0%)
TOTAL	2,434	814	3,248 (25.1%)

2.3.2. Operations Sites and Other Facilities

Nineteen operations sites across the five districts were used during the 2023 IRS campaign in Zambezia (Table 4). The government owns all operations sites except for one in Mopeia (Lua Lua), which is privately owned and is used for the campaign at no cost to the government. Teams used 25 warehouses across the five districts to store spray equipment, materials, and insecticide for the spray campaign. Each warehouse was equipped with a fire extinguisher, spill kit, and emergency poster indicating how to respond in case of accident/incident.

Table 4: 2023 IRS Operations Sites in Zambezia Province

District	Number and Name of Sites
Maganja da Costa	2 (Maganja da Costa Sede and Nante)
Mopeia	4 (Chimuara, Lualua, Mopeia Sede, and Posto Campo)
Milange	5 (Milange Sede, Carico, Dachudua, Dulanha, and Liciro)
Molumbo	2 (Molumbo Sede and Corromana)
Morrumbala	6 (Borroma, Chire, Megaza, Morrumbala Sede, Muandua, and Pinda)
	Total: 19

2.3.3. Deployment of Spray Operators

Each operations site in the 2023 campaign had one site supervisor, who in turn supervised team leaders. Each team leader was responsible for five spray operators. The number of spray operators at each operations sites varied. The smallest sites were in Mopeia district and had 25 spray operators, while the largest (Molumbo Sede operations site) had 110 spray operators. Site supervisors conducted a short morning assembly with all spray teams at the beginning of each operational day. At the assembly, base supervisors, district coordinators, SDSMAS representatives, and provincial-level supervisors shared reminders on proper house preparation, consequences of insecticide theft/misuse/data falsification, safety, insecticide mixing, accurate data collection, correct house marking, adherence to correct spray technique, and environmental compliance requirements. The group also discussed challenges observed or reported on the previous spray days and how to overcome these.

The spray campaign lasted 30 days in all 19 operations sites. Site supervisors assigned spray teams to communities according to the spray calendar. Deviations from the spray calendar were observed and are discussed in Section 6. Spray teams were transported to communities via inspected trucks in all districts except Mopeia, where spray operators walked from operations site to the communities for four days of the campaign (community-based IRS model).

During the first week of the campaign, some supervisors observed refusals in certain communities in Milange, Maganja da Costa, and Morrumbala. In some cases, these refusals were related to community members' dissatisfaction with municipal election results. The most common reason for refusals was that households indicated they had experienced a lack of government support following Cyclone Freddy or had not received an ITN during the last distribution, and hence were refusing IRS. After engaging community leaders, spray teams revisited these areas and acceptance improved.

2.3.4. Supervision Plan

In coordination with the DPS and SPS, a supervision plan was developed and shared with all stakeholders involved in the campaign—the DPS, SPS, SDSMAS, PMI, and NMCP. The plan also included partners from agriculture and environmental sectors at the provincial and district level. In the first week of the campaign, supervisors provided technical and logistical support to a single operations site. Supervisors then rotated starting from week 2, following the supervision calendar each district had designed.

All district and provincial supervisors attended daily check-in meetings held throughout the campaign to review IRS progress and discuss and troubleshoot challenges. The meetings also included representatives from the NMCP, PMI Mozambique, and PMI Evolve Mozambique.

2.3.5. Seasonal Worker Payments

Seasonal worker subsidies and salaries were facilitated through mobile payments. Payments for pre-IRS activities were made late, as SPS did not request the training funds early enough. When they realized the mistake, the training was already ongoing. When USAID reimbursed the funds into the SPS account, there was no system in place for seasonal worker payments. To avoid more delays, the mobile numbers of the DPS malaria focal person, SPS malaria focal person, and two other SPS financial staff were used to make the payments for pre-IRS activities. During the pre-campaign period, the SPS finance team was advised to put a payment plan in place, guided by the experience from PMI-supported previous campaigns, which used MPESA. This plan included a description of payments required pre-, during, and post-IRS with timelines. The SPS finance team was also advised on how to establish an MPESA business account to facilitate the payments, including payments for seasonal workers. Despite PMI Evolve raising this item in the weekly preparation meetings, there were delays in SPS ultimately adopting and establishing the payment system for IRS activities. PMI/Mozambique also raised these issues with the SPS and worked with the government counterpart on payment options. The issues with payments led to disruptions in the campaign, including a strike by spray operators in Maganja District and a one-day campaign pause in Milange District. Payment for pre-IRS activities was completed on December 29, 2023. Payment for campaign activities had been completed by mid-January.

2.4. Insecticide

The insecticide resistance management plan for Mozambique advocates rotation of different classes of insecticide every two years and requires that local vectors be susceptible to the selected insecticides in the districts to be sprayed. In 2022, the PMI-funded VectorLink Mozambique project sprayed an organophosphate, Actellic 300 CS (active ingredient pirimiphos-methyl) in Morrumbala District, and a carbamate, Ficam (active ingredient bendiocarb 80WP), in Mopeia. In 2023, per the recommendation to rotate insecticides every two years, the decision was made to spray Fludora Fusion in Morrumbala and Actellic 300 CS in Mopeia as well as in Maganja da Costa. In Milange and Molumbo Districts, where IRS had not been conducted for the past two years, Ficam was selected for deployment in 2023.

With the technical support of PMI Evolve Mozambique, Zambezia targeted 82,694 structures in Maganja da Costa and Mopeia Districts to be sprayed with Actellic 300CS, 163,299 structures in Milange and Molumbo Districts to be sprayed with Ficam, and 104,179 structures in Morrumbala District to be sprayed using Fludora Fusion during the 2023 campaign. During planning, Zambezia forecasted the rate of insecticide consumption as 2.2 and 2.5 structures per unit of insecticide for Morrumbala and Mopeia, respectively, based on insecticide consumption rates observed in previous campaigns.

In October 2023, Zambezia received 68,012 sachets of Ficam from NMCP and 67,650 sachets of Fludora Fusion from Nampula Province through the Global Fund. Both insecticides arrived in country on time. Table 5 shows the insecticide inventory, and Table 6 shows the insecticide used in the 2023 campaign.

