

Inheriting the World:

The Atlas of Children's Health and the Environment

Bruce Gordon, Richard Mackay and Eva Rehfuess



All rights reserved

First published 2004

1 3 5 7 9 10 8 6 4 2

ISBN 92 4 159156 0

Produced for the World Health Organization by
Myriad Editions Limited
6-7 Old Steine, Brighton BN1 1EJ, UK
<http://www.MyriadEditions.com>

Co-ordinated for Myriad Editions by Candida Lacey
Edited by Jannet King
Design by Corinne Pearlman
Maps and graphics by Isabelle Lewis

WHO Library Cataloguing-in-Publication Data

Gordon, Bruce.

Inheriting the world : the atlas of children's health and the environment /

Bruce Gordon, Richard Mackay, Eva Rehfuess. 1.Child welfare 2.Infant mortality - trends 3.Environmental health
4.Environmental pollution - adverse effects 5.Forecasting 6.Atlases I.Mackay, Richard. II.Rehfuess, Eva. III.Title
IV.Title: The atlas of children's health and the environment.

Publications of the World Health Organization can be obtained from:

Marketing and Dissemination, World Health Organization, 20 Avenue Appia, 1211 Geneva 27, Switzerland
tel: +41 22 791 2476; fax: +41 22 791 4857; email: bookorders@who.int

Requests for permission to reproduce or translate WHO publications,
whether for sale or for noncommercial distribution,
should be addressed to Publications, at the above address
fax: +41 22 791 4806; email: permissions@who.int

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 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.

The World Health Organization does not warrant that the information contained in this publication is complete and correct and shall not be liable for any damages incurred as a result of its use.

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

Printed and bound in Hong Kong
Produced by Phoenix Offset Limited under the supervision of
Bob Cassels, The Hanway Press, London

Contents

	Acknowledgements	4
	About the Authors	6
	Foreword by Dr LEE Jong-wook , Director-General, World Health Organization	7

Part One

Child Health and Poverty

1	The World's Forgotten Children	8
2	Two Worlds: Rich and Poor	10
3	Traditional Hazards, New Risks	12

Part Two

Global Environmental Issues

4	Water for All: Making it Happen	14
5	Hurry Up in the Toilet: 2.4 Billion are Waiting	16
6	To Fetch a Pail of Water	18
7	Malaria	20
8	Fluoride and Arsenic in Drinking Water	22
9	Indoor Smoke: Breaking Down Respiratory Defences	24
10	Passive Smoking: Children Protest	26
11	Polluted Cities: The Air Children Breathe	28
12	Child Injuries are Preventable	30
13	Child Labour: Growing Up Too Quickly	32
14	Lead: IQ Alert	34
15	Safe Food: Crucial for Child Development	36
16	Poisoning: Hidden Peril for Children	38

Part Three

A Look to the Future

17	Getting the Lead Out	40
18	Healthy Schools: Empowering Children	42
19	Enjoying the Sun Safely	44
20	Climate Change	46
	Highs and Lows of Environmental Health	48
	WHO Sub-Regions	49
	World Data Table	50
	Sources	58
	Index	64

Acknowledgements

We are most grateful to Margaret Chan, Director, Protection of the Human Environment, WHO, for her vision to produce an atlas on children's health and the environment. Her support, together with that of Kerstin Leitner, Assistant Director-General, Sustainable Development and Healthy Environments, WHO, made this atlas possible.

Special thanks go to the Office of Children's Health Protection, United States Environmental Protection Agency, for their generous financial contribution towards this atlas, and to Judith Mackay, who contributed a wealth of experience and inspiration.

For their creativity, artistic talent and innovative suggestions in the design and cartography of this atlas, we would like to thank the Myriad Editions team of Candida Lacey, Isabelle Lewis, Jannet King and Corinne Pearlman.

This Atlas could not have been written if not for the rich pool of information already available. We extend our gratitude to colleagues around the world who responded to impossible deadlines with data, literature, photographs and insightful suggestions. Their enthusiastic help and encouragement made this atlas a true collaborative effort. Our heartfelt thanks to all the colleagues listed below and to all those we may have omitted in error.

