



ERADICATION OF GUINEA WORM DISEASE

Case Statement

A South Sudanese child practices using a pipe water filter.

Guinea worm disease is an affliction of poverty. It debilitates people who live in remote and marginalized communities in sub-Saharan Africa. The disease negatively affects health, agricultural productivity, school attendance, and overall quality of life in the communities where it is found.¹

Guinea worm disease, also known as dracunculiasis, is caused by the parasitic worm *Dracunculus medinensis*, which infects those who drink from stagnant water sources containing microscopic infective larvae. During a yearlong incubation period, individuals unknowingly act as hosts to the parasite they have consumed, until the adult female worm, measuring up to one meter in length, emerges. An emerging worm causes a painful, burning blister on the victim's skin and results in an open lesion with a protruding Guinea worm. When a patient instinctively enters a stagnant water source to

obtain relief from the extremely painful and burning sensation, the worm releases tens of thousands of larvae, contaminating the water source and continuing the transmission cycle.

Unfortunately, there is no medicine to cure Guinea worm disease nor a vaccine to prevent it, and humans do not develop immunity to the disease.

However, disease transmission can be prevented. Guinea worm disease is on track to become the second human disease, and the first parasitic disease, to be eradicated.

The Carter Center and the World Health Organization (WHO)—in partnership with the national Guinea worm eradication programs of the ministries of health of affected countries and strategic partners such as the U.S. Centers for Disease Control and Prevention and UNICEF—have pioneered interventions and surveillance to prevent transmission and eradicate the disease.

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CONTEXT AND INTERVENTIONS

National ministries of health have reduced annual incidence of Guinea worm disease by 99.99 percent, from an estimated 3.5 million human cases in 1986 to 28 human cases in 2018.² To date, WHO has certified 187 Member states as free of transmission of the disease, including 16 that were formerly endemic.

Unfortunately, the recent emergence and persistence of Guinea worm infections in animals in Chad, Ethiopia, and Mali have challenged eradication efforts. The Carter Center and WHO are leading robust research efforts to better understand the peculiar epidemiology of animal infections and reduce their prevalence to zero.

Genetic, ecological, epidemiological, and operational research efforts involve academics, human and animal health experts, and modelers from around the world. Based on their findings, we now understand that domestic dogs and other animals can acquire *D. medinensis* infection by consuming raw fish entrails or other inadequately cooked aquatic animals. Studies have shown also that the worms infecting humans and animals are not genetically different.

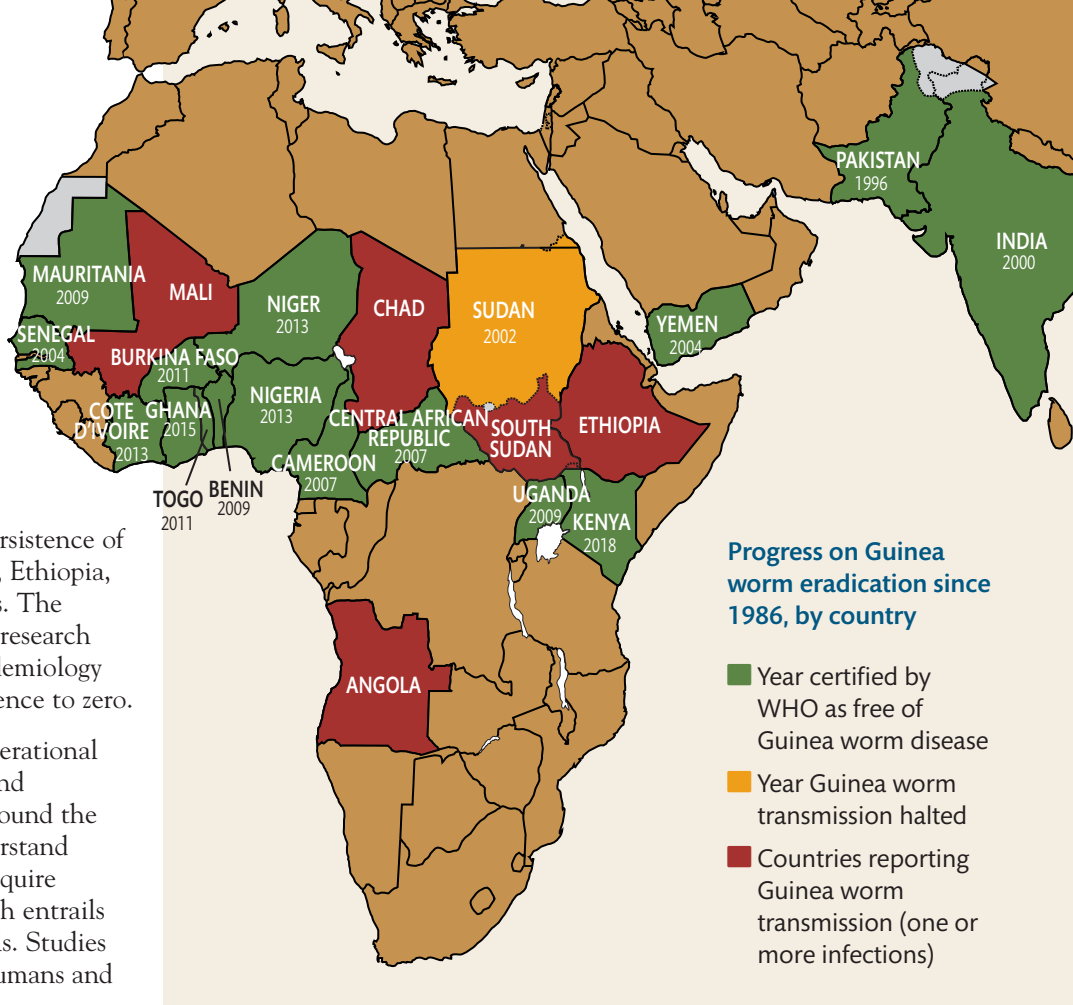
While research findings continue to clarify the scientific picture and interventions are adapted accordingly, reductions in animal infections are highly anticipated as national programs continue to strengthen their interventions.

