DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service
Centers for Disease Control
And Prevention (CDC)

Memorandum

Date: September 30, 2020

From: WHO Collaborating Center for Dracunculiasis Eradication, CDC

Subject: GUINEA WORM WRAP-UP #271

To: Addressees

Detect and Contain Every Guinea Worm!

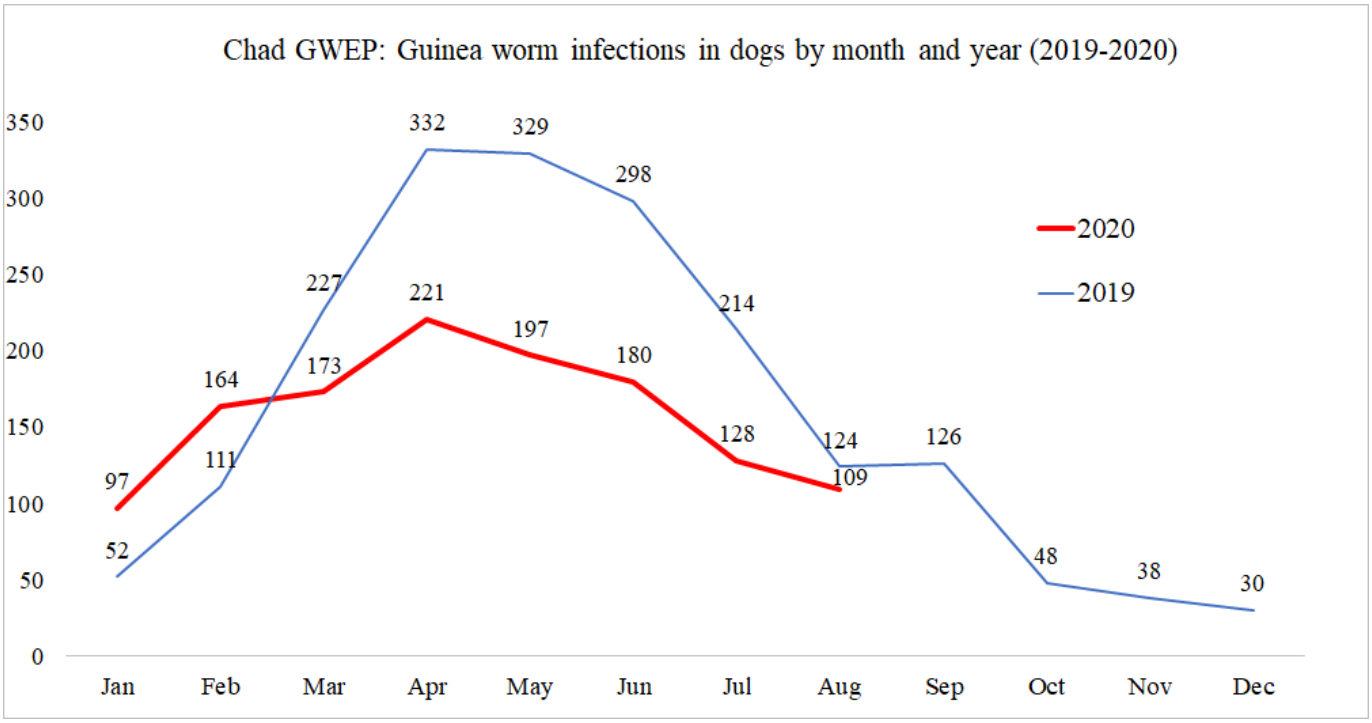
CHAD: 25% FEWER DOG INFECTIONS, 76% FEWER HUMAN CASES

Chad has reported a provisional total of 1,269 infected dogs and 55 cats in January-August 2020, compared to 1,687 infected dogs and 36 infected cats in January-August 2019, for year-to-date reductions of 25% fewer dogs and 53% more cats (**Figure 1**). A total of 87% of the animal infections were contained. Chad's Guinea Worm Eradication Program (CGWEP) reported 11 human cases during the same period of 2020 compared to 42 human cases in January-August 2019, which is a 76% reduction in human cases. A line listing of Chad's first nine human cases of 2020 was included in the previous issue. The tenth case, which was contained, is a 20 year old male from Matadjana district in Wadi-Fira Province whose worm emerged on July 10, 2020. The source of this infection is believed to be in Amsinene of Amtiman district of Salamat where this patient was living between May and September 2019. There is also a dog Guinea worm infection from Amsinene not far from where this patient lives. The eleventh case, which was not contained, is a 32 year old female from Bousso district in Chari-Baguirmi Province whose worm emerged on August 13, 2020. In addition to the two human cases (#6, #8) from Bogam, where the common source outbreak occurred in 2019, case #7 of 2020 is the uncle of case #25 of 2019, both of whom are from Bemadjirondjo village in Sarh district of Moyen Chari.

National Program Coordinator Dr. TCHINDEBET Ouakou visited ten refugee camps housing Chadian and Central African Republican communities in two districts of Logone Oriental Region from June 22 to July 5. Deputy NPC Mr. TCHONFINIET Moundai visited five refugee camps housing Chadian and CAR refugees during June 24 to July 8 in two districts of Mandoul and Moyen Chari Regions.

Transition. Guinea Worm Warrior Robert Hartwig left Chad in August after eight years assisting the country's Guinea Worm Eradication Program tirelessly on behalf of The Carter Center, starting as a Technical Advisor in parts of Chari Baguirmi (2013-2015) and Moyen Chari (2015-2016) Provinces. He later helped pilot test and scale up preventive Abate interventions and was promoted to Senior Technical Advisor for Mayo Kebbi Est, part of Chari Baguirmi, and N'Djamena Provinces. He is also an accomplished photographer and artist, who designed many products that the CGWEP uses today, including the program's logo (2014) which marks the beginning of this article on Chad, t-shirts, and many other images used for increasing awareness of Guinea worm infections in dogs. A former Peace Corps Volunteer in Burkina Faso, he decided to move on to other life projects after his exceptional service in Chad's Guinea Worm Eradication Program. God bless you Robert, and many thanks for your service!

