

To Spray or Not to Spray: A Debate Over Malaria and DDT



by
Frank J. Dinan and Joseph F. Bieron
Department of Chemistry and Biochemistry
Canisius College

As they settled into the office of Mr. Mali Sahriti, the United Nations Secretary for Public Health, all the participants of the impending discussion were nervous. Each was determined to press the points that would persuade Mr. Sahriti in his or her favor. Here, at last, was their chance to influence the United Nations decision on whether or not to ban the global use of DDT or to allow its use for the control of malaria.

Each of the three visitors to Secretary Sahriti's office, Dr. Nicole Lund, a tropical disease specialist with the World Health Organization, Chiba Iogu, the ambassador from the central African country of Malawi, and Dr. Patricia Canavan, a DDT expert and representative of the Sierra Club, were well prepared for the meeting. They had studied the issues carefully and were anxious to present their views to the secretary, hoping that they could influence his recommendation on DDT's future use.

Secretary Sahriti began the meeting. "Welcome, and thank you for coming. I know that you all have strongly held, expert views on the proposed global ban on the use of DDT that the United Nations Organization is considering, and I am most anxious to hear them. As you know, I must make a recommendation to the Secretary General in the near future on whether the United Nations should invoke a worldwide ban on the use of DDT by 2004. Since I am not as informed as each of you on aspects of this issue, you will have to provide me with some of the background that underlies your positions. Perhaps we could begin with you, Dr. Lund."

Nicole Lund, a physician specializing in tropical diseases, had been with the World Health Organization (WHO) for six years. Her work at WHO as well as her prior training was focused on malaria and its control.

"Thank you, Mr. Secretary, I'd be happy to start. As you are aware, even though WHO is a part of the United Nations, we are strongly opposed to the proposed ban on the use of DDT. Our reasons for this are quite straightforward. The number of malaria infections throughout the world has grown dramatically as the use of DDT for mosquito control has declined. Our studies show that between 350 and 500 million people in 101 countries throughout the world are currently infected with malaria, and between two and three million deaths result from these infections each year. Malaria also causes damage to the economies of developing nations, estimated at a half billion dollars annually.

"As I am sure you are aware, malaria infections are caused by mosquito bites, and nothing else is as effective as DDT for the control of mosquito populations. I should also mention that as of today, there is no effective vaccine against malaria, and we cannot say with any certainty when and if one will be developed."

"May I add to Dr. Lund's comments, Mr. Secretary?" asked Chiba Iogu.

"Certainly, Minister Iogu, please do."

"It is important to realize that malaria poses a threat to 40 percent of the world's population, and that most of those affected live in poor, underdeveloped parts of the world. Sub-Saharan Africa, Central and South America, and South East Asia are among the areas at the highest risk. I am particularly concerned because 90 percent of those dying from malaria are African children.

"In 1973, after DDT had been used for malaria control for over a decade, there were less than 400 cases of malaria in all of South Africa, and in 1977 only a single malaria death occurred. Now, not only is the number of malaria cases increasing, but the rate of increase is also accelerating.

"Since South Africa yielded to political and economic pressure from the developed nations and stopped the use of DDT in 1995, its rate of malaria infections has quadrupled, and hundreds of additional deaths have occurred."

Secretary Sahriti leaned forward in his chair and said, "Why do you say that South Africa's decision to ban DDT use was the result of political and economic pressures from the developed countries?"

"Because, Mr. Secretary, the developed countries are major contributors to the economies of the underdeveloped nations, and they often insist on a ban of DDT use as a condition for their aid. This is a clear case of the developed world imposing its values on poor nations regardless of the consequences for those nations. I am sure you realize that malaria is not a problem in most of the developed world, although that may be changing now."

The Sierra Club representative, Patricia Canavan, was visibly agitated. She said, "May I make some observations that would add a bit of balance to our discussion, Mr. Secretary?"

"Of course, Dr. Canavan."

"The reason that the developed countries want DDT banned from use worldwide is that its use presents an unacceptable risk to our environment and to our health. It is a risk that we simply cannot afford to take.

"DDT is so stable in the environment that it takes many years for it to decompose after it is exposed to air and water. Ten years after DDT began to be used studies found it in even the most remote areas of the world, places where it had never been applied. Wind and water transport DDT all over the globe.

"And then it began to show up in birds, fish, domestic animals, and humans. DDT accumulates in fatty tissues, and is passed from mothers to their infants during breast-feeding. Nursing infants all over the world were ingesting DDT from their moment of birth."

Nicole Lund shifted uneasily in her chair as she responded, "What you say is true, Dr. Canavan, but would you please tell us how many human deaths DDT has caused among the billions of human beings that have been exposed to it?"

"I think you know very well that DDT has not been proven to be the direct cause of any human deaths, Dr. Lund. I also think that you know that the 'precautionary principle' demands that we not take risks whose consequences we cannot predict."

"I am afraid that I am not aware of the details of the precautionary principle, Ms. Canavan," Secretary Sahriti interjected. "Could you enlighten me about it?"

"Certainly, Mr. Secretary. The precautionary principle requires that when an activity raises potential threats of harm to humans or the environment, it should not be undertaken even if some cause and effect relationships are not fully established scientifically. So we must assume that the potential risks posed by future use of DDT are such that we cannot take a chance and allow it to be used."

