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RESEARCH ARTICLE

# The ScHARR LMIC filter: Adapting a low- and middle-income countries geographic search filter to identify studies on preterm birth prevention and management

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## Abstract

Search filters are used to find evidence on specific subjects. Performance of filters can be varied and may need adapting to meet the needs of research topics. There are limited geographic search filters available, and only one pertaining to low- and middle-income countries (LMICs). When searching for literature on preterm birth prevention and management in LMICs for a research project at the School of Health and Related Research (ScHARR), we made use of the Cochrane Effective Practice and Organisation of Care (EPOC) LMIC geographic search filter for the databases; Ovid MEDLINE, Ovid Embase, Cochrane Library. During screening following a broad scoping search in Ovid MEDLINE, it was found that the EPOC LMIC filter did not identify a relevant study. Adaptations were made to the LMIC geographic search filter to maximise retrieval and identify the missing study. Institution was included as a search field, and the search terms high burden or countdown countries were added. The filter was translated for the databases; Ovid Embase, Cochrane Library, Ovid PsycINFO, and CINAHL via EBSCO. The adapted ScHARR LMIC filter is a non-validated 1st generation filter which increases the sensitivity of the EPOC LMIC search filter. Validating the filter would confirm its retrieval performance and benefit information professionals, researchers, and health professionals. We recommend that the ScHARR LMIC filter is used to improve sensitivity of the Cochrane EPOC LMIC filter and reduce the risk of missing relevant studies.

**KEYWORDS**
evidence synthesis, information retrieval, literature searching, low-and middle-income countries, search filters, systematic reviews

**Highlights**

**What is already known**
- The Cochrane EPOC LMIC geographic search filter is currently the only pre-made search filter to retrieve literature from low- and middle-income countries. The filter has not been validated.

**What is new**
- We present a useful adaptation of the Cochrane EPOC LMIC geographic search filter (the ScHARR LMIC filter), which may identify further studies and therefore be more comprehensive. The ScHARR LMIC filter can be used in Ovid MEDLINE, Ovid Embase, Ovid PsycINFO, Cochrane Library, and CINAHL via EBSCO.

**Potential impact for research synthesis methods readers outside the authors' field**
- Information specialists, researchers, and healthcare professionals' wishing to locate evidence in LMICs may find our revised geographic search filter useful.

# 1 | INTRODUCTION

## 1.1 | Search filters

Evidence synthesis requires the design of effective search strategies to identify the relevant evidence of interest.[1] Information specialists usually perform this task and use various tools and techniques to ensure that search strategies meet the requirements for the scope of the review. One method is to combine existing search filters with the search terms developed according to the review question.

Search filters are pre-made search strategies designed to retrieve particular types of study designs or topics, from bibliographic databases.[2] There are three search filters categories (see Table 1).

It is important for systematic searches to strike a balance between sensitivity (minimising the risk of failing to retrieve relevant records) and specificity (minimising the number of irrelevant records in order to manage "screening burden").[4] Appropriate use of search filters can assist with this challenge. Search filters are often developed for use in a particular context, and their effectiveness may be informally evaluated by comparing their results against a list of known studies to see what proportion are retrieved (1st generation search filter). Ideally, search filters are "externally validated", that is, tested against a "gold standard" reference set of results from outside the context for which they were developed (2nd generation search filter).[5] This gives a more rigorous assessment of how the filter performs overall, including in contexts beyond the one in which it was developed. Performance of search

filters are usually measured in terms of sensitivity, specificity, and precision. See Table 2 for definitions of search filter performance measures.

