



Dichlorodiphenyltrichloroethane (DDT)

Risks, Benefits and Public Perception

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Overview

- History
- Public Perception
- Science: Risks and Uncertainty
- Governmental, Intergovernmental, and Non-governmental Organizations
- Policy





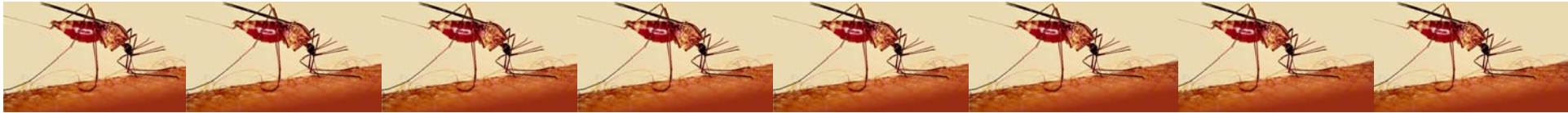
DDT: History

- First discovered in 1873
- Rediscovered in 1939 as an insecticide
- Used during WWII to combat typhus and Malaria
- Used post-war for agricultural insecticide
- Apparently benign to humans



Source: <http://markc1.typepad.com/relentlesslyoptimistic/images/ddt2.jpeg>





GOOD FOR FRUITS—Bigger apples, juicier fruits that are free from unsightly worms . . . all benefits resulting from DDT dusts and sprays.



GOOD FOR STEERS—Beef grows meatier nowadays . . . for it's a scientific fact that—compared to untreated cattle—beef-steers gain up to 50 pounds extra when protected from horn flies and many other pests with DDT insecticides.



Knox Out FOR THE HOME—helps to make healthier, more comfortable homes . . . protects your family from dangerous insect pests. Use Knox-Out DDT Powders and Sprays as directed . . . then watch the bugs "bite the dust"!



Knox Out FOR DAIRIES—Up to 20% more milk . . . more butter . . . more cheese . . . tests prove greater milk production when dairy cows are protected from the annoyance of many insects with DDT insecticides like Knox-Out Stock and Barn Spray.



CHEMICALS

97 Years' Service to Industry • Farm • Home



GOOD FOR ROW CROPS—25 more barrels of potatoes per acre . . . actual DDT tests have shown crop increases like this! DDT dusts and sprays help truck farmers pass these gains along to you.



Knox Out FOR INDUSTRY—Food processing plants, laundries, dry cleaning plants, hotels . . . dozens of industries gain effective bug control, more pleasant work conditions with Pennsalt DDT products.

Source: <http://www.mindfully.org/Pesticide/DDT-Household-Pests-USDA-Mar47.htm>





Silent Spring: 1962

- Single most influential published piece about DDT
Because it caught the public's attention
- Compiled an enormous amount of anecdotal evidence about the toxicity of pesticides



Source:
<http://www.mindfully.org/Pesticide/Rachel-Carson-Silent-Spring.htm>





Ubiquity and Persistence

- Every creature on earth contains detectable levels of DDT in their body
- DDT and its metabolites persist for decades



Courtesy of US Fish and Wildlife Service.



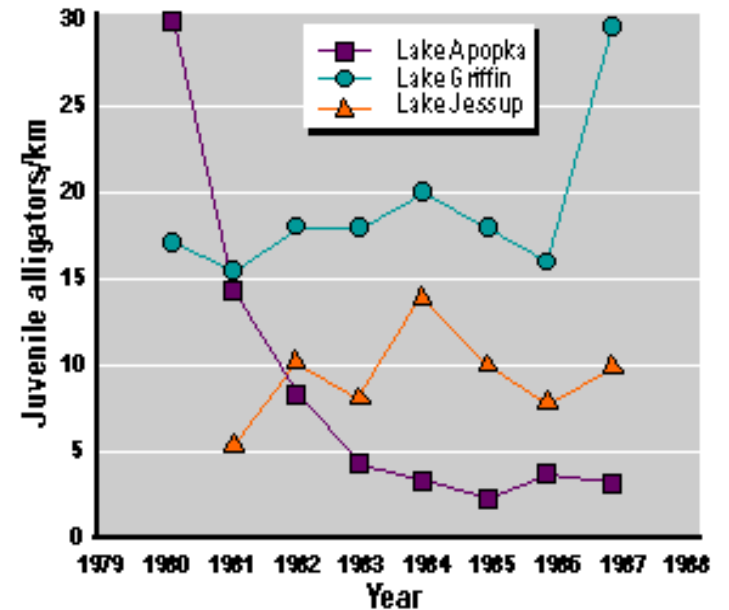


Evidence for toxicity: non-humans

- Fish Kills
- Reproduction inhibited in birds and other animals
- Feminization and other reproductive dysfunctions



