

## SPOTLIGHT: INDOOR RESIDUAL SPRAYING

As with any public health intervention, malaria control programs must be adaptable to risks, such as drug and insecticide resistance, changing epidemiology, and emergencies such as the Ebola outbreak or civil unrest. As the President's Malaria Initiative (PMI) enters its tenth year of implementation, it continues to adapt to the evolving needs of its 19 focus countries in Africa.

PMI has been particularly adaptive in relation to one of its three main prevention interventions: indoor residual spraying (IRS). Working in partnership with national malaria control programs (NMCPs), PMI's IRS program investments have grown greatly in size and geographic reach, from protecting approximately 2 million residents in 3 countries in its first year to protecting approximately 20 million residents in 13 countries in fiscal year (FY) 2014. Over the past decade, PMI has contributed substantially to building the operational capacity of national governments and institutions to implement IRS, reducing the need for external assistance. With financial and technical support from PMI, tens of thousands of individuals have been trained on IRS operations each year, building a large cadre of skilled workers throughout sub-Saharan Africa.

PMI has worked with partner countries to adapt IRS programs to address challenges and changes. Because of PMI investments in entomologic monitoring, often through local research institutions (e.g., Noguchi in Ghana, CREC in Benin, UCAD in Senegal, and MRTC in Mali), insecticide resistance to what had been the main insecticide in use – pyrethroids – has been uncovered in 14 PMI supported countries, necessitating a shift to more expensive, non-pyrethroid insecticides. PMI's supported IRS programs now rely predominantly on non-pyrethroid insecticides.



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In Ghana, PMI supported the collection of key entomological monitoring data, which revealed high levels of pyrethroid resistance in PMI-supported spray areas. This data prompted a switch in 2013 from pyrethroids to the long-lasting organophosphate, Actellic CS. PMI collected anemia and parasitemia data before and after the change in insecticide and found a large and statistically significant decrease in both indicators in children under five between 2012 and 2013. During this period, anemia fell from 67.8 percent to 48.3 percent and parasitemia fell from 47.7 percent to 20.6 percent. Other health indicators, such as the percent rapid diagnostic test-positive and the percent with fever also dropped substantially after the change to organophosphates, highlighting the importance of



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using entomological data to inform programmatic decision-making to ultimately achieve IRS impact.

PMI continues to engage directly with NMCPs on development of insecticide resistance management plans. In addition, USAID malaria funding supports the Innovative Vector Control Consortium, an international public-private partnership fostering research and development of new vector control products, including new insecticides. It is expected that alternative, long-lasting, non-pyrethroid insecticides for IRS will be brought to market in the next few years, providing countries with greater options for managing insecticide resistance and potentially stimulating competition and reducing insecticide costs. As was the case when the first long-lasting organophosphate became available, PMI will be ready to assist countries to incorporate these anticipated next generation insecticides into their programs once available.

PMI has also supported partner countries to use relevant epidemiological data to inform their IRS programs. For example, in Madagascar PMI has traditionally focused in the epidemic prone Central Highlands and Fringe districts; however, with the existence of a long-lasting susceptible insecticide and higher burden areas in the East, PMI has shifted its focus to prioritize IRS to eastern districts where the greatest impact can be achieved. In Ethiopia, PMI works with the NMCP to select communities targeted for spraying on an annual basis based on malaria case load, elevation, and other factors to ensure our spray campaign is targeting malaria hot spots.

**PMI remains committed to IRS as a core malaria prevention strategy. Indoor residual spraying is a powerful tool for combatting malaria in areas of insecticide resistance, as an adjunct to long-lasting insecticide-treated mosquito nets to further reduce malaria burden and in locations where the primary mosquito vectors rest indoors. Targeted use of IRS also may be an important tool to reduce malaria burden in areas moving toward elimination or in areas where other control measures have fallen short.**



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