Search filters are often adapted to suit the needs of research topics,[4,6] particularly if there are concerns that a pre-made filter will not retrieve some of the relevant studies. Cooper et al.[7] conducted a case study, which found that two established and widely used randomised controlled trial (RCT) filters missed studies, and therefore recommended incorporating an additional search filter they developed to improve sensitivity. Other studies have reported low precision of filters.[8] Search filters are often developed to find evidence in the context of a specific health speciality, for example, the Africa geographic filter was developed to find RCTs on HIV/AIDS[9] and therefore may not be as effective for other areas.[10] The choice of filter will be influenced by the type of the review, the aim, and the time and resources available. The most appropriate filter should be selected to meet to needs of the scope of the research topic. For example, a rapid review may favour high precision over sensitivity, and there may be some types of reviews, where use of filters are not recommended.[11] Formal appraisal of existing filters[3] will assist information specialists making decisions regarding choice of filter and potential adaptation. Both the Canadian Agency for Drugs and Technologies in Health and the InterTASC Information Specialists' Sub-Group (ISSG) have developed checklists to use to appraise search filters.[12,13] However, due to the potential time constraints of reviews, particularly those of a rapid nature, published appraisals are of benefit, and the ISSG collating and linking to these is an incredibly valuable resource.[14]

**TABLE 1** Search filter categories[3]

| 1st generation: non-validated | Designed subjectively and not tested for effectiveness against an independent set of relevant records (validation) |
|---|---|
| 2nd generation: validated (subjective methods) | Developed as 1st generation, but effectiveness is tested against an independent set of relevant records (known as a "gold standard"), resulting in a validated filter |
| 3rd generation: validated (objective methods) | Designed more objectively through various established methods, such as frequency analysis and logistic regression. The designed filter is then validated as in 2nd generation filters |

**TABLE 2** Search filter performance measures[5]

| Measure | Definition |
|---|---|
| Sensitivity (recall) | Number of records retrieved by the filter as a proportion of the gold standard set of references |
| Precision | Number of relevant records retrieved as a proportion of the total records retrieved |
| Specificity | Number of irrelevant records correctly not retrieved, as a proportion (usually expressed as a percentage) of all the irrelevant records in the database searched |

The most common type of search filter is methodological,[14] and therefore retrieves specific study types, such as systematic reviews or RCTs. Methodological search filters are well-established and used, and there are various studies evaluating their performance, including a review published in 2004.[3] Topic search filters are less common, but various ones have been developed covering areas, such as geographical settings, age groups, or specific conditions.[15]

## 1.2 | Geographic search filters

The ISSG Search Filters Resources is a comprehensive catalogue of filters, including citing papers that review search filter performance.[14] The ISSG Search Filters Resource categorises filters into study design filters and "other" filters. Geographic search filters are one of the types of filter categorised as "other". Geographic search filters are designed to retrieve research from specific locations, usually individual countries, or groups of countries. There are currently 15 search filters covering 12 different geographic areas or populations listed on the ISSG Search Filters Resource (Africa, OECD Countries, and the USA

all have two filters each), with nine of these filters designed for Ovid MEDLINE[14] (see Table 3). However, only one filter (which has versions for Ovid MEDLINE, PubMed, Ovid Embase, and CENTRAL via Cochrane Library, Wiley) aims to cover all low- and middle-income countries (LMICs).[16] The Cochrane Effective Practice and Organisation of Care (EPOC) LMIC geographic search filter has not been validated.[16] However, an evaluation was published in June 2020, that found whilst overall the filter does a good job of including the relevant MeSH and keyword terms, there were some suggestions for improvements, including expanding the regional terms and including terms for nationalities.[17]

## 1.3 | Scoping the literature on pre-term birth in low- and middle-income countries

In 2018, an information specialist (AS) and a systematic reviewer (FC) at the School of Health and Related Research (ScHARR), University of Sheffield conducted a scoping exercise to inform a research application to Global Challenge Research Fund (UK Research and Innovation) on preterm birth (PTB). Subsequently, this scoping exercise was used to inform a mapping review of interventions delivered in low- and middle-income country settings to prevent spontaneous PTB, commissioned by the National Institute for Health Research (NIHR) funded Global Health Research Group on Preterm birth prevention and management (PRIME). PRIME is a program bringing together a group of interdisciplinary researchers from the United Kingdom, South Africa, and Bangladesh to address the challenges of PTB in low-middle income countries (LMICs), where its prevalence is highest.[34] The mapping review aimed to identify and describe the quantity and quality of systematic reviews that have sought to explore the effectiveness, safety and, acceptability of interventions to prevent PTB. Based on the existing evidence, the review would identify research gaps in LMIC contexts to inform future research and identify areas for potential further research synthesis.

