



Date: April 12, 2017

From: WHO Collaborating Center for Dracunculiasis Eradication, CDC

Subject: GUINEA WORM WRAP-UP #247

To: Addressees

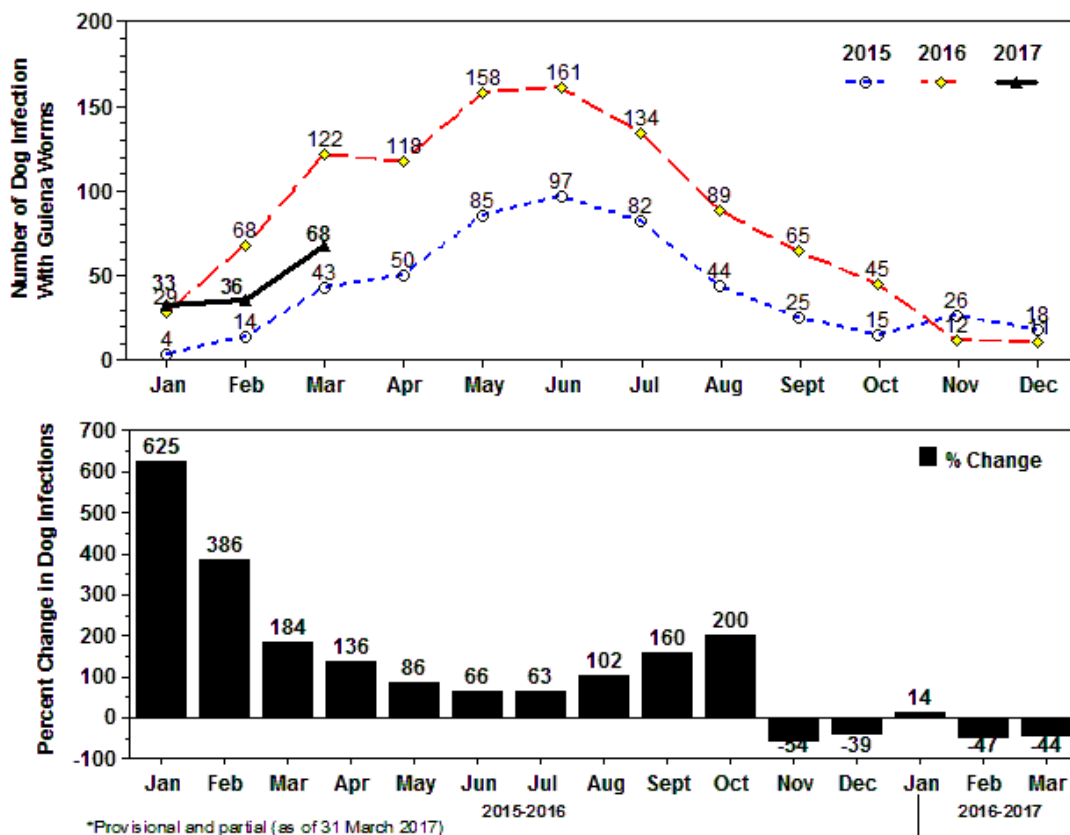
**Detect and Contain Every Guinea Worm Infection Immediately!!!**

**CHAD REPORTS 37% FEWER DOG INFECTIONS IN JANUARY-MARCH 2017**

In a welcome departure from experience since dog infections were first reported in Chad in 2012, Chad’s Guinea Worm Eradication Program (GWEP) reported 137 infected dogs (74% contained) in January-March 2017, which is 37% fewer than the 219 reported during the same period of 2016 (Figure 1). During the same quarter, the number of infected dogs reported from a cohort of villages under active surveillance during January-March 2016 and during 2017 declined by 40% (from 216 to 129) and the number of emerging Guinea worms declined by 42% (from 353 to 206). As shown in Figure 1, this apparent trend in reduced dog infections (compared to the year before) began in November 2016 and occurred in four of the last five months, except for a small increase in January.

