Speaker: Ensor Palacios (University of Bath)

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Title: Air pollution and risk of dementia in the UK Biobank

Abstract:
There is mounting evidence linking air pollution to dementia. Here we used the UK Biobank cohort to investigate both the individual and compound effects of PM10, PM2.5, PM2.5-10, PM absorbance, NO2 and NOx on the risk of all-cause dementia, Alzheimer's disease, and vascular dementia. We addressed key points that hinder causal interpretation of associations detected in the literature and their translation into clear public health policies. These points are: confounding by socioeconomic factors; spatial homogeneity of the detected associations across England (UK Biobank assessment centres); confounding between air pollutants and identification of the most ones; relevance of the time window for pollution exposure used in the analyses. Furthermore, we used positive and negative control analysis to validate our results. We found NO2 to be the strongest risk factor for dementia, especially when considering longer periods ($\geq$5 years) of exposure (HR=1.06, 1.02-1.11 per IQR). Between Alzheimer's disease and vascular dementia, air pollution was a risk factor selectively for the former. While the positive control analysis lend strength to our results, the analysis of the assessment centre-specific effects and negative control analysis revealed the presence of residual confounding, thus warranting care in the interpretation of the results. This work highlights the importance of preventive policies for dementia targeting air pollution, in particular NO2 levels.