Global Association of Cold Spells and Adverse Health Effects: A Systematic Review and Meta-Analysis

Niilo Ryti¹, Yuming Guo², Jouni Jaakkola³

¹University of Oulu, Finland, niilo.ryti@oulu.fi; ²University of Queensland, Australia

Background

There is substantial evidence that mortality increases in low temperatures. Less is known about the role of prolonged cold periods denoted as cold spells.

Objective

We conducted the first systematic review and meta-analysis to summarize the evidence on the adverse health effects of cold spells in varying climates.

Data sources and extractions

Four databases [Ovid Medline, PubMed, Scopus, Web of Science] were searched for all years and languages available. Cold spell was defined as an event below a temperature threshold lasting for a minimum duration of two days. Of 1527 identified articles, 26 satisfied our eligibility criteria. The articles were grouped by the three main study questions into Overall-effect Group, Added-effect Group, and Temperature-change-effect Group.

Data synthesis

Based on random-effects models in the meta-analyses, cold spells were associated with increased mortality from all non-accidental causes (summary-effect estimate 1.101, 95%CI: 1.035-1.172), cardiovascular diseases (1.111, 95%CI: 1.033-1.194), and respiratory diseases (1.213, 95%CI: 1.073-1.513). The increase in mortality was larger for males (1.08, 95%CI: 1.002-1.165) than for females (1.067, 95%CI: 0.992-1.147), and larger for people aged ≥65 (1.059, 95%CI: 1.004-1.116) than for people aged 0-64 (1.013, 95%CI: 0.998-1.029). Study-specific effect estimates from a limited number of studies suggested an increased morbidity related to cold spells, but it was not possible to quantitatively summarize the evidence.

Conclusions

Cold spells are associated with increased mortality rates in populations around the world. People with cardiovascular and respiratory diseases, elderly, and men are more susceptible to these effects.