Source: www.darp.noaa.gov/southwest/amtrader/photo.html



The number of juvenile alligators per kilometer of shore line fell drastically in Lake Apopka (purple) when it was contaminated by DDT

Source: Guillete et al. (200?)





Evidence of toxicity: humans

- Long term DDT exposure is potentially linked to:
 - Cancer
 - Genetic Mutations
 - Preterm birth
 - Underweight at birth
 - Reduced lactation period
 - Spontaneous abortion/miscarriage
 - Increased rate of hermaphrodites
- Studies lack controls and reproducibility





DDT: Banned by Developed Nations

First banned in 1969: Denmark, Sweden, Hungary, and the state of Michigan

1972: United States bans the use of DDT, but not the export of it

“DDT posed unacceptable risks to the environment and potential harm to human health.”

-EPA Press Release, 12/31/1972





Pressure on Developing Nations

- Reduction of aid for countries using DDT programs
- No importation of goods with DDT residues into developed countries
- Reduction in suppliers for malaria programs



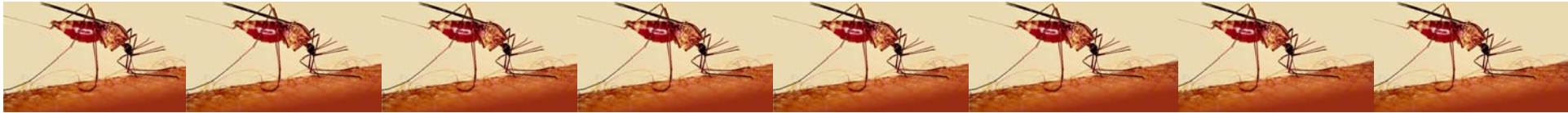


International Malaria Epidemic

Image removed for copyright reasons.

Please see: Hay, Simon, Carlos Guerra, Andrew Tatem, Abdisalan Noor, and Robert Snow. "The global distribution and population at risk of malaria: past, present and future." *The Lancet: Infectious Diseases* V4 (June 2004): 327-36.

