

Evidence on cataract in low- and middle-income countries: an updated review of reviews using the evidence gap maps approach

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In 2014, Sightsavers developed the first evidence gap map (EGM) to assess the extent and quality of review-level evidence on cataract relevant to low- and middle-income countries. The EGM identified 52 studies across five broad themes. This paper reports the update of the EGM conducted in 2021 and changes to the extent and quality of the evidence base. We updated the EGM using the exact process conducted to develop the original. Searches were run to 14 September 2021, and two independent reviewers selected eligible studies, critically appraised them and extracted data using the Supporting the Use of Research Evidence checklist. A summary quality assessment was shared with the authors for comments. Forty-six new reviews were identified, and the EGM now includes 98 reviews. The new reviews predominantly focus on treatment and risk factors. The overall methodological quality was found to be improved, with 13/46 reporting high confidence in findings. EGMs remain a useful tool for policy-makers to make informed decisions and periodic updates are important to assess changes and to refine the focus for future research. The EGM highlights significant disparity in the topics addressed by reviews, with health system interventions particularly neglected.

Keywords: cataract, systematic review, visual impairment.

Introduction

Cataract is the leading cause of blindness and the second leading cause of moderate and severe visual impairment globally, affecting >100 million people, 17 million of whom are blind.¹ Over 90% of people with visual impairment due to cataract live in low- and middle-income countries (LMICs), where access to relatively simple and cost-effective treatment, cataract surgery, is often restricted by poor awareness of services, a limited number of eye care facilities and high user fees and costs of transport.^{2–5} A review of national cataract surgical rates (CSRs), an indicator, which measures the number of cataract operations per million population per year, published by Wang et al. in 2016, showed significant regional variations in access to cataract surgery, with national CSRs ranging from 10 000 per million in some of the wealthiest countries of Europe and North America to <500 per million in the poorest parts of sub-Saharan Africa.⁶

Because prevalence of cataract increases sharply with age, the combination of a growing and ageing population in the next few decades will substantially increase the number of people

with cataract and subsequent demand for cataract services.^{7–10} In May 2021, the World Health Assembly (WHA) endorsed effective cataract surgical coverage as a global indicator for monitoring progress towards universal health coverage (UHC) and recommended to countries a target of a 30% increase in coverage by 2030.¹¹ The WHA also stressed the importance of equity of cataract surgical coverage for all relevant population subgroups. These demographic pressures and global policy commitments call for a stronger focus on evidence-based policies and practice at both national and subnational levels.^{12–14} An evidence-based approach to decision-making uses critical thinking and the best available evidence and helps policy-makers and practitioners make better decisions, achieve higher impact and gain greater value for money spent.¹⁵

Evidence gap maps (EGMs) are a tool for presenting the state of evidence in a particular topic with the aims of providing easy access to the best available evidence and highlighting knowledge gaps.¹⁶ The approach was developed by the International Initiative for Impact Evaluation (3ie) and has been applied in

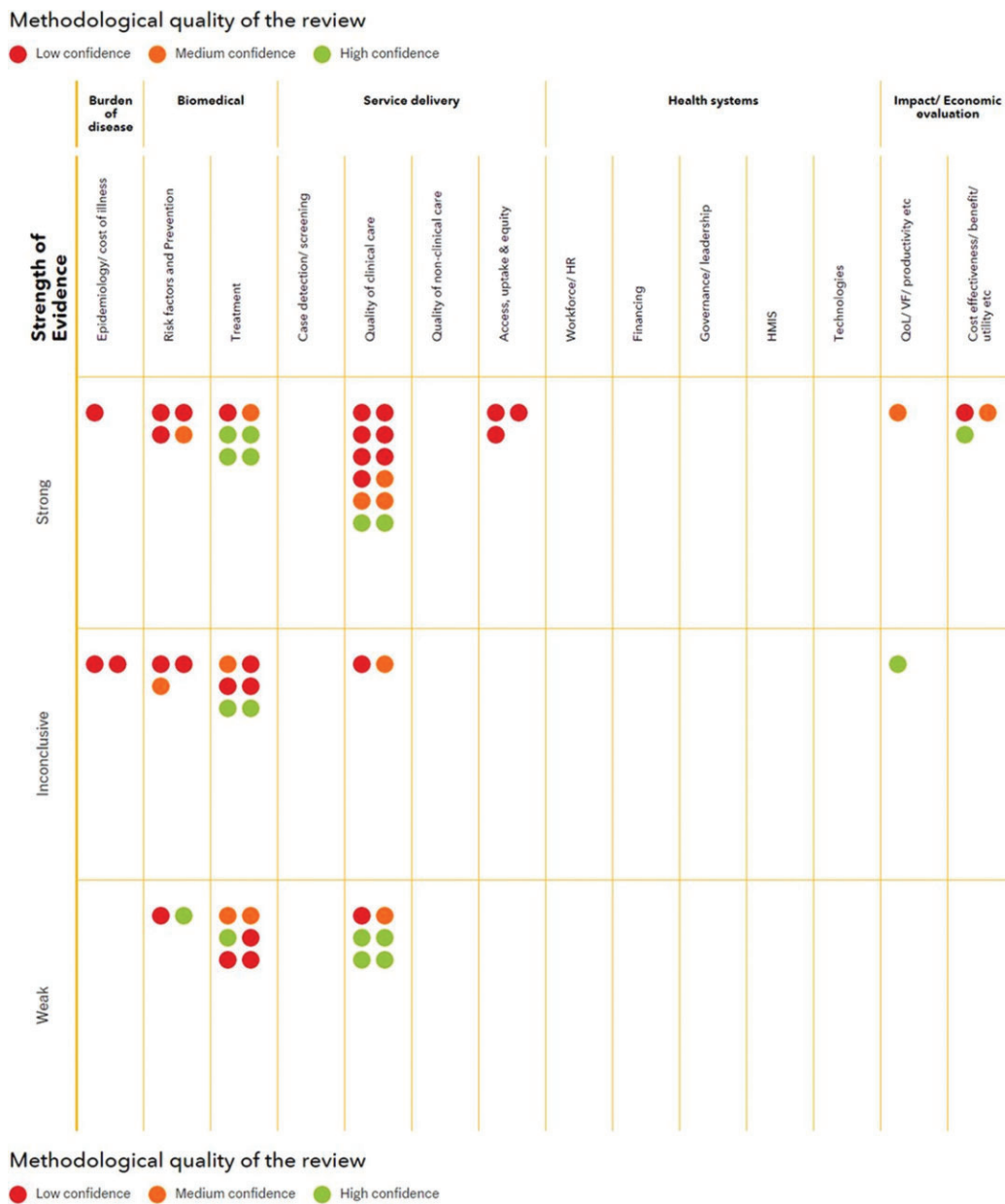


Figure 1. Cataract Evidence Gap Map, 2014, shared under CC BY-NC 4.0.

different sectors, including health, education, water and sanitation, food and nutrition, agriculture and many others.¹⁷ EGM methods draw on the principles of systematic reviews. The process involves a systematic search of relevant electronic databases and sifting sources identified against inclusion and exclusion criteria. Evidence included in an EGM can be drawn from any source, but many EGMs focus on evidence from systematic reviews. As the EGM approach was originally developed to make evidence more accessible to decision-makers in LMICs, evidence sources are usually assessed on their relevance to low- and middle-income contexts. Resultant EGMs are presented as visual matrices describing the areas of evidence available and evidence strength. Each cell is linked to a summary page and shows a con-

fidence rating of the review using the traffic light system. The rating is assigned using a standardised methodology used for critical appraisals of systematic reviews; it aims to help EGM users judge how much they can rely on the evidence presented.

