



Review

Public health co-benefits of greenhouse gas emissions reduction: A systematic review



Jinghong Gao^{a,b,c}, Sari Kovats^d, Sotiris Vardoulakis^e, Paul Wilkinson^f, Alistair Woodward^g, Jing Li^h, Shaohua Guⁱ, Xiaobo Liu^a, Haixia Wu^a, Jun Wang^a, Xiaoqin Song^{b,c}, Yunkai Zhai^{b,c,j,*}, Jie Zhao^{b,c,*}, Qiyong Liu^{a,**}

^a State Key Laboratory of Infectious Disease Prevention and Control, Collaborative Innovation Center for Diagnosis and Treatment of Infectious Diseases, National Institute for Communicable Disease Control and Prevention, Chinese Center for Disease Control and Prevention, Beijing, China

^b The First Affiliated Hospital of Zhengzhou University, Zhengzhou 450052, Henan, China

^c National Engineering Laboratory for Internet Medical Systems and Applications, Zhengzhou 450052, Henan, China

^d NIHR Health Protection Research Unit in Environmental Change and Health, London School of Hygiene and Tropical Medicine (LSHTM), 15-17 Tavistock Place, WC1H 9SH London, UK

^e Institute of Occupational Medicine, Edinburgh EH14 4AP, UK

^f Department of Social and Environmental Health Research, London School of Hygiene and Tropical Medicine, 15-17 Tavistock Place, WC1H 9SH London, UK

^g School of Population Health, University of Auckland, Private Bag 92019, Auckland, New Zealand

^h Changping District Centre for Disease Control and Prevention, Beijing 102200, China

ⁱ Ningbo Municipal Center for Disease Control and Prevention, Ningbo, China

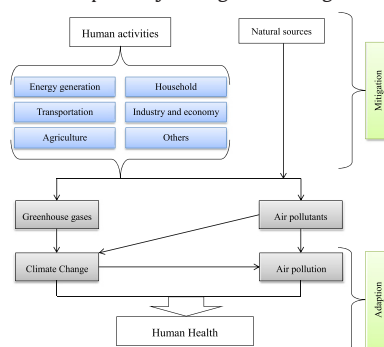
^j Engineering Laboratory of Henan Province for Internet Medical E-commerce and Active Health Services, Zhengzhou 450001, Henan, China

HIGHLIGHTS

- Public health co-benefits of GHG mitigation was primarily observed in five economic sectors.
- Comprehensive GHG mitigation measures across various sectors tend to provide greater ancillary health gains.
- Health co-benefits assessments of GHG reductions are based almost entirely on descriptive or modeling studies.
- Overestimation or underestimates may arise during the health co-benefits assessment of GHG mitigation strategies.
- Voluntary engagements in the use of standard methods to estimate the co-benefits of GHG abatement are needed.

GRAPHICAL ABSTRACT

Potential pathways that greenhouse gas mitigation measures result in public health co-benefits.



ARTICLE INFO

Article history:

Received 9 October 2017

Received in revised form 9 January 2018

Accepted 19 January 2018

Available online xxxx

Editor: P. Kassomenos

ABSTRACT

Background and objectives: Public health co-benefits from curbing climate change can make greenhouse gas (GHG) mitigation strategies more attractive and increase their implementation. The purpose of this systematic review is to summarize the evidence of these health co-benefits to improve our understanding of the mitigation measures involved, potential mechanisms, and relevant uncertainties.

Methods: A comprehensive search for peer-reviewed studies published in English was conducted using the primary electronic databases. Reference lists from these articles were reviewed and manual searches were

* Corresponding authors at: The First Affiliated Hospital of Zhengzhou University, Zhengzhou 450052, Henan, China.

** Corresponding author at: State Key Laboratory of Infectious Disease Prevention and Control, Collaborative Innovation Center for Diagnosis and Treatment of Infectious Diseases, National Institute for Communicable Disease Control and Prevention, Chinese Center for Disease Control and Prevention, No. 155 Changbai Road, Changping District, 102206 Beijing, China.

E-mail addresses: sari.kovats@lshtm.ac.uk (S. Kovats), sotiris.vardoulakis@iom-world.org (S. Vardoulakis), paul.wilkinson@lshtm.ac.uk (P. Wilkinson), a.woodward@auckland.ac.nz (A. Woodward), liuxiaobo@icdc.cn (X. Liu), wuhaixia@icdc.cn (H. Wu), wangjun@icdc.cn (J. Wang), zhaiyunkai@zzu.edu.cn (Y. Zhai), zhaojie@zzu.edu.cn (J. Zhao), liuqiyong@icdc.cn (Q. Liu).