Table 5: 2023 Insecticide Inventory

Insecticide	# Sachets/Bottles Remaining after 2022 Campaign	# Sachets/Bottles Used By DPS Before 2023 Campaign for Ad Hoc Purposes	2023 Insecticide Received from NMCP	# Sachets/Bottles Available for 2023 Campaign	# Sachets/Bottles Used in 2023 Campaign	Remaining Stock of Insecticide in Central Warehouse	Expiration Date
Actellic 300 CS	36,059	0	0	36,059	35,987	72	May 2024
Ficam	691	108*	68,012	68,595	67,667	928	May 2025
Fludora Fusion	0	0	67,650**	67,650	61,534	6,116	June 2024
TOTAL	36,750	108	135,662	172,304	165,188	7,116***	

*Prior to the 2023 campaign, the Zambezia DPS requested 30 sachets for Manica province and 50 sachets for Sofala province during Cyclone Gombe in March 2022. An additional 28 sachets were used to spray lodges during Cyclone Freddy in March 2023.

**The number of sachets for Fludora Fusion the NMCP expected to receive for Zambezia (left over from the 2022 campaign) was 67,671. However, when the boxes (which originated from Nampula province) were opened at the district level in Zambezia, it was discovered that some cases were incomplete. In total, 21 sachets were missing, and thus the total number of sachets of Fludora Fusion insecticide available for the 2023 campaign was 67,650.

***As of April 2024, given the expiration dates of the remaining insecticide, it is expected that the remaining Actellic and Fludora Fusion will be used to spray hospital wings, assisted living facilities, boarding school dormitories, and households of government staff in Quelimane. The remaining Ficam will remain on-hand for emergency purposes.

Table 6: 2023 Insecticide Use by District

District	Insecticide Sprayed	Total Structures Sprayed	Total # of Bottles/Sachets Used	Average # of Structures Sprayed per Bottle/Sachet	Average # of Bottles/Sachets per Spray Operator per Day	Average # of Structures Sprayed per Day per Spray Operator
Maganja da Costa	Actellic 300CS	47,611	20,073	2.4	5	10.2
Mopeia		38,765	15,914	2.3	5	9.5
Milange	Ficam	115,500	51,592	2.3	5	10.5
Molumbo		59,962	26,110	2.3	5	10.2
Morrumbala	Fludora Fusion	111,614	51,499	2.5	5	10.3
TOTAL		373,452	165,188			

2.5. IEC and SBCC Activities and Outcomes

2.5.1. Community Mobilization

As part of community mobilization efforts, a provincial engagement meeting took place in Maganja da Costa District on November 9, which is Malaria Day in the Southern African Development Community region. The provincial inspector chief led the meeting on behalf of the Provincial Health Director; attendees included district, community, administrative, political, and religious authorities, signaling the beginning of campaign mobilization efforts (Figure 2). After the meeting, the administrators of the five districts agreed to hold follow-up meetings at the district and locality level.

Figure 2: Photo of Provincial Engagement Meeting in Maganja District



2.5.2. IEC Coordination

As part of technical support, PMI Evolve developed a shared implementation plan with the DPS, SPS, and SDSMAS, which included IEC activities and training. The IEC training took place from October 13 to 14, because of the elections on October 11. After the training, all IEC started with pre-IRS mobilization activities.

PMI Evolve also collaborated with FMSBC, another PMI project that supports SBC activities in Zambezia. The FMSBC project supported the IRS campaign in Zambezia by training community theater groups in each of the five districts on IRS mobilization, which they then incorporated into performances. FMSBC also funded all radio activities in five districts. PIRCOM, another PMI-funded project, supplemented IRS mobilization efforts in Morrumbala and Maganja districts by engaging religious leaders in the mobilization activities to increase IRS acceptance. Table 7 summarizes other mobilization activities leading up to and during the campaign.

Table 7: IEC Channels Used During the 2023 IRS Campaign

Channel of Communication	Number of Times Used (Frequency)	Estimated Number of People Reached
Church announcements	148	55,814
Mosque announcements	76	18,740
Water point announcements	32	1,986
Health centers' morning mobilization	19	570
Public spaces (salons and soccer camp)	1	1,200
Engagement meetings	25	762
Meetings with political party leaders	146	3,168
Radio spots (before and during spray campaign)	834	General population*
Radio debates on IRS	41	General population*
Live radio programs about IRS	36	General population*
IRS key messages	157	General population*
Spray calendar announcements on radio	476	General population*
Meeting with community leaders	43	1,910

*General population refers to the situations where the project is unable to estimate the number of people reached.

2.6. Capacity-Strengthening Efforts

PMI Evolve supported Zambezia throughout the pre-IRS campaign planning period, implementation, and demobilization activities. PMI Evolve designed a comprehensive implementation plan outlining all activities and timelines and prepared a quantification plan to support SPS on budget development. Several virtual trainings took place involving provincial and district teams to ensure they were prepared to conduct the IRS campaign in compliance. In addition, a series of meetings were set up involving all parties involved in the preparations and implementation process to ensure they understood their role.

Tools and resources were also provided in line with the NMCP harmonization plan and project tools were used to optimize the IRS campaign. Technical assistance was also extended to the procurement team and vendors, to ensure they understood the specifications requested and that they followed and respected the established timeline. To ensure compliance and safety of seasonal workers during the implementation of the campaign, the project supported Zambezia Province by hiring an environmental compliance consultant for vehicle inspections and spray operator training.

During the IRS campaign, PMI Evolve Mozambique staff (Chief of Party, Vector Control Manager, and Entomology Manager) conducted supervision to ensure that all spray techniques were observed and that activities were compliant with PMI standards. The PMI Evolve Mozambique Vector Control Manager supported site and provincial teams on insecticide reconciliation in the SIIM and data analyses during the weekly campaign check-in meetings. PMI Evolve also provided guidance to the provincial and district teams on optimizing supervision visits so that issues faced at the various sites were tracked and confirmed to be resolved the following week.

Table 8 summarizes the capacity strengthening activities provided by PMI Evolve to DPS and SPS in Zambezia and Nampula Provinces.