Figure 1

**Dog Guinea Worm Infections, and Percent Change Month-to-Month During 2015 and 2016, and Jan - Mar 2016 - 2017\*; Chad**



Chad also reported zero infected dogs for an entire week (November 27-December 4) during this period for the first time. In contrast, a year ago the number of infected dogs increased by 208% between January-March 2015 and January-March 2016.

The change in direction of dog infections in Chad may reflect the impact of enhanced health education (cook and cure aquatic animals well, bury their entrails, tether infected dogs) that Chad's GWEP began in 2013-2014 in response to the hypothesis that the unusual epidemiology of Guinea worm infections in Chad since 2010 results from transmission of the parasite by eating a paratenic host, most likely aquatic animal(s), not by drinking water as in Chad earlier and in all other endemic countries. According to program reports, 74% of sampled households in at risk areas reported burying fish entrails in 2015 and 88% in 2016, while 40% of 113 infected dogs were tethered in 2014, 68% of 503 infected dogs in 2015 and 66% of 1,011 infected dogs in 2016 (71% of 718 emerging worms were contained in 2015, and 70% of 2,053 worms in 2016).

To address the serious constraint to Abate usage posed by extremely large lagoons in at-risk areas along the Chari River, in 2014 the program introduced temporary barriers as a way to cordon off and treat water at known contaminated entry points, and used that new innovative method for two thirds of the 114 Abate treatments in 26 villages in 2015 and of the 110 treatments in 61 villages in 2016 (including the 4 villages where 5 uncontained human cases were detected in 2016). To intensify interventions further in 2017, the GWEP has inventoried 115 ponds in 37 villages with highly endemic dog populations among the 54 priority villages (these villages reported 61% of all dog infections in 2016) described in *Guinea Worm Wrap-Up #246* and will treat those ponds with Abate monthly starting as soon as the Abate needed arrives in country. The other 17 priority villages are included in the Advocate® demonstration trial for treating dogs that began last October.

Surveillance and supervision have also been expanded from 609 villages under active surveillance (VAS) in 2014, to 1,015 VAS in 2015 and 1,799 VAS in 2016; along with 1,993 village volunteers (VV/ASV) in 2014, 2,924 in 2015, and 4,643 in 2016; as well as 6 international technical assistant positions (TAs) in 2014, 8 TAs in 2015 and 12 TAs in 2016. The number of rumors of cases addressed by the program rose over the same period from 1,723 in 2014 to 1,955 in 2015 and 3,093 rumors in 2016. The crude rates of awareness of the cash reward for reporting a case of the disease have not improved yet, being estimated at 64% of persons surveyed in 2015 and 54% in 2016 (48-46% knew of the reward for reporting an infected dog). The rates of reward awareness should improve after Chad launches its new mass communications strategy for the Guinea worm program in May 2017.

Several research projects to investigate the special circumstances of Guinea worm transmission in Chad and test other potential control measures suited to the country are underway, and more are planned after discussions during the meetings in Atlanta last month (see below).

During January-March 2017 Chad has reported three cases of GWD, all contained, in three different districts of Chari Baguirmi Region (Tables 1 and 2).

Table 1

CHAD GUINEA WORM ERADICATION PROGRAM  
LINE LISTING OF CASES OF GWD DURING 2017

Case #	Village or Locality of detection			District	Region	Patient			Case Contained?		1 = imported 2 = indigenous	Home Village or Locality			Presumed Source of infection identified?		Presumed Source of infection is a known VAS?	
	Name	1 or 2 = VAS	3 = VNAS			Age	Sex	Date GW emerged (D/M/Y)	(Yes, No, or Pending)	If no, date of Abate Rx		Name	1 or 2 = VAS	3 = VNAS	(Yes or No)	Name	(Yes or No)	Actions/ Comments?
1.1	Loumia	1		Mandelia	Chari Baguirmi	10	F	3-Mar-17	Yes	-	2	Loumia	1		No	N/A	N/A	Patient and family eat frogs and catfish ( <i>Synodontis</i> ) as well as Nile water monitors ( <i>Varanus</i> ).
1.2	Loumia							5-Mar-17	Yes	-			1					
2	Kakale Mberi	1		Guelendeng	Chari Baguirmi	6	F	22-Mar-17	Yes	-	2	Kakale Mberi	1		No	N/A	N/A	Patient's dog had two worms emerge during the same week.
3	Bougoumene 1	2		Dourbali	Chari Baguirmi	10	M	31-Mar-17	Yes	-	2	Bougoumene 1	2		No	N/A	N/A	Under investigation