For the mapping review, it was particularly important to identify literature relating to LMICs in this context, as some interventions that have been used in developed world contexts may be harmful in LMIC settings, and conversely there may be interventions that are even more effective in LMICs than in other settings,[35,36] the applicability of the intervention was key in this review. Therefore, we sought to use an LMIC geographic search filter to ensure the results of our search were relevant to the LMIC setting. The Cochrane Effective Practice and Organisational Care Group's LMIC geographic search filter[16] was selected. The filter has several versions available

**TABLE 3** Geographic search filters currently available

| Geographic locations | Database filters available | Validated? |
| --- | --- | --- |
| Africa[9] | Ovid Embase<br>Ovid MEDLINE<br>PubMed | Yes |
| Africa (a set of filters to cover, Northern, Eastern, Western, Southern, and Middle Africa) – note that some of the filters have been developed for more databases than others[18] | Ovid Embase<br>Ovid MEDLINE<br>EBSCO CINAHL<br>Ovid Global Health<br>Ovid ERIC | No |
| Canada (a set of filters to cover various provinces) – note that some of the filters have been developed for more databases than others[19] | Ovid Embase<br>Ovid MEDLINE<br>MEDLINE via EBSCO<br>Ovid Global Health<br>Ovid ERIC | No |
| Canadian Indigenous Peoples[20] | Ovid MEDLINE | No |
| Eastern Mediterranean Region[21] | PubMed | No |
| "New" European Union Member States (as in 2010)[22] | PubMed | No |
| German-speaking Countries[23] | Web of Science | No |
| Low- and middle-income countries[16] | CENTRAL via The Cochrane Library<br>Ovid Embase<br>Ovid MEDLINE<br>PubMed | No |
| OECD Countries (NICE)[24] | Ovid MEDLINE<br>Ovid Embase | Yes[25] |
| OECD Countries (Canadian Health Libraries Association)[26] | Ovid Databases | No |
| Spain[27] | PubMed | Yes |
| Sub-Saharan Africa[28] | Ovid Embase<br>Ovid MEDLINE | No |
| UK[29,30] | Ovid MEDLINE<br>Ovid Embase | Yes[31] |
| USA (Popoff et al.[32]) | Ovid MEDLINE | No (validation in process) |
| USA (University of Texas, School of Public Health)[33] | Ovid MEDLINE | No |

*Note*: For full details of the filters, visit the ISSG Search Filters Resource.[14]

for different databases: Ovid MEDLINE, PubMed, Ovid Embase, and CENTRAL.

## 1.4 | Requirement for adapting the Cochrane EPOC LMIC geographic filter

During the scoping search, we found that the Cochrane EPOC LMIC geographic search filter did not retrieve a known study of interest, therefore, we investigated possible adaptations to the filter to ensure this study was retrieved, and potentially further relevant studies.

## 1.5 | Aims and objectives

This filter development study aimed to develop a new 1st generation (non-validated) geographic search filter based on the Cochrane EPOC LMIC geographic search filter, with some adaptations to improve retrieval of LMIC studies relating to pre-term birth prevention and management.

## 2 | METHODS

The search strategy we developed aimed to identify systematic reviews and primary studies about PTB in

