Criteria for the certification of dracunculiasis eradication

2023 update
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Annex 3. Dracunculus species, infections in animals and similar infections of animal origin
Since the 1980s, the number of human dracunculiasis cases has decreased substantially, from around 3.5 million cases per year to only 13 in 2022.
1 Introduction


The present revised criteria include the recommendations of the thirteenth meeting of the ICCDE (Addis Ababa, 25–26 April 2019) at which a Subgroup on certification of countries reporting animal infections was established. The revision was led by the Subgroup with contributions from ICCDE members, the WHO Secretariat and the participants at the fourteenth (virtual) ICCDE meeting (8 October 2020) as well as those attending ad hoc meetings of the ICCDE.

The participants at the various meetings leading to the revision of the criteria are listed in Annex 1.

Dracunculiasis (Guinea-worm disease) results from infection with the nematode parasite *Dracunculus medinensis* (the Guinea worm). The disease has been endemic in certain communities without access to safe sources of drinking-water and has had serious adverse effects on health, agricultural production and school attendance (see life cycle in Fig. 1). A global campaign to eradicate dracunculiasis started in the early 1980s. In 1991, the World Health Assembly endorsed efforts to eliminate dracunculiasis country by country (4). Since the 1980s, the number of human dracunculiasis cases has decreased substantially, from around 3.5 million cases per year to only 13 in 2022. In accordance with the recommendations of the ICCDE, WHO has certified 199 countries, territories and areas as free of dracunculiasis transmission, including 187 Member States. However, cases continue to occur in a few African countries, and global eradication remains elusive. A critical challenge is the emergence of new patterns of infection in animal hosts, particularly domestic dogs, which has required revision of definitions and protocols for eradication and its certification.
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Fig. 1.

Life cycle of the Guinea worm (*Dracunculus medinensis*)

1. Human or animal eats uncooked aquatic animals harboring water fleas with infective larvae.

1.1 Human or animal drinks unfiltered water containing water fleas with infective larvae.

1.2 The water fleas are killed in the stomach but release infective larvae which penetrate the stomach wall. The female worm migrates to the lower limbs and exits the body 10–14 months after infection.

2. Infected human or animal with emerged worm enters water ponds to seek relief. Larvae are released into the water.

3. Larvae are swallowed by water fleas and undergo two molts and become infective.

4. WAYS TO BREAK THE CYCLE

- Access to improved water sources
- Use of individual pipe filters
- Use of fine-mesh cloth filters
- Health education (human to thoroughly cook aquatic animals or bury fish entrails)
- Proactive dog tethering
- Surveillance and early case detection
- Vector control
- Case containment

5. Individual collects water containing infected water fleas from the pond.

Source:

Table 1 groups those countries in which dracunculiasis is currently endemic (Group I); formerly endemic during and after the 1980s and in the precertification stage (Group II); certified but at high risk of reintroduction of transmission (Group III); and formerly endemic and certified to have eliminated transmission (Group IV). The countries listed in Table 1 will be updated according to changes in the disease epidemiology, data and country certification status. Fig. 2 shows the status of certification of countries on 1 January 2023. Fig. 3 shows the distribution of villages reporting human cases and animal infections in 2022.

The need for certification of attainment of the status of the absence of transmission of *D. medinensis* in each country, territory or area, including those where the disease has never been endemic, is inherent in the goal of an eradication programme. This contrasts with programmes which target elimination of a disease, where status is validated (for elimination as a public health problem) or verified (for elimination of transmission) only in formerly endemic countries; while, where the target is control, no acknowledgement process is in place. For programmes where the target is control, no acknowledgement process is in place. There must be an objective basis, based on agreed criteria, for determining if a country has achieved elimination of transmission of *D. medinensis*. To certify global eradication, there must be compelling evidence that transmission of *D. medinensis* has been eliminated in both human and animal hosts in all countries of the world. The criteria must consider the risk of importation of transmission from neighbouring countries and the need to maintain surveillance in neighbouring countries as well as in animal hosts. It is expected that such activities, which are necessary in certified countries to maintain transmission-free status, will be conducted until the final goal of global eradication certification is achieved.

The ICCDE was established by WHO in 1995 as an independent advisory body to recommend to WHO those countries which fulfil the requirements for certification, as well as to advise WHO on criteria, procedures and progress made towards certification of absence of transmission and contribute actively to the certification process in Member States. Since 1996, a roster of independent specialists has been maintained by WHO, the members of which can be assigned to International Certification Teams (ICTs). The ICT conducts an in-depth assessment of a country’s claim to have interrupted transmission of *D. medinensis* and makes an appropriate recommendation to the ICCDE. In 2019, during a statutory meeting of the ICCDE in Addis Ababa, a subgroup on animal certification was established to address issues raised for certification by *D. medinensis* infection in animal hosts.

