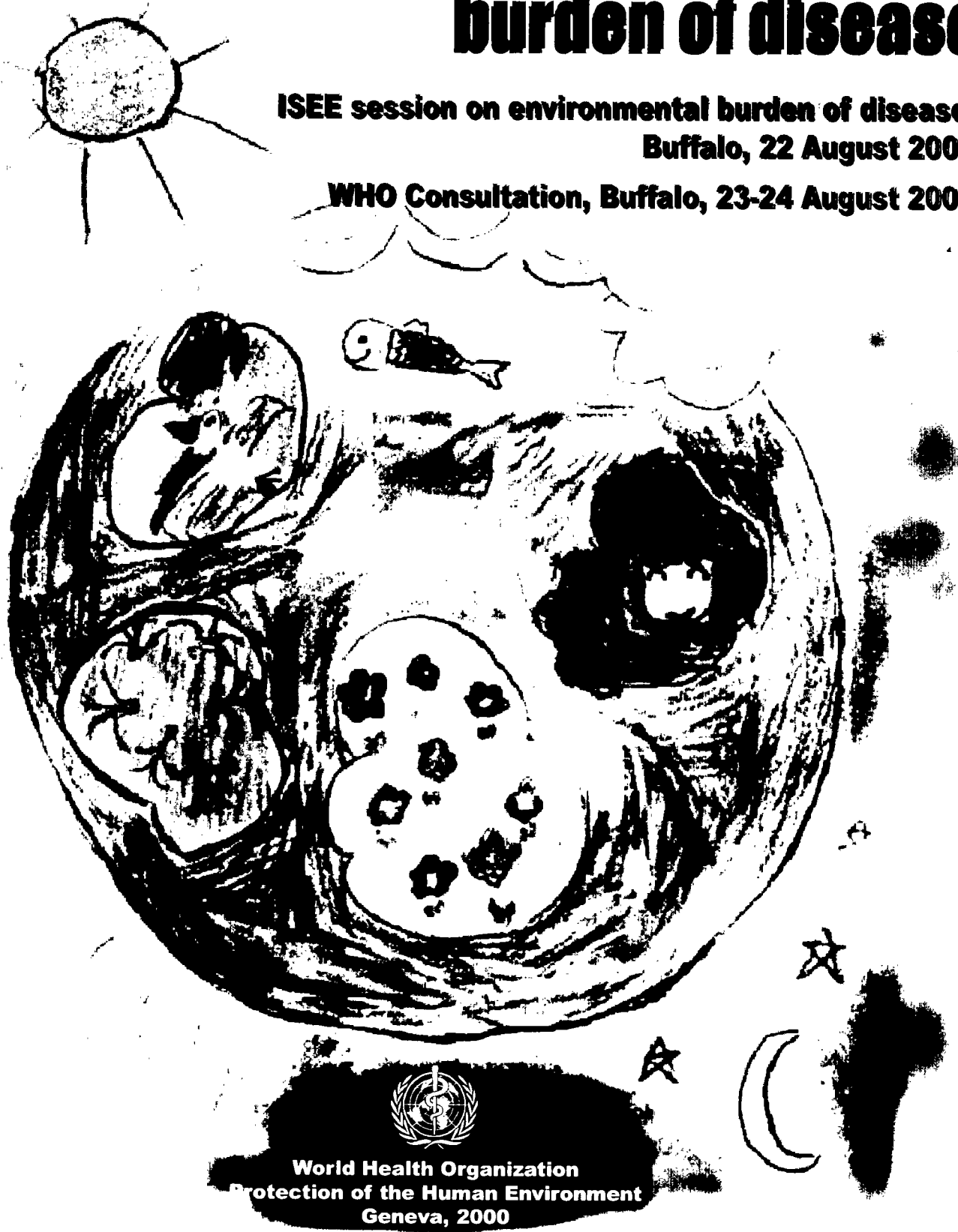


# Methodology for assessment of environmental burden of disease

ISEE session on environmental burden of disease,  
Buffalo, 22 August 2000  
WHO Consultation, Buffalo, 23-24 August 2000



World Health Organization  
Protection of the Human Environment  
Geneva, 2000

a7767

## **Methodology for assessment of Environmental burden of disease**

Prepared by:

### **David Kay**

Centre for Research into Environment and Health  
*Aberystwyth, United Kingdom*

### **Annette Prüss**

World Health Organization  
Protection of the Human Environment  
*Geneva, Switzerland*

### **Carlos Corvalán**

World Health Organization  
Protection of the Human Environment  
*Geneva, Switzerland*

ISEE session on environmental burden of disease, Buffalo, 22 August 2000

WHO Consultation, Buffalo, 23-24 August 2000



World Health Organization, Geneva

The cover illustration was designed by Paloma Corvalán.

© World Health Organization

This document is not issued to the general public, and all rights are reserved by the World Health Organization (WHO). The document may not be reviewed, abstracted, quoted, reproduced or translated, in part or in whole, without the prior written permission of WHO. No part of this document may be stored in a retrieval system or transmitted in any form or by any means - electronic, mechanical or other - without the prior written permission of WHO.

The views expressed in this document by named authors are solely the responsibility of those authors.

Although partial funding for this report was provided by the U.S. Environmental Protection Agency, it has not been subjected to Agency review and therefore does not necessarily reflect the views of the Agency.