Figure 1


Chad GWEP: Guinea worm infections in dogs by month and year (2019-2020)
350
300
250
200
150
100
50
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
2020
2019
97
164
173
221
197
180
128
109
52
111
227
332
329
298
214
124
126
48
38
30

ETHIOPIA

The Ethiopia Dracunculiasis Eradication Program (EDEP) has reported 9 confirmed and 1 suspected human cases of Guinea worm disease; 8 confirmed cat infections; 3 confirmed dogs; and 4 confirmed baboon infections so far in 2020. As reported in *Guinea Worm Wrap-Up* #268 and #270, 7 of the human cases were from a common source outbreak due to a shared source of contaminated drinking water near Duli village of Gog district in Gambella region. EDEP has since investigated and reported a second human outbreak of 3 cases from common contaminated sources near Abawiri village of Gog district. All the infected cats were in the PRC Agnua refugee camp in Gog district. All 9 human cases, all 8 infected cats, and all 3 infected dogs were contained. A line list of the human and animal infections is in **Tables 1 and 2**.

The source of the second outbreak is believed to be Ogul Ponds, located in Abawiri forest area of Atheti sub-district of Gog district. In 2019, all three cases travelled from Pugnido Refugee Camp (PRC) to the forest in Abawiri for wood collection and hunting. The 8th case is a 50-year-old Agnuak man who is known as ***"man of the forest"*** because he spends his time in the forest areas collecting wood, honey, and hunting for wild animals, traveling with his wives and friends. The 9th case is a 30-year-old Agnuak man, who in August 2019 stayed for about a month around Ogul ponds collecting firewood. The 10th provisional case is a 40-year-old Agnuak woman, and the wife of the 8th case. Cases 8 and 10 lived near Ogul ponds from July to September 2019 with some of their friends. The program identified and followed 32 travel partners who also travelled to the forest to collect firewood and hunt animals. The two confirmed cases and one provisional case reportedly did not use filters while they were drinking water collected from Ogul ponds (see **Figure 2**). The surveillance team left Abawiri between August and October 2019 due to disagreements with the community. However, Abating data and accounts from the community indicate that Ogul ponds and other unsafe water sources in the area were under regular treatment with Abate chemical during the probable period of infection. These ponds are regularly accessed by a baboon troop residing in the nearby forest, likely resulting in additional undetected baboon infections. One of the 2016 cases, Nyigwo Agada Ogoy, who was also a travel partner and close friend of the 8th case of GWD in 2020, was believed to have been infected from the same area in 2016.

Between July 27th and August 20th, EDEP detected a cluster of 8 confirmed cat infections in PRC Agnuak, of Gog district (see Fig. 2), the highest number of infected cats ever reported in Ethiopia. Five of the 8 infected cats were released at night by their owners 10 to 14 months prior to detection. Two cats were tethered by the program in the late kitten stage, and one of the cats was abandoned by the owner due to an intermittent security problem in the area. During May through August/September 2019, residents in Akobo New 1 and 2 blocks evacuated due to conflict and their cats and dogs were abandoned. Because of the conflict, 9 water sources in Akobo New 1 and 2 were not Abated in August 2019.

Three confirmed dog infections were also detected in 2020. The first, detected in Akweramero village, Gog Janjor sub-district of Gog district, was a puppy and therefore untethered until July 2019. Before tethering, it drank and possibly consumed small aquatic animals from a cluster of nearby unsafe streams and shallow wells, also known to be accessed by baboon troops. The second,

detected in Birged-3, Mender 8/9 sub-district of Abobo district, was never tethered until detected as a suspect infection. During the likely period of infection, the dog accompanied the owner while grazing cattle and drank/possibly consumed small aquatic animals from Chelle and Grar ponds. The third dog, detected in Wichini village of Atheti sub-district in Gog district, was untethered until March 2020. Before March 2020, dog 3 lived in Dikak, Okedi kebele and roamed the forest between PRC Agnuak and PRC Nuer, where it likely drank or ate small aquatic animals from unprotected water sources. Baboon troops also access these water points. As mentioned, conflict in this area prevented complete Abate coverage in August 2019. Dog infections 2 and 3 were not tethered 10 - 14 months before worm emergence because Birged-3 and Dikak villages are not targeted for proactive tethering. Owners of all the infected cats and dogs report feeding animals with only program provided or other safe foods and safe water. All 8 cats and 3 dogs were reportedly released or untethered at some point 10 – 14 months prior to detection.

Actions Taken:
EDEP conducted a meeting with PRC - Refugee Central Committee (RCC) and Administration for Refugees and Returnees Affairs (ARRA) on the management of cats and dogs roaming in the area.

The Gog Woreda Administration and Woreda Animal Health and Fishery Development offices made several field visits to speak with dog owners who released or imported dogs in many kebeles (sub-districts) including Atheti, Gog Dipach, Janjor and Awukoy. Because of these efforts, many dog owners are now tethering their dogs and returning dogs that were illegally imported.
The Gog Woreda Water Office in collaboration with Gog Woreda Administration maintained over 10 damaged boreholes in high risk areas of Gog.

Goyi Farm:
In April 2020, a borehole was successfully drilled at Goyi Farm, which was the site of the common source outbreak among migrant laborers in Abobo district of Gambella Region in 2017 (see *Guinea Worm Wrap-Up* #251 and #252. Currently, the farm owner is planning to purchase pipes and a generator to complete the process and ensure functionality. However to date there is no safe water at Goyi Farm or in the surrounding area. The workers continue to drink water reportedly collected from the Saudi Star canal.

IN BRIEF:
Cameroon reported 1 human case and 2 infected dogs in February and 1 infected dog and 1 cat in March and 1 infected dog in June. All six Guinea worm infections were found in Nouldaina zone of Guere district in Cameroon's Extreme Nord Region on the border with Chad, and all likely originated from cross-border transmission from nearby endemic villages in Chad. The villages reporting infections in dogs and humans are now part of a local epidemiological cluster comprising the same communities living on both sides of the Cameroon-Chad border in this area.