WHO, including its regional offices, will facilitate national preparations for certification by carrying out regular visits by WHO staff, members of the designated ICT or consultants to the country or subregion concerned. WHO maintains a register of countries requesting certification and of countries where official certification of elimination of transmission of *D. medinensis* is pending. WHO also maintains an official register of countries where transmission has been certified to have been eliminated, based on evaluations by the ICCDE.

**Assessment and management of conflict of interest**

All the participants of the thirteenth and fourteenth meetings of the ICCDE, including invited experts and those involved in drafting the document, were asked to declare any conflicts of interest before the meetings. No conflicts of interests were declared or found.
### Table 1. Epidemiological status of countries a,b

| **Group I: Currently endemic**            |
|-------------------------------|----------------|
| Angola                        |                |
| Chad                          |                |
| Ethiopia                      |                |
| Mali                          |                |
| South Sudan                   |                |

**Group II: Formerly endemic during and after the 1980s and in the precertification stage**

| Sudan                         |

**Group III: Certified but at high risk of reintroduction of transmission**

| Burkina Faso  |                |
| Cameroon       |                |
| Central African Republic |    |
| Niger          |                |

**Group IV: Formerly endemic and certified to have eliminated transmission**

| Benin                        |                |
| Côte d’Ivoire                |                |
| Democratic Republic of the Congo |                |
| Ghana                        |                |
| India                        |                |
| Kenya                        |                |
| Mauritania                   |                |
| Nigeria                      |                |
| Pakistan                     |                |
| Senegal                      |                |
| Togo                         |                |
| Uganda                       |                |
| Yemen                        |                |

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*Note: In certain cases, reference to “countries” should be understood to signify countries, territories and areas.*

*b The list will be updated according to changes in the disease epidemiology, data and country certification status.*
Fig. 2.

Status of certification of dracunculiasis eradication as of 1 January 2023

The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement. © WHO 2022. All rights reserved

Data Source:
World Health Organization
Map Production:
Control of Neglected Tropical Diseases (NTD)
World Health Organization

Certified free of dracunculiasis (n=183)
Previously endemic and certified free of dracunculiasis (n=17)
Previously endemic during/after 1980s and in precertification stage (n=1)
Currently endemic for dracunculiasis (n=5)
Not applicable
Fig. 3.

Distribution of villages reporting human cases and animal infections in 2022

The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement. © WHO 2022. All rights reserved

Data Source:
World Health Organization

Map Production:
Control of Neglected Tropical Diseases (NTD)
World Health Organization

Criteria for the certification of dracunculiasis eradication, 2023 update
Definitions

The changing epidemiology of dracunculiasis, with the confirmation of animal infections in several endemic countries and the emergence of domestic dogs as a reservoir for *D. medinensis* in Angola, Chad, Ethiopia and Mali has created challenges for certification. As a result, a clear understanding of terms and definitions is required by certification teams.

It is recognized that clinical disease outcomes following *D. medinensis* infection do not differ significantly in people and other animal hosts (including dogs, cats and baboons). The disease manifests as skin lesions and hanging worms in both humans and animals. It is therefore imperative to promptly report, investigate and contain hosts with hanging worms in both humans and animals. However, to remain consistent with the operational terms currently used in national dracunculiasis eradication programmes, a distinction is made in this document in defining the detection of hanging worms (confirmed to be *D. medinensis*) as cases in people and infection in animals.

A case of dracunculiasis is a person exhibiting a skin lesion with the emergence of a Guinea worm, which is confirmed in laboratory tests to be *D. medinensis*. That person is counted as a case only once during the calendar year (that is, when the first worm emerges from that host). All worm specimens should be obtained from each host for laboratory confirmation and sent to the WHO Collaborating Center for Dracunculiasis Eradication at the United States Centers for Disease Control and Prevention. All cases should be monitored at least twice per month during the next 12 months for prompt detection of the emergence of any additional Guinea worms.

An animal infection is an animal exhibiting a skin lesion with the emergence of a Guinea worm, which is confirmed in laboratory tests to be *D. medinensis*. That animal is counted as an infected animal only once during the calendar year (that is, when the first worm emerges from that host). All worm specimens should be obtained from each host for laboratory confirmation and sent to the WHO Collaborating Center for Dracunculiasis Eradication at the United States Centers for Disease Control and Prevention. All infected animals should be monitored at least twice per month during the next 12 months for prompt detection of the emergence of any additional Guinea worms.

