



The World Health Organization Report on Indoor Residual Spraying

AFM reviewed the November 2007 *Implementation of Indoor Residual Spraying of Insecticides for Malaria Control in the World Health Organization African Region Report*¹ to assess existing indoor residual spraying (IRS) programs in Africa. Below is a summary of the report including AFM's assessment of program successes and issues. The percent of the population covered that are at risk was calculated from the population at risk and the population covered provided in the report. A list of acronyms is available at the end of this document.

Angola	
Operational Coverage	95% targeted structures sprayed
Population Covered	0.65 million people (4% of population at risk)
Insecticide(s) Used	lambdacyhalothrin
Year of Initiation	2005
Successes	Most people at risk of epidemics are protected. Capacity for IRS implementation and management is good especially in US President's Malaria Initiative (PMI) supported areas.
Issues	Supervision, monitoring and evaluation in areas not supported by the President's Malaria Initiative need to be strengthened. Routine wall bioassays need to be conducted to evaluate the quality of the spray program. The impact of IRS on malaria transmission, morbidity and mortality needs to be assessed. Data from baseline surveys need to be compared with post-intervention surveys. A national IRS manual and strategic plan need to be developed to ensure quality, standard and timely implementation of spraying, and harmonization of partners.

Botswana	
Operational Coverage	73% targeted structures sprayed
Population Covered	0.43 million people (61% of population at risk)
Insecticide(s) Used	lambdacyhalothrin
Year of Initiation	Mid 1940s, 1950s (DDT), 1998 (changed to lambdacyhalothrin)
Successes	Persistent government effort and World Health Organization support has lead to general program improvement. Capacity for IRS implementation and management is good. Most of the population at risk is protected. The number of districts reporting less than 1% malaria prevalence in some areas has been increasing.
Issues	In the mid and late 1990s, following the decentralization of its management to the district level, the IRS program experienced problems with quality and standards. Some districts still report operational coverage less than 80%. No effort has been made to specifically establish a link between IRS and the reduction of the overall malaria burden to determine the impact of the intervention.

¹ http://www.afro.who.int/vbc/reports/report_on_the_implementation_of_irs_in_the_african_region_2007.pdf

Burundi*	
Operational Coverage	96.5% targeted structures sprayed
Population Covered	0.098 million people (1% of population at risk)
Insecticide(s) Used	alphacypermethrin
Year of Initiation	1940s-1960s (pilot projects began), 2006 (trial spraying began)
Successes	Not available (N/A)
Issues	IRS would have a significant impact on malaria transmission as long as availability of resources and technical capacity make its effective implementation feasible.

Cape Verde	
Operational Coverage	Targeted structures sprayed unknown
Population Covered	Population covered unknown (231,000 people at risk)
Insecticide(s) Used	DDT, pyrethroids
Year of Initiation	1948
Successes	Between 1950 and 1967 no malaria cases were reported. <i>Anopheles gambiae</i> complex was eliminated from five islands. Since its return, malaria has been controlled and the risk of epidemics has been reduced.
Issues	Malaria re-emerged in 1967. In the late 1970s malaria transmission gradually increased and in the 1980s Cape Verde experienced epidemics. Information on the size of the current operation and population coverage, actual impact on malaria transmission, technical and managerial capacity and other relevant information are not available.

Equatorial Guinea	
Operational Coverage	60% targeted structures sprayed
Population Covered	Population covered unknown (0.5 million people at risk)
Insecticide(s) Used	bendiocarb
Year of Initiation	2004
Successes	Spraying has resulted in a reduction in malaria transmission and burden. The IRS program is well monitored and evaluated with the direct involvement of the partner institutions.
Issues	The gradual development of national capacity to sustain the remarkable gains and to expand the intervention in other parts of the country is needed.

Eritrea	
Operational Coverage	93% targeted structures sprayed
Population Covered	0.20 million people (8% of population at risk)
Insecticide(s) Used	DDT
Year of Initiation	1965
Successes	Since the re-establishment of the National Malaria Control Program (NMCP) with IRS as a major component in 1996, IRS has been implemented in most malarious areas. The NMCP has been successful in the implementation of IRS and insecticide treated nets in a complementary manner in different areas based on some epidemiological indicators. A sustained malaria burden reduction has been reported for the last few years in areas where both interventions are implemented.
Issues	The political situation interrupted the IRS program in the late 1960s.

Ethiopia	
Operational Coverage	87.2% targeted structures sprayed
Population Covered	5.98 million people (12% of population at risk)
Insecticide(s) Used	DDT, malathion
Year of Initiation	1959
Successes	Anecdotal reports indicate that the frequency and magnitude of epidemics has declined in recent years since quality and standardized IRS implementation was revived.
Issues	Owing to low technical capacity for IRS at district offices and the lack of a robust IRS reporting system to the Ministry of Health (MOH), monitoring of the IRS program is very difficult. There is no reliable list at the national level of districts that implement IRS. Geographical and operational coverage have fluctuated due to several reasons including policy shifts and resource constraints. Decentralization of IRS management to District Health Management Teams without a clear routine reporting system to the MOH remains an impediment for the deployment of effective IRS. Quality and impact of IRS on malaria transmission has not been systematically evaluated. The lack of a national spray equipment maintenance center is a critical problem.

