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# **West Africa: Defeating Riverblindness—Success in Scaling Up and Lessons Learned**

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## **Executive Summary**

Riverblindness—an historic scourge affecting most of sub-Saharan Africa—has been successfully attacked by a large international partnership over the last 30 years. The partnership has defeated the disease in large parts of West Africa and is making rapid progress in the remaining endemic countries in West, Central, and Eastern Africa. Before control programs began, tens of millions were infected and hundreds of thousands suffered from the worst symptom: total blindness. In all, 30 countries are infested, ranging from Senegal across to Ethiopia in the north and as far south as Angola and Malawi.

With the program's success in West Africa, productive labor has increased; 600,000 cases of blindness have been prevented, and 25 million hectares of formerly evacuated arable lands have been made safe for settlement and agriculture. These lands have the potential to feed an additional 17 million people per year using indigenous technologies and methods. Increased agricultural production from these lands has transformed the region from aid-dependent to food-exporting. Eighteen million children born in the now-protected areas have been spared the risk of the disease. In West Africa, the program has achieved a 20 percent economic rate of return. Elsewhere in Africa, operations began in 1996 and have achieved a 17 percent economic rate of return while preventing blindness, and eliminating disabling itching and stigmatizing skin disease. Already, these extended operations have added over one million years of productive labor to the economies of participating countries.

### **The disease**

Commonly called riverblindness after its geographic locus—around fast-flowing rivers—and the blindness it causes, onchocerciasis, or *oncho*, has tormented people for centuries. Riverblindness is particularly prevalent in Africa, where more than 99 percent of all cases occur, causing unrelenting itching, physical scars from constant scratching, depigmentation and thickening of the skin, vision reduction, and—after prolonged exposure to the disease—complete blindness.

Riverblindness is a parasitic disease caused by worms. As adults, these worms can measure nearly a meter long and live in coiled mating pairs in nodules under the skin. Reproducing adult females spawn around 2,000 immature worms every day. These tiny juvenile worms migrate throughout the skin and eyes, causing the various disease symptoms. While they are damaging, the immature worms cannot mature to adulthood without being transmitted by a blackfly. Blackflies serve as the so-called intermediate host of the parasite. Flies ingest immature worms when they bite infected people. Living in the fly, the worms mature sexually over the course of a week. When the fly bites a person, the maturing worm enters the human body, where it grows to adulthood. Upon finding mating partners, the adults become encapsulated and produce more immature worms, completing the full transmission cycle.

Riverblindness control is complicated by the adult worm's 10–15 year lifespan. Adult females also remain fertile throughout most of their long lives. Though the immature worms live

in the skin for only about two years, their numbers are continually refreshed as long as adult females are alive in the body. Therefore, even with instant and complete transmission control, the disease would not die out naturally for 15 years (the lifespan of adult worms). In practical terms, it means that disease elimination attempts must last at least 20 years.

### **The program partnership**

The partnership to defeat riverblindness as a public health problem in Africa can be traced back to the 1940s, but a comprehensive plan was not formulated until 1968. By 1972, the international development community was mobilizing to fight the disease. Riverblindness control began in 1974 in West Africa as a large regional project. Vector control—treating the breeding sites of disease-transmitting flies with environmentally safe insecticides—was the only available approach. The West African program phase was planned as a regional initiative to overcome epidemiological factors that had undermined village-level efforts—effective control must encompass entire endemic zones. The program systematically expanded over its first few years to achieve full coverage of several river systems in seven countries. Nonetheless, even this ambitious start was not sufficient. The program subsequently doubled in size to cover 11 countries in all. Vector control was the primary strategy in West Africa, supplemented by drug distribution in 1989–90.

In the mid-1990s, phase two was launched to cover 19 more countries—the remainder of infested Africa. Phase two is based on Mectizan (ivermectin) distribution. Merck & Co developed this drug in the 1980s and now donates it for riverblindness control. Phase two is a more conventional scaling-up story than was phase one. Communities distribute Mectizan; community representatives are trained and supported by riverblindness partners, including international agencies, participating country governments, nongovernmental organizations (NGOs), donor countries, and of course, the communities themselves. Community-directed treatment enabled the campaign to scale up operations dramatically. Phase two was tested and validated on a local basis and has been scaled up by continually launching more projects.

From modest beginnings in 1996, it is estimated that by 2007, 65 million people will be reached annually through this program. The distribution network is also being tested to deliver other interventions. This enticing possibility opens the door to further scaling up and presents the opportunity to deliver other basic health interventions in the riverblindness areas, which are almost exclusively remote, rural, poor, and underserved.

In addition to its broad geographic scope and long duration, the riverblindness partnership has benefited from the breadth of its membership. More than 80 partners are involved, including 26 donors, 30 African countries, a major pharmaceutical firm, and 12 major NGOs, as well as tens of thousands of local communities. This broad coalition, with its mix of different *corporate cultures*, is complex to maintain, but it has created synergies that have yielded enormous advantages. By and large, the partnership's constituents have collaborated remarkably well, pulling the campaign forward toward its well-defined objectives. An international agreement clearly delineated roles for all parties.

## **The lessons**

Over the 30 years, the program has continually scaled up to cover more territory, reach more people, and push back a devastating disease. Riverblindness has been defeated throughout the program area in West Africa, except where operations were delayed by conflict in Sierra Leone. Operations continue there and in the phase-two area, with the goal of eliminating the disease as a public health problem by 2010.

Several major lessons underpin the program's success and could be useful to other development initiatives:

- Continuity and stability among international partners offer valuable synergies and provide the sustainability required to deal with even the most intractable problems. Clearly delineated roles and responsibilities are critical for reaping comparative advantages.
- On the other hand, wide-ranging partnerships are complex to form and maintain. All constituents need to enjoy distinct benefits—altruism is an inadequate base for long-term sustainability.
- Consistent operational research investments can pay large dividends, as anticipated issues can be addressed ahead of time. Having a research mechanism in place is invaluable for reacting quickly to unforeseen problems.
- Flexibility in approach is essential. Over three decades, the program has maintained disease control by adapting from a categorical control initiative to community distribution, and now to community ownership and empowerment. Each approach has helped the program advance the ultimate goal of health improvement while dealing with changing circumstances and maximizing technological innovations.
- The community-directed approach can be scaled up more with other interventions and also applied to non-oncho areas of Africa, and perhaps to other continents.

OVER THE PAST 30 YEARS, riverblindness (onchocerciasis)—a scourge that had long afflicted most of Sub-Saharan Africa—has been eliminated from large parts of the continent through the efforts of a large international partnership. This partnership has defeated the disease in most of West Africa and is making rapid progress in the remaining endemic countries in Central and Eastern Africa.

Thirty countries are infested, from Senegal to Ethiopia in the north and from Angola to Malawi in the south. Before control programs began, tens of millions of people were infected and hundreds of thousands suffered from the worst symptom, total blindness.