The Carter Center, WHO, and partners assist national eradication programs to halt disease transmission in humans and animals through the following interventions:

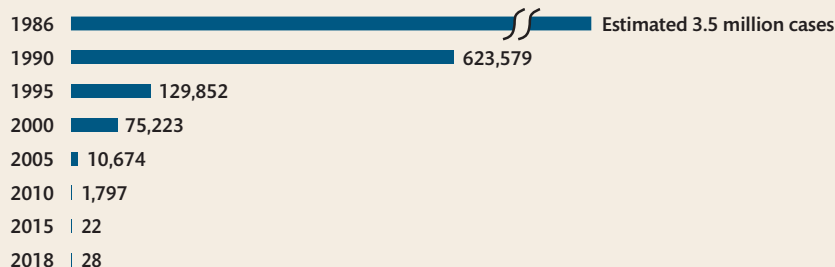
Surveillance: A comprehensive, community-based surveillance network detects and reports human cases and animal infections within 24 hours of worm emergence. A cash reward for confirmed Guinea worm cases or infections encourages this reporting.

Education: Health volunteers, traditional and religious leaders, and medical staff educate their communities about disease transmission and prevention. Radio broadcasts, posters, and school campaigns also share health education messages. Citizens learn never to enter a drinking water source if a Guinea worm is emerging, never to allow humans or animals with an emerging Guinea worm to do so, and to report all Guinea worm infections. These initiatives also emphasize the importance of safe disposal of raw fish entrails to prevent animal access to them.

Case containment: Human cases and animal infections are promptly contained and monitored to prevent contamination of drinking water sources.



Number of cases of Guinea worm disease worldwide since 1986, by year



Water treatment: Targeted stagnant sources of drinking water are treated with temephos (Abate®), a safe larvicide donated by BASF Corporation, to decrease transmission risk to both humans and animals.

Water filtration: Community members are taught to filter all unsafe drinking water, using cloth and pipe filters donated by Vestergaard.

GLOBAL SUPPORT

Over the past 30 years, The Carter Center has raised US\$466 million in financial and in-kind contributions. Sources of support are illustrated in the chart on the opposite page.

Continued support from the global community is critical as we take the last steps toward eradication of Guinea worm disease. The need for partnership and commitment grows greater during these final stages of eradication, and the work cannot be done alone. Join us in this historic effort to improve the lives of millions of people worldwide and create a brighter future for all.

