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Leishmaniasis in Cameroon: what is known and is done so far? A protocol for systematic review

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Complete List of Authors:	<p>Djune Yemeli, Linda; Centre for Research on Filariasis and other Tropical Diseases (CRFiMT), Molecular Parasitology and Genetic Epidemiology; University of Yaounde I, Molecular Diagnosis Research Group, Biotechnology Centre</p> <p>Domche, André; Centre for Research on Filariasis and other Tropical Diseases (CRFiMT), Entomology and Vector-Borne Diseases; University of Yaounde I, Department of Animal Biology and Physiology, Faculty of Science</p> <p>Nana Djeunga, Hugues Clotaire; Centre for Research on Filariasis and other Tropical Diseases (CRFiMT), Molecular Parasitology and Genetic Epidemiology (MPGE); University of Yaounde I, Department of Animal Biology and Physiology, Faculty of Science</p> <p>Lenou Nanga, Cédric; Centre for Research on Filariasis and other Tropical Diseases (CRFiMT), Epidemiology and Biostatistics</p> <p>Njih Tabah, Earnest; Ministry of Public Health, National Buruli Ulcer, Leprosy, Yaws and Leishmaniasis Control Program</p> <p>Nko'Ayissi, Georges; Ministry of Public Health, National Neglected Tropical Diseases Coordination Unit</p> <p>Kamgno, Joseph; Centre for Research on Filariasis and other Tropical Diseases (CRFiMT), Epidemiology and Biostatistics; University of Yaounde I, Department of Public Health, Faculty of Medicine and Biomedical Sciences</p>
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1 **Leishmaniasis in Cameroon: what is known and is done so far? A protocol** 2 **for systematic review**

3 Linda Djune-Yemeli^{1,2}, André Domche^{1,3}, Hugues C. Nana-Djeunga^{1,3,*}, Cédric G. Lenou-
4 Nanga¹, Earnest N. Tabah⁴, Georges B. Nko'Ayissi⁵, Joseph Kamgno^{1,6}

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7 ***Correspondence:** nanadjeunga@crfilmt.org

8 9 10 **Abstract**

11 **Introduction:** First visceral and cutaneous leishmaniasis cases were reported in Cameroon
12 since more than six decades. However, interest in the disease has decrease over time and data
13 on its epidemiology across the country are scanty. This systematic review aims to update data
14 on what is known and done so far on leishmaniasis in Cameroon.

15
16 **Methods and analysis:** PubMed/MEDLINE, EMBASE and Web of Science will be searched
17 from inception onwards. Grey literature will be identified through Google Scholar searches,
18 dissertation databases and other relevant documents such as report of the National Buruli Ulcer,
19 Leprosy, Yaws, and Leishmaniasis Control Program. All studies reporting endemicity,
20 distribution, infecting species, vectors and reservoirs will be eligible. The main outcomes will
21 be epidemiological data (infection rate, distribution, infecting species, vectors and animal
22 reservoir), while the secondary outcomes will be the management of cases (diagnostic,
23 treatment, reporting, intervention...). Two reviewers will independently screen eligible papers,
24 and potential conflicts will be resolved by involving a third reviewer as an adjudicator.
25 Methodological quality including bias will be appraised using a methodological quality critical
26 appraisal checklist proposed in the Joanna Briggs Institute (JBI) systematic review methods
27 manual. A narrative synthesis will describe quality and content of the epidemiological evidence.
28 Data on prevalence and vectors will be used to draw thematic maps of the distribution of
29 leishmaniasis in Cameroon.

30
31 **Ethics and dissemination:** This proposed study will not require ethical approval as it will be
32 based on already existing published or unpublished data. The final report of this review will be
33 published in a peer-reviewed journal, and the outcomes will be used (i) as baseline information

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3 34 to design further studies that will help to better refine the epidemiological situation of
4 35 leishmaniasis in Cameroon, and (ii) to inform both program managers and policy makers of the
5 36 situation of leishmaniasis in the country.
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38 **Systematic review registration:**

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11 39 This protocol was registered with the International Prospective Register of Systematic reviews
12 40 (PROSPERO) database.
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42 **Strengths and limitations of this study**

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18 43 ➤ To our knowledge, this article will be the second review on leishmaniasis in Cameroon,
19 44 the first being done since 2001. The results obtained will provide an update of the
20 45 leishmaniasis situation in Cameroon, which is important for the development of better
21 46 management strategy in the fight against this group of diseases.
22 47 ➤ A narrative synthesis will be used to describe quality and content of the epidemiological
23 48 evidence; a thematic map of the distribution of leishmaniasis in Cameroon will be drawn.
24 49 ➤ A limit of this review could be the few number of published studies given that the
25 50 diseases is underexplored in Cameroon.
26 51 ➤ There are often reports of suspicious cases with signs and symptoms of these diseases,
27 52 but no confirmatory testing is carried out. This therefore represents a potential limitation
28 53 to this study.
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43 **Introduction**

44 57 Leishmaniasis is a complex vector-borne zoonotic disease caused by more than 20 species of
45 58 an obligate intracellular parasitic protozoa of the genus *Leishmania*, and transmitted by sand
46 59 fly vectors of the genera *Phlebotomus* and *Lutzomyia* [1]. Humans are infected when they share
47 60 the same environment with a sand fly vector, and reservoir hosts. There are different types of
48 61 leishmaniasis according to the infecting species and clinical presentations. According to the
49 62 2010 World Health Organization (WHO) expert committee report, the different forms of
50 63 leishmaniasis encountered in the old world are (i) visceral leishmaniasis (VL also known as
51 64 kala-azar, caused by *L. donovani* and *L. infantum*), (ii) cutaneous leishmaniasis (CL, most
52 65 frequently caused by *L. tropica*, *L. major*, and *L. aethiopica*), (iii) mucosal leishmaniasis (ML,
53 66 that can be caused by any species), (iv) diffused cutaneous leishmaniasis (DCL, caused by *L.*

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3 67 *aethiopica*) and (v) post Kala-azar dermal leishmaniasis (PKDL, present in all areas with *L.*
4 68 *donovani*) [2]. While CL is the most common form of the disease, VL is the most serious and
5
6 69 is almost always fatal if untreated [3].
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9 70

