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2017 TANZANIA END OF SPRAY REPORT

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2017 TANZANIA END OF SPRAY REPORT

CONTENTS

Contents	iii
Acronyms	vii
Executive Summary	ix
1. Country Background	1
1.1 Mainland Tanzania	1
1.2 Zanzibar	5
1.2.1 Selection of Zanzibar Intervention Areas	5
1.3 Mainland Tanzania	5
1.3.1 Selection of Intervention Areas	5
2. Pre-Spray Activities	7
2.1 Insecticide Selection	7
2.2 Planning and Preparation	11
2.3 Regional and District Sensitization Meetings	11
2.3.1 Micro Planning Meetings	12
2.4 Procurement of IRS Materials And Equipment	12
2.4.1 Local Procurement	12
2.4.2 International Procurement	13
2.5 Logistics and Stock Management	13
2.6 IRS Trainings	14
2.7 IRS Human Resources	19
3. Information, Education and Communication	21
3.1 Advocacy Meetings	21
3.2 IEC and BCC Material and Information	21
3.3 World Malaria Day	22
4. Implementation of IRS Activities	23
4.1 IRS Approach	23
4.1.1 District-Based IRS	23
4.1.2 Community-Based IRS	23
4.1.3 Quasi-Community-Based IRS	23
4.2 Composition and Management of Spray Teams	24
4.3 Payment of Seasonal Staff	25
4.4 mHealth	26

4.5	Directly Observed Spray	27
4.6	Job Aids.....	27
4.7	Junguni Pilot.....	27
5.	Post-Season Activities	28
5.1	Post-Spray Evaluation.....	28
5.2	Inventory Assessment.....	28
5.3	Demobilization	28
6.	Environmental Compliance	31
6.1	Pre-, Mid- and Post-Season Assessment	31
6.1.1	Pre- Irs Assessment	31
6.1.2	Mid-IRS Assessment	32
6.1.3	Post-IRS Assessment.....	32
6.2	Waste Management	33
6.3	Worker and Resident Safety.....	34
7.	Entomology	37
7.1	Entomology	37
7.2	Insectary and Laboratory Support	41
7.3	IRS Quality Assays	41
7.4	Results.....	42
8.	Monitoring and Evaluation	45
8.1	Key Objectives	45
8.2	Approach and Objectives	45
8.3	Reporting Indicators.....	45
8.4	M&E Data Collection and Verification Tools.....	45
8.4.1	Database Preparation	46
8.4.2	Data Quality Assurance And Control.....	47
8.5	M&E Data Entry, Tracking, Storage and Security.....	49
8.5.1	Data Storage	50
8.5.2	Data Cleaning	50
9.	Results.....	51
9.1	Population and Structures Found	51
9.2	Population Protected	51
9.2.1	Refusals and Structures not Sprayed.....	52
9.3	Use of Insecticide	53
9.4	Community Sensitization Results	54
10.	Capacity Building	55
10.1	Capacity Building During IRS Training and Operation.....	55

11. Gender	57
11.1 Gender Training	57
11.2 Gender Inclusion Implementation	57
12. Challenges, Lessons Learned and Recommendations	59
12.1 Challenges and Lessons Learned.....	59
12.1.1 Challenges.....	59
12.1.2 Lessons Learned	60
12.2 Recommendations	60
Annex A: Local Procurement	61
Annex B: International Procurement	65
Annex C: Stock Update	67
Annex D: Environmental Mitigation and Monitoring Report	77
Annex E: Insecticide Quality Assurance Certificate	85
Annex F: AIRS Tanzania Monitoring and Evaluation Plan	87
Annex G: M&E Methods: Quality Assurance Methods and Tools	103

LIST OF TABLES

Table 1: 2017 AIRS Tanzania Campaign Summary.....	x
Table 2: Target Structures and Projected Population in the 18 Districts	7
Table 3: IRS Topics Covered During Trainings	14
Table 4: IRS Training AND Participants, Mainland and Zanzibar	17
Table 5: Seasonal Staff Hired	19
Table 6: AIRS Tanzania Message Dissemination Channels in Each Operation District.....	22
Table 7: IRS Sites That Were Refurshibed Prior to 2017 IRS Campaign.....	33
Table 8: Mortality Rate of Mosquitoes 24 Hours After Exposure to Different Types of Wall Surface	42
Table 9: Tanzania IRS 2017 Data Collection Tools.....	46
Table 10: Data Quality Assurance Tools	47
Table 11: Use of DCV Form: Common Issues Found and Corrective Actions Taken.....	48
Table 12: Data Quality Assurance and Control	49
Table 13: Summary of Tanzania IRS Results for the 2017 Campaign.....	51
Table 14: People Protected During IRS Tanzania 2017 Campaign.....	52
Table 15: Insecticide Use	53
Table 16: Community Sensitization Meetings, AIRS 2017 Campaign	54

LIST OF FIGURES

Figure 1: Map To Show Sentinel Population Malaria Prevalence for 2016 That Indicates Malaria Situation on Mainland Tanzania	3
Figure 2: Map of Tanzania Mainland and Zanzibar Showing IRS Targeted Zones and Regions	8
Figure 3: Tanzania Mainland Map Showing IRS Targeted Districts	10
Figure 4: IRS Central Warehouse.....	13
Figure 5: A Quasi Community-Based IRS in Mwanza	24
Figure 6: Site’s Organization Chart.....	24
Figure 7: A Covered Soak Pit at Kabale IRS Site in Bukoba Rural District.....	32
Figure 8: Standard IRS Site with a Washing Slab, Soak Pit, Water Reservoir and Ablution Facilities at Suguti in Musoma Rural District	33
Figure 9: Map Showing Distribution of All the 22 Insecticide Resistance Monitoring Districts in Tanzania Mainland	39
Figure 10: Mortality Rate Within 24 Hours, Tanzania Mainland.....	42
Figure 11: Structures Not Sprayed During 2017 IRS Campaign.....	52

ACRONYMS

AIRS	Africa Indoor Residual Spraying
BCC	Behavior change communication
CBIRS	Community-based IRS
CDC	Centers for Disease Control and Prevention
DCV	Data collection verification
DHIS2	District Health Information System 2
DITT	District IRS Technical Team
DMFP	District Malaria Focal Person
DOS	Directly Observed Spray
ECO	Environmental Compliance Officer
GGM	Geita Gold Mine
IEC	Information, education and communication
IRS	Indoor Residual Spraying
MEEDS	Malaria Early Epidemic Detection System
M&E	Monitoring and evaluation
MIS	Malaria Indicator Surveys
NEMC	National Environment Management Council
NIMR	National Institute for Medical Research
NMCP	National Malaria Control Programme
PMI	President's Malaria Initiative
PMT	Performance Monitoring Tracker
PPE	Personal protective equipment
Q&A	Questions and answers
SMPS	School Malaria Parasitological Survey
SOP	Spray operator
USAID	United States Agency for International Development
WHO	World Health Organization
ZAMEP	Zanzibar Malaria Elimination Programme

ZEMA

Zanzibar Environmental Management Agency

EXECUTIVE SUMMARY

The President's Malaria Initiative Africa Indoor Residual Spraying (PMI AIRS) project, funded by the U.S. Agency for International Development (USAID) and implemented by Abt Associates, supports the implementation of indoor residual spraying (IRS) in mainland Tanzania and Zanzibar. The objective of the project is to further PMI's goal to halve the burden of malaria in 70% of at-risk populations in sub-Saharan Africa. The project fits into the National Malaria Control Programme (NMCP) mission for the period 2014–2020, which aims to ensure that Tanzanians have access to quality, effective, safe, and affordable malaria interventions through timely and sustainable collaborative efforts with partners and stakeholders at all levels.

The AIRS Tanzania Project conducted its second IRS campaign in Tanzania from January 25 to April 4, 2017, with a target of spraying 574,905 structures in mainland Tanzania and 40,488 in Zanzibar. The operation covered nine districts on the mainland: Bukoba Rural, Missenyi and Ngara (in Kagera), Sengerema and Kwimba (in Mwanza), Musoma rural and Butiama (in Mara), and Chato and the new district of Nyanghwale (in Geita). In addition, the project covered nine districts in Zanzibar: Central, North A, North B, South, and West (on Unguja island); and Chakechake, Micheweni, and two new districts of Mkoani and Wete (on Pemba island). The project sprayed the organophosphate insecticide pirimiphos methyl (Actellic 300CS) in all areas.

The AIRS Tanzania project continues to partner with Geita Gold Mine (GGM) and Geita Town Council through a public-private partnership to implement IRS in Geita town. The campaign is planned for mid-June, and will cover roughly 20,000 structures. PMI will provide the insecticide and technical support through AIRS, while GGM will provide financial resources to cover the campaign costs. Geita Town Council will continue to provide the operations sites and co-supervise the campaign. AIRS Tanzania will submit an addendum to report on the Geita spray campaign upon its completion.

The following are project achievements and key highlights of the January–April 2017 spray campaign (see Table 1), which lasted 55 operational days:

- The project exceeded its target of spraying 615,393 structures in Tanzania and Zanzibar. Overall, the project sprayed 664,622 structures out of 700,085 structures that spray operators (SOPs) found in the targeted districts on the mainland and in Zanzibar, accounting for a coverage rate of 94.9%. The project protected 2,568,522 residents, including 490,049 children under five years of age and 94,122 pregnant women.
- In Zanzibar, the project sprayed 38,884 structures out of 42,147 structures that SOPs found in the targeted districts, accounting for a coverage rate of 92.3%. The project protected 191,119 residents, including 32,946 children under five and 5,746 pregnant women.
- In mainland Tanzania, the project sprayed 625,738 structures out of 657,938 structures that SOPs found in the targeted districts, accounting for a coverage rate of 95.1%. The project protected 2,377,403 residents, including 457,103 children under five and 88,376 pregnant women.

- The project trained 3,630 individuals to deliver IRS in the 18 districts of mainland Tanzania and Zanzibar. Of these, 2,991 were SOPs (1,812 males and 1,179 females), 97 were supervisors (71 males and 26 females), 479 were team leaders (290 males, and 189 females), and 63 were clinicians (42 males and 21 females). Females accounted for 39.4% of SOPs trained to implement IRS. Overall, 35.65% (1,681) of all IRS trained personnel for the January–April 2017 campaigns were female.
- The project used 211,118 bottles of Actellic 300CS insecticide to spray 664,622 structures in the 18 IRS districts, with a utilization ratio of approximately 3.1 structures sprayed per bottle of insecticide.
- The project will safely dispose of all IRS insecticide contaminated wastes, including 211,118 empty high-density polyethylene bottles and used masks. A National Environment Management Council (NEMC)-certified recycling company will recycle the bottles. The AIRS Tanzania Project incineration plants in Mwanza and Zanzibar will incinerate the masks. The project will use best management practices to dispose of other waste, including used gloves and boots, and assorted damaged plastic items.
- Wall bioassays conducted within one week of spraying in January–April 2017 to assess the quality of spraying in the target districts recorded mortalities of susceptible *An. gambiae* Kisumu strain ranging from 90.8% to 100%.

TABLE 1: 2017 AIRS TANZANIA CAMPAIGN SUMMARY

	Zanzibar	Tanzania Mainland	Total
Number of districts sprayed by PMI-supported IRS in 2017	9 (Central, Chakechake, Micheweni, Mkoani, North A, North B, South, West, Wete)	9 (Bukoba Rural, Missenyi, Ngara, Chato, Nyang'hwale, Butiama, Musoma Rural, Kwimba, Sengerema)	18
Insecticide	Pirimiphos-methyl (Actellic®300 CS)	Pirimiphos-methyl (Actellic®300 CS)	
Number of structures targeted by PMI-supported IRS	40,488	574,905*	615,393*
Number of structures found by SOPs	42,147	657,938	700,085
Number of structures sprayed by PMI-supported IRS**	38,884	625,738	664,622
Spray coverage	92.3%	95.1%	94.9%
Total population protected by PMI-supported IRS	191,119	2,377,403	2,568,522
Children under five	32,946	457,103	490,049
Pregnant women	5,746	88,376	94,122
Dates of PMI-supported IRS campaign	Feb. 14–Mar. 1, 2017	Jan. 25–Feb. 21, 2017 Mar. 8–Apr. 4, 2017	
Length of campaign (in days)	14	48	55***

Number of people trained with United States Government funds to deliver IRS****	429	3,201	3,630
Supervisors	12	85	97
Team leaders	56	423	479
SOPs	351	2,640	2,991
Clinicians	10	53	63

Note:

* This includes 20,000 structures to be sprayed through a public-private partnership arrangement with GGM that has yet to happen.

**This excludes data from the GGM spray campaign that has yet to happen.

*** The first seven days of the Zanzibar campaign overlapped with the January 25 campaign on the mainland.

**** This is based on the PMI indicator definition. It includes only spray staff such as SOPs, team leaders, supervisors, and clinicians. It excludes data clerks, information, education and communication (IEC) mobilizers, drivers, washers, porters, pump technicians, and security guards.

1. COUNTRY BACKGROUND

The United Republic of Tanzania has a total area of 947,480 km², with a 2017 population estimated at 56,022,007. The country has two ministries of health and two programs supporting malaria control, one for mainland Tanzania and one for the Islands of Zanzibar respectively. The NMCP is responsible for the mainland, while the Zanzibar Malaria Elimination Programme (ZAMEP) is responsible for Zanzibar malaria control.

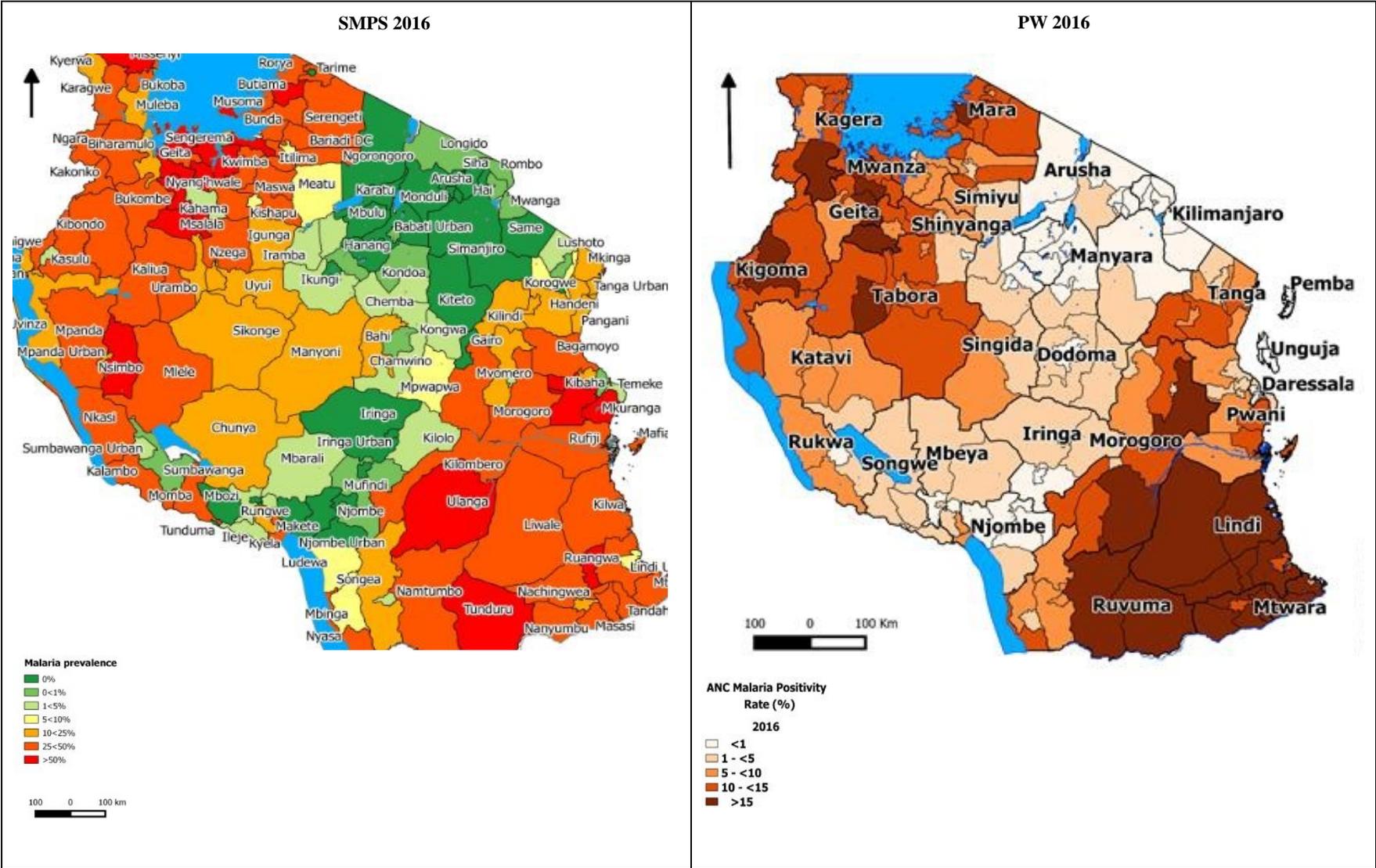
1.1 MAINLAND TANZANIA

The malaria situation in mainland Tanzania has changed over time and there is increasing evidence that malaria prevalence dropped significantly over the last decade following scale up of interventions to achieve universal coverage. An analysis of health facility data in the national routine reporting system, the District Health Information System 2 (DHIS2), over the period 2004 to 2016 indicates a decreasing trend of malaria incidence and mortality rate.

Importantly, malaria endemicity as reported in the last three Malaria Indicator Surveys (MISs) show heterogeneity across and within the regions, underscoring the need for deployment of appropriate interventions for each stratum. A review of the last three MISs shows declines in the prevalence of malaria among children under age five from 18.1% in 2007–2008 to 9.5% in 2011–2012; but this was followed by an increase to 14.8% in 2015–2016 according to the mRDT results (2007–2008 THMIS; 2011–2012 THMIS; 2015–2016 TDHS-MIS). There are spatial disparities across regions: the highest prevalence is 41% in Kagera region, and the lowest is <1% in Njombe, Dodoma, Arusha, Manyara, and Kilimanjaro regions (2015–2016 TDHS-MIS, p. 272). Recently observers have noted that while younger people used to be more affected compared to older ones, currently even older age groups are at increased risk (Malaria Surveillance Bulletin Issue #1, 2017). Similar patterns have been observed from the findings of the School Malaria Parasitological Survey (SMPS) (SMPS report, 2016), and the reported malaria positivity in antenatal care (Malaria Surveillance Bulletin Issue #1, 2017).

Almost the entire population of the Tanzania mainland is at risk of malaria. There are, however, considerable variations in levels of transmission due to a range of factors including geography and climate; level of urbanization; access to health care; economic indicators; and access to prevention methods; as well as land use patterns.

FIGURE 1: MAP TO SHOW SENTINEL POPULATION MALARIA PREVALENCE FOR 2016 THAT INDICATES MALARIA SITUATION ON MAINLAND TANZANIA



(Source: SMPS report 2016, p. 21, Malaria Surveillance Bulletin issue #1 2017, p. 5)

1.2 ZANZIBAR

Zanzibar is an archipelago, 25–50 kilometers (16–31 miles) off the coast, northeast of the Tanzania mainland. It consists of numerous small islands in the Indian Ocean and two large ones: Unguja, the main, formally referred to as Zanzibar and Pemba). The islands cover 2,461 square kilometers (950 square miles). Zanzibar currently has an estimated population of 1,303,568.

