Availability of systematic review evidence on diabetic retinopathy in low- and middle-income settings: A review of reviews using evidence gap map approach

Sightsavers

Background

Diabetic Retinopathy (DR), a common complication of both type 1 and type 2 diabetes, is recognised as one of the leading causes of blindness and visual impairment globally. (1, 2) Timely diagnosis and treatment are critical to slow disease progression and prevent blindness and visual impairment. (3) DR is a common complication associated with diabetes mellitus (DM), being one of the main reasons behind sight loss. In 2019, it was estimated the global population with DM to be 463 million and projected to increase to 700 million by 2045. (3)

In 2020, it was estimated that 103 million adults worldwide were living with DR. (4) A 2021 meta-analysis reported a global DR prevalence of 22%, with 6.17% facing vision-threatening DR, among people with DM. (5) The study, which aimed to assess the prevalence of DR across the different regions according to the International Diabetes Federation regions, found the highest prevalence of DR in Africa (36%). DR prevalence for the remaining regions were 19% for Western Pacific, 19% for Europe, 17% for Southeast Asia, and 13% for South and Central America. People living in Latin America and Middle East with diabetes have higher risk of developing DR compared to those living in Asia. (5) Projections indicate that by 2045, the number of individuals with DR is expected to increase to 160.50 million, disproportionally affecting people living in the Middle East, North America, and Western Pacific. (5)

To ensure that policymakers and clinicians can plan interventions based on the most current evidence and that patients receive the best possible care, an overview of the best available evidence on DR is essential. Moreover, without a comprehensive overview of available evidence, research efforts may not focus on the most pressing priorities and urgent evidence gaps. To address this need, the international non-governmental organisation, Sightsavers, has developed evidence gap maps (EGMs) for a number of eye health conditions, including DR.

Evidence gap maps

Evidence gap maps are a visual tool designed to present the state of available evidence from systematic or literature reviews in specific sectors relevant to low- and middle-income settings. Their aim is to illuminate knowledge gaps and provide user-friendly access to existing evidence. Originally developed by the Internal Initiative for Impact Evaluation (3ie), the EGM approach has been adopted by Sightsavers', with contributions from academic centres working in eye health, such as the Cochrane Eyes and Vision Group. Sightsavers' EGMs leverage evidence from systematic or literature reviews, organized into matrices that categorize information by sector and evidence strength.

These matrices are structured with columns representing five sectors and 14 sub-sectors pertinent to the thematic area, while rows indicate the strength of evidence in each review. Reviews that meet predefined inclusion criteria are plotted within the map cells according to the sector and sub-sector they address, alongside their evidence strength. Each cell displays a number indicating the count of systematic or literature reviews available for that sub-sector, with the accumulation of boxes reflecting the volume of available reviews. These numbers

are linked to the titles and summaries of each review, revealing the confidence level assigned to the review's evidence. At a glance, the map offers insights into the quality of evidence, identifies where gaps exist, and locates where evidence is available (Figure 1).

The initial DR EGM, developed in 2015, incorporated 20 reviews spanning six thematic areas. The majority of these reviews focused on the treatment of DR (n=6), with others addressing screening (n=5), risk or prevention (n=4), and individual reviews discussing the cost-benefit and quality of life associated with DR. Among these, 12 were classified as medium confidence, seven as low confidence, and one as high confidence. This mapping highlighted significant knowledge gaps, particularly concerning the quality of healthcare services, access to services, and broader health-related systems.

This paper reported on the updates of the DR EGM for the years 2020 and 2022, offering a comparative analysis of the evidence on DR, including the quality and breadth of reviews since the EGM's initial development.

Methods

A comprehensive overview of the EGM development approach is available in the paper by Virendrakumar (2016). Briefly, we conducted searches in several online databases, including Global Index Medicus, Global Health, and The Cochrane Library, for reviews published between 1993 and September 2014. This process was repeated for the initial EGM update to capture reviews published from July 2020 and again for reviews from November 2022. Additionally, we reviewed the references of included documents to spot potentially eligible reviews.

