



COMEAP Work Program: List of Topics

A number of topics have been identified for the Committee to consider (May 2020 onwards). Topics currently under consideration by the Committee, or proposed for future consideration, are listed below. The Committee's work programme is reviewed by the COMEAP Strategy Group annually, taking into account developments in the scientific literature, policy needs and public interest. It may be adapted or amended in the light of developments in these during the year.

The table below summarises the topics prioritised for consideration by the Committee.

Health Outcome / Topic	Status
Cardiovascular morbidity	Report on mechanisms published 2018. Report on epidemiology and quantification has been discussed by COMEAP. Additional analyses were requested and are underway.
Adverse Birth Outcomes	Working groups have reviewed epidemiological and mechanistic evidence. Draft report discussed by COMEAP (11 November 2020).
Cognitive decline and dementia	A Sub-group has examined the epidemiological and mechanistic evidence. A report is being prepared for publication.
COVID-19 and air pollution	COMEAP has established a working group to provide ad-hoc advice to government departments on the quality of the available studies and the appropriateness of methods used to investigate potential interactions between air quality and COVID-19.
Mortality associated with long- and short-term exposure to PM, NO₂ and O₃	COMEAP discussed (11 November 2020) whether to update its recommendations for quantification of mortality associated with air pollutants to reflect recent systematic reviews and meta-analyses.
Differential toxicity of particulate matter according to source or composition	COMEAP discussed (11 November 2020) whether to update its statement on this topic to reflect recent reviews.
Climate change, Net Zero carbon policies and air quality	COMEAP is keeping a watching brief on activities in this area.
Health evidence related to Environment Bill targets for PM_{2.5}	COMEAP provided initial views to Defra following a workshop in July 2020. It discussed responses to specific questions at a meeting on 24 November 2020.
Indoor Air Quality	A COMEAP Member will contribute to work on this topic planned by Defra's Air Quality Expert Group (AQEG).
Diabetes and metabolic syndrome	This topic has been identified as likely the next one for consideration when the work of current working groups on other topics has been completed.
Childhood asthma	This topic has been identified as being of particular interest, and is therefore likely to be a priority for the work programme in future. This work will be taken forward as soon as the 'Adverse birth outcomes' work is completed.

Ultrafine particles (UFP)	This topic has been identified as being of particular interest, and is therefore likely to be a priority for the work programme in future. Currently available reviews have considered that the evidence on UFP is insufficient to suggest that much of the impact of PM on health is attributable to the ultrafine fraction.
Methodological issues of importance for COMEAP's recommendations	Status
Low-dose exposures and the shape of the concentration-response curve	QUARK discussed (March and September 2020) studies of effects in cohorts exposed to low concentrations of pollutants, mostly focused on PM _{2.5} . In November 2020, COMEAP discussed a summary of QUARK views to be considered as an interim COMEAP statement on the basis of current evidence.
Exposure misclassification and two-pollutant models	QUARK discussed (March and September 2020) the use of multi-pollutant models in health impact assessment. A workshop on exposure misclassification and measurement error is planned for the first half of 2021.
Heterogeneity of coefficients and transferability to the UK context	QUARK discussed the transferability of epidemiological evidence to quantification in the UK in September 2019 and discussions continued in the March and September 2020 meetings. Simulation work to investigate the reasons for heterogeneity of coefficients is being designed.

COMEAP Work Program: Overview of the topics

The table below provides a short overview of the topics currently under consideration by the Committee.

Topic	Description
Birth Outcomes	Conditions during pregnancy can have immediate and potentially long-lasting impacts throughout a child's life. In recent years, there has been growing interest, both within the media and scientific communities, in whether a pregnant woman's exposure to outdoor air pollution may lead to adverse birth outcomes, such as babies being born prematurely and with a low birth weight. COMEAP therefore felt it was timely to consider the evidence linking adverse birth outcomes with maternal exposure to air pollution during pregnancy. The Committee has established a Sub-group, made up of Members and co-opted experts, to review the available evidence. The Sub-group will provide its analysis and recommendations to the full Committee. The Committee will then provide an independent expert opinion on the likelihood of a causal link between air pollution and adverse birth outcomes. The Committee's intention is to publish a report in 2021. Anyone who wishes to keep track of progress will be able to do so via the publicly available minutes of the Main Committee meetings.
Dementia and Cognitive Decline	Dementia is an umbrella term for a range of conditions that affect how the brain works and in particular the ability to remember, think and reason. It mainly affects older people, both men and women, and gets worse over time. A number of health and lifestyle factors, such as high blood pressure and smoking, are known to increase the risk of developing dementia. In recent years, there has been growing interest, both within the media and scientific communities, in the possibility that exposure to outdoor air pollution could increase the risk of dementia. COMEAP therefore felt it was timely to consider the evidence linking exposure to outdoor air pollution with dementia. The