10 71 Leishmaniasis is highly heterogeneous in its distribution. In fact, while the incidence across a
11 72 region may appear low, focal areas are intensely affected, leading to a high complexity in
12 73 assessing the real incidence of the disease [4,5]. Globally, the disease is endemic in all the six
13
14 74 WHO regions, with 87 and 75 countries having reported at least one case of CL and VL,
15 75 respectively [6]. In 2015, an estimated 200,000 new CL and 25,000 new VL cases were reported
16
17 76 worldwide [6].
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22 78 Both CL and VL have been described in Cameroon, and studies have revealed the presence of
23 79 about 20 sandflies species [7,8]. In fact, the first cases of CL and VL were described in 1930
24 80 and 1976 in the northern part of the country and in a hospital in Yaoundé, respectively [9,10].
25
26 81 However, over the time, studies on leishmaniasis are becoming scarce, and data are very scanty
27 82 and poorly documented. Cameroon is currently classified among the countries with no data
28
29 83 available on leishmaniasis[11]. Indeed, Cameroon is classified by the WHO as endemic to CL
30 84 but with no available data on the number of cases, and appears among countries with previous
31 85 reported VL cases with no available data on the number of cases [6]. Since the systematic
32 86 review on the situation of leishmaniasis in Cameroon carried out in 2001 (Ref), no update has
33 87 been made to allow the establishment of new management strategies against this group of
34 88 diseases. There is therefore an urgent need to perform a situation analysis of leishmaniasis in
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36 89 Cameroon.
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45 91 **Objective**

46 92 This systematic review aims to document the infection rate, circulating species, vectors and
47 93 reservoirs of leishmaniasis as well as data on control/management strategies in Cameroon. This
48 94 will help updating the situation of leishmaniasis in Cameroon, and ultimately helps
49 95 defining/refining control strategies and reinforcing advocacy.
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55 97 **Review questions**

56 98 By documenting data on what is known and done so far on leishmaniasis in Cameroon, this
57 99 review will help answering the following questions:

- 60 100 1. What are the circulating species and the clinical presentations?

- 101 2. What are the vectors responsible of the transmission of leishmaniasis?
- 102 3. What are the non-human reservoirs of leishmaniasis?
- 103 4. How is the diagnostic of leishmaniasis conducted?
- 104 5. What is the level of endemicity and distribution of leishmaniasis?
- 105 6. How is the control of leishmaniasis organized?

108 **Methods and analysis**

109 This systematic review protocol was written in accordance with reporting guidance provided
110 by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocols
111 (PRISMA-P) statement [12] (see PRISMA-P checklist in Additional file 1). The registration
112 process of the protocol with the Prospective Register of Systematic reviews (PROSPERO)
113 database is done (registration reference number: 211864; registration process ongoing in
114 PROSPERO).

116 **Eligibility criteria**

117 There will be no restriction regarding the date of the study. Any type of study, either published
118 or not, on *Leishmania* species, endemicity, distribution, clinical presentation, co-infection (HIV
119 or any other infection), vectors and reservoirs in Cameroon will be eligible for this review.
120 Since leishmaniasis belongs to case management Neglected Tropical Diseases (NTDs) group,
121 case reports and health facilities' data will also be considered in this review. In addition, study
122 or reports on control/management, as well as surveillance will be of interest. However,
123 systematic reviews or meta-analyses will be excluded. The search languages will be English
124 and French, the Cameroon official languages in which almost all publications are done.

126 **Information sources and search strategies**

127 PubMed/MEDLINE, EMBASE and Web of Science will be searched, from their inception
128 onwards, to identify relevant articles. Grey literature will be identified through search in Google
129 Scholar and other relevant documents such as dissertation databases and government/control
130 program reports. The combination of keywords to use in the search strategy will be
131 "leishmaniose" OR "leishmaniasis" OR "Kala-azar" OR "black fever" OR "fièvre noire" OR
132 "Leishmania" OR "sandflies" OR "mouche du sable" OR "phlebotomine" OR "Phlebotomus"
133 AND "Cameroun" OR "Cameroon". Authors of primary publications or aggregated data and

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3 134 stakeholders involved in research and/or control of leishmaniasis in Cameroon (National Buruli
4 135 Ulcer, Leprosy, Yaws and Leishmaniasis Control Program) will be contacted to request for
5 136 unpublished data and/or resources (reports, datasets) relevant for this study.
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10 138 **Study selection**

11 139 Two independent reviewers will first screen titles and abstracts against eligibility criteria to
12 140 identify studies that can be potentially included in this review. Studies whose titles and abstracts
13 141 will give indication that they contain any relevant information on the topic will be included.
14 142 Full texts of articles deemed potentially relevant will then be retrieved and assessed by the two
15 143 independent reviewers for the compliance with eligibility criteria. Finally, data will be extracted
16 144 using a purpose-build Microsoft Office Excel spreadsheet. In case of disagreements between
17 145 the two independent reviewers, a third one will be involved as an adjudicator, either by
18 146 consensus or by discussion.
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27 148 **Data extraction and management**

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29 149 A reference manager software (EndNote/Zotero) will be used to manage the retrieval of
30 150 literature and to screen for and exclude duplicates. This will be done first automatically using
31 151 the “find duplicate” or “de-duplication” function under EndNote or Zotero, respectively, by
32 152 comparing the title or various combinations of the author(s), year, secondary title, volume,
33 153 issue, and page numbers. In the second instance, the records of suspected duplicates will be
34 154 visually inspected.
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41 156 Full texts will be read, and Excel spreadsheet will be used for data extraction. The following
42 157 items will be extracted: (a) title, (b) years of publication, (c) authors names, (d) location of the
43 158 study (regions, health areas, communities), (e) type of environment (forest, savannah, forest-
44 159 savannah mosaic, type of vegetation), (f) place of report (communities, school or hospital for
45 160 case report), (g) date of data collection, (h) type of study (is the study on human, vectors or
46 161 animal reservoirs), (i) study design, (j) diagnostic methods, (k) *Leishmania* species, (l) vector
47 162 species, (m) potential reservoirs, (n) treatment provided, (o) geographical coordinates (latitude,
48 163 longitude and altitude).
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56 165 **Outcomes**

57
58 166 The main outcomes will be (1) the prevalence of leishmaniasis, (2) the distribution throughout
59 167 the country, (3) the infecting species and their distribution, (4) the vectors responsible of
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3 168 transmission and (5) the animal reservoir species. In addition, the secondary outcomes will be
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5 169 the management of cases (diagnostic, treatment, reporting, intervention...).