The inclusion criteria for reviews were as follows: (i) they had to be systematic or literature reviews; (ii) they needed to detail methods used for data collection and synthesis; (iii) they were required to include evidence relevant to low- and middle-income countries (LMICs); and (iv) they had to be published after 1993. To align with international development objectives, two eye health experts evaluated the reviews for relevance. Exclusion criteria were applied to reviews if their search methodology was limited to high-income settings, if they were narrative reviews, if they were published before 1993, or if they failed to describe their search and data synthesis methods. We applied no restrictions regarding the language or publication status of the reviews.

We extracted data from the included reviews into a customised form and assessed their methodological quality using the Supporting the Use of Research Evidence (SURE) checklist. This checklist assigns a confidence level of high, medium, and low, visually presented as a green hexagon, yellow square and red circle, respectively, in the EGM. A review received a high confidence rating if it systematically applied appropriate methods, as outlined in the checklist, thereby minimising the risk of bias. A medium confidence rating was assigned if the review methods were not all systematic, but methodological limitations were acknowledged. Low confidence was assigned when most review methods were not systematic or appropriate, and the methodological shortcomings were not acknowledged or considered in the review's conclusions. The evidence strength was categorised as strong if the review authors provided a conclusive answer to their research question. Conversely, the evidence was deemed weak if they could not reach a conclusive answer due to insufficient evidence, and inconclusive if the review presented mixed evidence.

For each review, we summarised the extracted data and methodological quality assessment in a brief summary accessible through the title link of each review.

Results

In the 2020 and 2022 updates, we included a total of 19 and 85 reviews, respectively (figure 1 & 2). This brought the cumulative number of reviews in the DR EGM to 124.

Figure 1: the EGM updated on 2020

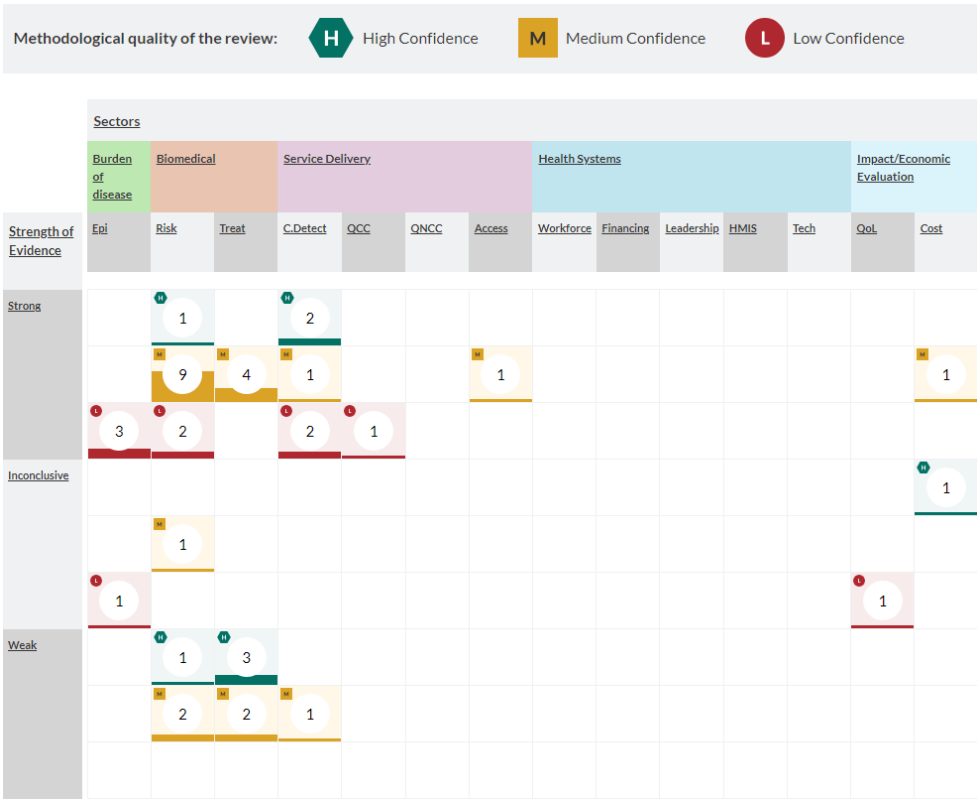
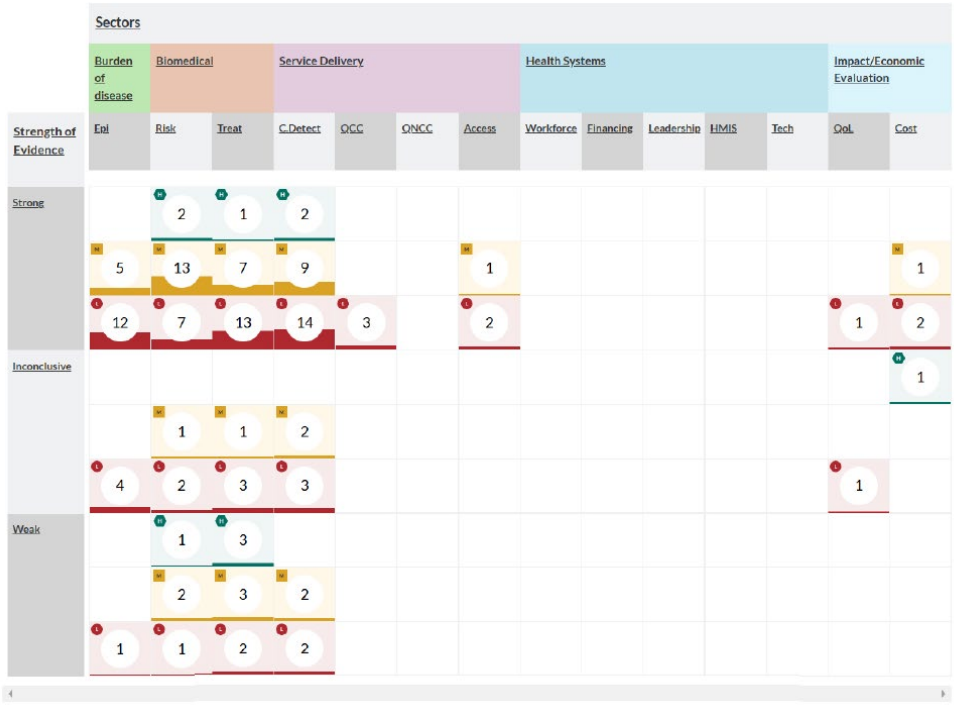


