



**Date:** July 31, 2025

**From:** Guinea Worm Eradication Program, The Carter Center

**Subject:** GUINEA WORM WRAP-UP #322

**To:** Addressees

**Table 1**

<b>Proportions of Guinea Worm Infections in Definitive Hosts, 2012/2020-2024*</b>						
	Angola	Cameroon	Mali	Chad	South Sudan	Ethiopia
Humans	2%	<1%	5%	2%	86%	30%
Dogs	98%	96%	86%	93%	6%	44%
Domestic cats	0	3%	9%	5%	4%	10%
Small carnivores**	0	0	0	<1%	4%	0
Baboons	0	0	0	0	0	16%

\*Since first infected animal discovered: Chad 2012; Ethiopia 2013; Mali 2015; South Sudan 2015; Angola 2019; Cameroon 2020.

\*\*African wild cat/hybrid (Chad), and genet (South Sudan).

### COMBATING ANIMAL GW INFECTIONS

When the global Guinea Worm Eradication Program (GWEP) began in 1980, we knew *Dracunculus medinensis* (Guinea worm) could infect dogs and other animals in the laboratory, but natural dog infections with Guinea worm (GW) were rare, and Guinea worm species in animals were often not rigorously studied or well classified. After the former Soviet Union eliminated GW in humans in Uzbekistan in the 1930s, concurrent dog GW infections also ceased there. The GWEP eliminated *D. medinensis* in humans in ten highly endemic West African countries (but not Mali), India, Pakistan, and Yemen by 2010--most of which had intense human transmission and environmental GW contamination--without finding *D. medinensis* infections in dogs there during elimination and despite searching for dog infections after 2012. Discovery of *D. medinensis* in dogs in Chad in 2012 led to finding GW infections in animals in all six countries where GW still occurs, including Angola which discovered its first ever GW in a human in 2018 (Table 1). Even in the latter countries, Cameroon and Chad had reduced their reported human cases to zero by 1998 and 2000, respectively, while Mali, Ethiopia, and South Sudan had reduced their reported human cases by over 99% as of 2010-2013.

The remaining six countries now face animal infections in different domestic and wild animal definitive hosts. The potential for food-based mode of transmission (via consumption of raw or undercooked fish or other aquatic vertebrates), has been raised as a potential additional mode of transmission to the traditional mode by drinking water contaminated with copepods containing infective GW larvae. However, the relative influence of each mode on overall transmission has yet to be evaluated in individual countries. Animal infections are apparently the main reason why these are the last endemic countries. Dogs appear to be sustaining GW infections in four countries, but not South Sudan and no longer in Ethiopia, where the role of wild animals must be considered. The epidemiology and ecology of GW transmission and the presumed proportions of food-based and water-based transmission vary among the different countries. In each country, animal GW infections may engender human GW case clusters via water-based point source outbreaks, as was suspected in Bogam, Chad in 2019 (22 cases), and/or isolated sporadic human GW cases apparently via food-based exposure to raw or undercooked fish, such as in Mali in 2020 (1 case), 2021 (2 cases), and 2023 (1 case).

The GWEP now seeks to eliminate *D. medinensis* transmission in humans and animals, using surveillance and interventions tailored to each group of potential hosts and local ecology. Surveillance for GW in humans and animals is currently based mainly on observation of emerging or subcutaneous GWs<sup>1</sup> (physical surveillance), with DNA analysis to confirm the species of GW. GW surveillance in wild animals may also include examination of animals that are trapped and sedated and animals found dead. All GW programs use cash rewards to incentivize public reporting of infected people and animals. The GWEP is supporting research to develop assays that can detect *D. medinensis* analytes in water bodies (environmental surveillance), and a test to detect pre-patent GW infections in dogs and potentially other animals. In some countries, close collaboration between Guinea worm programs, veterinarians, and wildlife authorities enhances surveillance and interventions.

Abate can be applied to water sources known or suspected to be contaminated with GW and, when properly applied, reduces the risk of infection of humans, domestic animals, and wild animals by controlling the intermediate host (copepods). Persuading humans to safely dispose of and manage aquatic animal waste can also prevent infections of humans and domestic and wild animals. Abate and safe disposal and management of aquatic animal waste are the only two interventions we currently have for preventing GW transmission in wild animals. Proactive tethering is a highly effective tool to prevent infected domestic dogs and cats from contaminating water sources and protect dogs and domestic cats from exposure to contaminated sources, and it is the only other tool besides Abate and safe disposal and management of aquatic animal waste for stopping GW transmission in domestic dogs and cats. Additional interventions for humans include containment of GW cases to prevent water contamination, teaching humans to filter unsafe drinking water and cook fish and other aquatic animals well to prevent water-based and food-based infections, respectively, and providing safe sources of drinking water. The GWEP is supporting research to identify potential therapeutics to treat GW infections in animals.