Figure 2a: Map showing GWD outbreak at Ogul ponds in 2020

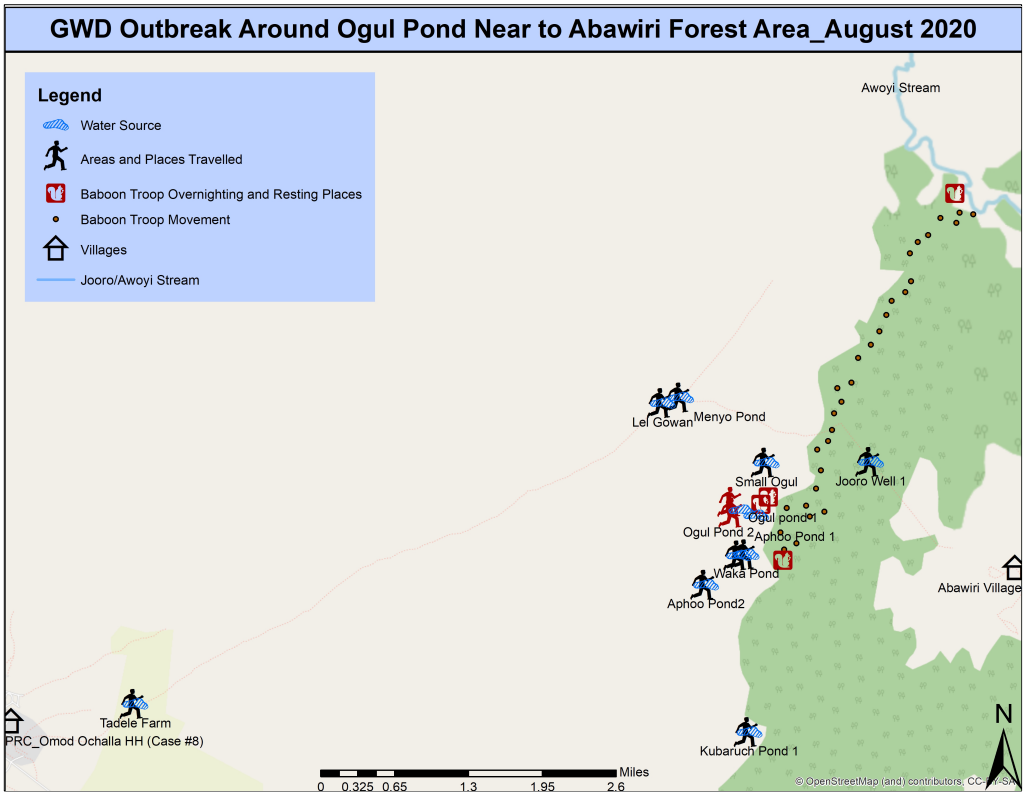


Figure 2b: Map showing cat infections in PRC Agnua and potential unsafe water sources associated with these infections

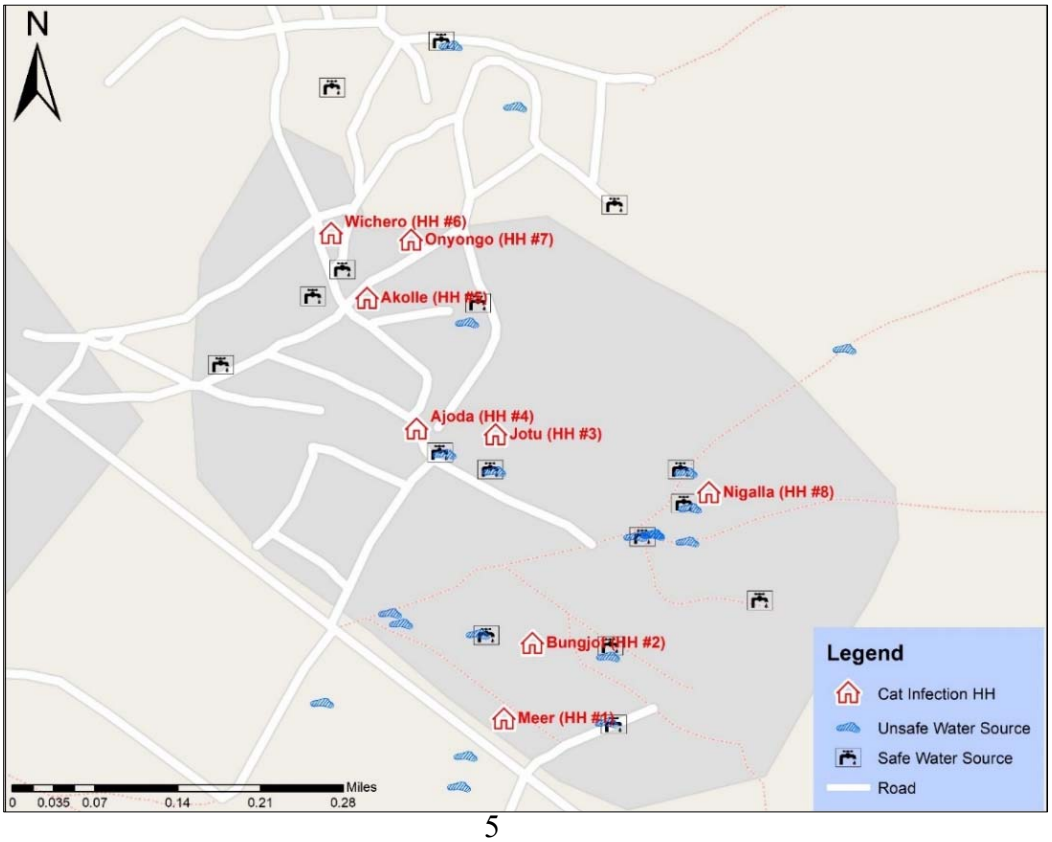


Table 1

Ethiopian Dracunculiasis Eradication Program

Line Listing of Confirmed and Pending Cases: Year 2020*

Case #	Age	Sex	Ethnicity	Occupation	Village of Detection	Zone	District	Region	Date of Detection	Date of Emergence	Contained (Yes / No)	Entered Water	Lab. Result	Total # of worms
1	14	F	Agnua	Student	Duli	Agnua	Gog	Gambella	29-Mar	2-Apr	Yes	No	Confirmed	1
2	12	F	Agnua	Student	Duli	Agnua	Gog	Gambella	29-Mar	3-Apr	Yes	No	Confirmed	3
3	35	M	Agnua	Farmer	Duli	Agnua	Gog	Gambella	30-Mar	5-Apr	Yes	No	Confirmed	3
4	30	M	Agnua	Farmer	Metaget Dipach	Agnua	Gog	Gambella	4-Apr	6-Apr	Yes	No	Confirmed	1
5	17	F	Agnua	Student	Duli	Agnua	Gog	Gambella	30-Mar	8-Apr	Yes	No	Confirmed	2
6	40	M	Agnua	Farmer	Wadmaro	Agnua	Gog	Gambella	1-Apr	8-Apr	Yes	No	Confirmed	4
7	60	F	Agnua	Farmer	Duli	Agnua	Gog	Gambella	22-Apr	23-Apr	Yes	No	Confirmed	1
8	50	M	Agnua	Hunter	PRC Agnua	Agnua	Gog	Gambella	9-Aug	12-Aug	Yes	No	Confirmed	2
9	30	M	Agnua	Wood collector	Angundack	Agnua	Gog	Gambella	14-Aug	17-Aug	Yes	No	Confirmed	1
10	40	F	Agnua	Wood collector	PRC Agnua	Agnua	Gog	Gambella	6-Sep	8-Sep	Yes	No	Pending	1