**Box 1. Chronology of riverblindness control in Sub-Saharan Africa**

1968	At an expert meeting in Tunis, participants agree that riverblindness should be controlled regionally.
1970	United Nations Development Programme (UNDP) funds a World Health Organization (WHO) team to prepare a regional strategy for West Africa.
1972	The World Bank convenes a meeting in London of the Food and Agriculture Organization of the United Nations (FAO), UNDP, and WHO, which jointly sponsor Phase I of the riverblindness partnership, dividing roles along lines of expertise.
1974	Phase I is launched.
1978	The program is extended into southern Côte d'Ivoire to prevent reinvasion of blackflies.
1981	Rotational larvacide is introduced as a viable solution to resistance.
Mid-1980s	Currency fluctuations create \$35 million shortfall in program trust fund.
1986	The program expands farther west and south
1987	Ivermectin is approved for human use
1988–95	Drug delivery strategies are developed and tested.
1994	Plan is formed to transfer and devolve post-Phase I surveillance and activities to participating country governments.
1995	Emphasis is placed on community-directed treatment method.
1995–present	TDR studies continue to evaluate and optimize methods.
1996	Phase II, covering 19 more countries, is launched, with the establishment of the first four projects.
1997	Distribution projects total 29.
2000	Distribution projects total 63.
2002	Phase I ends: riverblindness is eliminated as a public health and socioeconomic problem in large parts of West Africa.
2003	Phase II projects total 107.
Present	Phase II continues to extend drug distribution network to remaining 19 endemic countries and to foster delivery of a wide variety of health interventions. By 2010 Phases I and II will have protected some 150 million people.

Riverblindness control began in 1974 in West Africa as a large regional project (box 1). At the time the only available approach was vector control—treating the breeding sites of disease-transmitting flies with larvacides. Earlier control attempts dating to the 1950s had shown that riverblindness is transmitted on a regional scale. The first projects had been small, and the savanna was consistently reinfested. Accordingly, the West African phase of the program was planned as a regional initiative to overcome the epidemiological factors that had undermined village-level efforts. The program systematically expanded over its first few years to achieve full coverage of several river systems in seven countries. But even this ambitious start was not sufficient; the program subsequently doubled in size and was expanded to cover 11 countries.

Vector control was the primary strategy in West Africa, supplemented by drug distribution beginning in the late 1980s and early 1990s.

In 1996 Phase II of the program was launched to cover 19 more countries—the remainder of infested Africa. Phase II is based on distributing Mectizan (ivermectin). Merck & Co., which developed the drug in the 1980s, now donates the medicine on an unlimited basis to control riverblindness.

Phase II represents a much more conventional scaling up story than Phase I. Mectizan is distributed by communities themselves, trained and supported by the riverblindness partners, which include international agencies, participating national governments, nongovernmental development organizations (NGDOs), donor countries, and, of course, the communities themselves.

Phase II was tested and validated on a local basis and has been scaled up by continually launching more projects. From modest beginnings in 1996, the program was funding 107 projects by the end of 2003. These projects delivered more than 35 million treatments in 2003 alone. As of April 2004, six more projects were established; by 2007 another nine projects will be launched, bringing the number of people reached to 65 million. By 2010, when Phase II ends, 150 million people are projected to be protected in all 30 countries under both phases of the project (box 2).

### **Box 2. Thirty years of achievement in fighting riverblindness**

1975	Ten million people are protected; 10,000 kilometers of rivers are treated, covering 660,000 square kilometers in seven countries.
1979–80	Twenty million people are protected; 40,000 kilometers of rivers are treated, covering 780,000 square kilometers in eight countries.
1989–90	Thirty million people are protected; 50,000 kilometers of rivers are treated, covering 1.3 million square kilometers in 11 countries. Aerial spraying is fully scaled up.
1989–90	Large-scale Mectizan distribution begins, with 60,000 people treated.
1994	Thirty-five million people are protected; 2 million people are treated with Mectizan. Larvaciding continues.
2001	Phase II establishes community-directed drug distribution networks in 16 countries.
2002	Sixty-six million people are protected, 40 million in Phase I and 26 million in Phase II. Phase I ends. Six hundred thousand cases of blindness are prevented, and 18 million children are spared the risk of riverblindness. Twenty-five million hectares of land are freed for resettlement and cultivation, which will feed an estimated 17 million additional people. Phase II treats 26 million people with Mectizan.
2003	Seventy-five million people are protected. Thirty-five million people are treated in 68,000 communities in the Phase II area; more than 160,000 community distributors and 18,000 health workers are trained or retrained.
2007	One hundred and five million people are projected to be protected, including 65 million treated with Mectizan in 100,000 communities in 16 Phase II countries.
2010	One hundred and fifty million people are projected to be protected in all 30 countries under both phases of the project. Phase II ends.

The distribution network is also being tested to deliver other health interventions. This possibility opens the door to further scaling up to help control other diseases in the riverblindness areas, which are almost exclusively remote, rural, and poor. Most of the people living in these areas are not reached by other programs, and some are not reached by the national governments themselves.

## **What is riverblindness and how is it controlled?**

Onchocerciasis, or “oncho,” is known as riverblindness because it is prevalent around fast-flowing rivers and causes blindness. The disease causes unrelenting itching, physical scars from the constant scratching, depigmentation and thickening of the skin, reduction of vision, and eventually blindness. More than 99 percent of all cases of riverblindness occur in Africa.

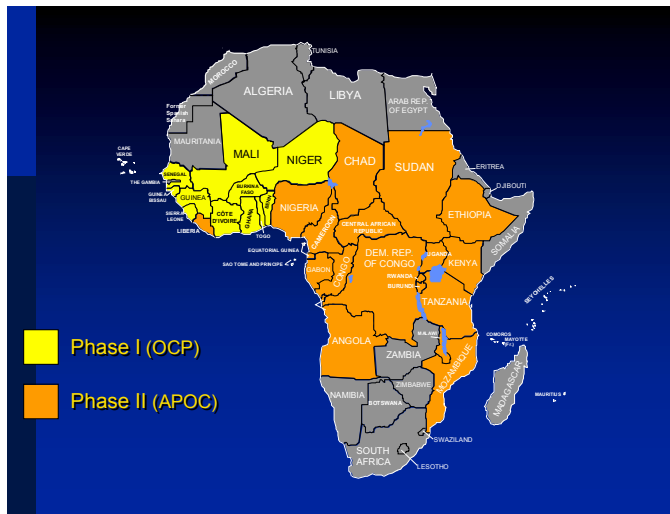
Riverblindness is a parasitic disease caused by worms. As adults these worms can measure nearly a meter long and live in coiled mating pairs in nodules under the skin. Reproducing adult females spawn about 2,000 immature worms every day. These tiny juvenile worms migrate throughout the skin and eyes, causing the various symptoms of the disease. While they are damaging, these immature worms cannot mature to adulthood without the blackfly, their intermediate host. Flies ingest immature worms when they bite infected people. As the worms live in the fly, they mature sexually over the course of a week. If the fly bites a human, the maturing worm will grow to adulthood inside the human body. Upon finding mating partners, the adults become encapsulated and produce more immature worms, completing the transmission cycle.

Riverblindness control is complicated by the 15 year lifespan of the adult worm. Adult females also remain fertile throughout most of their long lives. Although the immature worms live in the skin for only about two years, their numbers are continually refreshed as long as adult females are alive in the body. Therefore, even with instant and complete transmission control, the disease would not die out naturally for 15 years (the lifespan of adult worms). In practical terms, this means that attempts to eliminate the disease must last at least 20 years.

Phase I of the program in West Africa attacked the disease by killing the larvae of the flies that transmit the worms. It depended on killing these immature flies over a long enough period that the adult parasites in human hosts would all die out. Once the reproducing adult worms were eliminated, biting flies would no longer ingest any parasites, and the transmission cycle would be broken. The key to this approach lay in reducing the fly population for 15 years to stop transmission and then sustaining the achievement with follow-up surveillance to prevent recrudescence. As Phase I moved into infested areas of West Africa in several stages, more than 30 years of control have been required to fully eliminate the public health problem posed by riverblindness.

When ivermectin was developed and then donated by Merck, the program adopted a second strategy, implemented in West Africa in the late 1980s and early 1990s. This strategy formed the basis for Phase II (see map 1).

**Map 1**



*Source:* Onchocerciasis Coordination Unit, World Bank.