In 2014, using the 3ie methodology, Sightsavers developed the first eye care EGM with a focus on cataract (Figure 1). The process of the EGM development and the evidence base included in the map was published in 2016.¹⁸ The map included 52 systematic reviews identified through a search of Cochrane Library, MEDLINE and EMBASE from inception to the end of 2013. The reviews were mapped across 5 broad themes and 14 subthemes (Figure 1). These were developed in consultation with practising clinicians and researchers from a number of LMICs. Reviews

identified provided evidence in 7 out of 14 subthemes, with the majority of evidence available on the quality of clinical care (20/52) and types of treatment (18/50). The other subthemes were risk factors and prevention (9/52), access, uptake and equity (3/52), cost-effectiveness/cost-benefit (3/52), burden of disease/cost of illness (3/52) and productivity and quality of life (2/52). With regards to quality, 16 reviews were rated as high confidence, 13 were medium confidence and 29 were low confidence. Overall, the EGM showed that the evidence on cataract available in systematic reviews published up to the end of 2013 was primarily on types of treatment and other aspects of clinical care. Five reviews examined the impact and cost-effectiveness of cataract services and clear gaps were identified on broader aspects of cataract-related health systems.¹⁸ The EGM also drew attention to the need to better present and describe the methodology of published systematic reviews to ensure that their search strategies, selection criteria and data syntheses are transparent and clear to the reader.

In this paper we describe an update to our original cataract EGM completed in 2021 by reviewing and appraising systematic reviews published during 2014–2021. We report the updated state of evidence on cataract and specifically examine whether the extent and quality of the newly published reviews has changed since the original EGM. We also highlight persistent evidence gaps for researchers to concentrate on.

Materials and Methods

The update of the EGM followed the same methodology as the original.¹⁸ In summary, Cochrane Library, MEDLINE and EMBASE databases were systematically searched for all systematic and literature reviews published from 1 January 2014 to 1 January 2019 using the same search terms as previously reported (Appendix A).¹⁸ A further search was conducted on 14 September 2021, once again with the same terms as previously reported.

Sources were included if they (1) presented systematic or literature reviews, (2) described their methods for collecting and synthesising data, (3) contained evidence relevant to LMICs and (4) were published from 1 January 2014 to 14 September 2021. Reviews that restricted their searches to evidence solely from high-income settings were excluded. References in full-text articles were screened for relevance and added if they met the inclusion criteria.

We applied no restrictions on the language of publication. The relevance to LMICs was assessed jointly by an ophthalmologist with substantial clinical experience in LMICs and a Sightsavers researcher. Therefore, if a review question was assessed as relevant to LMICs (e.g. relevant clinical procedures/techniques) by the ophthalmologist and a Sightsavers researcher, and the search strategy was open to evidence from LMIC settings, it would be included in the cataract EGM regardless of where the studies identified and included actually came from.

Primary studies, purely narrative reviews, reviews where the search methodology was restricted to high-income settings and reviews that restricted their search strategies to high-income settings only, were excluded.

Data from the reviews that met the inclusion criteria were independently extracted by two reviewers, who also categorised

the strength of evidence of effect (strong, inconclusive or weak) and appraised the methodological quality of the review (high, medium or low). All data extraction and critical appraisal were in the original language of the publication.

Strength of evidence of effect summarises the extent to which the authors of each review were able to reach a conclusive answer to their research question, using the evidence they reviewed. Strength of evidence of effect was categorised as strong if the review found consistent strong evidence in response to the research question or outcome, inconclusive if the review reported mixed results and weak if the review found weak or no evidence in response to the research question or outcome.

The appraisal of methodological quality used an adapted version of the Supporting the Use for Research Evidence (SURE) tool developed by the SURE collaboration (Appendix B).¹⁹ This checklist has been used for all EGMs supported by 3ie.¹⁷ The tool gives reviews an overall rating of high, medium or low confidence based on the assessment of three components: (1) methods used to identify, include and critically appraise studies; (2) methods used to analyse the findings; and (3) reliability of the review.¹⁸ The validity of the SURE checklist was tested using another critical appraisal tool (the Scottish Intercollegiate Guidelines Network checklist) in our original publication¹⁸; the test showed a high level of agreement between the two tests (kappa statistics 0.79). A summary of the methodological quality assessment was produced for each review and a confidence rating was assigned as follows: high confidence, if all review methods were systematic and appropriate, as described in the appraisal checklist, and the risk of bias was minimised; medium confidence, if all or some of the review methods were not systematic but the methodological limitations were acknowledged; and low confidence if most review methods were not systematic or appropriate, and the methodological limitations were not acknowledged or taken into account in the conclusions of the review. All appraisals were conducted by two reviewers independently. Any disagreements were resolved by discussion or the involvement of a third reviewer.

A short summary describing the methodology and key findings of each review was developed for sharing publicly on the EGM (e.g. <https://research.sightsavers.org/gap-map/surgical-interventions-age-related-cataract/>). Authors of all included reviews were contacted and provided with the summary and quality appraisal for verification. If the authors were able to provide additional information to support a change in the methodological quality assessment, this was sent to the original reviewers, who conducted another independent evaluation. However, there were no cases of this happening.

The reviews were displayed across the same themes and subthemes as in the original map, although the format of the map was slightly revised in 2020 following a user-testing study described elsewhere.²⁰

Results

Description of included reviews

Out of 948 unique records identified using our search strategy, 46 reviews met the inclusion criteria, resulting in a total of 98 reviews included in the updated EGM. The sifting process is