VAS = villages under active surveillance in level 1 or 2 areas

VNAS = villages not under active surveillance, level 3 areas

## ANNUAL INTERNATIONAL REVIEW MEETING DISCUSSES RESEARCH ON CHAD'S DOG INFECTIONS

The second day of the 21<sup>st</sup> International Review Meeting of Guinea Worm Eradication Program Managers on March 21, 2017 was devoted entirely to reports of laboratory studies and field research to help understand and stop the unusual transmission of GWD among humans and dogs in Chad since 2010. At the urging of a donor-initiated review of the global GWEP at The Carter Center in July 2014, by the end of that year The Carter Center, the World Health Organization (WHO) Collaborating Center at CDC and Chad's GWEP had embarked on an expanded seven point agenda for research into the parasite and its epidemiology in Chad: 1) continue molecular studies of the worm; 2) review the literature; 3) assess copepod species and seasonality; 4) explore possible wild animal host; 5) test ivermectin treatment of dogs; 6) test for GW DNA in copepods and fish; and 7) investigate *D. medinensis* larvae infectivity, viability and longevity in potential aquatic hosts. Earlier investigations by the same team in cooperation with WHO already had suggested that Guinea worms from dogs and humans in Chad were indistinguishable from each other and from Guinea worms found elsewhere, and that the GW transmission cycle in Chad might involve eating a paratenic host rather than drinking contaminated water—findings that were published late in 2013. This research agenda was endorsed by scientific meetings convened by WHO in 2015 and 2016, and the latter meeting also recommended engaging a researcher to help study dog behavior and dietary habits.

Retired CDC scientist Dr. Mark Eberhard chaired the research session at the Atlanta meeting last month where reports from research teams led by Prof. Michael Yabsley at the University of Georgia (USA); by Dr. Elizabeth Thiele at Vassar College (USA); by Dr. James Cotton at Wellcome Trust Sanger Institute (UK), by Prof. Robbie McDonald at the University of Exeter (UK); by Dr. Sharon Roy and Dr. Jeffrey Priest of CDC, Chad's GWEP, The Carter Center and others, included several preliminary findings:

- Molecular analysis of GWs extracted from humans and other animals in various African countries to date indicates that they are a single species, *Dracunculus medinensis*.
- Laboratory and field studies are accumulating evidence that transmission of GW parasites in Chad involves a paratenic host\*, that frogs may be more susceptible hosts than fish, that third stage GW larvae can survive in frog tissue for several months, and that *D. medinensis* can move up the food chain to ferrets fed fish that ate infected copepods within 2-3 hours before. A *D. medinensis* larva has been found in a wild-caught frog in Chad†.
- Genetic studies suggest that numerous adult Guinea worms were circulating in Chad during the nine years (2001-2009) when no cases were reported.
- Copepods found in Chad are not unique from species found in other African countries where GWD was/is endemic.
- Use of GPS collars and examination of stable isotopes in dog whiskers are feasible ways to track dog movements and study dietary preferences of dogs in Chad.
- Review of the literature and other inquiries found evidence of recent changes in flora and fish populations in Lake Chad and the Chari River basin associated with overfishing and drought, and evidence of stigma associated with eating frogs in an adjacent area of Cameroon. Residents in certain villages in Chad admit to eating frogs and “frog hunter” is a known profession along the Chari River.

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\* Eberhard ML, Yabsley MJ, Zirimwabagabo H, et.al., 2016. Possible role of fish and frogs as paratenic hosts of *Dracunculus medinensis*, Chad. *Emerging Infectious Diseases* 22:1428-1430.

