A Report on the Onchocerciasis (River Blindness) Control Program

Rivers of Disease

by Thomas A. Blinkhorn

EIGHT YEARS AGO last month (May 1974), the World Health Organization (WHO) announced the formal launching of an unprecedented international campaign to control in seven West African countries a disease called onchocerciasis, or River Blindness. The disease was endemic in the area—about one million out of the more than 10 million people living in the seven countries were estimated to have the disease and at least 70,000 were blind or had serious sight impairment. The disease was also considered a serious impediment to development of large areas of the Volta river basin system of West Africa. At the time, the effort to control the disease was considered one of the most detailed and far-reaching public health campaigns ever undertaken. It was also significant because it was the first time that The World Bank became so intimately involved in a health project. Eight years later, what has the campaign achieved? What is the current status and what lies ahead?

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Emmanuel Boro collects flies for a living. When we met him he was sitting quietly along the banks of the Samandeni river outside of Bobo-Dioulasso in Upper Volta, his pant legs rolled up to his knees, a plastic vial in one hand and a stopper for the vial in the other. His job: To lure a female black fly, with a thirst for human blood, to try a feeding from his leg, to catch her in the vial before she has a chance to bite and hand her over to a laboratory assistant, who will dissect the victim and examine her under a field microscope.

Boro is 26; he works from 7 a.m. to about 6 p.m., one hour on, one hour off, alternating with another vector or fly collector.

Scores of teams such as these are employed throughout the Onchocerciasis (River Blindness) control zone in West Africa; the information they collect is essential to the entire campaign against the disease.

Boro was very pleased when we
Emmanuel Boro at work collecting black flies in Upper Volta. Photo by Yotsel Hadar

met him. "I haven't caught a fly for almost two months." Boro's lack of success in catching flies is actually good news for the people at the Onchocerciasis Control Program headquarters in Ouagadougou, Upper Volta, because it indicates that their efforts to control the vector that spreads the disease are having some success.

The director of the Oncho Control Program is a congenial surgeon from Gambia, Dr. E. M. Samba, whose strapping physique testifies to his contention that he helped put himself through medical school in the United Kingdom by being an amateur boxer ("£50 a fight"). He will be 50 this December and before joining the program in December 1980 he was director of medical services in his country. His predecessor as director of the control program was Marc Bazin, a former World Bank staff member who is now Minister of Finance for the Government of Haiti.

Dr. Samba heads a large staff from his offices in Ouagadougou. There are almost 750 general services staff and about 57 professionals in the Oncho program. Annual budget is currently about US$16 million. The program is being funded in six-year phases. The first phase (1972-1979) cost about US$54 million, and the second phase (1980-1985) is expected to cost about US$113 million, although this could increase if the program is extended.

The project is being financed by grants from a consortium of donors, including the beneficiary countries and external agencies: African Development Bank, Belgium, Canada, France, Germany, Japan, Kuwait, Netherlands, Norway, OPEC Fund for International Development, Saudi Arabia, Switzerland, United Kingdom, United Nations Development Programme, United States, and the Sabah Al-Salem Al-Murbarak Al-Sabah Foundation. The external donors make payments into the Onchocerciasis Fund, which The World Bank administers and from which quarterly advances are made to WHO, the executing agency.

"The biggest achievement," according to Dr. Samba, "is the sense of real hope that is now building in the Volta river basin—hope among people who were going blind but because of the program are not now. They come up to me and say, 'Look at me. I would have been blind without this program.' They know that their children will not have the disease. We estimate that about 500,000 children born in the controlled area since the launching of operations and who would have been infected are now free of risk of blindness. This is a difficult thing to quantify precisely, but it is tremendous."

In addition to bringing substantial health benefits to the area by controlling one of the major diseases, the campaign is also removing one of the roadblocks to economic development of areas close to rivers where the disease has been endemic. The program also has a potential catalytic role for health personnel and health system development in the entire area.