The two islands of Zanzibar experience differences in annual rainfall, temperature, and humidity. Similarly, there is variation of vegetation from the north to the south districts and between the western and the eastern coastlines. The distribution and density of the main vector is associated with these ecological differences, potentially resulting in varying natural malaria epidemiological patterns.

From 2011, malaria incidence has been consistently higher in Unguja compared with Pemba. Of late, the highest malaria incidence has been in the West and Central districts, which are linked to irrigation schemes and seasonal labor. In Pemba, ZAMEP documented higher incidences of malaria cases in the Chakechake and Micheweni districts.

Throughout implementation of the Malaria Early Epidemic Detection System (MEEDS) and Malaria Case Notification (MCN), the ZAMEP has been identifying *Shehias* that are malaria hotspots with continued malaria transmission.

1.2.1 SELECTION OF ZANZIBAR INTERVENTION AREAS

Like the FY 2015 Malaria Operational Plan (MOP), the 2016 MOP states that ZAMEP is to use proactive and reactive spraying of “hot spots.” This means that AIRS Tanzania is to spray known hot spots from the previous year and spray areas this year that meet the “hot spot” criteria during the course of the transmission season. The criteria include *shehias* reporting at least four or more weekly cases and a 150% increase in weekly cases compared with the average from the previous three weeks.

The selected *shehias* for the 2017 campaign were determined by ZAMEP, PMI and AIRS using incidence data covering the period from January to November 2016 for all *shehias* up to a maximum of 40,000 structures. This included a total of 72 *shehias* (52 in Unguja and 20 in Pemba) from 4 and 5 districts of Pemba and Unguja, respectively. The selected *shehias* had malaria incidence ≥ 4.1 cases per 1,000 population.

1.3 MAINLAND TANZANIA

1.3.1 SELECTION OF INTERVENTION AREAS

The NMCP, in conjunction with PMI and other key malaria vector control stakeholders selected the 2017 intervention areas. Through consensus, it was agreed that spraying the same districts for a minimum of three years would have a greater impact than rotating intervention districts every year. A decision was therefore made to keep the same eight districts of Ngara, Musoma rural, Missenyi, Kwimba, Sengerema, Chato, Butiama, and Bukoba rural that were sprayed in 2016. In addition, a ninth district of Nyang’hwale was added following Tanzania’s becoming part

of the Next Generation IRS program (NGenIRS), which subsidizes the price of long-lasting insecticide. This subsidy enabled AIRS Tanzania to save money on insecticide and use the money saved to expand coverage by one more district during 2017.

2. PRE-SPRAY ACTIVITIES

2.1 INSECTICIDE SELECTION

The NMCP, ZAMEP and PMI chose pirimiphos-methyl (Actellic 300CS) for the 2017 IRS campaigns in mainland Tanzania and Zanzibar, in accordance with the respective interim insecticide resistance monitoring and management plans for Tanzania and Zanzibar, and because it continued to show effectiveness. The same insecticide was effective during the 2016 spray, lasting over eight months post spray.

TABLE 2: TARGET STRUCTURES AND PROJECTED POPULATION IN THE 18 DISTRICTS¹

Region/Zone	District	Population*	Number of Target Structures
Kagera	Ngara	237,478	54,211
	Missenyi	188,543	45,344
	Bukoba rural	271,088	63,744
Geita	Chato	279,289	76,482
	Nyang'hwale	185,871	41,135
Mara	Musoma rural	153,502	36,682
	Butiama	181,533	52,748
Mwanza	Sengerema	372,538	105,129
	Kwimba	313,276	79,430
Unguja	Central	41,270	8,404
	North A	5,728	1,140
	North B	33,255	6,360
	South	13,149	2,483
	West	41,849	8,387
Pemba	Chakechake	3,260	649

¹ Target does not include Geita Town Council population; that is 107,623, and 20,000 structures.

	Micheweni	42,022	8,538
	Mkoani	3,549	706
	Wete	19,202	3,821
Total	18	2,386,402	595,393

*Based on population found in 2016 spray campaign.

FIGURE 2: MAP OF TANZANIA MAINLAND AND ZANZIBAR SHOWING IRS TARGETED ZONES AND REGIONS²

² Source: DHIS2 Tanzania, <https://dhis.moh.go.tz/>

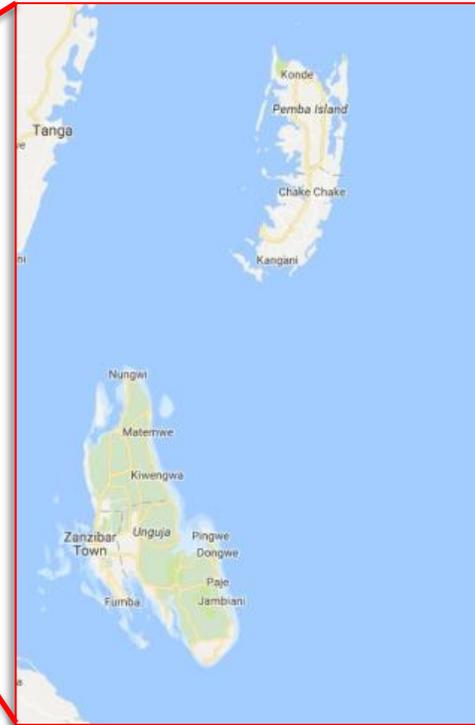
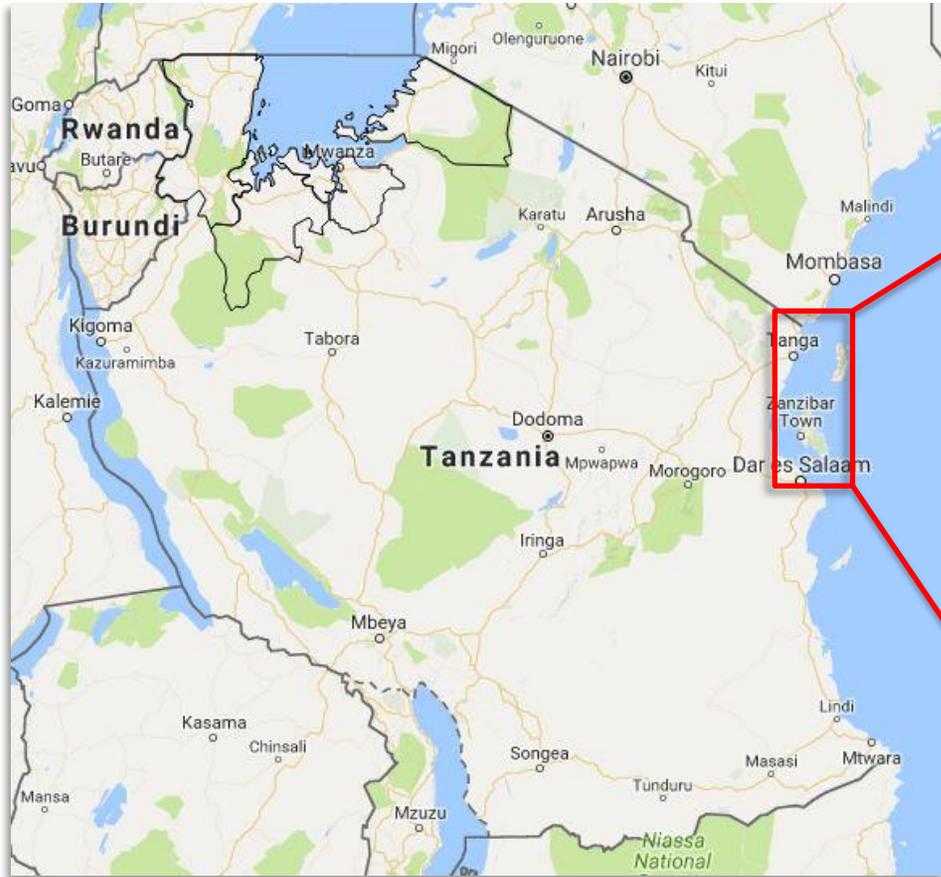


FIGURE 3: TANZANIA MAINLAND MAP SHOWING IRS TARGETED DISTRICTS³



³ Source: DHIS2 Tanzania, <https://dhis.moh.go.tz/>

2.2 PLANNING AND PREPARATION

For the second year, AIRS Tanzania in collaboration with PMI, NMCP and ZAMEP developed and disseminated the Race to the Starting Line (RSL) and an IRS activity schedule to all stakeholders for review and planning for the IRS campaign. The RSL is based on a nine-week pre-spray countdown showing deadlines for activities leading toward the spray campaign, while the IRS activity schedule is a document listing activities and exact dates when the activities are to be implemented. RSL and the IRS activity schedule ensured harmonization of spray schedules to protect vulnerable populations during historic peak transmission seasons based on malaria morbidity data trends collected by NMCP and ZAMEP. The IRS schedule listed dates for recruitment, procurement, advocacy, micro planning meetings, and launch of the IRS campaign. Other dates listed include those for logistics arrangements, materials distribution, and environmental compliance assessments.

AIRS Tanzania planned to have two consecutive spray campaigns of 24 operational spray days each in the Mainland and 14 operational days for the Zanzibar campaign. Because, as had been expected, the rains came early, spraying began on January 25 and lasted 24 operational days in the Kagera region (Ngara, Missenyi and Bukoba rural districts) and Geita region (Chato and Nyang'hwale districts). The Zanzibar spray campaign began on February 14 and lasted 14 operational days. Thereafter, Mwanza (Sengerema and Kwimba districts) and Mara (Butiama and Musoma districts) held the last spray campaign which began on March 8 and lasted 24 operational days. The timing of the spray campaigns is expected to provide protection over the key transmission periods both in the Lake Zone and on Zanzibar.

2.3 REGIONAL AND DISTRICT SENSITIZATION MEETINGS

During spray preparation, the project held regional and district advocacy meetings in both mainland Tanzania and Zanzibar with regional and district health management team members, regional and district administrative leaders, national security officers, NMCP, ZAMEP, NEMC, and Zanzibar Environmental Management Agency (ZEMA) representatives. Planning meetings focused on the following agenda items:

- Inform stakeholders at the district level about the AIRS Tanzania project objectives, goals, and planned activities.
- Assess previous IRS challenges and lessons learned, and make recommendations to improve performance during the 2017 IRS campaign.
- Share and review the 2017 IRS operation plan and make recommendations for improvement.
- Share how to best engage and solicit community participation and involvement of local leaders, particularly hamlet leaders, prior to, during, and after the spray campaign.
- Evaluate methods used in IEC/behavior change communication (BCC) before and during the campaign.
- Outline the role and involvement of community leaders, specifically hamlet and district supervisors, during the IRS campaign.
- Obtain collective administrative and political will, commitment, and collaboration for

implementation of the project.

As a follow-up to these sensitization meetings, AIRS Tanzania and the NMCP/ZAMEP organized pre-spray village advocacy meetings that involved community leaders from district, ward, *shehia*, village, and hamlet levels. Participants at these meetings were local leaders – i.e., hamlet leaders, village chairpersons, village executive officers, ward councilors, ward executive officers, and *shehas*, as well as site mobilizers and district IRS Technical Teams (DITTs). After the ward advocacy meetings, hamlet leaders went back to their communities, where they conducted door-to-door sensitization to prepare their communities for IRS.

2.3.1 MICRO PLANNING MEETINGS

Following the regional and district advocacy and sensitization meetings, AIRS Tanzania conducted district micro planning meetings in all the target districts. The main objective was to discuss roll-out and implementation of the IRS operational plan in the districts. Participants at the meetings included District Malaria Focal Persons (DMFP), District IEC Officers (DIECO), District Vector Control Officers (DVCO), and District Health Officers (DHO). These four district officers constitute the DITT during the campaign. The following issues were discussed:

- Progress in implementation of the planned activities
- IRS activity schedule
- Recruitment of temporary IRS staff
- Districts' roles and responsibilities in provision of stores in all operational sites and data centers at the district level
- Role of local leaders in supervision of IRS activities during the operations
- Renovation of IRS operation sites
- Community mobilization plan for IRS with emphasis on hamlet leaders working with site mobilizers
- IRS approaches to be deployed

It was agreed that regular feedback was the cornerstone for success at each stage during project implementation.

2.4 PROCUREMENT OF IRS MATERIALS AND EQUIPMENT

Procurement of IRS commodities was categorized into international and local procurement to ensure cost-effectiveness and timely delivery of commodities.

2.4.1 LOCAL PROCUREMENT

Local procurement involved an open competitive tendering process in which the project released solicitations for quotes for services and materials. The project constituted a procurement committee, which managed the vendor selection process. The committee based awards on the lowest-cost and technically acceptable bid according to the solicitation criteria. The services/items that the committee procured locally included the following:

- Transportation services for IRS distribution, operations, and supervision
- Printed materials for IEC, IRS data collection, and commodity tracking
- Personal protective equipment (PPE)
- Food for spray teams' breakfast supplies
- Operation site refurbishment materials, including materials for soak pits

Annex A provides details of local purchases, indicating quantities procured for each item.

2.4.2 INTERNATIONAL PROCUREMENT

The items that the committee procured internationally included the following.

- Insecticide (Actellic 300CS)
- Goizper pumps and accessories
- Control flow valves and seals
- Gloves and nose masks
- Face shields and brackets
- Hudson pump spare parts and nozzles

Annex B provides details of international purchases, indicating quantities procured for each item.

2.5 LOGISTICS AND STOCK MANAGEMENT

AIRS Tanzania set up 120 operational sites for the mainland and Zanzibar to support the 2017 IRS campaign. The project hired 120 storekeepers to be the custodians of the operational site stores and two additional storekeepers for the Bukoba region and Pemba zone warehouses.

AIRS Tanzania had 24,852 insecticide bottles brought forward from the 2016 campaign. A total of 196,558 bottles were ordered for the 2017 campaign, and the project received 13 extra bottles from the manufacturer (196,571). The insecticides were distributed as 208,136 bottles for the mainland and 13,287 bottles for Zanzibar.

FIGURE 4: IRS CENTRAL WAREHOUSE



IRS materials for the 2017 campaign were distributed two weeks before the IRS campaign began. This enabled storekeepers to verify that the needed materials were available and to store them as appropriate in their respective sites. The availability of IRS materials at sites during training made it possible for the spray teams to have dress rehearsals during the spray operator training, at which time any shortcomings could be identified and addressed. Insecticides and food items were distributed to the sites the week of the campaign for verification and storage. Spray operator and supervision vehicles were at operational sites and respective districts one day before the start of the IRS operation.

During the IRS campaign, districts and regional supervisors, as well as project staff and visiting PMI and NMCP personnel, conducted warehouse inspections in every operational site. This was done to monitor the movement of materials and insecticides and to ensure environmental compliance. At the midpoint of the operation, insecticide was resupplied. Supervisors ensured that storekeepers promptly updated their records and that records matched physical stock counts in the stores at all times.

2.6 IRS TRAININGS

During the planning period, AIRS project staff prepared and reviewed IRS training presentations and documents. These were then shared with national facilitators who facilitated the training. Tables 3 and 4 provide details on the types of training, key topics covered, targeted cadres, and the number of participants from each region of mainland Tanzania and Zanzibar, disaggregated by sex. The project held training for all cadres of staff excluding water fetchers.

TABLE 3: IRS TOPICS COVERED DURING TRAININGS

Type of Training	Key Topics Covered
Training of Trainers for IRS district coordinators, supervisors, and team leaders	IRS planning; insecticide selection; logistics, storage, safe handling, and safety issues in IRS; IEC and community mobilization; compression pump components, use, and maintenance; spray techniques; monitoring and supervision; data quality assurance; gender awareness
Spray operators	Insecticide and equipment handling, use of PPE hazard management; environmental risk awareness; spray techniques; data collection; waste management; gender awareness
Mobilizers	Key IRS concepts; human, health and environmental safety; behavior change concepts; communication and information transfer techniques; IEC/BCC; monitoring and evaluation (M&E)
Storekeepers	First expired/first out arrangement; stock card management; PMI IRS Best Management Practices on warehousing; environmental compliance and safety issues; managing operational sites, gender awareness
Pump maintenance technicians	Spray pump handling and planned preventive maintenance; calibration of spray equipment; assembling and maintenance of control flow valves for Hudson pumps and for Goizper pumps; differences between types of pump were explained in detail
Washers	Environmental and personal safety during washing of coveralls
Security guards	Security and safety
Drivers	Journey management; terrain of operational area; safe handling and transport of insecticides; human, personal health, and environmental safety; handling IRS commodities; spill management
Finance assistants	Effective payment of field staff; payment documentation
Data entry clerks/M&E assistants	Database error checking methods; data validation, search/edit functions
Health workers/clinicians	Insecticide poisoning management; poisoning prevention and mitigation practices; health hazard and side-effect management

Table 4 shows the number of trainees for each type of training and staff cadre trained, segregated by sex.

TABLE 4: IRS TRAINING AND PARTICIPANTS, MAINLAND AND ZANZIBAR

Cadres of People Trained	Training on IRS Delivery						Other Trainings																Total			
	Training of Trainers		Spray Operations		Insecticide Poisoning Management		Mobilization		Store Management		Pump Maintenance		Washing		Security		Driving		Finance & Administration		M&E			Gender Awareness		
	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M		F	M	
National representatives	2	5																						2	5	7
Abt Permanent Staff	9	26																						9	26	35
DMFP and DITT	6	33																						6	33	39
Supervisors	26	71																						26	71	97
Team Leaders	18	29																						189	290	479
Spray Operators			1,179	1,812																				1,179	1,812	2,991
Clinicians					21	42																		21	42	63
Mobilizers							34	62																34	62	96
Storekeepers									47	85														47	85	132
Pump Technicians											3	93												3	93	96
Washers													10	12										109	12	121

Cadres of People Trained	Training on IRS Delivery						Other Trainings																Total		
	Training of Trainers		Spray Operations		Insecticide Poisoning Management		Mobilization		Store Management		Pump Maintenance		Washing		Security		Driving		Finance & Administration		M&E			Gender Awareness	
	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M		F	M
													9												
Security Guards															15	227									242
Drivers																	0	336							336
Finance Assistants																			1	2					3
M&E Assistants																					4	7			11
Data Clerks																					36	54			90
TOTAL M/F	232	425	1,179	1,812	21	42	34	62	47	85	3	93	109	12	15	227	0	336	1	2	40	61	1,681	3,157	4,838
TOTAL/training	657		2,991		63		96		132		96		121		242		336		3		101		4,838		

2.7 IRS HUMAN RESOURCES

Overall, the project hired 4,334 seasonal staff to implement the 2017 IRS campaign. Table 5 shows details of seasonal staff hired for each cadre during the 2017 campaign, disaggregated by sex. The proportion of women hired for each cadre is indicated in the last column. Women hired to work at supervisory levels such as site supervisors, team leaders, and M&E assistants accounted for 37.2% of all staff hired into supervisory positions.