Table 2

Ethiopian Dracunculiasis Eradication Program

Line List of GWEP Confirmed Animal Infections 2020*

Case #	Age (years)	Sex	Type of Animal	Animal Infection ID	Village of Detection	Zone	District	Region	Date of Detection	Date of Emergence	Contained (Yes / No)	Entered Water	Lab. Result	Total # of worms
1	A young adult (2 years old)	M	Baboon	A1.1-A1.51	Ablen	Agnua	Gog	Gambella	12-Mar	Unknown	No	Unknown	confirmed	51
2	Adult (4 years old)	M	Baboon	A2.1-A2.14	Duli	Agnua	Gog	Gambella	9-May	Unknown	No	Unknown	confirmed	14
3	A young adult (1.5 years old)	M	Dog	A3.1	Akweramero	Agnua	Gog	Gambella	25-Jun	25-Jun	Yes	No	confirmed	1
4	A young adult (1.5 years old)	M	Dog	A4.1 -A4.8	Birged 3	Agnua	Abobo	Gambella	8-Jul	10-Jul	Yes	No	confirmed	8
5	Adult (5 years old)	M	Baboon	A5.1 - 5.4	Ablen	Agnua	Gog	Gambella	21-Jul	21-Jul	No	Unknown	confirmed	4
6	Adult (3 years old)	F	Dog	A6.1	Wichini	Agnua	Gog	Gambella	2-Jul	23-Jul	Yes	No	confirmed	1
7	Adult (2 years old)	F	Cat	A7.1 -7.9	Pochalla A: PRC	Agnua	Gog	Gambella	25-Jul	27-Jul	Yes	No	confirmed	9
8	Adult (3 years old)	F	Cat	A8.1	Pochalla B: PRC	Agnua	Gog	Gambella	29-Jul	31-Jul	Yes	No	confirmed	1
9	Adult (2 years old)	F	Cat	A9.1	Pochalla C: PRC	Agnua	Gog	Gambella	30-Jul	31-Jul	Yes	No	confirmed	1
10	A young adult (1.7 years old)	M	Cat	A10.1 – 10.5	Akobo B: PRC	Agnua	Gog	Gambella	28-Jul	31-Jul	Yes	No	confirmed	5
11	Adult (2 years old)	M	Cat	A11.1 -	Akobo D: PRC	Agnua	Gog	Gambella	28-Jul	3-Aug	Yes	No	confirmed	1
12	Adult (5 years old)	F	Cat	A12.1 - 12.2	Akobo D: PRC	Agnua	Gog	Gambella	7-Aug	9-Aug	Yes	No	confirmed	2
13	A young adult (1.8 years old)	M	Cat	A13.1 - 13.2	Akobo D: PRC	Agnua	Gog	Gambella	9-Aug	11-Aug	Yes	No	confirmed	2
14	Adult (4 years old)	F	Baboon	A14.1-14.3	Wichini	Agnua	Gog	Gambella	15-Aug	15-Aug	Yes	No	confirmed	3
15	Adult (2 years old)	F	Cat	A15.1 -15.2	Pochalla D: PRC	Agnua	Gog	Gambella	19-Aug	20-Aug	Yes	No	confirmed	2

MALI

Mali has reported one case of Guinea worm disease in a human and 4 infected dogs in January-August 2020, compared to 8 dogs and no human in January-August 2019 (**Figure 3**). There are 6 infected dogs, including 2 pending confirmation, as of September 29th. A line list of the confirmed (7) and pending (2) infections in 2020, 44% of which were contained, is in **Table 3**. As of August 2020, 82% of Mali's 2,699 villages under active surveillance reported monthly; as of July 2020 the levels of awareness of the cash reward for reporting a Guinea worm infection in a human or an animal was 85% or greater in Level 1 (endemic) and Level 2 (at risk) areas. Access to some areas is still limited for the GWEP national team, but local health workers do send reports from those areas. The number of rumors of GW infections reported so far in 2020 in Level 1 & 2 areas is still low: 76 humans and 6 animals as of July.

The National Program Coordinator Dr. Cheick Oumar Coulibaly and Carter Center Country Representative Mr. Sadi Moussa made a successful supervisory visit to Macina district of Segou Region on September 1-4. Mali's government is being reorganized following a military coup on August 18th.