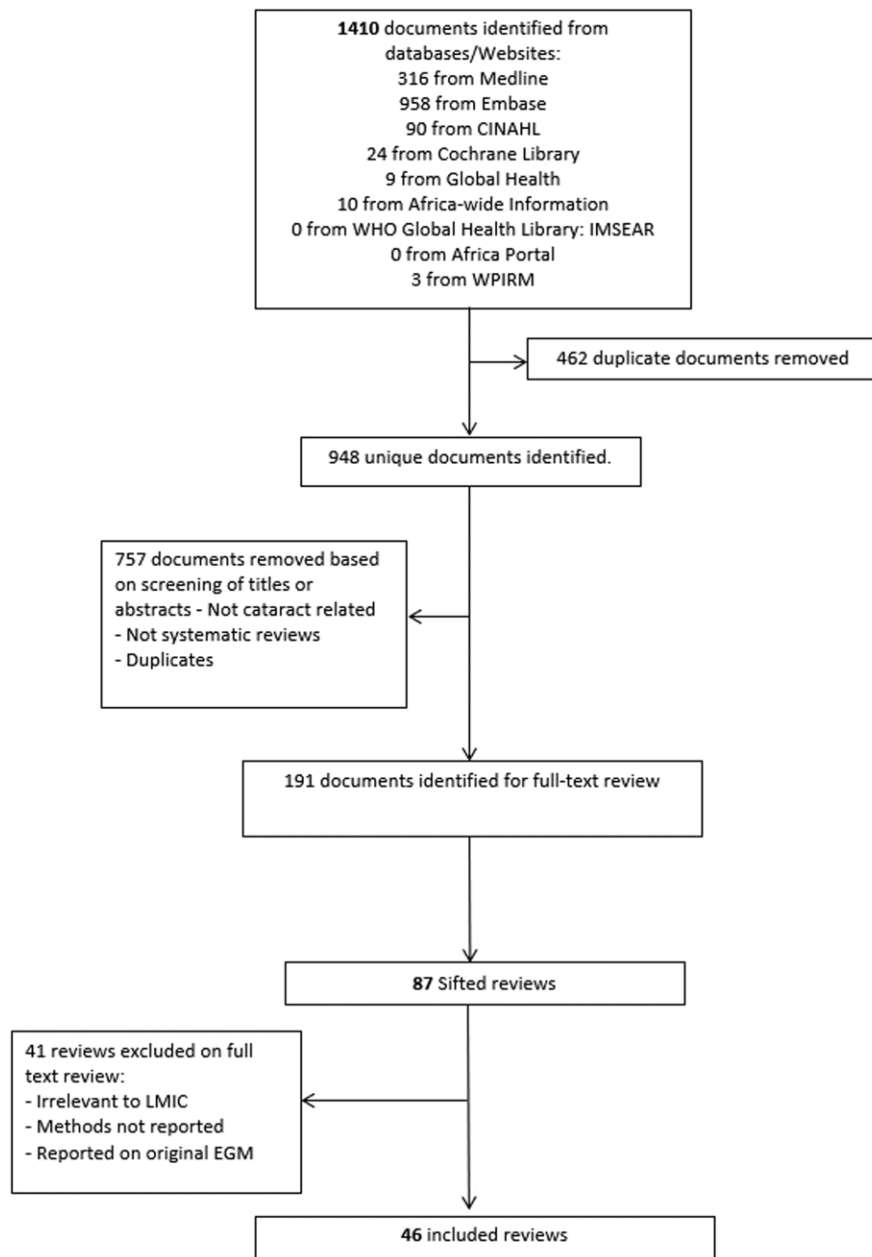


Figure 2. Flowchart of review selection process.

described in Figure 2. Based on full-text screening, reviews were excluded, as the majority were genetic-focused studies or the techniques used were deemed irrelevant to LMICs, followed by a lack of reported methodological details, while a few identified were already reported in the original EGM (data not available).

Six reviews in the original map provided evidence in two sub-themes each and thus were shown in the map twice, resulting in 104 entries on the map in total (Figure 3). All of the included reviews published since 2014 were in English. The majority of the reviews in the updated EGM (92/98) focused on age-related cataract and six reviews provide evidence on paediatric cataract.

Thematic focus

The majority of newly identified reviews were on types of cataract treatment (15/46) and risk factors and prevention (12/46). The remaining reviews provided evidence on quality of clinical care (10/46), access, uptake and equity of care (5/46), epidemiology/burden of disease (2/46), quality of life (1/46) and cost-effectiveness (1/46). There were no new reviews on the impact of cataract treatment on economic productivity or on cataract-related health systems.

Cumulatively, all reviews included in the updated map (a total of 104 due to 6 reviews reporting on multiple themes)

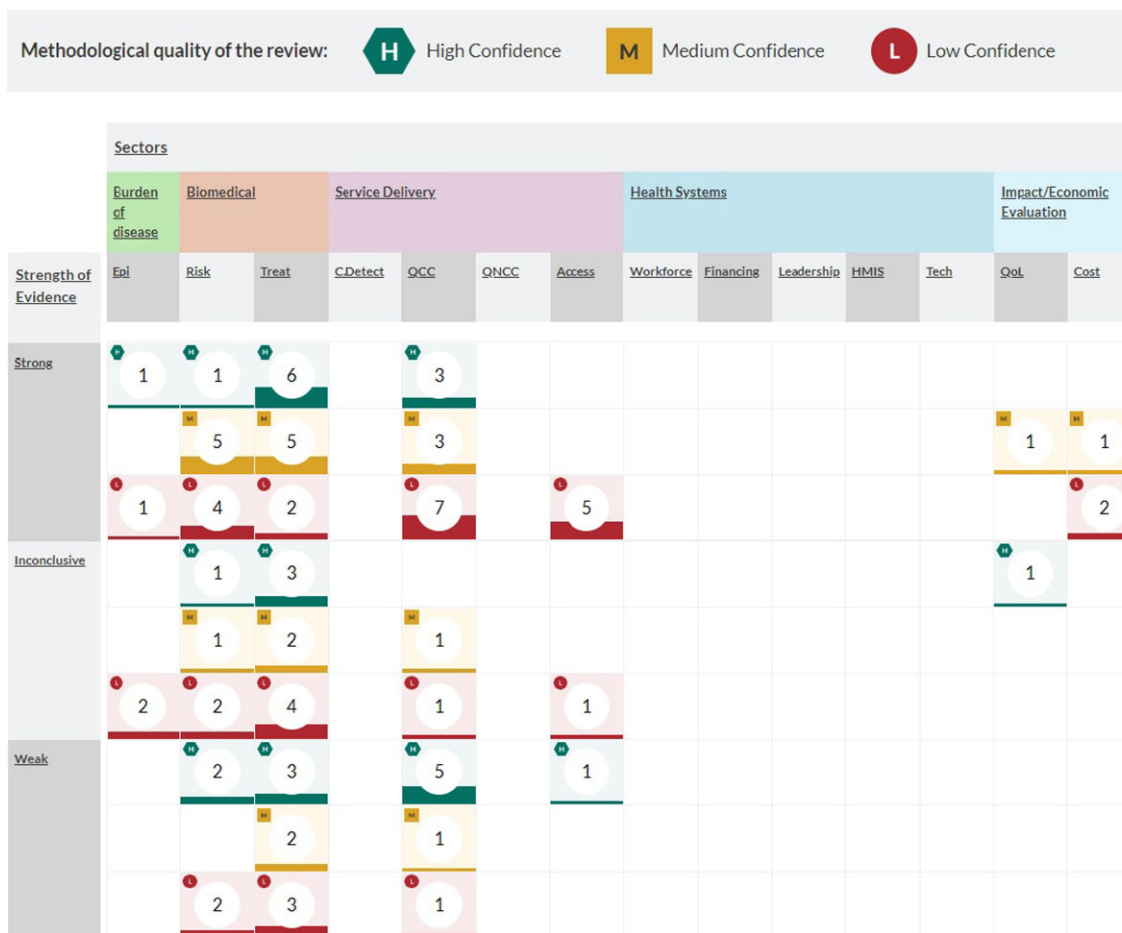


Figure 3. Cataract Evidence Gap Map, 2021 update. The columns show cataract-related sectors and subsectors. Strength of evidence was classed as strong if the authors of a particular review were able to reach a conclusive answer to their research question using the evidence available; if they were unable to answer the question given insufficient evidence then the evidence was classed as weak. If the outcome was somewhere in between, the evidence was classed as inconclusive. The number in each box represents the number of reviews. The boxes fill up depending on how many reviews are available. By hovering over a number and clicking on it, you can see the full hyperlinked list of reviews. The confidence level is an indicator of the methodological quality of the reviews. We have rated the methodological confidence in each review as high (green hexagon), medium (yellow square) or low (red circle). By clicking on one of the hyperlinks, you will be taken to a separate webpage to read a summary of that individual review. By clicking the details tab, added detail of their methodological quality is displayed on the map. Further information can be found at <https://research.sightsavers.org/evidence-gap-maps/cataract-gap-map/>.

