# **BMJ Open** Evidence-based guidelines for hypertension and diabetes in sub-Saharan Africa: a scoping review

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#### ABSTRACT

**Objective** The Collaboration for Evidence-Based Healthcare and Public Health in sub-Saharan Africa (CEBHA+), a research network, aims to build capacities for evidence-based healthcare. Hypertension (HTN) and diabetes mellitus (DM) are two priority areas of the network, both are major causes of burden of disease in this region. This review aimed to: (1) identify existing evidence-based guidelines for HTN and DM, (2) map their recommendations and (3) assess their quality. **Setting** Sub-Saharan Africa.

#### Design Scoping review.

Methods Systematic searches for evidence-based quidelines, developed with systematic review of evidence and certainty of evidence assessment, were undertaken in electronic databases and grey literature, and ministries of health of all countries in this region were contacted. Included guidelines were assessed with the Appraisal of Guidelines for research and evaluation II (AGREE-II) tool. Searches were conducted between 7 December 2021 and 14 January 2022. Results are presented descriptively. Results 66 potentially relevant guidelines were identified, developed in 23, out of 49 sub-Saharan African countries. Of these, only two guidelines (on DM) reported the use of systematic review of evidence and certainty of evidence assessment. Their guality appraisal showed that both have relatively similar scores on domains of AGREE-II. with higher scores on Scope and Purpose and Clarity and Presentation domains, and lower on Stakeholder Involvement, Applicability, Rigour of Development and Editorial independence domains. The overall scores of both guidelines were 50% and 58%, respectively. Conclusions Less than half of the countries in sub-Saharan Africa developed and published their own guidelines for HTN or DM. The quality appraisal showed that the two included guidelines scored relatively low in several crucial domains of AGREE-II. Countries in this region could consider adopting or adapting already published high-quality recommendations, in order to facilitate a more efficient and faster development of much needed trustworthy evidence-based guidance.

# BACKGROUND

Non-communicable diseases (NCDs) are a major public health problem worldwide, and NCDs are responsible for 41 million deaths each year.<sup>1</sup> In sub-Saharan Africa, infectious

#### STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ This is a comprehensive scoping review on clinical practice guidelines developed in sub-Saharan Africa on hypertension and diabetes.
- ⇒ This review followed a rigorous approach with systematic literature searches in multiple databases and grey literature.
- ⇒ Strict eligibility criteria for selecting guidelines were applied.
- ⇒ Certain countries or healthcare institutions might use unpublished internal guidelines that were not detected by our search.
- ⇒ Although we contacted the ministries of health of all countries, only one of the contacted institutions responded to our inquiry.

diseases have been the leading contributors to disease burden for a long time, however, this region is undergoing a fast epidemiological transition with a rapid increase in prevalence of NCDs.<sup>2 3</sup> For instance, between 1990 and 2017, this region experienced a 67% increase in the total number of disability-adjusted life years (DALYs) due to NCDs. This increase is observed also in comparison with other diseases. In 1990, NCDs represented 18.6% of the total burden of disease in sub-Saharan Africa, while in 2017, this increased to 29.8%.<sup>2</sup> Within the NCDs, 15% of the DALYs are attributable to cardiovascular diseases,<sup>2</sup> and hypertension (HTN) is the largest single risk factor for cardiovascular disease.<sup>45</sup>

Another major NCD and increasing contributor to the disease burden in this region is diabetes mellitus (DM), with an increase of 126.4% in total DALYs within the last three decades.<sup>2 6</sup> The African region has the third highest mortality rate (111.3 per 100 000) due to DM, after the eastern Mediterranean and South East Asian region. Currently 1 in 22 adults is living with DM, and it is estimated that by 2045, the total number of people living with DM will reach 55 million in this region.<sup>7</sup>

HTN and DM are two of the three selected priority areas by the Collaboration for Evidence-Based Healthcare and Public Health in Africa (CEBHA+); a research network involving University partners from sub-Saharan Africa and Germany. CEBHA+ is aiming to build longterm capacities and infrastructure for evidence-based healthcare and public health in sub-Saharan Africa. The priority areas were selected through a three-step process.<sup>8</sup> First, a short-list of priority research areas was identified through an online survey and expert discussions, involving Public Health and health research experts as well as policy-makers. This process led to the identification of NCDs, specifically of HTN and DM, as well as Road Traffic Injuries (RTIs), as priority research areas in many of the African countries. Second, evidence maps for each of the priority research areas were developed. Third, the findings from step one and two were synthesised to identify the final priority areas. Due to its specifics, the third priority area (RTIs) is not included in this review.