Houssain Abouzaid, WHO-EMRO
Said Arnaout, WHO-EMRO
Carmen Audera-Lopez, WHO
Hamed Bakir, WHO-EMRO
Jamie Bartram, WHO
Roberto Bertolini, WHO-EURO
Tony Blakely, Wellington School of Medicine and Health, New Zealand
Robert Bos, WHO
Cynthia Boschi-Pinto, WHO
Diarmid Campbell-Lendrum, WHO
Richard Carr, WHO
Carlos Corvalan, WHO
Marlies Craig, Mapping Malaria Risk in Africa, South Africa
Dafina Dalbokova, WHO-EURO
Gerry Eijkemans, WHO
Anaclaudia Fassa, Universidade Federal de Pelotas, Brazil

Lorna Fewtrell, Centre for Research into Environment and Health, United Kingdom
Chuck Gollmar, WHO
Frank Hagemann, ILO
Laurence Haller, WHO
Alexander von Hildebrand, WHO-SEARO
Anna Maria Hoffmann, UNESCO
Mollie Hogan, WHO
Honorat Hounkpatin, WHO-AFRO
Jose Hueb, WHO
Mie Inoue, WHO
Josefa Ippolito-Shepherd, WHO-AMRO
Jack Jones, WHO
Michal Krzyzanowski, WHO-EURO
Philip Landrigan, Mount Sinai School of Medicine, United States
Rolaf van Leeuwen, Rijksinstituut voor Volksgezondheid en Milieu, The Netherlands
Matt Livermore, University of East Anglia, United Kingdom
Peter Matz, ILO
Sumi Mehta, WHO
Gerry Moy, WHO
Leda Nemer, WHO-EURO
Hisashi Ogawa, WHO-WPRO
Lesley Onyon, WHO
Margie Peden, WHO
Jenny Pronczuk, WHO
Federico Properzi, WHO
Annette Pruess, WHO
Thebe Pule, WHO-AFRO
Sawat Ramaboot, WHO-SEARO
Vivian Rasmussen, WHO-EURO
Mike Repacholi, WHO
David Rivett, WHO-EURO
Colin Roy, Australian Radiation Protection and Nuclear Safety Agency, Australia
Yasmin von Schirnding, WHO
Jorgen Schlundt, WHO
Alois Schmalwieser, University of Vienna, Austria
Gabriele Schöning, European Environment Agency, Denmark
Hawa Senkoro, WHO-AFRO
Victor Shatalov, Meteorological Synthesizing Centre of EMEP, Russia
Kenji Shibuya, WHO
Amr Taha, ILO, Egypt
Joanna Tempowski, WHO
Thomas Teuscher, WHO

Michel Thieren, WHO
Lana Tomaskovic, WHO
Niels Tomijima, WHO
Michael Walsh, United States
Wick Warren, Centers for Disease Control &
Prevention, United States
Martin Weber, WHO
Sattar Yoosuf, WHO-SEARO
Maged Younes, WHO

International Network to Promote Household Water
Treatment and Safe Storage:
Robert Ainslie, Johns Hopkins University, United States
Mansoor Ali, UNICEF
Greg Allgood, Procter & Gamble, United States
Thomas Clasen, First Water, United States
Camille Dow Baker, Centre for Affordable Water and
Sanitation Technology, Canada
Sumita Ganguly, UNICEF-India, India
Willie Grabow, University of Pretoria, South Africa
Stephen Gundry, University of Bristol, United
Kingdom
Tara Meidl, Centre for Affordable Water and Sanitation
Technology, Canada
Adrian Mol, MEDAIR, Madagascar
Susan Murcott, Massachusetts Institute of Technology,
United States
Rob Quick, Centers for Disease Control & Prevention,
United States
Henk van Norden, UNICEF-India, India
Martin Wegelin, EAWAG/SANDEC, Switzerland
Giveson Zulu, UNICEF-Zambia, Zambia

Putting together an atlas on children's health and the
environment in less than three months has the tendency
to take over your life. We are immensely grateful to our
partners and families without whose practical and
moral support these months would have been difficult.

The publishers are grateful to the following
organizations and photographers for permission to
reproduce their photographs:

page 8 WHO/H. Bower; 10 Nigel Bruce; 14 WHO/C.
Gaggero; 16 WHO/C. Gaggero; 18 WHO/H.
Anenden; 19 WHO/P. Virot; 26 WHO; 28 Steve
Turner; 30 WHO/H. Anenden; 32 (top) ILO/P.
Lissac; 32 (bottom) WHO/C. Gaggero; 34 WHO/C.
Gaggero; 36 WHO/A. Waak; 38 Donald Cole, with
thanks to Phil Landrigan, Mount Sinai School of
Medicine and with the permission of Donald Cole,
Associate Professor Public Health Sciences, University
of Toronto; 42 WHO/C. Gaggero; 43 WHO/T. Kelly;
44 The Cancer Council Victoria; 47 WHO; 48 (left)
ILO/P. Lissac; 48 (middle) WHO/C. Gaggero;
48 (right) WHO/C. Gaggero

The publishers are grateful to the following
organizations for supplying maps:

Malaria in Africa, page 21

Africa malaria distribution map, theoretical model.
Mapping Malaria Risk in Africa, 2003.