TABLE 5: SEASONAL STAFF HIRED

Cadre	Female	Male	Total	% of Female hired
DMFP	3	6	9	33.3%
Supervisors	26	71	97	26.8%
Team Leaders	188	290	478	39.3%
Spray Operators (SOPs)	1,110	1,754	2,864	38.8%
Mobilizers	34	62	96	35.4%
Storekeepers	44	79	123	35.8%
Pump Maintenance Technicians	3	93	96	3.1%
Washers	109	12	121	90.1%
Water fetcher	16	97	113	14.2%
Security Guards	15	227	242	6.2%
Finance Assistants	1	2	3	33.3%
M&E Assistants	4	7	11	36.4%
Data Entry Clerks	34	47	81	42.0%
TOTAL	1,587	2,747	4,334	36.6%

3. INFORMATION, EDUCATION AND COMMUNICATION

The IEC/BCC activities focused on the following objectives:

- Inform the community on benefits of IRS while refuting common myths about it.
- Promote understanding and acceptance of IRS by educating the community about the purpose of the IRS campaign.
- Inform and educate householders regarding details on preparing their homes for spraying and post- spray safety requirements.

In 2017, the project used hamlet leaders to conduct the main thrust of the BCC initiative. The hamlet leaders worked closely with the site mobilizers.

3.1 ADVOCACY MEETINGS

AIRS Tanzania communicated IRS messages at the village level and conducted village/shehia advocacy meetings in all IRS regions in Mainland and Zanzibar. These meetings involved community leaders such as councilors, ward executive officers, village executive officers, and village mobilizers (community change agents). Advocacy to community leaders was conducted at ward level and facilitated by the district IEC focal persons. These meetings helped village leaders understand how to conduct the public IRS sensitization meetings in their areas. The aim of these meetings was to increase community awareness before the IRS operation. After the ward-level meetings, all hamlet leaders were assigned the task of going back to their respective hamlets to prepare their communities for IRS based on the calendar shared.

3.2 IEC AND BCC MATERIAL AND INFORMATION

The program engaged the local radio stations in Kagera, Mwanza, Mara, Geita and Zanzibar to air 138 radio spots and announcements. Of these announcements, 20 were aired in Pemba. . The spots were aired at intervals that maximized the duration and coverage pre- and mid-spray. The local radios the project engaged and districts covered were as follows:

- Radio Kwizera – Ngara
- Radio Vision – Bukoba Rural and Missenyi
- Radio Free Africa – Butiama, Musoma Rural, and Kwimba
- Radio Sengerema – Sengerema
- Radio Storm FM – Chato and Nyang’hwale

- Micheweni Community Radio (Radio Jamii) – Pemba

Table 6 shows details of IRS message dissemination channels broken down by district. In addition, AIRS Tanzania distributed 7,000 fact sheets and 1,060 Q&A sheets and put up 2,550 posters in the operation districts. Four radio spots titled "Tunahama Tena," "Jingle," "Dawa ya Ukoko," and "Bao," were also aired. The spots were prepared in collaboration with the Johns Hopkins University Center for Communications Programs. In Unguja and Pemba, there were no IEC materials disseminated instead Shehia leaders were used to convey information to the community.

TABLE 6: AIRS TANZANIA MESSAGE DISSEMINATION CHANNELS IN EACH OPERATION DISTRICT

Zone/Region	Location	Radio Spots	Fact Sheets	Q & A Sheets	IRS Posters
Kagera	Ngara	18	684	104	249
	Missenyi	18	572	87	208
	Bukoba rural		804	122	293
Geita	Chato	18	965	146	351
	Nyang'hwale		519	79	189
Mara	Musoma rural	18	463	70	169
	Butiama		665	101	242
Mwanza	Kwimba		1,002	152	365
	Sengerema	18	1,326	201	483
Mainland Total		90	7,000	1,062	2,549
Zanzibar	Unguja	0	0	0	0
	Pemba	20	0	0	0
Zanzibar Total		20	0	0	0
Grand Total		110	7,000	1,062	2,549

3.3 WORLD MALARIA DAY

To commemorate the 2017 World Malaria Day, AIRS Tanzania worked closely with the IRS regional authorities to host live radio phone-in programs during which IRS was emphasized. The teams planned and hosted radio phone-in programs lasting one hour in each region – i.e., Kagera, Geita, and Mwanza regions. The same was done in Unguja, Zanzibar.

4. IMPLEMENTATION OF IRS ACTIVITIES

AIRS Tanzania implemented IRS spray campaigns in three phases between January 25 and April 4, covering a total of 18 districts in mainland Tanzania and Zanzibar. Phase one lasted 24 operational days, from January 25 through February 21, 2017, in three districts of the Kagera region: Bukoba Rural, Missenyi, and Ngara, and two districts of Geita region: Chato and Nyang`hwale. The second phase lasted 14 operational days in Zanzibar, from February 14 through March 1, 2017, covering Unguja and Pemba Islands. The third phase lasted 24 operational days, from March 8, 2017, to April 4, 2017, in four districts: Sengerema and Kwimba in Mwanza region, and Musoma Rural and Butiama in Mara region.

4.1 IRS APPROACH

AIRS Tanzania used three IRS approaches in different districts. They include the district-based IRS, community-based IRS (CBIRS), and quasi-community-based IRS. For all approaches, spraying started from the more distant communities and ended with communities around the operation sites. In order to maintain quality of spray, control flow valves continued to be used with the Hudson sprayers and the new Goizper pumps.

4.1.1 DISTRICT-BASED IRS

The district-based approach is a centralized IRS approach where the operations and spray teams meet in one place and go out to the communities as a group, to spray. This model usually requires the spray teams to move very early in the morning and thereby reach the communities in question before the dwellers engage in other activities. The design uses vehicles to transport the spray teams for the entire duration of the campaign.

4.1.2 COMMUNITY-BASED IRS

CBIRS is an approach designed to decentralize the operations down to the community level. This design entails increasing the number of operation sites in a district to minimize distances from the sites to the target communities. It considerably reduces SOP travel distance from the operation sites to the target communities, such that operators may either walk or use bicycles to implement the campaign. It can also stimulate community participation as SOPs usually come from the target communities, villages, or hamlets. This design cuts costs associated with hiring vehicles for transporting the spray teams. For the second year, the project implemented CBIRS in Chato district, Geita region.

4.1.3 QUASI-COMMUNITY-BASED IRS

Quasi-community-based IRS is an AIRS Tanzania innovation that blends the district-based and community-based IRS approaches. It entails conducting two-thirds (16 days) of 24 operation days following a district IRS model, using rented vehicles. The remaining one-third (8 days) will

be implemented using the CBIRS approach, relying on bicycles. This approach reduces costs associated with vehicle rentals for the duration of the campaign, while maintaining the reduced number of operational centers as in the district-based approach. The rationale is that after 16 days of operation (having started from the distant areas), the coverage would be such that the spray teams could continue with bicycles and not exceed a radius of 10km per day. The project conducted the quasi-community-based IRS in Bukoba rural and Missenyi districts in Kagera region, Kwimba and Sengerema in the Mwanza region, and Butiama and Musoma rural districts in the Mara region.

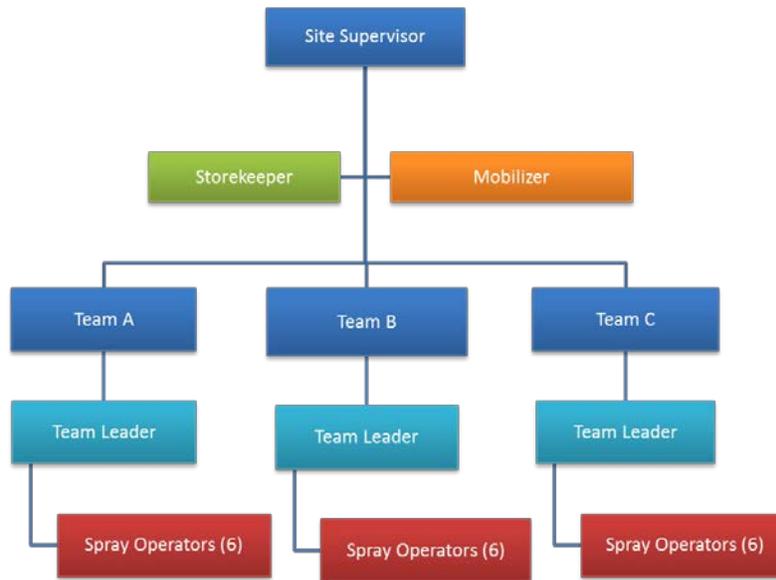
FIGURE 5: A QUASI COMMUNITY-BASED IRS IN MWANZA



4.2 COMPOSITION AND MANAGEMENT OF SPRAY TEAMS

In every operation site, the composition of IRS staff included the following cadres: one supervisor managing the spray teams in the field, a storekeeper, a site mobilizer, a pump technician, two site guards, a cleaner/washer, a water fetcher, and a team leader heading a team of SOPs. Each team had an average of six SOPs, and each site supervisor had an average of six team leaders per site. Spray operators reported directly to their team leader, who in turn reported to the supervisor. (See Figure 6.)

FIGURE 6: SITE'S ORGANIZATION CHART



Note: Numerical values represent # people of IRS cadres.

4.3 PAYMENT OF SEASONAL STAFF

AIRS Tanzania continued to use MPESA, a mobile money transfer service offered by Vodacom mobile network, to pay all seasonal staff on the mainland during IRS training and field operations, as it did in 2016. Bulk transfers of funds were made to each seasonal staff person's cell phone number after each training and twice during the 24-day operation.

The project hired finance assistants at the Mwanza Main Office, Bukoba Office and Zanzibar Office to help AIRS office coordinators compile payment lists, cross-check sign-in sheets, and verify phone numbers before payment. The project initiated all payments from the AIRS Mwanza Office. The office coordinators were responsible for distribution and collection of signed contracts from all seasonal staff (malaria focal persons, DITT members, SOPs, team leaders, supervisors, washers, water fetchers, storekeepers, security guards, and mobilizers) and collection of all timesheets for seasonal staff before preparing payrolls. Other roles include preparation of payrolls that the malaria focal persons approved and the regional coordinators submitted, and collection of payment documentation for hamlet leaders.

Because of the lack of reliable mobile payment options in Zanzibar, the project paid seasonal workers in cash during training and during the spray campaign. All seasonal workers received pay once at the end of the campaign. A police escort and the Zanzibar zonal coordinator accompanied the finance assistant as she disbursed the payments in cash.

4.4 MHEALTH

AIRS Tanzania partnered with Dimagi LLC to use the CommCare mobile health (mHealth) system again in 2017. The system enabled AIRS Tanzania staff and district supervisors to conduct standard supportive supervision, access daily spray data quickly, conduct data verification at the household level, and remind temporary staff about regulations and operational procedures through daily job aids. The system enabled real time sharing of data, and increased both the use of mobile technology and results-based decision making. Overall, the team managed the supervision system through CommCare, monitored supervision activities and data verification through CloudCare, and monitored site-level spray progress through Telerivet.

The mHealth reporting tools for data collection and verification, which the project used throughout the campaign, include:

- Supervisory Application

The supervisory application provided information on field activities for site supervisors, district coordinators, external supervisors and AIRS staff. The application was accessible through CommCare and was taught to users during the ToT training. Forms contained in the application were the morning mobilization and transportation, household preparation and SOP performance, storekeeper performance, and end of day cleanup. These forms were filled out and submitted to the CommCare system by users. Information reported was on spray performance and red flags during the campaign. Some of the red flags raised were refusals by communities, pump leakages, and need for additional items at sites such as gloves and painkillers.

- Data Collection Verification (DCV)

The M&E assistants used the DCV tool to collect household-level information on the spray status of randomly sampled households. The collected information was verified by comparing ward/*shehia*-level spray coverage to the AIRS database coverage of the same location. The margin of error during comparison was $\pm 5\%$ – i.e., any difference above 5%, given sufficient sample size, means there could be critical issues of data discrepancies. From 687 sampled structures in 58 wards & shehias visited, DCV produced 93.4% coverage rate while the Database had 94.5% coverage in the sampled wards and shehias with 169,319 structures.

- Performance Monitoring Tracker (PMT)

During their training, storekeepers were taught how to manage the PMT. Users were taught how to maintain a constant flow of data entry on the PMT sheet, which complements the PMT message system. At the end of each spray day, storekeepers sent PMT progress reports via SMS through the gateway to the Telerivet system that produced daily reports from the site to the national level on daily and accumulated results. The report enabled the team to note sites with low spray coverage, fluctuating progress, and insecticide consumption. The data reflected on communities' IRS response rate, unforeseen weather changes such as a brief rainy day, and estimation of sites' insecticide stocks throughout the duration of the campaign.

- Job Aid Messages

Supervisors, SOPs, team leaders, storekeepers, and district malaria focal persons received SMS messages to remind them about pertinent topics such as gender awareness, SOPs daily minimum number of targeted structures, donning personal protective equipment, and avoiding consuming food while on duty. On some occasions, emergency messages were sent out to cadres such as pump technicians, to either communicate changes or ensure adherence to IRS operating procedures, marking of structures, dissemination and use of IRS cards and stickers when in the field, and reminders to SOPs on depressurizing their tanks when moving between structures and in the vehicles.

4.5 DIRECTLY OBSERVED SPRAY

In addition to mHealth, AIRS Tanzania Database Manager with remote assistance from Ghana Database Manager established the DOS database in Access format. The DOS database allowed data entry of daily observed insecticide mixing and spray techniques of SOPs as observed by their respective Team Leaders. The information data source was the daily Team Leader DOS form. The information complimented PMT reports and mHealth supervisory feedback by specifying teams with identified red flags.

4.6 JOB AIDS

AIRS Tanzania printed job aids for three categories of field staff: SOPs, team leaders, and storekeepers. The project customized the booklets for each cadre of staff and used the booklets during the spray operation as pocket reference guides. All booklets were in the Swahili language.

4.7 JUNGUNI PILOT

AIRS Tanzania piloted an alternative model for IRS implementation using Community Health Committee members in Junguni *shelia*, Wete district, of Pemba Island. Junguni has 566 eligible structures. Ten members from the community health committee were selected to carry out the spray activities in the *shelia* based on demographic characteristics and previous experience working with community health programs. The selected community members had previously been involved in health interventions such as nutrition, immunization and mass drug distribution for schistosomiasis. Eight of the members functioned as spray personnel, one as a storekeeper and one as a supervisor. The pilot had high acceptance, and coverage above 90%.

5. POST-SEASON ACTIVITIES

5.1 POST-SPRAY EVALUATION

AIRS Tanzania conducted feedback meetings at the regional level to: 1) review the overall IRS programmatic implementation, experience, and achievements for the 2017 spray round; and 2) review IRS challenges and lessons learned in the target districts, and recommendations for improvement and the way forward for future spray campaigns.

The AIRS Regional Offices in collaboration with Regional Medical officers convened the review meetings. Due to the small size of the operation in Zanzibar, the project held only one meeting, which brought together delegates from Unguja and Pemba. ZAMEP convened the meeting with support from the AIRS Coordination office in Zanzibar. The post-spray review meetings were attended by the following:

- National: Representatives from NMCP in mainland Tanzania; and ZEMA and ZAMEP in Zanzibar
- Regional level: regional medical officers, regional health officer, and regional malaria focal person
- District level: DITT members, including district malaria focal person
- Representatives of each field IRS cadre, including those voted as best IRS performers from each district or region, who received recognition certificates

5.2 INVENTORY ASSESSMENT

All warehouses conducted a post-IRS inventory assessment of materials, insecticides and empty Actellic bottles after completion of the 2017 spray campaign. The inventory assessment report provides an update on the commodities and insecticides the project had before the campaign, quantities procured, items used during the campaign and items that remained after the campaign for future use. The report further indicates quantities of new, used, or damaged (requiring service or repair) items. In addition, it provides a list of items scheduled for disposal. Annex C shows the result of the post-IRS inventory.

5.3 DEMOBILIZATION

Immediately after the IRS operation, the project team decontaminated all IRS materials and left them to dry at the IRS sites. The materials were then demobilized from IRS sites to warehouses in Bukoba and Mwanza in mainland Tanzania, and Unguja and Pemba Warehouses in Zanzibar, for storage until the next IRS campaign. The project environmental compliance officer (ECO) led the post-spray IRS inspections and IRS sites closure with the support of the regional coordinators. The aim of the post-IRS inspections is to make sure that wastes were collected and disposed of safely, leaving the sites in an environmentally compliant condition. After confirming

that the sites were in a safe and well maintained state, the ECO formally handed back the sites to the local authorities for safe custody until the next IRS operation.

6. ENVIRONMENTAL COMPLIANCE

The focus of the environmental compliance activities was to ensure safety of field staff and community members and to avoid contaminating the environment. Prior to the start of the spray campaign a letter report was submitted to PMI.

6.1 PRE-, MID- AND POST-SEASON ASSESSMENT

6.1.1 PRE- IRS ASSESSMENT

A pre-IRS environmental compliance assessment was undertaken between November and December 2016. The exercise focused on the status of IRS operation sites and the required refurbishments for both the storage facilities and effluent management systems. Where new sites were being proposed, the assessment had to establish ideal places for locating the IRS sites according to best management practices guidelines and other local requirements. A team comprising the ECO, operations manager, and the six IRS regional coordinators accomplished pre-IRS environmental compliance assessment across 120 operation sites, of which 109 were in mainland Tanzania and 11 in Zanzibar. The exercise was conducted using pre-designed mHealth-based electronic data forms on smartphones that enabled scoring of specific conditions for every site. The assessing officer directly submitted the scored information to a central database on an automated server at Abt's Bethesda office. The server analyzed the submitted data and graded the sites as qualifying or non-qualifying for hosting IRS operations. Figure 8 shows a permanent standard site. The server also provided a list of gaps to be addressed at every site. The information was disseminated to various Abt staff including the chief of party, operations manager and ECO, who sorted out budgetary and logistic requirements for the refurbishment of sites in collaboration with the procurement team.

To comply with the importation requirement, project personnel delivered a sample of 17 bottles of Actellic 300CS for quality assay to the Tropical Pesticides Research Institute in Arusha. The Tropical Pesticides Research Institute found the Actellic 300CS to be of the required quality, with pirimiphos-methyl content estimated at 29.9%. This compares well with the World Health Organization (WHO)/United Nations Food and Agriculture Organization specification that ranges from 28.5 to 31.5%. A copy of the certificate of analysis appears in Annex E.

FIGURE 7: A COVERED SOAK PIT AT KABALE IRS SITE IN BUKOBA RURAL DISTRICT



6.1.2 MID-IRS ASSESSMENT

Mid-IRS assessment was conducted by a wide range of supervisory teams from AIRS and other stakeholders such as NEMC, ZEMA, NMCP, ZAMEP, and regional and district authorities. The exercise involved inspection to assess the level of environmental compliance through supportive supervision. Where gaps were established, immediate corrective measures were instituted; these included instructions to supervisees, and replacement or repair of missing or damaged tools.

