Umeå University Medical Dissertations, New Series No 1658

On temperature-related mortality in an elderly population and susceptible groups

Daniel Oudin Åström

Akademisk avhandling

som med vederbörligt tillstånd av Rektor vid Umeå universitet för avläggande av medicine doktorsexamen framläggs till offentligt försvar i Triple Helix, Samverkanshuset,
onsdagen den 11e juni, kl. 9:00.
Avhandlingen kommer att försvaras på engelska.

Fakultetsopponent: Professor Paul Wilkinson,
London School of Hygiene and Tropical Medicine, England

Institution / Department
Umeå universitet/Umeå University
Umeå 2014

Organization
Umeå University
Department of Public Health and Clinical Medicine
Occupational and Environmental Medicine

Document type
Doctoral thesis

Date of publication
21 May 2014

Author
Daniel Oudin Åström

Title
On temperature-related mortality in an elderly population and susceptible groups

Abstract
Background: Climate change has increased the frequency, intensity, duration, and spatial extent of some extreme weather events, for instance heat waves. Societies today are experiencing an ongoing change in the population structure yielding an increasing proportion elderly due to increased longevity, resulting in higher prevalence of chronic and degenerative diseases. Literature suggests that the elderly and certain susceptible subgroups with chronic disease are among the most vulnerable to heat waves and elevated temperatures.
Aim: The main aims of this thesis were to expand the scientific knowledge on the short-term effects of extreme heat on mortality for the general population and certain susceptible groups in society, to investigate the development of this relationship over time and to attribute mortality to observed climate change.
Methods: Daily numbers of deaths and daily meteorological observations during three different periods were collected for present day Stockholm County, Sweden. The analyses of the relationship between mortality and temperature extremes were analysed using a time series approach. The regression models assumed the daily counts of mortality to follow an overdispersed Poisson distribution and adjustments were made for time-trends as well as confounding factors.
Results: The literature review of recent studies identified a strong relationship between heat and heat waves and increasing death rates among the elderly, particularly for respiratory and cardiovascular mortality. A statistically significant increase in total daily mortality during heat extremes in all decades investigated, as well as over the entire period, during the period 1901-2009 with a declining trend over time for the relative risk associated with heat extremes, was reported in paper II. For the period 1901-2009 cold extremes significantly increased mortality, with a more disperse pattern over individual decades and no declining trend over time. Paper III attributed increased mortality due to climate change between 1900-1929 and 1980-2009. This increase was mainly due to a large number of excess heat extremes in the latter time period. Furthermore certain subgroups of the population above 50, were in paper IV found to have significantly increased mortality during heat waves as compared to non-heat wave days.
Conclusions: Although the relative risk of dying during extreme temperature events appears to have fallen in Stockholm, Sweden, such events still pose a threat to public health. The elderly population and certain susceptible subgroups of the population experience higher relative risks of dying on heat waves days as compared to normal summer days. Some of the groups most susceptible during heat waves were identified. In order to minimize future impacts of heat waves on public health, identifying susceptible subgroups in an ageing society as well as develop strategies to reduce the impact of future temperature extremes on public health will be important.

Keywords
Heat-related mortality, attribution, elderly, susceptible groups,

Language
English

ISBN
978-91-7601-066-2

ISSN
0346-6612

Number of pages
57 + 4 papers