The sun's rays, page 44

Unpublished data from Schmalwieser AW, Institute of
Medical Physics and Biostatistics, University of
Veterinary Medicine, Vienna, Austria
by model calculations described in: Schmalwieser AW
et al., Global validation of a forecast model for
irradiance of the solar, erythemally effective UV
radiation, *Journal of Optical Engineering*, 2002,
40:3040-3050.

A warming planet, page 46

Livermore M (University of East Anglia), Campbell-
Lendrum D (WHO). Generated in 2004 based on data
from the Hadley Centre. Climate change observations
and predictions. Exeter, UK Meteorological Office,
2003.

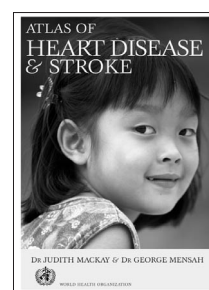
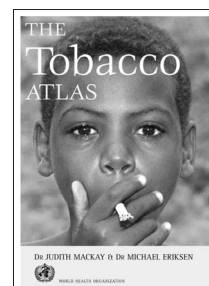
About the authors

Bruce Gordon is a member of the Healthy Environments for Children Alliance Secretariat of WHO, and a researcher in the area of health and sustainable development. Prior to joining WHO in 2002, he participated in environmental management and development studies in Thailand, Vietnam, and Peru. He was the recipient of a Canadian International Development Agency Innovative Research Award for his work in Peru on capacity-building and environmental management. He has a degree in Biochemistry from the University of British Columbia, and a Master's degree in Environmental Design from the University of Calgary. His fascination with the links between poverty, health and the environment continues to grow.

Richard Mackay is an environmental consultant. He has a science degree from the University of Cambridge, UK and a Master's degree in Environmental Management. He has implemented environmental and safety programmes for the University of Cambridge and for the business and government sectors. He is a member of the British Institute of Environmental Management and Assessment. He is the author of *The Atlas of Endangered Species* (Penguin USA/Earthscan UK, 2002), also produced by Myriad Editions. He takes a keen interest in environmental protection and ecology, including work on the Aride Island Nature Reserve, Seychelles and nature reserves in Britain.

Eva Rehfuess, a scientist with WHO's Department for the Protection of the Human Environment, is responsible for the agency's programme on indoor air pollution, a key environmental risk for childhood respiratory illness in the developing world. Since joining the WHO in 2000, she has also managed activities on topics as diverse as children's environmental health indicators and ultraviolet radiation. She is pursuing a PhD in Epidemiology at Imperial College London, on the links between environment, socio-economic factors and child health. She has a Master's degree in Biological Sciences from the University of Oxford. As the recipient of a Robert Bosch Foundation Fellowship in International Relations, she undertook work on sun protection in primary schools in the Middle East between 1999 and 2000.

In the same series:



Foreword



Every child has the right to live in a healthy, supportive environment – an environment that encourages growth and development, and protects from disease. Many of the world’s children, however, are exposed to hazards in the very places that should be safest – the home, school and community. Considering that their growing bodies are particularly sensitive to environmental threats, the final burden of childhood disease is substantial. Every year, more than three million children die due to unhealthy environments.

The majority of these child deaths are caused by unsafe water, lack of sanitation, indoor air pollution, and mosquitoes bearing malaria. Other environmental hazards include passive smoking, lead and pesticides, road traffic accidents, and global environmental changes.

Persistent poverty aggravates these environmental threats. The children worst affected are those in the developing world, and the enormous burden of ill-health falling on their youngest citizens constrains the social and economic development of these countries.

Children are helpless in the face of environmental risks and, all too frequently, adults do not listen to the voices of children or act upon their most urgent needs. But we must listen. Children are our most precious resource. Together, now is the time to focus our efforts on combating environmental threats to children’s health and to work towards a sustainable and brighter future.

A handwritten signature in black ink, reading "Jong-wook Lee". The signature is written in a cursive, flowing style.

Dr LEE Jong-wook
Director-General
World Health Organization
Geneva
March 2004