

Insecticide Spraying to End Malaria in Africa

Malaria remains one of the major public health problems on the African continent. Each year, between 300 and 500 million new cases occur, and about 900,000 people die from the disease. Ninety percent of deaths in Africa are children under 5 years of age.

The U.S. President's Malaria Initiative (PMI), introduced in 2005, aims to reduce malaria-related mortality by 50% in 15 African countries. The U.S. Agency for International Development (USAID)—in conjunction with the U.S. Centers for Disease Control and Prevention (CDC), the U.S. Department of State, and the White House—leads this initiative. PMI uses the following four key malaria vector control interventions:

- Rapid diagnostic tests followed by treatment with artemisinin-based combination therapy
- Intermittent preventative treatment in pregnancy
- Long-lasting insecticide-treated nets
- Indoor residual spraying (IRS)

RTI International has been working for over 12 years to prevent and control vector-borne diseases such as malaria. We are currently implementing the following five IRS projects:

- Indoor Residual Spraying, covering 13 countries (2006–2011)
- Indoor Residual Spraying 2, covering 13 countries (2010–2014)
- Kenya Indoor Residual Spraying (2010–2013)
- Malaria Control in Mainland Tanzania and Zanzibar (2006–2010)
- Tanzania Vector Control Scale-up Project (2010–2015)

For these efforts, RTI closely collaborates with each country's ministry of health (MOH) and national malaria control program (NCMP), USAID, CDC, other local and regional partners, and local communities to implement country-specific IRS programs.

To date, the IRS projects are estimated to have slowed malaria transmission rates by up to 50%.



How Does IRS Work?

IRS is an application of a residual insecticide to the interior walls of human dwellings. After biting, mosquitoes rest on walls to digest the blood meal, where they absorb a lethal dose of insecticide. IRS aims to kill female mosquitoes before the infective stage of the malaria parasite can develop. Data shows that if at least 85% of households in a community are treated, IRS can prevent transmission.

Collaboration is Key to Success

Although IRS is one of the most effective interventions against malaria, national health providers have not routinely employed it for a variety of reasons, including misconceptions about cost, lack of technical understanding of the intervention, the complex nature of its application, and weak local health systems. RTI is helping build technical understanding of IRS by training staff at NMCPs and MOHs and strengthening local capacity for implementation through a “learning by doing” approach.

For each country program, RTI maintains an office to oversee project management, environmental compliance, logistical analysis, in-country operations, and monitoring and evaluation. However, IRS activities require immense coordination, as success hinges on hundreds of spray operators coming together at the right time of year to spray dwellings in a specific area.



In each country, RTI works with the appropriate ministries to determine timing, target areas, number of structures to be sprayed, roles of participating organizations, and a media outreach strategy around the effort. Additionally, a number of assessments are required—such as baseline entomological, environmental, and logistical surveys—prior to spray operations, as well as determining logistical needs, such as procurement of appropriate insecticides, spray equipment, and personal protective equipment for spray operators.

IRS Country Highlights

The malaria control programs in Tanzania and Zanzibar are notably the most successful example of the PMI to date. These programs include other control interventions, but the impacts from IRS are especially significant.

- In Zanzibar, malaria prevalence decreased from 75% in 2003 to 0.07% after spray campaigns in 2009, in Micheweni and North “A” districts.
- In Mainland Tanzania’s Kagera Region, near Lake Victoria, the proportion of patients attending hospitals with malaria dropped from an average positivity rate of 40% before spraying began to less than 5% after IRS operations.
- Since the introduction of IRS, no single outbreak was reported in epidemic-prone Kagera Region.
- In Mainland Tanzania, hospital and clinic admissions for malaria cases recorded during and immediately after IRS operations in 2007 were the lowest in 10 years.

In Benin’s Ouémé Region, four communes with some of the highest incidences of malaria were targeted with IRS. The first spray round in 2008 achieved 94.1% coverage, protecting 521,738 people. The second IRS round in 2009 increased coverage to 99.4%, surpassing the goal of 85% coverage.

In Ghana, where malaria is the leading cause of school absenteeism, 20,000 students in first and second cycle schools were provided educational materials on malaria, its prevention methods, and IRS. This initiative culminated into the formation of IRS clubs in schools, where members serve as peer educators and IRS ambassadors in their respective communities. The Ghana program is also working to increase the role of women in IRS operations, many of which have become district program managers, spray operators, supervisors, washers, and trainers.

2010 IRS Coverage

| Country | Population Covered | Structures Sprayed | Persons Trained | Coverage of Targeted Areas |
|---------------------|--------------------|--------------------|-----------------|----------------------------|
| Angola | 649,842 | 135,856 | 1,118 | 96.3% |
| Benin | 636,448 | 166,910 | 445 | 99.3% |
| Burkina Faso | 118,691 | 33,897 | 574 | 98.9% |
| Ethiopia | 2,064,389 | 646,870 | 4,049 | 96.5% |
| Ghana | 849,620 | 342,876 | 936 | 97.3% |
| Kenya | 1,892,725 | 503,707 | 2,496 | 97.2% |
| Liberia | 420,532 | 48,375 | 704 | 97.9% |
| Madagascar | 2,895,058 | 576,320 | 1,612 | 96.3% |
| Mali | 440,815 | 127,273 | 464 | 97.3% |
| Mozambique | 2,945,721 | 618,290 | 1,996 | 98.8% |
| Rwanda | 1,365,949 | 303,659 | 197 | 99.4% |
| Senegal | 959,727 | 254,559 | 920 | 97.9% |
| Tanzania (mainland) | 6,095,891 | 1,144,621 | 9,796 | 94.5% |
| Zanzibar | 1,033,742 | 194,808 | 1,254 | 94.6% |
| Totals | 22,369,150 | 5,098,021 | 26,561 | |

Note: The IRS project expanded to Nigeria in 2011, with the first round of spray operations scheduled for 2012. RTI also supported spray operations in Zambia, but did not directly implement the activity.



More Information

Richard Reithinger, PhD
 Senior Director of Infectious Disease Programs
 Global Health Group
 +1.202.974.7810
 reithinger@rti.org

RTI 6257-4 0312



RTI International is one of the world’s leading research institutes, dedicated to improving the human condition by turning knowledge into practice. Our staff of more than 2,800 provides research and technical services to governments and businesses in more than 40 countries in the areas of health and pharmaceuticals, education and training, surveys and statistics, advanced technology, international development, economic and social policy, energy and the environment, and laboratory testing and chemical analysis. For more information, visit www.rti.org.

RTI International is a trade name of Research Triangle Institute.

