



Updated summary of approach to be taken by COMEAP for evidence reviews and syntheses

1. In order to provide accurate, up-to-date advice reflecting current knowledge, COMEAP and its Sub-group on the Quantification of Air Pollution Risks in the UK (QUARK) need to review the current state of evidence on health effects associated with air pollutants. In this context, COMEAP and QUARK have discussed whether they should establish a protocol for literature reviews and meta-analyses undertaken to inform their consideration of epidemiological and other evidence. At QUARK meetings held in March and September 2019, Members discussed various possible approaches, and considered their appropriateness and practicality for adoption by COMEAP/QUARK. Following these meetings, an approach was proposed to COMEAP, discussed by the whole Committee at its meeting held in November 2019 and published in 2020. More recently, QUARK (at its meeting in April 2022) and COMEAP (at its meeting in May 2022) discussed potential updates to the approach, including the need to reflect the increasing recognition¹ of the benefits of using a “triangulation” approach when synthesising epidemiological evidence. QUARK has also discussed the use of prediction intervals as an expression of statistical uncertainty in meta-analytical summary effects estimates.

2. Based on these discussions, the following approach was agreed:

a) The type of review that is undertaken will depend upon the required timescale and resources available, as well as the likely extent of the literature relevant to the policy-relevant question under consideration. This decision will therefore need to be made on a case-by-case basis.

b) The constraints of the review type selected will be made clear in the COMEAP statement/report.

c) If a systematic review and/or meta-analysis is undertaken or commissioned to support COMEAP’s considerations, it should be reported in line with the MOOSE guidelines.² COMEAP/QUARK may wish to consider using (or adapting) an

¹ For example, by the Committees on Toxicity (COT) and Carcinogenicity (COC) of Chemicals in Food, Consumer Products and the Environment: [SETE | Committee on Toxicity \(food.gov.uk\)](https://www.food.gov.uk/committees/committee-on-toxicity)

² https://www.elsevier.com/___data/promis_misc/ISSM_MOOSE_Checklist.pdf

appropriate quality scoring approach for the studies to be included in meta-analyses. However, COMEAP/QUARK considers that evidence synthesis should, where possible, consider the entire body of evidence available, while taking into account the possible biases in individual studies.

d) If a meta-analysis is undertaken or commissioned to support COMEAP's considerations, it should adopt an *a priori* algorithm for selecting which coefficients should be included or excluded from the meta-analysis. Algorithms similar to those which have previously been used in DH-funded meta-analyses of time-series studies³ or to support COMEAP's decision-making (for example, of studies linking all-cause mortality with long-term average concentrations of ozone⁴ or nitrogen dioxide⁵) would be appropriate. These algorithms are intended to ensure, for example, that only one coefficient is included from any cohort which has been included in multiple published papers, and that cohorts which are not relevant to the population in which the coefficient is to be applied for quantification purposes are not included.

e) COMEAP/QUARK recommends continuing to use 95% confidence intervals to express the uncertainty around summary effects estimates and concentration response functions used in quantification (for example, in health impact assessments or burden estimates). We consider confidence intervals to be the most appropriate representation of the uncertainty in the available epidemiological evidence base. We are aware that use of prediction intervals, for this purpose, has been suggested.⁶ Our view is that, while a prediction interval is appropriate to express the range within which the association in a new study at a new location would be expected to fall, it is less appropriate for expressing the uncertainty around a summary effects estimate.

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³ eg Atkinson et al (2014) <https://www.ncbi.nlm.nih.gov/pubmed/24706041>; Mills et al (2015) <https://www.ncbi.nlm.nih.gov/pubmed/24706041>

⁴ Atkinson et al (2016) <https://www.ncbi.nlm.nih.gov/pubmed/26908518>

⁵ <https://www.gov.uk/government/publications/nitrogen-dioxide-effects-on-mortality>

⁶ Chiolerio et al (2012) <https://link.springer.com/article/10.1007/s10654-012-9738-y>