

09 February 2017

Majid Ezzati FMedSci
Professor of Global Environmental Health
Director, Imperial College Wellcome Trust Centre for
Global Health Research

Dr. Bronwyn Wake
Chief Editor, *Nature Climate Change*

Dear Dr. Wake:

My colleagues and I would like to submit the enclosed manuscript titled "Seasonal dynamics of mortality in the United States from 1982 to 2013" for consideration in *Nature Climate Change* as a Letter.

Whether a warmer world will be associated with an overall reduction in deaths in temperate climates by reducing the so-called excess winter deaths remains a common but empirically unresolved hypothesis. This debate persists at least partly because there is no formal framework for studying seasonality of mortality, and probe how it varies over space and time. Yet analytical tools for studying periodicity, and its long-term dynamics, have been utilised in other areas of weather and climate, e.g., for El Nino-Southern Oscillation.

We use unique geo-coded data and innovative wavelet analytical methods to analyse seasonality of mortality for over three decades in the USA, nationally as well as in subnational climatic regions. This innovative and comprehensive analysis shows that seasonality of death rates in older middle- and older ages, when most deaths occur, is remarkably robust over time and climatic zone. In contrast, seasonality of deaths has largely disappeared in young children and weakened in adolescents and young adults. Deaths in the latter group, especially in young men, have the largely-overlooked feature of peaking in summer.

Our results generate new knowledge on seasonality of deaths, and its variations across time, geography and demographic groups. This knowledge is essential both for social, technological and health sector interventions today, and for understanding how changes in weather regimes may influence different population subgroups. Our approach harmonises methodologies used for analysing weather and climate and their consequences for human health. Therefore, the paper will be of interest to scientists and policy makers in a range of disciplines with interest in the human consequences of weather and climate.

The manuscript text, excluding methods and the introductory paragraph, is currently under 1,600 words; Methods are 650 words. The paper has 5 figures. I confirm that this paper, in whole or part, is not published or under consideration in another journal. All authors have approved the contents of the manuscript and its submission.

The following people are independent of this work and are qualified to review it from a substantive and methodological perspective. They all have expertise in US health and/or environmental data.

1) Professor Marcia Castro (climate change health effects and adaptation; statistical methods; population health and environmental health)

Harvard University

E-mail: mcastro@hsph.harvard.edu

2) Professor Brent Coull (environmental health; time-series statistical methods)

Harvard University

E-mail: bcoull@hsph.harvard.edu

3) Professor Deborah Balk (demography and population health; human/social dimensions of climate change)

CUNY

E-mail: Deborah.Balk@baruch.cuny.edu

4) Professor C Arden Pope (environmental health; statistical methods)

Brigham Young University

E-mail: cap3@byu.edu

5) Professor Peter Diggle (environmental health; statistical methods)

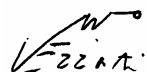
University of Lancaster

E-mail: p.diggle@lancaster.ac.uk

Subject to approval by the editors, we ask that this paper is not reviewed by Dr. Shilu Tong.

We look forward to your response and would be happy to answer any questions that you may have on this paper.

Sincerely,

A handwritten signature in black ink, appearing to read 'Majid Ezzati', with a stylized flourish at the end.

Majid Ezzati