6.1.3 POST-IRS ASSESSMENT

Post-IRS assessment was conducted after closure and demobilization of IRS supplies back to regional or central warehouses. Using pre-designed electronic data forms, the assessment scored various aspects that were meant to evaluate the status of the site after closure, to ensure that the environment was safe for residents and for life-supporting systems. The data was uploaded to the central server at a U.S. office of Abt Associates. An automated response was given indicating whether the site was safe or had some issues to address.

For 2017, permanent soak pits receiving effluent from the washing bays will be covered with iron plates firmly secured with padlocks (Figure 7). The aim is to prohibit access by humans and other organisms to the contaminated surface. In addition, it will prevent growth of plants, which eventually clogs the system.

FIGURE 8: STANDARD IRS SITE WITH A WASHING SLAB, SOAK PIT, WATER RESERVOIR AND ABLUTION FACILITIES AT SUGUTI IN MUSOMA RURAL DISTRICT



TABLE 7: IRS SITES THAT WERE REFURSHIBED PRIOR TO 2017 IRS CAMPAIGN

Location	Permanent Sites	Temporary Sites	Site Refurbished or Put Up (soak pit, storeroom, fence, etc.)
Tanzania Mainland	78	29	<ul style="list-style-type: none"> • 8 permanent IRS sites established • 5 temporary IRS sites established • 94 IRS sites refurbished
Zanzibar	12	2	<ul style="list-style-type: none"> • 1 permanent IRS sites established • 2 temporary IRS sites established • 11 IRS sites refurbished

6.2 WASTE MANAGEMENT

AIRS Tanzania employed different approaches for waste management, which include effluent detoxification, incineration, recycling, re-use, and disposal on the municipal landfill. Choice of the approach is guided by the nature of the waste (whether effluent or solid), level of contamination with insecticide, available technology for recycling, and laws and regulations as provided by USAID and the Government of Tanzania.

Effluent detoxification and soaking of effluent generated from washing pumps and sprayers' PPE was done using soak pits, which were constructed and installed having layers of gravel, stones, wood charcoal, and sawdust or rice hulls. These layers absorb the insecticides as they seep through the soak pit. This technique complies with the Best Practices Management manual standards, which the WHO, USAID, and the Government of Tanzania accept.

Empty high-density polyethylene plastic bottles previously containing Actellic 300CS will be recycled into electric conduit pipes by the plastic molding and recycling company (Mbope Investment) located in Dar es Salaam, as will cardboard that was used as secondary packaging material for the insecticide. The plastic bottles will be prepared prior to recycling by triple rinsing, removal of labels, and shredding. These prior preparations are meant to reduce the level of contamination and render the bottles less dangerous to the handlers. The empty insecticide bottles will be recycled into products that have minimal contact with human beings and cannot be used to handle clean water, food for humans, and animal feeds, based on NEMC regulations. For the 2017 campaign, a total of 211,118 bottles will be recycled (199,280 from mainland Tanzania and 11,838 from Zanzibar).

Solid wastes perceived as highly contaminated that can neither be recycled nor given away are incinerated at Nyanguge in Mwanza Region with an incinerator facility that can heat to > 1000°C. Wastes to be incinerated include contaminated masks, papers peeled off from bottles going out for recycling, and other secondary packaging material not suitable for recycling and that do not produce dioxins on burning.

Solid wastes perceived to be contaminated and damaged but not suitable for incineration will be disposed of at the municipal landfills. Items in this category include gloves, boots, coveralls, helmets and haversacks. Items with minor damage will be cleaned and given away to special groups in need of such items, such as street cleaners.

6.3 WORKER AND RESIDENT SAFETY

Various measures were put in place to ensure workers' and residents' safety during the 2017 IRS campaign in Tanzania.

The first safety measure was dissemination of information and knowledge on precautions to take for ensuring safety during the IRS operation. Through IEC/BCC, which was implemented by trained hamlet leaders, the project informed the communities of their responsibilities for household preparation and post-spray safety, and what to do in case of accidental insecticide contamination. In addition to safety information, health workers, site supervisors, storekeepers, team leaders, SOPs, washers and drivers received training on first aid in case of accidental poisoning with the insecticide. The project trained one clinician per health facility from each of the six selected health facilities per district. In Zanzibar, the project selected six clinicians from Unguja and three from Pemba. The health facilities were selected in consultation with the respective district medical officers. The preference was for health facilities close to spray areas, for ease of access by spray teams in the event of insecticide poisoning. The project gave the selected health facilities ampoules of atropine injections as antidotes for organophosphate poisoning. Strict compliance with guidelines for PPE use was also ensured for all field staff.

Drivers conveying both spray teams and insecticides were trained to comply with speed limits, and with guidelines for use of PPE and management of spills. Site guards were trained on use of fire extinguishers and management of accidental insecticide spillage.

All sites and vehicles for SOPs and insecticide transport had first aid boxes, material safety data sheets, spill kits, emergency procedures, spill cleanup procedures, and telephone contacts of the fire brigade, police, and ECO in case of emergencies.

In addition, AIRS Tanzania ensured that site supervisors and mobilizers, who were authorized to use motor bikes during the campaign, followed the motorcycle policy, which was aimed at regulating speed and ensuring compliance with road safety protocols.

7. ENTOMOLOGY

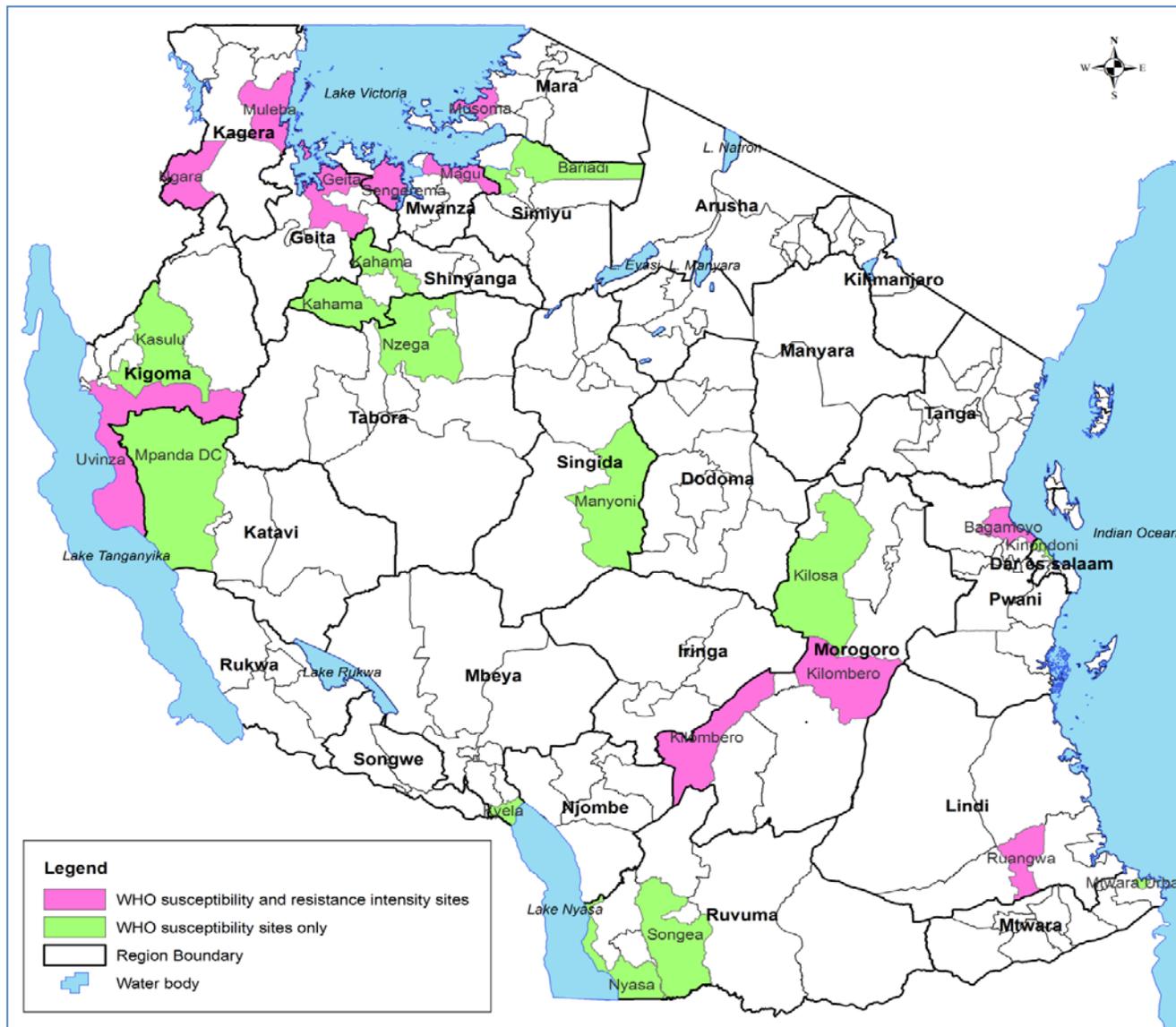
7.1 ENTOMOLOGY

Entomological surveillance is essential to determine the impact of vector control interventions, including IRS. AIRS Tanzania has put in place a subcontract mechanism with the National Institute for Medical Research (NIMR) Mwanza and Amani Centers, which are undertaking all entomological monitoring activities. The centers will test the susceptibility of local vectors to WHO-recommended insecticides. The NMCP will use the resulting data to decide which insecticides to use for IRS. AIRS Tanzania in collaboration with NIMR Mwanza conducted cone bioassays to assess the quality of spraying, and, going forward, will repeat them monthly to assess the decay rate of insecticide on walls. In addition, long-term entomological surveillance to monitor vector seasonality, abundance, distribution, and feeding and resting behaviors will be undertaken in selected district sentinel sites. Results for insecticide decay rate and long-term surveillance will be reported in the semi-annual and annual entomological reports.

The NIMR Amani Centre is conducting annual monitoring of vector susceptibility to WHO-recommended insecticides in 22 sentinel sites in mainland Tanzania. As much as possible, the 22 sentinel sites cover those areas with high malaria transmission across the country. These include Bagamoyo, Ruangwa, Geita, Kilombero, Uvinza, Muleba, Ngara, Sengerema, Musoma, Magu, Kinondoni, Mpanda, Kasulu, Kyela, Kilosa, Mtwara, Nyasa, Songea, Kahama, Bariadi, Manyoni, and Nzega. The WHO insecticide susceptibility tests will be conducted in all 22 sites above, while insecticide resistance intensity to deltamethrin and permethrin will be conducted in the first 10 sites only, from the above list. In addition, tests of insecticide resistance intensity to bendiocarb and pirimiphos-methyl will be conducted in Muleba and Ngara only. The sites for testing the intensity of resistance may be adjusted depending on the outcome of the WHO susceptibility tests, since they will be conducted in areas where respective resistance is detected in 2017. The current selection is based on the 2016 results, and is not expected to change much.

Wherever the Amani Centre detects resistance or tolerance, it will perform laboratory assays to determine the prevailing resistance mechanisms. These include biochemical and molecular biology techniques in addition to Centers for Disease Control and Prevention (CDC) bottle synergistic assays. In 2017, the NIMR Amani Centre will use WHO tube tests to test papers treated with deltamethrin (0.05%), bendiocarb (0.1%), alphacypermethrin (0.05%), permethrin (0.75%), and pirimiphos-methyl (0.25%). The center will conduct resistance intensity testing using CDC bottle bioassays with 1X, 2X, 5X, and 10X (or more) the diagnostic concentration of permethrin and deltamethrin, the most commonly used insecticides on long-lasting insecticidal nets in Tanzania. The Centre could test other insecticides based on the observed resistance pattern. NIMR Amani Centre field teams are currently conducting resistance testing, and no data are currently available for reporting.

FIGURE 9: MAP SHOWING DISTRIBUTION OF ALL THE 22 INSECTICIDE RESISTANCE MONITORING DISTRICTS IN TANZANIA MAINLAND



7.2 INSECTARY AND LABORATORY SUPPORT

The AIRS Tanzania project is providing support to insectary and entomology laboratory facilities in both NIMR partner institutions. AIRS Tanzania has ordered laboratory reagents and consumables for running the laboratories. NIMR Mwanza already has received other additional equipment, including CDC light traps, rotating bottle mosquito traps, Prokopak aspirators, and their accessories.

The Amani Centre partner has received WHO insecticide susceptibility test kits, and insecticide-treated papers. AIRS Tanzania has provided Wheaton bottles and insecticide for CDC intensity assays for vector resistance monitoring studies. With AIRS Tanzania support, NIMR Amani Centre and NIMR Mwanza conducted training of field teams in preparation for fieldwork. Teams are currently out in the field undertaking the tests. The project will include results from these field assays in the next report.

7.3 IRS QUALITY ASSAYS

The NIMR Mwanza Centre conducted cone bioassays to provide important feedback on the quality of spraying. The Centre conducted spray quality assessments in all nine districts of the Lake Zone. IRS quality assessment of the five districts in Zanzibar was done by ZAMEP (two districts in Pemba and three in Unguja) and reported directly to PMI. Only results for the mainland are included in this report.

The Centre sampled one village from each of the nine districts for wall bioassay tests. To minimize possible bias arising from SOP skills, they chose for testing houses sprayed by different SOPs and spray teams and with different wall substrates. The Centre randomly chose three houses of each wall surface type commonly found in the area for cone bioassay in each assessment sentinel site. The most common wall surface finishes in sentinel sites were mud, cement, white washed, painted, and burnt brick. Furthermore, the NIMR team tested two rooms in each house (bedroom and sitting room). To assess the spray quality on the different wall surfaces in each room, they tested two walls of the room by fixing each of the cones at about 1.0m and 2.0m high on each wall. The Centre carried out four cone assays in any one house using 10 adult female *Anopheles gambiae* mosquitoes per cone.

The NIMR Mwanza Centre did a control cone bioassay for every house bioassay tests on unsprayed surfaces by exposing mosquitoes to the unsprayed surface of a similar substrate. To avoid the possibility of the control mortality increasing due to the airborne effect of the Actellic 300CS formulations, the NIMR team did a bioassay on an unsprayed portable surface far away from any sprayed house or surfaces.

The Centre carried out cone bioassays according to WHO guidelines. The tests used a susceptible *Anopheles gambiae* s.s. Kisumu strain of mosquitoes reared at the NIMR, Mwanza Centre. The NIMR team exposed sucrose-fed, insectary-reared mosquitoes from two to five days old to the sprayed wall surfaces. The bioassays exposed batches of 10 mosquitoes for 30 minutes at two different points of sprayed wall surfaces (a lower level one meter high and the upper level two meters high) in each of the two rooms sampled in a house. At the end of the test, the team transferred mosquitoes using a pooter to insecticide-free paper cups and

supplied them with sugar solution. Paper cups with exposed mosquitoes were then placed in a wooden box covered with a damp towel. The NIMR team assessed knockdown 60 minutes after the end of exposure and scored mortality counts 24 hours after exposure. A mosquito was considered as alive if it could fly. When control mortality was between 5% and 20%, the NIMR team corrected experimental mortality using Abbott’s formula (Abbott, 1925).

7.4 RESULTS

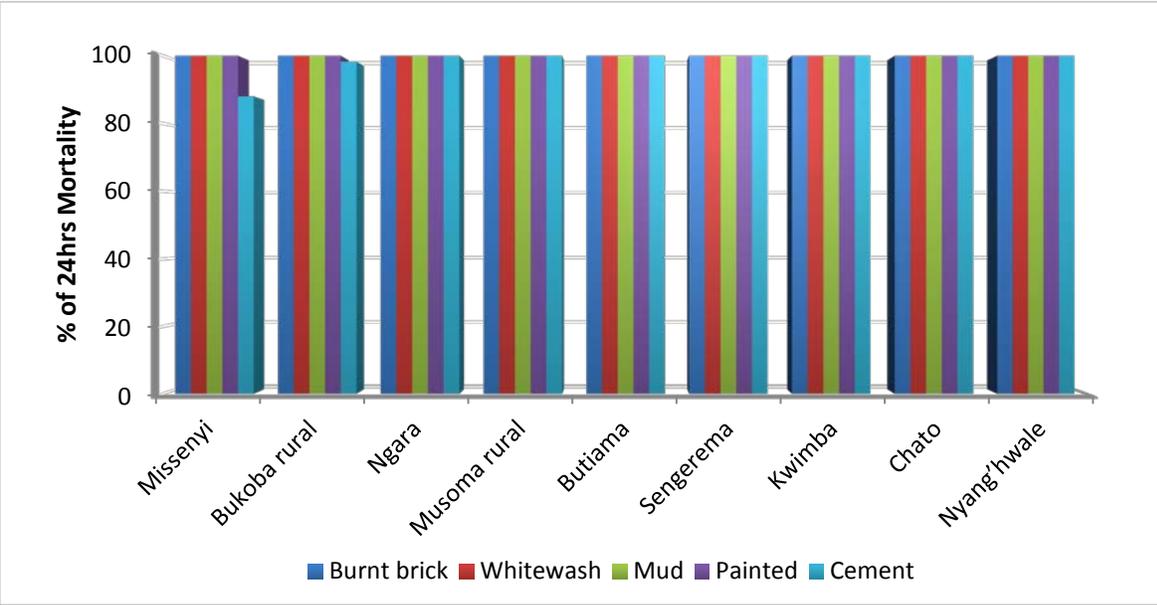
The sprayed surfaces mainly encountered and tested in the districts were mud, cement, white washed, oil painted and burnt brick. The Centre estimated the spray quality from the percentage mortality of the exposed mosquitoes from the WHO cone bioassay on the different types of sprayed surfaces. Mortalities scored from various wall surfaces ranged from 90.8% to 100%. Mortality in the majority of sentinel houses was 100%, and indicated that spray quality was acceptable in the houses tested. The NIMR Mwanza Centre will conduct bioassays monthly to determine the longevity of Actellic CS on the various wall substrates.

Table 9 shows mortality scores as the percentage of mosquitoes killed after exposure to different types of sprayed walls and 24 hours’ holding time for each district. Figures in parentheses show the total number of mosquitoes exposed on each surface.

TABLE 8: MORTALITY RATE OF MOSQUITOES 24 HOURS AFTER EXPOSURE TO DIFFERENT TYPES OF WALL SURFACE

District	% Mortality Scored 24 Hours Post Exposure (Number of Mosquitoes Exposed) on Each Wall Surface Type				
	Burnt Brick	Cement	Whitewash	Mud	Painted
Missenyi	100 (120)	90.8 (100)	100 (120)	100 (120)	100 (80)
Bukoba rural	100 (120)	98.3 (120)	100 (120)	100 (120)	100 (120)
Ngara	100 (80)	100 (120)	100 (80)	100 (120)	100 (120)
Musoma rural	100 (120)	100 (120)	100 (80)	100 (120)	100 (120)
Butiama	100 (120)	100 (120)	100 (120)	100 (120)	100 (120)
Sengerema	100 (120)	100 (120)	100 (120)	100 (120)	100 (80)
Kwimba	100 (40)	100 (120)	100 (120)	100 (120)	100 (40)
Chato	100 (120)	100 (120)	100 (120)	100 (120)	100 (120)
Nyang’hwale	100 (120)	100 (120)	100 (120)	100 (120)	100 (120)

FIGURE 10: MORTALITY RATE WITHIN 24 HOURS, TANZANIA MAINLAND



8. MONITORING AND EVALUATION

The monitoring and evaluation process for the 2017 IRS closely followed the 2017 AIRS Tanzania Work Plan and AIRS M&E Plan.