	<p>Committee set up a Sub-group, made up of Members and co-opted experts, to review the available evidence. The Sub-group has provided its analysis and recommendations to the full Committee. The Committee will now provide an independent expert opinion on the likelihood of a causal link between air pollution and dementia. The Committee's intention is to publish the Report in 2021. Anyone who wishes to view COMEAP's discussions on this topic can do so via the publicly available minutes of the Main Committee meetings.</p>
Cardiovascular Morbidity	<p>Cardiovascular disease (CVD), a general term for conditions affecting the heart or blood vessels, is a major cause of health problems in the UK. A combination of genes, lifestyle choices and environmental factors can influence a person's likelihood of developing CVD. Some of these factors, such as unhealthy diet and physical inactivity, can be avoided. In its 2006 report 'Cardiovascular Disease and Air Pollution', the Committee noted that air pollution has an impact on CVD but was unable to make any recommendations on which components of the air pollution mixture were responsible for the effects based on the evidence at that time. Since then, there has been a growing body of evidence suggesting that exposure to outdoor air pollution may be a risk factor for CVD. As such, COMEAP felt it was important to review the evidence and determine whether a cause-effect relationship exists between people's long-term exposure (over years) to outdoor air pollution and CVD. The Committee has set up a Sub-group, made up of Members and co-opted experts, to review the available evidence. Several lines of evidence are being considered, including studies on human populations and research on the underlying mechanisms (how the pollutants affect the cardiovascular system). This work has been partly funded by the British Heart Foundation. The Committee published its report on the mechanistic evidence: 'Effects of long-term exposure to ambient air pollution on cardiovascular morbidity: mechanistic evidence' in October 2018. The Sub-group has reviewed the human population studies (epidemiological studies) on the association of long-term exposure to air pollution with CVD and considered whether, and how, the effect in the UK can be estimated. It has discussed its analysis and recommendations with the full Committee. The Committee has requested some additional analyses, which are on-going. When these are complete, the Committee will provide an independent expert opinion in a report. The Committee's intention is to publish its report in 2021. Anyone who wishes to view COMEAP's discussions on this topic can do so via the publicly available minutes of the Main Committee meetings.</p>
COVID-19 and air pollution	<p>In the light of the COVID-19 situation, the links between Covid-19 and air pollution are the focus of several research papers and media coverage. COMEAP established a working group to keep the developments in the evidence under review by scrutinising the strengths and limitations of current evidence. In addition, COMEAP provided advice to the Office for National Statistics work on investigating UK data for any correlations between common air pollutants and rates of COVID 19 related mortality¹. In addition, COMEAP contributed to The Department for Environment, Food and Rural Affairs's independent Air Quality Expert Group's report based on its call for evidence on the estimation of changes in air pollution emissions, concentrations and exposure during the COVID-19 outbreak in the UK². Anyone who wishes to view COMEAP's views on this topic can do so via the publicly available statement via the main website³.</p>
Mortality associated with	<p>At its meeting on 11 November 2020, COMEAP considered whether recent reviews, including those commissioned by the World Health Organization, might provide a suitable basis to update its recommendations for quantification of mortality associated</p>

¹<https://www.ons.gov.uk/economy/environmentalaccounts/methodologies/coronaviruscovid19relatedmortalityratesandtheeffectsofairpollutioninengland>