Figure 2: the EGM updated in 2022



Characteristics of reviews

Thematic focus

The sector focus of newly identified reviews shifted overtime. In 2020, the emphasis was predominantly on the risk factors associated with DR, or prevention of DR. By contrast, the 2022 update saw a majority of new reviews focusing on case detection and treatment of DR (table 1, figure 2). Despite the huge increase in reviews identified through these updates, significant gaps in evidence persist, especially regarding the broader aspects of health

systems and the quality of clinical care beyond the healthcare setting itself (quality of non-clinical care).

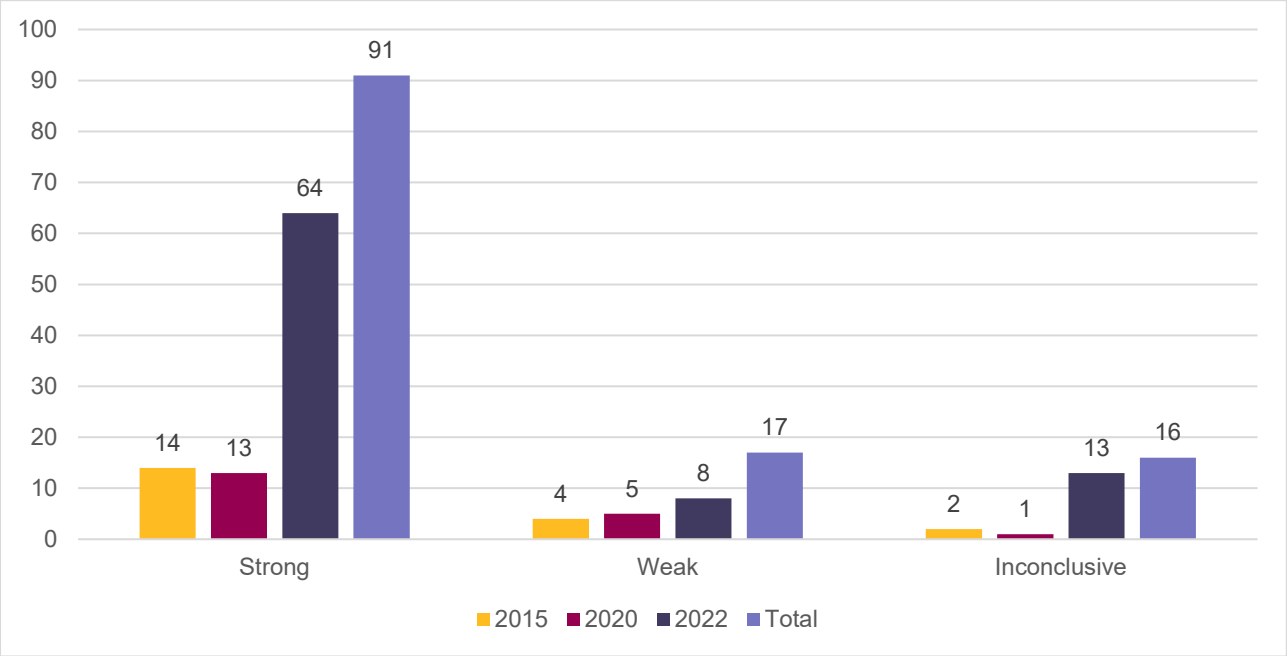
Table 1: Number of reviews by sub-sector

Sub-sector	2015	2020	2022	Total
Case detection	5	1	28	**34**
Treatment	6	3	24	**33**
Risk/prevention	4	12	13	**29**
Epidemiology	3	1	18	**22**
Cost	1	1	2	**4**
Access	0	1	2	**3**
Quality of clinical care	0	1	1	**2**
Quality of life	1	0	1	**2**

Strength of evidence of effect

The number of reviews with strong evidence significantly increased between 2015 and 2022. An increase was also noted on the number of reviews with inconclusive evidence included on the 2022 update of the map (figure 3).

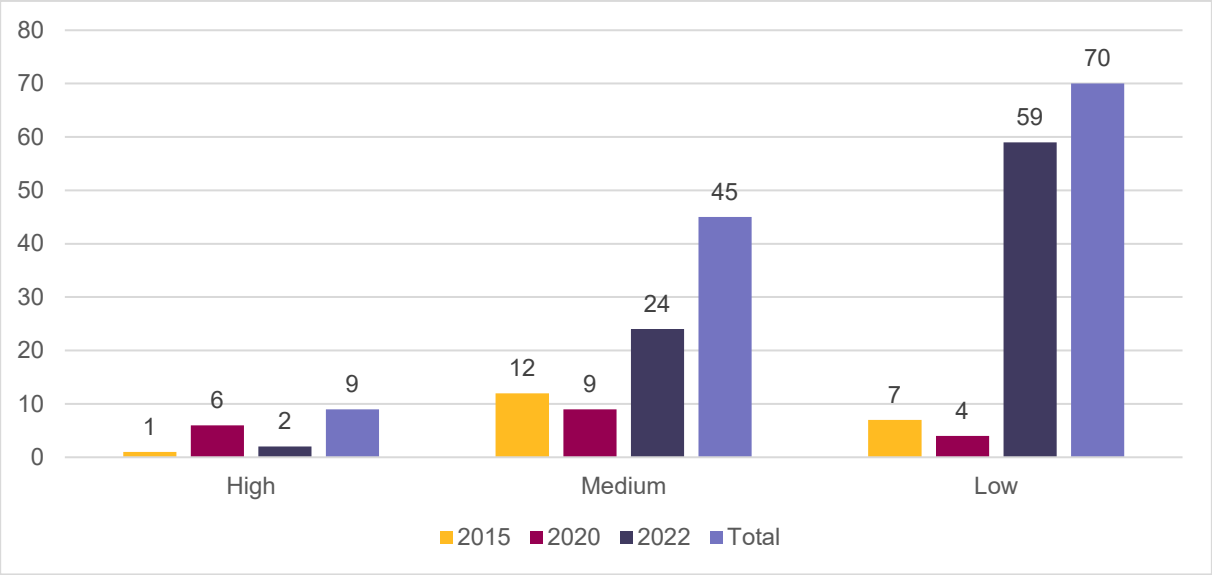
Figure 3: Number of reviews by strength of evidence over time