While the research activities of the CEBHA+ network fill important evidence gaps in the context of sub-Saharan Africa, trustworthy evidence for enabling evidencebased decision-making is still rare. The literature-based research conducted by the CEBHA+ network to date shows that relevant evidence is either lacking for lowincome and middle-income countries,<sup>9</sup> or is of low certainty and offers too little information about effectiveness of interventions.<sup>10</sup> Moreover, development and use of state-of-the-art evidence-based guidelines is not widespread in this region.<sup>6</sup> Previous systematic reviews show that few countries in this region use country-specific guidelines on HTN or other NCDs.<sup>411</sup> Critical appraisal of these guidelines showed that none scored well on the Appraisal of Guidelines for research and evaluation II (AGREE-II) domains, with the lowest-scoring domain being 'rigour of development'. This observed outcome, among others, could be attributed to non-systematic inclusion of research, unclear methods for SR development and uncertain links between references and recommendations.<sup>4</sup>

Therefore, since previous research shows an overall lack of guidelines, and methodological shortfalls of developed guidelines in sub-Saharan Africa, a clear and detailed overview of the published guidelines and their quality is needed.

# **Objectives**

This scoping review was performed to identify evidencebased guidelines for the prevention, diagnosis and management of HTN and DM in sub-Saharan Africa. Specifically, the review was conducted to: (1) identify existing evidence-based clinical practice and public health guidelines on HTN and DM, developed in or for sub-Saharan Africa, (2) map their recommendations and (3) assess the quality of included guidelines and discuss identified methodological shortfalls.

# METHODS Search strategies

This scoping review was conducted and reported in accordance with the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) extension for scoping reviews (PRISMA-ScR),<sup>12</sup> and based on an internal protocol. The search strategies were developed by an information specialist, and used a combination of Medical Subject Headings (MeSH) terms and text words, for the two topics of interest. The following electronic databases were searched for published guidelines: (1) Ovid MEDLINE(R) (from inception in January 1946 to 7 January 2022), (2) GIN International Guideline Library (https://guidelines.ebmportal.com/) Search (from inception to 8 December 2021), (3) Guideline Central (https://www.guidelinecentral.com/) (from inception to 8 December 2021) and (4) TRIP Medical Database (https://www.tripdatabase.com/) (from inception to 14 January 2022).

In addition, relevant guidelines were used to search for additional references via the PubMed similar articles function (https://www.nlm.nih.gov/bsd/disted/ pubmedtutorial/020\_190.html). Reference lists of relevant guidelines were screened for potentially relevant guidelines not covered by the searches. Furthermore, grey literature was extensively searched using Google and websites of governmental, non-governmental and academic organisations of all sub-Saharan African countries. Ministries of health of all countries in sub-Saharan Africa were contacted via e-mail to enquire about guidelines, and reminders were sent. In addition, 43 public health and health research experts from sub-Saharan Africa, who are part of the CEBHA+ network, were contacted via e-mail to enquire about eligible guidelines on the topics of interest.

# Identification of relevant guidelines

Screening for relevant guidelines, including title and abstract and full-text screening, was performed by two reviewers independently, and exclusion reasons were documented accordingly and are depicted in the PRISMA flow diagram.<sup>13</sup> The screening of literature was conducted using Covidence (www.covidence. org). Discrepancies were resolved by discussion and consensus.

# **Eligibility criteria**

Clinical or public health guidelines fulfilling the following criteria were considered for inclusion: (1) addressing at least one of the two topics of interest (HTN and DM); (2) using systematic methods to search and review the underlying evidence; (3) using any system or tool for assessing the certainty/quality of evidence (eg, GRADE approach); (4) developed for sub-Saharan African setting (as defined by the United Nations Statistics Division<sup>14</sup> and World Bank)<sup>15</sup> and (5) published in any language and dated between 1946 and 14 January 2022.