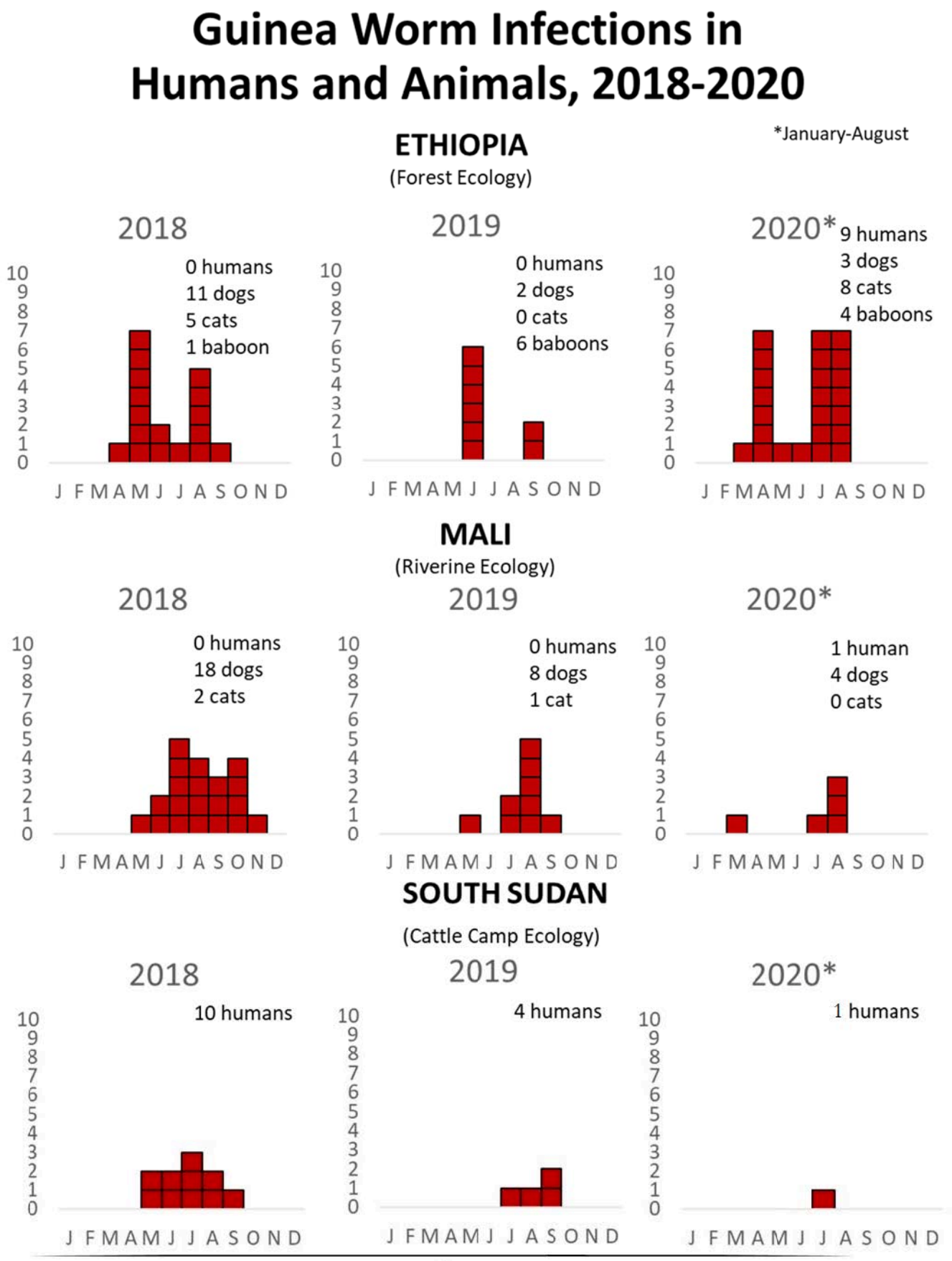
SOUTH SUDAN

The World Health Organization received a report in early September of a suspected case of Guinea worm disease in a 27-year-old man from South Sudan who arrived in the El Radom/Alradoum South Sudanese refugee camp in South Darfur State of Sudan on April 26 of this year. The refugee camp is one of many on the international border between Western Bahr Al Ghazal State of South Sudan and South Darfur State of Sudan. There has been a large influx of refugees since the beginning of this year due to food insecurity and conflict in the region. The man's first worm emerged in the camp in June 2020 but COVID-19 restrictions and flooding impeded proper investigation and early notification of the suspected case. The man is from Minamba village in Raga County of Western Bahr Al Ghazal State of South Sudan.

The South Sudan Guinea Worm Eradication Program Director Mr. Samuel MAKOY Yibi is leading the on-going investigation in South Sudan. A response team of South Sudan Guinea Worm Eradication Program (SSGWEP) and State Ministry of Health officials will be travelling to Raga County to conduct coordinated case searches in villages linked to the suspect's travel history. World Health Organization (WHO) sub-office staff and Dr. Siddiq from Sudan's Federal Ministry of Health are investigating this case in Sudan. Staff from the United Nations High Commissioner for Refugees (UNHCR) helped preserve a worm specimen in alcohol; it has been sent to Khartoum for shipment to the reference laboratory at CDC in Atlanta for analysis. If confirmed to be Guinea worm, this would be the second case from South Sudan so far this year (**Figure 3**).

In August, the SSGWEP conducted case searches in Awerial, Terekeka, Yirol East, Yirol West, and Kapoeta East Counties. The teams targeted 234 priority villages and cattle camps and screened 59,174 people and 2,180 animals, which resulted in 244 human rumors and 79 suspects, as well as 9 animal rumors and 2 suspects.

Figure 3


Guinea Worm Infections in Humans and Animals, 2018-2020
ETHIOPIA
(Forest Ecology)
*January-August
2018
0 humans
11 dogs
5 cats
1 baboon
2019
0 humans
2 dogs
0 cats
6 baboons
2020*
9 humans
3 dogs
8 cats
4 baboons
MALI
(Riverine Ecology)
2018
0 humans
18 dogs
2 cats
2019
0 humans
8 dogs
1 cat
2020*
1 human
4 dogs
0 cats
SOUTH SUDAN
(Cattle Camp Ecology)
2018
10 humans
2019
4 humans
2020*
1 humans
J F M A M J J A S O N D

ANGOLA

The Carter Center and WHO have been working with Angolan health authorities to initiate community-based surveillance (CBS) in and around the areas in Namacunde, Cuvelai and Cuanhama municipalities of Cunene Province where four Guinea worm infections (3 humans, 1 dog) have been reported in 2018-2020. A total of 35 villages have been categorized as endemic or at-risk and will be included in the first phase of the new CBS system. Community sensitization activities are underway and 54 community health workers were identified and scheduled to participate in an upcoming volunteer training. From August to September 2020, a joint MOH and WHO Team in Cunene province investigated two Guinea worm rumors in humans, detected in Cuvelai and Cuanhama municipalities, neither was Guinea worm. The team also conducted household visits to the four Guinea worm infections reported between 2018-2020 and supported integrated active case searches during MDA campaigns against Schistosomiasis in Obadja,Cuanhama and Cuvelai municipalities.

On 2 September 2020, Her Excellency the Governor of Cunene Province, Ms. Gerdina Ulipamwe Didalewa, met with Dr. Mavitidi, the WHO Focal Point for Guinea worm supporting Angola's MoH, who highlighted the importance of strong local government and community ownership and support for the creation of an effective CBS system, including the need to increase awareness about the cash reward and integrate Guinea worm surveillance into the Integrated Disease Surveillance and Response (IDSR) system. Her Excellency Madam the Governor assured her commitment and support to the GWEP.

In early September, Ms. Giovanna Steel, Associate Director of the GWEP at The Carter Center, led a virtual training with Dr. Mavitidi on the proper use of Abate®. On September 4, 2020, the MOH and WHO Guinea worm teams from Angola and Chad also organized a virtual meeting to further discuss how Abate® is being used in Chad.