Table 8: Summary of Capacity-Strengthening Activities

Type of Activity	Description
Nampula support for IRS preparations, TOT, and implementation	PMI Evolve provided technical assistance to Nampula DPS in implementing a TOT for the province ahead of the 2023 spray campaign. The training and training materials were based on the PMI VectorLink IRS training curriculum, which had been adopted by the national IRS technical working group. The project shared best practices in the form of documents and tools with the Nampula DPS on environmental compliance for pre-IRS activities and donated 266 sprayers, 67 backpacks, 119 sets of gloves, and 211 pairs of gumboots for IRS implementation.
Entomology	PMI Evolve Mozambique continued to support entomology activities in Nampula Province, in three districts: Nampula District, Ribáuè District, and Mogovolas District. The first two of these were IRS districts and Mogovolas District was a non-IRS (control) district. The Nampula DPS technicians performed the activities under the supervision and guidance of the PMI Evolve Nampula entomology coordinator. They measured entomological indicators—malaria vector species composition, density, biting time and place, blood meal source and human blood index, infection, entomological inoculation rate, and seasonality. The vector sampling methods included pit shelter, Prokopack, and U.S. Centers for Diseases Control (CDC) light trap collections. Cone bioassays were also conducted to evaluate quality of spraying and monitor the decay rate of the insecticide after spraying in the two IRS districts.
G2G Budget Development Technical Support	Since 2019, PMI has provided mentorship and support to the Zambezia DPS/SPS staff as part of preparations to implement a G2G agreement. The support included weekly spray planning calls and meetings. In 2022, the PMI VectorLink Mozambique project (which preceded PMI Evolve) provided critical support in developing a G2G budget and an activity plan for the activities transferred to the SPS. The G2G agreement was signed and became effective in 2023, with the DPS taking a lead role in all spray campaign activities, SPS taking a lead role in all procurement, administrative, and financial roles, and SDSMAS taking the lead role of implementations of all IRS activities.

2.7. Gender Mainstreaming

Increasing the number of women participating in the spray campaign continues to be an important goal to ensure IRS is inclusive. Zambezia increased the percentage of females hired to support IRS activities from 23.7% in two districts in 2022 to 25.1% in five districts in 2023. Despite this incremental increase, 3 out of 10 cadres of spray personnel hired in 2023 were 100% male (site supervisors, security guards, and sprayer technicians).

2.8. Safeguarding

Sessions and presentations on gender awareness were included in all trainings and all cadres supporting IRS activities in 2023. In addition, seasonal workers signed an anti-harassment agreement, and anti-harassment posters were posted at all operations sites.

3. Entomology

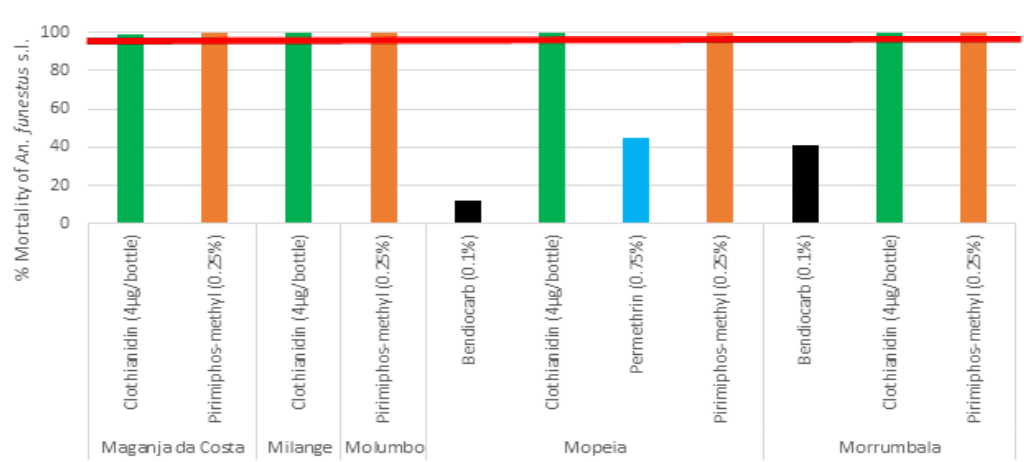
3.1. Insecticide Susceptibility

Susceptibility tests were conducted in six districts of Zambezia Province from January to April for *An. gambiae* s.l. and from July to October for *An. funestus* s.l. (Milange, Molumbo, Maganja da Costa, Lugela, Mopeia, and Morrumbala). In each district, insecticide testing prioritized the insecticides to be deployed in the upcoming IRS campaign and the insecticide used on ITNs distributed in each of the intervention and control districts. *An. gambiae* s.l. mosquitoes were collected as larvae and reared to adulthood prior to conducting the tests, while adult, unfed *An. funestus* s.l. tested were collected directly from the field. Tests were conducted according to Standard Operating Procedure 06/01. Tests using chlorfenapyr and clothianidin were conducted using CDC bottle bioassay according to Standard Operating Procedure 04/01.

Susceptibility tests for *An. funestus* s.l. and *An. gambiae* s.l. were conducted in Maganja da Costa, Milange, Molumbo, Mopeia, Morrumbala, and Lugela Districts. *Anopheles funestus* s.l. were exposed to bendiocarb (0.1%), clothianidin (4 µg/bottle), permethrin (0.75%) and pirimiphos-methyl (0.25%) in Maganja da Costa, Milange, Molumbo, Mopeia, and Morrumbala. *Anopheles gambiae* s.l. were exposed to diagnostic dosages of alpha-cypermethrin (0.05%), bendiocarb (0.1%), chlorfenapyr (100 µg/bottle), clothianidin (4 µg/bottle), deltamethrin (0.05%), permethrin (0.75%), and pirimiphos-methyl (0.25%) in Maganja da Costa, Milange, Molumbo, Mopeia, Morrumbala, and Lugela. Additional tests were conducted to explore the synergistic effect of piperonyl butoxide on pyrethroid susceptibility when combined with alpha-cypermethrin (0.05%), deltamethrin (0.05%), and permethrin (0.75%).

The test results are presented in Figure 3 and show that *An. funestus* s.l. was susceptible to clothianidin (4µg/bottle) and pirimiphos-methyl (0.25%) in Maganja da Costa, Milange, Molumbo, Mopeia, and Morrumbala. Resistance was detected to bendiocarb (0.1%) in Mopeia and Morrumbala and to permethrin (0.75%) in Mopeia. Few *An. funestus* s.l. were collected and no other insecticide was tested.