# Extraction and presentation of study data

Relevant information from the included guidelines were extracted by one reviewer and checked by a second independent reviewer. The data were extracted using a tailored application in GRADEpro<sup>16</sup><sup>17</sup> (https://www.gradepro.org/). The extracted data for each guideline include information on authors, issuing organisation, language, year of publication, source link, guideline aims, population of interest, interventions, recommendations issued, key stakeholders and databases searched. The data presented descriptively.

#### **Quality appraisal of guidelines**

The quality appraisal of included guidelines was performed using the AGREE-II tool, which consists of 23 individual items in six domains (scope and purpose, stakeholder involvement, rigour of development, clarity and presentation, applicability and editorial independence).<sup>18</sup> Each included guideline was assessed by two reviewers independently. Domain scores were calculated according to AGREE-II formula, by summing up all the scores of the individual items in a domain and by scaling the total as a percentage of the maximum possible score for that domain, taking into consideration the number of reviewers.<sup>18</sup> Each domain was scored from 0% to 100%, with higher scores indicating higher guideline quality.

# PATIENT AND PUBLIC INVOLVEMENT

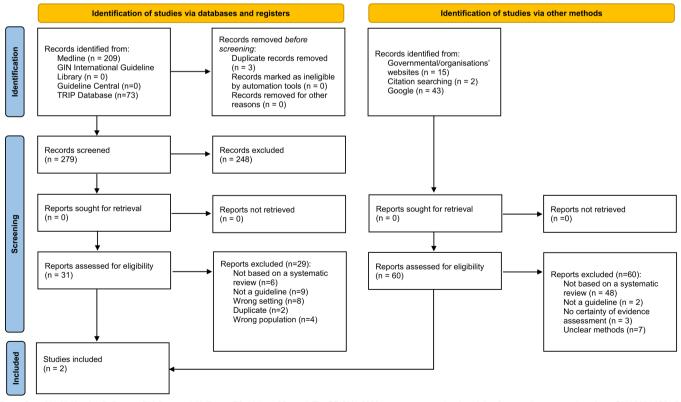
We did not involve patients or the public in the design and conduct of this scoping review.

#### RESULTS

Systematic and supplementary searches resulted in 339 records; 248 were excluded on screening their titles and abstracts, and 91 were assessed in full text (figure 1). Of these, 66 were potentially relevant guidelines, developed in or for a sub-Saharan African country, addressing at least one of the topics of interest. These guidelines were developed in 23 sub-Saharan African countries (out of 49 countries in this region). Only two guidelines fulfilled our predefined eligibility criteria, and were finally included (table 1). Both guidelines are about DM. There were no eligible guidelines on HTN.

#### **Characteristics of included guidelines**

The two included guidelines, Bahendeka *et al* (2018)<sup>19</sup> and Bahendeka *et al* (2019),<sup>20</sup> were published by the East African Diabetes Study Group (EADSG). The setting of both guidelines was East Africa (part of sub-Saharan Africa). Both were published in a scientific journal, in English language. In both guidelines, the majority of authors were from east Africa (Uganda, Tanzania, Kenya and Rwanda). Regarding the methodology, the two guidelines were very similar. Both were based on a systematic review of evidence, with searches performed



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Figure 1 PRISMA 2020 flow diagram. PRISMA, Preferred Reporting Items for Systematic reviews and Meta-Analyses.

# Table 1 Characteristics of included guidelines

| Title  | First<br>author<br>(year) | Organisation  | Purpose   | Population                | Key stakeholders and users  | Databases<br>searched                     |
|--|---------------------------|---|---|---------------------------|---|---|
| EADSG<br>Guidelines:<br>Insulin Therapy<br>in Diabetes <sup>19</sup>   | Bahendeka<br>(2018)       | East African<br>Diabetes<br>Study<br>Group<br>(EADSG) | To provide guidelines<br>for clinical practice on<br>the use of insulin in<br>diabetes based on the<br>best available evidence<br>to healthcare workers;<br>and for the rational use of<br>resources in the diagnosis,<br>treatment and follow-up of<br>diabetes in the East African<br>population with diabetes. | Patients with<br>diabetes | Healthcare<br>personnel<br>involved in<br>managing patients<br>with diabetes  | MEDLINE<br>and African<br>Journals Online |
| EADSG<br>Guidelines:<br>Insulin<br>Storage and<br>Optimisation<br>of Injection<br>Technique<br>in Diabetes<br>Management <sup>20</sup> | Bahendeka<br>(2019)       | East African<br>Diabetes<br>Study<br>Group<br>(EADSG) | The East Africa Diabetes<br>Study Group sought to<br>seek consensus on some<br>of the contextual issues<br>pertaining to insulin<br>therapy within the East<br>African region, specifically<br>focusing on scarcity of<br>resources and its adverse<br>effect on the quality of<br>care.                          | Patients with<br>diabetes | Personnel<br>in charge of<br>transport and<br>storing of insulin,<br>and patients with<br>diabetes receiving<br>insulin therapy | MEDLINE<br>and African<br>Journals Online |
| EADSG, East African Diabetes Study Group.  |                           |   |   |                           |   |   |

