

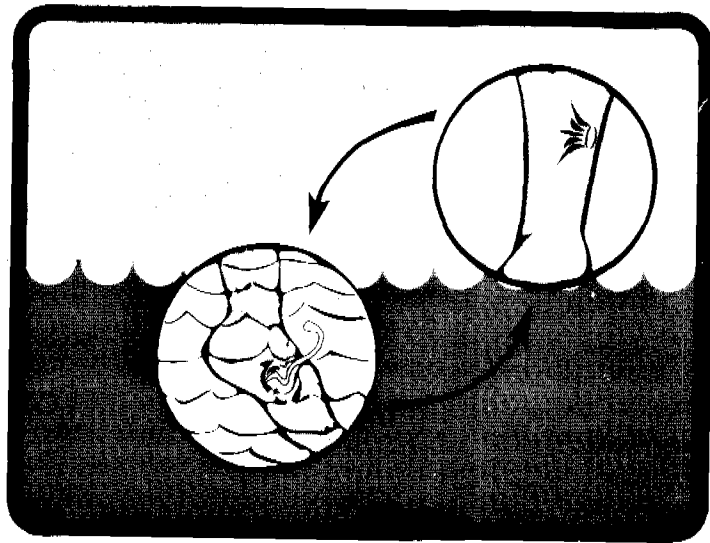
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REPORT ON IDWSSD IMPACT ON DRACUNCULIASIS



**INTERNATIONAL
DRINKING
WATER SUPPLY
AND SANITATION
DECADE**



1981-1990

**STEERING COMMITTEE FOR
COOPERATIVE ACTION**

JULY 1990

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INTERNATIONAL DRINKING WATER SUPPLY AND SANITATION DECADE

STEERING COMMITTEE FOR COOPERATIVE ACTION

REPORT ON IDWSSD IMPACT ON DRACUNCULIASIS

CONTENTS

1. Guinea worm and the IDWSSD	2
2. About the disease	3
3. Cooperative action	6
4. Accomplishments	10
5. Could more have been done?	12
6. The way ahead	13
Bibliography	15

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1. Guinea worm and the IDWSSD

One of the significant accomplishments of the International Drinking Water Supply and Sanitation Decade (IDWSSD) has been the impetus it has given to the global campaign to eradicate dracunculiasis, or Guinea worm disease. If the present momentum can be maintained after 1990, the disease could become the second (smallpox was the first) to be certified by the World Health Organization as totally eradicated from all countries.

Dracunculiasis is a debilitating disease, victims of which are incapacitated for weeks or months by the emergence of the long worms through the skin. About 10 million people are thought to be infected by the disease each year in India, Pakistan, and 19 African countries; over 100 million persons are at risk of the infection. As the worms commonly emerge during the harvest or planting season, the infection has a disproportionate adverse effect on agriculture as well as health in endemic communities.



Millions at risk

Dracunculiasis is only transmitted by drinking contaminated water, and has no natural reservoir other than the human population. It can therefore be eradicated if transmission to humans is interrupted, ideally by providing safe sources of drinking water. In fact, dracunculiasis is the only waterborne disease for which it is possible to say that the provision of safe drinking water alone can eliminate it.

The potential impact of the IDWSSD on the incidence of dracunculiasis was not directly recognized in the Mar del Plata Action Plan, which formed the basis for Decade plans and programmes. The mutual goals were however quickly recognized by the UN InterAgency Steering Committee for the IDWSSD. Prompted by submissions from epidemiologists at the Centers for Disease Control in Atlanta, Georgia, USA, the Steering Committee adopted dracunculiasis eradication as a subgoal of the IDWSSD at its meeting in April 1981, and issued a public statement to that effect. The result has been a strong linkage between IDWSSD programmes and Guinea worm eradication in virtually all of the countries in which the disease is endemic, with substantial progress achieved in combatting the disease.

Mutual goals

Nearing the end of the Decade, the policy basis for the international eradication effort has been firmly established, most endemic countries



National successes

have begun national eradication programmes or preliminary activities, and the disease is on the verge of eradication in India and Pakistan, the two remaining endemic Asian countries. In India and Nigeria, the presence of dracunculiasis is a major criterion for prioritizing villages for new sources of safe water supply. In several countries, the existence of national efforts to eradicate dracunculiasis has helped to attract new resources to increase the rate of provision of new safe sources of drinking water. An international donor conference in July 1989 helped to secure funding to assure continued momentum towards eradication of dracunculiasis by 1995.

