

METHODOLOGICAL APPROACHES AND CHALLENGES IN PROJECTING HEALTH IMPACTS ASSOCIATED WITH AIR POLLUTION AND CLIMATE CHANGE

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Background and Aims: Quantifying the health impacts of climate change has been an active area of research in recent years. Different methods have been developed to estimate the magnitude of a number of diseases potentially modified by climate change. The focus of this review is on methodological approaches and challenges in projecting future health impacts associated with air pollution under a changing climate.

Methods: The review is limited to studies published between 2000 and 2010. In addition to examining approaches and challenges in projecting the effects of climate change on health outcomes related to air quality, we also compared them with projections of potential health effects attributable to climate change such as temperature-related deaths and food-borne disease.

Results: Approximately 90% of the published articles used epidemiological approaches where reference dose-response functions of pollutants were linked with projected air quality concentrations generated from climate-air pollution modelling systems. Recently a study proposed a combination of synoptic weather typing and statistical downscaling as an alternative approach. Factors other than climate change, for example, emissions of ozone precursors, population growth, age structure, and disease incidence, were mostly held constant to reduce uncertainty in the model predictions. Such simplified future scenario has been commonly found in estimating various disease outcomes under a changing climate. Challenges identified in the past studies include correlation of multiple air pollutants, interrelated air pollution-temperature health burdens, application of air pollution health thresholds, future demographic characteristics, and adaptive actions.

Conclusions: Developing models and realistic scenarios to minimise bias and uncertainty in predictions are the key challenges for future research. Similar to approaches in studying future impacts of climate change of heat on mortality, incorporating insights gained from historical air pollution episodes during extreme weather events can potentially help improve estimating future health effects of air pollution and climate change.