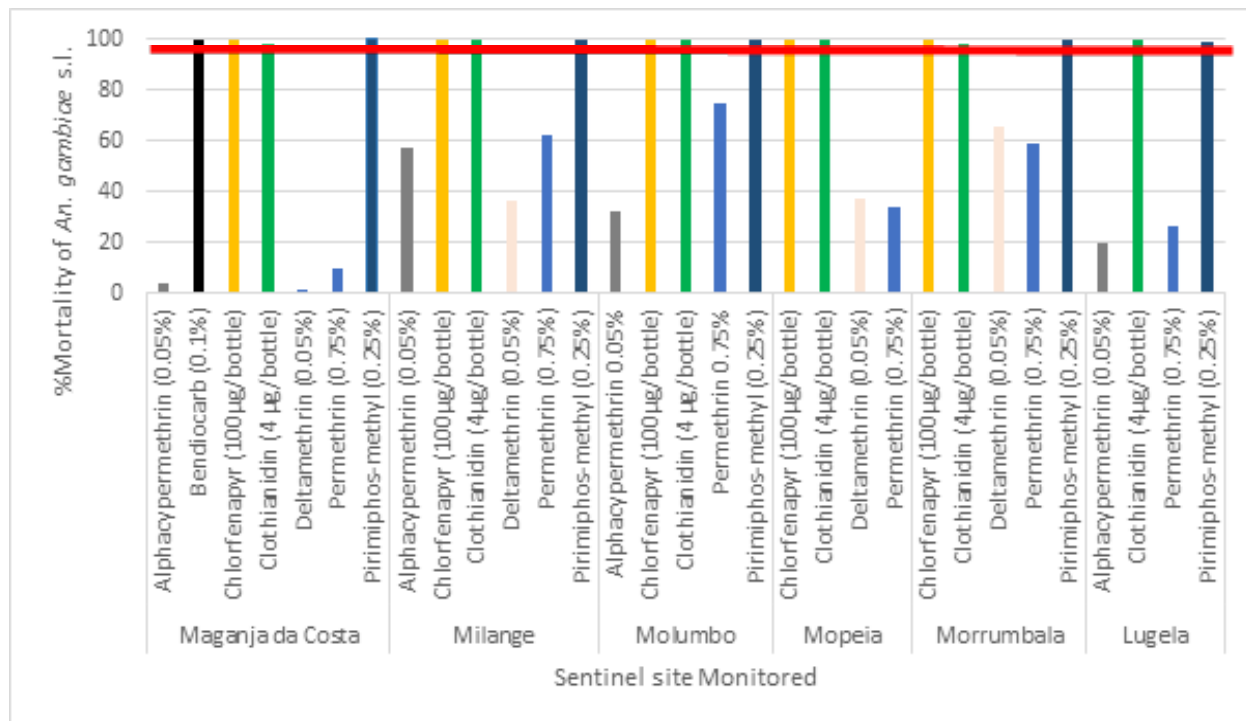
Figure 3: Percentage Mortality of Adult *An. funestus* s.l. Collected by Prokopack and Exposed to Bendiocarb, Clothianidin, Permethrin, and Pirimiphos-methyl



Red line indicates 98% mortality cut-off point for susceptibility.

Figure 4 shows the results of the tests from *An. gambiae* s.l. This species was susceptible to pirimiphos-methyl, clothianidin, bendiocarb, and chlorfenapyr in all districts where these insecticides were tested. Resistance to alpha-cypermethrin (0.05%) was observed in all four districts tested (Maganja da Costa, Milange, Molumbo, and Lugela). Resistance to deltamethrin (0.05%) was also found in all districts assessed (Maganja da Costa, Milange, Mopeia, and Morrumbala); the same was found for permethrin (0.75%), which was tested in Maganja da Costa, Milange, Molumbo, Mopeia, Morrumbala, and Lugela.

Figure 4: Percentage Mortality of Adult *An. gambiae* s.l. Raised from Larval Collections Exposed to Various Insecticides

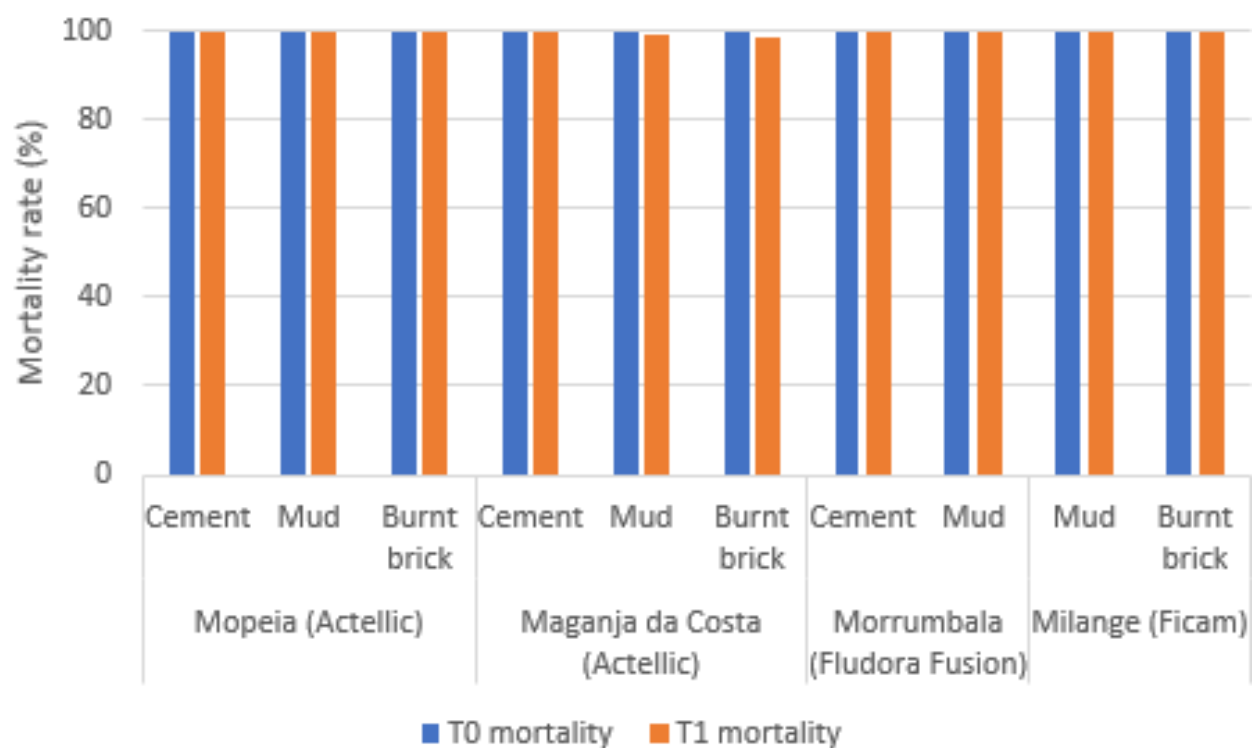


Red horizontal line indicates the 98% mortality cut-off point for susceptibility. Note: chlorfenapyr holding periods were up to three days. The mortality for other insecticides was observed at a 24-hour holding period.