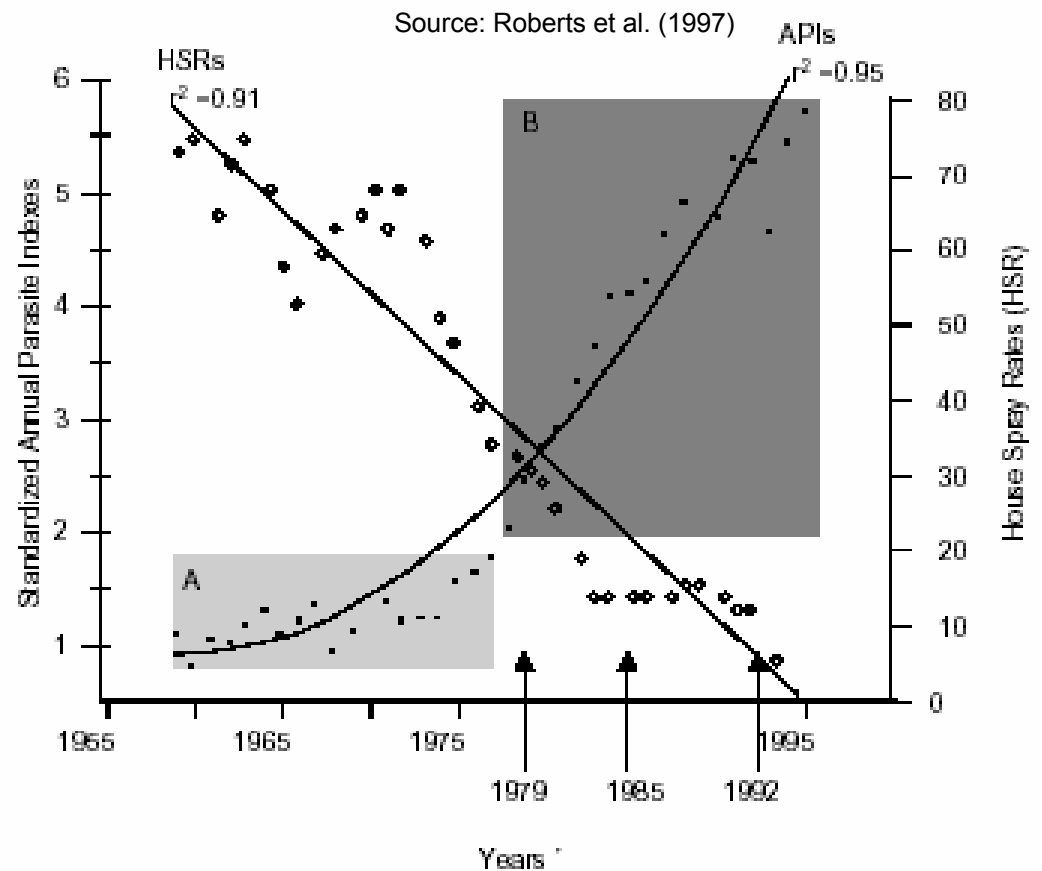




Effectiveness against Malaria

Reduction in DDT directly correlated to increase in Malaria

Source: <http://www.cdc.gov/ncidod/EID/vol3no3/roberts.htm>



Annual Parasite Indexes (Y-axis one) and House Spraying Rates (Y-axis two) in American countries plotted against time show an inverse relationship between DDT use and parasite exposure





Alternative Malaria Control Options

- Insecticide treated bed nets
- House spraying with alternative pesticides
- Land use modification
- Vaccines, fast diagnosis and treatment
- General health care improvements and education





Indoor Residue Spraying

Image removed for copyright reasons.

Please see: Figure 1 in Walker, K. "Cost Comparison of DDT and alternative insecticides for malaria control."
Medical and Veterinary Entomology 14 (2000): 345-354.





Scientific Conclusion:

- Wide spread use of DDT is harmful to the environment
- No clear evidence of human health risk
- DDT is the single most effective prevention method for malaria
- DDT is the most cost effective method of preventing malaria





Public Policy & DDT

1. Public perception of DDT: misinformed
2. Stockholm Convention: balancing perception
3. National organizations: USAID & bed nets
4. WHO abandons DDT in favor of bed nets

Action controlled by public perception





Public Perception of DDT Environment v Humans

Developed Nations



www.habitat.org.uk

- Eradicating bird and fish species
- Cancer and endocrine disruption in humans

Developing Nations



“Unite against malaria” www.unicef.org

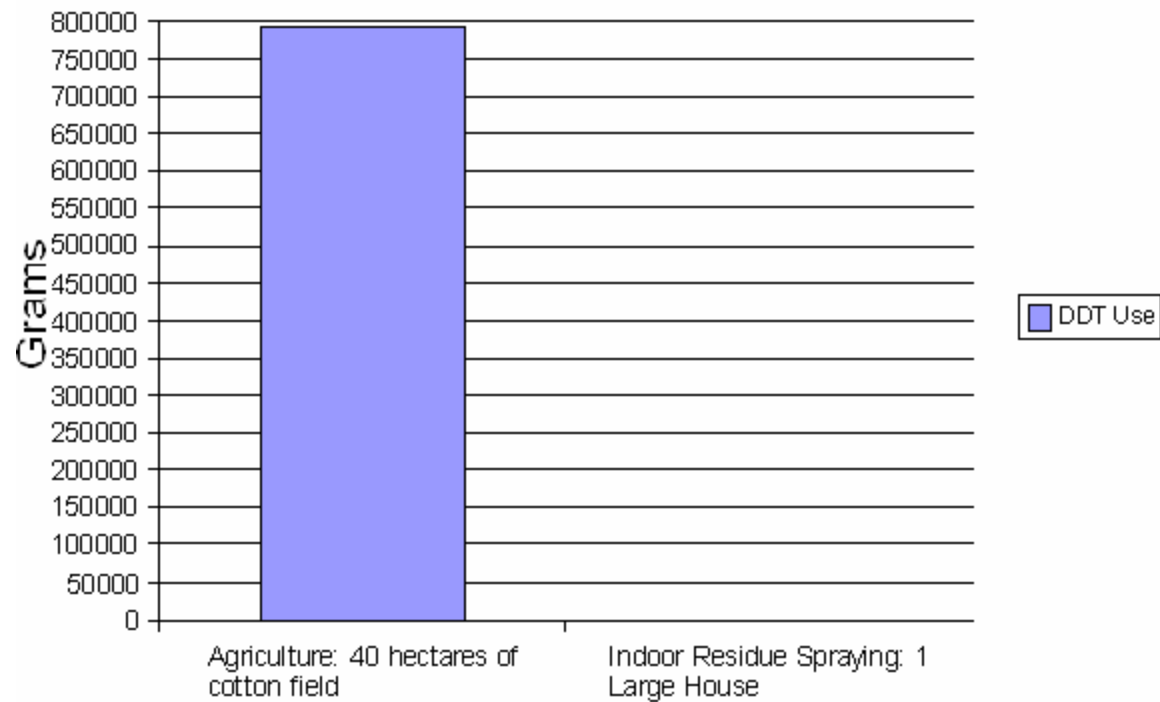
- 3000 children / day, dead
- 300-600 million / yr, sick
- Lost growth in economy