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8 171 **Data analysis**

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10 172 Data will be recorded as prevalence with 95% confidence intervals [13]. Prevalence of infection
11
12 173 estimates will be stratified according to gender, age, geographical location, and year of
13
14 174 publication. Chi-square test will be used to compare the prevalence of leishmaniasis between
15
16 175 different data collection time points/periods. Data on prevalence and vectors will be used to
17
18 176 draw thematic map of the distribution of leishmaniasis in Cameroon using a geographical
19
20 177 information system (GIS) software (ArcGIS, version 10.2, ESRI Inc.)

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23 179 **Assessment of risk of bias**

24 180 The risk of bias of primary observational studies will be evaluated using a methodological
25
26 181 quality critical appraisal checklist proposed in the Joanna Briggs Institute (JBI) systematic
27
28 182 review methods manual [14]. We will also not include studies with aggregated data by
29
30 183 community/village.

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33 185 **Confidence in cumulative evidence**

34 186 The quality of the evidence will be judged using the Grading of Recommendations Assessment,
35
36 187 Development and Evaluation (GRADE) approach [15]. Evidence quality assessment will be
37
38 188 performed for each outcome. The grades of evidence will be defined into four categories and
39
40 189 adjudicated as “high” (further research is unlikely to change our confidence in the estimate of
41
42 190 effect), “moderate” (further research is likely to have an important impact on our confidence in
43
44 191 the estimate of effect and may change the estimate), “low” (further research is very likely to
45
46 192 have an important impact on our confidence in the estimate of effect and is likely to change the
47
48 193 estimate) and “very low”(any estimate of effect is very uncertain) [15]. The confidence in
49
50 194 evidence will be discussed among authors, and a narrative synthesis of the results will be
51
52 195 provided as some degree of heterogeneity is expected.

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55 197 **Presentation and reporting of results**

56 198 A flow chart will be used to demonstrate the study selection process. Table or plots will be used
57
58 199 to represent qualitative/quantitative variables when appropriate. Data on prevalence, infective

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3 200 species and vectors will be used to draw thematic map of the distribution of leishmaniasis in
4
5 201 Cameroon.

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8 203 **Amendments to protocol**

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10 204 Any necessary amendment to the protocol will be registered with PROSPERO and documented
11
12 205 in the final publication, by indicating the date, description and rationale of each amendment.

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14 206

15 207 **Ethics and dissemination**

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17 208 This proposed study will not require ethical approval as it will be based on already existing
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19 209 published or unpublished data. The final report of this review will be published in a peer-
20
21 210 reviewed journal, and the outcomes will be used (i) as baseline information to design further
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23 211 studies that will help to better refine the epidemiological situation of leishmaniasis in
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25 212 Cameroon, and (ii) to inform both program managers and policy makers of the situation of
26
27 213 leishmaniasis in the country.

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30 215 **Author affiliation**

31 216 ¹Centre for Research on Filariasis and other Tropical Diseases (CRFilMT), Yaoundé,
32 217 Cameroon

33
34 218 ²Molecular Diagnosis Research Group, Biotechnology Centre-University of Yaoundé I (BTC-
35 219 UY-I), Yaoundé Cameroon

36
37 220 ³Parasitology and Ecology Laboratory, Department of Animal Biology and Physiology, Faculty
38 221 of Sciences, University of Yaoundé I, Yaoundé Cameroon

39
40 222 ⁴National Buruli Ulcer, Leprosy, Yaws and Leishmaniasis Control Program, Ministry of Public
41 223 Health, Yaoundé, Cameroon

42
43 224 ⁵National Neglected Tropical Diseases Coordination Unit, Ministry of Public Health, Yaounde,
44 225 Cameroon

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46 226 ⁶Department of Public Health, Faculty of Medicine and Biomedical Sciences, University of
47 227 Yaoundé I, Yaoundé, Cameroon

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50 229 **Author's contributions**

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52 230 All study authors contributed intellectually to the development of the present protocol. LDY,
53
54 231 AD and HND prepared the first draft of the manuscript. All authors reviewed and approved this
55
56 232 version of this manuscript. HND and JK are the study guarantors.

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4
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6 236

7
8 237 **Competing interests**

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10 238 The authors declare that they have no competing interests.

11 239

12
13 240 **Word count**

14
15 241 1588

16 242

17
18 243 **Additional files**

19
20 244 Additional file 1: Text S1. PRISMA-P checklist

21 245

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24 247 **REFERENCES**

- 25
26 248 1 World Health Organization. Control of the Leishmaniasis: Report of a WHO Expert
27 249 Committee. *Weekly Epidemiological Record* 1991;**66**:88–88.
- 28
29 250 2 World Health Organization. Report of a meeting of the WHO Expert Committee on the
30 251 Control of Leishmaniasis, Geneva, Switzerland, 22–26 March 2010. *WHO technical*
31 252 *report series* 2010.
- 32
33 253 3 Colmenares M, Kar S, Goldsmith-Pestana K, *et al.* Mechanisms of pathogenesis:
34 254 differences amongst *Leishmania* species. *Transactions of the Royal Society of Tropical*
35 255 *Medicine and Hygiene* 2002;**96**:S3–7. doi:10.1016/S0035-9203(02)90044-1
- 36
37 256 4 Bern C, Hightower AW, Chowdhury R, *et al.* Risk factors for kala-azar in Bangladesh.
38 257 *Emerging infectious diseases* 2005;**11**:655.
- 39
40 258 5 Bern C, Maguire JH, Alvar J. Complexities of assessing the disease burden attributable to
41 259 leishmaniasis. *PLoS Negl Trop Dis* 2008;**2**:e313.
- 42
43 260 6 Global leishmaniasis update, 2006–2015: a turning point in leishmaniasis surveillance–
44 261 *Weekly Epidemiological Record* 2017;**92**:557–65.
- 45
46 262 7 Dondji B, Duhlińska DD, Same-Ekobo A. Species Composition of the Phlebotomine
47 263 Sandfly Fauna (Diptera: Phlebotominae) in Mokolo Region, Northern Cameroon. *Insect*
48 264 *Science and Its Application* 2000;**20**:221–6. doi:10.1017/S1742758400019676
- 49
50 265 8 Tateng AN, Payne VK, Ngouateu OB, *et al.* Inventory and taxonomy of phlebotomine
51 266 sand flies of the Mokolo leishmaniasis focus, northern Cameroon, with description of new
52 267 *Sergentomyia* taxa (Diptera: Psychodidae). *Acta Tropica* 2019;**194**:172–80.
53 268 doi:10.1016/j.actatropica.2019.04.006