3.2. Residual Efficacy

Cone wall bioassays were done to assess the quality of IRS 24 hours after spray (T0) in Milange, Mopeia, and Morrumbala districts and three days after spraying in Maganja da Costa, according to Standard Operating Procedure 09/01. The residual efficacy of the insecticide one month after spraying (T1) was tested in December, and will be monitored each month until the mortality drops to less than 80% for two consecutive months. Figure 5 shows the results of the cone wall bioassay for T0 and T1. At T0, the mortality after 24 hours was 100% for Actellic 300CS (Mopeia) and Ficam (Milange). For Fludora Fusion (Morrumbala), 100% mortality was also observed after 24 hours, except for in one house that took 48 hours to reach 100% mortality. At T1, the mortality was 100% 24 hours post-exposure on all surfaces in Mopeia, Morrumbala and Milange, while in Maganja da Costa the mortality rate was 100% on cement, 99.33% on mud wall, and 98.33% on the burned brick surfaces.

Figure 5: Decay Rate Mortality of *Anopheles arabiensis* KGB Strain on Different Sprayed Surfaces in Mopeia, Maganja da Costa, Morrumbala, and Milange Districts



4. Environmental Compliance

Zambezia Province, with technical support from PMI Evolve Mozambique, implemented the 2023 IRS campaign under the Mozambique supplemental environmental assessment (SEA) approved on March 31, 2021. The SEA is valid until 2025 and authorizes the use of five World Health Organization (WHO)-recommended classes of insecticides: pyrethroids, carbamates, organophosphates, neonicotinoids, and pyrroles, and the deltamethrin/clothianidin mixture in Fludora Fusion. In addition, PMI Evolve Mozambique used the project-wide approved Environmental Mitigation and Monitoring Plan as a guide for corrective actions to mitigate the environmental impacts of IRS when required. The 2023 Environmental Mitigation and Monitoring Report can be found in Annex B.

4.1. IRS Campaign Assessments

As part of technical support to Zambezia, the project provided virtual training to the five district teams on how to perform Pre-spray Environmental Compliance Assessments (PSECAs). After the training, the malaria focal persons assessed the operations sites, took pictures, and shared these with the PMI Evolve Mozambique Vector Control Manager. Using the information the districts shared, a report and work list were prepared and shared with the DPS, SPS, and districts for rehabilitation activities.

The PMI Evolve Mozambique Chief of Party visited all 19 operations sites before the campaign started, to ensure the rehabilitation had been completed in compliance with the standards and that the sites were ready to start the campaign. PMI Evolve also hired a consultant to support Zambezia with vehicle inspections and spray operator training.

4.2. Noted Incidents

During the campaign, three incidents of insecticide theft were noted in Molumbo, Milange, and Morrumbala and reported to DPS, SPS, and PMI. Fifteen sachets of insecticide that had been stolen in Molumbo and Morrumbala districts were recovered and stored in the district warehouse before being transported to the central warehouse for final disposal. In Milange, four pilfered sachets were recovered and taken into police custody. SDSMAS was responsible for dealing with spray operators and filing police reports.

4.3. Demobilization and Waste Management

A demobilization plan was developed in coordination with SPS and DPS and shared with districts. After the end of the campaign, there were delays in the procurement of vehicles needed to conduct the reverse logistics from the districts to the central warehouse, and thus the plan was not executed according to the original schedule. As of the end of January, all five districts had completed demobilization of all operations sites, and an assessment and update of the inventory is in progress.

As part of the technical assistance provided by PMI Evolve Mozambique, a waste management plan was developed and used during the IRS campaign. As outlined in the plan, all uncontaminated waste was managed at the district level on a weekly basis. Plastic waste was transported biweekly to Incala company, responsible for recycling of all plastic waste in Quelimane. Once the inventory of goods and damages is complete, the final phase of waste management will start.

5. Monitoring and Evaluation

5.1. Data Collection, Entry, and Quality Assurance

In 2023, IRS campaign data was entered into the SIIM, the national system for health information data management, including vector control activities.

5.2. Results

Zambezia, with technical support from PMI Evolve Mozambique, targeted 350,172 structures for IRS in the five districts in 2023. At the end of the spray campaign, spray teams had found 377,986 eligible structures, and sprayed 373,452, resulting in 98.8% spray coverage. The total population protected by IRS (all ages) was 1,955,852. This includes 257,196 children under 5 years of age and 87,720 pregnant women.

Table 9: 2023 IRS Results in Five Districts in Zambezia Province

District	# of Structures Found	# of Structures Sprayed	Spray Coverage (%)	Total Population Found	Population Protected by IRS				
					Total Population	# of Males	# of Females	# of Pregnant Women	# of Children <5 Years
Maganja da Costa	48,143	47,611	98.9%	222,069	219,696	107,531	112,165	10,089	27,438
Milange	117,646	115,500	98.2%	790,268	783,859	353,516	430,343	26,402	91,122
Molumbo	60,645	59,962	98.9%	300,308	297,143	143,296	153,847	13,125	46,652
Morrumbala	112,060	111,614	99.6%	480,429	478,360	223,443	254,917	29,913	63,823
Mopeia	39,492	38,765	98.2%	180,191	176,794	89,841	86,953	8,191	28,161
Total	377,986	373,452	98.8%	1,973,265	1,955,852	917,627	1,038,225	87,720	257,196