† Eberhard ML, Cleveland CA, Zirimwabagabo H, et.al., 2016. Guinea worm (*Dracunculus medinensis*) infection in a wild-caught frog, Chad. *Emerging Infectious Diseases* 22:1961-1962.

- GW infections in Chadian dogs peak during the rainy season in May-August, while GW cases in humans in Chad are much fewer in number and scattered year-round.

**On-going studies.** The study of twice-monthly treatment of dogs with ivermectin (Heartgard® that began in 2015 was revised in September 2016 to study the effect of monthly treatments. A study of monthly treatment of 5,000 dogs with the anti-helminthic Advocate ® began in October 2016. Both treatment trials are still underway. Other on-going research includes expanded molecular studies at Vassar College and at Sanger Institute, investigation of susceptibility to and longevity of GW larvae in aquatic hosts, monitoring seasonal densities of copepod populations, extension of stable isotope studies in Chadian dogs, and development of a serological test for GW in humans and infected animals.

**New studies.** Discussions during and after the meeting in Atlanta also considered several additional proposed studies or demonstration projects, including 1) a case control study to identify risk factors in households with and without infected dogs and investigate characteristics of first infected dogs in a village; 2) monitoring the impact on dog behavior and GW incidence of helping dog owners provide water for dogs at home to reduce foraging (as suggested by Prof. McDonald's recent pilot project); 3) establishing an animal model of the *D. medinensis* life cycle in dogs or ferrets to provide a steadier supply of first stage larvae to infect copepods, for use in aiding serologic assay development and further drug testing; 4) exploring the feasibility of a pond-side test for GW-infected copepods; 5) mathematical modeling of the GW life cycle with and without a paratenic host; and 6) exploring the potential utility of using remote satellite imagery to augment existing on-ground mapping of bodies of water. The informal Guinea worm eradication research group will meet two more times this year including in conjunction with a meeting of the International Task Force for Disease Eradication to review the status of the GWEP and research agenda.

## ALL 8 REMAINING UNCERTIFIED COUNTRIES REPORT TO ANNUAL INTERNATIONAL REVIEW MEETING

THE  
CARTER CENTER



World Health  
Organization

The 21<sup>st</sup> International Review Meeting of Guinea Worm Eradication Program Managers that was co-hosted by The Carter Center and the World Health Organization in Atlanta on March 20-21 included 82 participants from 13 countries, including all four remaining officially-endemic countries (Chad, Ethiopia, Mali, and South Sudan) as well as representatives from the four countries in the pre-certification stage (Angola, Democratic

Republic of Congo, Kenya and Sudan). The World Health Organization also reported on efforts to strengthen surveillance for GWD in the Central African Republic. Highlights from the meeting included Mali's confirmation that it found no cases of GWD in humans in 2016, news of recently apparent reductions of dog infections in Chad, absence of any infections east of the Nile in South Sudan for the first time throughout 2016, and significantly increased Abate treatments in Ethiopia's residual endemic focus. The serious constraints imposed by continued insecurity, especially in Mali and South Sudan, and the need for more political support of the programs in Chad and Ethiopia were also evident.

Angola and the DRC both reported having conducted active searches for GWD in about two-thirds of their 18 and 26 provinces, respectively, between 2014 and so far in 2017 with support from WHO and found no confirmed cases of the disease. Kenya and Sudan are in advanced stages of their preparations for certification of eradication, with Sudan having submitted its Country Report to WHO in December 2016.