in MEDLINE and African Journals Online (AJOL). Bahendeka *et al* (2018) used no time restrictions, while Bahendeka *et al* (2019) focused the searches between 2010 and 2018. Only studies in English were considered by both guidelines.

In Bahendeka *et al* (2018), recommendations issued covered aspects of diagnosis of DM, treatment, education, types of insulin to be used, insulin regimens and dosage, administration techniques and also considerations in special populations (pregnancy, lactation, organ impairments, fasting conditions, infections etc.) (online supplemental table 1). In Bahendeka *et al* (2019) guideline, recommendations were issued on transporting, storage, injection and administration of insulin (online supplemental table 1).

The main intervention of interest in both guidelines was insulin therapy. In the Bahendeka *et al* (2018) guideline, the purpose was to provide guidance for clinical practice about the use of insulin in DM management, with key users being healthcare personnel managing patients with DM. The Bahendeka *et al* (2019) guideline aimed to provide guidance on insulin storage, transportation and optimisation of injection techniques, with the key users being personnel in charge of transport and storing of insulin, and people living with DM. The evidence was summarised narratively in both guidelines. No metaanalyses or any other statistical analyses were conducted. The recommendations were made based on conclusions reached by discussion or consensus. Furthermore, the certainty of evidence was assessed using a hierarchical system, based on the type of evidence.<sup>21</sup> This system defined also the strength of recommendations, with four levels: (1) grade A: strong recommendation, based on high-quality evidence, (2) grade B: weak recommendation, based on moderate quality of evidence, (3) grade C: optional recommendation, based on low-quality evidence and (4) grade D: optional recommendation, based on expert opinion. See online supplemental tables 2,3 for more details.

#### **Quality appraisal of guidelines**

The quality assessment of the included guidelines showed that both guidelines have relatively similar scores on AGREE-II domains (online supplemental table 4). Both guidelines clearly presented the objectives and the topics addressed. Bahendeka et al (2018) and Bahendeka et al (2019), in the domain Scope and Purpose, had a score of 78% and 67%, while in the Stakeholders Involvement domain, they scored 61% and 42%, respectively. For the latter, the low score was due to lack of clarity regarding the role and duties of involved stakeholders. In the Rigour of Development domain, both guidelines scored 56% and 45%, respectively. In both guidelines, information on systematic searches, inclusion criteria, strengths and limitation of evidence and methods of formulating the recommendations were not presented in sufficient detail. Of all domains, the lowest scores were registered for Editorial Independence, where Bahendeka et al (2018) scored 54% and Bahendeka et al (2019) 42%. Low scores in this domain were given as some of the activities for the

# **Characteristics of excluded documents**

A total of 89 documents (guidelines and other types of documents) were excluded during the full-text screening phase. The exclusion reasons were: not based on systematic review of evidence (n=54), not a guideline (n=11), wrong setting (n=8), unclear methods (n=7), wrong population (n=4), no certainty of evidence assessment (n=3) and duplicates (n=2) (figure 1).

Of the identified 89 documents, 64 were guidelines on the topic(s) of interest (including different outdated versions), but were excluded as per our eligibility criteria (online supplemental table 5a). These guidelines were developed in Burundi, Cape Verde, Eritrea, Eswatini, Ethiopia, Gambia, Ghana, Kenya, Lesotho, Liberia, Malawi, Mauritius, Namibia, Nigeria, Rwanda, Sierra Leone, Somalia, South Africa, South Sudan, Sudan, Tanzania, Uganda and Zambia. One guideline was developed by an international organisation specifically for this region. Regarding the topics, these guidelines were on HTN (n=13), DM (n=11) and multiple conditions (n=40). They were published between 1995 and 2021, all in English language (except for one in Amharic, one in French and one in Portuguese). Of the 64 guidelines, 40 were comprehensive documents addressing multiple conditions (online supplemental table 5a). Detailed characteristics of other excluded documents (non-guidelines, guidelines on other topics etc.) can be found in online supplemental table 5b.