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3 269 9 Dondji B. Leishmaniasis and Phlebotomus of Cameroon: review of current data. *Bulletin*
4 270 *de la Societe de pathologie exotique (1990)* 2001;**94**:277–9.
5
6 271 10 Deniau M, Mbede J, Obama M, *et al.* Premier cas confirmé de leishmaniose viscérale au
7 272 Cameroun. *Bull Soc Fr Parasitol* 1986;**4**:197–200.
8
9 273 11 Gyapong J, Boatin B. *Neglected tropical diseases-sub-Saharan Africa*. Springer 2016.
10
11 274 12 Moher D, Shamseer L, Clarke M, *et al.* Preferred reporting items for systematic review
12 275 and meta-analysis protocols (PRISMA-P) 2015 statement. *Systematic reviews* 2015;**4**:1.
13
14 276 13 Brown LD, Cai TT, DasGupta A. Interval estimation for a binomial proportion. *Statistical*
15 277 *science* 2001;:101–17.
16
17 278 14 Munn Z, Moola S, Lisy K, *et al.* Chapter 5: systematic reviews of prevalence and
18 279 incidence. *Joanna Briggs Institute Reviewer's Manual The Joanna Briggs Institute*
19 280 2017;:37.
20
21 281 15 GRADE Working Group. Grading quality of evidence and strength of recommendations.
22 282 *Bmj* 2004;**328**:1490.
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Reporting checklist for protocol of a systematic review.

Based on the PRISMA-P guidelines.

Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

Your article may not currently address all the items on the checklist. Please modify your text to include the missing information. If you are certain that an item does not apply, please write "n/a" and provide a short explanation.

Upload your completed checklist as an extra file when you submit to a journal.

In your methods section, say that you used the PRISMA-Reporting guidelines, and cite them as:

Moher D, Shamseer L, Clarke M, Ghersi D, Liberati A, Petticrew M, Shekelle P, Stewart LA. Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) 2015 statement. Syst Rev. 2015;4(1):1.

	Reporting Item	Page Number
Title		
Identification	#1a Identify the report as a protocol of a systematic review	1
Update	#1b If the protocol is for an update of a previous systematic review, identify as such	n/a; this is the initial protocol, not an update.

1 **Registration**

2
3
4 [#2](#) If registered, provide the name of the registry (such as 2
5
6 PROSPERO) and registration number
7
8

9 **Authors**

10
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12
13 **Contact** [#3a](#) Provide name, institutional affiliation, e-mail address of 7
14
15 all protocol authors; provide physical mailing address
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17 of corresponding author
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19
20 **Contribution** [#3b](#) Describe contributions of protocol authors and identify 7
21
22 the guarantor of the review
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25 **Amendments**

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29 [#4](#) If the protocol represents an amendment of a 7
30
31 previously completed or published protocol, identify as
32
33 such and list changes; otherwise, state plan for
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35 documenting important protocol amendments
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38 **Support**

39
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42 **Sources** [#5a](#) Indicate sources of financial or other support for the 8
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44 review
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47 **Sponsor** [#5b](#) Provide name for the review funder and / or sponsor n/a; this
48
49 publication is not
50
51 funded.
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55 **Role of sponsor** [#5c](#) Describe roles of funder(s), sponsor(s), and / or n/a; this
56
57 or funder institution(s), if any, in developing the protocol publication is not
58
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funded.

Introduction

Rationale [#6](#) Describe the rationale for the review in the context of what is already known 2

Objectives [#7](#) Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO) 3

Methods

Eligibility criteria [#8](#) Specify the study characteristics (such as PICO, study design, setting, time frame) and report characteristics (such as years considered, language, publication status) to be used as criteria for eligibility for the review 4

Information sources [#9](#) Describe all intended information sources (such as electronic databases, contact with study authors, trial registers or other grey literature sources) with planned dates of coverage 4

Search strategy [#10](#) Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated 4

Study records - data [#11a](#) Describe the mechanism(s) that will be used to manage records and data throughout the review 5

management

Study records - [#11b](#) State the process that will be used for selecting studies 5

1	selection process	(such as two independent reviewers) through each	
2		phase of the review (that is, screening, eligibility and	
3		inclusion in meta-analysis)	
4			
5			
6			
7			
8	Study records -	#11c Describe planned method of extracting data from	5
9			
10	data collection	reports (such as piloting forms, done independently, in	
11		duplicate), any processes for obtaining and confirming	
12	process	data from investigators	
13			
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18	Data items	#12 List and define all variables for which data will be	5
19		sought (such as PICO items, funding sources), any	
20		pre-planned data assumptions and simplifications	
21			
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25	Outcomes and	#13 List and define all outcomes for which data will be	5-6
26			
27	prioritization	sought, including prioritization of main and additional	
28		outcomes, with rationale	
29			
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33	Risk of bias in	#14 Describe anticipated methods for assessing risk of bias	6
34			
35	individual studies	of individual studies, including whether this will be done	
36		at the outcome or study level, or both; state how this	
37		information will be used in data synthesis	
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43	Data synthesis	#15a Describe criteria under which study data will be	6
44		quantitatively synthesised	
45			
46			
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48	Data synthesis	#15b If data are appropriate for quantitative synthesis,	6
49		describe planned summary measures, methods of	
50		handling data and methods of combining data from	
51		studies, including any planned exploration of	
52		consistency (such as I ² , Kendall's τ)	
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1	Data synthesis	#15c	Describe any proposed additional analyses (such as	n/a; meta-
2			sensitivity or subgroup analyses, meta-regression)	analyses will not
3				be performed.
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8	Data synthesis	#15d	If quantitative synthesis is not appropriate, describe the	n/a; meta-
9			type of summary planned	analyses will not
10				be performed.
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16	Meta-bias(es)	#16	Specify any planned assessment of meta-bias(es)	6
17			(such as publication bias across studies, selective	
18			reporting within studies)	
19				
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23				
24	Confidence in	#17	Describe how the strength of the body of evidence will	6
25			be assessed (such as GRADE)	
26	cumulative			
27	evidence			
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31				
32	None		The PRISMA-P checklist is distributed under the terms of the Creative Commons Attribution	
33			License CC-BY 4.0. This checklist can be completed online using https://www.goodreports.org/ , a tool	
34			made by the EQUATOR Network in collaboration with Penelope.ai	
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BMJ Open

Leishmaniasis in Cameroon: what is known and is done so far? A protocol for systematic review

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1 **Leishmaniasis in Cameroon: what is known and is done so far? A protocol** 2 **for systematic review**

3 Linda Djune-Yemeli^{1,2}, André Domche^{1,3}, Hugues C. Nana-Djeunga^{1,3,*}, Cédric G. Lenou-
4 Nanga¹, Earnest N. Tabah⁴, Georges B. Nko'Ayissi⁵, Joseph Kamgno^{1,6}