6. Challenges, Lessons Learned, and Key Recommendations

6.1. Challenges

- **Incomplete insecticide procurement:** In 2022, PMI requested from NMCP the quantity of insecticide that would be needed to spray the five targeted districts. Through its Global Fund grant, the government of Mozambique donated the insecticide it procured through the Global Fund Pooled Procurement mechanism to PMI Evolve. In 2023, when the insecticide arrived in the country, the project realized that only 68,012 units out of the expected 129,093 units of Ficam had arrived in Quelimane Central warehouse. The NMCP, PMI, Zambezia, and the Global Fund logistics manager met and the NMCP determined that they had not included the full amount of insecticide needed when sending the request to the Global Fund. The NMCP promised to resolve the issue to ensure all targeted structures in Zambezia could be sprayed. The NMCP subsequently communicated with the Nampula SPS and arranged for them to provide the remaining insecticide needed to Zambezia. Zambezia, with support from PMI Evolve, transported the insecticide from Nampula to Zambezia.
- **Delayed execution of the implementation timeline:** After the G2G agreement was signed, PMI Evolve developed an implementation plan with a timeline of all IRS activities and shared it with the DPS, SPS, and SDSMAS. Throughout the pre-campaign period, delayed execution of activities was observed, which led to delays in procurement, trainings, pre-IRS mobilization activities, and the start of the campaign—which took place about five weeks later than planned.
- **Weak mobilization in some districts:** PMI Evolve Mozambique observed poor mobilization in some districts, leading to some level of refusals, especially in Milange, Maganja da Costa, and some communities in Morrumbala District. Community members who were dissatisfied with municipal election results, had experienced a delay in government support following Cyclone Freddy, or had not received an ITN during the last distribution were in turn refusing IRS. Meetings were held with communities' leaders to request their support in sensitizing and remobilizing these communities for the campaign. These areas were subsequently revisited by spray teams, with higher rates of acceptance.
- **Incorrect use of spray and mobilization calendars:** During supervision, PMI Evolve observed that IEC assistants and site supervisors in Milange, Maganja da Costa, and Molumbo were not using the spray and mobilization calendar tools correctly. This affected spray performance during the first two weeks of the campaign because of incorrect deployment of spray teams to the communities (e.g., more spray teams were deployed to a given area than were needed based on the number of structures located there). After the first week of the campaign, PMI Evolve conducted a virtual refresher training with the provincial and district teams on these tools, which helped improve adherence in the subsequent weeks of the campaign.
- **Sprayer malfunction:** In 2023, some Goizper sprayers' collar seals did not maintain pressure during spraying—the sprayers lost pressure almost immediately after spraying began. The sprayer technicians replaced the collar seal when necessary. When needed, they also met spray teams in the communities to replace sprayers. During supervision, PMI Evolve staff also observed that some spray operators were spraying without a control flow valve because it was not releasing the insecticide. These spray operators were advised to replace the control flow valve during the end-of-day cleanup activities.

- **Late payment of spray actors:** Payments to spray actors for IRS preparatory and training activities were late. The issue led to dissatisfaction among seasonal workers in all districts, and spray operations were paused as a result in Milange Sede operations site in Milange district on November 23. Payments for pre-campaign activities were issued during the last week of the campaign. Payment for IRS implementation activities were also late, which led to dissatisfaction, low morale, and strikes in some districts, e.g., Maganja da Costa.
- **The NED's delayed data entry:** There were some issues with data transportation. The vendors did not accept the proposed payment amount. To resolve the issue, data was transported every other day, not every day. This solution led to a data entry backlog and incomplete data in the system. All remaining data was entered during the demobilization process.
- **Low quality of spray operator training:** In 2023, supervisors noted challenges, particularly with the recording of data, that suggested a low quality of training. There were differences from one district to another in data recording and house marking. More specifically, spray operators were not recording the structures not sprayed, due to limited space on the Daily Spray Operator Form. Team leaders were instructed to bring extra forms and distribute as needed. In addition, to help ensure consistency across spray teams, PMI Evolve Mozambique shared a Daily Spray Operator Form that had been completed correctly with all supervisors via WhatsApp for reference. PMI Evolve also addressed the issue during the daily check-in meetings and followed up during the morning mobilizations at several operations sites to make sure the issue had been resolved.
- **Lack of adequate PPE for spray operators:** During the PMI Evolve Mozambique budget finalization process, some PPE (such as helmets and visors) was removed. This happened after the government of Mozambique had submitted the G2G agreement for signature and there was no way to include these items in the G2G budget. Since the items are not available in the local market, they needed to be ordered ahead of time from South Africa. PMI Evolve procured some needed items but was not able to obtain enough helmets. PMI Evolve suggested that Zambezia provide the currently available helmets and visors for all spray operators to reduce their exposure to insecticides, and that all supervisors including team leaders use disposable visors and change these three times per week. While not ideal, this suggestion was implemented throughout the campaign. During the supervision, PMI Evolve observed that some spray operators and team leaders in Muandua and Borroma operations sites were working without gum boots. When asked, the procurement manager explained that the vendor did not have the number of gum boots requested.
- **Pilferage of insecticide in some districts:** During supervision visits to verify that households were prepared adequately prior to being sprayed and were marked correctly, supervisors found that some spray operators had stolen insecticide and were attempting to sell it to homeowners.

6.2. Lessons Learned

- Holding daily and weekly debriefings with the DPS, SPS, SDSMAS, and PMI was an effective way to share lessons and take collective decisions to improve spray campaign outcomes. It was during such meetings that the project brought up the issues mentioned above, especially the challenge related to not adhering to the timelines. Even though the issue remained throughout the campaign, these debriefings helped encourage action by all involved parties.
- Preparing request advances ahead of time was a lesson learned in 2023. Doing so in future campaigns will help to prevent delays in all activities included under G2G, since the timeframe needed by USAID to make funds available in the province is well known by the SPS. This implies that the technical team needs to

submit the technical proposal to Unidade de Gestão Executora de Aquisição team as a complete and detailed proposal including timelines that the funds are needed to execute the related activities.

- **Budget Development:** PMI Evolve Mozambique in coordination with PMI Mozambique and the SPS/DPS used the budget development period to continue identifying other needs that had not identified during the conception of the G2G agreement, to include in the budget. Several drafts were made, to accommodate those needs identified in each meeting.
- **“All hands on deck”/team effort during supervision:** Everybody involved prioritized supervision; this included support from NMCP teams that had been organized to supervise the different operations sites in the districts. Milange provided a very good example of how to organize a supervision team. The malaria focal person sent a WhatsApp message to everyone responsible that week and indicated which operations site to supervise on each day.