The newly appointed WHO Country Representative in Angola, Dr. Djamila Cabral Khady was briefed on NTD's and Guinea worm eradication in Angola, including the ongoing recruitment process for a driver and Data Manager in Cunene province. After the virtual briefing session held on September 17, 2020, Dr. Djamila assured that efforts to combat NTD's, as well as eradicate Guinea worm, is a national and global public health priority.

MAKE *D. MEDINENSIS* EXTINCT

As Guinea Worm Eradication Programs of Angola, Chad, Ethiopia, Mali, and South Sudan work to stop transmission of *Dracunculus medinensis* (Guinea worm) in humans and animals, the ultimate goal is to eliminate the parasite altogether. Progress towards that goal can be measured by monitoring the number of affected localities or villages (geographic extent of infection), the number of infected humans and animals (potential spreaders of infection), and the number of Guinea worms in infected humans and animals (parasite load). Tracking the total (known) parasite load remaining in each country is an indirect indicator of potential parasite diversity. Similar to endangered wild animals, less genetic diversity means the species may be more susceptible to extinction. The total number of worms doesn't correlate with the amount of genetic diversity exactly; diversity depends on how closely the remaining worms are related to each other, i.e.,

whether the worms share parents, grandparents or more distant ancestry. But the number of remaining worms is easier to measure than the worms' genetic composition, and fewer worms mean lower statistical odds of genetic diversity.

Table 4 summarizes the numbers of affected villages, Guinea worm infections, and total Guinea worms reported in each country in 2019 and in January-August 2020. Among the four endemic countries with active village-based surveillance, Mali and South Sudan had the fewest known Guinea worms remaining, with only 12 and 11 worms respectively in 2019, while Chad had the largest number by far and Ethiopia had much less than Chad but still twice as many as Mali and South Sudan. Mali and South Sudan had 31 and 20 total Guinea worms respectively in 2018. While Mali and South Sudan appear to be closest to stopping transmission, they also have the biggest security challenges of the remaining countries. The other key challenges for all countries are to contain, and determine the source (see definition below), of every current infection. *Not being able to link a current infection to a known Guinea worm infection from 10-14 months earlier means there may be other undetected chains of transmission.*

Table 3

MALI GWEP LISTING OF HUMAN CASE AND DOG INFECTIONS: YEAR 2020

Case #	Region	District	Health Zone	Village	Ethnicity	Profession	Host	Probable Origin	Date of Detection	Date of Emergence	Entered Water?	Water Source Treated?	Contained (Yes / No)	Confirmed to be GW
1	Segou	Baroueli	Konobougou	Konobougou	Bozo	Housewife	Human	Komara(Macina)	23-Mar	23-Mar	No	No	No	YES
2	Segou	Tominian	Ouan	Ouan	Bobo	Farming	Dog	Djenne	12-Jul	12-Jul	Probable	Yes	No	YES
3	Segou	Macina	Kolongotomo	Kolongotomo Bozo	Minianka	Farming	Dog	Kolongotomo Bozo	13-Aug	13-Aug	Probable	Yes	No	YES
4	Mopti	Djenné	Djenné Central	Djenné town (Youbkaina)	Peulh	Farming	Dog	Djenne	19-Aug	19-Aug	Probable	Yes	Yes	YES
5	Segou	Macina	Kolongotomo	Kolongotomo Bozo Hamlet	Bambara	Farming	Dog	Unknown	27-Aug	28-Aug	Probable	Yes	No	YES
6	Segou	Macina	Macina Central	Macina town(Némabougou Bellah Wéré)	Bozo	Fishing	Dog	Unknown	1-Sep	2-Sep	Probable	No	Yes	YES
7	Segou	Macina	Kolongotomo	Kolongotomo Bozo	Bozo	Fishing	Dog	Kolongotomo Bozo	14-Sep	15-Sep	No	No	Yes	Yes
8	Mopti	Djenne	Djenné Central	Doteme(Djenne town)	Peulh	Housewife	Dog	Djenne town	12-Sep	12-Sep	Probable	No	No	Pending
9	Mopti	Djenne	Djenné Central	Dioboro(Djenne town)	Bozo	Fishing	Dog	Djenne town	18-Sep	22-Sep	No	No	Yes	Pending

Table 4 Number of Guinea worm infected villages, humans/animals and number of Guinea worms by country, January-December 2019 and January-August 2020

Guinea Worm Eradication Program						
	Number of Affected Villages/Localities		Number of Infected Humans and Animals		Number of Guinea Worms	
	2019	2020*	2019	2020*	2019	2020*
Chad	444	380	2,031	1,335	4,331	2,912
Ethiopia	5	14	8	24	61	123
Mali	8	5	9	5	12	10
South Sudan	2	1	4	1	11	1
Angola	2	1	2	1	3	1
Cameroon	1	4	1	6	1	6
TOTAL	462	405	2,055	1,372	4,419	3,053
* January-August						

Table 5

Number of Laboratory-Confirmed Cases of Guinea Worm Disease, and Number Reported Contained by Month during 2020* ^

(Countries arranged in descending order of cases in 2019)

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^	1 / 1	0 / 2	0 / 3	1 / 2	2 / 2	0 / 0	0 / 1	0 / 1	0 / 0				4 / 12	33%
SOUTH SUDAN	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	1 / 1	0 / 0	0 / 0				1 / 1	100%
ANGOLA	0 / 0	0 / 0	0 / 1	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0				0 / 1	0%
ETHIOPIA	0 / 0	0 / 0	0 / 0	7 / 7	0 / 0	0 / 0	0 / 0	2 / 2	0 / 0				9 / 9	100%
MALI §	0 / 0	0 / 0	0 / 1	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0				0 / 1	0%
TOTAL*	1 / 1	0 / 2	0 / 5	8 / 9	2 / 2	0 / 0	1 / 2	2 / 3	0 / 0				14 / 24	58%
% CONTAINED	100%	0%	0%	89%	100%		50%	67%					58%	

*Provisional

Cells shaded in black denote months when zero indigenous cases were reported. Numbers indicate how many cases were contained and reported that month.

Shaded cells denote months when one or more cases of GWD did not meet all case containment standards.

§Reports include Kayes, Koulikoro, Segou, Sikasso, and Mopti, Timbuktu and Gao Regions; contingent on security conditions during 2018, the GWEP continued to deploy one technical advisor to Kidal Region to oversee the program.

†Cameroon reported one case in February that was likely infected in Chad.