Real Risks

DDT Use: 1 unit of agriculture vs. 1 unit of house spraying



All houses in Guyana (800 thousand people) = 4 km² cotton field





Eradiation to Reduction: Past funding failures

Necessary for Malaria eradication:

- Reducing malaria prevalence below critical level → requires DDT
- Stop DDT use for agriculture
- Funding from developed nations





Comparison of Methods

Malaria Eradication Program

- Attack: house spraying and treatment
- Consolidation: increased treatment, limited spraying
- Maintenance: vigil against return

Goal: Global elimination

Roll Back Malaria Program

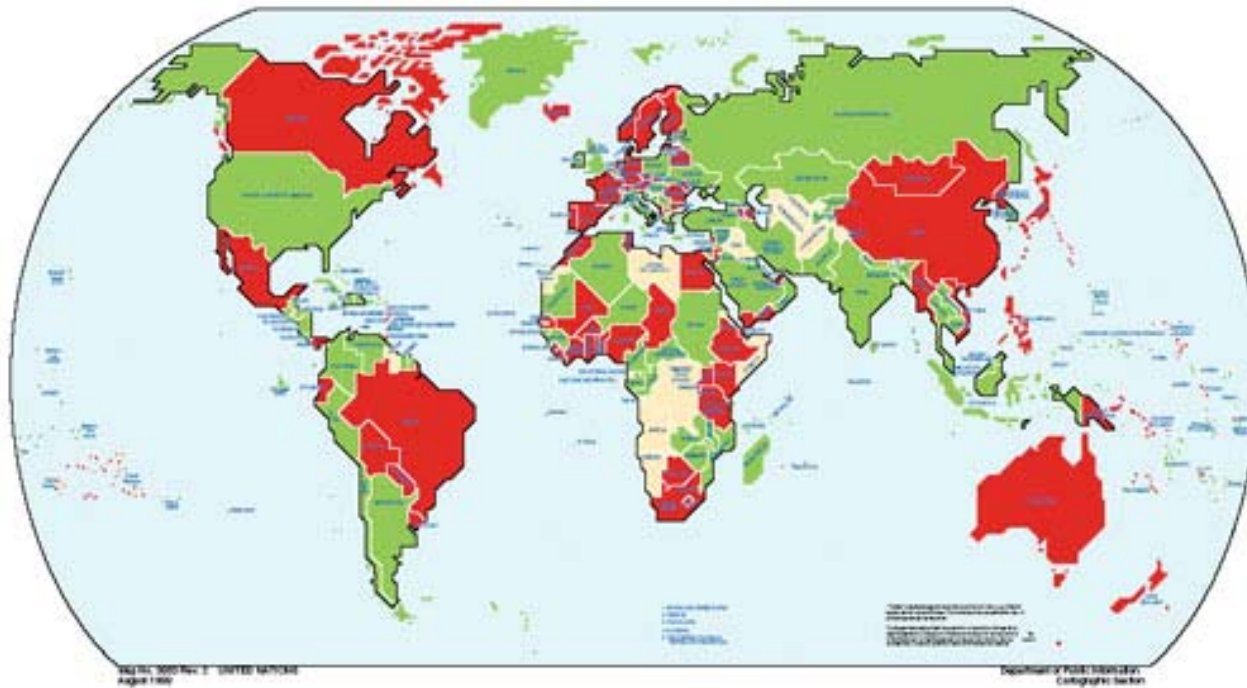
- 60% use of bednets
- 60% preventative treatment of pregnant women
- Maximum 2 weeks to outbreak detection