Phase II of the program, in the remainder of endemic Sub-Saharan Africa, is based on ivermectin distribution; vector control is not possible in these areas because forest cover precludes West African-style aerial spraying. This method aims to disrupt transmission by a different mechanism. The drug is effective against only the juvenile parasites, killing 95 percent with a single dose. The adult worms continue to live, churning out offspring. However, because it is the juvenile parasites that cause

the disease, ivermectin immediately relieves symptoms and allows the body to begin healing itself. Doses of the drug are required only once a year, but they must be taken for as long as any adult worms are still alive—up to 15 years. By killing almost all the immature worms, ivermectin also dramatically lowers the chance of parasite ingestion by biting flies. To affect transmission, it is therefore necessary to treat a high share of people who have the disease in a given community, because if only a few people take the drug, flies will continue to transmit parasites ingested from others.

## **The devastating socioeconomic toll of riverblindness**

The consequences of infection are severe. Infected people face physical disability and social stigma that can reduce the quality of life. The unbearable itching and blindness hinder individuals’ contributions to their own well-being and undermine the emotional and economic health of the household and community (see box 3). Consequently, riverblindness—which predominantly affects poor people in remote areas—has a direct link to poverty.

Before World War II little was known about the relationship between riverblindness and poverty in Africa. The disease was neglected by colonial administrations because it did not threaten their interests, as it affected the poorest of the poor, living in the most remote rural areas.



### **Box 3. The human face of riverblindness: a Nigerian woman's daily torment**

The rashes first appeared when I was six years old. That was when the itching began. At school I couldn't concentrate because of the incessant itching. The children in class used to laugh at me, so I stopped going to school when I was nine. I married in 1989. My father arranged the marriage; my husband didn't see me before we got married. When we met and he saw my skin, he was very angry. I lived with him for a few months and became pregnant. Then my skin got worse. Despite the pregnancy, he sent me home to my parents. From the time I left until the birth of my baby, I had no support from my husband, no money for me or my baby. You can see from my skin that I am always scratching. It affects the amount of attention that I can give to my children. I can hardly sleep at night. I feel weak from the pain and nuisance that is always there. What can I do?

—Agnes, a Nigerian mother, 1995

Following treatment with ivermectin, Agnes' symptoms disappeared. She has since reconciled with her husband.

When scientists began to investigate riverblindness in the endemic villages and districts of West Africa, they made astonishing and disturbing discoveries. They found that more than 60 percent of the savanna population carried the parasite, and 10 percent of the adult population and half of males over age 40 were blind. Thirty percent of people were visually impaired, and early signs of riverblindness were common among children.

Eventually, scientists discovered the huge socioeconomic consequences of the high infection rates they had found. As village blindness reached epidemic proportions, it left too few able-bodied people to tend fields. Food shortages and economic collapse forced residents to abandon homelands in fertile river valleys. Moving to highlands and forested areas offered some protection from further infection, but it forced farmers to struggle with poor soil and water shortages on overcrowded lands. Eventually, riverblindness pushed prosperous communities into poverty. Armed with this new knowledge about its economic impact, development agencies made the disease a new priority.

## **A vision takes shape**

The roots of the program and the partnership to defeat riverblindness as a public health problem in Africa can be traced back to the 1940s, but a comprehensive plan was not formulated until 1968. The riverblindness problem was evaluated at a meeting in Tunis sponsored by the government of France through the West African Epidemic Disease Control Organization in the former French areas (OCCGE), the World Health Organization (WHO) and the United States Agency for International Development (USAID). Participating experts agreed that it was both technically feasible and desirable to control riverblindness in the Volta River Basin of West Africa, the region with the highest blindness rates.

Funded by the United Nations Development Programme (UNDP), a team of WHO scientists and consultants began to lay the technical groundwork for a major regional initiative to defeat riverblindness in 1970. By 1972 the international development community was mobilizing

to fight the disease (box 4). In 1974 the affected countries and four UN agencies (the World Bank, WHO, FAO, and UNDP) launched an unprecedented partnership to defeat riverblindness.

#### **Box 4. Robert McNamara's vision for controlling riverblindness**

During a 1972 visit to Upper Volta (now Burkina Faso) and Mali, World Bank President Robert McNamara saw shattered villages and fallow fields, a then-common feature of regions with endemic riverblindness. He saw chains of blind people led by small boys whose vision had not yet been extinguished by the scourge. After meeting scientific experts, he was quickly convinced that it was possible to control the disease. It was estimated that a program to control the disease would cost \$120 million over 20 years at the 1973 exchange rate.

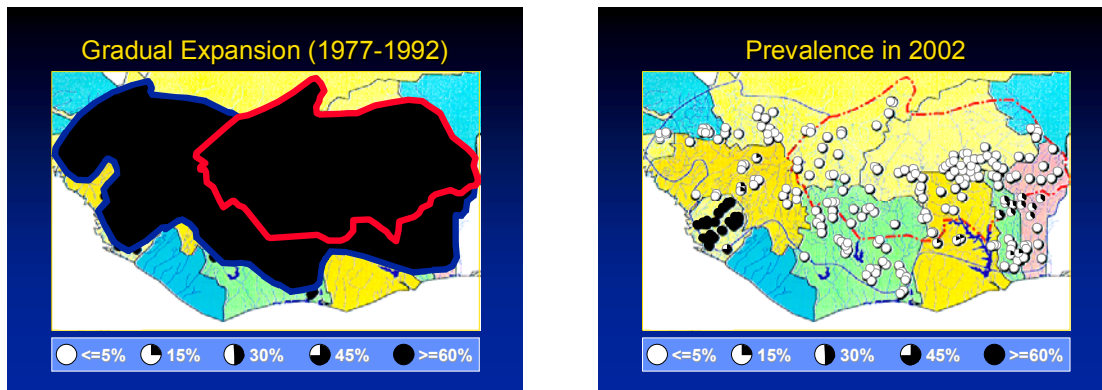
About a month after his visit to West Africa, McNamara convened a meeting in London with counterparts from WHO, UNDP, and FAO. Together they agreed to jointly sponsor the program and form its steering committee. Annual meetings would assemble the governing body, to be composed of all donors, participating countries, and the four UN agency sponsors.

“Nothing like that had ever been done before,” McNamara later recalled. “We [the four UN agencies] brought together a group of interested parties—both the nations of the infected areas and potential donors. It was a very tight organization. It never did develop a big bureaucracy, and we were able to get the commitments for long-term financial support from various governments.”

The riverblindness program has funded two distinct phases: the Onchocerciasis Control Program (OCP) between 1974–2002 (Phase I) and the African Programme for Onchocerciasis Control (APOC) between 1996–2010 (Phase II). Phase I had a dual mandate: to eliminate riverblindness as a public health problem and as an obstacle to socioeconomic development. Phase II also seeks to eliminate riverblindness as a public health problem, but East and Central Africa do not have the same socioeconomic development needs as West Africa did in Phase I. The effects of riverblindness are different in East and Central Africa, because the strain of parasite prevalent outside the savanna belt is less likely to be blinding but has a greater impact on the skin. The stigma and disability due to these dermatologic effects is difficult to quantify, but humanitarian reasons alone were more than sufficient to justify the expense of control. The labor lost due to itching runs in the millions of person-years every year; this labor is added back into rural economies as the disease is brought under control.

By the end of Phase I, the riverblindness program had covered 1.3 million square kilometers of land in 11 countries, protecting 40 million people at risk. Based on the lessons learned, Phase II was launched in the mid-1990s to defeat the disease in the continent's remaining 19 endemic countries.