5 **Author affiliations**

6 ¹Centre for Research on Filariasis and other Tropical Diseases (CRFilMT), Yaoundé,
7 Cameroon

8 ²Molecular Diagnosis Research Group, Biotechnology Centre-University of Yaoundé I (BTC-
9 UY-I), Yaoundé Cameroon

10 ³Parasitology and Ecology Laboratory, Department of Animal Biology and Physiology, Faculty
11 of Sciences, University of Yaoundé 1, Yaoundé Cameroon

12 ⁴National Buruli Ulcer, Leprosy, Yaws and Leishmaniasis Control Program, Ministry of Public
13 Health, Yaoundé, Cameroon

14 ⁵National Neglected Tropical Diseases Coordination Unit, Ministry of Public Health, Yaounde,
15 Cameroon

16 ⁶Department of Public Health, Faculty of Medicine and Biomedical Sciences, University of
17 Yaoundé I, Yaoundé, Cameroon

18 ***Author for correspondence:** Hugues C Nana Djeunga, PO Box 5797, Yaoundé, Email:
19 nanadjeunga@crfilmt.org; Phone: +237 699 07 64 99; Fax: +237 222 20 24 43.

20 **Abstract**

21 **Introduction:** First visceral and cutaneous leishmaniasis cases were reported in Cameroon
22 since more than six decades. However, interest in the disease has decreased over time and data
23 on its epidemiology across the country are scanty. This systematic review aims to update data
24 on what is known and done so far on leishmaniasis in Cameroon.

25 **Methods and analysis:** PubMed/MEDLINE, EMBASE and Web of Science will be searched
26 from inception onwards. Grey literature will be identified through Google Scholar searches,
27 dissertation databases and other relevant documents such as report of the National Control
28 Program. Searches will be conducted between January and February 2021. All studies reporting

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2
3 35 endemicity, distribution, infecting species, vectors and reservoirs will be eligible. The main
4 36 outcomes will be epidemiological data (infection rate, distribution, infecting species, vectors
5 37 and animal reservoir), while the secondary outcomes will be the cases management (diagnostic,
6 38 treatment, reporting, intervention...). Two reviewers will independently screen eligible papers,
7 39 and potential conflicts will be resolved by involving a third reviewer as an adjudicator.
8 40 Methodological quality including bias will be appraised using a methodological quality critical
9 41 appraisal checklist proposed in the Joanna Briggs Institute (JBI) systematic review methods
10 42 manual. A narrative synthesis will describe quality and content of the epidemiological evidence.
11 43 Data on prevalence and vectors will be used to draw thematic maps of the distribution of
12 44 leishmaniasis in Cameroon.
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22 46 **Ethics and dissemination:** This study will not require ethical approval as it will be based on
23 47 already published or unpublished data. The final report of this review will be published in a
24 48 peer-reviewed journal, and the outcomes will be used (i) as baseline information to design
25 49 further studies that will help to better refine the epidemiological situation of leishmaniasis in
26 50 Cameroon, and (ii) to inform both program managers and policy makers of the situation of
27 51 leishmaniasis in the country.
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34 53 **Systematic review registration:**

35 54 This protocol was registered with the International Prospective Register of Systematic reviews
36 55 (PROSPERO; registration number: CRD42020211864) database.
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41 57 **Strengths and limitations of this study**

- 42
43 58 ➤ To our knowledge, this article will be the second review on leishmaniasis in Cameroon,
44 59 the first being done since 2001. The results obtained will provide an update of the
45 60 leishmaniasis situation in Cameroon, which is important for the development of better
46 61 management strategy in the fight against this group of diseases.
47
48 62 ➤ A narrative synthesis will be used to describe quality and content of the epidemiological
49 63 evidence; a thematic map of the distribution of leishmaniasis in Cameroon will be drawn.
50 64 ➤ A limit of this review could be the few number of published studies given that the
51 65 diseases is underexplored in Cameroon.
52
53 66 ➤ There are often reports of suspicious cases with signs and symptoms of these diseases,
54 67 but no confirmatory testing is carried out. This therefore represents a potential limitation
55 68 to this study.
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7 **Introduction**

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9 72 Leishmaniasis is a complex vector-borne zoonotic disease caused by more than 20 species of
10 73 an obligate intracellular parasitic protozoa of the genus *Leishmania*, and transmitted by sand
11 74 fly vectors of the genera *Phlebotomus* and *Lutzomyia* [1]. Humans are infected when they share
12 75 the same environment with a sand fly vector, and reservoir hosts. There are different types of
13 76 leishmaniasis according to the infecting species and clinical presentations. According to the
14 77 2010 World Health Organization (WHO) expert committee report, the different forms of
15 78 leishmaniasis encountered in the old world are (i) visceral leishmaniasis (VL also known as
16 79 kala-azar, caused by *L. donovani* and *L. infantum*), (ii) cutaneous leishmaniasis (CL, most
17 80 frequently caused by *L. tropica*, *L. major*, and *L. aethiopica*), (iii) mucosal leishmaniasis (ML,
18 81 that can be caused by any species), (iv) diffused cutaneous leishmaniasis (DCL, caused by *L.*
19 82 *aethiopica*) and (v) post Kala-azar dermal leishmaniasis (PKDL, present in all areas with *L.*
20 83 *donovani*) [2]. While CL is the most common form of the disease, VL is the most serious and
21 84 is almost always fatal if untreated [3].

22 85
23
24 86 Leishmaniasis is highly heterogeneous in its distribution. In fact, while the incidence across a
25 87 region may appear low, focal areas are intensely affected, leading to a high complexity in
26 88 assessing the real incidence of the disease [4,5]. Globally, the disease is endemic in all the six
27 89 WHO regions, with 87 and 75 countries having reported at least one case of CL and VL,
28 90 respectively [6]. In 2015, an estimated 200,000 new CL and 25,000 new VL cases were reported
29 91 worldwide [6].