Goal: Halve the malaria burden





Repeating the Past: The Stockholm Convention, 2001



Countries that have signed in green and those that have ratified in red



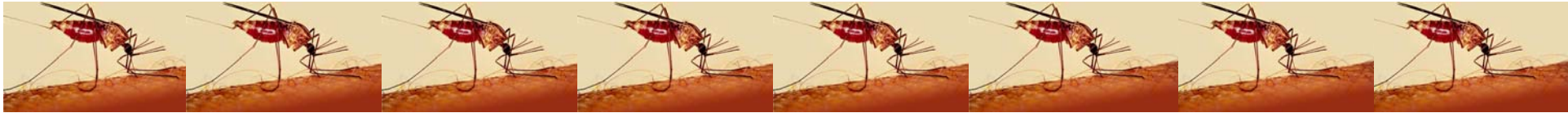


USAID Says...

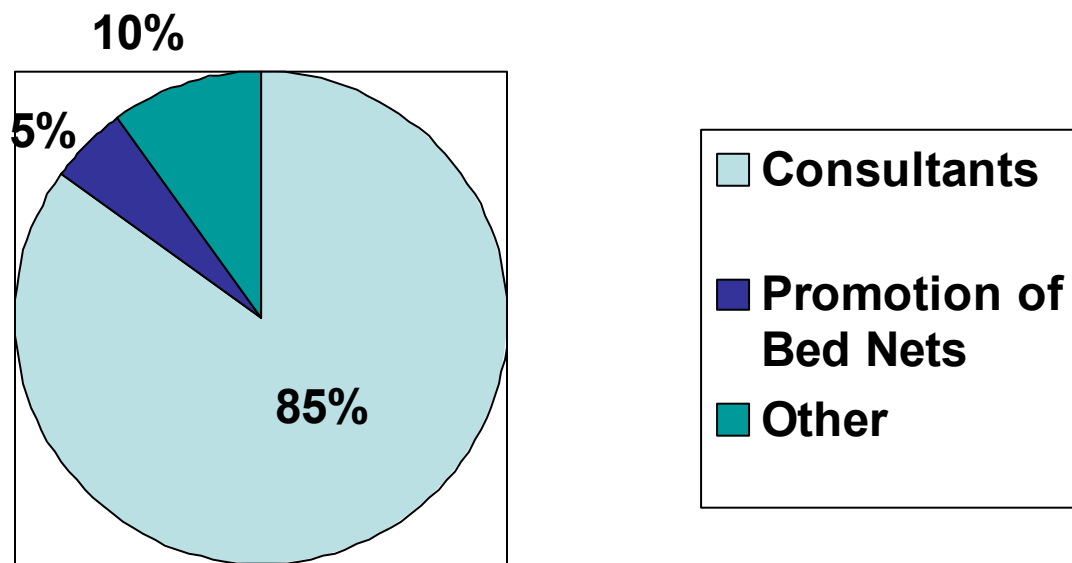
“USAID and others have not seen DDT as a high priority component of malaria programs for practical reasons...

It has been judged more cost-effective and appropriate to put US government funds into preventing malaria through insecticide-treated nets.”





Case Study: USAID & Funding



Driessen, Paul. "USAID could stop this epidemic." *The Hill*. November 2, 2005

\$80 million spent by USAID





Case Study: USAID & Policy

- DDT as weapon of last resort
- Capitalist approach: private sale of bednets
- Lack of infrastructure inhibiting





World Health Organization

- Staunch supporter of DDT
- Stockholm Convention provides an opportunity to eliminate agricultural use
- Developed countries withhold funding
- Situation in developing countries worsens



WHO
creates Roll
Back Malaria
program





Conclusions:

Public perception, not science, dictates the action of malaria control

DDT should remain an integral part of malaria control programs