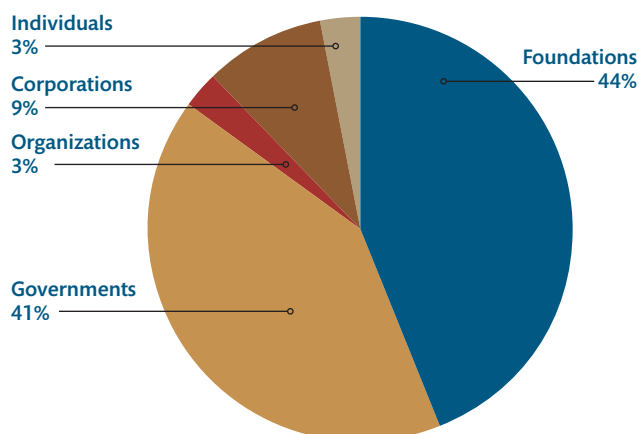
THE FINAL APPROACH TO ZERO

The goal of the campaign is to certify all countries as free of Guinea worm disease. The following phases outline the remaining work to be done and the lead external organizations. The Carter Center and WHO support national ministries of health, national Guinea worm eradication programs, and affected communities in these efforts. Governments of affected countries are the leaders of their national programs and key partners with The Carter Center and WHO.

Phase 1 Transmission interruption in remaining endemic countries

- Ensure 100 percent coverage of active surveillance in remaining endemic areas, including regular case searches, investigation and documentation of, and response to, rumored cases and Guinea worm infections within 24 hours. (The Carter Center and Ministries of Health)
- Maintain surveillance and response capacity in areas of endemic countries where transmission has been stopped. (The Carter Center and Ministries of Health)
- Continue health education and mobilization, including containment of cases and animal infections, distribution of cloth and pipe water filters, application of Abate larvicide, access to safe drinking water (supported by UNICEF), and promotion of national cash rewards for reporting cases. (The Carter Center and Ministries of Health)
- Conduct ongoing advocacy at national and international levels for continued support and funding to achieve eradication as mandated by the World Health Assembly. (The Carter Center and WHO)
- Maintain cross-border surveillance and response capacity to prevent importation of cases and ensure that eradication status is maintained in all countries that have already been certified. (WHO and Ministries of Health)

Contributions and pledges for Guinea worm eradication by donor type, 1986–2018



Phase 2 Pre-certification

- Continue active surveillance and immediate investigation of rumored cases in the final endemic areas. (The Carter Center and Ministries of Health)
- Conduct ongoing advocacy at national and international levels for continued support and funding to achieve eradication. (The Carter Center and WHO)
- Facilitate external assessments to verify national claims that transmission has been interrupted. (WHO)
- Implement a global reward for reporting Guinea worm infection in humans and animals. (WHO)
- Continue to maintain cross-border surveillance and response capacity to prevent importation of cases and ensure that eradication status is maintained in all countries that have already been certified.³ (WHO and Ministries of Health)

Phase 3 Certification

- Continue promotion of cash rewards for reporting suspected cases. (WHO and Ministries of Health)
- Assist countries in preparing a report for the International Commission for the Certification of Dracunculiasis Eradication (ICCDE). (WHO)
- Certify the remaining seven countries, based on ICCDE assessment: Chad, Ethiopia, Mali, South Sudan, Sudan, Angola, and the Democratic Republic of Congo. (WHO)



Long and threadlike, Guinea worms often appear in a person's legs and feet.

CASE FOR ERADICATION

The consequences of Guinea worm disease extend beyond individual suffering to significant, community-wide economic and social burden, inhibiting development and perpetuating a cycle of poverty and disease.⁴ Due to its detrimental effects, Guinea worm disease is both a symptom of and a contributor to poverty.

The economic hardship on poor rural communities is particularly severe and aggravated by the seasonality of transmission, which coincides with peak agricultural activities. Agricultural laborers infected with *D. medinensis* are unable to tend crops, negatively affecting income and nutrition for families and the wider community.⁵ Additionally, children may be forced to take on the work of sick family members, causing absences at school.

Through health education, filtration of drinking water, application of Abate larvicide, and prompt detection and containment of human cases and animal infections, Guinea worm disease can be affordably and effectively prevented.