Number of Laboratory-Confirmed Cases of Guinea Worm Disease, and Number Reported Contained by Month during 2019* †

(Countries arranged in descending order of cases in 2018)

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 / 2	1 / 1	1 / 3	2 / 3	11 / 17	4 / 6	4 / 6	2 / 7	1 / 2	0 / 1	0 / 1	0 / 0	26 / 49	53%
SOUTH SUDAN	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 1	1 / 1	1 / 2	0 / 0	0 / 0	0 / 0	2 / 4	50%
ANGOLA	0 / 1	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 1	0%
ETHIOPIA	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	0%
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	0%
TOTAL*	0 / 3	1 / 1	1 / 3	2 / 3	11 / 17	4 / 6	4 / 7	3 / 8	2 / 4	0 / 1	0 / 1	0 / 0	28 / 54	52%
% CONTAINED	0%	100%	33%	67%	65%	67%	57%	38%	50%	0%	0%		52%	

*Provisional

Cells shaded in black denote months when zero indigenous cases were reported. Numbers indicate how many cases were contained and reported that month.

Shaded cells denote months when one or more cases of GWD did not meet all case containment standards.

§Reports include Kayes, Koulikoro, Segou, Sikasso, and Mopti, Timbuktu and Gao Regions; contingent on security conditions during 2018, the GWEP continued to deploy one technical advisor to Kidal Region to oversee the program.

†Cameroon reported one case in March that was likely infected in Chad.

DEFINITION OF A PRESUMED SOURCE OF INFECTION

Below is a definition for a presumed source/location of a Guinea worm case, just as we have defined a contained case already; focus on both are now increasingly important. *When* an infection took place is already standardized at 10-14 months ago; *where* the transmission likely took place is what we suggest standardizing now.

We need to know where a person likely was infected with Guinea worm disease both in order to target interventions and in order to trace other potential chains of transmission. The modality of infection (the *how*: whether by drinking water, eating fish or frogs) is not so important for those purposes, but the modality of infection is important to address in patient interviews. We've used the ambiguous term "source" (which might mean the locality or the modality of infection) up to now, so to be more specific we suggest "presumed source/location" here. The idea is to define a useful yes/no standard like we already have for containment of infection. We suggest national GWEPs use this definition as the standard to decide whether the source of a human Guinea worm case is considered known or not.

This is the suggested definition:
"A presumed source/location of a human dracunculiasis infection is considered identified if:
The patient drank unsafe water from the same source/location (specify) as other human case(s) or an infected domestic animal 10-14 months before infection, or
The patient lived in or visited the (specify) household, farm, village, or non-village area of (specify) a Guinea worm patient or infected domestic/peri-domestic animal 10-14 months before infection, or
The patient drank unsafe water from (specify) a known contaminated pond, lake, lagoon or cut stream 10-14 months before infection.
If none of the above is true, the presumed source/location of the infection is unknown. Whether the patient's residence is the same as the presumed source/locality of infection or not should also be stated in order to distinguish indigenous transmission from an imported case."

COVID-19 AND GUINEA WORM ERADICATION

All national Guinea Worm Eradication Programs (GWEP) are fully operational, with precautions taken to ensure the safety of program staff and community members in response to COVID-19 (physical distancing, hygienic measures, face covering), as required by the respective Ministries of Health. Internationally, the pandemic caused the annual GWEP Program Managers Meeting and the meeting of Guinea worm researchers hosted by The Carter Center to be conducted remotely this year, while the annual meeting of the International Commission for the Certification of Dracunculiasis Eradication has been rescheduled and will also be held remotely, and the Informal Meeting of Ministers of Health of endemic and formerly endemic dracunculiasis-affected countries that is normally held during the World Health Assembly was cancelled. Laboratory and field research projects have been slowed and shipping of worm specimens has also been delayed, but not halted. Due to travel restrictions, programs have not received regular in-person supervisory visits from Carter Center headquarters since March 2020 as they normally would. The additional challenges posed by COVID-19 have raised the stakes in the daily acts of courage and creativity manifest by the GWEPs.

Chad reported its first case of COVID-19 in March. The program continues to operate with strict respect to preventive measures. Ten international technical advisors (ITA) left the country; 12 remained in Chad. Some of the ITAs who left continue to work with Chad GWEP staff remotely and 7 have returned to Chad. Chad has 2,219 villages under active surveillance (VAS), 99% of which reported in June. Efforts to provide a source of safe drinking water in Bogam village have been delayed, due partly to COVID-19 precautions.

Ethiopia had 4 international technical advisors in 2020. All left Ethiopia in March and one has returned. The Ethiopia Dracunculiasis Eradication Program (EDEP) has 189 villages under active surveillance, of which 100% reported in June.

Mali had no international technical advisors in 2019 or 2020, due to the security situation. In May, national technical advisors attended training of trainers for COVID-19 activities in Djenne, Markala, Macina and Mopti. Mali has 2,699 villages under active surveillance, 88% of which reported in July.

In **South Sudan**, even before the first COVID-19 cases were reported early April the SSGWEP adopted protective measures for program staff and community members and adapted surveillance and intervention activities accordingly. By May, the program had distributed 8,000 COVID-19 posters to health facilities and villages and provided 1,000 COVID-19 health education flip charts to workers in over 20 counties. The SSGWEP also developed a customized briefing for health workers conducting routine surveillance activities, integrated activities like Mass Drug Administration, and case searches in areas not under active surveillance. Nine Carter Center-supported international technical advisors (ITA) left the country, leaving four senior office staff. Some of the ITAs who left continue to work with SSGWEP staff remotely and four have returned to South Sudan. South Sudan has 2,162 villages under active surveillance, of which 88% reported in July. A reduced flight schedule in South Sudan delayed report submissions in July and August.

DONATION

The Carter Center is grateful for Health & Development International's (HDI) steadfast partnership with the Guinea Worm Eradication Program. HDI supports cash reward systems which national ministries of health operate to encourage community members to report Guinea worm cases or infections. The Center is grateful for nearly three decades of partnership and for HDI's commitment to continue its collaboration until eradication is accomplished.

MEETING

The World Health Organization has announced that the International Commission for the Certification of Dracunculiasis Eradication will meet virtually on October 8, 2020.