Ghana*	
Operational Coverage	Targeted structures sprayed unknown
Population Covered	0.23 million people (1% of population at risk)
Insecticide(s) Used	pirimiphosmethyl
Year of Initiation	Mid 2006 (pilot project began)
Successes	At present, a 75% reduction in malaria case incidence has been recorded in Obuasi.
Issues	The resistance of the three major vectors to one or the other of the major groups of insecticides except organophosphates poses a problem to the application of IRS as a major component of the malaria control strategy.

Kenya	
Operational Coverage	16% targeted structures sprayed
Population Covered	0.55 million people (2.5% of population at risk)
Insecticide(s) Used	lambdacyhalothrin, deltamethrin, PYMOS (natural pyrethrum)
Year of Initiation	1950s and 1960s (pilot projects began)
Successes	The Pare Taveta IRS project implemented between 1955 and 1959 resulted in a complete disappearance of <i>Anopheles funestus</i> . Since 2005, progressive capacity building at the district level has resulted in the training of 30 District Trainers and 1700 spray operators. There is a strong government and partner commitment to scale up quality IRS. Technical capacity in malaria entomology and vector control is available at the national level.
Issues	When the Pare Taveta IRS project ceased, both vector abundance and malaria transmission rate increased. Cessation of the pilot spraying project in Kisumu from 1973-1975 was followed by a rebound of malaria transmission and burden. Overall program management and system capacity at implementation (district) level needs to be strengthened. Some areas have very low operational coverage. Supervision and monitoring quality of IRS needs attention. The impact of IRS on the vector population density and malaria transmission in terms of sporozoite positivity rate is not assessed, nor has malaria burden been evaluated in relation to IRS implementation to guide program planning and implementation. Urgent attention should be given to strengthening the ties between the operational malaria control programs and the research institutions to provide support in resistance monitoring and evaluation.

Madagascar	
Operational Coverage	98% targeted structures sprayed
Population Covered	1.25 million people (7% of population at risk)
Insecticide(s) Used	alphacypermethrin
Year of Initiation	1950, 1999-2000 (DDT), 2006 (changed to alphacypermethrin)
Successes	Reportedly, the central highlands have achieved a significant reduction in malaria burden. The NMCP has a good IRS management system and capacity.
Issues	The IRS program was stopped in 1970 due to the failure in the anticipated eradication of the disease in the perennial transmission areas. In 1988, devastating epidemics occurred in the central highlands.

Mauritius	
Operational Coverage	IRS is applied sporadically in response to case detection in high risk areas
Population Covered	Population covered unknown
Insecticide(s) Used	DDT
Year of Initiation	1949
Successes	<i>Anopheles funestus</i> disappeared completely following the intensive implementation of IRS in 1949-1951. By 1973, malaria was officially eradicated. After its return, the epidemic was contained through the application of IRS and case management. Since then, limited reports of indigenous malaria cases continued until 1997. The MOH is carrying out rigorous entomological surveillance. Capacity for malaria control including IRS is sufficient with supportive services provided by laboratories and a strong entomological team.
Issues	Malaria transmission was re-established in 1975. Mauritius continues to experience a problem of imported malaria. The importation of cases and the presence of vector mosquitoes remain a challenge to potential elimination.

Mozambique	
Operational Coverage	91% targeted structures sprayed
Population Covered	5.7 million people (30% of population at risk)
Insecticide(s) Used	DDT, deltamethrin, lambdacyhalothrin, bendiocarb
Year of Initiation	1946
Successes	The Lubombo Spatial Development Initiative (LSDI) project has reported reductions in malaria prevalence each year of implementation. Mozambique is one of the countries in the region where IRS has significantly expanded. Significant reduction in malaria burden is being achieved particularly in the LSDI operational areas.
Issues	The NMCP needs to further build its technical and system capacity for effective implementation and management of IRS in order to increase quality and efficacy of the program outside the LSDI operational areas.

Namibia	
Operational Coverage	86% targeted structures sprayed
Population Covered	0.4 million people (57% of population at risk)
Insecticide(s) Used	DDT, deltamethrin
Year of Initiation	1965
Successes	The IRS program has shown progressive changes and improved operational coverage and quality of spraying during the last 3-4 years. The chronic problem of quality and low coverage has been resolved through persistent efforts including training of staff and improving supervision quality.
Issues	The impact of IRS on malaria transmission and burden is not regularly assessed and reported and this needs to be strengthened in order to facilitate informed decision and program planning.

Sao Tome & Principe	
Operational Coverage	87% targeted structures sprayed
Population Covered	0.14 million people (93% of population at risk)
Insecticide(s) Used	alphacypermethrin
Year of Initiation	1980 (DDT), 2004 (alphacypermethrin)
Successes	The continuous and blanket spraying together with other malaria control interventions has resulted in a reduction of malaria burden. Sao Tome & Principe is one of the few countries where multiple vector control interventions are applied within the context of Integrated Vector Management.
Issues	IRS was terminated in 1984 resulting in severe epidemics in 1985-1986. No information is available on the existing technical, management and monitoring and evaluation capacity and practice of the IRS program.

