

SCIENTIFIC AMERICAN™

Permanent Address: <http://www.scientificamerican.com/article.cfm?id=ddt-use-to-combat-malaria>

Should DDT Be Used to Combat Malaria?

DDT should be used "with caution" in combating malaria, a panel of scientists reported today

By Marla Cone and Environmental Health News | Monday, May 4, 2009 | 25 comments

A panel of scientists recommended today that the spraying of DDT in malaria-plagued Africa and Asia should be greatly reduced because people are exposed in their homes to high levels that may cause serious health effects.

The scientists from the United States and South Africa said the insecticide, banned decades ago in most of the world, should only be used as a last resort in combating malaria.

The stance of the panel, led by a University of California epidemiologist, is likely to be controversial with public health officials. Use of DDT to fight malaria has been increasing since it was endorsed in 2006 by the World Health Organization and the President's Malaria Initiative, a U.S. aid program launched by former President Bush.

In many African countries, as well as India and North Korea, the pesticide is sprayed inside homes and buildings to kill mosquitoes that carry malaria.

Malaria is one of the world's most deadly diseases, each year killing about 880,000 people, mostly children in sub-Saharan Africa, according to the World Health Organization.

The 15 environmental health experts, who reviewed almost 500 health studies, concluded that DDT "should be used with caution, only when needed, and when no other effective, safe and affordable alternatives are locally available."

We cannot allow people to die from malaria, but we also cannot continue using DDT if we know about the health risks," said Tiaan de Jager, a member of the panel who is a professor at the School of Health Systems & Public Health at the University of Pretoria in South Africa. "Safer alternatives should be tested first and if successful, DDT should be phased out without putting people at risk."

The scientists reported that DDT may have a variety of human health effects, including reduced fertility, genital birth defects, breast cancer, diabetes and damage to developing brains. Its metabolite, DDE, can block male hormones.

"Based on recent studies, we conclude that humans are exposed to DDT and DDE, that indoor residual spraying can result in substantial exposure and that DDT may pose a risk for human populations," the scientists wrote in their consensus statement, published online today in the journal *Environmental Health Perspectives*.

"We are concerned about the health of children and adults given the persistence of DDT and its active metabolites in the environment and in the body, and we are particularly concerned about the potential effects of continued DDT use on future generations."



MALARIA KILLER: Should pesticide DDT be used to kill the mosquitoes that spread malaria?

Image: ©ISTOCKPHOTO.COM/CHRISTOPHER BADZIOCH

ADVERTISEMENT



In 2007, at least 3,950 tons of DDT were sprayed for mosquito control in Africa and Asia, according to a report by the United Nations Environment Programme.

"The volume is increasing slowly," said Hindrik Bouwman, a professor in the School of Environmental Sciences and Development at North-West University in Potchefstroom, South Africa, who also served on the panel.

In South Africa, about 60 to 80 grams is sprayed in each household per year, Bouwman said.

Brenda Eskenazi, a University of California at Berkeley School of Public Health professor and lead author of the consensus statement, is concerned because the health of people inside the homes is not being monitored.

A 2007 study on male fertility is the only published research so far. Conducted in Limpopo, South Africa by de Jager and his colleagues, the study found men in the sprayed homes had extremely high levels of DDT in their blood and that their semen volume and sperm counts were low.

"Clearly, more research is needed...but in the meantime, DDT should really be the last resort against malaria, rather than the first line of defense," Eskenazi said.

The pesticide accumulates in body tissues, particularly breast milk, and lingers in the environment for decades.

In the United States, beginning in the 1940s, large volumes of DDT were sprayed outdoors to kill mosquitoes and pests on crops. It was banned in 1972, after it built up in food chains, nearly wiping out bald eagles, pelicans and other birds.

Today's use differs greatly. In Africa, it is sprayed in much smaller quantities but people are directly exposed because it is sprayed on walls inside homes and other buildings.

Many health studies have been conducted in the United States, but on people who carry small traces of DDT in their bodies, not the high levels found in people in Africa.

"DDT is now used in countries where many of the people are malnourished, extremely poor and possibly suffering from immune-compromising diseases such as AIDS, which may increase their susceptibility to chemical exposures," said panel member Jonathan Chevrier, a University of California at Berkeley post-doctoral researcher in epidemiology and in environmental health sciences.

In 2001, more than 100 countries signed the Stockholm Convention, a United Nations treaty which sought to eliminate use of 12 persistent, toxic compounds, including DDT. Under the pact, use of the pesticide is allowed only for controlling malaria.

Since then, nine nations—Ethiopia, South Africa, India, Mauritius, Myanmar, Yemen, Uganda, Mozambique and Swaziland—notified the treaty's secretariat that they are using DDT. Five others—Zimbabwe, North Korea, Eritrea, Gambia, Namibia and Zambia—also reportedly are using it, and six others, including China, have reserved the right to begin using it, according to a January Stockholm Convention report.

"This is a global issue," Eskenazi said. "We need to enforce the Stockholm Convention and to have a plan for each country to phase out DDT, and if they feel they can't, good reason why other options cannot work."

Mexico, the rest of Central America and parts of Africa have combated malaria without DDT by using alternative methods, such as controlling stagnant ponds where mosquitoes breed and using bed nets treated with pyrethroid insecticides. But such efforts have been less successful in other places, particularly South Africa.

"We have a whole host of mosquito species and more than one parasite. The biology of the vectors is different and there is therefore no one-method-fits-all strategy, as is the case in Central America," Bouwman said.

For example, he said, some types of mosquitoes in South Africa breed in running water, which cannot be easily controlled.

"The area to be covered is also vast, and infrastructure in most areas is too little to allow environmental management on a sustainable basis," he said.

When a mosquito strain that had previously been eliminated returned to South Africa, it was resistant to the pyrethroid insecticides that had replaced DDT.

"The resulting increase in malaria cases and deaths was epidemic," Bouwman said. Cases soared from 4,117 in 1995 to 64,622 in 2000.

"South Africa had to fall back on DDT, and still uses it in areas where other chemicals would have a risk of failure," he said.

The scientists also recommended study of possible health effects of pyrethroids and other alternatives for DDT.

"The general thoughts are that if chemicals have a shorter half-life, like pyrethroids, they are less dangerous," Eskenazi said. "This may be true, but there are virtually no studies on the health effects in humans of the alternatives."

The panel convened in March, 2008, at Alma College in Michigan, near a Superfund site where DDT was produced at a chemical plant. Their goal was "to address the current and legacy implications of DDT production and use," according to their report.

Acknowledging that some areas remain dependent on DDT, they recommended monitoring of the spraying to ensure that usage guidelines are followed and improved application techniques.

"It is definitely not a matter of letting people die from malaria," de Jager said.

This article originally ran at Environmental Health News, a news source published by Environmental Health Sciences, a nonprofit media company.

Scientific American is a trademark of Scientific American, Inc.,
used with permission

© 2012 Scientific American, a Division of Nature America, Inc.

All Rights Reserved.