

GATES MALARIA Forum – October 17, 2001 – Seattle, Washington

*Introductory comments before panel discussion on lessons from previous eradication programs. This one discusses the first malaria program and smallpox*

As we endeavor to shape a contemporary program for malaria eradication, it is well to recall the rationale and anatomy of WHO's first major eradication initiative. It began boldly in 1955 but eventually ground to a halt some 15 years later. It left a prevalent deep skepticism about eradication efforts of any sort.

Why was the eradication program started in 1955? DDT had become increasingly available after WW II. It was inexpensive and widely used in agriculture. It proved to be dramatically effective in stopping malaria transmission throughout areas where mosquitoes bred seasonally. In most areas, one or two applications a year to the interior walls of houses largely stopped malaria transmission in as little as 2 to 3 years. With quinine and chloroquine treatment for the residual few cases, Europe and North America became malaria-free. Other countries in the Americas and some in Asia recorded considerable progress.

But little was achieved or even attempted in most of Africa. The barriers of high endemicity in the tropical countries and lack of development were too formidable. Nevertheless some dreamed of global eradication. Among the most fervent advocates was Dr. Fred Soper, a public health physician and architect in the 30s of the yellow fever eradication program. Soper was an autocratic, dominating personality and when teamed with an equally determined Italian malariologist, Emilio Pampagna, they were an unstoppable force. They met resistance from those who argued that little was known about African malarial epidemiology -- that more studies, more research were needed. In 1951, however, insecticide-resistant strains of DDT were discovered. The argument for eradication shifted to one of urgency – eradicate the disease before insecticide resistant spreads. And so a malaria eradication program was approved in 1955 by the World Health Assembly. Augmenting the very modest regular budget of WHO were special contributions provided by the U.S. and other countries as well

as other United Nations agencies. The program began to falter in the mid-1960s as it was found to be more expensive and far more difficult than anticipated. Eventually, some two billion dollars were expended. During its existence, its budget constituted one-third of all funds at WHO's disposal and one-third of all its personnel.

The view of the WHO leadership was that there was only one way the program could succeed – it had to be run like a military organization with strict discipline, rigid schedules and uniform adherence to meticulous, fixed procedures. Their belief was that all was known that needed to be known about malaria and that research efforts could only be distracting. Agreements for national program direction were unprecedented. All participant countries had to agree that the director of the national program would report only to the head of state, i.e. the president of the country. The program was independent of the health department.

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By 1966, when smallpox eradication was being considered, a belief was growing that no disease could possibly be eradicated. The well-known scientist-writer, Rene Dubos, had published a popular, new book called *Man Adapting*, in which he stated "Public health administrators have to compromise with the limitations of human nature. For this reason, and many others, eradication programs will eventually become a curiosity item on library shelves, just as have all social utopias." These were sobering thoughts for the new director of the global smallpox eradication program. But it did seem to me that there were lessons to be learned from the then failing malaria program.

Most important was to encourage and support, to the extent we could, research in all components of the program – studies that would help us to improve the likelihood of success at all levels. Field staff undertook a variety of epidemiological studies that revealed that smallpox did not spread anywhere near as rapidly as textbooks stated; that vaccine protection extended for at least a decade or more and thus, one successful vaccination was all that was required. We altered the age-old techniques of vaccination with a just-invented vaccine

needle which greatly increased the proportion of successful vaccinations and used only one-fourth as much vaccine.

A second important difference between the smallpox and malaria programs was the introduction of surveillance and containment. From the beginning of each national program, we sought to obtain weekly reports of smallpox cases from all health units in the country. When cases were reported, a team of two or three was sent to investigate and to vaccinate all contacts. It was a new approach. In most countries health units seldom provided any sort of report even monthly. The fact that a team would arrive to vaccinate whenever reports were provided reinforced the belief that someone really cared as to what happened in the field and would do something about it. Reporting steadily improved. In turn, each country submitted weekly reports to WHO which we published in widely distributed reports. From special surveys, we found that less than 1% of cases were being reported -- we called the information "Best Available Data" (the acronym is BAD). However, it provided valuable clues as to developing epidemics, susceptible populations such as nomads or religious groups. It served to focus and prioritize program strategy. The regular distribution of data about smallpox occurrence had another effect which took us quite by surprise. There are those among us who avidly follow football or baseball standings, seeing how our favorite team is doing compared to others. As we came to learn, some high officials when regularly provided publicly distributed information about current national counts sometimes became sufficiently disturbed about poor performance as to demand that program staff improve performance and would sometimes offer to provide more in resources. I know for a fact that such information generated a decisive change in government support in at least three of our most important countries.

In addition to research and surveillance, I believe that continuing efforts directed to "quality control" made a substantial difference. This was a component during the first malaria eradication program in implementing spraying programs and, if creatively applied, I believe could play a significant role in health programs of all types in all countries, including our own. When we began the global

smallpox program, most countries were doing some vaccinating because of the fear of epidemic smallpox. At that time, vaccine was provided by some 54 different manufacturers. Quality control was primarily in the hands of the producers. Laboratories in Canada and the Netherlands volunteered to test all vaccines to be used in the program. To our astonishment, we discovered that not more than 10% of the vaccine in use met accepted standards. Five years were required but by 1973 all vaccine in the program fully met standards.

Quality control was invaluable in vaccination programs both to measure success of vaccination and whether at least 80% had been successfully vaccinated. It greatly facilitated epidemic control in setting standards for speed in implementing control measures and in time required to stop spread of the disease.

Finally, the importance of a meaningful involvement of those in the communities where programs were being implemented cannot be overstated. This necessarily requires the program to be integral to the public health structure and activities and it inevitably requires countless hours and cups of tea with village elders, school teachers, other health personnel, government officials, and others. In the interests of speed and efficiency, such activities are often overlooked or scorned. Such was a basic failure of the first malaria eradication program. At times, I times I envied our colleagues in the malaria eradication program as they had so many personnel dedicated explicitly to the malaria program. In Ethiopia, with its population of 25 million people, Ciro was our field general and seldom had more than 50 personnel – including, in addition to Ethiopian smallpox and health staff, Peace Corps personnel, casual international visitors; and a handful of WHO short-term consultants. The malaria program had more than 8000. When civil war broke out, embassies and voluntary agencies withdrew staff. The smallpox program continued almost without interruption as they had become integral to the life of the villagers and the country.

But I do want to give due credit to those engaged in that first malaria eradication effort. Never before had an international organization been involved in such an effort involving people, logistics, politics, and natural adversity. They

were pioneering a unique venture of a dimension and complexity never before attempted and the effort was successful in a number of countries. Moreover, they blazed a path for execution of the smallpox campaign and, from them, we learned a great deal. However, as we soon discovered, there was still a great deal more to be learned from research and in integrating research activities, about developing and utilizing effective surveillance systems, about execution of field programs and about the vagaries of international bureaucracies. I'm confident that the challenges today can be met and, indeed, malaria can be eradicated – but time, creativity, resources, and inspired leadership will be necessary.