Elimination of dracunculiasis is the confirmed absence of the emergence of adult female worms (that is, the interruption of transmission of *D. medinensis*) in humans and animals for 3 consecutive years or longer from a country or region, with such a low risk of reintroduction of the parasite that preventive measures could be reduced to a strict minimum. The area must be evaluated by an ICT, which provides recommendations, and the decision reviewed and endorsed by the ICCDE, with a recommendation for certification to the Director-General of WHO.

Eradication of dracunculiasis is the confirmed absence of the emergence of adult female worms (defined as compatible with the interruption of transmission of *D. medinensis*) in humans and animals for 3 consecutive years or longer at the global level based on the recommendation of the ICCDE to the WHO Director-General and endorsed by the World Health Assembly.
Criteria for certification of elimination

Standard criteria for certification are needed in order to:

(i) ensure international credibility for the expected future claim that transmission of *D. medinensis* is absent from an area;

(ii) have an established, consistent mechanism for judging the success of recent elimination of dracunculiasis at country level;

(iii) have a standard, effective procedure to identify and eliminate any previously unknown foci of transmission; and

(iv) help in the investigation of rumoured or sporadic occurrences of the infection in unconfirmed potentially endemic areas.
3. Criteria for certification of elimination

3.1 Uncertified countries

The two groups of uncertified countries are:

- **Group I**: countries that are currently endemic and were formerly endemic during and after 1980 (Angola, Chad, Ethiopia, Mali and South Sudan); and

- **Group II**: countries that were formerly endemic during and after the 1980s and in the precertification stage (Sudan).

3.2 Requirements for certification

National governments requesting certification of elimination should submit to WHO a country report that describes the procedures undertaken and provides documented evidence in support of the assertion that dracunculiasis has been eliminated (see Annex 2).

In these countries, elimination will be considered to have been achieved when surveillance systems have not discovered any evidence of transmission in humans or animals despite rigorous annual searches, carried out during the expected transmission season, for 3 consecutive years. For surveillance to be deemed adequate, this should include the submission of evidence of reporting active searches for human cases and animal infections, if necessary, even in the most remote and difficult-to-access areas of the country.

The objective of surveillance for dracunculiasis during the 3-year precertification period is to rapidly detect and contain any human cases or animal infections that might occur, to prevent further transmission. Confirmation of the absence of transmission in a country is judged based on:

(i) an assessment of the capability of the surveillance system to detect human cases and animal infections should they occur; and

(ii) the records compiled by the national authorities, the quality of which can be determined during a field appraisal by an ICT. In general, the reliability of certification will depend on the amount of time that has elapsed since the last known human case or animal infection and on the sensitivity of active surveillance.
The establishment of a claim in relation to a specific, defined area must fulfil the following conditions:

For all formerly endemic countries, there should be proof that an active case detection system has operated in the area for at least 3 consecutive years since the occurrence of the last known indigenous case. For formerly endemic countries during and after the 1980s the recommended approach is to use a village-based surveillance system remaining in place in every formerly endemic village with a system for the rapid reporting of information to the next surveillance level. Surveillance coverage will be considered to be adequate: (i) if 85% or more of the villages placed under active surveillance submit their reports each month; or (ii) if each village under active surveillance provides its report at least nine months out of 12. For all formerly endemic countries, a reward for the case detected as well as for the health worker who identified the case and took the appropriate measures (i.e. containment or hospitalization) strongly reinforces active surveillance.

**Rationale:** There is no asymptomatic carrier state in dracunculiasis; the incubation period is usually 10–14 months. Normally it takes approximately 2 weeks for larvae ingested by Cyclops to become infective, and the infected Cyclops normally have a lifespan of fewer than 50 days, at least in the conditions under which they were studied (5). Therefore, the absence of indigenous cases in humans and infections in animals for a 3-year period, in the presence of adequate systems for the detection of human cases and animal infections, provides evidence that is consistent with the elimination of transmission in a country.

If this human case or animal infection has been fully contained, the locality will not be considered an endemic focus. If, following importation, local transmission occurs for three or more transmission cycles, the focus will be considered one of local transmission.