provided evidence on cataract treatment (35/104), quality of clinical care (30/104), cataract risk factors and prevention (20/104), access, uptake and equity (8/104), epidemiology/burden of disease (5/104), cost-effectiveness/cost-benefit (3/104) and productivity/quality of life (3/104) (Figure 4).

Geographic representation within reviews

Figure 5 shows the number of reviews including at least one primary study from each of the six WHO geographic regions, and the themes of those studies. Thirty of the 98 studies do not report on the geographical location of the primary studies they include. Eleven reviews include primary studies from only one geographic region; 30 include studies from two regions; 12 include studies from three regions; 16 from four regions; 10 from five regions; and only 3 reviews include primary studies from all six regions. The

Africa and Eastern Mediterranean regions have the fewest number of primary studies included in reviews (15 and 16 reviews, respectively), while Europe (52), Western Pacific and America (50 each) and South-East Asia regions (37) have the most.

Strength of evidence of effect

The distribution of the reviews based on the strength of evidence of effect has not changed much over time, with the majority of the reviews providing strong evidence in response to the research question (28/46 for the newly identified reviews and 55/98 for all reviews in the updated EGM). The remaining reviews were equally split between those where evidence in response to the research question was weak (7/46 and 19/98) and where it was mixed and inconclusive (11/46 and 24/98) (Figure 6).

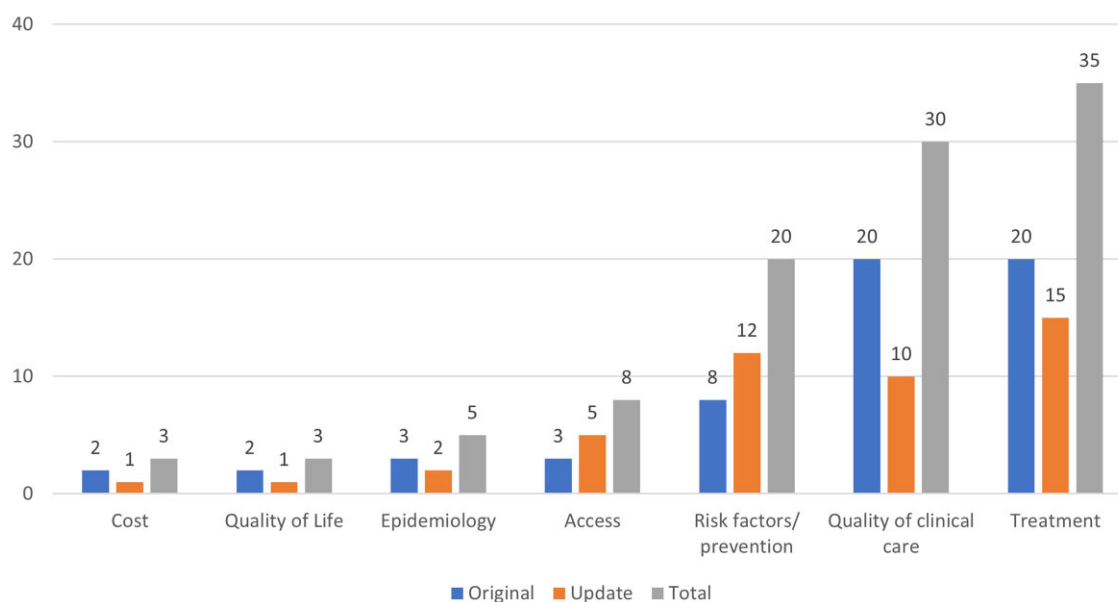


Figure 4. Distribution of reviews by theme.

Methodological quality of reviews

The majority of newly identified reviews (17/46) were rated as low confidence in findings and conclusions. Sixteen reviews were rated as medium confidence and 13 reviews were high confidence (Figure 7). Although the number of reviews rated as low confidence continued to be high (43/98), the number of reviews rated as high confidence has nearly doubled (27/98), and while in 2014 more than half of the reviews available were of low confidence (29/52), in 2021 nearly 60% of the reviews were either high or medium confidence (55/98).

Among 55 reviews that provided strong evidence in response to the research question, 11 were rated as high confidence, 19 were medium confidence and 25 were low confidence (Figure 8). Among 19 reviews that showed weak evidence in response to the research question, 10 were high confidence, 3 were medium confidence and 6 were low confidence. Among 24 reviews where evidence was inconclusive, 6 were high confidence, 6 were medium confidence and 12 were low confidence.

The updated cataract EGM is available publicly and can be accessed at <https://research.sightsavers.org/evidence-gap-maps/cataract-gap-map/>.

Discussion

Our EGM shows that cataract continues to be a high priority topic for systematic and literature reviews, with 46 new reviews published in 7 y since our original EGM. This is not surprising, as cataract continues to be the main contributor to the burden of blindness in low- and middle-income settings and has been a primary focus of the global efforts to eliminate avoidable visual impairment in the past 3 decades.^{1,7} However, thematic distribution of the evidence base available continues to be skewed towards

different aspects of clinical care and treatment of cataract. For example, the largest increase in the number of reviews in the past 7 y was observed in the area of cataract treatment, with many new reviews focusing on the efficacy and safety of clinical procedures or the medicines used during or after cataract surgery.

One interesting development in the available evidence base is the significant increase in the number of reviews of risk factors associated with cataract, including dietary factors such as consumption of vegetables²¹ or vitamin C,²² use of prescribed medicines, for example, antidepressants,²³ as well as a review of association of cataract with mortality.²⁴ This evidence opens up new opportunities for building links between cataract care and broader health systems and for integrating health promotion messages in primary and community care systems, as a measure to influence patient behaviour and reduce the fast-growing burden of cataract.

Another positive trend is the increased number of systematic reviews on barriers to cataract services,²⁵ patient education²⁶ and gender inequities.^{27,28} We commend authors for undertaking these important reviews. Synthesis of evidence on access to services, health behaviour and health inequalities is extremely difficult, as primary studies producing such evidence tend to be heterogeneous and context specific. In addition, many of these studies are observational in design and often have methodological caveats or gaps in their presentation of findings. However, the availability of such evidence across settings is critical for addressing eye health inequities and progress towards UHC and we call for both more primary research and systematic reviews on these topics.