RECENT PUBLICATIONS

Perini T, Keskinocak P, Li Z, Ruiz-Tiben E, Swann J, Weiss A, 2020. Agent-based simulation for seasonal guinea worm disease in Chad dogs. *The American Journal of Tropical Medicine and Hygiene*. 2020 Sep 08. doi:10.4269/ajtmh.19-0466

Priest JW, Stuchlik O, Reed M, Soboslay P, Cama V, Roy SL, 2020. Development of a multiplex bead assay for the detection of igg antibody responses to guinea worm. *The American Journal of Tropical Medicine and Hygiene*. 2020 Sep 08. doi:10.4269/ajtmh.20-0511

Galán-Puchades MT, 2020. Commentary: dogs and the classic route of guinea worm transmission: an evaluation of copepod ingestion. *Frontiers in Veterinary Science*. 7:404-404. doi:10.3389/fvets.2020.00404

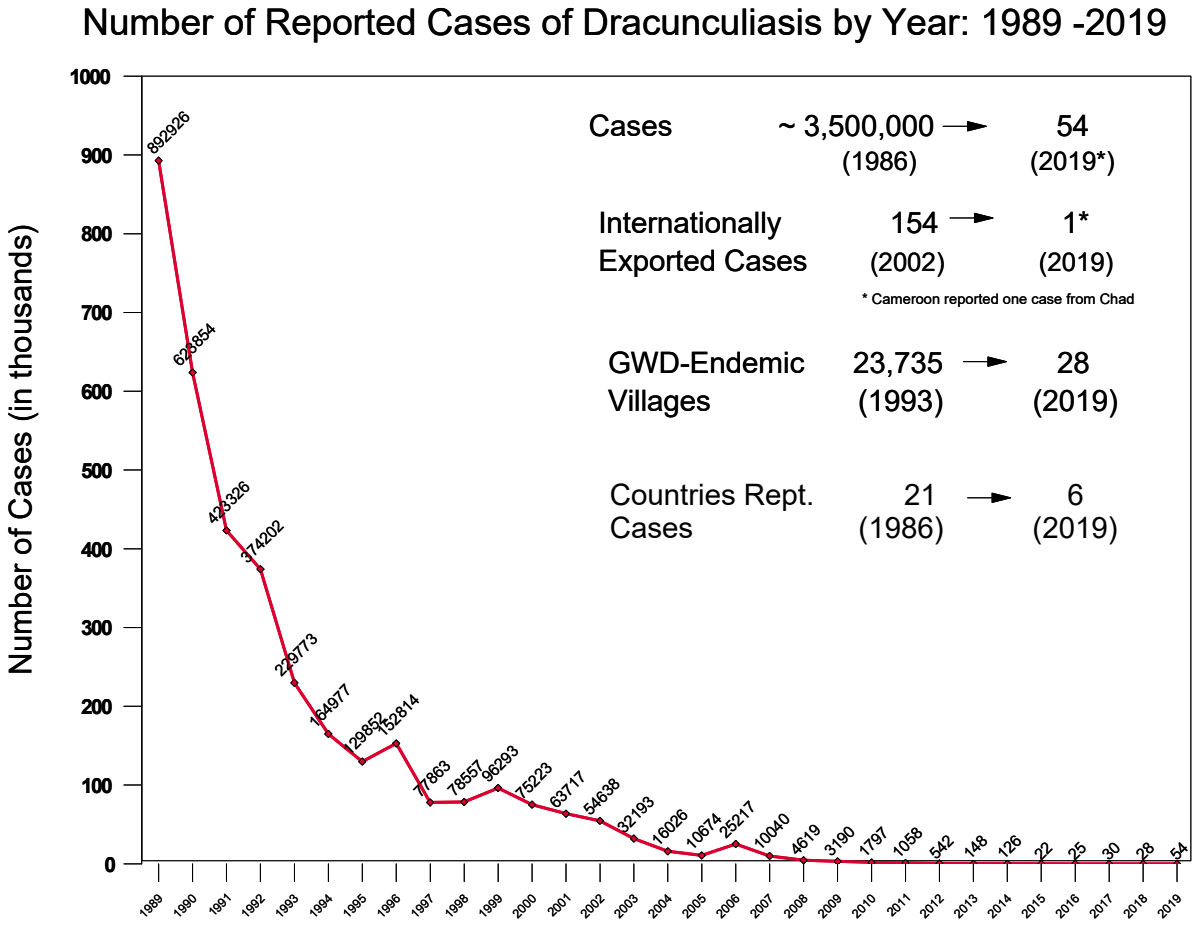
Weldu Lemma G, Müller O, Donald Reñosa M, Lu G, 2020. Challenges in the last mile of the global guinea worm eradication program. *Tropical Medicine & International Health*. 2020 Sep 18. doi:10.1111/tmi.13492

World Health Organization, 2020. Monthly report on dracunculiasis cases, January-July 2020. Wkly Epidemiol Rec 95:475-476

IN MEMORIUM: BILL GATES SR., PHILANTHROPIST

We are saddened to report the passing of Bill Gates Sr. on September 14, 2020 at his home near Seattle, Washington. A graduate of the University of Washington law school in 1950, the accomplished lawyer and humanitarian was 94 years old. Father of Microsoft co-creator Bill Gates Jr., who with his wife Melinda Gates founded the Bill & Melinda Gates Foundation, the world's largest philanthropic institution, Bill Gates Sr. managed his son and daughter-in-law's philanthropy during its first 13 years, beginning in 1994. He helped establish the strategic focus and enduring principles of the foundation before his son retired as the head of Microsoft and began working at the foundation full time in 2008. The Guinea Worm Eradication Program received one of the then young foundation's awards for the first time, a joint grant to The Carter Center, the World Health Organization and UNICEF which was announced during the World Health Assembly in Geneva, in May 2000. With commitments totaling $208 million through 2021, The Bill & Melinda Gates Foundation has since become the largest donor to the global Guinea worm eradication campaign. We extend our heartfelt sympathy to his family.

Figure 4



Inclusion of information in the Guinea Worm Wrap-Up does not constitute "publication" of that information.
In memory of BOB KAISER

Note to contributors: Submit your contributions via email to Dr. Sharon Roy (gwwrapup@cdc.gov) or 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, Mr. Adam Weiss, Ms. Shandal Sullivan, and Ms. Renn McClintic-Doyle of The Carter Center, Dr. Sharon Roy of CDC, and Dr. Dieudonne Sankara of WHO.

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http://www.cdc.gov/parasites/guineaworm/publications.html#gwwp
Back issues are also available on the Carter Center web site English and French are located at
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