² https://uk-air.defra.gov.uk/library/reports.php?report_id=1005

³ <https://www.gov.uk/government/groups/committee-on-the-medical-effects-of-air-pollutants-comeap>

long- and short-term exposures	with long- and short-term exposure to air pollutants. It was agreed that, for mortality associated with long-term exposure to NO ₂ and O ₃ , COMEAP will retain its current recommendations (2018 for NO ₂ , 2015 for O ₃). A small working group will give further consideration to updating COMEAP's recommendations for mortality associated with long-term exposure to PM _{2.5} . The Committee considered that the available reviews may provide a suitable basis to update their recommendations for quantification of mortality associated with short-term average concentrations of some air pollutants (PM ₁₀ /PM _{2.5} and NO ₂). However, this was not considered an immediate priority. The Committee considered that the available meta-analysis was not suitable for updating their recommendation on O ₃ . Therefore, for the time being, the current recommendations for mortality associated with short-term exposures will be retained. Anyone who wishes to keep track of progress will be able to do so via the publicly available minutes of the Main Committee meetings.
Differential toxicity of particulate matter	COMEAP published a statement on the evidence for differential health effects of particulate matter according to source or components in 2015. This remains an important question to inform policy priorities and understanding of the health effects of the PM mixture. Since COMEAP last considered this issue, relevant reviews by authoritative bodies have been published. These provide an opportunity for COMEAP to evaluate the new information. This was discussed at the COMEAP meeting held on 11 November 2020. A small working group was established to revise the 2015 statement. Anyone who wishes to keep track of progress will be able to do so via the publicly available minutes of the Main Committee meetings.
Climate change and Net Zero carbon policies	COMEAP Members have expressed an interest in undertaking work on the topic of air pollution and climate change. The potential for either beneficial or detrimental effects on air quality to arise from interventions implemented to mitigate, or adapt to, climate change has been acknowledged. This item has been discussed at the COMEAP meetings on 19 May and 11 November 2020. Anyone who wishes to view COMEAP's discussions on this topic will be able to do so via the publicly available minutes of the Main Committee meetings.
Environment Bill targets for PM_{2.5}	COMEAP is providing advice to Defra to inform the derivation of PM _{2.5} targets under the Environment Bill ⁴ . A workshop was conducted in July 2020 to initiate this work. Relevant topics, and specific questions, have been discussed at COMEAP meetings held on 11 November and 24 November 2020. Anyone who wishes to keep track of progress will be able to do so via the publicly available minutes of the Main Committee meetings.
Low-dose exposures and the shape of CRF	COMEAP has made recommendations of how to quantify mortality associated with long-term average concentrations of PM _{2.5} and/or NO ₂ . In doing so, Members have needed to consider the shape of the exposure-response relationship, including whether there is evidence of a threshold for effect or whether the relationship is likely to continue in a linear fashion below the range of studied concentrations. These issues have implications for the quantification methods recommended and thus they have been considered by QUARK. An interim statement summarising the QUARK views on the studies in populations with low-level exposures and the shape of the exposure-response curve was discussed by COMEAP on 11 November 2020. Anyone who wishes to keep track of progress will be able to do so via the publicly available minutes of the Main Committee meetings.
Exposure misclassification,	During the work done on the 'Associations of long-term average concentrations of nitrogen dioxide with mortality' ⁵ , it had been difficult to distinguish the independent

⁴ <https://www.gov.uk/government/publications/environment-bill-2020/august-2020-environment-bill-environmental-targets>

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

two-pollutant models	effects of NO ₂ on mortality. It was known that the association with the pollutant whose exposure was more accurately estimated in an epidemiological study could be overestimated, and that the association with the pollutant with less accurately estimated exposure could be underestimated (effect transfer), with the direction and degree of effect transfer in this case being unknown. This was understood to be a greater problem if the pollutants' concentrations were closely correlated. QUARK has discussed this methodological issue in order to inform future approaches to quantification of effects associated with air pollutants.
Heterogeneity and transferability of coefficients	Studies evaluating exposure-response relationships for air pollutants with specific health outcomes often result in different Concentration–response functions (CRFs). This heterogeneity between coefficients can arise from different factors, including how the studies measured or modelled exposures, when and where they took place, which confounders were adjusted for, and the characteristics of the study population. QUARK Members started discussions in September 2019 to inform COMEAP's thinking about the extent to which the coefficients derived from particular studies might be transferable to the UK situation. QUARK is now designing simulation studies to investigate the reasons why the coefficients are heterogeneous, which will help COMEAP decide on whether and to what extent they can be applied within UK work.

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