**Map 2. Phase I, Onchocerciasis Control Programme of West Africa, 1974 (left) and 2002 (right)**



The red line indicates the original seven-country control area. The blue line encloses 11 countries and shows the extensions made during program implementation. The map also shows prevalence in 1974.

The map shows the larger area covered in 2002 and the much lower rate of infection obtained after 28 years of partnership.

*Source:* Onchocerciasis Coordination Unit, World Bank.

## Phase I: controlling riverblindness in West Africa

For sheer magnitude and duration, the campaign to defeat riverblindness is unique. The program spans 30 countries across Africa, embracing a comprehensive approach to eliminate the disease as a public health problem. Remarkably, seven of the nine original donors have been with the campaign steadily over three decades. Such a long-term commitment has been crucial, since it takes up to 20 years to interrupt the disease’s transmission.

Since blackflies migrate across international borders, the affected governments and international experts were convinced that only a regional program could control riverblindness. Phase I therefore targeted seven West African countries (Benin, Burkina Faso, Cote d’Ivoire, Ghana, Mali, Niger, and Togo). With the collaboration and political commitment of these nations, control operations were discussed and planned. As the primary method of control, aircraft would spray environmentally safe larvacides around fast-flowing rivers, the breeding grounds of the intermediate host of the disease, the blackfly.

### Containing the blackfly through vector control

Initially, vector control operations covered 660,000 square kilometers in seven countries—an area believed to be large enough to contain the blackfly vector. However, in May 1975, after three months of successful operations, many migrant blackflies from untreated watercourses reappeared, threatening to reintroduce the disease into the program area. “We were really very,

very worried,” recalls Dr. Azodoga Sékétéli, who has been involved in technical operations for the program since 1976. “After investigations, we found the flies were coming from up to 600 kilometers away from the area we were treating.” In response, the program extended operations to another four West African countries—Guinea, Guinea-Bissau, Senegal, and Sierra Leone (map 2). The program area increased geographic coverage to 1.3 million square kilometers, enabling the campaign to increase the number of people protected from 10 million to 30 million.

The program’s experts, who formulated the so-called “long-term strategy,” fully recognized that extension of control operations had two purposes. The first was to halt reinvasion of infected blackflies into the central area and make the program sufficiently comprehensive to eliminate the disease throughout much of West Africa. The second was to nearly double the number of at-risk people protected from the disease, thereby greatly enhancing the welfare of a high proportion of West Africa’s rural villages. (Map 2 shows the program’s effect on disease prevalence.) In light of this opportunity to protect many more people, the program expanded beyond what was required to stop reinvasion in the original area.

This large initial effort is not typical of a scaling-up operation, but the ecology of the target disease demanded an extensive initial scope. Some issues must be addressed on a regional basis; sometimes a large approach can work where a local one has failed. Riverblindness is one of many epidemic diseases that is best addressed comprehensively.

Size limitation—leading to reinvasion—was not the only problem faced in Phase I. In 1980, while the campaign was struggling with reinvasion, blackflies began to develop a genetic resistance to previously lethal doses of the only larvacide available to the program. “That was really bad for all of us,” recalls Dr. Sékétéli. “To have such resistance plus the reinvasion phenomenon looked like a disaster.”

Through intensive scientific research and experiments, program scientists kept fighting the resistance and exploring the potential for new larvacides. The result: an innovative strategy to use seven different larvacides in rotation. Because each larvacide is used for only a few weeks at a time, the fly population does not have a chance to develop resistance before facing a different insecticide. Their various compositions and modes of action are sufficiently different to prevent cross-resistance as well. This strategy, which addressed several parameters and met ecological standards, successfully eliminated resistance within the fly population. It has now become the standard model for vector control. This aspect of the program is directly applicable to other programs involving insect management.

Expanding operations to fight reinvasion and developing new larvacides to overcome resistance involved huge new expenses. Ultimately, donors’ commitment carried the day. “Donors appreciated our ability to give them scientific explanations of the problems,” says Dr. Sékétéli. “Their continued commitment and understanding was crucial to us. They always responded positively and increased the budget for operational research accordingly.” Bruce Benton, who manages the World Bank’s Onchocerciasis Coordination Unit, adds, “If the Bank had been the executing agency, the response may have been different. I think our ability to speak to donors on their own level generated trust and confidence that we could overcome these crises.”

The expensive effort to develop new larvacides began in the early 1980s and lasted for many years. In the mid-1980s, when this effort was in full swing, international currency markets delivered a crushing blow to the program. The U.S. dollar–denominated trust fund plummeted in value, while the program’s obligations increased, thanks to the soaring French franc and Japanese yen. In a little more than two years, these shifts, coupled with the increased cost of combating resistance, created a shortfall of \$35 million.

With the campaign in jeopardy, the World Bank set out to visit as many donors as possible to solicit more support. Building on its role as a fellow donor that was prepared to reinvest in the program, the Bank convinced other partners to follow suit. “The donors’ willingness to increase support shows their commitment to the program, but it also demonstrates why it’s so important to maintain good donor relations,” says Benton. “If we had just called them up out of the blue, they might not have been so receptive. But because we had involved them all along, keeping them informed and trying to meet their own priorities, I think they had a greater sense of ownership over the program. What was at stake was the survival of their program too. The series of crises that could have brought the program down demonstrated two things: overall commitment by the various partners and the importance of clearly delineated roles. WHO staff could go ahead and address problems on the ground, including resistance and implementing the long-term strategy, while the Bank could talk to donors, and say, ‘We’ve got a problem, but it’s not insurmountable. It’s something we think we can address.’”

Political instability also threatened the program. Two major conflicts could have derailed the campaign’s work in Phase I, but the success of operations had increased awareness of the disease and its devastating socioeconomic impact. As a result, the program director was able to prevail on heads of state to allow operations to continue uninterrupted. When the program began, regional aerial operations were based in Ghana. When Ghana closed its borders during the 1978–79 revolution, the entire campaign was jeopardized. Togo’s President Gnassingbe Eyadema, whose parents had suffered from riverblindness, appreciated the importance of continued larvacidal spraying and offered a new base for operations in Kara, Togo. By 1982 all air operations had moved from Ghana to Togo, where they remain today. A few years later, in 1985, the program was again threatened when Burkina Faso and Mali closed their borders as a result of the conflict between the two countries. Following an appeal by the program, the countries made exceptions for the campaign, allowing aircraft to continue larvacidal spraying.

### **A new drug and new possibilities: using ivermectin to control riverblindness**

Rotational spraying was defeating transmission, but the strategy did nothing to relieve the symptoms of those already afflicted. By the late 1970s Merck & Co.’s Mectizan (ivermectin) was shown to be effective against the juvenile worms that cause the disease’s symptoms. Following slow and expensive drug development and safety trials, ivermectin was finally registered in 1987. Under treatment, the unbearable itching quickly subsides, the skin heals, and the sight is saved as long as a patient is not yet completely blinded.

Since ivermectin does not kill adult worms, an infected person must typically take the drug every 6–12 months for 20 years to interrupt transmission. A community must obtain 65 percent therapeutic coverage to interrupt disease transmission.

Most people with the disease, however, live in rural areas, which are often beyond the reach of national health services. Sustaining a drug coverage threshold long enough to interrupt transmission therefore represented a daunting challenge. Recognizing the importance of the drug—and the inability of the riverblindness partnership to afford it—in 1987 Merck & Co. generously agreed to donate it, free of charge, for as long as necessary (box 5). The drug—effective, safe, and now free—presented the opportunity to control riverblindness in far-flung areas in which the use of expensive larvacides was not practical. Most blackfly breeding areas outside West Africa are also covered by foliage, which precluded Phase I’s strategy of aerial larvaciding.