2. About the disease

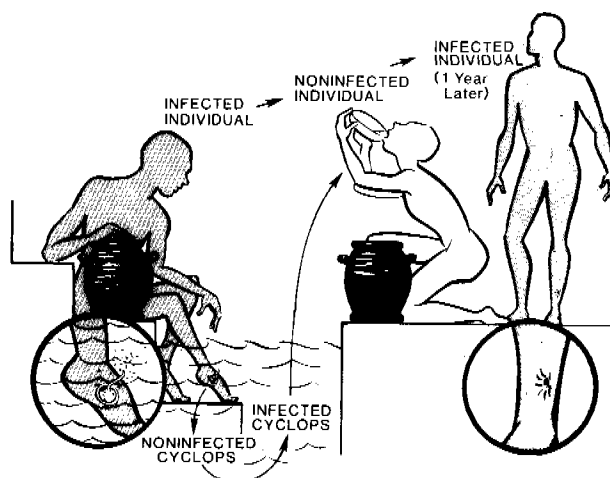
Dracunculiasis is a shocking waterborne parasitic infection which humans acquire only by drinking water contaminated with the microscopic immature stage of the parasite. About a year after a person has drunk such water, the mature adult female worm, which measures up to a metre in length, secretes a toxin which causes a severe local burning sensation below the skin and raises a blister, through which she eventually emerges. Usually the victim experiences no symptoms or signs of infection during the year long incubation period before the worm makes its final appearance. The worms tend to emerge on the lower legs, ankles or feet, but they may come through the skin or mucosa anywhere on the body.

Horrific effects

The biological reason for the worm's emergence is so that the female worm can discharge her hundreds of thousands of larvae back into a body of stagnant fresh water. When the leg or other part of the body containing a mature worm is immersed in cool water, the blister ruptures, and the larvae enter the water, where they are ingested by a tiny cyclopid copepod, commonly known as a "water flea". Copepods, which are ubiquitous in stagnant bodies of fresh water, are barely visible to the naked eye when a

Water is the link

clear container of such water is held up to the light.



The ingested Guinea worm larvae undergo two transformations in the copepods, over the course of about two or three weeks, after which they are infective to humans if the water containing them



is ingested. In humans, the larvae mature and mate in about three or four months, after which the males die. The females later migrate to the part of the body from which they will seek to emerge several months later.

Weeks of pain

People acquire no effective immunity to the painful disease, even after repeated infections year after year. Although most patients suffer only one worm emerging at a time, up to two dozen or more have been known to emerge from one person at the same time. Each worm may take up to a few weeks to emerge, and the associated pain is made far worse if the fragile worm is broken before it leaves the body. Hence the time-honored traditional "treatment" of slowly winding the emerging worm around a stick.

Dracunculiasis infections are not usually fatal, unless the worm emerges in a vital area such as the spinal cord, or where several worms occur in one victim at the same time, or if secondary tetanus infection of the wound caused by the worm occurs. The physical incapacity which often occurs in association with the pain and secondary bacterial infection can be severe, and surprisingly long-lasting: averaging 5 weeks in one study, and 100 days in another study, for example. About 0.5% of victims are said to suffer permanent physical disability as a result of the infection, usually due to frozen joints or contractures.

Economic consequences

The real significance of dracunculiasis lies in the social and economic consequences of the temporary disability it produces in so many of its victims, at a critical time of year. The infection is most prevalent in working age adults, between the ages of 15 and 55 years. It is often seasonal, becoming most prevalent during the time of year when some villagers must plant their crops (early rainy season) or harvest them (early dry season).

Prevalence rates in many African communities often exceed one-third of the total population of an endemic village. Over the past few years, much evidence has been documented by researchers in endemic countries of this disease's large adverse effects on school attendance; on parental ability to care for their young children, including taking them to receive childhood immunizations; and on agricultural production. For example, according to one study supported by UNICEF in an area of only 1.6 million people in southeastern Nigeria, the losses in profit from rice production alone due to incapacitation of farmers by dracunculiasis amounted to over US\$ 20 million per year.