30 92
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32 93 Both CL and VL have been described in Cameroon, and studies have revealed the presence of
33 94 about 20 sandflies species [7,8]. In fact, the first cases of CL and VL were described in 1930
34 95 and 1976 in the northern part of the country and in a hospital in Yaoundé, respectively [9,10].
35 96 However, over the time, studies on leishmaniasis are becoming scarce, and data are very scanty
36 97 and poorly documented. Cameroon is currently classified among the countries with no data
37 98 available on leishmaniasis[11]. Indeed, Cameroon is classified by the WHO as endemic to CL
38 99 but with no available data on the number of cases, and appears among countries with previous
39 100 reported VL cases with no available data on the number of cases [6]. Since the systematic
40 101 review on the situation of leishmaniasis in Cameroon carried out in 2001 [9], and the

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3 102 leishmaniasis country profile established by WHO in 2012 [12] no update has been made to
4
5 103 allow the establishment of new management strategies against this group of diseases. There is
6
7 104 therefore an urgent need to perform a situation analysis of leishmaniasis in Cameroon.
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9 105

10 106 **Objective**

11 107 This systematic review aims to document the infection rate, circulating species, vectors and
12 108 reservoirs of leishmaniasis as well as data on control/management strategies in Cameroon. This
13 109 will help updating the situation of leishmaniasis in Cameroon, and ultimately helps
14 110 defining/refining control strategies and reinforcing advocacy.
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20 112 **Review questions**

21 113 By documenting data on what is known and done so far on leishmaniasis in Cameroon, this
22 114 review will help answering the following questions:

- 25 115 1. What are the circulating species and the clinical presentations?
 - 26 116 2. What are the vectors responsible of the transmission of leishmaniasis?
 - 27 117 3. What are the non-human reservoirs of leishmaniasis?
 - 28 118 4. How is the diagnostic of leishmaniasis conducted?
 - 29 119 5. What is the level of endemicity and distribution of leishmaniasis?
 - 30 120 6. How is the control of leishmaniasis organized?
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40 123 **Methods and analysis**

41 124 This systematic review protocol was written in accordance with reporting guidance provided
42 125 by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocols
43 126 (PRISMA-P) statement [13] (see PRISMA-P checklist as Supplementary file 1). The
44 127 registration process of the protocol with the Prospective Register of Systematic reviews
45 128 (PROSPERO) database is done (registration number: CRD42020211864; registration process
46 129 ongoing in PROSPERO). The review process will be conducted between January and February
47 130 2021.
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54 132 **Eligibility criteria**

55 133 There will be no restriction regarding the date of the study. Any type of study, either published
56 134 or not, on *Leishmania* species, endemicity, distribution, clinical presentation, co-infection (HIV

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3 135 or any other infection), vectors and reservoirs in Cameroon will be eligible for this review.
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5 136 Since leishmaniasis belongs to case management Neglected Tropical Diseases (NTDs) group,
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7 137 case reports and health facilities' data will also be considered in this review. In addition, study
8
9 138 or reports on control/management, as well as surveillance will be of interest. However,
10
11 139 systematic reviews or meta-analyses will be excluded. The search languages will be English
12
13 140 and French, the Cameroon official languages in which almost all publications are done.
14
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15 142 **Information sources and search strategies**

16
17 143 PubMed/MEDLINE, EMBASE and Web of Science will be searched, from their inception
18
19 144 onwards, to identify relevant articles. Grey literature will be identified through search in Google
20
21 145 Scholar and other relevant documents such as dissertation databases and government/control
22
23 146 program reports. The combination of keywords to use in the search strategy will be
24
25 147 "leishmaniose" OR "leishmaniasis" OR "Kala-azar" OR "black fever" OR "fièvre noire" OR
26
27 148 "Leishmania" OR "sandflies" OR "mouche du sable" OR "phlebotomine" OR "Phlebotomus"
28
29 149 AND "Cameroun" OR "Cameroon" (Supplementary file 2). Authors of primary publications or
30
31 150 aggregated data and stakeholders involved in research and/or control of leishmaniasis in
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33 151 Cameroon (National Buruli Ulcer, Leprosy, Yaws and Leishmaniasis Control Program) will be
34
35 152 contacted to request for unpublished data and/or resources (reports, datasets) relevant for this
36
37 153 study.
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37 155 **Study selection**

39 156 Two independent reviewers will first screen titles and abstracts against eligibility criteria to
40
41 157 identify studies that can be potentially included in this review. Studies whose titles and abstracts
42
43 158 will give indication that they contain any relevant information on the topic will be included.
44
45 159 Full texts of articles deemed potentially relevant will then be retrieved and assessed by the two
46
47 160 independent reviewers for the compliance with eligibility criteria. Finally, data will be extracted
48
49 161 using a purpose-build Microsoft Office Excel spreadsheet. In case of disagreements between
50
51 162 the two independent reviewers, a third one will be involved as an adjudicator, either by
52
53 163 consensus or by discussion.
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55 165 **Data extraction and management**

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57 166 A reference manager software (EndNote/Zotero) will be used to manage the retrieval of
58
59 167 literature and to screen for and exclude duplicates. This will be done first automatically using
60
168 the "find duplicate" or "de-duplication" function under EndNote or Zotero, respectively, by

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3 169 comparing the title or various combinations of the author(s), year, secondary title, volume,
4 170 issue, and page numbers. In the second instance, the records of suspected duplicates will be
5 171 visually inspected.
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10 173 Full texts will be read, and Excel spreadsheet will be used for data extraction. The following
11 174 items will be extracted: (a) title, (b) years of publication, (c) authors names, (d) location of the
12 175 study (regions, health areas, communities), (e) type of environment (forest, savannah, forest-
13 176 savannah mosaic, type of vegetation), (f) place of report (communities, school or hospital for
14 177 case report), (g) date of data collection, (h) type of study (is the study on human, vectors or
15 178 animal reservoirs), (i) study design, (j) diagnostic methods, (k) *Leishmania* species, (l) vector
16 179 species, (m) potential reservoirs, (n) treatment provided, (o) geographical coordinates (latitude,
17 180 longitude and altitude).
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25 182 **Outcomes**

26 183 The main outcomes will be (1) the prevalence of leishmaniasis, (2) the distribution throughout
27 184 the country, (3) the infecting species and their distribution, (4) the vectors responsible of
28 185 transmission and (5) the animal reservoir species. In addition, the secondary outcomes will be
29 186 the management of cases (diagnostic, treatment, reporting, intervention...). We therefore
30 187 expected at the end of this study to demonstrate that although data on leishmaniasis are scanty
31 188 in Cameroon, the disease is a public health concern. This will further serve (i) as basis to design
32 189 studies that will help to better refine the epidemiological situation of leishmaniasis in
33 190 Cameroon, and (ii) to inform both program managers and policy makers of the situation of
34 191 leishmaniasis in the country.
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44 193 **Data analysis**

45 194 Data will be recorded as prevalence with 95% confidence intervals [14]. Prevalence of infection
46 195 estimates will be stratified according to gender, age, geographical location, and year of
47 196 publication. Chi-square test will be used to compare the prevalence of leishmaniasis between
48 197 different data collection time points/periods. Data on prevalence and vectors will be used to
49 198 draw thematic map of the distribution of leishmaniasis in Cameroon using a geographical
50 199 information system (GIS) software (ArcGIS, version 10.2, ESRI Inc.)
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201 **Assessment of risk of bias**

202 The risk of bias of primary observational studies will be evaluated using a methodological
203 quality critical appraisal checklist proposed in the Joanna Briggs Institute (JBI) systematic
204 review methods manual [15]. We will also not include studies with aggregated data by
205 community/village.