**Box 5. A veterinary drug to control a human disease: Merck and Mectizan**

The Mectizan Donation Program resulted from the convergence of several unique factors. Ivermectin was initially tested and subsequently developed as a broad-spectrum antiparasitic veterinary drug. In the veterinary market, ivermectin was one of Merck’s biggest successes ever. The animal formulation of the drug is extensively used in cattle, sheep, and other farm animals, as well as in dogs as protection against heartworm.

Ivermectin was not developed for human use, because there is no need for it in the countries where most drugs are sold. But some of Merck’s scientific staff had experience in the areas of Africa affected by riverblindness and realized its potential for use against the disease. Much of the subsequent testing for this purpose was done in Ghana, at a program-affiliated research center, with the cooperation of Merck scientists, who often conducted research on their own time.

When it became clear that the drug would be useful, Merck management initially considered selling it at a reduced price. However, at the time, no one knew how good the drug was, and there was disappointment that it was not able to kill adult worms. Accordingly, donors decided against paying for it. In the meantime, Merck management and some of the Merck scientists who had worked on the drug’s development began to discuss the possibility of donating the drug. Merck was faced with the lack of a buyer and saw an opportunity to make a significant impact on public health. Many research scientists felt that the drug should be donated, since none of the people afflicted with the disease could afford to buy it and the donor countries would not, but the need was clear.

In 1987 Merck announced that it would donate the drug on an unlimited basis, its financial stability enabling it to make such a large and long-term commitment. The lack of a human need in paying markets proved helpful, since Merck did not have to be concerned about donated ivermectin being smuggled into countries and undermining legitimate sales.

This experience was unusual. The lack of a commercial market generally means that no research is conducted and no drugs developed. Where drugs have been developed, drug companies face many problems in giving them away in some countries and charging for them in others—as the struggle to supply free or inexpensive HIV/AIDS drugs to developing countries has shown. The riverblindness program was fortunate to find a drug with no other human applications—and a drug company that was willing to donate it on a large scale.

The program first used ivermectin only in highly endemic areas, where the risk of blindness was greatest. As it became clear that ivermectin was well tolerated—both physically and culturally—the partnership scaled up treatment. In 1989–90, the first years of scaling up ivermectin treatments, the partnership provided doses to 60,000 people. The scaling-up process continued, reaching 2 million people in 1994 over much of the Phase I territory. The combination of aerial spraying and ivermectin distribution allowed for complete coverage, prompt alleviation of symptoms, permanent interruption of transmission, and a defined end-point for the partnership based on the lifespan of the adult worm. By 2002 the partnership had lowered the prevalence rate of infection and virtually stopped transmission within 10 of the 11 West African countries where it operated.<sup>1</sup>

Planning for other programs that require pharmaceuticals cannot assume that manufacturer will donate the drugs. However, this experience shows what can be achieved with donated drugs, and it may prove useful in publicizing the opportunity available to other pharmaceutical companies considering philanthropic initiatives of their own.

## **Phase II: scaling up to control riverblindness throughout Africa**

The introduction of ivermectin presented challenges and opportunities that became a catalyst for scaling up at all levels. It transformed the program from a technologically driven categorical health initiative to a community-directed process of treatment and empowerment, focused on riverblindness, of course, but applicable to other diseases as well. Not only did this grassroots approach contribute to high population coverage and empower communities to take charge of their own health, it also planted the seeds for sustainability—absolutely vital for a disease that must be treated for at least 20 years to interrupt transmission.

With the drug challenge solved thanks to Merck & Co., the program had to find a cost-effective and feasible way to distribute ivermectin in remote areas of Africa where the disease was endemic. Many vaccines, immunizations, and vitamins are inexpensive or free but go unused because they never reach those who need them. In 1990 the program began full-scale distribution in extension areas—to the south and west of the original core area in West Africa—using mobile teams in jeeps plus local health staff support.

In this first step toward scaling up, paid local health professionals called communities to a central location for dosing. In more than 30 river basins, therapeutic coverage averaged about 65 percent in 1987, rising to more than 70 percent by 1995. Using trained health staff at the local level was expensive, however. The program considered various cost-recovery schemes, to no avail.

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<sup>1</sup> Benin, Burkina Faso, Côte d'Ivoire, Ghana, Guinea, Guinea-Bissau, Mali, Niger, Senegal, and Togo. Operations that had been interrupted in Sierra Leone due to a decade-long civil war are now resuming.

The answer to the high cost of mobile teams arrived indirectly. Invariably, when drugs were distributed some villagers were away—hunting, working, or traveling. In response, once it became clear that ivermectin’s safety profile allowed unsupervised dosing, the program authorized the mobile teams to leave doses for absent community members.

In the second step toward scaling up, national health services combined with local health staff to distribute the drug through a community-based distribution approach. This approach had several advantages over the mobile teams—particularly higher coverage and benefits at a lower cost. But even community-based methods proved too expensive, because some remote areas required high daily stipends and travel costs for supervising staff. After evaluating community-based methods, the program decided that the key to effective, replicable, and inexpensive distribution was to scale up again to “community-directed treatment,” a strategy that enabled communities to take charge of distribution—and ultimately their own health (boxes 6 and 7). The decision represented a major turning point for the riverblindness program.

The program adopted community-directed treatment for Phase I in 1995. Under this approach each community collectively appointed a local drug distributor from within its village. This person, who became the contact between the community and health care services, received supplies of ivermectin annually. NGOs and public health workers trained and supervised community drug distributors, who then ensured that medicine was dosed properly and delivered to those who needed it. Communities themselves determined what compensation, if any, the drug distributor received.

Training and communication between the distributors and their trainers (NGOs and health workers) have been essential for maintaining the quality and responsiveness of services. And open channels of communication between the ministries of health, NGOs, and health workers have facilitated field operations. Overall, the close links established between the partners have facilitated greater ownership, innovation, and treatment coverage.

Emboldened by the remarkable success of Phase I—and empowered by Merck & Co.’s donation of free drugs and the feasibility and efficacy of community-directed treatment—the program embarked on a broader and more ambitious mission for Phase II (see box 7). Together the same sponsoring agencies, most of the same donors, and 19 new participating countries joined forces to defeat the disease throughout Africa.<sup>2</sup>

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<sup>2</sup> Phase II countries include Angola, Burundi, Cameroon, Central African Republic, Chad, the Democratic Republic of Congo, the Republic of Congo, Equatorial Guinea, Ethiopia, the Gabon, Kenya, Liberia, Malawi, Mozambique, Nigeria, Rwanda, Sudan, Tanzania, and Uganda.



**Box 6. How do community-directed treatments compare with treatments provided by regular health services?**

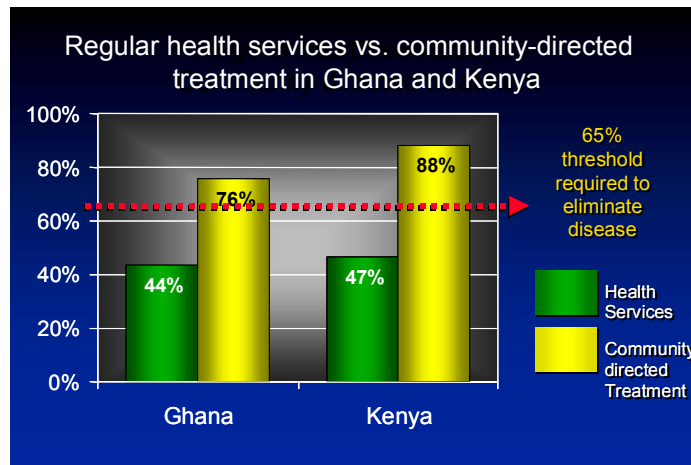
In 1994–96 the riverblindness partnership and the UNDP/World Bank/WHO Special Program for Research and Training in Tropical Diseases (TDR) jointly compared drug delivery methods used by health services with those used by communities in five countries. Health service providers determine the steps and schedule, as well as design and implementation. In community-directed treatment systems, after training and support, the community itself decides how to organize treatment for its members, including selecting the drug distributor, determining the timing and method of drug collection and distribution, and reporting to local health providers. Thus, the role of the community changes from being solely the recipient of services within the guidelines and limits set by outside providers to a position of prominence as the lead stakeholder and decisionmaker in community-level health services.