The National Program Managers of Guinea Worm Eradication Programs of Chad (Dr. Tchindebet Ouakou), Ethiopia (Mr. Getaneh Abrha Estayew), Mali (Dr. Mohamed Berthe), and South Sudan (Mr. Samuel Makoy Yibi) led their country delegations, which included the respective Carter Center Country

Representatives (Ms. Melinda Denson, Dr. Zerihun Tadesse, Mr. Sadi Moussa, Ms. Sarah Yerian) and respective WHO Country Office Focal Points for Guinea Worm Eradication (Dr. Honore Djimrassengar, Dr. Zeyede Zeleke, Dr. Sidibe Boubakar, Mr. Evans Liyosi). Delegations of the four countries preparing for certification from the Ministries of Health and WHO Country Offices, led by their respective Senior staff from MoH and National Program Mangers; Kenya (Dr. Tatu Kamau, Prof. Benson Estambale and Dr. John Ogange); Angola (Dr. Miguel Dos Santos De Oliveria, Dr. Maria Cecilia Cesar d'Almeida; Dr. Nzuzi Katondi); Democratic Republic of Congo (Dr. Justin Bokabo; Dr. Augustin Kadima Ebeja), Sudan (Dr. Elmuez Eltayeb Elnaiem; Ms. Hind Mohamed Ibrahim), participated in the meeting. Three members of WHO's International Commission for the Certification of Dracunculiasis Eradication, Dr. Mark Eberhard, Prof. Robert Gueguemde, and Prof. Abolhassan Nadim, also attended. Senior representatives from the World Health Organization included Dr. Gautam Biswas, Dr. Dieudonne Sankara, Mr. Ashok Moloo and Ms. Junerlyn Agua from headquarters; Dr. Andrew Seidu Korkor and Dr. Albis Francesco Gabriella from the AFRO and EMRO regional offices respectively. Participants from The Carter Center headquarters included CEO Amb. (rtd) Mary Ann Peters, Vice-President Dr. Dean Sienko, Guinea Worm Eradication Program Director Dr. Ernesto Ruiz-Tiben, and Special Consultant Dr. Donald Hopkins as well as Dr. James Zingesser, Mr. Adam Weiss, and Dr. Hubert Zirimwabagabo. Other participants included Dr. Sharon Roy of CDC, Goodwill Ambassador Hon. Dr. Tebebe Yemane Berhan of Ethiopia, Dr. Katy Owen and Dr. Julie Jacobson of the Bill & Melinda Gates Foundation, Mr. Robert Miyashiro of the Conrad N. Hilton Foundation, Mr. Aryc Mosher of USAID, and Dr. Anders Seim of Health and Development International.

### **ETHIOPIA: IMPROVED SURVEILLANCE, INTENSIFIED VECTOR CONTROL**



Ethiopia has officially reported 3 cases of Guinea worm disease in humans (2 contained), 14 infected dogs (11 contained) and 2 infected baboons (0 contained) in 2016, as well as one infected baboon in the first quarter of 2017. All but one of the cases and infected animals in 2016 and 2017 occurred in Gog district of Gambella Region. The Ethiopia

Dracunculiasis Eradication Program (EDEP) applied Abate to water sources associated with each of the uncontained patients and uncontained infected dogs within ten days of worm detection in 2016. It treated 437 water sources with Abate in Gog district in 2016, a 355% increase compared to 96 water sources treated there in 2015.

The EDEP has 152 villages under active surveillance in three Level I districts (Gog, Abobo, Lare) where cases or infected animals were detected in Gambella Region in recent years. Lare district was placed under Level I surveillance after case #3 was detected there when he arrived from South Sudan in September 2016. Insecurity seriously constrained program operations in parts of Gambella sporadically in 2016, especially in January. The estimated level of awareness of the cash reward in Level I areas for reporting a case of GWD in 2016 was 79% of 600 persons queried.

Level II active surveillance is in place in 12 districts comprising the remainder of Gambella Region and two formerly endemic districts of SNNP Region. During 2016 the EDEP conducted active case searches itself in schools, community meetings, markets, churches and mosques; and in cooperation with National Polio Immunization Days and Mass Drug Administration by the trachoma and onchocerciasis programs in the Level II surveillance areas. These case searches reached 713,194 persons or an average of over 59,000 persons per month in 2016, and 182,060 persons in January-February 2017. The estimated level of reward awareness among 3,599 persons queried here in 2016 was 56%.