A register should be maintained of suspected or rumoured human cases and animal infections (for countries that reported animal infections) of dracunculiasis reported or discovered during the last 3-year period prior to the ICT mission. For each suspected or rumoured case the date of reporting and investigation, including age, sex and place of residence should be recorded. Similarly, for each suspected or rumoured infected animal, the date of reporting, investigation, residence or location, and species should be recorded. If the species is not known, attempts to identify the animal should be made from photographs and/or by the preservation of the specimen. For both human cases and animal infections, the register should also indicate: whether hanging worms were confirmed to be *D. medinensis* or identified as some other condition. Adequate measures include containment of transmission, perhaps with hospitalization for people, and confinement (for example, tethering) of animals until the worm has been completely extracted, with effective application of temephos to water bodies in the event of the emergence of the worm.

**Rationale:** Each worm emergence that is not detected carries the risk of new infections 10–14 months later. There is no vaccine or medicine with which to contain the spread of *D. medinensis* by protecting individuals and animals at risk of infection. Therefore, surveillance for dracunculiasis must be active and village-based. Effective containment of residual cases is critical in both humans and animals to prevent contamination of water sources where Cyclops can become infected by the larvae which emerge from adult female worms and thus maintain the life cycle.

In the event of suspected importation to an area not endemic for dracunculiasis, it should be established that each confirmed human case or animal infection was in fact imported, by tracing the case or animal infection to its origin in a dracunculiasis-endemic area.
3. Criteria for certification of elimination

In countries where sustained animal infections have been recorded, further structured surveillance measures should be implemented, including, when available and validated, serological surveillance in sentinel hosts and surveillance of environmental sources of infection, with the intensity of surveillance varying in relation to the frequency of animal infections previously detected.

**Rationale:** New serological and molecular tests are currently under development and might provide valuable additional tools for surveillance and to assist certification. With domestic dogs emerging as important hosts of *D. medinensis* in some areas and as useful sentinel hosts for the detection of *D. medinensis*, surveillance will likely focus on domestic dogs.

A detailed account of the history of dracunculiasis in the country should be given (Annex 2).

**Rationale:** This is necessary for those who must judge the completeness of steps taken to eliminate transmission of *D. medinensis* in the country.

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### 3.3 Previously certified countries at high risk of reintroduction of transmission

These are the Group III countries (Burkina Faso, Cameroon and the Central African Republic as well as Niger).

Requirements for maintaining certification status should be tailored to each situation, relating to the following issues.

1. A detailed description of any imported cases or animal infections, with confirmation of the origin of each case or animal infection in a dracunculiasis-endemic area. If the human case or animal infection was fully contained, the locality will not be considered an endemic focus and the status of the country will not be affected. If, following importation, local transmission occurs for three or more transmission cycles, the area will be considered to be an endemic focus. This has implications for the ICCDE, which may recommend to the Director-General of WHO that the certification of elimination status previously accorded to the country should be reviewed, and potentially revoked, if local transmission of *D. medinensis* is confirmed for 3 or more consecutive years. If the elimination status is revoked, the country would then revert to endemic status.

2. The findings of at least one active case search, conducted in areas that have reported imported human case(s) or animal infection(s) within 2 years following such report. Such villages should be placed under active surveillance within the 2 years following the report. Any search(es) should be conducted during the expected transmission season and carried out village-by-village (targeting all concerned villages and nearby localities/villages) and/or nationally, supplemented by a widely publicized reward using recognition cards with the local (vernacular) name for dracunculiasis. The data presented should be sufficiently robust to demonstrate that infection no longer exists. Data obtained by passive surveillance will also be given due consideration.

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1 A country is considered to have re-established endemicity if: (i) no confirmed indigenous case of dracunculiasis was reported for > 3 years; and (ii) indigenous transmission of laboratory-confirmed cases subsequently occurred during ≥ 3 consecutive years.
Certification procedures

All uncertified countries should contact WHO to initiate the verification and certification process. The proposed sequence of events is listed below but should be flexible. This listing summarizes the process for certification.

1. WHO will distribute a set of international guidelines on verifying the absence of *D. medinensis* transmission and certifying elimination of transmission in the country or territory as defined by the WHO Office of the Legal Counsel. The revised criteria will be sent to the countries.

2. All uncertified countries and territories will be encouraged to submit a formal request to WHO to verify the absence of transmission and, accordingly, to certify the elimination of transmission at a minimum of 36 months after robust evidence can be presented that *D. medinensis* transmission has been halted in each country.