Conducted in Cameroon, Ghana, Mali, Nigeria, and Uganda, the study showed that community-directed treatment offered several important advantages:

- Less work for local health providers.
- Better treatment and geographical coverage.
- Stronger ability to adapt the drug distribution and treatment program as the communities’ needs and requirements change.
- A greater sense of commitment to and ownership of the program, which in turn promotes sustainability and the possibility of eventual integration into the local health system.

The study concluded that community-directed treatment with ivermectin was feasible and effective in a wide range of geographical and cultural settings in Africa and likely to be replicable in other communities where riverblindness was endemic. It recommended that this approach become a principal method for riverblindness control in Africa.

Community-directed treatment overwhelmingly exceeds the treatment coverage rates of regular health services in Ghana and Kenya (see figure). It produces therapeutic coverage well over the 65 percent threshold necessary for long-term riverblindness elimination.



Source: UNDP-World Bank-WHO Special Program for Research and Training in Tropical Diseases.

**Box 7. Scaling up riverblindness control in Nigeria**

Nigeria, Africa's most populous country, provides a good example of scaling up along a variety of dimensions—number of projects, population treated, therapeutic coverage achieved, and number of community drug distributors trained.

Year	Approved projects, new	Phase II projects total	Population treated	Therapeutic treatment coverage ( %)	Trained community drug distributors
1995	pre-Phase II	–	4,237,982	20	–
1996	4	4	5,901,961	66	na
1997	5	9	8,617,602	70	na
1998	8	17	9,000,000	77	4,884
1999	8	25	13,180,987	86	37,663
2000	1	26	na	64	49,352
2001	0	26	16,586,354	75	56,797
2002	1	27	18,552,844	75	58,384

– is not applicable

na is not available

Source: African Programme for Onchocerciasis Control.

At the inception of Phase II, Nigeria was the world's most heavily endemic country, representing almost 40 percent of all riverblindness cases. A serious public health problem in 26 of 30 Nigerian states, riverblindness was estimated to put more than 30 million people at risk. Although Nigeria was not a Phase I country, treatment with ivermectin began, as both a humanitarian mission and a cross-border initiative, under the auspices of Phase I in 1989. Cross-border community-initiated ivermectin treatment also brought relief to six communities in Cameroon: by 1995 roughly 4.2 million people had been treated for riverblindness, mainly through NGDO programs. These results achieved only a 20 percent therapeutic coverage rate, however—far below the 65 percent required to interrupt transmission.

In 1997, with Nigeria officially participating in Phase II, the riverblindness partnership implemented four principal projects in the country using community-directed treatment with ivermectin. Since then it has treated almost 20 million people a year, trained tens of thousands of community drug distributors, and surpassed the threshold in therapeutic treatment coverage needed to halt transmission. Overall community-directed treatment activities in 2002 included an average geographical coverage of 95 percent and an average therapeutic coverage of 75 percent, with 18.5 million people treated. Moreover, many projects in Nigeria have added other health interventions to community-directed treatment for riverblindness, including treatment for lymphatic filariasis, vitamin A deficiency, schistosomiasis, guinea worm, as well as primary eye care and cataract identification.

Community-directed treatment enabled the campaign to dramatically scale up operations. The program has already established a drug distribution network in 16 of the 19 Phase II countries. Reaching the most remote rural areas, this network reliably delivers annual doses of medicine where national health services are weak or nonexistent. In 2003 alone 35 million people in 68,000 communities were treated—doubling the coverage provided in 2001. More than 160,000 community distributors and 18,000 health workers were trained or retrained in 2003. By 2010 the riverblindness program will protect 150 million people.

**Table 1. Scaling up Phase II, 1996–2003**

	1996	1997	1998	1999	2000	2001	2002	2003	Total
Community-directed projects approved	4	25	16	12	6	6	11	27	107
Annual treatments (millions of people)	7.9	10.5	14.1	17.0	22.0	24.5	28.0	35.0	159
Geographic coverage (%) <sup>a</sup>	69.6	69.6	73.6	75.5	82.6	83.3	87.7	88.1	—
Therapeutic coverage (%) <sup>b</sup>	51.2	52.7	54.2	55.7	59.7	60.8	64.5	74.0	—

—not applicable

a. Percentage of area treated per total area at risk.

b. Percentage of people covered per total population.

Source: WHO 2003e.

Phase II faces many difficulties, including a lack of health infrastructure in many affected areas (box 8). As everywhere else in the world, trained nurses and doctors in many African countries prefer to work in urban areas. Meanwhile, the number of doctors and nurses has been decreasing in Africa because of death and illness caused by HIV/AIDS. To strengthen capacity, partner NGOs are training health service staff to take more responsibility for training drug distributors.

Empowered health service staff and local communities play an increasingly important role in Phase II's operations. Strengthening capacity is a central feature of the program's sustainability plans. All projects are launched with program management, technical assistance from Phase II's NGO partners, and financial assistance from donors. For the first five years of each project, 75 percent of costs are paid by the Phase II Trust Fund, with participating countries and NGOs contributing the remaining 25 percent in cash or in kind. Projects making progress toward sustainability become eligible for an additional three years of international financing at a greatly reduced level.

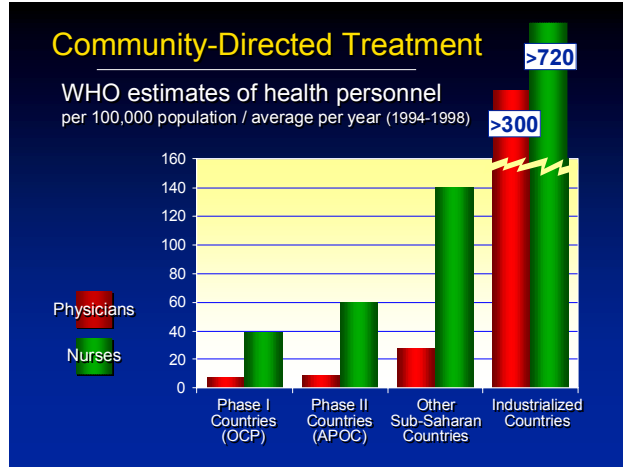
The program is building capacity where needed in national governments, health services, local NGOs, and communities. By 2010, when international financing for all projects will cease, the countries themselves will bear responsibility for distributing ivermectin and supporting the community distribution network.

Unlike more linear, health service-based distribution systems, community-directed treatment endorses active community participation, which improves drug access while creating a sense of responsibility and ownership. Communities often hold the position of drug distributor in high esteem. Many community drug distributors, in fact, feel honor-bound to give their time freely for the benefit of the whole community. Moreover, through the process of creating extensive networks of community drug distributors, the program has strengthened many of the weakest ministries of health, and several international partner NGOs have worked to build

capacity among local NGOs. With support from the partnership, community-directed treatment stresses ownership by communities, grassroots viability, empowerment, and self-reliance.