Research Synthesis Methods—WILEY | 5

**TABLE 4** Adding the institution search field (Ovid MEDLINE)

| Line of existing filter (2012 version) | Changes highlighted in bold<br>*note that quotation marks were added to "Cote d'Ivoire" as the apostrophe is an unsupported character in Ovid MEDLINE |
|---|---|
| 2. | (Africa or Asia or Caribbean or West Indies or South America or Latin America or Central America).hw,kf,ti,ab,cp,**in**. |
| 3. | (Afghanistan or Angola or Armenia or Armenian or Bangladesh or Benin or Bhutan or Bolivia or Burkina Faso or Burkina Fasso or Burundi or Cambodia or Central African Republic or Chad or Comoros or Congo or "Cote d'Ivoire" or Ivory Coast or Djibouti or Egypt or El Salvador or Eritrea or Ethiopia or Gambia or Gaza or Georgia or Ghana or Guatemala or Guinea or Guam or Haiti or Honduras or India or Indonesia or Kenya or Kiribati or Korea or Kosovo or Kyrgyzstan or Lao PDR or Lesotho or Liberia or Madagascar or Malawi or Mali or Mauritania or Moldova or Mongolia or Morocco or Mozambique or Myanmar or Myanma or Nepal or Nicaragua or Niger or Nigeria or Pakistan or Paraguay or Philippines or Philipines or Phillipines or Phillippines or Rwanda or Ruanda or Sao Tome or Senegal or Sri Lanka or Solomon Islands or Somalia or Sudan or Swaziland or Tajikistan or Tanzania or Timor-Leste or Tokelau or Togo or Tuvalu or Uganda or Ukraine or Uzbekistan or Vanuatu or Vietnam or Viet Nam or West Bank or Yemen or Zambia or Zimbabwe).hw,kf,ti,ab,cp,**in**. |
| Existing filter (2020 LMIC COUNTRY NAMES AND GENERAL LMIC TERMS Version) | Changes highlighted in bold<br>Recommend adding an additional line to the filter to search for institution as it does not work by adding .in to the existing search fields (ti,ab,sh,kf.) |
| Note: added .in to the country names and regions only | (afghanistan OR albania OR algeria OR american samoa OR angola OR "antigua and barbuda" OR antigua OR barbuda OR argentina OR armenia OR armenian OR aruba OR azerbaijan OR bahrain OR bangladesh OR barbados OR republic of belarus OR belarus OR byelarus OR belorussia OR byelorussian OR belize OR british honduras OR benin OR dahomey OR bhutan OR bolivia OR "bosnia and herzegovina" OR bosnia OR herzegovina OR botswana OR bechuanaland OR brazil OR brasil OR bulgaria OR burkina faso OR burkina fasso OR upper volta OR burundi OR urundi OR cabo verde OR cape verde OR cambodia OR kampuchea OR khmer republic OR cameroon OR cameron OR cameroun OR central african republic OR ubangi shari OR chad OR chile OR china OR colombia OR comoros OR comoro islands OR iles comores OR mayotte OR democratic republic of the congo OR democratic republic congo OR congo OR zaire OR costa rica OR "cote d'ivoire" OR "cote d' ivoire" OR cote divoire OR cote d ivoire OR ivory coast OR croatia OR cuba OR cyprus OR czech republic OR czechoslovakia OR djibouti OR french somaliland OR dominica OR dominican republic OR ecuador OR egypt OR united arab republic OR el salvador OR equatorial guinea OR spanish guinea OR eritrea OR estonia OR eswatini OR swaziland OR ethiopia OR fiji OR gabon OR gabonese republic OR gambia OR "georgia (republic)" OR georgian OR ghana OR gold coast OR gibraltar OR greece OR grenada OR guam OR guatemala OR guinea OR guinea bissau OR guyana OR british guiana OR haiti OR hispaniola OR honduras OR hungary OR india OR indonesia OR timor OR iran OR iraq OR isle of man OR jamaica OR jordan OR kazakhstan OR kazakh OR kenya OR "democratic people's republic of korea" OR republic of korea OR north korea OR south korea OR korea OR kosovo OR kyrgyzstan OR kirghizia OR kirgizstan OR kyrgyz republic OR kirghiz OR laos OR lao pdr OR "lao people's democratic republic" OR latvia OR lebanon OR lebanese republic OR lesotho OR basutoland OR liberia OR libya OR libyan arab jamahiriya OR lithuania OR macau OR macao OR republic of north macedonia OR macedonia OR madagascar OR malagasy republic OR malawi OR nyasaland OR malaysia OR malay federation OR malaya federation OR maldives OR indian ocean islands OR indian ocean OR mali OR malta OR micronesia OR federated states of micronesia OR kiribati OR marshall islands OR nauru OR northern mariana islands OR palau OR tuvalu OR mauritania OR mauritius OR mexico OR moldova OR moldovian OR mongolia OR montenegro OR morocco OR ifni OR mozambique OR portuguese east africa OR myanmar OR burma OR namibia OR nepal OR netherlands antilles OR nicaragua OR niger OR nigeria OR oman OR muscat OR pakistan OR panama OR papua new guinea OR new guinea OR paraguay OR peru OR philippines OR philipines OR phillipines OR phillippines OR poland OR "polish people's republic" OR portugal OR portuguese republic OR puerto rico OR romania OR russia OR russian federation OR ussr OR soviet union OR union of soviet socialist republics OR rwanda OR ruanda OR samoa OR pacific |

