EDITORIAL

What does systematic review and meta-analysis offer, and what does it not?

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In the rapidly evolving field of health sciences, systematic reviews and meta-analyses have been increasingly used to inform health care practices and to provide an evidence base for policy making. Despite their increasing popularity, the findings and conclusions of systematic reviews and meta-analyses should be read, interpreted and applied with caution. Here we provide an example of incompatible conclusions from two recent systematic reviews and meta-analyses on indoor air pollution (IAP) and tuberculosis (TB) to illustrate the challenge of such an approach.

In the first systematic review, Sumpter and Chandramohan identified 10 case-control studies and 3 cross-sectional studies.¹ They applied the fix-effect model and reported that the pooled odds ratio from the 10 case-control studies was 1.30 (95% confidence interval [CI] 1.04–1.62). They concluded that ‘there is increasingly strong evidence for an association between IAP and TB.’ In the other systematic review, Lin and colleagues identified 10 case-control studies and 5 cross-sectional studies.² They found a high risk of bias in control selection and exposure assessment and substantial between-study heterogeneity, implying that the true association between IAP and TB was likely to be different across studies. They applied the statistical model that accounted for between-study heterogeneity (the random-effects model), and reported a pooled odds ratio of 1.17 (95%CI 0.83–1.65) for the 10 case-control studies. Based on the quality of the included studies and the quantitative results, the authors concluded that the level of evidence for a positive association between IAP and TB was low.

Although systematic reviews can be a useful tool for summarising available evidence and to ‘see the forest’, it may not always offer unbiased estimates of interest, as study selection, data extraction or statistical analysis might be inadequate, resulting in biases. In addition, the reviewers might have different (and of-

ten subjective) interpretations of the studies. It is thus not rare to see two meta-analyses conducted in the same period that report different or even inconsistent results. Finally, meta-analysis should be more than just a mechanistic procedure for reducing multiple studies into one single summary effect estimate. The objective of a systematic review and meta-analysis is not to pool all included studies. In the presence of substantial between-study heterogeneity, the exploration and explanations of the heterogeneity observed will be more informative than the mechanical pooling itself.

To make the best use of systematic review and meta-analysis in the synthesis of public health evidence, peer-reviewed journals should advise researchers to follow reporting guidelines for systematic reviews and meta-analyses, such as the now widely accepted PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-analyses) guideline.³ For the readers, users’ guides are available to help appraise this type of literature and apply results to daily practice.⁴ In sum, systematic reviews and meta-analyses can be a valuable tool for evidence synthesis in health sciences, but to achieve the anticipated value both reviewers and readers need to be fully aware of their limitations.

References

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