8.1 KEY OBJECTIVES

The key objectives of AIRS Tanzania M&E activities are:

- Emphasize timeliness of the data collection and accuracy of the data entry process through comprehensive training and supervision at all levels.
- Streamline and standardize data flow to minimize errors and facilitate timely reporting.
- Ensure IRS data security and storage for future reference through establishment and enforcement of proper protocols.

8.2 APPROACH AND OBJECTIVES

AIRS Tanzania implemented M&E using standard procedures, and incorporated lessons learned from the 2016 spray campaign. During the campaign, the AIRS Tanzania M&E system provided accurate and timely data through paper-based forms and the centralized Access AIRS. AIRS Tanzania observed a high level of data quality throughout the campaign by ensuring that teams maintained focus on achieving the M&E objectives as indicated above.

8.3 REPORTING INDICATORS

AIRS Tanzania's M&E Plan was used to ensure proper data collection and reporting of all approved core and other indicators. AIRS Tanzania used indicator targets to assess the project's progress during the campaign and will use the same data at the end of the project. The project used quality assurance methods and tools as outlined in the 2017 Work Plan to ensure high-quality IRS program implementation.

8.4 M&E DATA COLLECTION AND VERIFICATION TOOLS

During the 2017 AIRS spray campaign, data was collected and verified using standardized forms designed to capture all core PMI indicators.

The AIRS Tanzania M&E team adhered to M&E protocols and introduced modifications in the data collection tools based on 2016 feedback and reviews from project peers, the Home Office M&E specialist and the CTC team. These improvements ensured collection, management, and reporting of high-quality data. Both databases helped the M&E and operations teams to produce real-time reports for quick feedback, follow up on spray quality, reconcile data collection errors and prevent additional errors in data collection and entry through programmed quality checks.

Spray operators collected spray data, which were verified by team leaders and supervisors. Supervisors and supervision vehicles (for distant sites) transported the forms to the data entry centers. Data clerks performed a final verification of spray form data and arithmetic before entering the data into the database. At the end of each day, the M&E assistants reviewed the data entered for anomalies and addressed issues with data center staff. For quality control purposes and timely generation of weekly client spray progress reports, the standard was to enter all data within 48 hours of spraying. Data entry clerks filed and archived daily SOP forms at each of the data centers. Meeting the 48-hour data entry turnaround posed a challenge in some remote sites. At the end of each day, M&E assistants backed up all databases electronically; first, into a backup folder on each server that served as the district data entry server; second, into a cloud backup system (Dropbox); and third, onto an external memory card/MicroSD adapter inserted into each server. All servers and external memory cards are secured in the IT offices in Mwanza and Zanzibar.

TABLE 9: TANZANIA IRS 2017 DATA COLLECTION TOOLS

Data Collection Tool	Used by Whom and When
Training participants registration form	Used by lead trainer at training workshop to capture category and number of people trained, disaggregated by sex.
IRS card	Used by SOPs to record spray data. Data captured by the IRS cards includes: name of head of household, data of mobilization, name of mobilizer, data of visited household, number of structures, spray dates and signature of SOP.
Daily SOP form	Used by SOPs during spray operations to capture structures found, structures sprayed and not sprayed, population protected and not protected, and rooms found and sprayed. In 2017, further information was also collected: on the gender of the household representative that was interviewed during the SOP's visit, and on 2016 IRS card retention.
Daily Team Leader Summary Form	Used by Team Leader at the end of the spray day to compile all data from their respective SOPs. Like the Daily SOP form, they also capture structures found, structures sprayed and not sprayed, population protected and not protected, and rooms found and sprayed.

8.4.1 DATABASE PREPARATION

For the 2017 IRS campaign, two databases were used: the usual AIRS database that captures all the spray data from SOP forms

The AIRS Tanzania M&E team performed the following activities in preparation for the spray campaign:

- AIRS database

After reviewing the AIRS 2016 SOP Form, the team reviewed the 2016 AIRS database to identify the modifications/additions that needed to be incorporated in the 2017 AIRS

database to be in line with the data collection form. After identifying these needs, the team worked in close collaboration with the CTC to update and incorporate the additions into the database. This included translating some areas of the database screens/forms from English to Swahili, reviewing and testing the database, and providing necessary recommendations to ensure data quality at all levels and proper control of IRS data.

The M&E team ensured IRS data security and storage for future reference through:

- Establishment and enforcement of proper protocols
- Streamlined and standardized data information flow to minimize errors and facilitate timely reporting
- Emphasis on accuracy of both the data collection/verification and the data entry process through comprehensive training and supervision at all levels
- Facilitating recruitment and training of data entry clerks and M&E assistants on the database, data entry, and data management

Spray coverage was calculated as the proportion (percentage) of the number of structures sprayed out of the total number of structures that SOPs found in the field. Spray progress was the proportion (percentage) of the number of sprayed structures out of the total number of targeted structures. Final counts of “structures found” from the 2016 spray campaign served as targets for tracking spray progress and performance at the sector and district levels.

8.4.2 DATA QUALITY ASSURANCE AND CONTROL

To ensure data integrity, AIRS Tanzania used a number of quality assurance and control tools. Two standardized data quality assurance tools, the Error Eliminator and Data Collection Verification, helped improve the quality of data collection and data entry during the 2017 spray campaigns. These tools were used to assess the accuracy and completeness of SOP forms and verify household data. Table 11 describes the tools, their purpose, and their users.

TABLE 10: DATA QUALITY ASSURANCE TOOLS

Tool	Purpose, Used by Whom and When
Error Eliminator form	Purpose: <ul style="list-style-type: none"> • To check the completeness and correctness of data collected in the field • To identify quickly and highlight common data collection errors, make corrections, and provide re-training by the supervisor Used by: <ul style="list-style-type: none"> • Team leaders on a daily basis to check 100% of the forms the SOPs under their supervision filled out • Supervisors, district coordinators, M&E assistants, operations manager, database manager, and M&E manager when visiting the field
Data Collection Verification form	Purpose: <ul style="list-style-type: none"> • Used during randomized household visits to check the accuracy of

	<p>data collected in the field, i.e., to ensure that the data written on the daily SOP forms matches the information households reported and/or the data recorded on the IRS Cards disseminated to households</p> <p>Used by:</p> <ul style="list-style-type: none"> • M&E assistants • District and regional coordinators • Database manager and M&E manager
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TABLE 11: USE OF DCV FORM: COMMON ISSUES FOUND AND CORRECTIVE ACTIONS TAKEN

Errors/Issues Observed	Corrective Actions Taken
<p><i>Understatement of total number of eligible structures found by SOPs.</i> In compounds where some structures were locked, SOPs did not always count them as part of the total number of eligible structures found.</p>	<p>The M&E team provided correction regarding this error to SOPs, team leaders, and field supervisors. The team emphasized that all eligible structures were part of the count, whether locked or open. Spray teams were to probe further concerning the eligibility of structures, especially when the structure was locked. This was spotted early on, thus avoiding larger oversight during the campaign.</p>
<p><i>Overestimation of the total number of eligible structures found. In some compounds,</i> some new SOPs overcounted the number of eligible structures by counting the number of rooms as though they were structures. Also, some SOPs overcounted the total number of eligible structures by counting food stores and traditional shrines (especially when these structures were locked at the time of visit). Additionally, in some compounds, households convinced SOPs that structures that were under construction at the time of visit would be ready for occupancy in the next few days and thus eligible. These structures were counted as eligible with the hope that they would be ready for spraying during a revisit, but many were not completed in time to be covered and thus should not have been counted as eligible. However, this was a negligible number of structures.</p>	<p>The M&E team addressed SOPs, team leaders, and field supervisors, asking them to take note of these common errors and to be careful in determining the eligibility of structures before recording them. Spray teams were reminded that the eligibility of a structure is based on evidence at the time of the visit, not on its expected future eligibility. There is a need to strengthen SOP training next year to avoid some of the shortcomings observed.</p>
<p><i>Underestimation of the number of structures sprayed.</i> In some compounds the sprayed structures were undercounted. This was specific to very large compounds where SOPs had to make their way through different courtyards in the same compounds.</p>	<p>The M&E team asked SOPs, team leaders, and field supervisors to note this error and to be careful in counting both eligible and sprayed structures, especially in large compounds with different courtyards. In the future, SOPs will be given practical exercises during training before they can qualify to be SOPs.</p>

TABLE 12: DATA QUALITY ASSURANCE AND CONTROL

Issue	Method/Tools for Quality Assurance
Spray data integrity	<ul style="list-style-type: none"> • Use of standardized data collection forms • Comprehensive training for spray data capture • Multiple levels of supervision • SOPs supervised directly by their team leaders • Supervisors monitored the team leaders and verified SOP forms • M&E manager, database manager, and district M&E assistants monitored and verified data captured by SOPs, team leaders, and Supervisors • Structure spot checks to crosscheck daily spray data captured by SOPs • Database designed with locks and validation checks • Use of EE and DCV forms to ensure complete and accurate data collection
Spray data entry and management	<ul style="list-style-type: none"> • Data entry training for all data entry clerks and M&E assistants • Prompt field data entry and transfer; data collection forms arrived at data entry sites daily and daily data entry • Data entry via double-data entry method <ul style="list-style-type: none"> • Initial data entry of totals per data collection form • Follow-up entry of details data, i.e., data per individual household • Data scan for irregularities by database manager and IRS supervisory staff • Use of Microsoft Access-based IRS cleaning/reporting tool to clean data daily
Data security	<ul style="list-style-type: none"> • Data collection forms printed on durable sheets. • Paper data collection forms filed systematically in arc files. • Database designed with passwords to restrict unauthorized entry. • Databases backed up daily on the server laptop, on Dropbox, and on external memory cards.

8.5 M&E DATA ENTRY, TRACKING, STORAGE AND SECURITY

AIRS Tanzania employed 81 data entry clerks (10 in Chato, 5 in Nyang'hwale, 8 in Bukoba Rural, 7 in Ngara, 6 in Missenyi, 5 in Musoma Rural, 7 in Butiama, 14 in Sengerema, 10 in Kwimba, 6 in Unguja and 3 in Pemba) to enter all spray data generated from the 18 districts. Project laptops were used for spray data entry. The database setup entailed using a server in each district data entry center. The 2017 AIRS Tanzania database was installed on all servers and on each client laptop connected to the server. The project used double data entry, in which data were entered first by "Totals" (i.e., data entry by the total lines of each form) for quick reporting and feedback, then by "Details" (i.e., data entry by detail data for each structure) for more-accurate data entry and verification.

For the DOS database, the M&E assistants entered data on separate standalone laptops available at each data center.

8.5.1 DATA STORAGE

Box files were used to store paper-based forms – i.e., SOP forms, team leader daily summary forms, and supervisor forms. Team leaders had their own box files with their nametags, while supervisors and M&E assistants had one box file in which to file both supervisor forms and data collection verification forms. At the end of each day, all databases were backed up. The system used three backup methods: first, into a backup folder on the laptop that served as the district data entry server; second, into a cloud backup system (Dropbox); and third, onto an external memory card/MicroSD adapter inserted into each server. All computer and flash drives are secured in IT offices in the Mwanza and Zanzibar campaign.

8.5.2 DATA CLEANING

Data entry clerks at the district level cleaned the data, which involved the following:

- Ensuring correct entry of data forms by double entry method (entering first by totals and then by details)
- Ensuring completion of all necessary corrections so that the data entered by totals and details balance
- Checking whether any orphan record exists in the database and if so correcting it
- Checking and removing duplicate records
- Identifying and entering missing records

The data clerks used a Microsoft Access-based IRS cleaning/reporting tool for data cleaning. Data were cleaned daily throughout the spray campaign, with final data cleaning completed within five days of the end of the Lake Zone campaign and three days of the Zanzibar campaign.

9. RESULTS

9.1 POPULATION AND STRUCTURES FOUND

The spray campaign covered 664,622 structures out of the 700,085 structures found, resulting in 94.9% spray coverage and 111.6% spray progress (Table 14).

TABLE 13: SUMMARY OF TANZANIA IRS RESULTS FOR THE 2017CAMPAIGN

Zone/District	Targeted Structures	Total Structures Found	Total Structures Sprayed	Spray Progress (%)	Spray Coverage (%)
Bukoba Rural	63,744	70,136	69,083	108.4%	98.5%
Missenyi	45,344	50,856	49,494	109.2%	97.3%
Ngara	54,211	63,125	61,422	113.3%	97.3%
Chato	76,482	91,660	83,163	108.7%	90.7%
Nyang'hwale	41,135	52,468	50,099	121.8%	95.5%
Butiama	52,748	61,908	58,386	110.7%	94.3%
Musoma Rural	36,682	43,880	40,981	111.7%	93.4%
Kwimba	79,430	94,465	90,634	114.1%	95.9%
Sengerema	105,129	129,440	122,476	116.5%	94.6%
Mainland Total	554,905 ⁴	657,938	625,738	112.8%	95.1%
Pemba	13,714	13,757	12,901	94.1%	93.8%
Unguja	26,774	28,390	25,983	97.0%	91.5%
Zanzibar Total	40,488	42,147	38,884	96.0%	92.3%
Total	595,393 ⁵	700,085	664,622	111.6%	94.9%

9.2 POPULATION PROTECTED

During the 2017 campaign, 2,568,522 (95.6%) out of 2,687,348 people reached were protected by IRS. The number of people protected includes 94,122 pregnant women and 490,049 children under five. Table 15 provides a detailed summary of total population in each district, proportion protected, and total population protected, segregated into pregnant women and children under five protected.

⁴ Does not include the projected 20,000 targeted structures for the Geita Gold Mine campaign.

⁵ Same as above comment.

TABLE 14: PEOPLE PROTECTED DURING IRS TANZANIA 2017 CAMPAIGN

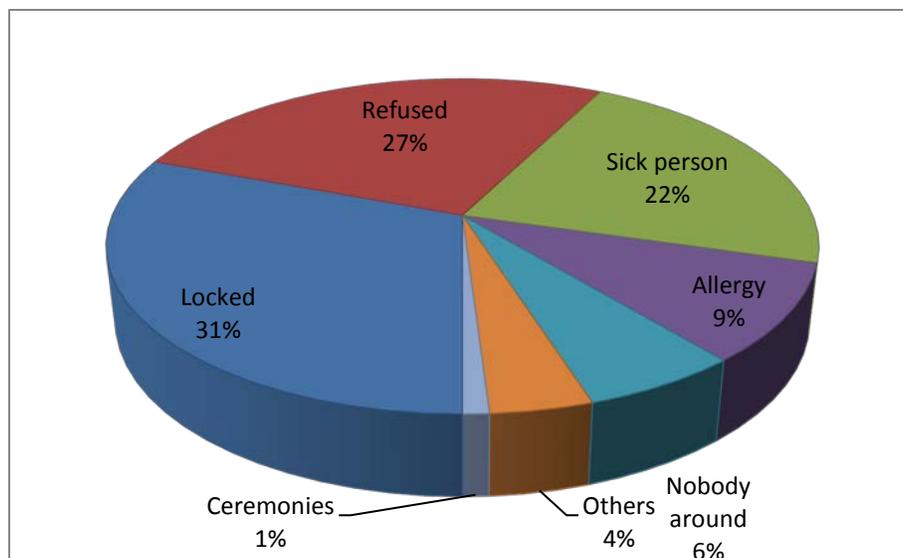
Zone/District	Total Population	# of People Protected	% of Pop. Protected	Pregnant Women Protected	Children Under Five Protected
Bukoba rural	301,329	297,283	98.7%	7,194	40,763
Missenyi	215,501	210,566	97.7%	6,789	31,191
Ngara	272,860	266,748	97.8%	7,623	48,238
Butiama	210,166	198,977	94.7%	7,428	39,216
Musoma rural	175,116	164,916	94.2%	4,558	34,042
Kwimba	337,133	324,587	96.3%	10,082	67,199
Sengerema	472,598	448,530	94.9%	22,547	91,646
Chato	313,655	288,411	92.0%	12,196	61,711
Nyang'hwale	184,123	177,385	96.3%	9,959	43,097
Mainland Total	2,482,481	2,377,403	95.8%	88,376	457,103
Pemba	73,792	70,075	95.0%	2,441	13,749
Unguja	131,075	121,044	92.3%	3,305	19,197
Zanzibar Total	204,867	191,119	93.3%	5,746	32,946
Grand Total	2,687,348	2,568,522	95.6%	94,122	490,049

9.2.1 REFUSALS AND STRUCTURES NOT SPRAYED

In the 2017 AIRS spray campaign, 35,463 structures (5.1%) were not sprayed. The reasons for structures not being sprayed were: locked structures (31%), refusals (27%), sick person in the structure (22%), allergy (9%), no adult was around (6%), "other reason" (4%), and ceremonies/funerals (1%).⁶ The pie chart in the figure provides detailed reasons for structures not sprayed across the whole campaign.

FIGURE 11: STRUCTURES NOT SPRAYED DURING 2017 IRS CAMPAIGN

⁶ These reasons also include revisits and the reasons why those revisits were not successful, for structures that were eventually sprayed. This is why the total of the reasons cited is larger than the total number of structures not sprayed.



9.3 USE OF INSECTICIDE

Spray operators used 211,118 insecticide bottles during the AIRS 2017 spray campaign to spray 664,622 structures. On average, one bottle sprayed 2.9 structures. Spray operators used an average of 3.5 bottles per day, and each operator sprayed an average of 10.3 structures per day. Table 16 shows details of insecticide consumption broken down by district.

TABLE 15: INSECTICIDE USE

District	Total Structures Sprayed	Total Bottles Used	Average Number of Structures Sprayed per Bottle	Average Number of Bottles per SOP per Day	Number of Structures Sprayed per Day per SOP
Bukoba Rural	69,083	20,893	3.3	3.1	10.1
Missenyi	49,494	13,655	3.6	2.8	10.0
Ngara	61,422	20,011	3.1	3.4	10.5
Chato	83,163	27,357	3.0	3.3	10.1
Nyang'hwale	50,099	16,263	3.1	3.6	11.2
Butiama	58,386	19,124	3.1	3.3	10.2
Musoma Rural	40,981	13,547	3.0	3.4	10.3
Kwimba	90,634	30,137	3.0	3.5	10.6
Sengerema	122,476	38,293	3.2	3.4	10.7
Mainland Total	625,738	199,280	3.1	3.3	10.4
Pemba	12,901	3,979	3.2	2.6	8.4
Unguja	25,983	7,859	3.3	2.5	8.4
Zanzibar Total	38884	11838	3.3	2.6	8.4
Total	664,622	211,118	3.1	3.3	10.3

At the end of the operation, 3,056 bottles of Actellic 300CS (excluding 7,241 bottles set aside for GGM spraying) remained unused and are safely stored in warehouses on the mainland for use in forthcoming operations. 3 insecticide bottles went missing in Chato and an incident report was submitted during the campaign.

9.4 COMMUNITY SENSITIZATION RESULTS

AIRS Tanzania conducted community meetings with local leaders including ward executive officers, village executive officers, village chairpersons, and council and community health agents and hamlet leaders. Table 17 provides a summary of the number of community meetings conducted and total number of participants for each district.