207 **Confidence in cumulative evidence**

208 The quality of the evidence will be judged using the Grading of Recommendations Assessment,
209 Development and Evaluation (GRADE) approach [16]. Evidence quality assessment will be
210 performed for each outcome. The grades of evidence will be defined into four categories and
211 adjudicated as “high” (further research is unlikely to change our confidence in the estimate of
212 effect), “moderate” (further research is likely to have an important impact on our confidence in
213 the estimate of effect and may change the estimate), “low” (further research is very likely to
214 have an important impact on our confidence in the estimate of effect and is likely to change the
215 estimate) and “very low”(any estimate of effect is very uncertain) [16]. The confidence in
216 evidence will be discussed among authors, and a narrative synthesis of the results will be
217 provided as some degree of heterogeneity is expected.

219 **Presentation and reporting of results**

220 A flow chart will be used to demonstrate the study selection process. Table or plots will be used
221 to represent qualitative/quantitative variables when appropriate. Data on prevalence, infective
222 species and vectors will be used to draw thematic map of the distribution of leishmaniasis in
223 Cameroon.

225 **Patient and Public Involvement**

226 No patient involved.

228 **Amendments to protocol**

229 After approval of the protocol, any important amendments will be documented in the final
230 publication. The date, rationale and description of each change will be provided. If necessary,
231 these amendments will be registered with PROSPERO.

233 **Ethics and dissemination**

234 This proposed study will not require ethical approval as it will be based on already existing
235 published or unpublished data. The final report of this review will be published in a peer-
236 reviewed journal, and the outcomes will be used (i) as baseline information to design further
237 studies that will help to better refine the epidemiological situation of leishmaniasis in
238 Cameroon, and (ii) to inform both program managers and policy makers of the situation of
239 leishmaniasis in the country.

240

241 **Author's contributions**

242 LDY, AD, HCND, CGLN, ENT, GBN and JK contributed intellectually to the development of
243 the present protocol. LDY, AD and HCND prepared the first draft of the manuscript. LDY, AD,
244 HCND, CGLN, ENT, GBN and JK reviewed and approved the final version of the manuscript.
245 HCND and JK are the study guarantors.

246

247 **Funding**

248 Not applicable.

249

250 **Competing interests**

251 The authors declare that they have no competing interests.

252

253 **Word count**

254 1725

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257 **Additional files**

258 Supplementary file 1: Text S1. PRISMA-P checklist

259 Supplementary file 2: Table S1. Example of search strategy used in PubMed/Medline

260

261

262 **References**

- 263 1 World Health Organization. Control of the Leishmaniases: Report of a WHO Expert
264 Committee. *Weekly Epidemiological Record= Relevé épidémiologique hebdomadaire*
265 1991;**66**:88–88.

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3 266 2 World Health Organization. Report of a meeting of the WHO Expert Committee on the
4 267 Control of Leishmaniasis, Geneva, Switzerland, 22-26 March 2010. *WHO technical report*
5 268 *series* 2010.
- 7 269 3 Colmenares M, Kar S, Goldsmith-Pestana K, *et al.* Mechanisms of pathogenesis:
8 270 differences amongst *Leishmania* species. *Transactions of the Royal Society of Tropical*
9 271 *Medicine and Hygiene* 2002;**96**:S3–7. doi:10.1016/S0035-9203(02)90044-1
- 12 272 4 Bern C, Hightower AW, Chowdhury R, *et al.* Risk factors for kala-azar in Bangladesh.
13 273 *Emerging infectious diseases* 2005;**11**:655.
- 15 274 5 Bern C, Maguire JH, Alvar J. Complexities of assessing the disease burden attributable to
16 275 leishmaniasis. *PLoS Negl Trop Dis* 2008;**2**:e313.
- 19 276 6 mondiale de la Santé O, World Health Organization. Global leishmaniasis update, 2006–
20 277 2015: a turning point in leishmaniasis surveillance—Le point sur la situation mondiale de la
21 278 leishmaniose, 2006-2015: un tournant dans la surveillance de la maladie. *Weekly*
22 279 *Epidemiological Record= Relevé épidémiologique hebdomadaire* 2017;**92**:557–65.
- 24 280 7 Dondji B, Duhlińska DD, Same-Ekobo A. Species Composition of the Phlebotomine
25 281 Sandfly Fauna (Diptera: Phlebotominae) in Mokolo Region, Northern Cameroon. *Insect*
26 282 *Science and Its Application* 2000;**20**:221–6. doi:10.1017/S1742758400019676
- 29 283 8 Tateng AN, Payne VK, Ngouateu OB, *et al.* Inventory and taxonomy of phlebotomine sand
30 284 flies of the Mokolo leishmaniasis focus, northern Cameroon, with description of new
31 285 *Sergentomyia* taxa (Diptera: Psychodidae). *Acta Tropica* 2019;**194**:172–80.
32 286 doi:10.1016/j.actatropica.2019.04.006
- 34 287 9 Dondji B. Leishmaniasis and Phlebotomus of Cameroon: review of current data. *Bulletin*
35 288 *de la Societe de pathologie exotique (1990)* 2001;**94**:277–9.
- 37 289 10 Deniau M, Mbede J, Obama M, *et al.* Premier cas confirmé de leishmaniose viscérale au
38 290 Cameroun. *Bull Soc Fr Parasitol* 1986;**4**:197–200.
- 41 291 11 Gyapong J, Boatın B. *Neglected tropical diseases-sub-Saharan Africa*. Springer 2016.
- 43 292 12 Alvar J, Vélez ID, Bern C, *et al.* Leishmaniasis Worldwide and Global Estimates of Its
44 293 Incidence. *PLOS ONE* 2012;**7**:e35671. doi:10.1371/journal.pone.0035671
- 46 294 13 Moher D, Shamseer L, Clarke M, *et al.* Preferred reporting items for systematic review and
47 295 meta-analysis protocols (PRISMA-P) 2015 statement. *Systematic reviews* 2015;**4**:1.
- 49 296 14 Brown LD, Cai TT, DasGupta A. Interval estimation for a binomial proportion. *Statistical*
50 297 *science* 2001;101–17.
- 53 298 15 Munn Z, Moola S, Lisy K, *et al.* Chapter 5: systematic reviews of prevalence and incidence.
54 299 *Joanna Briggs Institute Reviewer's Manual The Joanna Briggs Institute* 2017;:37.
- 56 300 16 GRADE Working Group. Grading quality of evidence and strength of recommendations.
57 301 *Bmj* 2004;**328**:1490.