Keywords:

Air pollution
Climate change
Greenhouse gas emissions
Health co-benefits
Mitigation
Uncertainty

performed to supplement relevant studies. The identified records were screened based on inclusion criteria. We extracted data from the final retrieved papers using a pre-designed data extraction form and a quality assessment was conducted. The studies were heterogeneous, so meta-analysis was not possible and instead evidence was synthesized using narrative summaries.

Results: Thirty-six studies were identified. We identified GHG mitigation strategies in five domains – energy generation, transportation, food and agriculture, households, and industry and economy – which usually, although not always, bring co-benefits for public health. These health gains are likely to be multiplied by comprehensive measures that include more than one sectors.

Conclusions: GHG mitigation strategies can bring about substantial and possibly cost-effective public health co-benefits. These findings are highly relevant to policy makers and other stakeholders since they point to the compounding value of taking concerted action against climate change and air pollution.

© 2018 Published by Elsevier B.V.

Contents

1.	Introduction	389
2.	Methods	390
2.1.	Relevant definitions	390
2.2.	Data sources and search strategy	391
2.3.	Inclusion criteria	391
2.4.	Study selection	391
2.5.	Data extraction	391
2.6.	Quality assessment	392
2.7.	Data synthesis	392
3.	Results	392
3.1.	Energy generation sector	392
3.2.	Transportation sector	392
3.3.	Agriculture and food sector	396
3.4.	Residential and household sector	396
3.5.	Industrial and economic processes	397
3.6.	Other	397
4.	Discussion	397
4.1.	Challenges and uncertainties in estimating health co-benefits	398
4.2.	Strengths and limitations	400
5.	Conclusion	400
	Acknowledgments	400
	Appendix A. Supplementary data	400
	References	400

1. Introduction

There is robust evidence that climate change is well underway and that anthropogenic greenhouse gas (GHG) emissions, primarily from the burning of fossil fuels, are the main drivers (Solomon, 2007; Stocker et al., 2013). According to the Intergovernmental Panel on Climate Change (IPCC), the average global surface temperature rose by about 0.85 °C from 1880 to 2012, and high-end emissions projection scenarios have shown that if no further mitigation actions are taken, the globe will warm by 2.6–4.8 by the end of the century (Stocker et al., 2013; Watts et al., 2015). Even if carbon dioxide (CO₂) emissions abruptly ceased, climate change would continue for hundreds of years due to the inertia in the global climate system (Matthews and Caldeira, 2008; Solomon et al., 2009).

There are clear signs that climate change already threatens human health, directly and indirectly, and is expected to cause increasingly adverse impacts in the future (Ebi et al., 2017; Field et al., 2014; Forzieri et al., 2017; Gasparrini et al., 2017; Pachauri et al., 2014a; Smith et al., 2014; Woodward et al., 2014). Climate change can affect public health by various pathways (Fig. 1) (Field et al., 2014; McMichael et al., 2006; Seal and Vasudevan, 2011; Shannon et al., 2007). It is estimated that there were 125 million additional vulnerable adults exposed to heatwaves between 2000 and 2016, due to the increasing exposure to more frequent and intense heatwaves (Watts et al., 2017a; Watts et al., 2017b). Increasing ambient temperatures during this period have reduced 5.3% outdoor manual labour productivity worldwide

(Watts et al., 2017b). In 2016, the value of economic losses resulting from climate-related events were reach totally US\$129 billion (Watts et al., 2017a). According to the report from World Health Organization (WHO), considering only the well understood impacts of climate change, and assuming continued progress in economic development and public health protection, that climate warming is still likely to cause about 250,000 additional deaths annually worldwide between 2030 and 2050 (Hales et al., 2014). Climate change has been described as the biggest global threat confronting public health in the 21st century (Costello et al., 2009; Watts et al., 2015).

In light of the broad evidence that climate change is occurring with potentially expensive and far-reaching health consequences, urgent and substantial actions are needed, to limit disruption of the global climate. We have the means to mitigate climate change (Cheng and Berry, 2013; Pachauri et al., 2014a; Smith et al., 2014; Watts, 2009; Xia et al., 2015), but many countries are reluctant to make decisive changes (Edenhofer et al., 2014; Haines, 2012). In general, the focus lies on developing economies, reducing poverty, and improving living standards, and climate change is often perceived as a distant threat and a lower priority on the political agenda (Aunan et al., 2004; Li and Crawford-Brown, 2011). Additionally, developing countries often insist that the “common but shared responsibility” principle of the 1992 United Nations Framework Convention on Climate Change (UNFCCC) should be applied, meaning they should not have the same GHG emissions reduction obligations as developed countries until a certain level of development is achieved

Download English Version:

<https://daneshyari.com/en/article/8860771>

Download Persian Version:

<https://daneshyari.com/article/8860771>

[Daneshyari.com](https://daneshyari.com)