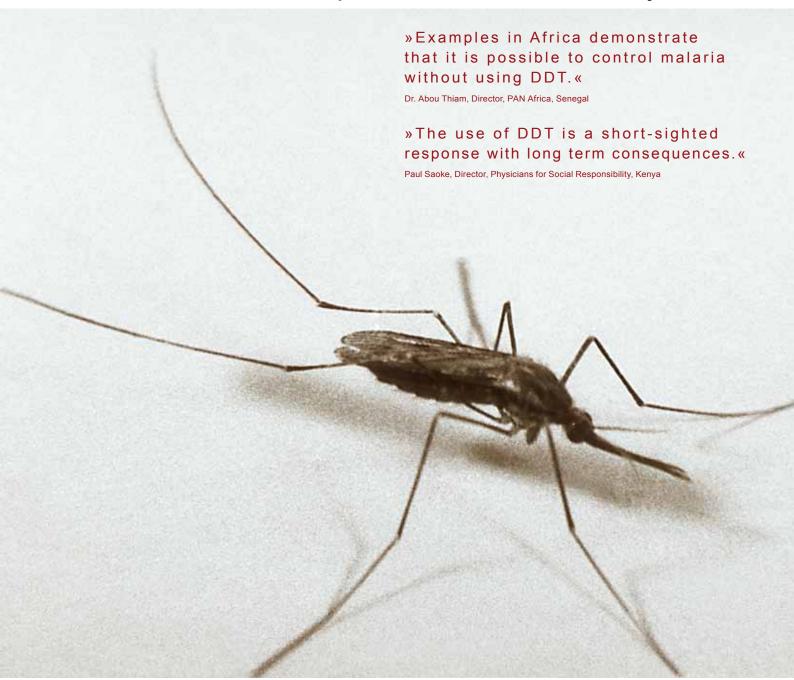


# Control malaria without DDT! There are more options than currently used



A healthy world for all.

Protect humanity and the environment from pesticides. Promote alternatives.

### Diversifying malaria control - reducing reliance on DDT

In December 2009 the World Health Organisation (WHO) launched its »World Malaria Report 2009« on global efforts to control malaria and the distribution of malaria cases and deaths worldwide. Funding for malaria control has increased, providing opportunities in several countries for a dramatic scale up of malaria control interventions. The strategies being primarily adopted are based on widespread distribution of long-lasting insecticidal nets and artemisinin-based combination therapy, plus a revival of indoor residual spraying of insecticides. In spite of the renewed efforts, compared to 2006 global statistics remain relatively unchanged: in 2008, there were an estimated 243 million malaria cases in 109 countries. Malaria accounted for almost one million deaths, of which 89% were in the African Region.

The WHO presents evidence that prevention and treatment can alleviate the burden of disease. So far most reductions have been seen in smaller countries and do not yet influence the global figures. Reductions of more than 50% in the numbers of reported malaria cases and deaths were observed in Eritrea, Rwanda, São Tomé and Príncipe, Zambia and Zanzibar. These reductions were a result of the widespread use of insecticide-treated bednets, the rapid treatment of cases with effective anti-malarial drugs and the massive application of residual insecticides sprayed on walls, ceilings, and all other surfaces inside houses. Most countries are adopting these methods for malaria control, which means that the tools and strategies employed to control malaria are substantially reliant on chemicals.

The over-reliance on chemical- and pharmaceutical-based strategies may undermine, and inhibit the development of the successful application of other more sustainable approaches to malaria control. The efficacy of alternatives is damaged by the development of resistance by mosquito vectors to chemicals and by parasites to pharmaceuticals. The chemical-dependent approach fails to address changes in the behaviour of mosquito vectors; the logistics of distributing drugs, chemicals and bednets; and future funding problems. The WHO states that global eradication cannot be expected with existing tools. Additionally, there is growing concern about impacts on human health and the environment associated with the use of pesticides for malaria vector control.

DDT and almost all recommended pesticides for malaria control are considered by internationally recognized organisations as highly hazardous pesticides with adverse impacts that can adversely affect human health and the environment.