**Chad** has reported 8,936 infected dogs, 449 domestic cats, 12 small wild carnivores, and 186 human cases in 2012-2024 (see Table 1), spread over the southern part of the country mostly in riverine ecology. Domestic dogs appear to be sustaining GW transmission year-round, aided by increased environmental

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<sup>1</sup> Humans or animals with only *un-emerged* Guinea worms do not meet the official definition of a GW case or infection and are not reported as human cases or animal infections. While un-emerged GWs do not pose a threat of further transmission, they are evidence of previous transmission and should be treated as such. See note in *Guinea Worm Wrap-Up* #315 (December 2024), page 3.

contamination with fish and aquatic animal waste during seasonal mass fishing, and free-roaming dogs. Mainly by using Abate and proactive tethering effectively since 2019 and 2020, respectively, Chad has reduced GW infections in dogs by 88% during 2019-2024, to 234 dogs in 2024, and reduced villages with GW infections by 56% in the same period, to 184 in 2024, while still averaging 10-15 human GW cases annually in the same period. It has provisionally reduced dog infections by 44% in January-June 2025 compared to January-June 2024. Chad's GWEP integrates GW surveillance into zoonotic disease monitoring at national, provincial, and sectoral levels through the Directorate-General for Veterinary Services.

**Mali** has reported GW infections in 174 dogs, 18 domestic cats, 9 humans, and 1 donkey, plus a jackal (African wolf) with an un-emerged GW in 2015-2024, but genetic analysis suggests Mali's GWEP is missing many infections. Mali's known residual endemic area in the inland delta of the Niger River is also riverine, about 120 x 120 miles. Domestic dogs likely sustain GW transmission, aided especially by limited access due to insecurity, as well as by commercial marketing and transport of dogs, and feeding fish or aquatic animal waste to dogs. The GWEP applies Abate to eligible water bodies, began limited proactive tethering of dogs and cats in 2021, and encourages safe disposal and management of aquatic animal waste. Most known endemic villages (22 in 2024) have safe drinking water. The Carter Center-assisted Peace Through Health project has promoted improved access since 2020, but to limited effect so far on Mali's GWEP. Mali's GWEP works closely with veterinarians at all levels, but not wildlife authorities.

**Ethiopia** reported GW in 64 dogs, 44 humans, 24 baboons, and 14 domestic cats in 2013-2024, plus a leopard and a wild serval cat with un-emerged GWs in 2019 and 2023, respectively. It reported 2 baboons with emerging GWs and found 1 baboon with un-emerged GWs in 2024. The most recent infected domestic cat was reported in 2021, human in 2022, and dog in 2023, but genetic analysis suggests the program is not detecting all GW infections. GW transmission is now apparently sustained by baboons and limited to a forested area of about 25 x 50 miles. The program uses mainly proactive tethering of dogs and cats, Abate applications, and educating humans to only drink safe water, using cloth or pipe filters if needed. After it began proactive tethering of dogs and cats in 2018, Ethiopia's GWEP reduced dog GW infections by 84% from 2015-2018 to 2019-2022. It began gradually scaling back proactive tethering in 2024, which will restore dogs as potential sentinels of GW in villages and forests. Ethiopia's GW program has studied the home-range, extent and locations of some baboon troops in endemic areas since 2018 and collaborates actively with veterinary and wildlife authorities.

**South Sudan** reported GW infections in 43 humans, 3 dogs, 2 domestic cats, and 2 genets in 2015-2024. It also reported un-emerged GWs in 14 small wild carnivores (6 African wild cat/hybrids, 5 servals, 2 African civets, 1 genet) after increasing surveillance in wild animals with the help of wildlife authorities in 2024. Infected small wild carnivores may be sustaining GW transmission, but genetic analysis suggests the program is not detecting many GW infections in animals and/or humans. In 2024 South Sudan detected 6 humans and 4 animals with emerging GWs and 14 animals with un-emerged GWs in 16 communities spread over vast distances in six of South Sudan's 79 counties. This program used mostly health education, community mobilization, cloth and pipe filters, and Abate to greatly reduce human GW transmission from 521 cases as recently as 2012, with little targeted supply of safe drinking water. It began promoting safe disposal and management of aquatic animal waste in 2024. Sporadic insecurity constrains access to a few affected communities.