The overall methodological quality of the reviews included has also improved, with many new reviews being rated as high confidence. Based on the analysis of methodological quality of reviews in our original EGM, we used various opportunities to encourage researchers to follow more standardised approaches

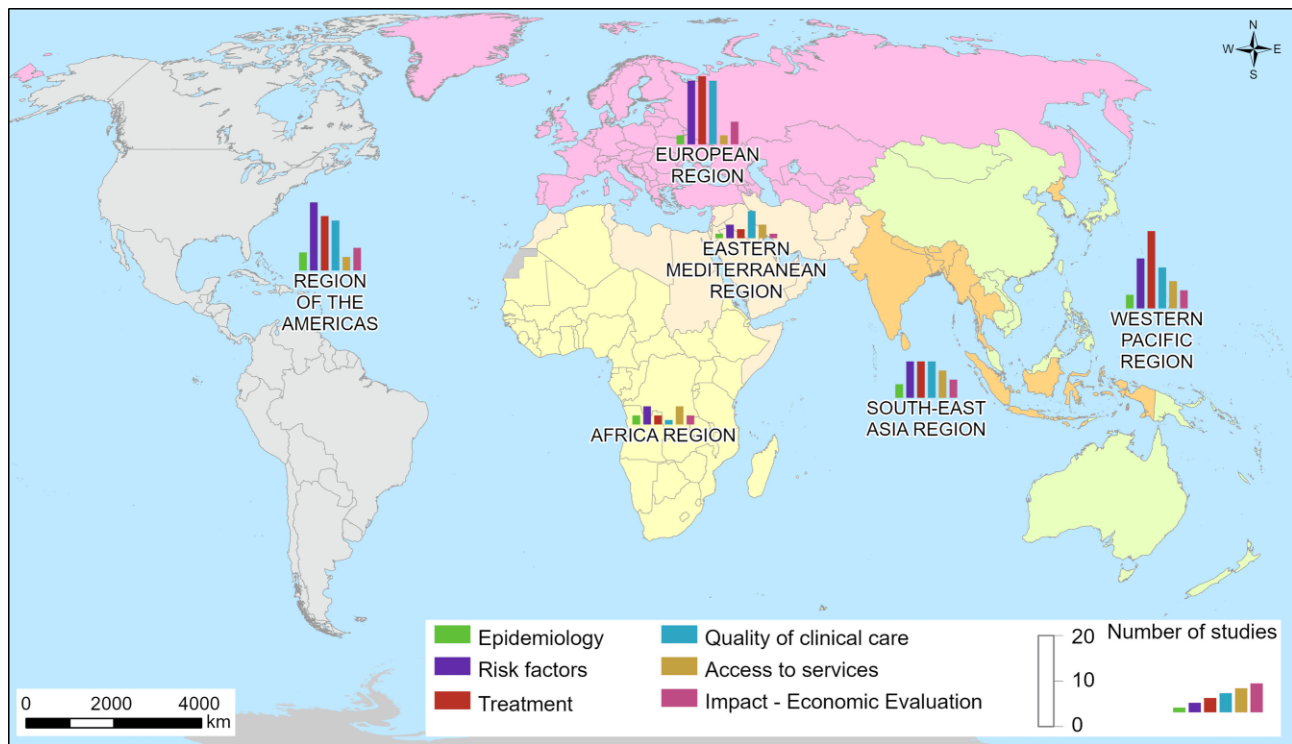


Figure 5. Geographic representation of primary studies within included reviews.

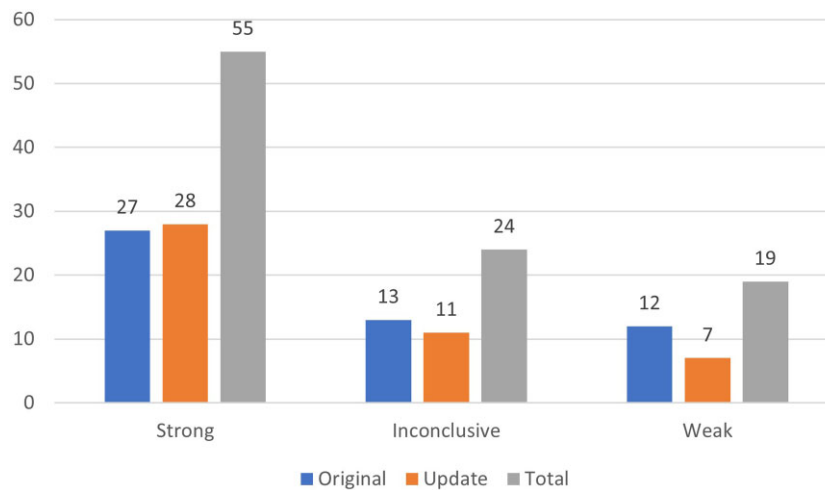


Figure 6. Distribution of reviews by strength of evidence.

and guidelines for systematic reviews and to provide details required in the critical appraisal checklists. The apparent trend toward more transparent presentation of systematic reviews and resultant higher levels of confidence in the conclusions is very promising. However, the methodological quality of reviews concluding strong evidence of effect were much more likely to be of low or medium quality (44/55) compared with those concluding weak evidence of effect, which were more likely to be of high methodological quality (10/18). This indicates the need

for continued advocacy on using standardised and transparent approaches, and for the users of reviews to remain alert to study limitations and the implications of the conclusions they draw.

On the less positive side, in the 7 y since the original EGM, there was only one additional review that examined links between cataract surgical rate and socioeconomic development and only one additional review on the impact of cataract surgery on quality of life. There also continues to be a dearth of evidence on cataract services and health systems, which is at stark odds

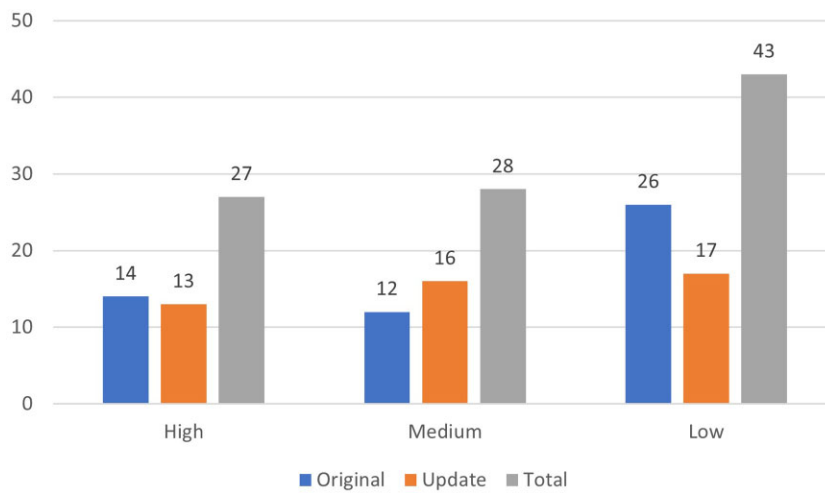


Figure 7. Distribution of reviews by level of confidence.