3. Such formal requests should conform with the procedures described in this document and elaborated in the guidelines prepared by WHO and approved by the ICCDE. In particular, countries requesting certification should prepare a detailed report describing all surveillance, reward systems in place for follow up of rumours, and other pertinent activities. Such countries may find it useful to designate a national committee to evaluate the report on the dracunculiasis eradication programme before it is submitted to WHO.

4. Uncertified countries should convene a national committee or group to examine surveillance activities and give evidence before the ICT visit.

5. WHO will designate an ICT that is mandated to evaluate the country report and to determine, in collaboration with the host country, the status of the certification schedule.

6. The ICT will evaluate the likelihood that human cases and animal infections of *D. medinensis* would have been detected and reported, had any transmission occurred during the previous 3 years, and make an appropriate recommendation to WHO regarding approval of the claim that transmission of *D. medinensis* has been eliminated (see 4.1).

7. If certification of the elimination of transmission of *D. medinensis* is granted, the country will then be listed on a WHO official register of countries and territories certified as free of *D. medinensis* transmission, consistent with the absence of dracunculiasis in the country or territory. Adequate surveillance after certification should be maintained until global eradication is declared.
4.1 National preparations for certification

4.1.1 Precertification surveillance

Countries should conduct the following activities in preparing for certification (Table 1).

1. Enhance the sensitivity of case detection nationwide by promoting and maintaining a high degree of public awareness of dracunculiasis, and by stressing: (i) the importance and need of reporting human cases of dracunculiasis; (ii) in countries where animal infections have previously been confirmed, the need for reporting of animal infections; (iii) the offering of rewards for the reporting of human cases and animal infections; (iv) the measures required for the containment of human cases and animal infections. Enhanced awareness of the need for reporting and containment of animal infections is likely to require engagement of animal health and wildlife sectors. Monitoring the awareness campaign periodically to assess coverage and comprehension of messages, particularly in remote rural areas where potential for *D. medinensis* transmission is highest (e.g., villages without safe sources of drinking water and situated near borders with other countries affected by dracunculiasis or in a formerly endemic area).

2. Institute and maintain compulsory notification of human cases of *D. medinensis* (dracunculiasis) by all units of the national passive disease-surveillance system (i.e., primary health-care posts, health centres, and hospitals).

3. Institute and maintain a register of compulsory notification of animal infections, in countries where animal infections cases have previously been confirmed.

4. Institute and maintain a village-based surveillance and containment programme for all human cases and animal infections in all villages formerly affected, during a minimum of the last 3 consecutive years following the report of the last indigenous human case or animal infection. All formerly endemic villages with continuous risk of transmission should be maintained under active village-based surveillance (7).

5. Institute and maintain a register of human cases and animal infections and use it to: (i) note any suspected cases of infection reported or discovered during the precertification period, (ii) indicate that each confirmed case or animal infection was either imported, by tracing it to its origin in a dracunculiasis endemic area or indigenous site of transmission. Ascertain that all reports were well documented.
6. Conduct at least one active survey to detect human cases and animal infections, village by village, in any areas that may have been formerly endemic. Searches should be conducted during the presumed transmission season, using photo identification recognition cards and the local vernacular name for dracunculiasis, and should include reference to animal infections. School-based (8) and market-based (9) surveys, as well as surveys at religious gatherings, in refugee camps and in other places where people congregate (mass gatherings); in addition, surveys of relevant data collected by nongovernmental organizations working in the field can be used to elicit information about villages where cases might have occurred previously. Information derived from other health outreach programmes, such as mass drug administration for neglected tropical diseases via community drug distributors or immunization programmes and national immunization days, can be used to sensitize communities about reward systems, investigate any historic knowledge of dracunculiasis and thus can contribute to the portfolio of knowledge available to ICTs. Mass dog rabies vaccination campaigns should be used to obtain information on reports of hanging worms in dogs.

7. For countries in which animal infections have previously been confirmed, conduct structured surveillance activities for detection of infections in animals and environmental sources.

8. Incorporate surveillance of other diseases or other human and animal health and development activities into the surveillance system for cases and animal infections, or vice-versa.
4.1.2 Preparation of a country report

Countries should submit a “country report” to the ICCDE as part of the certification process. The level of detail required will vary depending on the time elapsed since the last confirmed cases, the incidence of human cases and animal infections at that time, the geographical distribution of previously reported cases and any records of the previous occurrence in animal hosts.

Formerly endemic countries should include the following information in their reports. A checklist for the preparation of the report is proposed in Annex 2.

The report should include the following elements.

1. An historical account of dracunculiasis in the country, including a detailed overview of the dracunculiasis elimination campaign(s) as well as of the status of water and sanitation projects and of their contribution to the elimination effort.