"Let me see if I understand this concept," said the secretary. "The precautionary principle maintains that some technological activities pose such grave potential threats to our well-being that they should not be undertaken, even if definitive scientific evidence is not available to establish that the activity will cause the harm. Is that correct, Dr. Canavan?"

"That's right. The principle might seem a bit unreasonable at first glance," Patricia Canavan replied, "but if you consider the totally unanticipated problems caused by the use of asbestos and PCBs as well as the harm done to the ozone layer by chlorofluorocarbons you can understand why use of the precautionary principle is necessary."

"One more question, if I may, Dr. Canavan. Is it true that the precautionary principle focuses only on the risks associated with a technology and not the benefits that may result from its use?"

"Yes, because the potential risks associated with some technological activities are so grave that regardless of the benefits that may be derived from them, they must not be undertaken. Besides, we have seen that the risks associated with a new technology are often not apparent until it is in use, and then it is too late to undo the harm that has been done."

Chiba Iogu interjected, "Mr. Secretary, the question that you have raised about the benefits is exactly why the precautionary principle, so beloved by environmentalists, is not a reasonable guideline in many areas, and especially so in the case we are considering here. I believe that the developed world is far more concerned with the theoretical long-term risks of DDT use than it is with the needless and very real deaths of millions of people, mostly children, in the poor nations of the world.

"And we have only touched on the great economic benefits that could result in those nations if the threat of malaria were significantly reduced. It is estimated that new badly needed development programs would bring in a half billion dollars per year to those poor nations, and their health care costs would be reduced by about two billion dollars per year if malaria were controlled. Think of the good this could do."

Patricia Canavan replied, "How can we know, though, that long-term chronic exposure to DDT won't do irreparable harm to us all, and to our children? There is no doubt that DDT does bioaccumulate in humans and throughout the environment. If its use is allowed to continue we may pass a point of no return, one where irreversible harm has been done."

Nicole Lund countered, "Despite the great public outcry caused by Rachel Carson's book *Silent Spring*, claims of the risk to human health and the environment caused by DDT have never been confirmed or replicated by any scientific inquiry, even after the passage of almost 40 years. And there is no evidence that DDT has ever caused harm to a single human being. We simply cannot afford to close our eyes to DDT's benefits and focus only on its potential risks.

"And there is a way to keep any risks that may be involved in DDT's use much lower than they have been in the past. A recent study conducted in Belize has demonstrated that DDT protects people against malaria not only by killing mosquitoes, but mainly by repelling them. It showed that only three percent as many mosquitoes entered huts sprayed with DDT on their interior walls as entered unprotected huts. If DDT is used in this way, in small amounts and only in enclosed spaces, it presents a greatly reduced environmental and health risk."

"That may be true," answered Patricia Canavan, "but how can we be sure that DDT intended for use in this way will not be used in agriculture, and in other ways that will spread it widely into the environment?"

Ambassador Iogu responded, "DDT would only be provided in small amounts, and it would be used only by trained indoor spraying technicians. These would be the conditions for its use."

"I don't think anyone would believe," replied Patricia, "that if DDT is provided to all sorts of people in all sorts of places it wouldn't be misused. Sooner or later, it would once again become a major threat to both our health and the environment."

"I agree that we cannot reduce the risk to zero, Dr. Canavan," said the ambassador, "but certain risks must be accepted to provide health benefits in the least developed parts of the world. We have to balance these potential risks against some certainties. The certainties are that as many as 500 million people will suffer and more than a million people will die from malaria each year if we deny them the public health benefits that come from using DDT."

Patricia responded, "I understand your point, Ambassador Iogu, but once the DDT genie is out of the bottle again, we may find it impossible to control. Not even the most farsighted among us could begin to imagine the damage to the environment and to human health that could result from its use. Technological dangers sneak up on us, and by the time that we realize that we are in danger, it is often too late to prevent the damage. May I remind you of the ozone, PCB, and asbestos examples once again."

Secretary Sahriti leaned back in his chair, folded his hands before him, and said, "I am afraid that our time is up and I must bring our discussion to a close. I thank you all for coming to this meeting. Your arguments have been most enlightening and have raised many important issues. I assure you that I will consider all of the points that you have raised very carefully before making my recommendation to the Secretary General."

Questions

1. At one point in the discussion, Ambassador Iogu comments, "Malaria is not a problem in most of the developing world, although that may be changing." This comment is not followed up in the case study. What changes could the ambassador be referring to? How can this comment be related to the West Nile virus problem troubling parts of the northeastern United States?
2. What are the strengths, weaknesses, and implications of the precautionary principle as a method for deciding whether a technology should be used?
3. What are the strengths, weaknesses, and implications of risk/benefit analysis as a method for deciding whether a technology should be employed?
4. Compare risk/benefit analysis to the precautionary principle. Which of these methods do you feel would generally lead to better decisions on questions involving potential applications of technologies in society? On what reasoning is your conclusion based?
5. How do you think that the question of using DDT for malaria control vs. banning its use worldwide will be resolved? Is your answer to this question the same as your view on how this matter *should* be resolved? Explain.

Image Credit: Copyright © Julie de Leseleuc.

Date Posted: 03/14/01 mb. Revised 09/06/02 nas. Copyright © 1999–2006 by the [National Center for Case Study Teaching in Science](#). Please see our [usage guidelines](#), which outline our policy concerning permissible reproduction of this work.