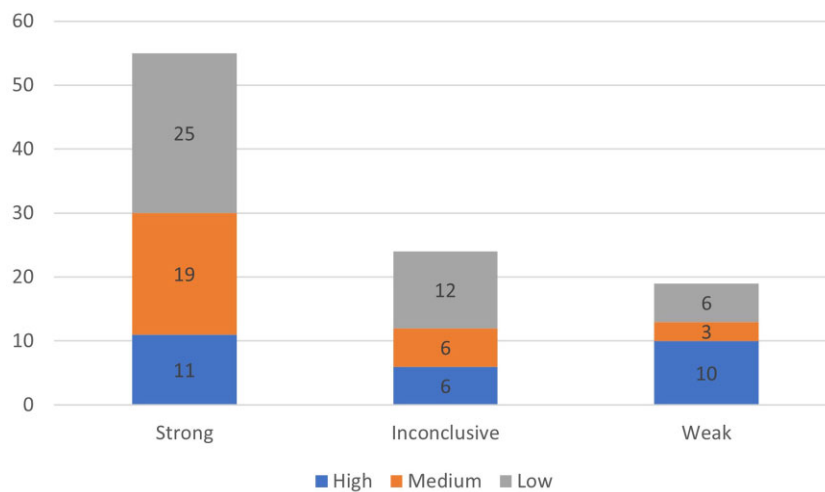


Figure 8. Distribution of quality of all reviews, by strength of evidence reported.

with evidence needs. Recent publications have identified global disparities in eye health access and outcomes, and highlighted evidence of inequality within countries, with women, poor people and those living in rural areas particularly disadvantaged. Calls for equity-focused health systems cannot be answered without high-quality evidence of how this can be achieved in different settings.

Close inspection of the location of primary studies included in the reviews is hindered by lack of reporting in nearly one-third of reviews (30/98). Although crude, the map included (Figure 5) highlights a disparity in the geographic provenance of primary studies, with evidence from the WHO Africa and Eastern Mediterranean regions significantly underrepresented in reviews. It is worth noting that disparity also exists within regions, for example, the majority of included primary studies within Western Pacific Region were conducted in just two countries. Furthermore, some reviews may include multiple studies from one region, and

just one from another, and they would be represented equally on the map.

Very few of the reviews report outcomes with a focus on equity, for example, only 5% of the reviews report outcomes-related gender equity. Because access to cataract services remains a major issue in low-income settings, particularly among certain population groups, the lack of evidence in these areas is of particular concern.

EGMs are highly dependent on the availability of primary studies that are available to be synthesised in systematic reviews. Thus, the lack of reviews on these topics is likely to be due to two factors, the lack of primary research published and the heterogeneity of the few studies that are available. This is in line with a finding reported by the Cochrane Eyes and Vision Group, who note that issues of equity are rarely considered within primary studies, which filters through to associated systematic reviews conducted by their group.²⁹ Our findings therefore call for more

geographically diverse primary studies that report outcomes by different characteristics of equity and examine interventions around the health system blocks, including governance, financing, procurement, workforce and information systems. We also call for more standardised approaches to assessing and measuring the performance of eye health systems, so that the evidence can be synthesised across settings. Tools such as the PRISMA-Equity 2012 extension reporting guidelines can help researchers to ensure that their reviews adequately reflect the state of the evidence with regard to inequities.³⁰

Eye health is now globally recognised as an integral component of UHC and must be factored into national planning, resourcing and delivery of healthcare.^{1,11} While evidence is clearly only one factor considered by policy-makers in their decision-making processes, it is important that the evidence they have access to is of high quality and relevant to the questions they face. The EGMs attempt to make clear the availability of quality evidence in a way that can be easily accessed by policy-makers. Although we have conducted some exploration into the usability of the EGMs,²⁰ the extent to which they are used by this audience, and the impact they have on decision-making, is unknown and warrants further investigation.

Conclusion

Our work on the updated cataract EGM has shown once again that EGMs are a useful tool, not only for providing a one-stop shop for the best available evidence, but also for monitoring trends in the development of the evidence base and closing evidence gaps. They are also useful in encouraging a discourse on the methodological quality of evidence available and thus encouraging more rigorous and transparent approaches to evidence generation. We have developed similar EGMs for other areas of eye care, including refractive error, glaucoma, diabetic retinopathy and trachoma. All these EGMs are available in the public domain and we would encourage policy-makers, programme managers and clinicians to use them in their day-to-day decision-making (<https://research.sightsavers.org/evidence-gap-maps/>). We would like also to encourage other researchers to use the EGM approach to collate and present the state of evidence in other areas. The approach may be particularly useful in complex areas, such as disability inclusion.

With regard to cataract, the evidence base relevant for decision-making in LMICs is substantial, but more primary studies and systematic reviews are required on the impact of cataract interventions, their cost-effectiveness, equity of services and broader aspects of cataract-related health systems, particularly in low-income settings.

Authors' contributions: EJ, BV and ES conceived the study; BV, EJ and ES designed the study protocol; BV conducted searches and initial searching; BV, VP, MB and EM conducted full text review, critical appraisal, data extraction and drafted summaries. EJ and ES drafted the manuscript. BV, VP, MB and EM critically revised the manuscript for intellectual content. All authors read and approved the final manuscript. EJ and ES are guarantors of the paper.

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Ethical approval: This was a secondary review of previously published reviews and ethical approval was not required.

Data availability: Data is available at <https://research.sightsavers.org/evidence-gap-maps/> or on reasonable request to the authors

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Appendix A. Literature search strategy

The following databases were searched:

- Cochrane Library
- Medline
- Embase
- CINAHL
- WHO library (Index Medicus for the Eastern Mediterranean Region [IMEMR], Index Medicus for South-East Asia Region [IMSEAR], Western Pacific Region Index Medicus [WPIRM], Global Health and Africa-wide)
- LILACS (Latino Americana e do Caribe em Ciencias da Saude).

The search strategy was to combine searches of:

- 'Cataract' and 'health' related terms
- 'Cataract' and 'quality of life' terms
- 'Cataract' and 'vitamin' related terms
- 'Cataract' and 'surgical' related terms
- 'Cataract' and 'economic' related terms

Cataract terms

1. Cataract
2. Cataract extraction
3. Cataract*

Health and quality of life terms

1. Health Status
2. Health Status Indicators
3. Health care
4. Health planning
5. Health planning guidelines
6. Health services
7. Regional health planning
8. Quality of Life
9. Value of Life
10. quality near/2 life
11. daly or qol or hql or hqol or hrqol or hr ql or hrql
12. Activities of Daily Living
13. 'activities of daily living'
14. Accidental Falls
15. (fall*) near/5 (risk* or reduc* or associa* or prevent*)
16. Visual Acuity
17. visual acuit*
18. Contrast Sensitivity
19. contrast near/2 sensitivity
20. Depth Perception
21. stereopsis
22. stereo acuit*
23. (visual* or vision) near/2 (function*)
24. (visual*) near/3 (disabilit* or impair*)
25. (vision) near/3 (disabilit* or impair*)
26. Disability Evaluation

Databases were also searched for specific types of reviews using the following search terms:

1. Meta-analysis
2. Systematic review
3. Literature review
4. Bibliography
5. Randomised controlled trial

Economic terms

1. Socioeconomic factors
2. Economic
3. Employment
4. Cost allocation/control/illness/savings/ sharing/benefit analysis
5. Costs and costs analysis
6. Drug costs
7. Employer health costs
8. Hospital costs
9. Health expenditures
10. Medical savings accounts
11. Fees and charges
12. Budgets
13. Fiscal or funding or finance cost

Vitamin terms

1. Vitamin E
2. Vitamin C
3. Ascorbic Acid
4. beta Carotene
5. alpha-Tocopherol

Surgical terms

1. Phacoemulsification
2. ECCE
3. manual near/3 small near/3 incision near/3 cataract*
4. MISICS or SICS
5. CCC or CCS
6. Endocapsular
7. Surgical equipment
8. Surgical Procedures, Operative

Other terms

1. Public opinion
2. Health behaviour
3. Social behaviour
4. Hospitals, private/public
5. Decision making
6. Program evaluation
7. Benchmarking
8. superstitions

Appendix B. Checklist for making judgements about how much confidence to place in a systematic review of effects (adapted version of SURE checklist)ⁱ

Assessed by: _____

Date: _____

Section A: Methods used to identify, include and critically appraise studies

A.1 Were the criteria used for deciding which studies to include in the review reported?

Did the authors specify:

- Types of studies
- Participants/ settings/ population
- Intervention(s)
- Outcome(s)

- Yes
- Partially
- No

Coding guide—check the answers above
 YES: All four should be yes
 NO: All four should be no
 PARTIALLY: Any other

Comments (note important limitations or uncertainty)

A.2 Was the search for evidence reasonably comprehensive?

Were the following done:

- Language bias avoided (no restriction of inclusion based on language)
- No restriction of inclusion based on publication status
- Relevant databases searched
 (Minimum criteria: All reviews should search at least one source of grey literature such as Google; for health: Medline/ Pubmed + Cochrane Library; for social sciences IDEAS + at least one database of general social science literature and one subject specific database)
- Reference lists in included articles checked
- Authors/experts contacted

- Yes
- Partially
- No
- Can't tell

Coding guide—check the answers above:
 YES: All five should be yes
 PARTIALLY: Relevant databases and reference lists are both reported
 NO: Any other

Comments (note important limitations or uncertainty)

A.3 Does the review cover an appropriate time period?

Is the search period comprehensive enough that relevant literature is unlikely to be omitted?

- Yes
- Can't tell (only use if no information about time period for search)
- No
- Unsure

Coding guide:
 YES: Generally this means searching the literature at least back to 1990
 NO: Generally if the search does not go back to 1990
 CAN'T TELL: No information about time period for search

Note: With reference to the above—there may be important reasons for adopting different dates for the search, e.g. depending on the intervention. If you think there are limitations with the timeframe adopted for the search which have not been noted and justified by the authors, you should code this item as a NO and specify your reason for doing so in the comment box below. Older reviews should not be downgraded, but the fact that the search was conducted some time ago should be noted in the quality assessment. Always report the time period for the search in the comment box.

Comments (note search period, any justification provided for the search period, or uncertainty)

A.4 Was bias in the selection of articles avoided?

Did the authors specify:

- Independent screening of full text by at least 2 reviewers
- List of included studies provided
- List of excluded studies provided

- Yes
- Partially
- No

Coding guide:

YES: All three should be yes, although reviews published in journals are unlikely to have a list of excluded studies (due to limits on word count) and the review should not be penalised for this.

PARTIALLY: Independent screening and list of included studies provided are both reported

NO: All other. If list of included studies provided, but the authors do not report whether or not the screening has been done by 2 reviewers review is downgraded to NO.

Comments (note important limitations or uncertainty):

A.5 Did the authors use appropriate criteria to assess the quality and risk of bias in analysing the studies that are included?ⁱⁱ

- The criteria used for assessing the quality/ risk of bias were reported
- A table or summary of the assessment of each included study for each criterion was reported
- Sensible criteria were used that focus on the quality/ risk of bias (and not other qualities of the studies, such as precision or applicability/external validity). ‘Sensible’ is defined as a recognised quality appraisal tool/ checklist, or similar tool which assesses bias in included studies. Please see footnotes for details of the main types of bias such a tool should assess.

- Yes
- Partially
- No

Coding guide:

YES: All three should be yes

PARTIALLY: The first and third criteria should be reported. If the authors report the criteria for assessing risk of bias and report a summary of this assessment for each criterion, but the criteria may be only partially sensible (e.g. do not address all possible risks of bias, but do address some), we downgrade to PARTIALLY.

NO: Any other

Comments (note important limitations or uncertainty):

A.6 Overall—how much confidence do you have in the methods used to identify, include and critically appraise studies?

Summary assessment score A relates to the 5 questions above.

High confidence applicable when the answers to the questions in section A are all assessed as ‘yes’

Low confidence applicable when any of the following are assessed as ‘NO’ above: not reporting explicit selection criteria (A1), not conducting reasonably comprehensive search (A2), not avoiding bias in selection of articles (A4, not assessing the risk of bias in included studies (A5)

Medium confidence applicable for any other—i.e. section A3 is assessed as ‘NO’ or ‘can’t tell’ and remaining sections are assessed as ‘partially’ or ‘can’t tell’

- Low confidence** (limitations are important enough that the results of the review are not reliable)
- Medium confidence** (limitations are important enough that it would be worthwhile to search for another systematic review and to interpret the results of this review cautiously, if a better review cannot be found)
- High confidence** (only minor limitations)

Comments (note important limitations):

Section B: Methods used to analyse the findings**B.1 Were the characteristics and results of the included studies reliably reported?**

Was there:

- Independent data extraction by at least 2 reviewers
- A table or summary of the characteristics of the participants, interventions and outcomes for the included studies
- A table or summary of the results of all the included studies

- Yes
- No
- Partially
- Not applicable (e.g. no included studies)

Coding guide:

YES: All three should be yes

PARTIALLY: Criteria one and three are yes, but some information is lacking on second criteria.

NO: None of these are reported. If the review does not report whether data was independently extracted by 2 reviewers (possibly a reporting error), we downgrade to NO.

NOT APPLICABLE: if no studies/no data

Comments (note important limitations or uncertainty):

B.2 Are the methods used by the review authors to analyse the findings of the included studies clear, including methods for calculating effect sizes if applicable?

- Yes
 Partially
 No
 Not applicable (e.g. no studies or no data)

Coding guide:

YES: Methods used clearly reported. If it is clear that the authors use narrative synthesis, they don't need to say this explicitly.

PARTIALLY: Some reporting on methods but lack of clarity

NO: Nothing reported on methods

NOT APPLICABLE: if no studies/no data

Comments (note important limitations or uncertainty)

B.3 Did the review describe the extent of heterogeneity?

- Did the review ensure that included studies were similar enough that it made sense to combine them, sensibly divide the included studies into homogeneous groups, or sensibly conclude that it did not make sense to combine or group the included studies?
 Did the review discuss the extent to which there were important differences in the results of the included studies?
 If a meta-analysis was done, was the I^2 , chi square test for heterogeneity or other appropriate statistic reported? If no statistical test was reported, is a qualitative justification made for the use of random effects?