6.3. Key Recommendations

- For future campaigns, a robust G2G procurement plan with all needed approvals should be established ahead of time to avoid the issues experienced in 2023. SPS should request funds ahead of time to avoid delays. Continue using the non-IRS period to discuss all needs and expectations and align roles and responsibilities.
- Improved communication and coordination between the technical and administrative departments at SPS is needed to facilitate timely procurements and funding requests for future campaigns.
- TOTs are an optimal time to address issues of mobilization, data entry, and spraying techniques. It is recommended that the TOTs be used to strengthen the capabilities of the trainers through practice sessions.
- We recommend that the NMCP leverage microplanning meetings to advocate for increased participation by women in IRS activities, and adopt recruitment criteria and techniques that allow and encourage women to apply for positions, especially for those roles traditionally filled by men such as sprayer technicians and security guards. Promote women with experience and good performance as team leaders to leadership positions as site supervisors. This can be a way to motivate them to apply for different positions and make a more equitable work environment.

Annex A: Monitoring and Evaluation Plan

Indicator #	PMI Evolve Results and Indicators (EOSR reporting includes a subset of PMI Evolve indicators that are specific to IRS implementation)	Year 1 IRS Results [Covering Period: 04/2023 to 12/2023]*		
		Disaggregation	Target	Result
Objective 1: Implementation and/or TA for implementation of proven, life-saving VC interventions for malaria using an integrated approach				
1.1 Support operational aspects of vector control program execution.				
1.1.2	IRS Spray Coverage	Total	85%	99%
1.1.3b	Number of eligible houses/structures sprayed with IRS by other partners with PMI Evolve support	Total	350,172	373,452
		Milange District	106,537	115,500
		Maganja da Costa District	45,934	47,611
		Mopeia District	36,760	38,765
		Molumbo District	56,762	59,962
		Morrumbala District	104,179	111,614
1.1.4	Number of people protected by IRS	Total	1,484,191	1,955,852
		Male	-	917,627
		Female	-	1,038,225
		Children < 5	-	257,196
		Pregnant Women	-	87,720
		People living in special structures	0	0
		Milange District	475,604	783,859
		Maganja da Costa District	196,868	219,696
		Mopeia District	161,550	176,794
		Molumbo District	241,682	297,143
Morrumbala District	408,487	478,360		
1.1.10	Number of people hired [or contracted] to support vector control and entomological activities in targeted areas	Total	-	2
		Male (#)	-	2
		Female (#)	-	1
		Male (%)	-	66.6%
		Female (%)	-	33.4%
		By cadre	-	See Table 2

Indicator #	PMI Evolve Results and Indicators (EOSR reporting includes a subset of PMI Evolve indicators that are specific to IRS implementation)	Year 1 IRS Results [Covering Period: 04/2023 to 12/2023]*		
		Disaggregation	Target	Result
1.3 Ensure the safe and judicious use of insecticides and vector control products.				
1.3.1	Number of people trained in environmental compliance and safety standards in vector control implementation	IRS: Total	-	3,285
		IRS: Male	-	2,460
		IRS: Female		825
		IRS: By entity	-	See Table 3a
1.4 Strengthen capacity of NMPs and local partners in implementation and management of vector control activities				
1.4.1	Number of people trained to support vector control	IRS: Total	3,293	3,285
		IRS: Male	-	2,460
		IRS: Female	-	825
		IRS: By cadre & entity	-	See Table 3b
1.6 Promote GESI across all facets of planning and implementation of vector control.				
1.6.1	Number and percentage of women hired by PMI Evolve to support vector control activities	IRS: #	TBD	0
		IRS: %	40%	0
1.6.3	Number of groups representing marginalized or vulnerable populations engaged in vector control planning and/or implementation	IRS: #	0	0
1.7 Implement and support local partners and community-based platforms in implementing, social and behavior change and mobilization activities for vector control programs.				
1.7.1	Number of people reached by community mobilization activities aimed at preventing malaria	Total	-	>=84,150
		IRS: Church announcements	-	55,814
		IRS: Mosque announcements	-	18,740
		IRS: Water point announcements	-	1,986
		IRS: Health centers' morning mobilization	-	570
		IRS: Public spaces (salons and soccer camp)	-	1,200
		IRS: Engagement meetings	-	762
		IRS: Meetings with political party leaders	-	3,168
		IRS: Radio spots (before and during spray campaign)	-	General population*
		IRS: Radio debates on IRS	-	General population*
		IRS: Live radio programs about IRS	-	General population*
		IRS: IRS key messages	-	General population*
		IRS: Spray calendar announcements on radio	-	General population*
IRS: Meeting with community leaders	-	1,910		
1.7.2	Number of social and behavior change/mobilization activities led by community-based organizations	IRS: #	-	0

Indicator #	PMI Evolve Results and Indicators (EOSR reporting includes a subset of PMI Evolve indicators that are specific to IRS implementation)	Year 1 IRS Results [Covering Period: 04/2023 to 12/2023]*		
		Disaggregation	Target	Result
1.8 Establish cost-effective procurement mechanism and execute logistical aspects of vector control.				
1.8.1	Percentage of insecticide/larvicide procurements for IRS and LSM received on time for vector control activities	IRS: #	100%	100%
Objective 2: Support the collection and analysis of data to inform strategic deployment of VC interventions for malaria.				
2.1.5a	Determination of quality of IRS: a) Number of sites that conducted WHO cone bioassays within one week of IRS	Total	5	6
		Actellic		4
		Fludora Fusion	-	1
		Ficam	-	1
2.1.5b	Determination of quality of IRS: b) Number and percentage of houses in which WHO cone bioassays were conducted within one week of spraying with ≥ 98% test mortality	Total	40	48
		Actellic	-	32
		Fludora Fusion	-	8
		Ficam	-	8
		[Insecticide]: %	-	100%
		[Insecticide]: %	-	100%
		[Insecticide]: %	-	100%
Objective 3: Strengthen capacity of host governments and local entities to plan, design, implement and monitor vector control interventions and foster resilience and sustainability				
3.2 Promote technical and strategic leadership among NMPs and local partners				
3.2.2	Number of local partners who lead/manage priority components of vector control activities or entomological surveillance activities	IRS	1	1
3.4 Ensure GESI is incorporated in capacity building				
3.4.2	Number of trainings on GESI specific topics			9

* Results included in the EOSR for this sub-set of PMI Evolve MEL indicators are reflective of results to date for the period specific in the table. Several indicators presented in this table will incorporate additional results over the remainder of the PMI Evolve {Country} workplan period (from ongoing activities, additional VC interventions, etc.). Thus, values that are included in the EOSR may not always align with cumulative annual results for selected indicators.