2. The results of active case detection including: (i) data from at least three annual reports of case detection, based on the monthly readings of daily case registers, regularly updated at the village level in the 3 years immediately preceding the application for certification; (ii) any evidence of validation of results from active searches and case containment measures; (iii) the results from any other assessments carried out, for example, in schools, markets, other places where nomadic, migratory people or displaced persons congregate, or during mass dog vaccination campaigns; and (iv) genomic analysis in documenting shrinking genetic diversity of *D. medinensis* in the country, if available, which could provide important additional evidence of the control of transmission. Such DNA evidence could document not only declining genetic diversity trends in individual countries but could also provide genetic evidence for the origins of the last few cases (with or without epidemiological evidence of such source(s)) or in relation to the origins of re-introduced infections.
3. An evaluation of the effectiveness of the routine disease reporting system. Such evaluation should include: (i) evidence of the inclusion of dracunculiasis as a reportable disease on the official disease reporting forms; (ii) the regularity and completeness with which the health reporting units have reported; (iii) validation of the reports; (iv) records of action taken when dracunculiasis cases were reported during the later stages of the campaign; (v) the number and distribution of health units (including primary health posts, dispensaries, health centres and hospitals) throughout the endemic areas covered by the smallest officially recognized administrative unit in which dracunculiasis was reported in the years preceding the application for certification; and (vi) for countries that had previously reported animal infections: evidence of the effectiveness of reporting of animal infections, including involvement of animal health and wildlife authorities in surveillance activities.

4. Results of active and structured surveillance activities to detect infection in animal hosts and environmental sources (for countries that had previously reported animal infections).

5. A description of all public health education campaigns, including, if applicable, details of whether any rewards have been paid for reporting cases of dracunculiasis in humans and animal infections and the results of these efforts. Evidence that any rumours of human cases and animal infections have been investigated and the proportion of rumours investigated over a period of a year within 24 hours.

6. Demographic information, including population distribution by geographical region and significant migration patterns. Where dog infections have previously been reported, estimates of dog population size, distribution, and ownership/management patterns. There are data available that could be used to provide simple estimates of dog populations in different demographic and agro-ecological settings.
4.2 Operation of international certification teams

International certification teams will be asked to reach one of two possible conclusions: either (i) they are satisfied that elimination of *D. medinensis* transmission has been achieved; or (ii) they are not satisfied that elimination of *D. medinensis* transmission has been achieved. ICT reports will articulate and provide evidence for their decision and recommendation to the ICCDE. The government of the country requesting certification should guarantee the ICT full access to all documentation of programme activities and to all parts of the country if on-the-ground investigation will be needed.

The timing of the ICT visits and the membership of the teams will be decided by WHO in consultation with national authorities. Persons selected as team members should be able to be critical in their assessments, and their views as independent experts should be respected both nationally and internationally. Members should be chosen from different regions of the world so that the nature and extent of the efforts made to document the interruption of transmission may become widely known. Scientists working on dracunculiasis and countries with eradication or elimination programmes should both be represented on ICTs so that technical expertise can be exchanged and applied to the certification process. Potential conflicts of interest, such as the nomination of a national from a country under review, as a member of the ICT should be avoided. All members of an ICT must declare any perceived conflicts of interest in accordance with WHO requirements. In general, contiguous formerly endemic countries should be considered and evaluated at the same time.

The principal aim of an ICT visit to a country is to evaluate the reliability, accuracy and veracity of that country's report, by interviewing health personnel and others and by examining records at central and peripheral levels, in order to ascertain the likelihood that *D. medinensis* transmission has been interrupted as claimed. Because ICT members will not usually be able to spend more than a few weeks in a country, the objective will be to assess the quality of the surveillance programme and to determine the probability of detecting dracunculiasis cases and animal infections if transmission had occurred during the preceding 3 years. Preliminary visits by selected consultants or temporary advisers may be arranged by WHO to examine the status of documentation and to recommend any additional measures they consider are indicated before the visit by the ICT.