**Box 8. Building capacity where health services are weakest**

The paucity of trained health staff in riverblindness-endemic countries, particularly in remote rural areas, presented a tough challenge to maximizing coverage rates and eliminating riverblindness as a public health problem. How to distribute drugs when national health systems had inadequate access to rural populations, the main target group? Accordingly, the program directed research toward operational efficiency. Thus far, community-directed treatment has proven to be one of the most successful methods of distribution for developing countries in Africa, planting seeds for the long-term sustainability of ivermectin distribution (see figure).



Source: UNDP-World Bank-WHO Special Program for Research and Training in Tropical Diseases.

Community-directed treatment has empowered Africans to successfully fight riverblindness in their own villages, relieving suffering, boosting productivity, and slowing transmission across the entire region. The approach provides hope, and it empowers communities to help themselves or seek the partnerships that allow them to do so. It allows them to play a large role in determining their own health outcomes and future.

**How much did the program cost?**

The riverblindness partnership is set to complete its second and final phase by 2010. The total budget for the two phases will amount to about \$735 million in donor financing, primarily for larvaciding and entomological evaluation. Other costs have included administration, ivermectin delivery, training, research and development, and extensive meetings aimed at ensuring transparency within the wide-ranging partnership. The annual cost of protecting one person was well under \$1 year in Phase I. The target cost per treatment is about \$0.15 for the end of Phase II.

The economic rate of return for Phase I—the result of an increase in labor and arable land made available by the program—was 20 percent. Labor was calculated based on the 20 years of productive labor per person formerly lost to the disease—8 years of blindness and 12 years of reduced life expectancy. The increased benefits from land assumed a conservative resettlement rate and the increased agricultural production that would occur in the new lands minus the production forgone in the departed areas. Normally, a 10 percent rate of return for World Bank projects in the “productive sector” (excluding social projects such as education and health) is considered a success. By 2010 the economic rate of return for Phase II is expected to reach 17 percent.

## **Expanding the program to cover other health problems**

What began as a categorical disease program has broadened into an ideal entry point for providing health care to tens of thousands of people living in remote communities in Africa—most of them not reached by other programs and many not reached by national health services. The community-directed distribution network can provide primary health care to the poorest of the poor through simple, once or twice a year interventions by nonmedical staff. In some areas, additional activities have been tested and planned; in other areas, communities themselves took spontaneous action. In some cases communities chose to distribute other externally provided drugs using the same distributor and distribution method. In other cases ivermectin distributors obtained supplies on their own from district health centers and then provided them to community members.

Participating countries, donors, and the partnership's governing board have all endorsed the integration of community-directed treatment into existing health systems through other health interventions. Some countries, such as Uganda, have begun reorganizing their rural health services to use the community-based network as a national strategy. Communities within the 30 African countries, along with NGOs such as Helen Keller International and Global 2000, have begun distributing other medications, including vitamin A to prevent malnutrition, pediatric blindness, and death; Praziquantel to control schistosomiasis; ivermectin and albendazole to halt the transmission of lymphatic filariasis; bed nets to prevent malaria; and condoms to prevent HIV/AIDS and promote reproductive health.

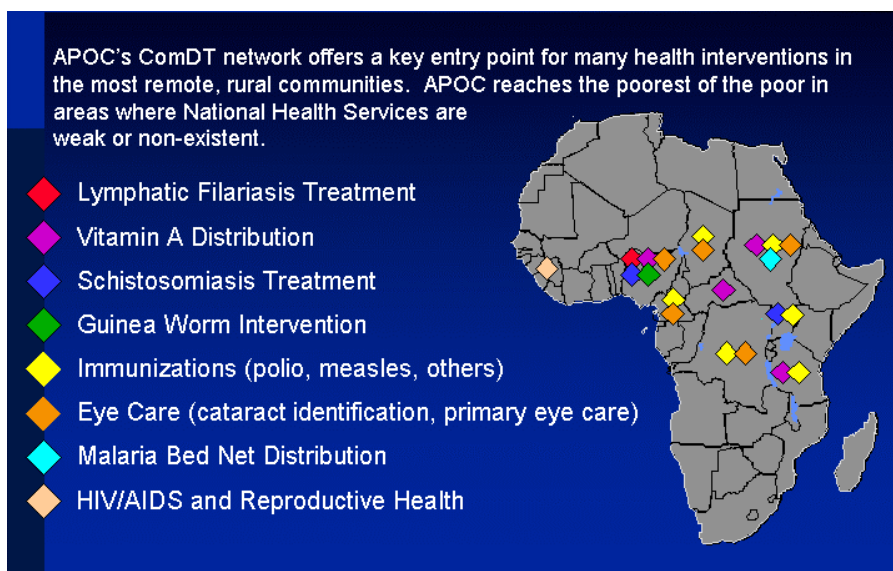
Distributing other drugs along with ivermectin can also boost acceptance. Because ivermectin brings immediate relief from the maddening itching of riverblindness, patients want to take it. Demand for the drug and compliance with the drug regime are therefore high among affected communities. The dramatic, immediate effect of ivermectin demonstrates to patients the value of pharmaceuticals in general. Establishing a positive attitude toward appropriate drugs is essential for ensuring the acceptance of important interventions that do not act as quickly or in ways as obvious to patients. Vitamin A, for instance, can reduce under-five child mortality by 25–35 percent, but its effect is not immediate, making the link between the drug and its effects harder for patients to appreciate. Codistributing vitamins along with ivermectin helps boost acceptance.

Results from a pilot study in Nigeria on the codistribution of ivermectin and vitamin A have shown the potential of the drug distribution network. Helen Keller International, a Phase II partner, teamed up with the Micronutrient Initiative to promote vitamin A distribution, working through the national health service's district facilities. Coverage was disappointingly low, ranging from zero in some areas to 30 percent in others. Once Helen Keller International began distributing the capsules through the Phase II network, coverage jumped to an average 80 percent. WHO is halfway through a three-year, multicountry study to evaluate this wider potential to deliver new health interventions in the poorest areas of Africa.

The community network established for riverblindness control has enormous potential, but it is necessary to clarify what it can be expected to do and what remains out of reach. No one would argue that this program—or any other—is a replacement for a functioning primary health care system. However, riverblindness areas are typically so poorly served that it has been necessary to construct an intermediary system.

With this system in place, the natural question becomes: what can be done through it? Some other interventions are already being tried (figure 1), but there are limits. Some vaccines may not be appropriate for community distribution, because they are too time- and temperature-sensitive or need to be administered by trained personnel. In contrast, antimalarial bed nets or tsetse traps to prevent sleeping sickness could be distributed through the system. Some drugs, such as azithromycin for trachoma, which is donated by Pfizer, or albendazole for lymphatic filariasis, which is donated by GlaxoSmithKline, could also be safely distributed through community networks. A WHO/TDR study is now under way to evaluate the feasibility of handling complicated interventions such as tuberculosis and home management of malaria through Phase II projects. The first data are expected by 2005.

**Figure 1. Scaling up for additional interventions**



*Source:* Onchocerciasis Coordination Unit, World Bank.

The riverblindness partnership does not expect to fully address many diseases, but the partnership can pursue aspects of disease control and health promotion to offer partial solutions when complete answers are out of reach. Insecticide-treated bed net distribution, for example, is an important step in preventing malaria.

The fundamental tension between the appeal of delivering more interventions and the danger of overwhelming the distribution system has long been acknowledged. Both the World Bank and WHO have sponsored studies on the issue, many executed by TDR. One study showed that community distributors were already involved in a wide range of health care activities (WHO

2003c). Often the person selected by the community for riverblindness work is the same person chosen for other externally driven health activities, including National Immunization Day work and the polio eradication campaign.