TABLE 16: COMMUNITY SENSITIZATION MEETINGS, AIRS 2017 CAMPAIGN

District	Number of Community Meetings	Total Number of Participants
Bukoba Rural	29	761
Missenyi	20	551
Ngara	22	590
Chato	25	891
Nyang'hwale	15	428
Butiama	18	508
Musoma Rural	21	531
Kwimba	30	1,172
Sengerema	47	1,244
Mainland Total	227	6,676
Pemba	28	10,097
Unguja	51	20,313
Zanzibar Total	79	30,410
Total	306	37,086

10. CAPACITY BUILDING

10.1 CAPACITY BUILDING DURING IRS TRAINING AND OPERATION

The PMI AIRS Project continued to build the capacity of local staff and government counterparts. Two separate five-day boot camp trainings took place in Mwanza (for the mainland) and Unguja (for Zanzibar), where participants from NMCP/ZAMEP and districts health staff participated. In addition, following the introduction of a new type of spray pump (Goizper pump), NMCP and key district health officials participated in a two-day pump training facilitated by Goizper in Mwanza.

As part of a hands-on approach to capacity building, the District medical officer's office (including the Vector Control officer, district IEC coordinator, district health officer and district malaria focal person) was fully involved in the planning and supervision of IRS in its respective districts. In addition, to strengthen ownership and joint planning, regional and district health teams were invited in Mwanza to jointly plan the 2017 IRS campaign.

Apart from the joint planning meetings, district and regional administrators such as district medical officers and regional medical officers were enabled to participate in IRS supervision. Others participating included the regional commissioners, regional administrative secretaries and regional malaria focal persons from each region. From the district level, there were district commissioners and district executive directors.

11. GENDER

The USAID policy of gender equality and women empowerment aims to improve lives of citizens around the world by advancing equality between men and women and empowering women and girls to participate fully and benefit from their society's development. In furtherance of this policy, AIRS Tanzania increased women's participation in the 2017 spray campaign to 36.6% from 34.5% in 2016. During recruitment of field staff, priority was given to women applicants in the event that a female candidate had an equal merit to a male candidate.

All operational sites were refurbished in such a way that they could accommodate males and females, ensuring clean, safe toilets and showers and changing rooms' facilities that ensured privacy.

11.1 GENDER TRAINING

AIRS Tanzania ensured that all permanent and temporary staff had training on gender awareness and inclusion before starting the spray campaign. The project incorporated gender awareness and inclusion in all IRS pre-spray training programs, which focused on PMI anti-sexual harassment guidelines. Project staff facilitated gender awareness for team leaders, site supervisors, storekeepers, SOPs, and all other temporary staff, including government personnel who were to work on the project during the spray campaign. Training was in Kiswahili so that all participants could understand it. Gender training established communication channels and hotlines to report any sexual harassment and gender-based violence among temporary staff.

11.2 GENDER INCLUSION IMPLEMENTATION

To ensure a gender-equitable working environment, the project translated the anti-sexual harassment guidelines into Kiswahili and printed them on big Plexiglas posters that were conspicuously displayed at all operation sites as well as at Abt offices. The anti-sexual harassment posters ensured that all staff were aware of the standard of the project on the subject, and therefore served as a deterrent, thus making the work site safe and free from harassment.

12. CHALLENGES, LESSONS LEARNED AND RECOMMENDATIONS

12.1 CHALLENGES AND LESSONS LEARNED

The main challenges experienced and lessons learned during the 2017 IRS campaign include the following:

12.1.1 CHALLENGES

- The recruitment procedure encountered challenges in some villages and wards where leaders wanted their relatives to be part of the IRS staff though they did not qualify.
 - In Kashozi site, Bukoba District, a vehicle accident involving the spray team as they returned from the field led to the death of one SOP, with eight others injured and five admitted to the hospital for a number of days.
 - Hudson pump leakages in some sites necessitated replacement of a number of the pumps with buffers. Hudson pumps required a lot of troubleshooting due to their old age, and this wasted time during IRS implementation.
 - Misconceptions about the relationship between IRS and bedbugs still persist in some communities.
 - Some districts did not provide enough resources as part of their contribution to IRS project implementation; e.g., Sengerema district did not have enough vehicles to support the project.
 - Structures were not sprayed for various reasons, ranging from householders being away; to having a very sick person in the house, funeral ceremonies, locked houses, some householders being allergic to Actellic, or refusal to have the house sprayed. The project scheduled revisits during mop-up in the last two days of the operation in order to cover houses missed earlier.
 - Some team leaders did not comply with the directive to fill out the DOS form while observing the SOPs spray. Some were found to have filled out the DOS forms later, in the evening at the sites. Also, only a few of the filled-out DOS forms suggested that the team leaders instituted any form of corrective action toward the SOPs. Most of the forms indicated that the SOPs were getting all the procedures correctly, whereas the converse was the case in some instances as witnessed during supervision.
 - Due to the geographical distribution of sites over vast areas in districts like Sengerema and Chato, there were some delays in arrival of data forms to data centers for entry.
-

- M&E assistants were over-occupied with activities/responsibilities, because they had to enter DOS forms into the DOS database on top of their daily activity of supervising data entry for the AIRS database, field spot checks, and filling out of DCV and error eliminator forms, among other tasks.

12.1.2 LESSONS LEARNED

- Involvement of hamlet leaders in mobilization reduced refusals; thus more structures were found and sprayed during this campaign.
- The use of hamlet leaders as community mobilizers made a significant contribution to the mobilization process and contributed to the success of the spray campaign.
- The introduction of a new marking protocol involving the IRS card number ensured that virtually all structures found were documented in the field.

12.2 RECOMMENDATIONS

- Scale up the use of Goizper pumps to more districts.
 - Introduce use of megaphones for the site IRS mobilizers and for public announcements in one of the district supervision vehicles.
 - Consider reducing the responsibilities of M&E assistants by recruiting one extra data entry clerk specifically for entering DOS forms; this will enable M&E assistants to deal with other important responsibilities such as data collection verification.
 - Supervision team should make sure that team leaders fill out the DOS form while directly observing the spray activity for each SOP.
-

ANNEX A: LOCAL PROCUREMENT

Description	Quantity
Assorted Materials	(per item unless noted)
Aprons	52
Bar soap	2,280
Barrel for solid waste	130
Basin 80 L	130
Batteries	3,154
Breakfast - Biscuits	104,551
Breakfast - Juice	104,551
Broom (soft)	255
Calculators	234
Chalk (pkt of 100)	749
Coveralls 5xl	590
Fire extinguisher (9kg)	38
First Aid Kits	255
Gumboot size 12	220
Gumboot size 10	220
Handkerchiefs	3,336
Haversacks	3,837
Helmet	2,341
Helmet Harness	3,017
Hoe	108

Description	Quantity
Liquid washing soap (5L)	720
Lubricant oil (1L bottles)	150
Neck Protection	7,340
Padlocks	205
Plastic bags for packing material	650
Plastic cup (0.5L)	1,320
Plastic cover sheets	798
Pregnancy tests for female spray personnel	1,884
Rake	16
Red Tin Bucket	47
Safety Signs and labeling	126
Sanitary Napkins for female spray personnel	1,999
Shovels	44
Sisal rope	240
Slashers/Cutlasses	23
Socks	3,670
Stationery - Attendance Register	55
Stationery - Box Files	14
Stationery -Clear bag files	1,985
Stationery- ID Card Holder	3,178
Stationery - Ledger Book	189
Stationery - Marker Pens	1,145
Stationery - Masking Tape	878
Stationery - Notebook	5,758
Stationery – Pens	9,537
Stationery - Puncher Machine	86

Description	Quantity
Stationary - Stapler Machine	101
Stationery - Stapler Pins	132
Stationery - Visitors Book	88
Stationery - Flip Chart	285
Thermometers	107
Tool Kits for TL	131
Torch	717
Toilet Paper	3,193
Tooth Brush (for cleaning nozzles)	927
Towel	3,456
Vest – Yellow	151
Waste Baskets for wash rooms	120
Whistle for security	177
Yellow Hazard Bags	240
Waste Baskets kept in vehicles	120
Water Tanks	48
Printed Materials	
<i>M&E Forms</i>	
IRS Cards	707,250
Spray Operator Forms	83,955
Team Leader Forms with DOS at the Back	15,950
Error eliminator form for team leader	15,950
Error eliminator form for supervisor	4,257
PMT forms	374
<i>IEC Materials</i>	
IEC materials- Q&A Booklets	2490

Description	Quantity
IEC materials- Fact Sheets	9931
IEC materials- Posters	1318
Store Stationary	
Bin Cards	10759
IRS Stickers	707,250
Daily distribution form	5574
Goods Received Note	2471
Goods Issued Note Books	151
Daily Insecticide tracking sheets	5800
Daily Monitoring form for Insecticide consumption	5411
Finance Forms	
Training Attendance Sheet (booklet)	124
Daily IRS attendance sheet (booklet)	124
IRS Vehicle Logbook (booklet)	247
Medical Attendance Card	422
Medical Examination Form	4216
Personal Particular Form (booklet)	124
Temporary Worker Contracts (booklet)	124
IRS Transportation	
IRS Supervision Vehicles	22
Rented Vehicles used in IRS implementation (Mainland and Zanizbar)	213
Rented Vehicles used in Distribution	107

ANNEX B: INTERNATIONAL PROCUREMENT

Description	Quantity
Gloves – 19"	5,256
Gloves – 26"	106
Nose masks	57,360
Insecticide – actellic 300CS (bottles)	196,558
Face shields with bracket	4,200
Hudson kit F/3 & 4 gal x-perts	21
Hudson cup plunger XP	82
Hudson stop-cock XP	290
Hudson screen ASM SP XP	406
Hudson filter nylon XP	482
Goizper pumps	1,150
Goizper team leader service kit	230
Goizper EVO handle	50
Goizper pressure regulator	50
Goizper lance tube	50
Goizper EVO complete handle	50
Goizper EVO complete hose	50
Control flow valves and seals	1,707

ANNEX C: STOCK UPDATE

ITEM NAME	UOM ⁷	FROM RTI	Abt 2016	PROCURED	TOTAL BEFORE IRS	ISSUED DURING IRS	TOTAL AVAILABLE AFTER IRS
PPE:							
Coverall	Pc	1788	7184	590	9562	8392	8,547
Masks	Pc	0	45159	57360	102519	101564	11,395
Gumboots	Pair	4342	0	440	4782	4148	3,748
Gloves New	Pair	0	485	5256	5741	5,212	529
Gloves Used	Pair	-	2,504	-	2,504	-	4,814 ⁸
Long Gloves for Washers	Pair	0	198	106	304	240	235
Helmet, Complete	Set	2759	0	2341	5100	3978	3,440
Helmet Harness	Pc	1019	0	3017	4036	3978	4,200 ⁹
Face shields with bracket from U.S.	Pc	0	0	4282	4282	3459	4282
Shield Brackets New from U.S.	Pc	0	0	4282	4282	3459	3846
Shield Adaptor	Pc	13610	0	0	13610	4151	13,610
Other Equipment for Operations:							
Handkerchief	Pc	0	0	3336	3336	3336	0

⁷ Unit of measure.

⁸ Use gloved increased from the New Gloves

⁹ 164 came from damaged complete harness

ITEM NAME	UOM ⁷	FROM RTI	Abt 2016	PROCURED	TOTAL BEFORE IRS	ISSUED DURING IRS	TOTAL AVAILABLE AFTER IRS
Socks	pc	0	0	3670	3670	3670	0
Small Towels	Pc	0	0	3456	3456	3456	0
Haversack with USAID Logo	Pc	0	0	3837	3837	3837	3,777
Plastic cup	Pc	1985	0	1320	3305	3147	2,320
Tool kits	kit	88	413	131	632	598	524
Basin 80 Lts	Pc	1487	0	130	1617	1560	1442
Barrel for liquid waste	Pc	164	0	0	164	132	164
Hoe	Pc	12	0	108	120	120	119
Slashes	Pc	52	50	23	125	120	122
Rakes	Pc	46	45	16	107	107	107
Plastic Buckets 20 Lts	Pc	2057	0	120	2177	2040	2075
Red Plastic Buckets 10 Lts	Pc	21	0	120	141	141	141
Jugs for buckets & basins	Pc	3224	0	0	3224	2280	3224
Thermometer	Pc	140	0	107	247	240	193
Moper Bucket, moper (Cleansing Set)	Set	589	0	0	589	360	589
Squeezer	Pc	458	0	0	458	360	458
Soft Broom	Pc	79	0	255	334	334	283
Hard Broom	Pc	319	0	0	319	319	290
Calibrated jug 2Lts	Pc	274	0	0	274	240	208
"Tooth brush" for nozzle cleaning	Pc	0	297	927	1224	956	415
Color Coded Vest Yellow	Pc	612	0	151	763	737	763
Color Coded Vest Orange	Pc	279	0	0	279	264	279

ITEM NAME	UOM ⁷	FROM RTI	Abt 2016	PROCURED	TOTAL BEFORE IRS	ISSUED DURING IRS	TOTAL AVAILABLE AFTER IRS
Washing Brush	Pc	255	0	0	255	240	201
Plastic Apron	Pc	20	120	52	192	156	157
Consumables:							
Battery per watchmen (Size MU-1)	Pc	0	0	3154	3154	3154	593
Liquid soap (5 ltr.)	Pc	0	0	720	720	720	0
Bar Soap	Bar	0	0	2280	2280	2280	67
Toilet Paper	Pc	0	44	3193	3237	3237	648
Oil (1 Ltr.)	Pc	0	8	150	158	132	7
Pregnancy Test	Strip	0	103	1884	1987	1987	0
Spray Equipment:							
TOTAL Hudson pump	Pc	4293	0	0	4293	2371	4,271
Pump hanger	Pc	139	0	0	139	139	123
Pallets		402	0	0	402	402	416
Hudson pump spare parts							
Hudson spare kits	kits	0	97	21	118	118	118
8L Extension tube assembly only 141-967	Pc	864	0	0	864	864	0
Hose pipe/Hose only 115-902 (Hose 5' Long)	Pc	78	0	0	78	78	0
Plunger tube and handle only 147-501	Pc	75	0	0	75	75	25
Shutoff valve body cap 115-733	Pc	72	0	0	72	72	0
Strainer Assembly complete 146-617	Pc	915	0	0	915	915	440
O ring gasket for male strainer fitting 805-310	Pc	1000	0	0	1000	1000	0
Strainer housing assembly 146-627	Pc	1764	0	0	1764	1764	0

ITEM NAME	UOM⁷	FROM RTI	Abt 2016	PROCURED	TOTAL BEFORE IRS	ISSUED DURING IRS	TOTAL AVAILABLE AFTER IRS
Nozzle body 114-791	Pc	2589	0	0	2589	2371	1990
Supply tube 129-074 - 3 gallon tank	Pc	1217	0	0	1217	1217	93
Supply tube 129-074 - 4 gallon tank	Pc	339	0	0	339	339	0
CF Valve (Green) 98668	Pc	100	0	0	100	100	49
CF Valve (Blue) 98667	Pc	100	0	0	100	100	50
CF Valve (Red) 98666	Pc	0	2579	1707	4286	2371	2418
CF Valve (Yellow) 98665	Pc	100	0	0	100	100	50
Male fitting for strainer housing 114-905	Pc	475	0	0	475	475	360
Nut wing 115-970	Pc	112	0	0	112	112	0
No. 8002E Hardened stainless steel Nozzle tip (TIP T-JET) 805-855	Pc	656	0	0	656	656	400
Nozzle body cap (Nozzle nut) 115-680	Pc	1241	0	0	1241	1241	1233
Hose adaptor assembly (stop cock) 148-704	Pc	0	0	290	290	290	10
Supply tube adapter with wing fitting 115-968	Pc	228	0	0	228	228	7
Pump cylinder assembly, complete (Brass cylinder assembly xp) 147-202	Pc	42	0	0	42	42	42
Shoulder strap "2" wide 152-829	Pc	130	0	0	130	130	0
100-Lb Pressure Gauge 803-311	Pc	988	0	0	988	988	669
Filter assembly for pressure gauge 146-605	Pc	88	0	482	570	570	138
Plunger assembly, complete for 3/4 gallon unit (147-538) 147-541	Pc	451	0	0	451	451	0
Cup replacement kit 148-833	Pc	249	0	0	249	249	100
Plug for gauge adaptor fitting (Plug) 114-152	Pc	4207	0	0	4207	2371	1521

ITEM NAME	UOM⁷	FROM RTI	Abt 2016	PROCURED	TOTAL BEFORE IRS	ISSUED DURING IRS	TOTAL AVAILABLE AFTER IRS
Cotter Pin, 3/32 x 7/8 - 801-419	Pc	393	0	0	393	393	393
1/8 x1/2 Cotter Pin 801-423	Pc	1447	0	0	1447	1447	1445
Polyethylene nozzle gasket 123-950	Pc	465	0	0	465	465	0
Nozzle assembly complete 141-989	Pc	330	0	0	330	330	0
Bumper pad 151-028	Pc	762	0	0	762	762	401
cup retainer 153-816	Pc	425	0	0	425	425	361
Washer 123-908	Pc	678	0	0	678	678	0
Cup leather only 154-007	Pc	15	0	0	15	15	0
Hose clamp 803 623	Pc	660	0	0	660	660	587
Valve Pin assembly 143-000	Pc	3815	0	0	3815	2371	3815
cover chain 116-426	Pc	768	0	0	768	768	768
Valve body cap, with O ring gaskets 149-702	Pc	114	0	0	114	114	114
Housing for pump cylinder 110-790	Pc	860	0	0	860	860	860
Shutoff valve pin 115-716	Pc	413	0	0	413	413	413
Shutoff valve pin washer 123 -911	Pc	940	0	0	940	940	940
Pump cylinder check valve assembly 140-054	Pc	4305	0	0	4305	2371	2611
Bumper spring 150-409	Pc	215	0	0	215	215	180
Shutoff valve pin spring 150-400	Pc	62	0	0	62	62	52
Spring for pump cylinder check valve 150-604	Pc	3006	0	0	3006	2371	499
Valve pin spring 150-605	Pc	3820	0	0	3820	2371	2777
Pump cap assembly, brass 149-102	Pc	98	0	0	98	98	70
Valve body cap O ring 805-309	Pc	3320	0	0	3320	2371	452