After arrival in the country, the ICT would typically spend several days at the health ministry to review the country report with nationals of the host country and to listen to presentations by designated officials concerning the activities carried out. The team would divide into groups to facilitate visits to all epidemiologically important areas. The areas selected for visits would be those identified as having the least satisfactory documentation or as being at the highest risk of continuing transmission, for example: (i) areas near countries with affected populations; (ii) previous highly endemic areas; (iii) areas where the last human cases or animal infections occurred; (iv) areas with little progress in the provision of safe sources of drinking-water; and (v) areas with a history of poor surveillance for dracunculiasis. Team members will decide exactly which areas, villages and health units they wish to visit.
Dracunculus species, infections in animals and similar infections of animal origin

*Dracunculus medinensis* infections have been documented in several definitive mammalian hosts which, in addition to humans, include domestic dogs and cats, and wild carnivores and primates (see Annex 3). Although infections in non-human hosts were previously considered to represent spillover infections, there is strong evidence that domestic dogs are now able to act as reservoirs of *D. medinensis* in Chad, thereby maintaining infection independently of humans. Infections in domestic animals (dogs and cats) have also been reported in Mali; in dogs, cats and baboons (*Papio anubis*) in Ethiopia; and a few human cases and animal infections in dogs have been reported in Angola. However, the role of animal hosts as reservoirs of infection in Angola, Ethiopia and Mali remains to be determined.

The emergence of animal reservoirs and the growing prominence of animal infections during the end stages of the dracunculiasis eradication programme raises challenges for control, elimination and certification. In countries that have reported animal infections, new surveillance measures and certification procedures addressing infected animals will likely be needed to generate sufficiently robust data to allow ICTs to certify freedom from transmission of *D. medinensis* and meet the revised criteria for elimination of transmission.


Suggested further reading


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Annex 1.

Participants at the thirteenth meeting of the International Commission for the Certification of Dracunculiasis Eradication, Addis Ababa, 25–26 April 2019

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Country report checklist for certification of dracunculiasis eradication

Countries should submit a “country report” to the International Commission for the Certification of Dracunculiasis Eradication (ICCDE) as part of the certification process. The level of detail needed in different parts of the report will vary depending on the epidemiology of dracunculiasis in each country. Countries with a history of dracunculiasis in humans or animals may use this checklist to help assure that all necessary parts of the report are included. Countries with no history of dracunculiasis can prepare a simplified report, as described in the Guidelines for Country Applications (reference in the sentence which follows). This checklist is based on the text in the body of the present document and of “Guidelines: Country-Applications for Certification as a Dracunculiasis-Free Area” (WHO/FIL/96.188 revised in 2022), where this checklist is also included as an addendum (1–3).

Country reports should include the following elements.

1. **A historical account of dracunculiasis in the country, including:**
   1.1 a detailed overview of any dracunculiasis eradication campaign;
   1.2 the country’s water supply situation, including especially the status of water and sanitation projects and water supply in any formerly endemic areas;
   1.3 any available data which indicates the contribution water-supply projects made to the eradication effort.

2. **The results of active case detection activities including:**

   2.1 If the country was endemic for dracunculiasis during the 1980s:
   - data from at least three annual reports of case detection, based on the monthly reading of case registers regularly updated at the village level;
   - any evidence of validation of results from active searches and case-containment measures;
   - the results from any other assessments carried out, for example, in schools, markets, places of worship and other places where nomadic or migratory people or others congregate.

   2.2 If the country was not endemic for dracunculiasis during the 1980s:
   The same information as above, with the modification that active searches for dracunculiasis may have been done through fewer than 3 years and may not have used village-level registers in their surveillance, relying instead on widely publicized rewards and other survey methods mentioned above.
3. If the country was endemic for dracunculiasis during 1970s or 1980s:
   3.1 A description of the final parts of the case-containment phase under the national dracunculiasis eradication programme and details surrounding the last year or two, including where the last few cases were found.

4. A description regarding the handling of rumours of dracunculiasis during the certification period, including the rumour register and the case/rumour registration forms.

5. An evaluation of the effectiveness of the routine disease reporting system, including:¹
   5.1 the number and distribution of primary health posts, health units, health centres, etc., throughout the endemic areas;
   5.2 evidence of the inclusion of dracunculiasis as a reportable disease on the official disease reporting forms, if certification is undertaken in continuation of an eradication programme;
   5.3 the regularity and completeness with which the health reporting units reported; if dracunculiasis is a reportable disease as discussed above;
   5.4 validation of the reports;
   and, if the country was endemic for dracunculiasis during the 1970s or 1980s:
   5.5 records of action taken when dracunculiasis cases were reported during the latter stages of the campaign.

6. Maps should be presented as part of the country report, to visualize as many as possible of the points described in the text of the report, especially:
   6.1 the distribution of “health units/hospitals”;
   6.2 the status and distribution of safe water sources;
   6.3 the location and distribution of schools relative to the formerly endemic areas in the country;
   6.4 the location of cases during the last years of case containment;
   6.5 the sources of reports which were not confirmed and turned out to be rumours.