A second TDR study showed that involvement in additional activities was actually beneficial. In general, more activities correlated with better coverage rates and improvements in other key indicators. A third study, which compared the effectiveness of distribution through Phase II community projects with that of school-based programs, found that communities achieved much better coverage (Ndyomugenyi and others 2004).

While these studies have been progressing, governments have begun advocating wider use of the Phase II system. Guinea is working with its Phase II projects to distribute condoms and HIV/AIDS educational materials. The current optimism may or may not be borne out by future experiences, but it is supported by both scientific studies and field experiences. Much remains to be seen, but there is good reason for a hopeful outlook.

## **Lessons**

Over 30 years the riverblindness program has continually scaled up to cover more territory, reach more people, and push back a devastating disease. As a result of its efforts, riverblindness has been defeated throughout the program area in West Africa, except where operations were delayed by conflict in Sierra Leone. Operations continue there and in the Phase II area, with the goal of eliminating the public health problem posed by the disease throughout Africa by 2010.

Several lessons emerge from the partnership's three decades of operations.

### **Establishing a broad partnership and defining each partner's role**

Continuity and stability among international partners has tremendous benefits, offers valuable synergies, and provides the longevity required to deal with even the most intractable problems.

In addition to its broad geographic scope and long duration, the riverblindness partnership has benefited from the breadth of its membership. More than 80 partners are involved—including 26 donors, 30 African countries, a major pharmaceutical firm (Merck & Co.), and 12 major NGOs—and tens of thousands of local communities are served. This broad coalition, with its mix of different “corporate cultures,” is complex to maintain, but it has created synergies that have yielded enormous advantages (box 9). By and large, the partnership's constituents have collaborated remarkably well and have pulled the campaign forward toward its well-defined objectives.

**Box 9. Seven lessons about partnership**

Wide-ranging partnerships can have distinct synergies.

Given the mix of “corporate cultures,” wide-ranging partnerships are complex to form and maintain.

Program proactivity and service to the partner constituencies are essential in holding a large coalition together.

The perception of transparency is necessary to instill trust.

All constituents need to enjoy distinct benefits, since altruism is an inadequate basis for long-term sustainability.

Trust enhances equity of participation.

Clearly delineated roles and responsibilities are critical for reaping comparative advantages.

An international agreement clearly delineated roles for all parties. Each UN agency relies on its comparative advantage and reputation to develop the program and maintain high standards of operation and treatment. WHO, the executing agency, handles all operations, as well as all technical and scientific matters. The World Bank generates interest among donors and participating country governments and manages donor relations, and UNDP focuses on postcontrol development. FAO applied its agricultural expertise to the many fertile valleys in West Africa once they had been freed of disease.

WHO has flourished in its role as the executing agency. Freed of fundraising obligations and able to count on the Bank’s convening power, it has been able to concentrate on the scientific and technical matters in which it is proficient. Handling the disease control aspects is exactly what WHO is intended to do and is best at. In cooperation with other partners, WHO fulfills this role without distraction.

The World Bank’s well-defined role has been advantageous for the partnership. Since it is a donor and fiscal agent, the Bank has been able to approach other donors as an equal. Because WHO is the executing agency, the Bank avoids the conflict of interest inherent in advocating on behalf of its own program. Moreover, recognizing that altruism is not the sole motivating factor for involvement, the Bank has worked hard to address the priorities and needs of each donor. This attention to donor relations has built trust and goodwill, creating a sense of ownership among the partners that has helped the campaign weather its crises. It has required that the Bank meet with each donor at least once a year on a one-on-one basis, that it be prepared to answer questions, address problems, and be attentive to each donor’s needs and concerns. The result has been the mobilization of \$700 million in donor financing since 1974—an unprecedented level of long-term support for a multidonor program.

The World Bank recognized that the unusually long duration inherent in riverblindness control would require a major effort to recruit new donors. By the mid-1990s, the program had tripled the number of donors from the original nine in 1974. This served the program well by ensuring continuity in financing, as support from individual donors varied over time as a result of changes in governments, shifting aid priorities, economic recessions, and donor fatigue. Despite inconsistent participation by some donors during the 1980s and 1990s, the program did not incur



financial shortfalls. Between 1985 and 2000 new donors were enlisted from the Far East, the Middle East, and Northern, Western, and Central Europe.

NGDOs have been key partners in Phase II. Individually, some NGDOs had been working on riverblindness for a long time. SightSavers International (originally the British Empire Society for the Blind) has been active in Ghana and Northern Nigeria since the 1950s, surveying the disease and then providing rehabilitative services. Over the past two decades, more and more NGDOs have been providing eye care and other services in riverblindness areas. Even before Phase II began, many NGDOs were distributing ivermectin on their own. Within the riverblindness partnership, these NGDOs offer essential experience and expertise in community mobilization, training, and other areas crucial to achieving high coverage rates in drug distribution. At the same time, these partners have benefited from inclusion in Phase II, which provides them with external financing, scientific expertise, and a forum for coordinating activities continentwide.

The partnership has benefited tremendously from Merck & Co.'s donation of ivermectin—and the company has been well served by its participation in Phase II. However generous, the donation would mean little without a distribution system. Other partners in Phase II provide that mechanism, maximizing the effectiveness of Merck & Co.'s contribution. The initial donation helped boost morale among senior Merck scientists; as Phase II has progressed, the humanitarian benefit has become a major source of pride and employee satisfaction companywide. In an industry frequently blamed for the high cost of drugs and shortcomings in the health care system, Merck has found that the Mectizan Donation Program has been an important factor in recruiting top researchers by reassuring them about the company's corporate citizenship.

By the 1980s the program had an international reputation as one of the most successful health programs since smallpox eradication. It brought high visibility to a disease that might otherwise have been overlooked and attracted resources to defeat it. African health ministers became aware of the disease and were consistently involved in the program, meeting frequently, exchanging views, and putting subtle pressure on one another to achieve as much progress as possible. In this way the program provided a forum for participating countries to collectively take action, learn from one another, and defeat the disease. In Phase II participating countries have taken on a large role in coordinating other partners' activities, collecting and synthesizing data, storing Mectizan, and often operating jointly with NGDOs.

The broad partnership pioneered by the riverblindness programs stands as a ready model for other large programs. Through clearly defined roles and explicit governance rules, the riverblindness program has been able to address a complex problem for three decades. The partnership attained stability by delivering benefits to each constituent, allowing the partnership as a whole to endure. Other programs addressing integrated issues, such as health and development or industry and the environment, could consider similar partnerships.

### **Funding ongoing research**

Consistent operational research investments can pay large dividends when they are needed most. Having a research mechanism in place allows anticipated issues to be addressed ahead of time and is invaluable for reacting quickly to unforeseen problems.

The ability of the campaign to adapt from aerial spraying to community-directed treatment of ivermectin was made possible only through ongoing research. The program now invests at least 10 percent of its budget in operational research, which is considered the minimum amount necessary. Continued research has led to the development of Rapid Epidemiological Mapping of Onchocerciasis (REMO), a technique vital to rapid mapping and accelerating the scaling-up process. Social development research has led to greater understanding of local conditions and the most effective method of treatment.

### **Flexibility and community-directed approval**

Flexibility is essential. Over three decades the program maintained riverblindness control by adapting strategies as circumstances changed. From a vertical, categorical vector-control program to community distribution and now community mobilization, each approach has helped the program advance the ultimate goal of improving health while dealing with changing circumstances and maximizing technological innovations.

The community-directed approach can be scaled up further for use in non-onchocerciasis areas of Africa—and perhaps other regions as well. It can also be adapted to deliver other health interventions.

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