ITEM NAME	UOM ⁷	FROM RTI	Abt 2016	PROCURED	TOTAL BEFORE IRS	ISSUED DURING IRS	TOTAL AVAILABLE AFTER IRS
Plunger adaptor 153-812	Pc	832	0	0	832	832	650
O ring gasket for hose connector 805-307	Pc	1897	0	0	1897	1897	1125
O ring for supply tube 805-312	Pc	2365	0	0	2365	2365	777
Shutoff valve pin packing 151-016	Pc	2925	0	0	2925	2371	1764
Teflon valve pin sparer 118-243	Pc	68	0	0	68	68	30
Valve body cap O ring for valve pin 805-335	Pc	2898	0	0	2898	2371	1935
Cover gasket 151-401	Pc	444	0	0	444	444	429
Plier spanner	Pc	21	0	0	21	21	21
Adjustable spanner	Pc	15	0	0	15	15	0
Screw driver	Pc	29	0	0	29	29	0
Pump cylinder gasket 151-030	Pc	3027	0	0	3027	2371	2557
Shut-off operating lever 123-899	Pc	790	0	0	790	790	790
Instruction Booklet - 871-596B	Pc	3	0	0	3	3	2
Instruction Booklet - 871-598	Pc	0	44	0	44	44	0
Insecticide:							
Actellic 300 CS	Bottles	0	24847	196571	221418	214177	10297
Environmental Compliance and Mitigation Devices:							
Plastic sheets	Pc	190	1385	798	2373	2373	2373
Whistle for security	Pc	58	25	177	260	240	224
Emergency Medication Kit	Pc	0	55	255	310	310	138
Torch for security guards	Pc	29	40	717	786	786	736
Fire Extinguisher 9 Kg	Pc	169	0	38	207	120	195

ITEM NAME	UOM ⁷	FROM RTI	Abt 2016	PROCURED	TOTAL BEFORE IRS	ISSUED DURING IRS	TOTAL AVAILABLE AFTER IRS
Red Tin Bucket 10 liters for sand	Pc	191	0	47	238	238	194
Shovel	Pc	61	30	44	135	120	123
Safety Signs and Labelling	Pc	112	0	126	238	238	216
Water Tank 210Lt	Pc	66	0	130	196	196	196
Water Tank 1000Lt	Pc	49	0	48	97	97	44
Water Tank 2000Lt	Pc	3	0	0	3	3	3
Door Locks	Pc	0	282	205	487	480	206
Information System:							
Calculator	Pc	229	176	234	639	604	528
IRS cards by SOPs	Pc	0	0	707250	707250	684248	147,182
Chalks white	Pc	0	966	74900	75866	65294	15,946
SOPs form	Pc	0	0	83955	83955	83955	13,084
PMT forms by storekeepers	Pc	0	0	374	374	360	28
Bin cards	Pc	0	0	10759	10759	10759	824
Store Ledger Book	Pc	0	113	189	302	240	36
Daily distribution form	Pc	0	0	5574	5574	5574	1,986
Goods received note (GRN)	Pc	0	0	2471	2471	2471	471
Issue Vouchers	Pc	0	129	0	129	129	56
Daily Insecticide tracking sheets	Pc	0	0	5800	5800	5800	316
Daily monitoring form for insecticide consumption	Pc	0	0	5411	5411	5411	1,928
Daily temperature Log sheet	Pc	0	201	0	201	201	48
Attendance Register	Pc	0	211	55	266	240	42

ITEM NAME	UOM ⁷	FROM RTI	Abt 2016	PROCURED	TOTAL BEFORE IRS	ISSUED DURING IRS	TOTAL AVAILABLE AFTER IRS
Visitor's Book	Pc	0	28	88	116	116	57
My clear bag	Pc	0	2555	1985	4540	3911	3,202
ID Card Holder	Pc	0	1377	3178	4555	4555	2,786
Box Files	Pc	0	901	14	915	843	225
Pens	Pc	0	742	9537	10279	10279	500
Punch Machine	Pc	36	0	86	122	122	120
Stapler Machine	pc	31	0	101	132	132	114
My pocket guides for storekeepers	Pc	0	102	77	179	120	179
My pocket guides for Team Leaders	Pc	0	284	240	524	478	509
My pocket guides for Spray Operators	Pc	0	1436	1786	3222	2861	3222
Stapler Pin Size 24/6	P1000	31	0	132	163	132	0
Atropine Injection	Vial	0	0	630	630	630	70
Breakfast - Biscuits	PC	0	0	104551	104551	104551	0
Breakfast - Juice	PC	0	0	104551	104551	104551	0
Neck Protection	PC	0	0	7340	7340	5722	6973
Sanitary Pads	PC	0	0	1999	1999	1999	24
Sisal Rope	Roll	0	0	240	240	240	2
Stationary - Flip Chart	PC	0	0	285	285	285	63
Stationary - Marker Pen	PC	0	0	1145	1145	960	0
Stationary - Masking Tape	PC	0	0	878	878	360	260
Stationary - Note Book	PC	0	0	5758	5758	5758	776
Stationary - IRS Stickers	PC	0	0	707250	707250	684248	126889

ITEM NAME	UOM⁷	FROM RTI	Abt 2016	PROCURED	TOTAL BEFORE IRS	ISSUED DURING IRS	TOTAL AVAILABLE AFTER IRS
Yellow Hazard Bags	PC	0	0	240	240	240	127
Hudson Cup Plunger XP	PC	0	0	82	82	82	0
Hudson Screen ASM SP XP	PC	0	0	406	406	406	0
Goizper Pumps	PC	0	0	1150	1150	1150	1150
Goizper Team Leader Service Kit	PC	0	0	230	230	230	230
Goizper EVO Handle	PC	0	0	50	50	50	50
Goizper Pressure Regulator	PC	0	0	50	50	50	43
Goizper Lance Tube	PC	0	0	50	50	50	44
Goizper EVO Complete Handle	PC	0	0	50	50	50	43
Goizper EVO Complete Hose	PC	0	0	50	50	50	43
Team Leader Forms with DOS at the Back	PC	0	0	15950	15950	15278	625
Error eliminator form for team leader	PC	0	0	15950	15950	15278	650
Error eliminator form for supervisor	PC	0	0	4257	4257	3635	2330
Training Attendance Sheet (booklet)	PC	0	0	124	124	124	25
Daily IRS attendance sheet (booklet)	PC	0	0	124	124	124	0
IRS Vehicle Logbook (booklet)	PC	0	0	247	247	247	19
Medical Attendance Card	PC	0	0	422	422	422	0
Medical Examination Form	PC	0	0	4216	4216	4216	1129
Personal Particular Form (booklet)	PC	0	0	124	124	124	47
Temporary Worker Contracts (booklet)	PC	0	0	124	124	124	6

ITEM NAME	UOM⁷	FROM RTI	Abt 2016	PROCURED	TOTAL BEFORE IRS	ISSUED DURING IRS	TOTAL AVAILABLE AFTER IRS
IEC materials- Q&A Booklets	PC	0	0	2490	2490	2490	0
IEC materials- Fact Sheets	PC	0	0	9931	9931	9931	0
IEC materials- Posters	PC	0	0	1318	1318	1318	0

ANNEX D: ENVIRONMENTAL MITIGATION AND MONITORING REPORT

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
1. Pre-contract inspection and certification of vehicles used for pesticide or spray team transport	Each vehicle selected for IRS operations had to submit a certificate of inspection from the government vehicle inspector. Thereafter, the ECO and other members of the technical team inspected vehicles to be used during IRS operations to see if they met IRS standard requirements. They inspected 309 vehicles hired to support IRS operations in the 18 districts.	The project did not contract vehicles that did not meet PMI and IRS requirements or local regulations on vehicle road worthiness, such as the driver having a valid driving license, road license, and insurance, or strong benches for SOPs to sit on. Old and expired fire extinguishers were replaced with new ones. Where the vehicle broke down during the operation the vendor replaced it with another vehicle.	
2. Driver training	A total of 309 drivers were trained on safety issues, including observing speed limit, ensuring passengers use safety belt, and wearing coveralls while on IRS field operations, for drivers driving vehicles carrying insecticide or transporting spray operators.	A few drivers were not adhering to instructions on speed limit and the use of PPE. In general, there was a high degree of compliance, but warnings were immediately issued to non-compliant drivers, who subsequently complied.	
3. Cell phone, PPE, and spill kits on board during pesticide	We ensured that cellphone, PPE and spill kits were on board during insecticide transportation.	The very few cases of drivers not found in PPE were recorded as non-compliant and corrective measures immediately taken.	

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
transportation			
4. Mandatory pregnancy testing for female candidates applying for jobs with potential pesticide contact (washers, SOPs, team leaders, storekeepers, and supervisors)	Those found pregnant were given positions that did not expose them to insecticides. These included mobilization of households for IRS.	There were no outstanding issues of concern.	
Mandatory health fitness testing for all SOPs	All IRS workers potentially to be exposed to insecticide were tested for fitness. These included SOPs, washers, team leaders, storekeepers and supervisors. A total of 3,042 personnel were tested and found to be physically fit for IRS work.	There were no outstanding issues of concern.	
5. Procurement of, distribution to, and training on the use of PPE for all workers with potential pesticide contact	For the 2017 IRS there were two main successes which include use of correct size of PPE and the use of neck protection.	There were no outstanding issues of concern.	
Training on mixing pesticides and proper use and maintenance of spray pumps	All SOPs were trained on mixing pesticides before spraying. Pump technicians were re-trained on pump maintenance and repair.	There were no outstanding issues of concern.	
Provision of adequate	Few cases were reported as non-	Inadequate supply for end-of-day clean-up is	The logistics team will have to

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
facilities and supplies for end-of-day cleanup	compliant related to end-of-day cleanup supplies. This was immediately rectified through instructions and supply of the missing items.	a matter of concern no matter how few cases are reported.	ensure zero incidence of inadequate supply for entire IRS operation.
6. Enforce cleanup procedures	The end-of-day cleanup activities were to be supervised by the team leaders to ensure compliance with all required procedures. A total of 36 events were reported to have taken place without supervision of team leaders.	Day clean-ups that were not supervised by team leaders raise suspicion of poor compliance.	This will be emphasized as something not to happen in the future.
7. IEC campaigns to inform homeowners of responsibilities and precautions	For the year 2017 IEC/BCC was mainly conducted by hamlet leaders, who were trained prior to their engagement. Mass media campaigns, mainly the radio, were also used. Out of 7,226 events of supervision, only 234 (3%) were reported not to have received information prior the arrival of SOPs.	Few houses (234) that were reported by supervisors not to have received information prior the arrival of SOP, leading to delays.	More-efficient IEC/BCC, leading to zero non-informed households prior to IRS, should be our future target.
8. Prohibition on spraying houses that are not properly prepared	About 1% (85/7226) of house structures were not well prepared prior to being sprayed (food or animal not removed).	No matter how small the number of unprepared structures is, the possible consequences are serious in terms of environmental compliance requirements	When the house is not well prepared, there are two options: either give time and support to have it fully prepared, or do not spray if the first option is not possible.
9. Two-hour exclusion from house after spraying	Post IRS, home owners are instructed to remain out for two hours, and not to paint the house. Only 0.9% reported not to have been instructed post IRS.	Post-IRS instructions to homeowners are a way to check safety against insecticide contamination.	In the future homeowners will be told to ask the SOP what to do after spraying. Mobilizers and mass media will continue to emphasize the importance of

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
			remaining outside for two hours.
10. Instruct homeowners to wash itchy skin and go to a health clinic if symptoms persist	This can be combined with the above where homeowners did not receive the instruction from the SOP on post spray activities.	Post-IRS instructions to homeowners are a way to check safety against insecticide contamination.	In the future homeowners will be told to ask the SOP what to do after spraying. Mobilizers and mass media will continue to emphasize the importance of remaining outside for two hours.
11. Indoor spraying only	About 0.7% reported spraying of wrong surface.	Though the surfaces were not specified, the event posed two dangers: contamination of homeowners and the environment, and wastage of insecticide.	Future trainings shall emphasize restricting spraying to recommended surfaces.
12. Training on proper spray technique	Some events of improper spraying were reported, primarily underpressurizing the pump(1.8%); other issues involved spraying from the wrong distance and at the wrong speed.	IRS supervisors immediately addressed the few issues raised concerning spraying techniques.	This component will be emphasized more in future operations.
13. Maintenance of pumps	About 12.5% of the SOPs reported leaking pumps.	A leaking pump poses the risk of contaminating the SOP and the environment as well contributing to insecticide wastage. The project provided spare parts, soldering tools and procurement of new pumps to counter effects of leakage	Old pumps will be replaced with new ones; repairs will be made and equipment will be checked prior to IRS.
14. Choose sites for disposal of liquid wastes according to PMI best management practices	About 1% (73/7226) of soak pits were reported to be not properly located. This was possibly due to distance from the population.	There were no outstanding issues of concern.	All soak pits were fenced to ensure humans and animals had no access to them. During the operation the project hired site guards to ensure that unwanted people and animals were denied access to the soak pit. Post IRS all

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
			soak pits receiving effluent from the washing slab (perceived to be highly contaminated) will be covered and locked with an iron plate to ensure no access to them.
15. Construct soak pits with charcoal to absorb pesticide from rinsewater	Reconstruction of new soak pits was done before spraying operations. Rehabilitation and reconstruction of some soak pits was done, all based on PMI Best Management Practices guidelines.	There were no outstanding issues of concern.	
16. Maintain soak pits as necessary during the season	0.1% of the soak pits were reported to have poor drainage.	The reported case were mostly in rocky areas or due to other technical problems.	The reported cases were fixed by vendors allocated to repair the specific IRS sites. In the future contractors will be instructed to report rocky areas that the project can relocate the soak pit.

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
17. Inspection and certification of solid waste disposal sites before spray campaign.	The program inherited the two incineration units, which were qualified by Supplemental Environmental Assessment for incineration of masks and other contaminated materials. Two local companies have submitted tenders to recycle empty plastic bottles previously containing insecticide. The project is waiting for the permit from the environmental authority to issue bottles for recycling. Cardboard previously used as secondary packaging material for insecticide will be issued to a paper recycling company. A sample from the 2016 consignment was tested in an authenticated laboratory in the country and revealed no traces of insecticide.	There were no outstanding issues of concern.	
18. Monitoring waste storage and management during the campaign	Waste generated from the IRS campaign is kept under strict rules of storage , which include recordkeeping on bin cards and ledgers and using issue vouchers while transferring them from field stores to the main warehouse.	There were no outstanding issues of concern.	
19. Monitoring disposal procedures post-campaign	All IRS wastes to be disposed of in the municipal council landfills will be accompanied by a team including the ECO from Abt, NEMC, and the relevant city/town council authorities.	There were no outstanding issues of concern.	

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
20. Maintain records of all pesticide receipts, issuance, and return of empty sachets/bottles	0.9% (8/932) of the inspected stores had their ledger or bin cards not up to date.	Not keeping these records up to date can lead to un-noticed loss of insecticide, and if the insecticide falls into the wrong hands it could contaminate the environment.	Future training and supportive supervision will ensure zero failures to update store records.
21. Reconciliation of the number of houses sprayed vs. number of sachets/bottles used	About 6% of the inspection events reported that stock balance on the spray performance tracking sheet was not the same as the physical stock count. Such events were due to poor counting and recording; rechecks were done and the balances were found to be the same.	Some storekeepers were less than conversant with filling out the performance tracking sheet.	Recruitment and training of storekeepers will ensure adequate competency of storekeepers with no exceptions.
22. Visual examination of houses sprayed to confirm pesticide application.	Quality control wall bioassay tests were conducted by an independent qualified institution, the National Institute for Medical Research. The testing was found to adhere to PMI guidelines, and WHO standards were the cutoff points. All nine districts in mainland Tanzania were subject to the evaluation, and five districts were sampled in Zanzibar. Most of the tests registered 100% mortality after 24 hours, and few cases, in the district of Missenyi and Bukoba Rural, indicated inadequate quality of spraying .	No structures documented as sprayed were found not to have been sprayed.	In future operations of IRS, SOPs and team leaders will continue to be trained to observe quality of spraying by mastering good spray techniques.
23. Perform physical inventory counts during the spray season	Inventory check was done by coordinators, storekeepers, and supervisors during the spraying periods in all districts. Emphasis was on insecticide inventory.	In a few IRS operations sites where inventory checks were done by supervisors, stock was found to be improperly recorded, due to inexperience of new storekeepers. Supervisors addressed these issues immediately.	Though no major setbacks were encountered during stores inspection, the few that were found imply the requirement for more training and focused supervision in this area.

ANNEX E: INSECTICIDE QUALITY ASSURANCE CERTIFICATE

Form Parts-5

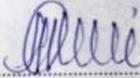

THE UNITED REPUBLIC OF TANZANIA

MINISTRY OF AGRICULTURE, FOOD SECURITY AND COOPERATIVES
Plant Protection Division Pesticides Registration and Control
P.O. Box 9071, Dar es Salaam - Tanzania No 00002320

CERTIFICATE OF ANALYSIS
(Under Regulation 22)
(To be filled in Quadruplicate)

I hereby declare that I have made a proper analysis of the sample of **Actellic 300 CS**
Batch No. **BSN6G2882**, Sample Lab No. **2414 - 2417** (4 Samples)
submitted to the Pesticides Registration and Control Analytical Laboratory by **Abt Associates Inc., P O Box 1212, Mwanza**
on (Date) **30** (Month) **January** Year **2017** the
result of the analysis being as follows:
Active ingredient content: **Pirimiphos-methyl 29.9% w/v (average)**

Remarks **Results meet the required specification.**
Required specification: 28.5 - 31.5%

Name and Signature of Analyst in Charge: **T Hangali** 
Designation: **Analyst I/C**
Laboratory and Address: **TPRI, P O Box 3024, ARUSHA.**
Date: **27/02/2017**

Government Printer - Dar

ANNEX F: AIRS TANZANIA MONITORING AND EVALUATION PLAN ¹⁰

Last Updated: 2 May 2017

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
Component 1: Establish cost-effective supply chain mechanisms and execute logistical plans								
1.1 Procurement								
1.1.1 Number and percentage of insecticide procurements that had a pre-shipment QA/QC test at least 60 days prior to the spray campaign	<i>Data source:</i> Project records – insecticide procurements <i>Reporting frequency:</i> Each spray campaign	By spray campaign	1; 100%	1; 100%	1; 100%	1; 100%	TBD; 100%	
1.1.2 Number and percentage of international insecticide procurements delivered in country at port of entry at least 30 days prior to the start of spray	<i>Data source:</i> Project records – international procurements <i>Reporting frequency:</i> Each spray campaign	By spray campaign	1; 100%	1; 100%	1; 100%	1; 100%	TBD; 100%	

¹⁰ Results shown do not include Geita Gold Mine supported campaign

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
operations								
1.1.3 Number and percentage of international equipment procurements, including PPE, delivered in country at port of entry at least 30 days prior to start of spray operations	<i>Data source:</i> Project records <i>Reporting frequency:</i> Each spray campaign	By spray campaign	1; 100%	1; 100%	1; 100%	1; 100%	TBD; 100%	
1.1.4 Number and percentage of local procurements for PPE delivered 14 days before the start of spray operations	<i>Data source:</i> Project records <i>Reporting frequency:</i> Each spray campaign	By spray campaign	1; 100%	1; 100%	1; 100%	1; 100%	TBD; 100%	
1.1.5 Successfully completed spray operations without an insecticide stock-out	<i>Data source:</i> Project records <i>Reporting frequency:</i> Each spray campaign	By spray campaign	Completed	Completed	Completed	Completed	Completed	
1.2 In-Country Exemption and Custom Clearance Process								
1.2.1 Complete exemption and clearance process within the minimum two weeks	<i>Data source:</i> Project records <i>Reporting frequency:</i> Each spray campaign	By spray campaign	Completed	Completed	Completed	Completed	Completed	