Recent economic analysis indicates that Guinea worm eradication remains highly cost-effective, despite steep

costs in the eradication endgame.⁶ The costs per case of treatment and containment increase toward the end of the global campaign for the following reasons:

Long incubation: The yearlong incubation period makes it difficult to determine and intervene at the source of infection. An extensive surveillance system must be maintained for several years beyond the report of the last indigenous case. To certify eradication, countries must prove that their surveillance would have detected any possible infection during a consecutive three-year period after transmission was stopped.

Prompt detection and containment: Interrupting transmission requires intensified operations during the last phase of the eradication campaign in order to detect all cases within 24 hours of worm emergence, manage patients and infected animals promptly, and prevent transmission through ongoing community education and treatment of targeted sources of drinking water.

Isolation and marginalization of affected communities: The last communities affected by Guinea worm disease are often the most marginalized and distrustful of government programs. Every national Guinea worm program therefore endeavors to build community trust and active engagement in transmission prevention efforts, to minimize unreported cases, and to maximize success.

CALL TO ACTION

The global Guinea worm eradication program continues to deliver on its goals, steadily reducing the number of cases,

stopping transmission, and ensuring optimal surveillance and reporting. Each country that triumphs over Guinea worm disease serves as a reminder that the greatest challenges can be overcome with hard work, political commitment, and unwavering support from the international community. Once transmission is interrupted globally, no further interventions or monitoring will be needed beyond the three-year precertification stage required by WHO.⁷

The legacy of the established health infrastructure and networks created to fight Guinea worm disease will include community-based surveillance and health education delivery systems ready to provide future interventions.⁸ Eradication of this disease will bring about economic returns in perpetuity that will benefit the health, agricultural productivity, and school attendance of some of the world's poorest people.

Everyone has a stake in these efforts. Our combined commitment will serve as additional proof that disease eradication can be achieved with community engagement, political involvement, perseverance, and collaborative investment.

Join us in this historic international effort. Your support is needed as the global community takes the final steps toward eradicating Guinea worm disease.



In Chad, volunteers speak to community members about how to detect Guinea worm disease.

- 1 Cairncross, S., Muller, R., & Zagaria, N. (2002). Dracunculiasis (Guinea worm disease) and the eradication initiative. *Clinical Microbiol Reviews*, 15(2), 223–246.
- 2 Watts, S.J. (1987). Dracunculiasis in Africa in 1986: Its geographic extent, incidence, and at-risk population. *American Journal of Tropical Medicine and Hygiene*, 37(1), 119–125.
- 3 The World Health Organization. (2019). Year in which countries certified. Retrieved from http://apps.who.int/dracunculiasis/dradata/html/report_Countries_i1.html.
- 4 Levine, R. (2007). Case 11: Reducing Guinea worm in Asia and sub-Saharan Africa. *Case Studies in Global Health of Center for Global Development*. Retrieved from https://www.cgdev.org/sites/default/files/archive/doc/millions/MS_case_11.pdf.
- 5 Kim, A., Tandon, A., & Ruiz-Tiben, E. (1997). Cost-benefit analysis of the global dracunculiasis eradication campaign. *Policy Research Working Paper of The World Bank*, no. 1835. Retrieved from <http://www.cartercenter.org/documents/2101.pdf>.
- 6 Fitzpatrick, C., Sankara, D.P., Agua, J.F., Jonnalagedda, L., Rum, F., Weiss, A., et al. (2017). The cost-effectiveness of an eradication programme in the end game: Evidence from Guinea worm disease. *PLOS Neglected Tropical Diseases*, 11(10), e0005922. Retrieved from <https://doi.org/10.1371/journal.pntd.0005922>.
- 7 The World Health Organization. (2018). Dracunculiasis fact sheet. Retrieved from <http://www.who.int/mediacentre/factsheets/fs359/en>.
- 8 Callahan, K., Bolton, B., Hopkins, D.R., Ruiz-Tiben, E., Withers, P.C., et al. (2013). Contributions of the Guinea worm eradication campaign toward achievement of the Millennium Development Goals. *PLOS Neglected Tropical Diseases*, 7(5), e2160. Retrieved from http://www.cartercenter.org/resources/pdfs/news/health_publications/guinea_worm/plos-contributions-of-gweradication-toward-achievement-of-MDG.pdf.

For more details on how to support the Guinea worm eradication campaign, please contact:

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For the most up-to-date information, including a link to the current case count, go to www.cartercenter.org/guinea-worm and www.who.int/dracunculiasis/en.

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