No cure

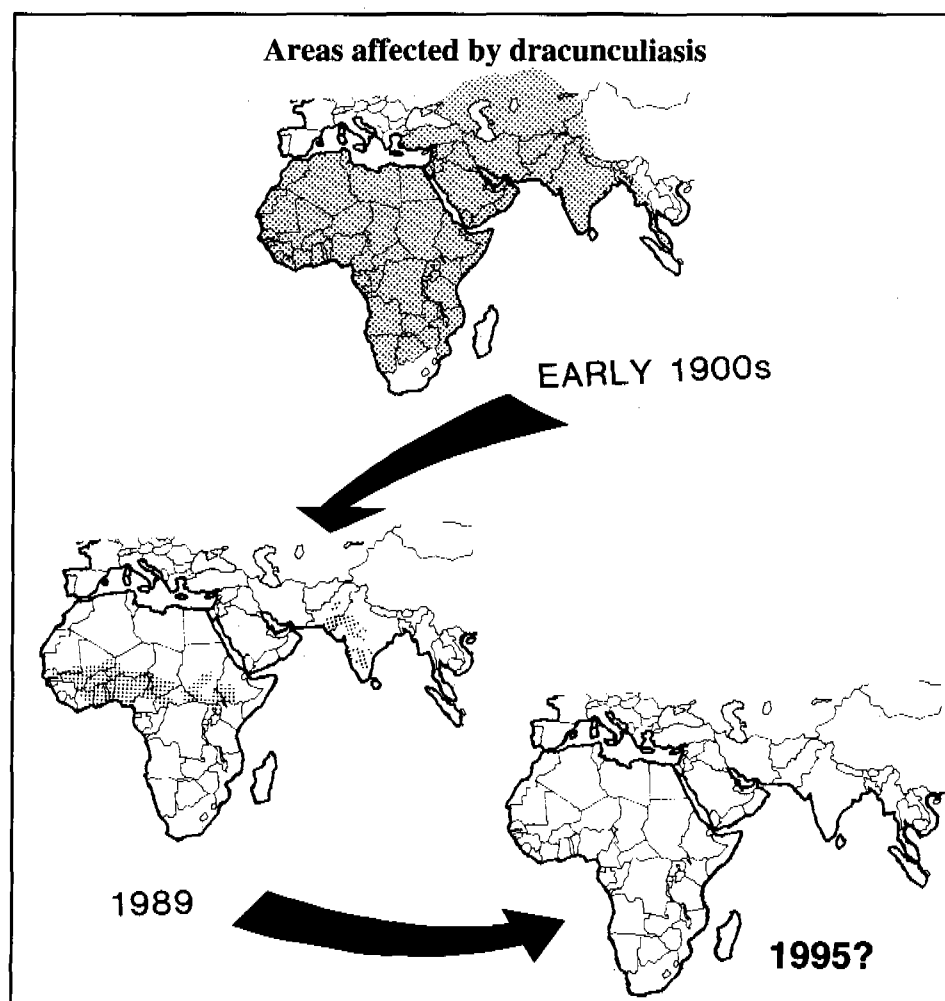
There is no curative treatment for the infection. The only means of control are: to prevent infection, by teaching people in endemic areas to



Improving situation

boil their drinking water (if they can afford fuel) or filter it through a fine mesh cloth; by providing safe sources of water from underground as in borehole wells; or by treating the contaminated sources of surface water monthly with a cyclospicide known as temephos (Abate). There is no natural animal reservoir of the parasite that infects humans, *Dracunculus medinensis*, although there are other species of *Dracunculus* which infect wild animals in many parts of the world.

Dracunculiasis has been known since at least the period of Ancient Egypt. It is currently limited to Pakistan, India, and 19 subsaharan African countries, stretching from Senegal in the west to Ethiopia in the east. In the early part of the Twentieth Century, Guinea worm was commonly found throughout the Middle East and much of southern Asia (one of the synonyms for the parasite is "Medina worm"), as well as a larger part of north, east and west Africa. It was imported into the Americas with African slaves, but died out. It was eliminated from the southern USSR in the 1920s and from Iran in the 1970s. It appears to have gradually disappeared in most of the Middle East as drinking water sources improved.





