Quantitative risk assessment of the effects of climate change on selected causes of death, 2030s and 2050s



Editors: Simon Hales, Sari Kovats, Simon Lloyd, Diarmid Campbell-Lendrum

WHO Library Cataloguing-in-Publication Data

Quantitative risk assessment of the effects of climate change on selected causes of death, 2030s and 2050s. 1.Climate Change. 2.Environmental Health. 3.Mortality – trends. 4.Risk Assessment. I.World Health Organization.

ISBN 978 92 4 150769 1

(NLM classification: WA 30.5)

© World Health Organization 2014

All rights reserved. Publications of the World Health Organization are available on the WHO website (www.who.int) or can be purchased from WHO Press, World Health Organization, 20 Avenue Appia, 1211 Geneva 27, Switzerland (tel.: +41 22 791 3264; fax: +41 22 791 4857; e-mail: bookorders@who.int).

Requests for permission to reproduce or translate WHO publications -whether for sale or for non-commercial distribution- should be addressed to WHO Press through the WHO website (www.who.int/about/licensing/copyright_form/en/index.html).

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature that are not mentioned. Errors and omissions excepted, the names of proprietary products are distinguished by initial capital letters.

All reasonable precautions have been taken by the World Health Organization to verify the information contained in this publication. However, the published material is being distributed without warranty of any kind, either expressed or implied. The responsibility for the interpretation and use of the material lies with the reader. In no event shall the World Health Organization be liable for damages arising from its use.

The named authors alone are responsible for the views expressed in this publication.

Printed in Switzerland

Cover photo: © Russell Watkins/DFID UK Department for International Development

Photo caption: Flooding following extreme rainfall in Pakistan in 2010, with trees covered in webs made by spiders displaced by rising waters. Climate change is expected to increase temperatures and alter precipitation patterns, leading to a range of risks, from increased risks of water-borne infections, to changing transmission cycles of vector-borne disease, to impacts on agricultural production and malnutrition.

Data source and map production of figure 2.3: Simon Hales

Copyediting and layout: Inis Communication – www.iniscommunication.com

Quantitative risk assessment of the effects of climate change on selected causes of death, 2030s and 2050s



Acknowledgements

This work was funded by the World Health Organization (WHO), with institutional support for non-funded participants. The work was undertaken by an international consortium coordinated by the London School of Hygiene and Tropical Medicine (United Kingdom of Great Britain and Northern Ireland), the University of Otago (New Zealand) and WHO. Mariam Otmani del Barrio from the Department of Public Health, Environmental and Social Determinants of Health, WHO, was responsible for managing the completion of the assessment and the production of the report.

The climate projections were derived from the ENSEMBLES project, which was funded by the European Union (EU) FP6 Integrated Project ENSEMBLES (contract no. 505539). This research also uses data provided by the Bergen Climate Model project (http://www.bjerknes.uib.no/pages.asp?id=1837&kat=8&lang=2) at the Bjerknes Centre for Climate Research, funded largely by the Research Council of Norway.

The authors would like to thank Ian Harris at the Climate Research Unit, University of East Anglia, for processing and providing the climate model data. We also thank the individual climate modelling groups.

Chapter 2: This study was supported by Environment Research and Technology Development Fund S-8 and S-10 from the Ministry of the Environment, Japan and the Global Research Laboratory (no. K21004000001–10AO500–00710) through the National Research Foundation funded by the Ministry of Education, Science and Technology, Republic of Korea.

Chapter 3: We thank Sally Brown and Robert Nicholls for providing data on coastal flooding exposures from the Dynamic Interactive Vulnerability Assessment (DIVA) model, and for advice on the assessment. For the flood mortality data, we used the International Disaster Database (EM-DAT) at the Centre for Research on the Epidemiology of Disasters, Belgium (http://www.emdat.be).

Chapter 5: We thank Simon Hay and the Malaria Atlas Project team for providing access to the malaria map data (http://www.map.ox.ac.uk/).

Chapter 7: We used data produced by the International Food Policy Research Institute (IFPRI) to accompany the report *Food security, farming, and climate change to 2050* (http://www.ifpri.org/sites/default/files/publications/climatemonograph_advance.pdf).

We also thank the anonymous reviewers for their comments on the report.