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results

1.3 In-Country Logistics, Warehousing, and Training

1.3.1 Number and percentage of logistics and warehouse managers trained in IRS supply chain management	<i>Data source:</i> Training records <i>Reporting frequency:</i> Each spray campaign	By spray campaign By gender	116; 100%	119; 102.6% 45 female 74 male	122; 100% 46 Female 76 Male	132 ¹¹ ;108% 47 Female 85 Male	TBD; 100%	
1.3.2 Number and percentage of base stores where physical inventories are verified by up-to-date stock records	<i>Data source:</i> Project records <i>Reporting frequency:</i> Each spray campaign	By spray campaign	116; 100%	109; 94.0%	124; 100%	124 ¹² ; 100%	TBD; 100%	
1.3.3 Submit up-to-date inventory records 30 days after the end of each spray campaign	<i>Data source:</i> Project records <i>Reporting frequency:</i> Each spray campaign	By spray campaign	Completed	Completed	Completed	Completed	TBD; 100%	

Component 2: Implement safe and high-quality IRS programs and provide operational management support

2.1 Planning and Design of IRS Programs

2.1.1 Annual PMI AIRS country work plan developed and submitted on time	<i>Data source:</i> Project records <i>Reporting frequency:</i> Annually	By spray campaign	Completed	Completed	Completed	Completed	Completed	
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¹¹ 120 sites, 1 Junguni site, 1 Pemba WH, 10 reserve

¹² 120 sites, 1 Bukoba WH, 1 Mwanza WH, 1 Pemba WH, 1 Unguja WH

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
2.1.2 Percentage reduction in project operational expenses per structure from the previous year, excluding insecticide costs	<i>Data source:</i> Project financial records <i>Reporting frequency:</i> Annually	By spray campaign	N/A	N/A	5%	8% ¹³	5%	

2.2 Support of Safety and Health Best Practices and Compliance with USAID and Host Country Environmental Regulations

2.2.1 SEA/letter reports submitted on time based on schedule agreed upon with the PMI COR team	<i>Data source:</i> Project records – submitted SEAs/letter reports <i>Reporting frequency:</i> Each spray campaign	By spray campaign	Completed	Completed	Completed	Completed	Completed	
2.2.2 Number of spray personnel trained in environmental compliance and personal safety standards in IRS implementation	<i>Data source:</i> Project records – Training reports <i>Reporting frequency:</i> Each spray season	By spray campaign By gender	3,458	3,359 1,315 female 2,044 male	3,557 1,387 Female 2,170 Male	3,699 ¹⁴ 1,441 Female 2,258 Male	TBD	
2.2.3 Number of health workers receiving insecticide poisoning case management training	<i>Data source:</i> Project records – Training reports <i>Reporting frequency:</i> Each spray season	By spray campaign By gender	62	57 24 female 33 male	62 26 Female 36 Male	63 21 Female 42 Male	TBD	
2.2.4 Number of adverse reactions to pesticide	<i>Data source:</i> Incident	By spray	0	0	0	0	0	

¹³ Includes all billed costs from October 2016 – April 2017, excluding Insecticide costs

¹⁴ 2,991 SOPs, 479 TLs, 97 Sup, 132 S/Keepers

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
exposure documented	report forms <i>Reporting frequency:</i> Each spray campaign	campaign By residential/ occupational exposure						
2.2.5 Number and percentage of soak pits and storehouses inspected and approved prior to spraying	<i>Data source:</i> Project records – Reports submitted by district environmental officers <i>Reporting frequency:</i> Each spray season	By spray campaign By soak pit By storehouse	109 Soak pits; 100%	102 Soak pits; 93.6%	120 Soak Pits; 100%	120 Soak Pits; 100%	TBD; 100%	
			115 Storehouses; 100%	109 Storehouses; 94.8%	120 Storehouses; 100%	120 Storehouses; 100%		

2.3 Conduct Communications Activities and Community Mobilization

2.3.1 Number of radio spots and talk shows aired	<i>Data source:</i> Project records <i>Reporting frequency:</i> Per spray campaign	By spray campaign	60 Radio Spots 4 Talk Shows	138 Radio spots 4 Talk shows	146 Radio Spots ¹⁵ 4 Talk shows	110 Radio Spots 4 Talk shows	TBD	
2.3.2 Number of IRS print materials disseminated	<i>Data source:</i> Project records <i>Reporting frequency:</i> Semi-annually	By spray campaign By type of printed material and message(s)	10,000	12,150 1,540 Q&A brochures 9,933 fact sheets 677 posters	15000 3,400 Q&A brochures 10,000 fact sheets 1,600	10,611 7,000 fact sheets 2,549 posters 1,062 Q&A	NA	

¹⁵ 40 pre spray, 96 during spray and 10 post spray radio spots

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
					posters	brochures		
2.3.3. Number of people reached with IRS messages via door-to-door mobilization	<i>Data source:</i> Mobilization Data Collection Forms <i>Reporting frequency:</i> Daily per mobilization conducted	By spray campaign By gender	846,954	276,156 Female 146,997 Male 129,157	NA	NA ¹⁶	NA	

2.4 Spray Targeted Structures According to Technical Specifications

2.4.1 Number of structures targeted for spraying	<i>Data source:</i> Previous spray campaign data, enumeration data (targets); daily spray operator forms (results) <i>Reporting frequency:</i> Daily per spray campaign	By spray campaign	502,934	543,865	595,393	700,085	TBD	
2.4.2 Number of structures sprayed with IRS	<i>Data source:</i> Daily spray operator forms <i>Reporting frequency:</i> Daily per spray campaign	By spray campaign	427,494	515,217	506,084	664,622	TBD	

¹⁶ No Enumeration in 2016 - 2017 FY Plan

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
2.4.3 Percentage of total structures targeted for spraying that were sprayed with a residual insecticide (spray coverage)	<i>Data source:</i> Daily spray operator forms <i>Reporting frequency:</i> Daily per spray campaign	By spray campaign	85%	94.7%	85%	94.9%	85%	
2.4.4 Number of people residing in structures sprayed (number of people protected by IRS)	<i>Data source:</i> Daily spray operator forms <i>Reporting frequency:</i> Daily per spray campaign	By spray campaign By gender By pregnant women By children <5 years old	2,243,305	2,042,561 Female 1,047,834 Male 994,727 61,822 pregnant women 400,314 children <5 years old	2,028,442	2,568,522 Female 1,317,652 Male 1,250,870 ¹⁷ 94,122 pregnant women 490,049 children <5 years old	TBD	TBD
Component 3: Ongoing Monitoring and Evaluation and Quality Control Measures								
3.1 Submit AIRS country M&E Plan to PMI for approval	<i>Data source:</i> Project records <i>Reporting frequency:</i> Semi-annual	By spray campaign	Completed	Completed	Completed	Completed	Completed	

¹⁷ Tanzania 2012 Population and Housing Census; population ratios between male and female were 48.7% and 51.3%, respectively.

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
3.2 Conduct a post-spray data quality audit data collection within 120 days of completion of spray operations	<i>Data source:</i> Spray operations reports <i>Reporting frequency:</i> Per spray campaign	By spray campaign	N/A	N/A	N/A	N/A	Completed or N.A.	
Component 4: Contribute to Global and Country-Level IRS Policy Setting and Develop and Disseminate Experiences and Best Practices								
4.1 Number of guidelines/checklists/tools related to IRS operations developed or refined with project support	<i>Data source:</i> Project records – activity reports <i>Reporting frequency:</i> Semi-annually	By spray campaign By guideline/checklist/tool	11	14	5	6 ¹⁸	TBD	
4.2 Number of articles/best practices documents published	<i>Data source:</i> Project records – activity reports <i>Reporting frequency:</i> Semi-annually	By spray campaign By IRS technical area	1	1 ¹⁹	1	0	TBD	
4.3 Number of best practice presentations given at national/regional/international workshops and conferences	<i>Data source:</i> Project records – activity reports <i>Reporting frequency:</i> Semi-annually	By spray campaign By IRS technical area	1	0	1	2 ²⁰	TBD	

¹⁸ Modified IRS card, Daily SOP form, Daily Team Leader form with DOS form at the back, Supervisor form and PMT form with includes DOS indicators

¹⁹ Abstract for American Central Tropical Medicine submitted in August 2016

²⁰ American Society of Tropical Medicine and Hygiene, Nov. 2016; RBM Vector Control Working Group, Feb 2017.

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
4.4 Number of enterprises engaged through public-private partnerships	<i>Data source:</i> Project records – activity reports <i>Reporting frequency:</i> Semi-annually	By spray campaign	1	1	1	1 ²¹	TBD	

Component 5: Contribute to the collection and analysis of Routine entomological and epidemiological data

5.1 Support entomological monitoring activities and insecticide resistance strategies

5.1.1 Number of entomological sentinel sites supported by the PMI AIRS Project established to monitor vector bionomics and behavior (vector species, distribution, seasonality, feeding time, and location)	<i>Data source:</i> Entomological reports <i>Reporting frequency:</i> Annually	By spray campaign	10	10	14	14	TBD	
5.1.2 Number and percentage of entomological monitoring sentinel sites measuring all the five primary PMI entomological monitoring indicators	<i>Data source:</i> Entomological reports <i>Reporting frequency:</i> Annually	By spray	3; 100%	3; 100%	4; 100%	8; 200%	TBD	

²¹ We are to run the IRS campaign with Geita TC under PPP but the campaign has not yet taken place

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
5.1.3 Number and percentage of entomological monitoring sites measuring at least one secondary PMI indicator	<i>Data source:</i> Entomological reports <i>Reporting frequency:</i> Annually	By spray campaign	10; 100%	10; 100%	14	14; 100%	TBD	
5.1.4 Number and percentage of insecticide resistance testing sites that tested at least one insecticide from each of the four classes of insecticides recommended for malaria vector control	<i>Data source:</i> Entomological reports <i>Reporting frequency:</i> Annually	By spray campaign By insecticide class	11; 100%	11; 100%	22; 100%	22; 100%	TBD	
5.1.5 Number of wall bioassays conducted within two weeks of spraying to evaluate the quality of IRS	<i>Data source:</i> Entomological reports <i>Reporting frequency:</i> Per spray campaign	By spray campaign	80	80	100	135 ²²	TBD	
5.1.6 Number of wall bioassays conducted after the completion of spraying at monthly intervals to evaluate insecticide decay	<i>Data source:</i> Entomological reports <i>Reporting frequency:</i> Per spray campaign	By spray campaign	96	40	120	155 ²³	TBD	

²² Each sentinel site has 15 structures that received 1 wall bioassay each. Also, there are 9 sentinel sites. Therefore, 9 * 15 = 135 wall bioassays.

²³ Month 1 sites @ 5 bioassay, 5 sites * 5 bioassays = 25 bio assays; Plus, Month 1 sites @ 10 bioassay, 4 sites * 10 bioassays = 40 bio assays; Plus, Month 2 sites @ 10 bioassay, 9 sites * 10 bioassays = 90 bio assays.

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
5.1.7 Number of vector susceptibility tests for different insecticides conducted in selected sentinel sites	<i>Data source:</i> Entomological reports <i>Reporting frequency:</i> Per spray campaign	By spray campaign	55	55	110	88	TBD	

5.2 Support Epidemiological Malaria Data Collection and Analysis

5.2.1 Collect routine epidemiological data	<i>Data source:</i> Project Reports <i>Reporting frequency:</i> Annually	By spray campaign	N/A	N/A	N/A	N/A	TBD	
5.2.2 Number of targeted health facilities with routine epidemiological malaria data collection supported by AIRS Tanzania	<i>Data source:</i> Epidemiological reports <i>Reporting frequency:</i> Annually	By spray campaign	N/A	N/A	N/A	N/A	TBD	

Component 6 (Cross-cutting): Capacity Building, Knowledge Transfer, Gender Inclusion

6.1 Increasing the Role of Women and Addressing Gender Barriers

6.1.1 Number of people trained to deliver IRS in target districts	<i>Data source:</i> Project records – training reports <i>Reporting frequency:</i> Semi-annually	By spray campaign By spray campaign	3,411	3,297 1,294 Females 2,003 Males	3,497 1,364 Female 2,133 Male	3,630 ²⁴ 1,415 Female	TBD	
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²⁴ 97 Supervisors, 479 TLs, 2,991 SOPs, and 63 Clinicians

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
		By gender Percentage of women trained		39.3% Female		2,215 Male 39% Female		
6.1.2 Total number of people trained to support IRS in target districts	<i>Data source:</i> Project records – training reports <i>Reporting frequency:</i> Semi-annually	By spray campaign By spray campaign By gender Percentage of women trained	5,084	4,911 1,816 Females 3,095 Males 36.98%	4,498 1,664 Female 2,834 Male	4,803 ²⁵ 1,672 Female 3,131 Male 34.8%	TBD	

²⁵ 2,991 SOPs, 479 TLs, 97 Supervisors, 96 Mobilizers, 132 Storekeepers, 121 Washers, 96 Pump Tech., 336 Drivers, 3 Financial Assistants, 90 DECAs, 11 MEAs, 63 Health Care Workers, 242 Guards, 9 DC, 37 Government officials (DITT, Regional and National representatives).

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
6.1.3 Number and percentage of women recruited (i.e., number/percentage of women on the selection list) for IRS employment	<i>Data source:</i> Project records – Recruitment reports reports <i>Reporting frequency:</i> Semi-annually	By country	1,253; 25%	1,642 ; 34.5%	1819 ²⁶ ; 40%	1,587 Female 36.6%	TBD	
6.1.4 Number of people trained as IRS Training of Trainers	<i>Data source:</i> Project records – training reports <i>Reporting frequency:</i> Semi-annually	By spray campaign By gender Percentage of women trained	645	617 201 female 416 male	592 178 Female 414 Male	622 ²⁷ 223 Female 399 Male	TBD	
6.1.5 Total number of people hired to support IRS in target districts	<i>Data source:</i> Project records – contracts signed <i>Reporting frequency:</i> Semi-annually	By spray campaign By gender Percentage of women hired	5,013	4,754 1,642 female; 3,112 male	4,547 1,591 Female 2,956 Male	4,334 ²⁸ 1,587 Female 2,747 Male 36.6%	TBD	
6.1.6 Number of women hired in supervisory roles in target districts (this number	<i>Data source:</i> Project records – contracts signed <i>Reporting frequency:</i>	By spray campaign Percentage of	136	197 24	205 ²⁹ ; 35%	218; 37.2% 26	TBD	

²⁶ 40% of indicator 6.1.5

²⁷ 97 Supervisors, 479 TLs, 9 DCs, 37 Government officials (DITT, Regional and National representatives).

²⁸ 2,864 SOPs, 478 TLs, 97 Supervisors, 96 Mobilizers, 121 Storekeepers, 2 Warehouse, 121 Washers, 96 Pump Tech., 213 Drivers, 3 Financial Assistants, 81 DECs, 11 MEA, 242 Guards, 9 DMFP and 113 Water fetcher.

²⁹ 20% of Supervisors, TLs and M&E Assistants hired

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
includes site supervisors, team leaders, M&E assistants, and others who supervise seasonal staff)	Semi-annually	women hired By role		Supervisors 170 Team Leaders 3 M&E Assistants		Supervisors 188 Team Leaders 4 M&E Assistants		
6.1.7 Number of staff (permanent and seasonal) who have completed gender awareness training	<i>Data source:</i> Project records – training reports <i>Reporting frequency:</i> Semi-annually	By spray campaign By gender Percentage of women	5,108	4,945 1,826 Females 3,119 Males 36.9% Female	4,491 1,662 Female 2,829 Male	4,838 ³⁰ 1,681 Female 3,157 Male 34.7%	TBD	
6.2 Capacity Building								
6.2.1 Number of government officials trained in IRS oversight	<i>Data source:</i> Project records – training reports <i>Reporting frequency:</i> Semi-annually	By spray campaign By gender Percentage of women	18	30 7 Females 23 Males 23.3% Female	18 4 Female 14 Male	46 ³¹ 8 Female 38 Male	TBD	

³⁰ 2,991 SOPs, 479 Team Leaders, 97 Supervisors, 39 DITTs, 7 National supervisors, 63 Health care Workers, 96 Mobilizers, 132 store keepers, 121 washers, 96 pump technicians, 336 drivers, 242 Security Guards, 3 Finance Assistants, 90 DECs, 11 M&E Assistants, and 35 Abt. Permanent staff

³¹ 9 DMFP, 30 DITTs and 7 National supervisors

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
6.2.2 Implement all activities outlined in their yearly Capacity Building Action Plan	<i>Data source:</i> Project records – capacity assessment reports <i>Reporting frequency:</i> Semi-annually	By spray campaign	Completed	Completed	Completed	Completed ³²	Completed	
6.2.3 Tanzania government implements at least one aspect of the IRS program independently.	<i>Data source:</i> Project records – MOUs <i>Reporting frequency:</i> Semi-annually	By spray campaign	Completed	Training of Clinicians Supervision of SOP training	Completed	Training of Clinicians Supervision of SOP training	Completed	

³² Capacity Building took place through Boot Camp, Goizper Pump Training and IRS ToT trainings

ANNEX G: M&E METHODS: QUALITY ASSURANCE

METHODS AND TOOLS

QA/QC Issue	Method/Tools for Quality Assurance	Party Responsible at Country Level
Insecticide Procurement	<ul style="list-style-type: none"> • Pre-shipment testing 	<ul style="list-style-type: none"> • Procurement manager • Logistics coordinator
Spray Operator Safety	<ul style="list-style-type: none"> • Pre-spray training • Spray operations checklist • Field supervision • Adverse incidence reports 	<ul style="list-style-type: none"> • Operations manager • District/field coordinator • Spray team supervisor • Team leaders
Insecticide Warehousing/Transport	<ul style="list-style-type: none"> • Store manager/driver training • Warehousing operations manual • Spot checks 	<ul style="list-style-type: none"> • Operations manager • Procurement/logistics coordinator • District/field coordinators
Warehouse/Stores and Logistics	<ul style="list-style-type: none"> • Monthly/bi-weekly physical stock audit and comparison with stock movement records • Inventory tracking systems 	<ul style="list-style-type: none"> • Procurement/logistics coordinator • District/field coordinators • Spray team supervisors
Environmental Compliance	<ul style="list-style-type: none"> • Pre-spray training • Geographical Information Systems (GIS) mapping • Spot checks during spray operations 	<ul style="list-style-type: none"> • Environmental compliance officer • District environmental health officer

QA/QC Issue	Method/Tools for Quality Assurance	Party Responsible at Country Level
Spray Data Integrity	<ul style="list-style-type: none"> • Error eliminator form: Paper checklist form that helps team leaders and supervisors to check the completeness and correctness of spray operator data before leaving the field. • Data Collection Verification Form: Tool used in structure spot checks to interview households about IRS treatment and the number of people protected; used to cross-check data reported on the daily SOP forms • Number of bottles issued to SOP vs. reported structures sprayed • Average number of structures sprayed per bottle • Average number of structures sprayed daily by SOP • Multiple levels of data verification to eliminate errors: team leader, field supervisor, site manager, M&E coordinator and data clerk 	<ul style="list-style-type: none"> • Country operations manager • M&E manager • Database manager • District/field coordinators • Spray team supervisors