Priority projects

3. Cooperative action

The fact that dracunculiasis is so horrible and obvious (at least to inhabitants of affected communities), and has such a direct link with development, made it an ideal target for promotion as a potential "health benefit" of the IDWSSD. Indeed, one can make a cogent case that since rural water supply projects offer the best long term solution to the problem of dracunculiasis, such projects should give first priority to dracunculiasis-endemic villages:

First, there is the epidemiologic and humanitarian rationale that villages with Guinea worm suffer the deleterious effects of that disease in addition to all the other negative effects of not having adequate amounts of safe drinking water. That is, they too have diarrhoea, etc, as do all unserved villages, but they suffer the ill effects of Guinea worm on their health, education, and agriculture as well. Arguably then, villages with Guinea worm are the worst-off of all villages which do not have safe drinking water.

Second, the mathematical rationale is that the villages where Guinea worm is endemic are only a small fraction of all the villages which do not have safe drinking water. In Nigeria, for example, dracunculiasis is found in less than 7,000 villages of the 90,000 villages estimated to be without safe drinking water. So, reserving a share of new water supplies in affected countries for endemic villages until the disease is eradicated is quite feasible, despite the inevitable political considerations in earmarking new sources of drinking water.

Third, the economic rationale is that the benefits to individual villages concerned, and to the country, of providing safe water supplies to villages with Guinea worm are, on average, greater than the benefits of doing the same in villages without Guinea worm. Thus, by directing the finite resources available for safe water supplies first to those endemic villages, the country will receive the greatest return on its investment in this expensive sector; a return that will be manifest in increased agricultural production, better school attendance, improved health, and several other ways that are much harder to measure.

Great opportunity

These reasons have all been true for years, as have the currently available effective means for preventing dracunculiasis. The mutually beneficial connection between the IDWSSD and dracunculiasis eradication has a compelling logic. For its part, the IDWSSD offered those who would control or eradicate dracunculiasis an unparalleled opportunity: for the first time, they were not in the position of arguing for expensive safe water



***IDWSSD
endorsement***

India's lead

***Regional
Workshops***

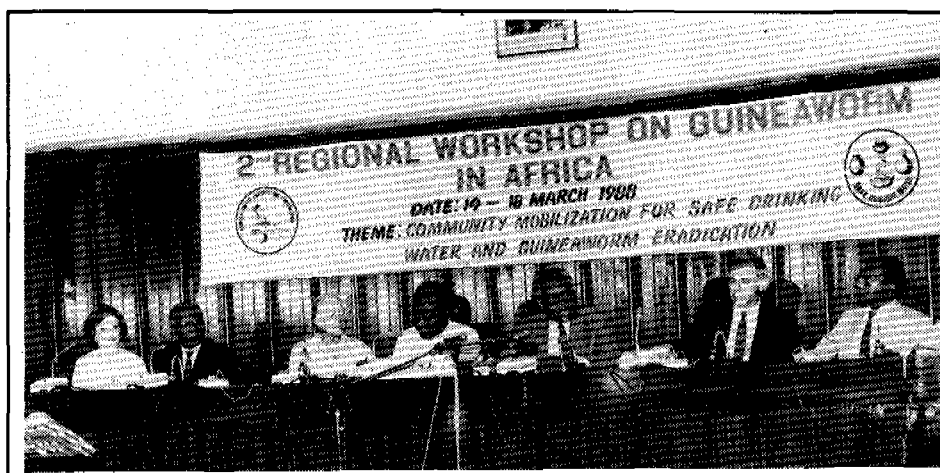
***Global 2000
initiative***

supplies in order to prevent the disease (the IDWSSD was already advocating safe drinking water for *all* unserved populations, a goal which if achieved, would inevitably lead to the eradication of dracunculiasis); so the "Guinea worm eradicators" had only to point to the benefits which would accrue to the Decade itself if advantage were taken of the previously overlooked, uniquely attractive target of dracunculiasis.