**TABLE 4** (Continued)

islands OR polynesia OR samoan islands OR navigator island OR navigator islands OR "sao tome and principe" OR saudi arabia OR senegal OR serbia OR seychelles OR sierra leone OR slovakia OR slovak republic OR slovenia OR melanesia OR solomon island OR solomon islands OR norfolk island OR norfolk islands OR somalia OR south africa OR south sudan OR sri lanka OR ceylon OR "saint kitts and nevis" OR "st. kitts and nevis" OR saint lucia OR "st. lucia" OR "saint vincent and the grenadines" OR saint vincent OR "st. vincent" OR grenadines OR sudan OR suriname OR surinam OR dutch guiana OR netherlands guiana OR syria OR syrian arab republic OR tajikistan OR tadjikistan OR tadzhikistan OR tadzhik OR tanzania OR tanganyika OR thailand OR siam OR timor leste OR east timor OR togo OR togolese republic OR tonga OR "trinidad and tobago" OR trinidad OR tobago OR tunisia OR turkey OR turkmenistan OR turkmen OR uganda OR ukraine OR uruguay OR uzbekistan OR uzbek OR vanuatu OR new hebrides OR venezuela OR vietnam OR viet nam OR middle east OR west bank OR gaza OR palestine OR yemen OR yugoslavia OR zambia OR zimbabwe OR northern rhodesia OR global south OR africa south of the sahara OR sub-saharan africa OR subsaharan africa OR africa, central OR central africa OR africa, northern OR north africa OR northern africa OR magreb OR maghrib OR sahara OR africa, southern OR southern africa OR africa, eastern OR east africa OR eastern africa OR africa, western OR west africa OR western africa OR west indies OR indian ocean islands OR caribbean OR central america OR latin america OR "south and central america" OR south america OR asia, central OR central asia OR asia, northern OR north asia OR northern asia OR asia, southeastern OR southeastern asia OR south eastern asia OR southeast asia OR south east asia OR asia, western OR western asia OR europe, eastern OR east europe OR eastern europe).**in.**

LMICs. The search was limited to English Language and Human studies only, added to MEDLINE since 1st April 2009. The date limit was used due to a previous mapping review being identified, which covered studies pre-April 2009.[37] For the scoping search, the Cochrane EPOC LMIC geographic search filter for Ovid MEDLINE was used.[16] The searches were conducted in July 2018, and the version of the Cochrane EPOC LMIC Filter at that time dated from 2012.[38] The filter has since been updated in 2020,[16] however neither versions of the filter have been validated. The main changes to the 2020 version of the filter relate to the list of countries, updated by the World Bank in 2019,[39] and including subject heading as a search field. There is also now a LMIC Demonyms version of the filter,[16] but our focus is on the LMIC Countries and General LMIC terms version, as this is the equivalent of the 2012 filter.[38]

The results of the Ovid MEDLINE scoping search were screened by the systematic reviewer (FC). Following the screening of the scoping search results, a relevant study was identified, which had not been retrieved by the search.[40] The study was looked up on Ovid MEDLINE to check it was indexed on the database and the record was examined for potential additions to the search strategy (search terms or syntax) to ensure that the Bhutta et al.[40] study was retrieved, along with any other potentially missed studies.