**Cameroon** detected GW in 2019 after more than a decade with no reported infections. It reported 593 infected dogs, 19 domestic cats, and 3 human cases in 2019-2024, with a provisional 32% increase in animal

infections in January-June 2025 compared to January-June 2024. The GW infections began as apparent spillover into one Cameroonian district from adjacent Chad in an area where families and their dogs live on both sides of the river that is the international border but now includes indigenous transmission in the Cameroonian district. Cameroon has struggled, with WHO help and recent Carter Center assistance, to organize effective community-based GW surveillance and interventions in 16 known endemic communities as of 2024. It is implementing some Abate application, proactive tethering, filter distribution, and health education. Cameroon's GWEP is working with veterinarians but not wildlife authorities.

**Angola** discovered GW disease for the first time ever in 2018 in humans who denied having traveled out of the country and in a population that had not seen the disease before and had no word for it. It has reported 134 dog infections and 3 human cases in two communes of one province in 2018-2024, with 39 infected dogs in 2024 and a provisional 47% reduction in dog infections in January-June 2025 compared to January-June 2024. Angola has struggled, with WHO help and recent Carter Center assistance, to organize effective community-based surveillance and interventions in 25 known endemic villages as of 2024. It trained volunteers for village-based surveillance, health education, and cloth filter distribution in 2020 and 2022. It began using Abate early in 2023, preparing communities for proactive tethering in 2024, and has offered a cash reward for reported GW in people or animals since 2018.

### **Going forward:**

Stopping GWD in humans should be easier than in animals since we have more tools available to prevent GW infection of humans: Abate; teaching people at risk to cook fish and other aquatic animals well, filter unsafe drinking water, and practice safe disposal of aquatic animal waste; cloth and pipe filters; case containment (preventing humans from contaminating water sources); and provision of safe drinking water. Human behavior is also key to preventing GW transmission in domestic animals (proactive tethering, safe disposal and management of aquatic animal waste, providing safe drinking water to dogs and cats, and use of Abate) and to a lesser degree in wild animals (use of Abate and safe disposal and management of aquatic animal waste). The four "legacy" endemic countries--Chad, Ethiopia, Mali, and South Sudan--have used these tools with variable intensity and consequent effectiveness. Chad and Ethiopia have greatly reduced GWD in their domestic animals, while Mali and South Sudan have done the same with GWD in humans. Ethiopia's impact on GWD in its infected wild animals (baboons) is being determined. "Late comers" Angola and Cameroon have been mobilizing slowly. In order to certify Guinea worm eradication by 2030 as called for in the NTD Roadmap however, we must stop GW transmission by 2027. This is a big challenge, given the current state of GW transmission and national GWEPs, but some countries have made notable progress using the tools that we have. *All six countries need urgently to:*

- *Focus surveillance and all available interventions more intensely on the known endemic and at-risk areas and monitor the status of interventions and surveillance in each endemic community monthly. Establish or maintain robust collaboration with veterinary services and wildlife authorities for surveillance and interventions.*
- *Advocate relentlessly for necessary security to allow safe access soon in affected areas of Mali and South Sudan for elimination, and in Sudan for certification of elimination.*
- *Use data to ensure interventions are implemented according to Standard Operating Procedures and technical guidelines.*
- *Work with research partners on research findings and lessons learnt from field studies to devise data-driven strategies for translating research evidence into action.*

- *Where and when appropriate, support development of novel interventions, e.g., assays to detect *D. medinensis* analytes in clinical and environmental samples, and work with research partners to develop programmatically relevant deployment strategies for these interventions.*
- *Use physical surveillance and genetic analysis to monitor progress toward elimination.*
- *Continue advocating for safe drinking water in communities at risk of Guinea worm disease.*

## IN BRIEF

**Cameroon.** Carter Center GWEP Associate Director Mindze Nkanga returned in July from a one-month visit, during which she assisted with office opening activities, conducted a supervisory visit with field teams and assisted with the CDC's Field Epidemiology Training Program fellows who were engaged to conduct GW case searches in areas adjacent to known GW endemic communities.

**Mali.** The Peace Through Health program launched community mobilization campaigns in Macina and Tominian districts in late June to reach over 400 people in seven conflict-affected communities over a 13-day period, in close coordination with the GWEP, community partners, and *prefets* of the two districts. The campaign will disseminate peacebuilding and conflict mitigation techniques and raise awareness about the GWEP. A survey on management of fish guts in Macina district in May found 83 of 86 (97%) households and 5 of 7 fish sellers visited managed fish guts properly. A similar survey in Tominian district found 85 of 90 households (94%) and 50 of 75 fish sellers applied proper management of fish guts.