The IDWSSD Steering Committee's first endorsement of dracunculiasis eradication as a Decade subgoal in April 1981 led one month later to inclusion of language in a resolution on the IDWSSD at the World Health Assembly referring specifically to the special opportunity which the Decade afforded to combat dracunculiasis. These two official endorsements thus became the policy basis for urging leaders in endemic countries to look seriously at the problem of dracunculiasis, in the context of the commitment to provide many more safe water supplies during the Decade. An extremely important factor in these early endorsements was the knowledge that India had begun a national Guinea Worm Eradication Programme in 1980.

Following a first international meeting on the problem of dracunculiasis held by the U.S. National Research Council in Washington in 1982, several African countries requested consultations from WHO or UNICEF. WHO also designated a WHO Collaborating Centre for Research, Training, and Control of Dracunculiasis, at the Centers for Disease Control, located in Atlanta, USA, in 1984. In 1986, the World Health Assembly adopted a separate resolution calling specifically for the "elimination of dracunculiasis, country by country" by taking advantage of the opportunity of the Decade. This resolution did not, however, set a target date for achieving eradication. The first African Regional Workshop on Dracunculiasis was held in Niamey, Niger in 1986, at which 14 of the 19 countries presumed to be endemic in Africa were represented. By the time the second such meeting was convened in Accra, Ghana in 1988, all but two endemic African countries were represented, as well as observers from India and Pakistan, and another major supporter had taken up the cause.

Under the leadership of former U.S. President Jimmy Carter, Global 2000, Inc, a non-profit organization at the Carter Presidential Center in Atlanta, Georgia, USA, began in November 1986 to support a national eradication initiative in Pakistan with the financial backing of the Bank of Credit and Commerce International (BCCI). The same group then began supporting a small secretariat, to serve as a focus for national Guinea Worm Eradication Programmes, in Ghana in 1987, and in Nigeria in 1988. Ex-President Carter personally attended the Second African Regional Conference in Accra in 1988. While initiation of the programme in Pakistan



3-pronged attack

completed the attack on the disease in its main remaining focus in Asia (in addition to the programme in India), the two programmes initiated with the help of Global 2000 in Africa addressed the problem in two of the three countries where the disease was known to occur nationwide.

Ghana's commitment

In Ghana, an extraordinary level of public mobilization was achieved in June 1988, when the Head of State, Flt-Lt Jerry Rawlings, spent eight days visiting 21 endemic villages in that country's highly endemic Northern Region, promoting the goals of the national eradication campaign: an exceptional degree of involvement by any head of state in combatting any disease.

Nigerian study

For its part, the Nigerian Guinea Worm Eradication Programme completed a nationwide village-by-village search for cases of Guinea worm within its first nine months, then presented the results to the nation at its Second National Conference on Dracunculiasis in Nigeria, in March 1989 (Nigeria held its first national conference in 1985). At the opening ceremony of the 1989 conference, the second-highest official of the Nigerian government announced that thenceforth, all rural water supply projects in the country would "now use the presence of Guinea worm as the primary criterion for targeting water supply". With the Indian Guinea Worm Eradication Programme, this was only the second instance where such an explicit national policy of basing placement of rural water supplies on health-related criteria was established. Ghana set a national goal of dracunculiasis eradication by 1993; Nigeria, by 1995.

Eradication dates set

Written reports on the status of the initiative to eradicate dracunculiasis were presented by the Director-General of WHO to the World Health Assembly in 1988, and to the Executive Board in 1989. The Ministers of Health of the African Region adopted a resolution endorsing dracunculiasis eradication at their annual meeting in Brazzaville in September 1988. And