Confidence level of reviews

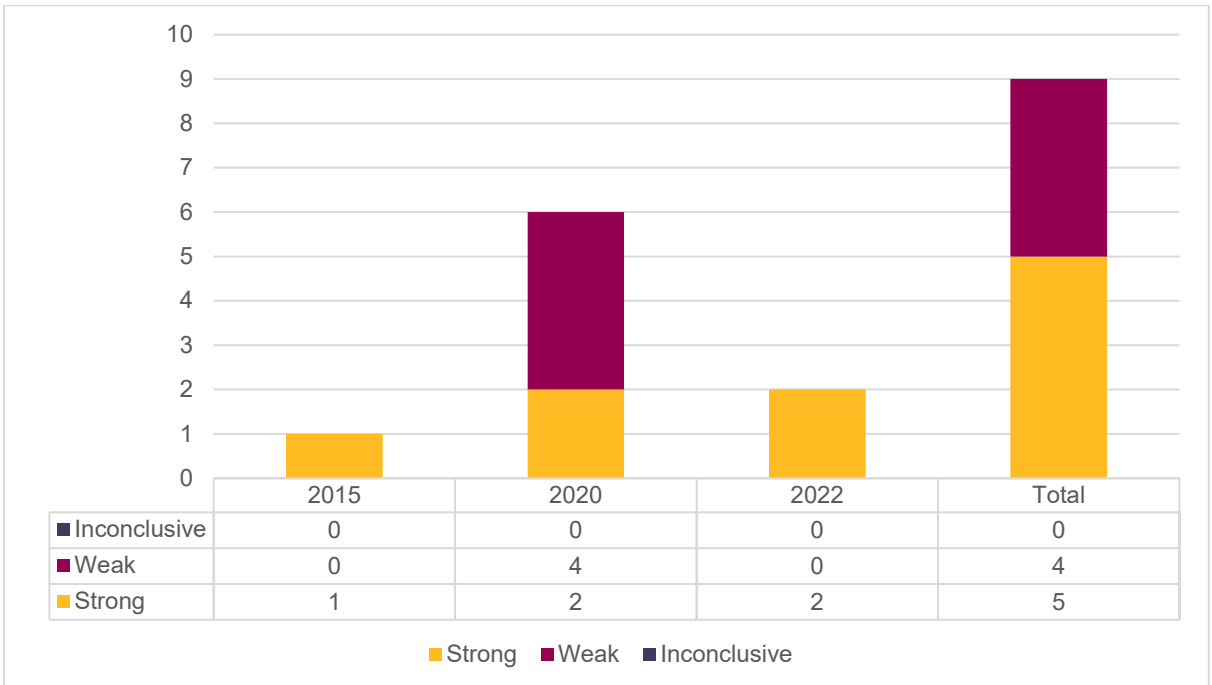
Our evaluation of the confidence levels of reviews added to the EGM between 2015 to 2022 reveals that the increases in the quantity of reviews, was not matched by improvements in methodological quality. Despite large increases in reviews rated low (from 7 in 2015 to a total of 70 in 2022) and medium quality (12 to 45), we observed only a small increase among those rated high quality (from 1 to 9).