As a public health initiative, malaria control programmes need to avoid harm, and must broaden their scope to incorporate existing non-chemical control methods, drawing on biological pest and disease control, environmental management and personal protection (bioenvironmental control), as well as contributing factors like public health education. The diagram inside sets out a raft of methods and factors that have been successfully used to control the incidence of malaria. An integrated strategy can restrict the use of hazardous insecticides, and avoid their adverse health effects while providing a sustainable way for malaria vector and disease control.

### DDT - a persistent organic pollutant

- »Maternal exposure to DDT by living in a DDT-sprayed village was associated to having male offspring with one or more urogenital birth defects.« (Bornman, 2009)
- »The recent literature shows a growing body of evidence that exposure to DDT and its breakdown product DDE may be associated with adverse health outcomes such as breast cancer, diabetes, decreased semen quality, spontaneous abortion, and impaired neurodevelopment in children.« (Eskenazi 2009)
- »Evidence is presented showing that neurological and endocrine effects are associated with pyrethroids and DDT at levels equal or below known levels in breastmilk.« (Bouwman 2009)

### The legally binding Stockholm Convention

calls for reduced reliance on DDT for vector control with the goal of reducing and ultimately eliminating the use of DDT. However, for malaria control the World Health Organisation still recommends the application of DDT on all surfaces inside houses to kill malaria transmitting mosquitoes. An estimated 5,000 tonnes of DDT are used each year in 26 countries for the control of vector-borne diseases, mainly for malaria and visceral leishmaniasis control.

#### Notes

- Bornman, Riana et al. (2009): DDT and urogenital malfomations in newborn boys in a malarial area; BJUI
- Eskenazi et al. (2009): The Pine River Statement: Human Health Consequences of DDT Use; Environmental Health Perspectives (online: http://dx.doi.org; accessed May 4, 2009)
- Bouwman, H.; Kylin, H. (2009): Malaria Control Insecticide Residues in Breastmilk: The Need to consider Infant Health Risks; Environmental Health Perspectives (online: http://dx.doi.org; accessed May 1, 2009)
- World Health Organisation (2009): World Malaria Report 2009

#### For more information

- PAN Germany (2009): DDT and the Stockholm Convention States on the edge of non-compliance, Pesticide Action Network, Hamburg (DIN A4, 39 pages)
- · PAN Germany (2009): Environmental strategies to replace DDT and control malaria, Pesticide Action Network, Hamburg (DIN A4, 30 pages)
- PAN Germany (2009): Phasing in Alternatives to DDT Reasons, experiences and links, Pesticide Action Network, Hamburg (DIN A4, 8 pages)

These PAN Germany documents can be downloaded free of charge at www.pan-germany.org.

# Better strategies for malaria control – beyond the chemical path

Insecticides currently used for malaria control carry risks to human health and the environment. PAN is calling for integrated malaria control based on social and ecological practices and drawing on local resources. These strategies will diversify malaria control methods and reduce reliance on pesticides.

Today, many programmes all over the world have successfully demonstrated the use of a holistic approach incorporating bioenvironmental control methods for malaria vector control (see also PAN Germany, 2009). The diagram »The spectrum of methods« shows the diversity of methods to combat malaria. Many tools exist both to control malaria and to attack the parasite at different stages of its life cycle. In addition to the common use of chemical and pharmaceutical interventions, non-chemical methods have been successful and include environmental management, non-chemical personal protection and biological control. These possibilities are frequently neglected even though they have proved their value for malaria control and appear to be safe to humans, environmentally sound, relatively cost-effective, locally available and sustainable in comparison to the widely-adopted chemical tools.

Combinations of interventions adapted to the local situation are a key to sustaining malaria control efforts. Effective non-pesticidal interventions begin with understanding the epidemiology of malaria, and this depends on a variety of factors: the biology and ecology of local vectors, the distribution and behaviour of people; and environmental conditions in the target areas. An analysis of the local situation is essential in order to develop a holistic strategy of interventions appropriate to conditions and vectors. These elements provide the basis for responsible authorities to reduce gradually the intensive use of pesticides, apply effective non-pesticidal interventions and finally to restrict the use of insecticides to emergencies.

Malaria is fundamentally a disease of poverty and it can be contained and reduced by investment in improving the local environment, educating populations in affected areas, and engaging communities in prevention strategies. A full programme for sustainable malaria control will require support for participation of communities in malarial areas, investment in technical capacity, and development of guidelines to inform and educate all the participants.