Milestones in the battle to eradicate dracunculiasis

- 1980** India Guinea Worm Eradication Programme begins
- 1981** Resolutions by the IDWSSD Interagency Steering Committee and by the 34th World Health Assembly
- 1982** Workshop on Opportunities to Control Dracunculiasis
- 1983** Consultations in Togo, Benin, Côte d'Ivoire, Nigeria, Uganda
- 1984** CDC designated WHO Collaborating Centre
Consultation in Niger
- 1985** Nigeria National Conference
- 1986** 39th World Health Assembly Resolution for Elimination of Dracunculiasis
First African Regional Conference, at Niamey, Niger
Global 2000 funding for Pakistan, Ghana programmes
Consultations in Cameroon, Pakistan, Burkina Faso
- 1987** Hearing on Dracunculiasis Eradication before the US House of Representatives' Select Committee on Hunger
Pakistan conducts active search for cases
Study on agricultural impact completed in Nigeria
- 1988** Second African Regional Conference, at Accra, Ghana
Report to 41st World Health Assembly
Ghanaian Head of State visits 21 endemic villages
Global 2000 assists Nigeria, which conducts national search for cases
National Conferences held in Benin, Ghana, India, Pakistan
Movie *Guinea Worm: The Fiery Serpent* completed
Band Aid Foundation funds pilot projects in Mali, Burkina Faso
Resolution by African Regional Committee
Consultation in Republic of Guinea
- 1989** Resolution by 42nd World Health Assembly
UNDP, UNICEF announce major new support for initiative
Second National Conference in Nigeria; announcement of new Water Priority Policy
First Eastern Mediterranean Regional Conference meets at Islamabad, Pakistan
International Donor Conference held at Lagos, Nigeria



the endemic countries in WHO's Eastern Mediterranean Region held their first meeting on the subject in Islamabad in April 1989.

Other important milestones in the initiative were the Hearings on Dracunculiasis held by the Select Committee on Hunger of the U.S. House of Representatives in 1987, the continued steady reduction of cases and endemic villages achieved by the Indian national programme, and the periodic announcements of support for countries' programmes by new allies such as the Band Aid Foundation, Rotary International, the American Cyanamid Company, the Danish Bilharziasis Laboratory with support from DANIDA, the USAID mission in Ghana, and others.

Funding pledges

The policy and financial bases for Guinea worm eradication were firmly established in 1989, beginning with a resolution by the World Health Assembly in May that called explicitly for the elimination of dracunculiasis "as a public health problem" . . . "during the 1990s". Shortly before, UNICEF and UNDP had indicated their willingness to fund major parts of the Global Strategic Plan for Dracunculiasis (1989-1995) that had just been developed by Global 2000 and CDC. In July 1989, an international donors conference "Target 1995: Global Eradication of Guinea Worm", met in Lagos, Nigeria, where support totalling US\$ 9.6 million for Guinea worm eradication was announced, and the entire initiative received considerable additional international publicity. There should therefore be support for all remaining endemic countries to have undertaken a national assessment of the extent of dracunculiasis by the end of 1990, the year when India and Pakistan intend to have eliminated the infection.

4. Accomplishments

The IDWSSD has been largely responsible for increased recognition of the opportunity to eradicate dracunculiasis, because in setting the goal of providing safe water for all, the Decade took the onus of that relatively expensive intervention away from public health advocates; because the Decade provided a receptive forum for putting forth the initiative for consideration, and because of the early public endorsement of the initiative which was provided by the Steering Committee of the Decade in April 1981. Although early hopes that eradication would be achieved by the end of the Decade itself did not materialize, there should be little doubt that the Decade has launched the next eradication campaign to follow the successful example of smallpox eradication.

Milestones

In return, the initiative to eradicate dracunculiasis has helped the IDWSSD to attain significant milestones in the recognition it has attracted globally, and especially in Ghana, Nigeria and India, of the principle that