- Yes
 Partially
 No
 Not applicable (e.g. no studies or no data)

Coding guide:

YES: First two should be yes, and third category should be yes if applicable should be yes

PARTIALLY: The first category is yes

NO: Any other

NOT APPLICABLE: if no studies/no data

Comments (note important limitations or uncertainty)

B.4 Were the findings of the relevant studies combined (or not combined) appropriately relative to the primary question the review addresses and the available data?

How was the data analysis done?

- Descriptive only
 Vote counting based on direction of effect
 Vote counting based on statistical significance
 Description of range of effect sizes
 Meta-analysis
 Meta-regression
 Other: specify
 Not applicable (e.g. no studies or no data)

How were the studies weighted in the analysis?

- Equal weights (this is what is done when vote counting is used)
 By quality or study design (this is rarely done)
 Inverse variance (this is what is typically done in a meta-analysis)
 Number of participants (sample size)
 Other: specify
 Not clear
 Not applicable (e.g. no studies or no data)

Did the review address unit of analysis errors?

- Yes—took clustering into account in the analysis (e.g. used intra-cluster correlation coefficient)
 No, but acknowledged problem of unit of analysis errors
 No mention of issue
 Not applicable—no clustered trials or studies included

- Yes
 Partially
 No
 Not applicable (e.g. no studies or no data)
 Can't tell

Coding guide:

YES: If appropriate table, graph or meta-analysis AND appropriate weights AND unit of analysis errors addressed (if appropriate).

PARTIALLY: If appropriate table, graph or meta-analysis AND appropriate weights AND unit of analysis errors not addressed (and should have been).

NO: If narrative OR vote counting (where quantitative analyses would have been possible) OR inappropriate reporting of table, graph or meta-analyses.

NOT APPLICABLE: if no studies/no data

CAN'T TELL: if unsure (note reasons in comments below)

Comments (note important limitations or uncertainty)

B.5 Does the review report evidence appropriately?

- The review makes clear which evidence is subject to low risk of bias in assessing causality (attribution of outcomes to intervention), and which is likely to be biased, and does so appropriately
- Where studies of differing risk of bias are included, results are reported and analysed separately by risk of bias status

- Yes
 No
 Partially
 Not applicable

*Coding guide:**YES: Both criteria should be fulfilled (where applicable)**NO: Criteria not fulfilled**PARTIALLY: Only one criteria fulfilled, or when there is limited reporting of quality appraisal (the latter applies only when inclusion criteria for study design are appropriate)**NOT APPLICABLE: No included studies*

Note on reporting evidence and risk of bias: For reviews of effects of 'large n' interventions, experimental and quasi-experimental designs should be included (if available). For reviews of effects of 'small n' interventions, designs appropriate to attribute changes to the intervention should be included (e.g. pre-post with assessment of confounders)

Please specify included study designs and any other comments (note important limitations or uncertainty):

B.6 Did the review examine the extent to which specific factors might explain differences in the results of the included studies?

- Were factors that the review authors considered as likely explanatory factors clearly described?
- Was a sensible method used to explore the extent to which key factors explained heterogeneity?
- Descriptive/textual
 - Graphical
 - Meta-analysis by sub-groups
 - Meta-regression
 - Other

- Yes
 Partially
 No
 Not applicable

*Coding guide:**YES: Explanatory factors clearly described and appropriate methods used to explore heterogeneity**PARTIALLY: Explanatory factors described but for meta-analyses, sub-group analysis or meta-regression not reported (when they should have been)**NO: No description or analysis of likely explanatory factors**NOT APPLICABLE: e.g. too few studies, no important differences in the results of the included studies, or the included studies were so dissimilar that it would not make sense to explore heterogeneity of the results*

Comments (note important limitations or uncertainty)

B.7 Overall—how much confidence do you have in the methods used to analyse the findings relative to the primary question addressed in the review?

Summary assessment score B relates to the 5 questions in this section, regarding the analysis. High confidence applicable when all the answers to the questions in section B are assessed as 'yes'.

Low confidence applicable when any of the following are assessed as 'NO' above: critical characteristics of the included studies not reported (B1), not describing the extent of heterogeneity (B3), combining results inappropriately (B4), reporting evidence inappropriately (B5).

Medium confidence applicable for any other: i.e. the 'Partial' option is used for any of the 6 preceding questions or questions and/or B.2 and/or B.6 are assessed as 'no'.

- Low confidence** (limitations are important enough that the results of the review are not reliable)
- Medium confidence** (limitations are important enough that it would be worthwhile to search for another systematic review and to interpret the results of this review cautiously, if a better review cannot be found)
- High confidence** (only minor limitations)

Use comments to specify if relevant, to flag uncertainty or need for discussion

Section C: Overall assessment of the reliability of the review

C.1 Are there any other aspects of the review not mentioned before which lead you to question the results?	<input type="checkbox"/> Additional methodological concerns—only one person reviewing <input type="checkbox"/> Robustness <input type="checkbox"/> Interpretation <input type="checkbox"/> Conflicts of interest (of the review authors or for included studies) <input type="checkbox"/> Other <input type="checkbox"/> No other quality issues identified
C.2 Are there any mitigating factors which should be taken into account in determining the reviews reliability?	<input type="checkbox"/> Limitations acknowledged <input type="checkbox"/> No strong policy conclusions drawn (including in abstract/ summary) <input type="checkbox"/> Any other factors

Use comments to specify if relevant, to flag uncertainty or need for discussion

C.3 Based on the above assessments of the methods how would you rate the reliability of the review?

Low confidence in conclusions about effects:
The systematic review has the following major limitations...

Medium confidence in conclusions about effects:
The systematic review has the following limitations...

High confidence in conclusions about effects :
If applicable: The review has the following minor limitations...

Coding guide:

High confidence in conclusions about effects: high confidence noted overall for sections A and B, unless moderated by answer to C1.

Medium confidence in conclusions about effects: medium confidence noted overall for sections A or B, unless moderated by answer to C1 or C2.

Low confidence in conclusions about effects: low confidence noted overall for sections A or B, unless moderated by answer to C1 or C2.

Limitations should be summarised above, based on what was noted in Sections A, B and C.

Notes

i Adapted from Supporting the Use of Research Evidence (SURE) Collaboration. SURE checklist for making judgements about how much confidence to place in a systematic review. In: SURE guides for preparing and using policy briefs. www.evipnet.org/sure

ii **Risk of bias** is the extent to which bias may be responsible for the findings of a study.

Bias is a systematic error or deviation from the truth in results or inferences. In studies of the effects of social, economic and healthcare interventions, the main types of bias arise from systematic differences in the groups that are compared (selection bias), the intervention that is provided, or exposure to other factors apart from the intervention of interest (performance bias/contamination), withdrawals or exclusions of people entered into a study (attrition bias) or how outcomes are assessed (detection bias) and reported (reporting bias). Reviews of social science studies may be particularly affected by reporting bias, where a biased subset of all the relevant data and analyses is presented. Assessments of the risk of bias are sometimes also referred to as assessments of the **validity** or **quality** of a study.

Validity is the extent to which a result (of a measurement or study) is likely to be true.

Quality is a vague notion of the strength or validity of a study, often indicating the extent of control over bias.