Following the examination of all the search fields of the Bhutta et al.[40] study, including the MeSH headings,

two edits were made to the LMIC geographic search filter[16] as described below and depicted in Tables 4 and 5 for the Ovid MEDLINE version. We present the changes we made to the 2012 filter,[38] but also present the same changes as they would apply to the updated filter.[16]

## 2.1 | Named countries: searching in the institution field (in)

Despite the Bhutta et al.[40] study covering LMICs, its record on MEDLINE contained no MeSH headings relating to LMICs, neither the generic "Developing Countries" MeSH heading nor any specifically named countries. India is mentioned, but in the address (institution) of one of the authors. In the Cochrane EPOC LMIC geographic search filter used, the countries are searched for in title, abstract, country of publication, headings, or author keywords, so we added institution (in) for our version of the filter (see Table 4).

## 2.2 | Generic LIMC terms: high-burden or countdown countries

The Bhutta et al.[40] study did not include any of the generic terms for LMICs included in the Cochrane EPOC LMIC geographic search filter.[38] However, it did mention "high burden Countdown countries". The concept of

**TABLE 5** Adding high-burden/countdown countries as a free-text search (Ovid MEDLINE)

| | |
|---|---|
| Add this line at the end of the filter combining with OR (2012 & 2020 versions) | ((high burden or high-burden or countdown) adj countr*).ti,ab. |

high burden countries is most commonly used in the context of tuberculosis,[41] but it was used as a more general term in Bhutta et al.[40] It is stated in the abstract that they *"modelled the effect and cost of scale-up in the 75 high-burden Countdown countries"*.[40] Countdown countries relates to an initiative in the use of data to foster accountability for women's and children's health.[42–44]

To retrieve the Bhutta et al.[40] study, a free-text title or abstract search for high burden or countdown countries was added to the LIMC geographic search filter (see Table 5).[16,38]

The adapted search filter was developed in Ovid MEDLINE, and then translated for use in Ovid Embase, Cochrane Library, Ovid PsycINFO, and CINAHL via EBSCO.

# 3 | RESULTS

The ScHARR LMIC filter we developed is a non-validated 1st generation geographic search filter adapted from the Cochrane EPOC LMIC filter. We adapted the ScHARR LMIC geographic search filter to be run in Ovid Embase, Cochrane Library, Ovid PsycINFO, and CINAHL via EBSCO. For PyscINFO and CINAHL, there was not an existing filter, so these were developed from scratch, based on the Ovid MEDLINE filter. Full details of our adapted geographic search filter (ScHARR LMIC) for each database can be found in Appendix S1.

We developed the filter during scoping searches to inform a mapping review of interventions delivered in low- and middle-income country settings to prevent spontaneous PTB. The ScHARR LMIC filter is more sensitive than the Cochrane EPOC LMIC filter for this particular topic. The scoping searches (conducted on Ovid MEDLINE) were complex and went through several iterations, trialling combinations of terms, date limits and with or without a geographical filter applied to retrieve reviews about LMICs, or primary studies conducted in LMIC countries. In addition, the adaptation of the Cochrane EPOC LMIC geographic search filter was not designed as methods work, it was a pragmatic decision made during the scoping of the literature to inform a future project, which was a time-limited exercise due to

internal deadlines. As such the detail on search results from the scoping search and the impact of adapting the Cochrane EPOC LMIC geographic search filter is limited. An initial scoping search to retrieve reviews found 251 references, with 131 of these being conducted from 2009 onwards. Following the inclusion of more terms related to pre-term birth and adapting the Cochrane EPOC LMIC geographic search filter, the number of increased to 1465, with 842 being published since 2009. Approximately 400 of the total increase were due to the adapted geographic search filter. The final iteration of the scoping search retrieved the Bhutta et al.[40] study, which went on to become an included study for the mapping review.[35,36] For full copies of the adapted geographic search filters used, see Appendix S1.