Reporting checklist for protocol of a systematic review.

Based on the PRISMA-P guidelines.

Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

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In your methods section, say that you used the PRISMA-Reporting guidelines, and cite them as:

Moher D, Shamseer L, Clarke M, Ghersi D, Liberati A, Petticrew M, Shekelle P, Stewart LA. Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) 2015 statement. *Syst Rev.* 2015;4(1):1.

		Reporting Item	Page Number
Title			
Identification	#1a	Identify the report as a protocol of a systematic review	1
Update	#1b	If the protocol is for an update of a previous systematic review, identify as such	n/a; this is the initial protocol, not an update.
Registration			
	#2	If registered, provide the name of the registry (such as PROSPERO) and registration number	2
Authors			
Contact	#3a	Provide name, institutional affiliation, e-mail address of all protocol authors; provide physical mailing address of corresponding author	1
Contribution	#3b	Describe contributions of protocol authors and identify	8

the guarantor of the review

Amendments

[#4](#) If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments

Support

Sources [#5a](#) Indicate sources of financial or other support for the review

Sponsor [#5b](#) Provide name for the review funder and / or sponsor n/a; this publication is not funded.

Role of sponsor or funder [#5c](#) Describe roles of funder(s), sponsor(s), and / or institution(s), if any, in developing the protocol n/a; this publication is not funded.

Introduction

Rationale [#6](#) Describe the rationale for the review in the context of what is already known

Objectives [#7](#) Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)

Methods

Eligibility criteria [#8](#) Specify the study characteristics (such as PICO, study design, setting, time frame) and report characteristics (such as years considered, language, publication status) to be used as criteria for eligibility for the review

Information sources [#9](#) Describe all intended information sources (such as electronic databases, contact with study authors, trial registers or other grey literature sources) with planned dates of coverage

Search strategy [#10](#) Present draft of search strategy to be used for at least

one electronic database, including planned limits, such that it could be repeated

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4	Study records -	#11a	Describe the mechanism(s) that will be used to
5	data management		manage records and data throughout the review
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8	Study records -	#11b	State the process that will be used for selecting
9	selection process		studies (such as two independent reviewers) through
10			each phase of the review (that is, screening, eligibility
11			and inclusion in meta-analysis)
12			
13			
14	Study records -	#11c	Describe planned method of extracting data from
15	data collection		reports (such as piloting forms, done independently, in
16	process		duplicate), any processes for obtaining and confirming
17			data from investigators
18			
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21	Data items	#12	List and define all variables for which data will be
22			sought (such as PICO items, funding sources), any
23			pre-planned data assumptions and simplifications
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27	Outcomes and	#13	List and define all outcomes for which data will be
28	prioritization		sought, including prioritization of main and additional
29			outcomes, with rationale
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32	Risk of bias in	#14	Describe anticipated methods for assessing risk of
33	individual studies		bias of individual studies, including whether this will be
34			done at the outcome or study level, or both; state how
35			this information will be used in data synthesis
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39	Data synthesis	#15a	Describe criteria under which study data will be
40			quantitatively synthesised
41			
42			
43	Data synthesis	#15b	If data are appropriate for quantitative synthesis,
44			describe planned summary measures, methods of
45			handling data and methods of combining data from
46			studies, including any planned exploration of
47			consistency (such as I ² , Kendall's τ)
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51	Data synthesis	#15c	Describe any proposed additional analyses (such as
52			sensitivity or subgroup analyses, meta-regression)
53			n/a; meta-
54			analyses will not
55			be performed.
56			
57	Data synthesis	#15d	If quantitative synthesis is not appropriate, describe
58			the type of summary planned
59			n/a; meta-
60			analyses will not

be performed.

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3	Meta-bias(es)	#16	Specify any planned assessment of meta-bias(es)
4			(such as publication bias across studies, selective
5			reporting within studies)
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8	Confidence in	#17	Describe how the strength of the body of evidence will
9	cumulative		be assessed (such as GRADE)
10	evidence		
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12			

13 None The PRISMA-P checklist is distributed under the terms of the Creative Commons Attribution
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 15 made by the [EQUATOR Network](#) in collaboration with [Penelope.ai](#)
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Table S1. Example of search strategy used in PubMed/Medline

Search #	PubMed search terms
#6	(((((Leishmaniose) OR (Leishmania)) OR (Fièvre noir)) OR (Mouche du sable)) OR (Phlebotome)) AND (Cameroun)
#5	((((((Leishmaniasis) OR (Kala-azar)) OR (Black fever)) OR (Leishmania)) OR (Sandflies)) OR (Phlebotomus)) OR (Phlebotomine)) AND (Cameroon)
#4	(((((Leishmaniose[Title/Abstract]) OR (Fièvre noir[Title/Abstract])) OR (Leishmania[Title/Abstract])) OR (Mouche du sable[Title/Abstract])) OR (Phlebotome[Title/Abstract])) AND (Cameroun[Title/Abstract]))
#3	((((((Leishmaniasis[Title/Abstract]) OR (Kala-azar[Title/Abstract])) OR (Black fever[Title/Abstract])) OR (Leishmania[Title/Abstract])) OR (Sandflies[Title/Abstract])) OR (Phlebotomus[Title/Abstract])) OR (Phlebotomine[Title/Abstract])) AND (Cameroon[Title/Abstract]))
#2	(((((Leishmaniose[Title]) OR (Fièvre noir[Title])) OR (Leishmania[Title])) OR (Mouche du sable[Title])) OR (Phlebotome[Title])) AND (Cameroun[Title]))
#1	((((((leishmaniasis[Title]) OR (Kala-azar[Title])) OR (Black fever[Title])) OR (Leishmania[Title])) OR (Sandflies[Title])) OR (Phlebotomine[Title])) OR (Phlebotomus[Title])) AND (Cameroon[Title]))