A holistic strategy must be designed with close attention to these local ecological, socio-economic, political and cultural factors. In this way, the living conditions and the general health of the people will be improved, while at the same time protecting the environment and the biodiversity, enabling sustainable development and contributing to rural development and poverty reduction.

## Keypoints of success for malaria control



- Awareness raising
- Health education

- Combining multiple control interventions
- · Adapting to the local situation
- Prefering bioreliant and low pesticide reliant tools



Environmental management (ecosystem compatible removal of mosquito breeding sites): Environmental modification (draining wetlands, constructing drainage canals, covering water tanks and stagnant water, land levelling, filling depressions and pools of water), environmental manipulation (irrigation management, clearing of vegetation, planting of trees, removal of trash)



Ecosystem compatible predators (larvivorous fish) and nematodes (under development)



Bacterial larvicides (Bacillus thuringiensis) **Botanical larvicides** (neem)



**Chemical larvicides** 



Medicinal herbs

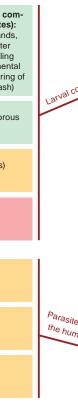


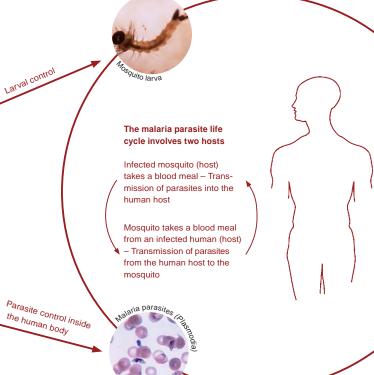
Pathogen contro

Chemoprophylaxis Chemotherapy



Vaccination (under development)





House improvement Improved sanitation Use of long sleeved shirts Botanical repellents (neem, citronella) Mosquito nets and screens



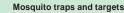




Insecticide-treated bednets **Chemical repellents** 







Botanical pesticides (pyrethrum) Fungi (under development)



Sterile insect technique (under development)





Sponging cattle with insecticides



Indoor-residual spraying with insecticides



Space spraying of insecticides



### Goals

- Reduction of malaria cases
- Improvement of the general health status
- Pollution prevention
- Biodiversity protection



· Community participation



· Improvement of public health system



- · Financial and technical support
- · Support by local research



Moderate risk low pesticid reliant method

High risk high pesticide reliant r

Low or no risk bioreliant / low pesticide reliant method

· Monitoring of the epidemiology, mosquitoes and parasites

Legend



- Good governance
- · Decentralisation of control methods
- · Local capacity building



- Regional cooperation
- Intersectoral collaboration
- · Involvement of civil society organizations





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### A healthy world for all. Protect humanity and the environment from pesticides. Promote alternatives.

PAN Germany is a charitable organisation which provides information on the adverse effects of pesticides and promotes environmentally friendly and socially just alternatives. We are part of the International Pesticide Action Network (PAN). Our working areas range from critical-constructive assessments of policy and legislation to practical services for farmers and consumers.

### Support PAN Germany. Donate now.

Account Number: Postbank Hannover, Konto-Nr. 470 588 - 307, BLZ 250 100 30

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Photos: farmer group: van den Berg; workers: Méndez-Galván; malaria treatment: Gillespie; researcher: Gillespie; monitoring: Gillespie; African village: Courtesy of Gene Dailey, American Red Cross; group discussion: CDC/Dr. Robert Newman; digging workers: CDC; water management; Mbogo; gambusia: CDC; biological larviciding: Mbogo; chemical larviciding: CDC; pyrethrum: Jerry Friedman; laboratory: CDC; cattle: CDC/Abbigail Tumpey; indoor-residual spraying: Gillespie; space spraying: CDC; mosquito: CDC/Edward McCellan; feeding mosquito: CDC/James Gathany; plasmodia life cycle: CDC/Alexander J. da Silva, Melanie Moser; plasmodia: CDC/Steven Glenn; mosquito net: P. Skov Vestergaard Frandsen; house: Méndez-Galván; citronella: @Hakcipta Yosri – Dibebaskan di bawah {CC|Version 2}; insecticide-treated net: Gillespie; malaria drug: Carina Weber; vaccination: CDC/Judy Schmidt

This project was supported by:





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