7. If the country was endemic for dracunculiasis during the 1980s, tables and graphs should also be presented in the country report, to visualize:
   7.1 trends in the numbers of cases up through the case-containment phase;
   7.2 reporting from villages, including percentages of timely monthly reports, to show trends in the application of the various interventions against dracunculiasis up through the case-containment phase.

¹ The recommendations in this section are based on the expectation of these revised criteria that dracunculiasis should be an officially reportable disease, at least in all endemic or recently endemic countries.
8. A description of all public health education campaigns for dracunculiasis eradication including, if applicable, details of whether any rewards have been paid for reporting human cases of dracunculiasis and animal infections as well as the results of these efforts. If rewards have been offered, an important part of the report will be:

8.1 a description of publicity efforts to make populations aware of the rewards,

8.2 the results of any surveys undertaken to evaluate what percentage of populations in various parts of the country are aware of the reward and its purpose.

9. Demographic information, including:

9.1 population distribution by geographical region; and

9.2 known significant migration patterns.

10. If the country has set up a National Committee or group to critically examine and/or oversee programme activities:

Information describing work undertaken by the National Committee to ensure the quality of surveillance activities during the certification period.

11. A copy of the International Certification Team’s report.

In some cases, countries that were not endemic for dracunculiasis during the 1980s may be advised in writing by the ICCDE or its Secretariat at WHO that a visit by an International Certification Team (ICT) is not considered necessary, in view of documentation provisionally provided to WHO and the ICCDE. Such countries can refer to that letter in their country report, in lieu of an ICT report.

References for Annex 2


Annex 3.

Dracunculus species, infections in animals and similar infections of animal origin

Although it can be difficult to differentiate Dracunculus species, natural infections allegedly caused by D. medinensis have been reported from a wide variety of animals in many parts of the world. These animals include dogs, cats, horses, cattle, wolves, foxes, badgers and leopards. The possibility that some of these animal infections are due to Dracunculus species which are not known to be infective to humans cannot be ruled out. Most reports have been from domestic dogs. Infection in dogs occurred in regions where human dracunculiasis was formerly endemic, e.g., Uzbekistan (1, 2) and Tamil Nadu State in India (3, 4).

Domestic and wild mammals presumably become infected by accidental ingestion of infected copepods while drinking water. Although this mechanism is possible, it probably occurs rarely for two reasons. First, these animals drink water by lapping, an inefficient mechanism for the ingestion of copepods since the lapping action itself disturbs the water surface sufficiently to drive the elusive and rapid-swimming copepods away from the immediate area. Secondly, the altered swimming behavior of infected copepods makes their presence near the water surface unlikely. A potential alternative and likely mode of transmission is through paratenic (transport) hosts, such as frogs or fish, which ingest copepods and are capable of concentrating infective larvae in their tissues. Such a mechanism of transmission has been postulated for dracunculids of raccoons (procyonids), mustelids and reptiles (which drink directly very little, if any, water), and has been experimentally confirmed (6, 7; Eberhard, 1989, personal communication).

Documented transmission of Dracunculus species from animals to man is extremely rare; only two, apparently bona fide, cases have been described; one case from Korea (8, 9), and another from Japan (10). In both instances, there was no evidence to indicate that the patients had travelled to endemic countries during the 12–24-month period preceding patency. Moreover, there is no record that foci of human dracunculiasis in Korea or Japan have ever existed. What was common to both occurrences was a history of ingestion of uncooked loaches (small fresh-water fish of the Cobitidae family). Loaches are effective predators of copepods from which they acquire Gnathostoma. This nematode, which is a parasite of carnivores, only accidentally infects humans in Asia who eat raw loaches; it causes ocular and visceral manifestations as well as larva migrans syndrome. There was no subsequent transmission to other humans in either case.

At a time when D. medinensis, the causative agent of human dracunculiasis, is on the brink of being eradicated, WHO considered it necessary to carry out precise identification of D. medinensis isolated from humans in different ecological and climatic environments in Africa and in India. It would also be useful to compare D. medinensis isolated from humans with Dracunculus species isolated from mammals in endemic or formerly endemic areas. Genomes of worms from dog, and human infections in Chad were sequenced and compared. All the worms were confirmed to be D. medinensis, and the same population of worms are causing infections in both humans and animals (11).
References for Annex 3


Suggested further reading for Annex 3

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Criteria for the certification of dracunculiasis eradication, 2023 update

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