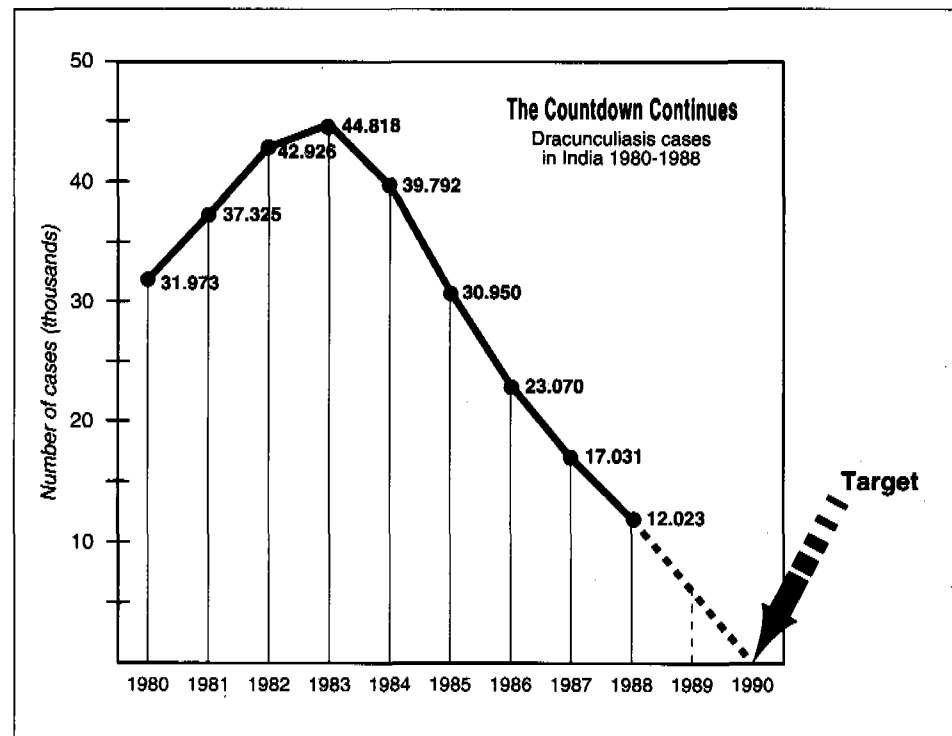


JICA funds

Dramatic impact

health factors should also be considered in determining priorities for provision of safe drinking water. And the focus on dracunculiasis has helped many more people in endemic and nonendemic countries to understand in very concrete terms the importance of the Decade's objective to provide safe water to unserved populations in the first place. For example, the existence of Guinea worm disease, and recognition of the opportunity to help prevent it, provided a direct incentive for the Japanese International Cooperation Agency to undertake two rural water supply projects worth about US\$ 6.0 million each in heavily endemic areas of Nigeria's Anambra State, and in the Northern Region of Ghana.

Dramatic reductions in the prevalence of dracunculiasis as a result of prominence given to the eradication initiative during the IDWSSD, and subsequent targetting of endemic villages, have been achieved in recent years by rural water supply projects in parts of Nigeria, Togo, Pakistan and India. For example, in one Local Government Area of Kwara State in Nigeria, a UNICEF-assisted rural water supply project reduced the average prevalence rates of Guinea worm infection in 20 villages from 59.6% during the 1983-84 Guinea worm transmission season to 11.3% during the 1986-1987 season, the rates in three villages being reduced to zero (from 62.0%, 52.7%, and 44.8%). India reduced its numbers of cases of dracunculiasis by 67% between 1984 and 1988. Pakistan reduced the number of cases from an estimated 2400 in 1987, to 1111 cases in 1988, and less than 550 cases in 1989.





**Heightened
knowledge**

Much greater knowledge of the extent of dracunculiasis has been obtained as a result of efforts conducted in connection with the eradication initiative during the Decade. For example, whereas at the beginning of the Decade it was thought that the number of cases of the disease could be anywhere from 10 to 48 million per year, we now know that the true total is closer to 10 million cases, with approximately 140 million persons at risk in 20 countries. National village-by-village searches for cases have been conducted in India, Pakistan, and Nigeria, with more to follow. A national assessment of the problem was also undertaken in Cameroon. We also have learned that the disease appears to have been eliminated (or disappeared) within the past 15 years or less in Gambia, Guinea, Iran, Saudi Arabia, and Yemen Arab Republic.

Animal studies

Operational research has demonstrated the utility of monofilament nylon or polyester filter material as a means of eliminating the copepods from drinking water. More recent studies in Ghana and at the CDC showed that commonly available "grey baft" material is also effective as a filter for this purpose. Those investigations have thus confirmed a practical way to help protect communities even before they may be provided with safe sources of drinking water. Other laboratory-based research conducted at CDC developed an animal model for the infection, using the ferret (*Mustela putorius furo*) as host for *Dracunculus insignis*. An investigation of the potential curative and prophylactic effects of several antihelmintics was unable to demonstrate any significant action of the drugs tested. Numerous evaluations conducted during the Decade have confirmed the efficacy of health education, with and without provision of filters, and of water supply in preventing Guinea worm. Evaluations of temephos in controlling the disease are also pending.

Films

Finally, the initiative has resulted in the production of several training materials pertaining to all aspects of dracunculiasis eradication. One new film, "Guinea Worm: the Fiery Serpent", was produced by CDC, Global 2000, UNDP, and UNICEF. Another, "The Water of Ayole", produced by UNDP and USAID, also shows considerable footage on Guinea worm.