Success of the campaign thus far is due in large part to an amazingly intricate and difficult manhunt. The object of the hunt is an elusive female black fly less than half the size of a human adult male's smallest fingernail. She is fast, cunning and stubborn. She requires a meal of blood in order to develop her eggs. Man is her favorite source of supply, although she also bites animals but without the same damaging consequences (skin discoloration, severe infection, bodily disorders of many kinds, and ultimately blindness). In sucking blood from the human being, the fly can, at the same time, deposit tiny infectious parasitic worms into the skin.

One of the most awesome puzzles was to identify correctly the parasite, since some 300 filarial parasites are known to man, and some are infective and harmful while others are not.

Having correctly identified the parasite, the species of fly, the nature of the disease cycle, it was then decided that the best approach to control the disease would be to...
attack the larvae of the fly with an effective insecticide. Thousands of breeding places were identified throughout the seven-country region, and after considerable research, a compound called temephos (or Abate commercially) was found that could be used most effectively; it has very few adverse environmental consequences and could be used in relatively low doses.

Helicopters and fixed-wing aircraft are used to apply the insecticide upstream of the breeding places. Aerial control operations must be planned very carefully on a weekly basis; this is because of the speed of the larval development and also because the fly's breeding places can change quickly, depending on the changes in the courses and flow of the rivers.

Some 6,000 kilometers of river are treated in the dry season and about 18,000 in the wet season. The planning thus depends on the efforts of ground surveillance teams—people like Emmanuel Boro.

Field laboratory specialists examine the flies after they are caught to determine species, number of infective larvae, etc. All of the data flow into Oncho headquarters from 25 subsectors in the control area each Friday; they are then analyzed and form the aerial spraying program for the following week.

While successes have been achieved, certain new problems and issues have also emerged. One is reinvasion.

When the campaign began, it was generally assumed that the female black fly could travel more than 100 miles a day. It now turns out that she can go about five times that distance, especially during the rainy season, with the jet assist of a good monsoon wind. This means that flies from outside the control area can continue to reinvade the control zone, thus complicating the task of control.

The main sources of reinvasion are to the south of the present zone in Benin, Togo and Ghana and to the west in the Senegal river basin area. Compared to the present control area of 746,000 square kilometers (with 18,000 km of rivers), the new southern area would involve a further 111,000 square kilometers (with 5,800 km of river), and the Senegal river basin area would comprise 430,000 square kilometers (with 22,000 km of rivers). The expansion of vector control would thus involve substantial additional expenditures.

Another issue involves genetic resistance. So far, two ecologically localized species of black fly have developed resistance to the insecticide in the Ivory Coast. An alternative insecticide, Bacillus thuringensis serotype H-14 (B.K. H-14), has been introduced and has proved effective; however, a larger quantity of doses is required and this makes it more expensive.

Then there are questions about proper chemotherapy; that is, development of a safe, effective, relatively inexpensive drug that could be used to treat victims of the disease. The program's chances of ultimate success would be greatly enhanced if a drug suitable for mass treatment were available. However, this too is an expensive proposition. Some drugs have been developed in the past but they were found to have damaging side effects.

Finally, there is the question of economic development of areas cleared of the fly. Originally it was thought some of the most fertile lands in the region were in the oncho zone and had been abandoned and that once the disease were controlled people would return to work those lands. But even in those that are fertile and in which the disease is now under control, it is not always easy to get large groups of people to move to them from their long established settlements. In other words, there are other social and economic factors involved which must be considered.

In 1979, WHO established an Independent Commission on the Long-Term Prospects of the Onchocerciasis Control Program to review the long-term objectives and strategies of the campaign. The commission presented its final report late last year and it concluded that, despite the serious problems of reinvasion and resistance, the control program is proceeding satisfactorily and on schedule. It is bringing substantial health benefits to the area, is removing one road block to economic development and has a considerable potential catalytic role for health personnel and health system development in the area.