**Sudan** has not reported a GW case since 2002, and has never detected GW in an animal, but has not been certified as GW-free due to insecurity.

## TRANSITION



The Carter Center is pleased to welcome Dr. Sudhir Bunga, MD, DrPH as its new Senior Country Representative in South Sudan. Dr. Bunga was CDC's Country Director in South Sudan from 2017 to June 2024, based in Juba. In South Sudan, he led CDC assistance to outbreaks of measles, MERS, yellow fever, and COVID-19 and to immunization campaigns. His next assignment for CDC was as Senior Regional Technical Advisor, Eastern Europe and Central Asia Regional Office, based at Tbilisi, Republic of Georgia. He is an alumnus of the Jawaharlal Institute of Post-Graduate Medical Education & Research (JIPMER) and of CDC's Epidemic Intelligence Service (EIS). Welcome, Dr. Bunga!!

## GUINEA WORM WARRIOR JIM NIQUETTE RETIRES



Carter Center Senior Country Representative in South Sudan Jim Niquette officially retired at the end of June 2025. He had held that position since August 2021, with responsibilities to assist South Sudan's Guinea Worm Eradication Program and its Trachoma Control Program. Before coming to South Sudan, he assisted Ghana's Guinea Worm Eradication Program as the Carter Center's Resident Representative during that program's final years, from August 2006 until Ghana's last GW case in 2010. Thank you, Jim, and Godspeed!!

Table 2 Number of Laboratory-Confirmed Human Cases of Guinea Worm Disease, and Number Reported Contained by Month during 2025* (Countries arranged in descending order of cases in 2024)														
COUNTRIES WITH TRANSMISSION OF GUINEA WORMS	NUMBER OF CASES CONTAINED / NUMBER OF CASES REPORTED													% CONT.
	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	TOTAL*	
CHAD	0 / 1	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0							0 / 1	0%
SOUTH SUDAN	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0							0 / 0	N / A
CAMEROON	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0							0 / 0	N / A
MALI	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0							0 / 0	N / A
TOTAL*	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0							0 / 1	0%
% CONTAINED	0%	N / A	N / A	N / A	N / A	N / A							0%	
*Provisional														
	Cells shaded in black denote months when zero indigenous cases were reported. Numbers indicate how many cases were contained and reported that month.													
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Number of Laboratory-Confirmed Cases of Guinea Worm Disease, and Number Reported Contained by Month during 2024 (Countries arranged in descending order of cases in 2023)														
COUNTRIES WITH TRANSMISSION OF GUINEA WORMS	NUMBER OF CASES CONTAINED / NUMBER OF CASES REPORTED													% CONT.
	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	TOTAL	
CHAD	0 / 0	0 / 0	0 / 0	0 / 0	0 / 1	0 / 0	0 / 3	1 / 1	1 / 1	1 / 1	1 / 1	0 / 1	4 / 9	44%
SOUTH SUDAN	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 2	0 / 3	0 / 0	0 / 1	0 / 0	0 / 0	0 / 0	0 / 6	0%
CENTRAL AFRICAN REPUBLIC	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	N / A
CAMEROON	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	N / A
MALI	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	N / A
TOTAL*	0 / 0	0 / 0	0 / 0	0 / 0	0 / 1	0 / 2	0 / 6	1 / 1	1 / 2	1 / 1	1 / 1	0 / 1	4 / 15	27%
% CONTAINED	N / A	N / A	N / A	N / A	0%	0%	0%	100%	50%	100%	100%	N/A	27%	
	Cells shaded in black denote months when zero indigenous cases were reported. Numbers indicate how many cases were contained and reported that month.4													
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### **Are the right people receiving the Guinea Worm Wrap-Up?**

We remind leaders of National Guinea Worm Eradication Programs to make sure all appropriate persons are receiving the Guinea Worm Wrap-Up directly, by email. With frequent turnover of government officials, representatives of partner organizations, and recruitment of new Guinea worm program staff, keeping desired recipients up to date is challenging. Frequent review of who is receiving the newsletter directly is advised. To add an addressee, please send their name, title, email address, and preferred language (English, French, or Portuguese) to Adam Weiss at The Carter Center (adam.weiss@cartercenter.org).

Note to contributors: Submit your contributions via email to Adam Weiss (adam.weiss@cartercenter.org), by the end of the month for publication in the following month's issue. Contributors to this issue were: the national Guinea Worm Eradication Programs, Dr. Donald Hopkins and Adam Weiss of The Carter Center, and Dr. Dieudonné Sankara of WHO. Formatted by Diana Yu.

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