5. Could more have been done?

Momentum towards the eradication of dracunculiasis is well established before the end of the Decade, although the ultimate goal of eradication itself is not yet as close as it could have been if countries and international organizations had mobilized around the initiative more rapidly.

There appear to have been several reasons why the dracunculiasis eradication initiative was not taken up faster. Chief among these were



*Competing
demands*

other coincident major problems in the main endemic area of Africa, such as the debt crisis, drought, famine, civil wars, and the advent of the AIDS epidemic. Very poor reporting of the disease misled many to assume it was not an important problem (by 1987, Nigeria's Anambra State alone was reporting twenty times as many cases of dracunculiasis to WHO as had all of Africa only two years before). Despite the policy basis already described which derived from the 1981 actions of the Steering Committee of the Decade and the World Health Assembly, the early lack of perceived relationship between expensive rural water supply projects and "child survival" in the narrow minds of some key officials, for all the talk of support for the goals of the IDWSSD, was another serious handicap.

PHC concept

Fear of what many perceived as another "vertical" eradication campaign and the dangers that presented to promotion of Primary Health Care caused some to hesitate, even though the thrust against dracunculiasis is now increasingly recognized as the very essence of the PHC concept. Some officials appear to have feared that any support for doing something about another tropical disease might mean less attention, and perhaps less funding, for their own area of professional interest. The usual problems of overcoming inertia in mobilizing any large bureaucracy also came into play.

6. The way ahead

The anticipated extension of IDWSSD activities beyond 1990 bodes well for the eradication of dracunculiasis by 1995. The main current uncontrollable constraint to achievement of eradication by 1995 is the disruption of services in southern Sudan because of civil disturbances. Otherwise, the goal is clearly attainable if full mobilization begins soon. Although Guinea worm will not have been eradicated by the formal end of the IDWSSD in 1990, it should be eliminated or almost eliminated in Asia by then, and full attention can then be concentrated on the most heavily endemic areas, in Africa. The extent of the disease in those areas should have been established by that time.

More resources

To eradicate dracunculiasis by 1995 however, increased resources will need to be made available immediately, to support interventions in the remaining endemic countries. Although all such countries must participate if eradication is to be achieved, dracunculiasis is not a major public health problem in some. In Kenya and Cameroon, for example, financial assistance will be needed to secure the necessary attention to dracunculiasis in terms of global, not national, interests. Resources are also required to support the necessary central planning and coordination activities. And clear priority needs to be given to dracunculiasis-endemic villages for new sources of safe drinking water in all rural water supply projects in endemic countries.



***Certification
criteria***

Internationally-agreed criteria need to be developed urgently, ideally under the auspices of the World Health Organization, for certification of elimination of dracunculiasis from endemic or formerly endemic countries. These criteria are needed not only in countries like India, which will attain a state of no more cases in one or two years; they are needed now in order to verify, reliably, whether the disease indeed no longer exists in several countries of the Eastern Mediterranean Region of WHO, where it has not been reported in many years.

Such investigations could and should begin as soon as criteria can be agreed upon, since it would be foolish to wait to do so, only to discover that there are a few hitherto unknown foci remaining, without allowing time to eliminate them before 1995. By its very nature, dracunculiasis is a disease of remote, neglected rural areas, and it is only prudent to anticipate that a few surprises may be forthcoming when thorough searches are conducted in some formerly endemic areas. Funding will need to be raised to assist formerly endemic countries to conduct active surveillance in search of cases, in preparation for formal certification of elimination.



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This document is one of a series of booklets prepared on behalf of the Steering Committee for Cooperative Action for the International Drinking Water Supply and Sanitation Decade. Titles in the series are:

- 1. Report on IDWSSD impact on Diarrheal Disease**
- 2. The IDWSSD and Women's Involvement**
- 3. Human Resources Development in the IDWSSD**
- 4. IDWSSD activities in Technical Information Exchange**
- 5. Report on IDWSSD impact on Dracunculiasis**
- 6. Report on IDWSSD impact on Schistosomiasis**

Copies of the documents are available from the CWS Unit, World Health Organization, 1211 Geneva 27, Switzerland.