Figure 4: Methodological quality of reviews overtime



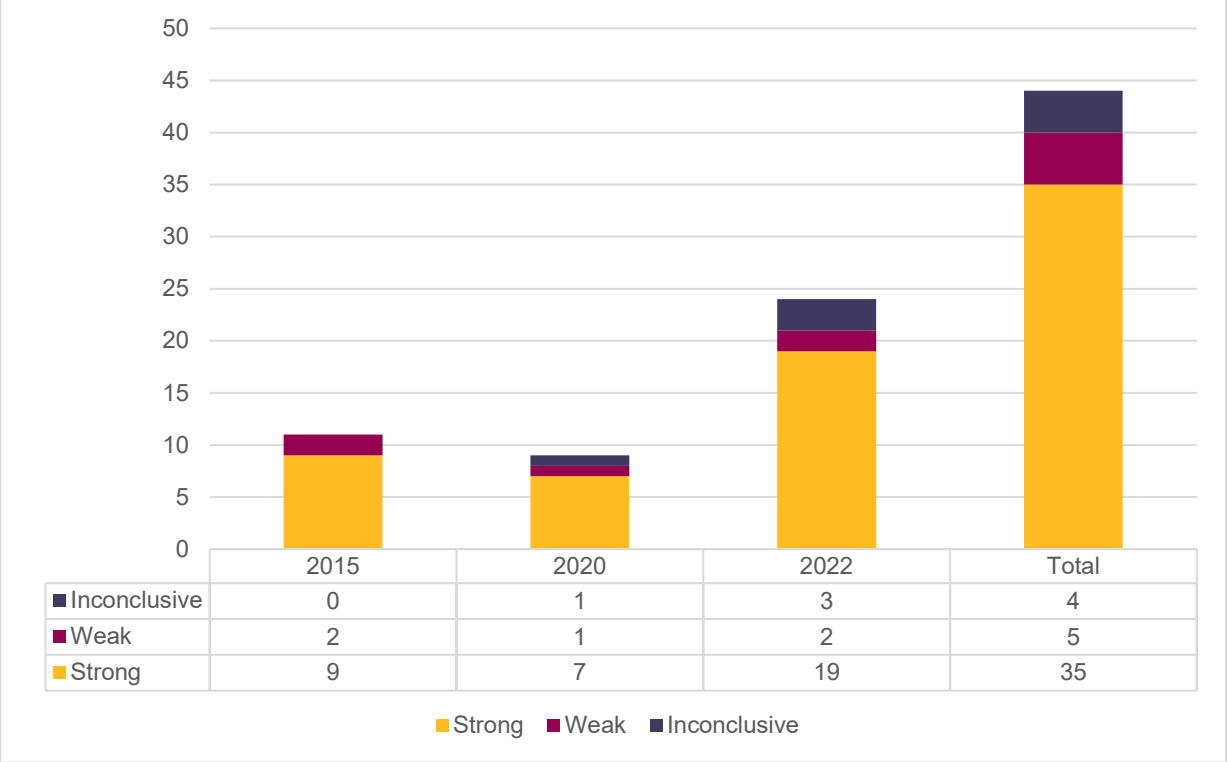
Among the high confidence level reviews (9), five provide strong evidence and four reviews found weak evidence in response to the review's research question. Out of the 45 medium confidence level reviews, 35 found strong evidence to the reviews research question, and among the low confidence reviews, 51 out of 70 reviews found strong evidence (figure 5 -7).