The remaining 814 districts of Ethiopia are under Level III passive surveillance. Last year the EDEP sensitized inhabitants of this vast area that includes most of the country by periodic announcements on radio and television, and through outreach in cooperation with the polio, onchocerciasis, trachoma, and

HIV counseling programs. The level of reward awareness in Level III areas in 2016 was 15% among 514 persons queried. Reward awareness was 62% among 400 persons queried in refugee camps.

The average overall level of awareness of the reward for reporting infected humans in Ethiopia was 55% in 2016 (54% in 2015); awareness of the reward introduced in April 2015 for reporting infected dogs was 51% in 2016. The EDEP investigated 12,592 rumors of Guinea worm disease in 2016, a substantial increase from the 8,321 rumors it investigated in 2015. The EDEP held three press conferences in 2016 and ten meetings of the National Guinea Worm Eradication Task Force. Ethiopia's National Certification Committee has been dormant in recent years and will be reorganized in 2017. The communication campaign assisted by the KYNE communications team that will begin in 2017 is expected to help improve knowledge of the cash rewards nationwide.

### MALI LAUNCHES NEW COMMUNICATIONS CAMPAIGN



Mali's Minister of Health, the Honorable Dr. Marie Madeleine Togo, led a long list of dignitaries to launch the GWEP's new communication campaign in a ceremony in Bamako on Friday March 10<sup>th</sup>. The minister participated in the launching despite an on-going strike of Malian health sector workers seeking higher salaries. The communication campaign, which is a collaborative effort between the Ministry of Health's GWEP, the CNI ECS ("Centre National D'Information D'Education et de Communication pour la Sante"), assisted by KYNE, a professional public information firm supported by The Carter Center. The campaign is designed to increase national awareness of the cash rewards for reporting people and dogs with Guinea worm infections, and remind people how to prevent the infection. Other speakers at the launch ceremony included the WHO Country Representative to Mali, the Carter Center Country representative, the local Mayor of Commune VI, and a representative of the Governor of Bamako. Traditional leaders, members of national and local media, and school children were among the estimated 1,400 stakeholders, partners and community members who participated. The campaign is built around the concept of becoming a "Guinea Worm Hero", and its materials include radio spots in 13 languages, a theater piece, a song and video clip featuring a well-known national artist (Ms. Djeneba Seck) and a logo figuring on all visual materials, including posters, t-shirts, and caps. During the annual International meeting in Atlanta, GWEP KYNE INC staff reported on the launching of the campaign in Mali, discussed the time-line for launching campaigns in the remaining three endemic countries during 2017, and demonstrated some of the materials, including a snippet of the GW song to be used in Mali during the launching of the campaign and in future months.

On February 7, the German Non-Governmental Organization HELP completed badly needed repairs on the water system in Tanzikratene, formerly the highest endemic community in Mali. The water system had been broken for several months. Mali had 698 villages under active surveillance (level I or level II) in 2016, and reported an impressive average level of reward awareness among 23,943 persons queried in all three surveillance levels of 79% for the year. The program responded to 557 rumors of GWD in 2016, but found no cases in humans. Eight of the 11 infected dogs detected during the year were contained, and Abate was applied within one day to water sources associated with the three uncontained infected dogs. Mali's National Certification Committee met in February, June and August 2016, and the national GW task force also met three times.



## SOUTH SUDAN REPORTS NO CASES EAST OF NILE



The six cases reported by South Sudan in 2016 were found in four localities of two counties. Three (50%) of the six cases and 17 of the 20 worms (85%) were contained, and the program treated water sources associated with each of the three uncontained cases within six days or less after their worms began to emerge. A line-listing of the six cases is included in the previous issue (#246, February 17) of the *Guinea Worm Wrap-Up*.