# DISCUSSION

Our review showed that less than half of countries in this region have published guidelines on HTN or DM, that we could identify or access through our comprehensive searches. Out of 49 countries, only 23 had guidelines available, for at least one of the topics of interest. Of 66 potentially relevant guidelines identified, only two were developed using a systematic review of evidence and quality of evidence assessments, and were finally included in this review. Both guidelines are on DM, have insulin as the main intervention, and were published from the same professional society. One guideline issued recommendations covering various aspects of DM diagnosis and treatment, while the other is focused on issues of transportation and storage of insulin. Several methodological shortfalls were identified with AGREE-II tool. Domains on which both guidelines scored relatively low were Stakeholders Involvement, Rigour of Development and

Editorial Independence. On the other hand, both guidelines scored high on Clarity of Presentation domain. The overall AGREE-II score for Bahendeka *et al* (2018) was 58.33%, while for Bahendeka *et al* (2019) was 50%.

The lack of published guidelines for countries in sub-Saharan Africa, reported in our review, could be explained by a relative shortage in research output in this region.<sup>22</sup> Moreover, there are large differences between countries of this region in research capacities, from South Africa having the most, to Central African Republic, Gambia, Lesotho and Zambia having the least.<sup>22 23</sup> A study reported that three countries (South Africa, Nigeria and Kenya) contributed with 52% of all publications from WHO African region during 2000-2001<sup>24</sup>. This could further explain our findings. On the bright side, studies show that the overall health research output, although low, has been growing steadily in Africa in the past decades.<sup>24</sup> However, further interventions are still needed for strengthening and increasing health research capacities in this region and for improving the health status of people in sub-Saharan Africa.

Our findings are consistent with Okwen et al 2018,<sup>4</sup> which reviewed African guidelines (including WHO ones) on diagnosis and management of HTN. This study found that only 26 (out of 62 countries in Africa) reported the use of guidelines, in response to the authors' query. Six countries had country-specific guidelines for HTN diagnosis and management, 10 used protocols within Standard Treatment Guidelines for multiple conditions, and other 10 used international guidelines. However, Okwen et al did not assess the methodological approach used for guideline development or the presence of a certainty assessment in the guidelines. In another investigation about the availability of guidelines for sub-Saharan Africa, Kredo et al 2012,<sup>11</sup> aimed to identify guidelines for five different conditions including communicable and non-communicable diseases. They found a relatively low number of guidelines (n=30), developed in 13 countries.

Another issue, as demonstrated in our findings, and previously reported by others, is that the published guidelines in this region often have shortfalls in rigour of development, especially in the area of reporting of the methods linking between evidence and recommendations and stakeholder involvement. Similar findings with ours were reported by Okwen *et al.*<sup>4</sup> The guideline quality was assessed with AGREE II and resulted in low scores for all included guidelines. Regarding the quality aspects of the guidelines, the findings by Kredo *et al.*<sup>11</sup> were similar with ours. The AGREE-II quality assessment resulted in guidelines scoring higher on Scope and Purpose and Clarity and Presentation domains, and lower on Stakeholder Involvement, Applicability, Rigour of Development and Editorial Independence.

Developing trustworthy evidence-based guidelines, with high methodological standards, requires substantial financial and human resources.<sup>25 26</sup> It is a long and costly process that can take up to 3 years for a single guideline due to labour-intensive processes of systematic reviews