Figure 5: strength of evidence among high confidence reviews



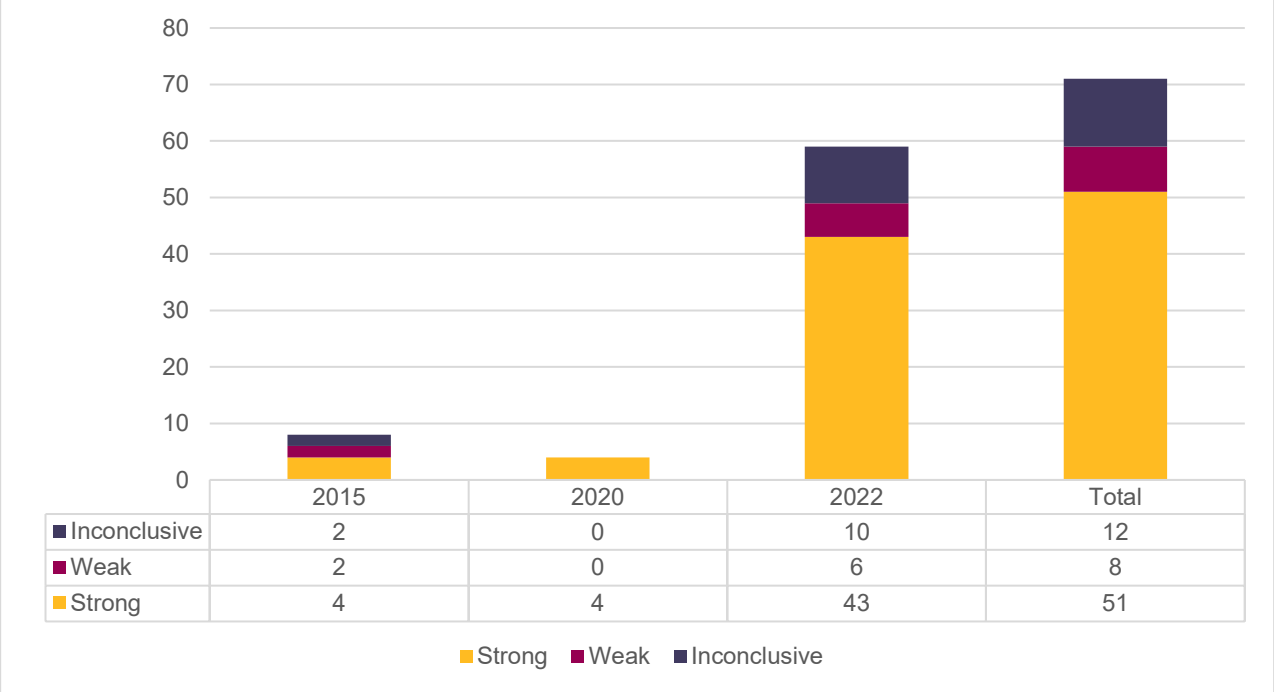
	2015	2020	2022	Total
Inconclusive	0	0	0	0
Weak	0	4	0	4
Strong	1	2	2	5