For the first time since its GWEP began in 2006, South Sudan has detected no known cases of GWD east of the Nile River (the last indigenous case of GWD there was reported in Kassongor in July 2015), an area that includes the formerly highly endemic focus of Greater Kapoeta. The South Sudan Guinea Worm Eradication Program (SSGWEP) had 2,736 villages or cattle camps under active surveillance as of the end of 2016, and it responded to 15,471 rumors of cases (vs. 469 rumors in 2015). The Ministry of Health doubled its cash reward for reporting a case of GWD to 10,000 South Sudanese Pounds (~US\$139) in March 2017 (to adjust for inflation), and also introduced a cash reward [amount?] for reporting and tethering an infected animal. The SSGWEP found one dog infected with GW in 2015 in a household that also had an infected human; it has found no infected dogs before or since then and continues to manifest traditional water-borne transmission of GW infections. The overall level of reward awareness among 495 persons queried in level I & level II active surveillance areas in 2016 was 76%.

Residual concerns of the SSGWEP at this stage are mainly the result of insecurity, which has limited access to much of former Jongli and Upper Nile States, and caused most expatriate technical assistants to be absent from the country for the past nine months. The sources of infection of two of South Sudan's cases in 2016 are unknown, as is the origin of infection in the Nuer Sudanese man detected with an emerging Guinea worm in Lare district of Ethiopia's Gambella Region in September 2016, who had entered Ethiopia from South Sudan about a year earlier. The Carter Center will transfer funds for supporting surveillance in Jongli/Upper Nile States to WHO, which has better access to those areas, at the request of the SSGWEP.

## JIMMY AND ROSALYNN CARTER AWARDS TO TWO SOUTH SUDANESE STALWARTS

THE  
CARTER CENTER



During the reception held on the first evening of the 21st International Review Meeting of Guinea Worm Eradication Program Managers at The Carter Center on March 20, 2017, Carter Center CEO Ambassador (rtd) Mary Ann Peters presented the Jimmy and Rosalynn Carter Award to South Sudan's Minister of Health, Honorable Dr. Riek Gai Kok, "in recognition of his untiring and unwavering support of the South Sudan Guinea Worm Eradication Program since 2013". Ambassador Peters also presented the Jimmy and Rosalynn Carter Award to the Undersecretary of South Sudan's Ministry of Health, Honorable Dr. Makur Matur Kariom, "in recognition of his untiring and unwavering support of the South Sudan Guinea Worm Eradication Program since 2011". The director of South Sudan's GWEP, Mr. Samuel Makoy Yibi, accepted both awards on their behalf, since they had to cancel their planned attendance at the review meeting on short notice. President and Mrs. Carter established the Jimmy and Rosalynn Carter Award for Guinea

Worm Eradication for Ghana and Nigeria, then the highest endemic countries for Guinea worm disease in the world, during the first Program Review for those two countries, which was held at The Carter Center in 1991. The awards are for nationals who contribute the best idea or the best performance to the GWEP in their country. The award was first presented to individuals from Ghana and Nigeria in 1992. Since then, it has been awarded to Guinea worm warriors from other countries as well. The most recent presentations had been to Mrs. Ifeoma Anagbogu and Mr. Harou Oumarou, then the National GWEP Program Managers of Nigeria and Niger, respectively, in 2011 for their leadership in the interruption of transmission and preparations for certification of their countries as free of Guinea worm disease.



Table 2

**Number of Laboratory-Confirmed Cases of Guinea Worm Disease, and Number Reported Contained by Month during 2017\***  
(Countries arranged in descending order of cases in 2016)

COUNTRIES WITH ENDEMIC TRANSMISSION	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	1 / 1	2 / 2	/	/	/	/	/	/	/	/	/	3 / 3	
SOUTH SUDAN	0 / 0	0 / 0	0 / 0	/	/	/	/	/	/	/	/	/	0 / 0	
ETHIOPIA	0 / 0	0 / 0	0 / 0	/	/	/	/	/	/	/	/	/	0 / 0	
MALI §	0 / 0	0 / 0	0 / 0	/	/	/	/	/	/	/	/	/	0 / 0	
TOTAL*	0 / 0	1 / 1	2 / 2	/	/	/	/	/	/	/	/	/	3 / 3	
% CONTAINED	0%	100%	100%										100%	

\*Provisional

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

Cells shaded in yellow denote months when a case of GWD did not meet all case containment standards.