Following the scoping searches, it was decided that the search for systematic reviews for the mapping review would not be limited to setting due to the paucity of evidence, therefore the LMIC filter was removed from this part of the search. Due to this, we did not map the included studies onto the MEDLINE scoping search as it was a reference set with different search parameters. As such we do not have an exact calculation of the "number needed to read"[5] versus the yield. The scoping searches were done in full consultation with the reviewer, who was satisfied with the increase in search result volume to retrieve the Bhutta et al[40] study. The ScHARR LMIC geographic search filter was used for the primary study searches in the mapping review.

# 4 | DISCUSSION

The ScHARR LMIC filter is an adapted version of the Cochrane EPOC LMIC geographic search filter. From our brief investigation, we found that studies about LMICs may not be indexed accordingly or have no information in the abstract about the geographical setting. Comparing our findings with other geographic search filters, only one makes use of the institution field, which is the National Institute for Health and Care Excellence (NICE) UK filter developed for both Ovid MEDLINE and Embase.[29,30] The NICE UK filter had not been published at the time of our investigation, but our study findings that including institution as a search field is beneficial matches the findings from these more recent studies.

If using our adapted filter, information specialists and researchers should note that the ScHARR LMIC geographic search filter has only been used in scoping searches and the subsequent PRIME mapping review[35,36] so far. Beyond our initial development, it has not been tested for sensitivity and precision, nor undergone any validation. Future developments for the filter would

benefit from such testing and validation, similar to that conducted by the developers of other geographic search filters.[9,24,25,27,29–31]

Future research on the use and efficiency of geographic search filters would be of benefit to information specialists and the evidence synthesis community. Ayiku et al.[45] provide a useful guide to developing and validating geographic search filters and encourage more to be developed. There are perhaps enough geographic search filters now to warrant a review, similar to those about methodological and topic search filters.[3,46] Damarell et al.[46] included three geographic search filters in their review of topic search filters, but their searches were conducted in 2016–2017, therefore there are new filters published since this review. When conducting reviews of search filters, it is important to include grey literature searching as findings may first be presented at conferences prior to publication, or never be formally published as a journal article. It is also recommended to consult with experts (e.g., information specialists) via existing networks, such as mailing lists, social media, and personal contacts of colleagues and peers. Damarell et al.[46] found 28 studies to screen from their supplementary search methods.

## 4.1 | Limitations

The ScHARR LMIC geographic search filter has several limitations. First, it has not been validated. Second, it was designed for finding evidence to identify studies on pre-term birth, so it's applicability for other topics is unknown. Final, we know that our filter identified one further relevant study, however we do not know, whether it retrieved further relevant studies as this investigation was beyond the resources that were allocated to the project. Using the ScHARR LMIC geographic search filter increased the search result volume, but we do not know if this increase in screening burden was worth the effort to retrieve potentially only one additional relevant study, that was already known to the research team.

## 5 | CONCLUSION

When searching for literature from LMICs, there is currently limited choice regarding search filters to use. We recommend using the ScHARR LMIC filter if you wish to improve sensitivity and reduce the risk of missing relevant studies, when searching for literature about LMICs. Versions of the ScHARR LMIC filter exist for Ovid MEDLINE, Ovid Embase, Ovid PsycINFO, Cochrane Library, and CINAHL via EBSCO. The ScHARR LMIC filter has not yet been validated therefore any recommendations are based on this initial case study. Future research on validating our adaptations and the Cochrane EPOC LMIC geographic search filter in general would be beneficial.

## CONFLICT OF INTEREST
The authors declare no conflicts of interest.

## AUTHOR CONTRIBUTIONS
Anthea Sutton carried out the searches and adapted the search filter, in discussion with Fiona Campbell. Anthea Sutton drafted the manuscript with contributions from Fiona Campbell. Anthea Sutton and Fiona Campbell made revisions, with final approval of the manuscript from both authors.

## DATA AVAILABILITY STATEMENT
Data sharing is not applicable to this article as no new data were created or analyzed in this study.

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## SUPPORTING INFORMATION

Additional supporting information may be found in the online version of the article at the publisher's website.