Figure 6: strength of evidence among medium confidence reviews



	2015	2020	2022	Total
Inconclusive	0	1	3	4
Weak	2	1	2	5
Strong	9	7	19	35

Figure 7: Strength of evidence among low confidence reviews

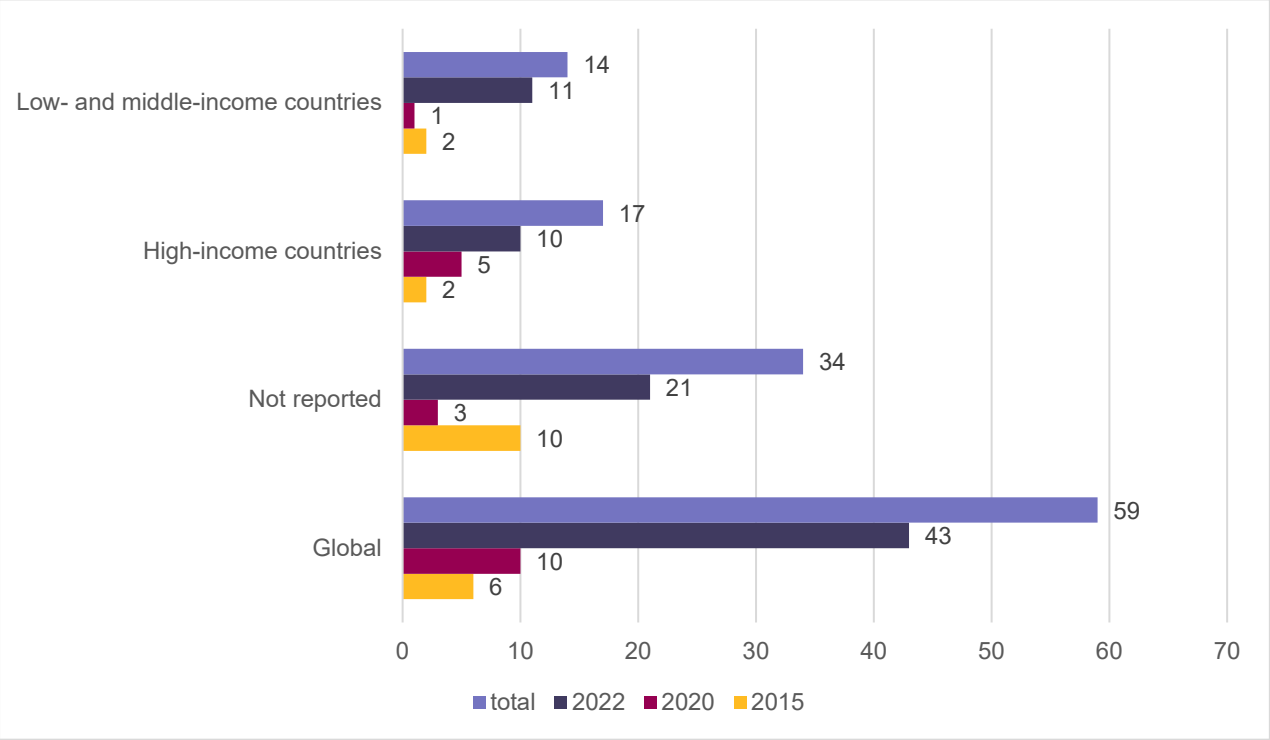


	2015	2020	2022	Total
Inconclusive	2	0	10	12
Weak	2	0	6	8
Strong	4	4	43	51

Geographic focus

While reviews focusing on all geographical regions have increased between 2015 and 2022, the increase is greatest among those including studies from high income countries (Figure 8). Reviews reporting studies from high-income countries have consistently doubled every five years, while those including primary studies from low- and middle-income countries increased particularly between 2020 and 2022. Notably, the number of reviews failing to report the geographical location of focus has also increased.

Figure 8: Geographic focus of reviews



Discussion

The process of identifying and adding new systematic reviews to the DR EGM is crucial for continually updating our understanding of the available systematic review evidence, and monitoring how researchers are addressing gaps in the evidence base. The EGM allows users to clearly visualise and understand the comparative strengths in quality and quality of systematic review level evidence. By updating the DR EGM with new reviews, researchers can better identify gaps in the current knowledge, guiding future research priorities. Highlighting areas where evidence is lacking can stimulate collaboration among researchers and attract funding for high-priority research areas. This can accelerate the generation of new knowledge and innovations in care. (6) Furthermore, by continuously updating the DR EGM with new systematic or literature reviews, it ensures that clinical practice and policy decisions can be based on the most current and comprehensive evidence, promoting the principles of evidence-base medicine. Ultimately, the goal of expanding the evidence base is to improve patient outcome. With more comprehensive and up-to-date evidence, healthcare providers can make informed decisions about the best care for individuals with DR.

The change in distribution of reviews across sub-sectors between 2015 and 2022 illustrates the evolution of focus areas and the shifting research emphasis over time. The domain of case detection has seen an increase in reviews, totalling 34 in 2022, signalling an increasing interest in the early identification of DR cases. This area has also witnessed the swift adoption of novel technologies, such as digital diagnostics and artificial intelligence, to improve detection accuracy and efficiency. The treatment sector remains paramount, as evidenced by the accumulation of 33 reviews, indicating persistent efforts to enhance DR management. The increase to 29 reviews concerning risk and prevention underscores sustained interest in the comprehension and mitigation of DR risk factors. Despite their lower overall numbers, sectors related to cost, access, and quality of clinical care, along with patient quality of life, are indispensable for a holistic approach to DR management.

When assessing confidence levels across the different sub-themes (e.g. case detection or treatment) between the 2015 and 2022 updates, an increase was observed of medium confidence addressing risk and prevention of DR. Low confidence reviews saw an increase among those addressing screening and treatment of DR. Reviewing confidence levels across themes - like biomedical factors and disease burden -from 2015 to 2020 reveals a subtle, positive shift in review methodologies. However, the high number of studies with low to medium confidence levels highlights an urgent need for improvement in methodological precision and transparency in research reporting practices.

A growing trend of reviews omitting the geographic location of their study subjects calls into question the generalisability and relevance of their findings. For example, the lack of geographical data hampers the interpretation of factors that may affect the efficacy of screening procedures. This gap underscores the necessity for research that specifies geographic settings and investigates regional differences in detection strategies and outcomes. Such studies could offer invaluable insights into customised approaches that accommodate local epidemiological and socioeconomic contexts.

References

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