South Africa	
Operational Coverage	83% targeted structures sprayed
Population Covered	4 million people (89% of population at risk)
Insecticide(s) Used	DDT, deltamethrin, alphacypermethrin
Year of Initiation	1932
Successes	IRS has significantly impacted malaria transmission through the years. The geographical extent and intensity of transmission of the disease has been greatly reduced due to IRS. The IRS program has a history of practicing good management and monitoring systems. The capacity for IRS is sufficient at all levels.
Issues	Pyrethroids were the insecticide of choice from 1996 to 2000 - when high malaria transmission of epidemic proportion was reported due to the emergence of pyrethroid resistance. Further success in reduction or even elimination of malaria in South Africa might be difficult without similar successes in neighboring countries.

Swaziland	
Operational Coverage	93% targeted structures sprayed
Population Covered	0.4 million people (80% of population at risk)
Insecticide(s) Used	DDT, deltamethrin
Year of Initiation	1947
Successes	In recent years, the malaria control program has been reporting a significant reduction in malaria burden following an intensive application of IRS in all malarious areas. <i>Anopheles funestus</i> was eliminated due to the intensive application of IRS. The IRS program has good technical and systemic capacity and is well managed. Malaria transmission is diminishing through a comprehensive malaria control strategy with IRS as the major component.
Issues	N/A

Tanzania*	
Operational Coverage	Targeted structures sprayed unknown
Population Covered	Population covered unknown (32 million people at risk)
Insecticide(s) Used	lambdacyhalothrin
Year of Initiation	1930s (pyrethrum), 1946-1960 (DDT), 1988-1996, 2005-2006 (small scale spraying began)
Successes	N/A
Issues	The method of IRS has not been applied consistently to achieve a significant and sustained impact. There have been a number of short lived initiatives.

Uganda*	
Operational Coverage	96% targeted structures sprayed
Population Covered	0.49 million people (2% of population at risk)
Insecticide(s) Used	lambdacyhalothrin
Year of Initiation	1940s-1960s (pilot projects began), 2006 (pilot project began)
Successes	A dramatic reduction of disease transmission was documented in Kampala as a result of the IRS pilot projects conducted in the 1940s-1960s. The National Environment Management Authority has approved the re-introduction of DDT for IRS following an environmental impact assessment and public hearing. National technical capacity for undertaking IRS has been strengthened. A national team of 14 vector control officers from the MOH have been trained in planning, implementation and monitoring of national IRS activities. The managerial capacity of the NMCP has been re-enforced by the appointment of an additional medical officer in the Monitoring and Evaluation Unit of the program. A National Multi-Sectoral Committee that will monitor IRS issues has also been constituted.
Issues	N/A

Zambia	
Operational Coverage	84% targeted structures sprayed
Population Covered	0.77 million people (7% of population at risk)
Insecticide(s) Used	DDT, lambdacyhalothrin, alphacypermethrin
Year of Initiation	1930s (copper mining towns), 1950s (urban communities)
Successes	Since 2004, IRS has been expanding. Zambia is one of the few countries where the two major vector control interventions, insecticide treated nets and IRS, are concurrently being scaled up within the context of Integrated Vector Management. The country has been building its capacity to ensure effective implementation of IRS. There is a good technical capacity and management system.
Issues	After 1976, the decline in copper prices together with the ban of DDT for agricultural use led to the unavailability of affordable and effective insecticides and negatively affected the NMCP. By 1980, IRS coverage was reduced markedly and finally stopped altogether.

Zanzibar	
Operational Coverage	96% targeted structures sprayed
Population Covered	1.02 million people (85% of population at risk)
Insecticide(s) Used	lambdacyhalothrin
Year of Initiation	1950s (DDT), 2006 (lambdacyhalothrin)
Successes	The IRS campaign was re-introduced in 2006 and has achieved a dramatic impact on malaria transmission and burden.
Issues	IRS was interrupted from 1958-1965 due to a policy change. It was re-initiated in 1966 and again ceased in 1987 due to a lack of funds and the appearance of vector resistance to DDT, which caused program failure. Being fully partner-funded, a strategy must be devised to sustain the gains made against malaria when donor support ceases in the coming few years.

Zimbabwe	
Operational Coverage	82% targeted structures sprayed
Population Covered	2.2 million people (40% of population at risk)
Insecticide(s) Used	DDT, lambdacyhalothrin
Year of Initiation	1947
Successes	The country has a history of managing quality and effective IRS. To date, IRS management is improving and coverage is increasing as more resources are made available.
Issues	In recent years, resource constraints and scarcity of technical capacity has been challenging to the IRS program – this has impacted the quality and extent of the intervention. More effort should be put in place to monitor the impact of the intervention on vector and malaria burden in the target areas.

*Countries conducting pilot IRS programs

Acronyms

IRS	Indoor Residual Spraying
LSDI	Lubombo Spatial Development Initiative
MOH	Ministry of Health
NMCP	National Malaria Control Program