and evidence syntheses.<sup>27–29</sup> Such resources often might not be available in developing countries in sub-Saharan Africa. To overcome these issues, countries in this region, particularly those with more limited resources, could consider alternative approaches for developing guidelines. They could adopt or adapt existing trustworthy recommendations, published by renowned international societies or by governmental or non-governmental organisations from other countries. There are several methodologies on how this can be achieved, for example: GRADE-ADOLOPMENT<sup>25</sup> or ADAPTE.<sup>30 31</sup> Adoption of a recommendation is the process of using an existing recommendation from another guideline, without making changes, while adaptation is a more complex process, where a guideline panel makes changes to the recommendation, based on the setting, feasibility or various cultural contexts.<sup>25 31</sup> Such a mixed approach, of adopting and adapting existing recommendations, can be more efficient and more feasible than creating comprehensive guidelines de novo. Furthermore, it can help making trustworthy recommendations/guidelines becoming available much faster.<sup>25</sup> There were two guidelines (developed in Kenya) identified by our searches, which used adaptation methods, but were excluded due to not reporting the certainty evidence assessment or were not based on a systematic review of evidence. One used the ADAPTE approach, but did not report methodological details in the document,<sup>32</sup> until 1 year later in a separate publication.<sup>33</sup> The other did not use a formal framework for adapting recommendations.<sup>34</sup>

This review has several strengths. It is the largest scoping review, to the best of our knowledge, on clinical practice guidelines developed in sub-Saharan Africa on HTN and DM. We assessed their methodological quality and summarised their recommendations. Furthermore, this review followed a comprehensive and rigorous approach with systematic literature searches in multiple databases, and was supplemented with extensive and detailed searches in grey literature. Ministries of health of all countries in the region were contacted via e-mail to enquire about guidelines, and reminders were sent. Moreover, local experts from this region were contacted and asked for relevant guidelines.

This review has also its limitations. We applied strict eligibility criteria for selecting guidelines, based on the Institute of Medicine (IOM) criteria for trustworthy guidelines.<sup>35</sup> We only included guidelines which fulfilled two of the criteria: (1) clearly reported the use of a systematic review of the existing evidence, and (2) use of any type of certainty of evidence assessment. We considered that these two are the minimal criteria for state-of-the-art evidence based guidelines. On the other hand, 40 of the published guidelines, identified by this review, were not developed using a systematic review, but are comprehensive documents issuing recommendations for diagnosis and treatment of multiple conditions. Most likely it would have been unfeasible to develop such documents with systematic reviews and assessments of the certainty

of evidence for each condition addressed. Therefore, we need to acknowledge the relevance and importance of such documents, for guiding healthcare personnel in sub-Saharan Africa, even if they have not been developed using the criteria for evidence-based guidelines. In addition, we did not systematically contact authors for clarifying the approach used for (excluded) guidelines with unclear methods. Author contact might potentially have clarified the methods of seven such guidelines, six developed in South Africa and one in Ghana, where the methods were unclear. However, the methods of this scoping review stipulate that guidelines should contain a clearly described methodology in order to be assessed and so they were excluded. Another potential limitation is the fact that certain countries or healthcare institutions in the region might use their unpublished internal guidelines. Although, we contacted the ministries of health of all countries, only one of the contacted institutions responded to our injury, therefore we cannot exclude such possibility. Finally, we might have inadvertently missed guidelines that are available only in printed form, since we have not explicitly enquired for such formats.

#### CONCLUSIONS

Less than half of countries in sub-Saharan Africa developed and published their own guidelines on HTN or DM. Of the 66 identified guidelines, only two clearly reported the use of a systematic review of evidence and certainty of evidence assessment. The quality appraisal showed that both guidelines had methodological shortfalls, and scored relatively low in several crucial domains of AGREE II. As development of evidence-based guidelines requires substantial resources, countries in sub-Saharan Africa could consider adopting or adapting already published high-quality recommendations, using established methodologies. Such approach might facilitate a more efficient and faster development of much-needed guidance. And, healthcare professionals in sub-Saharan Africa could have on their hands evidence-based guidelines developed with a more robust methodology.

**Contributors** All authors contributed to development of the scoping review. BN and IT conceptualised the study; KG, JLZN, IT and BN conducted the searches; BN, JLZN, IT, BEB and JO screened titles and abstracts; BN, JLZN, BEB and KG retrieved full texts; IT and BN performed the full-text screening; BN and JLZN extracted data and appraised included guidelines. BN, IT, JM and OK provided overall methodological guidance. BN, IT and JM drafted the manuscript. IT is the guarantor for the manuscript. All authors have read, revised and approved the published version of the manuscript.

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Provenance and peer review Not commissioned; externally peer reviewed.

**Data availability statement** All data relevant to the study are included in the article or uploaded as supplementary information. All data are available in the manuscript and in the supplementary material.

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