§Reports include Kayes, Koulikoro, Segou, Sikasso, and Mopti, Tinbuktou, Gao, and Kidal Regions; reports from Kidal Region are contingent on security conditions during 2017 and times when the GWEP is able to deploy a technical advisor to Kidal Region to oversee the program there.

**Number of Laboratory-Confirmed Cases of Guinea Worm Disease, and Number Reported Contained by Month during 2016\***

COUNTRIES WITH ENDEMIC TRANSMISSION	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	1 / 1	0 / 0	1 / 1	1 / 1	0 / 1	1 / 2	1 / 3	1 / 2	3 / 4	0 / 0	0 / 1	9 / 16	56%
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%
SOUTH SUDAN	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	3 / 4	0 / 0	0 / 0	0 / 1	0 / 0	0 / 1	0 / 0	3 / 6	50%
ETHIOPIA	0 / 0	0 / 0	0 / 0	0 / 0	1 / 1	1 / 1	0 / 0	0 / 0	0 / 1	0 / 0	0 / 0	0 / 0	2 / 3	67%
TOTAL*	0 / 0	1 / 1	0 / 0	1 / 1	2 / 2	4 / 6	1 / 2	1 / 3	1 / 4	3 / 4	0 / 1	0 / 1	14 / 25	56%
% CONTAINED	0%	100%	0%	100%	100%	67%	50%	33%	25%	75%	0%	0%	56%	

\*Provisional

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

Cells shaded in yellow denote months when a case of GWD did not meet all case containment standards.

§Reports include Kayes, Koulikoro, Segou, Sikasso, and Mopti, Tinbuktou, Gao, and Kidal Regions; reports from Kidal Region are contingent on security conditions during 2016 and times when the GWEP is able to deploy a technical advisor to Kidal Region to oversee the program there.

## MEETINGS

Annual Ministerial Meeting on Guinea Worm Eradication: Wednesday, May 24, 2017, from 6pm to 8pm during the World Health Assembly in Geneva

## RECENT PUBLICATIONS

Boakye, D., 2016. Challenges to global control and/or elimination of NTDs: threats of animal reservoirs of human infections. Ghana Medical Journal, 50(4), 200.

Friedrich M. Zero Cases of Guinea Worm Disease in Mali. JAMA. 2017;317(11):1109.

Gaeta, R., Bruschi, F., & Giuffra, V., 2017. The painting of St. Roch in the picture gallery of Bari (15th century): An ancient representation of dracunculiasis?. The Journal of Infection,

Guinea-worm eradication efforts. 2017. Bulletin of the World Health Organization, 95(2), 89.

Molyneux, D. H., Savioli, L., & Engels, D., 2017. Neglected tropical diseases: progress towards addressing the chronic pandemic. Lancet, 389(10066), 312-325.

World Health Organization, 2017. Monthly report on dracunculiasis cases, January-November 2016. Wkly Epidemiol Rec 92:35-36.

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 Dr. Ernesto Ruiz-Tiben (eruizti@emory.edu), 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, Drs. Donald R. Hopkins and Ernesto Ruiz-Tiben of The Carter Center, Drs. Sharon Roy of CDC, Dr. Dieudonné Sankara of WHO, and Dr. Mark Eberhard.

*WHO Collaborating Center for Dracunculiasis, Eradication, Center for Global Health, Centers for Disease Control and Prevention, Mailstop C-09, 1600 Clifton Road NE, Atlanta, GA 30329, USA, email: gwwrapup@cdc.gov, fax: 404-728-8040. The GW Wrap-Up web location is*

<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

[http://www.cartercenter.org/news/publications/health/guinea\\_worm\\_wrapup\\_english.html](http://www.cartercenter.org/news/publications/health/guinea_worm_wrapup_english.html).

[http://www.cartercenter.org/news/publications/health/guinea\\_worm\\_wrapup\\_francais.html](http://www.cartercenter.org/news/publications/health/guinea_worm_wrapup_francais.html)



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