Contents

Figures	vi
Tables	vii
Abbreviations	viii
Executive summary	1
1 Introduction and key findings	
1.1 Methods and data	5
1.2 Findings	10
1.3 Discussion	13
2 Heat-related mortality	17
2.1 Background	17
2.2 Model development	17
2.3 Quantifying the association between temperature and mortality	18
2.4 Scenario data	20
2.5 Mortality projections	21
2.6 Adaptation assumptions	21
2.7 Results	21
2.8 Uncertainty	24
2.9 Discussion	24
3 Coastal flood mortality	27
3.1 Background	27
3.2 Quantifying the burden of flood-related disasters	28
3.3 Objectives	29
3.4 Description of the model	29
3.5 Scenario data	32
3.6 Assumptions	34
3.7 Results	34
3.8 Discussion	35
4 Diarrhoeal disease	37
4.1 Background	
4.2 Description of model	38
4.3 Scenario data	43
4.4 Assumptions	43

4.5 Results	44
4.6 Climate uncertainty	48
4.7 Discussion	48
5 Malaria	51
5.1 Background	
5.2 Description of the model	52
5.3 Estimating model parameters and validation	53
5.4 Scenario data	54
5.5 Results	55
5.6 Population at risk of malaria	58
5.7 Discussion	59
6 Dengue	61
6.1 Background	
6.2 Description of the model	61
6.3 Scenario data	62
6.4 Statistical analysis	63
6.5 Results: time periods and scenarios	64
6.6 Discussion	67
7 Undernutrition	69
7.1 Background	60
7.2 Assessment method: linking crop, trade and health impact models	71
7.3 Scenario data	77
7.4 Results	79
7.5 Regional estimates of children with stunting due to climate change	82
7.6 Mortality due to climate change-attributable undernutrition	89
7.7 Uncertainty	93
7.8 Discussion	94
8 Future worlds and scenario data	97
8.1 Introduction	
8.2 Climate data: observed	97
8.3 Climate scenario data	98
8.4 Population projections	99
8.5 GDP data	100
8.6 Mortality projections	102
9 References	105
Annex	113

Figures

Figure 1.1

Models used in t	this assessment,	with output	metrics
------------------	------------------	-------------	---------

Figure 1.2

Estimated future annual mortality attributable to climate change under A1b emissions and for the base case socioeconomic scenario in 2030 (blue bars) and 2050 (orange bars), by world region and health outcome, for (a) undernutrition, (b) malaria, (c) diarrhoeal disease, (d) dengue and (e) heat_ 11

Figure 2.1

Schematic graph	of relationship	between	daily	mortality	and	daily	
temperature							

Figure 2.2

Relationship between temperature index (daily maximum temperature minus optimum temperature) and relative mortality for people aged over 19 65 vears

Figure 2.3

Estimated annual counts of heat-related deaths in people aged 65 years	;
and over, by 0.5° grid cell, for BCM2 in 2050, with no adaptation	
assumed	2:

Figure 3.1

Estimates of region-level annual average mortality ranges at baselin	ie in
2030, 2050 and 2080, based on median exposure estimates	35

Figure 4.1

Structure of the	diarrhoeal	disease	mortality	model	

Figure 4.2

Projections of diarrhoeal	mortality: (a,) deaths and	(b) crude n	nortality
rate for three socioecond	omic scenario.	S		43

Figure 5.1

Changes in the global population at risk of malaria transmission in the five climate change datasets and in the cases of population change only within the model baseline and the observed baseline when evaluating 58 climate and socioeconomic change_

Figure 5.2

Changes in the global population at risk of malaria transmission in the five climate change datasets and in the cases of population change only within the model baseline and the observed baseline when evaluating 59 climate change, keeping socioeconomic changes fixed_

Figure 6.1

Modelled relationship between dengue transmission and	
climate variables	64

Figure 7.1

Schematic illustration of the modelled pathway from climate change to child undernutrition and its consequences_ 71

Figure 7.2

FAO method for	or estimating	g the proportion	of a population	that is
undernourishe	d			

Figure 7.6

Δ

18

38

74

Histograms proportional to probability density functions for the propor of children estimated to be stunted in 2050 under the base case	tion
scenario, for selected regions	93
Figure 8.1 A1b emissions trajectory; for comparison, an optimistic mitigation scenario known as E1 is also shown	98
Figure 8.2 World population projections by year to 2100 for the UN 2010 revision (medium variant) and IIASA A1	_100

Figure 8.3	
Global level GDP per capita for three future worlds	101

Figure 8.4

Trends in mortality for communicable diseases (Comm D), noncommunicable diseases (NCD) and injuries (Inj), by age group, from 2008 to 2080 under (a) base case, (b) low growth and (c) high 103 growth scenarios

3结束,完整报告链接和二维码如7 下: **预览**t



https://www.yunbaogao.cn/report/index/report?reportId=5_27751 https://weweb2/01