* Indicator 1.7.1: General population refers to the situations where the project is unable to estimate the number of people reached.

MEL Annex Table 2: Indicator 1.1.10 Number of people hired [or contracted] to support vector control and entomological activities in targeted areas

*A contracted temporary hire must receive a contract and a stipend/per diem as compensation for work.

**This indicator excludes all government and subcontractor employees.

Simplified IRS Cadres	Titles to be Mapped:	Permanent / Temporary Staff*	Male	Female	Total
Spray Operations	IVC Manager (Full-time Country Staff)	Permanent	0	1	1
	EC Assistant	Temporary	1	0	1
Ops Site/Logistics and Supply/Warehousing	Warehouse Assistant	Permanent	1	0	1
IRS Sub-Total			2	1	3

MEL Annex Table 3a: Number of people trained in environmental compliance and safety standards in vector control implementation

People Trained in VC by Entity	# of people trained IRS
Governmental	3,285
Total	3,285

MEL Annex Table 3b: Indicator 1.4.1 Number of people trained to support vector control

People Trained in VC by Entity	# of people trained IRS
Governmental	3,285
Total	3,285

Annex B: Environmental Mitigation and Monitoring Report

Mitigation Measure(s)	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
Activity 1: Implementation of indoor residual spraying (IRS)			
<ul style="list-style-type: none"> Insecticide selection for any USAID-supported malaria program is subject to the criteria listed in the USAID Programmatic Environmental Assessment, country SEAs, and host country requirements, including quality control checks. Procurement and inventory logs must be maintained. Ensure storage facility and PPE are appropriate for the active ingredient used and in accordance with approved standard operating procedures. Distribute insecticides to facilities that can manage such commodities safely and securely in storage, use, and disposal. Inspect vehicles used for insecticide or team transport prior to contract. Train drivers for insecticide or team transport. Ensure availability of cell phone, PPE, and spill kits during insecticide transport. Employ initial and 30-day pregnancy testing for female candidates in jobs with potential insecticide contact. Conduct health tests for all spray team members to ensure duty fitness. Train all workers with potential insecticide contact on the use of PPE. Train spray operators on mixing insecticides and the proper use and maintenance of application equipment. Provide adequate facilities and supplies for end-of-day cleanup. Enforce application and cleanup procedures. Implement IEC campaigns to inform homeowners of responsibilities and precautions. Ensure health facility staff are aware of insecticide poisoning management. 	<ul style="list-style-type: none"> Insecticide classes used were selected based on the list of insecticides in the approved SEA Vehicle inspections were done before the contract for all districts except Maganja de Costa, where two vehicles were used without being inspected. Pregnancy tests were administered to all women after the first week of the campaign. All spray operators were trained in insecticide mixing and spray techniques. IEC activities were carried out before and during the IRS campaign to inform communities about precautionary measures with insecticide and provide safety messages after spraying, including a spray calendar. 	<p>No issues were identified.</p> <p>Two washers in Molumbo district were found to be pregnant and were reassigned to mobilizer positions</p>	<p>To ensure safety and compliance, all vehicles involved in IRS must be inspected prior to use. To ensure safety and compliance and reduce exposure, all women working in potential positions with insecticide contact must be tested before the start of the IRS campaign.</p>

Mitigation Measure(s)	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
<ul style="list-style-type: none"> Storage facilities and transportation vehicles must be physically secured to prevent theft. Maintain records of all insecticide receipts, issuance, and return of empty containers. Conduct analysis comparing number of houses treated vs. number of units used. Examine houses treated to confirm application. Perform physical inventory counts during the spray season. Transportation of insecticide over water must conform to the requirements of the PMI Best Management Practices Manual (BMPs). Train spray actors on the SEA operational requirements, standard operating procedures, PMI BMPs, and approved Waste Management Plan developed for the safe and effective storage, distribution, application, and disposal of insecticides. Ensure application equipment and PPE are appropriate for the active ingredient used and in accordance with approved Standard Operating Procedures and maintain equipment to avoid leaks. No application of insecticides within 30 meters of beekeeping sites. No soak pit/wash areas will be constructed or installed within 30 meters of beekeeping and other sensitive sites (e.g., organic farming). Choose sites for disposal of liquid wastes, including fixed and mobile soak pit sites, according to PMI BMPs. Construct fixed and mobile soak pits with charcoal according to the BMPs to adsorb insecticide from rinse water. Maintain soak pits as necessary during season. Wastes will only be disposed of in incinerators that comply with PMI BMPs. Handling, treatment, and disposal of hazardous wastes must be in accordance with the approved Integrated Waste Management Plan (IWMP) standard operating procedures and the PMI BMPs. Monitor waste storage and management during campaign. Monitor disposal procedures post-campaign. 	<ul style="list-style-type: none"> All stores were secured 24/7. Records were kept of the inventory throughout the campaign, and supervisors conducted inventories during the warehouse visits. No water crossing was made during the 2023 spray campaign. All soak pits used during the campaign were compliant with PMI BMPs and located in secure places inspected and approved for the purpose by the district environmental officer. Demobilization activities are complete. Waste will be disposed of in facilities certified by Mozambican environmental law. 		

Mitigation Measure(s)	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
Conduct entomological surveillance and vector control monitoring and research			
<ul style="list-style-type: none"> Implement laboratory environmental, health, and safety manuals with standard operating procedures for laboratory operations in accordance with country-specific compliance mechanisms. Implement standard operating procedures for the safe storage, transport, and use of equipment, chemical reagents, insecticides, and supplies in conformance with international best practices (e.g., WHO, Food and Agriculture Organization) and host country requirements. Provide training to workers on the approved standard operating procedures or IWMP developed for properly handling and disposing of wastes. 	Standard operating procedures were prepared and shared by NMCP in accordance with WHO standards and country specifications.	No issues identified	