



Malaria Facts

- Malaria affects over 40% of the world's population in 90 countries.
- Half a billion people contract malaria each year, and over a million die from the disease.
- It is estimated that a child under five dies of malaria every 30 seconds. Children in remote rural areas with poor access to health services are especially vulnerable.
- Malaria is estimated to cost Africa \$12 billion each year in lost productivity.
- Global funding for malaria control is roughly 60 times what it was in 1999.
- The World Health Organization recommends:
 - Treating malaria with Artemisinin-based combination therapy (ACT)
 - Indoor residual spraying (IRS) with one of twelve approved insecticides, including DDT
 - Sleeping under a long-lasting insecticidal net (LLIN) every night

Public Health Insecticide Facts

- Malaria control has always been reliant on agricultural insecticides.
- Pyrethroids, such as alphacypermethrin, permethrin and deltamethrin, are the most common class of active ingredients (AIs) used to control disease-carrying mosquitoes with IRS and LLINs.
- Since pyrethroids were developed by agricultural producers in the 1970s, no new major AI class has entered the public health pesticides market.
- Pyrethroids are still widely used in agriculture, while DDT is reserved strictly for public health.

Applicability of Study Results

- *Aedes aegypti* mosquitoes, those studied by Grieco et al (2007)¹, transmit dengue and yellow fever. The former was eliminated from many areas in the 1950s and 60s but re-emerged in Latin America and Asia in the past three decades. Dengue is second only to malaria in terms of global vector-borne infections, though malaria accounts for an incredibly disproportionate share with 75 percent of the global burden and 90 percent of vector-related deaths.
- Malaria-carrying *Anopheles* mosquitoes are repelled to a higher degree and are more responsive to the behavioral actions of chemicals than are non-malaria carrying *Aedes aegypti* mosquitoes^{2,3}. Thus the behavioral actions detected with *Aedes aegypti* mosquitoes will be greater against *Anopheles* mosquitoes.
- DDT's spatial repellent action on malaria-carrying mosquitoes has been demonstrated elsewhere^{2,4} and quantitatively illustrated in a probability models by some of the same authors⁵.

¹ Grieco et al., *A New Classification System for the Actions of IRS: Chemicals Traditionally Used for Malaria*. Public Library of Science One, August 8, 2007.

² Kennedy, J., *The excitant and repellent effects of mosquitoes of sub-lethal contacts with DDT*. Bulletin of Entomological Research, 1947. 37: p. 593-607.

³ Muirhead-Thomson, RC. 1951. Mosquito behaviour in relation to malaria transmission and control in the tropics. Edward Arnold & Co. 219 pp; Zulueta, J.d., *The irritability of mosquitoes to DDT and its importance in malaria eradication*. Rivista Di Malariologia. XLI: p. 169-178; Zulueta, Jde , Kafuka, GW , Cullen, JR , Pedersen, CK . 1961. The results of the first year of a malaria eradication pilot project in northern Kigezi (Uganda). East African Medical Journal 38(1):1-26.; Zulueta, J.d and J.R. Cullen, J.R. *Deterrent effect of insecticides on malaria vectors*. Nature, 1963. 200(4909): p. 860-61; Smith, A. and Webley, D.J *A verandah-trap hut for studying the house-frequenting habits of mosquitoes and for assessing insecticides. III. The effect of DDT on behaviour and mortality*. Bulletin of Entomological Research, 1969. 1968(59): p. 33-46.)

⁴ Gabaldon, A., *The Nation-wide campaign against malaria in Venezuela. Parts I & II*. Transactions of the Royal Society of Tropical Medicine and Hygiene, 1949. 43(2): p. 113-132; 133-164.

⁵ Roberts, D., et al., *A probability model of vector behavior: Effects of DDT repellency, irritancy, and toxicity in malaria control*. Journal of Vector Ecology, 2000. 25: p. 48-61.