

Technical Brief

Data Drives Decisions in IRS

Strong Entomological Monitoring Leads to Evidence-Based Decision Making



The President's Malaria Initiative (PMI) delivers vector control interventions and protects millions of people from contracting malaria through its Africa Indoor Residual Spraying Program (AIRS). An integral part of AIRS is robust entomological monitoring; enabling entomologists to identify which mosquitoes carry malaria, the relative geographical and temporal distribution of the mosquitoes transmitting malaria, and the feeding and resting habits of the vector. AIRS monitor the quality of spraying as well as the length of time that sprayed insecticides remain effective. Monitoring also helps to determine which insecticides are effective against the target mosquito population and assess the impact of IRS on mosquito population and behavior. The collected data is made public through the Insecticide Resistance (IR) Mapper, an online data platform, which consolidates reports of insecticide resistance in malaria vectors onto filterable maps to inform vector control strategies.

What Data is Collected?

Vector Abundance and Behavior

Knowing and understanding vector density, longevity, and resting and feeding behavior of malaria-carrying mosquitos is essential for effective vector control planning. Beginning one month before the start of spraying and continuing post spray monthly for the duration of the malaria transmission season, AIRS entomologists work with local government entities, research institutes and universities to collect such information from both sprayed and control villages. The data is used to assess the impact of IRS on vector density, behavior, and making future decisions on type of insecticide used for IRS.

Spray Quality Assurance

Using World Health Organization (WHO) cone bioassay tests, AIRS conducts efficacy testing of the insecticide in the first week of the spray campaign to determine whether spray teams correctly sprayed the wall surfaces.

Monitoring the Residual Life of Insecticides

Each month following the spray, cone bioassay data continues to be collected to determine whether the insecticide has remained effective on sprayed surfaces. AIRS streamlined the 2013 WHO insecticide resistance protocols into the AIRS data collection system and uses the new resistance classification criteria.

Insecticide Resistance Data

Each year after a spray campaign is completed, data on the susceptibility of vectors to potential insecticides is collected, analyzed, and presented to local government and in-country partners to support the selection of the next year's insecticide for IRS. AIRS also uses WHO tube tests and Centers for Disease Control and Prevention bottle bioassays to determine the level of resistance malaria-carrying mosquitoes have developed to insecticides. Insecticide resistance and residual life data helps PMI and host country governments to properly identify the most effective insecticide to use and the best time to spray to reduce the burden of malaria.

How Is the Data Collected?

Standardization of Data Collection Tools

AIRS developed and distributed standard entomological data collection tools to each of the country offices in which it works. The data collection forms cover all mosquito sampling methods used in the project as well as standard mosquito testing methods. The forms help AIRS to capture uniform entomological data across project countries that is complete and pertinent for effective IRS planning and assessing impact of IRS on entomological indicators.

Entomological Database

PMI and AIRS have developed an entomological database for two important indicators: insecticide resistance and cone bioassay tests. The entomology database uses web-based "cloud" storage capacities to allow for easy real-time sharing of information within the country and with the home office, which can be used for further analysis, evaluation, and feedback.

The PMI entomology database produces summary tables and charts using a push button function. This reporting function simplifies the work of entomologists. In areas where there is less technical skill, the tool can easily generate the report.

The database also allows for pooled, detailed and comparable analysis of the entomology data from multiple countries, and enables PMI to contribute to the global and/or regional entomological data pool.

AIRS is piloting Disease Data Management System (DDMS) in Ethiopia in collaboration with Innovative Vector Control Consortium (IVCC), an innovative platform used to enter, store and analyze entomological data. It also display maps and produce reports.

Building Capacity

Trained and well-experienced entomologists in malaria control programs are key to establishing a strong entomological monitoring system. Where possible, AIRS hired trained entomologists to coordinate and lead entomological activities in the project countries. In countries lacking trained entomologists, such as Angola and Mozambique, high school graduates interested in entomology were recruited locally by AIRS. Extensive training was provided on basic entomological monitoring, with a focus on practical demonstrations and field exercises. Recruits were supplied with the necessary equipment and deployed to conduct field work under the direct supervision of experienced entomologists before being allowed to work independently. Continuous assessment, technical support, and on-the-job training were provided.

In Angola, Liberia and Mali, insectaries (infrastructure for rearing and keeping mosquitoes) were lacking. AIRS took innovative measures to overcome this challenge, converting 40-foot shipping containers into functional insectaries (Insectary-in-a-Box). These insectaries provided an optimal environment for rearing and keeping of mosquitoes; testing; and identification, dissection and preserving mosquitoes for further analysis.

Moving Forward

AIRS provides the information governments and stakeholders need to ensure IRS is effective and efficient. Strong data combined with increased capacity of local governments to implement IRS is helping to reduce the incidence of malaria in Africa.

AIRS is protecting millions of people from malaria by supporting IRS and entomological monitoring in Africa.