## Table of Contents

### WHO Consultation on Methodology for Assessment of Environmental Burden of Disease

#### Acknowledgements

1.	<b>Introduction</b>	5
2.	<b>Objectives</b>	5
3.	<b>Organization of the consultation</b>	6
4.	<b>Recommendations</b>	7
<b>Annex 1:</b>	<b>Background paper</b>	12
<b>Annex 2:</b>	<b>List of participants</b>	24
<b>Annex 3:</b>	<b>Agenda</b>	30
<b>Annex 4:</b>	<b>Summaries of presentations</b>	
4.1	Comparative risk assessment in the global burden of disease study and the environmental health risks	31
4.2	An aggregate public health indicator of the impact of multiple environmental exposures	34
4.3	Burden of disease and selected conceptual issues	39
4.4	Statistical uncertainty in burden of disease estimates	40
4.5	Determining the strength of evidence	45
4.6	Climate change and uncertainty: Methods developed for intergovernmental panel on climate change	47
<b>Annex 5:</b>	<b>Results of the working groups</b>	
5.1	Air quality	50
5.2	Chemical exposure	53
5.3	Global environment	57
5.4	Water and sanitation	61
<b>Annex 6:</b>	<b>ISEE Special Symposium on Environmental Burden of Disease</b>	
6.1	Programme	63
6.2	Background and rationale to environmental burden of disease	64
6.3	Methodological approaches to environmental burden of disease assessment	66
6.4	Assessing environmental disease burden: examples from the Netherlands	69
6.5	Estimating the global burden of disease from indoor air pollution	76
6.6	Estimating the global burden of disease from exposure to lead	85
6.7	Comparative risk assessment of the health effects of climate change	88

## **Acknowledgements**

Many thanks are due to all the participants in the consultation, and in particular the chair, the chairs of the working groups, rapporteurs and the presenters. Also the review group is gratefully acknowledged for their advice on drafting the meeting report. This group consists of the following:

Diarmid Campbell-Lendrum	London School of Hygiene and Tropical Medicine, London, UK
Joe Eisenberg	University of California, Berkeley, USA
Keith Florig	Carnegie Mellon University, Pittsburgh, USA
Scott Grosse	Centers for Disease Control & Prevention (CDC), Atlanta, USA
Tord Kjellström	New Zealand Environmental and Occupational Health Research Centre, Auckland, New Zealand
Eric Lebret	National Institute of Public Health and the Environment, Bilthoven, The Netherlands
Tony McMichael	London School of Hygiene and Tropical Medicine, London, United Kingdom

Special thanks also to John Vena, University of Buffalo, who kindly assisted with the organization of the consultation, and the symposium on environmental burden of disease during the ISEE Annual Conference. Thanks also to Eileen Brown for the layout of the report.

The authors gratefully acknowledge the financial assistance received from the Environmental Protection Agency of the United States of America.

## 1. Introduction

The disease burden caused by an environmental exposure, and the preventable part of it, are major elements which can guide decision-making, priority setting and resource allocation in health and environmental management. Quantitative assessment of the burden, together with information on the effectiveness and cost-effectiveness of interventions within a social and ethical framework, provide a rational basis for research, implementation and policy development.

Since the Global Burden of Disease study was published in 1996<sup>1</sup>, the overall burden of disease has mainly been estimated by 'disease outcome' rather than by 'risk factor'. A few approaches to estimating the burden of disease from environmental risk factors have been tested and some have produced promising results.

For comparison of disease burden estimates across risk factors, estimates need to employ a harmonized methodology. This requires the development of:

- working definitions,
- the definition of 'zero-exposure' and/or
- appropriate hypothesised 'alternative' exposure scenarios, and
- a common approach to evidence or uncertainty underlying an estimate.

To address these issues, a consultation was held in Buffalo, New York, 23-24 August 2000, following the 12<sup>th</sup> Annual Meeting of the International Society for Environmental Epidemiology (ISEE 2000).

## 2. Objectives

The overall aim of the consultation was to advance the agenda of the evaluation of disease burden from environmental risk factors. This consultation was part of an ongoing process aiming primarily at the following:

- To provide methodological guidance on the quantitative assessment of the burden of disease from environmental risk factors at national or regional level; the process should result in a practical guide.
- To create a network of experts interested in developing the conceptual and practical implementation of environmental disease burden assessment and sharing experience to define priorities in future developments.

This meeting constitutes the first consultation of experts in the framework of this project. The participants undertook a structured review of the proposed elements and methodological approaches for environmental burden of disease assessment. A first draft of the methodological elements is provided below. This was tabled in a series of presentations and developed during the meeting.

This project builds upon a previous consultation organized by WHO/ILO<sup>2</sup>. Several papers from that consultation were published in the *September 1999* issue of the journal *Epidemiology*. It also builds upon and adapts concepts put forward in the global

---

<sup>1</sup> Murray CJL, Lopez AD. *The Global Burden of Disease*. World Health Organization, Harvard School of Public Health, World Bank, 1996.

<sup>2</sup> Methods for health impact assessment in environmental and occupational health – Report of a WHO/ILO consultation, Geneva, 1998 (WHO/EHG/98.4, ILO/OSH/98.1)

assessment methodology of the GBD study<sup>3,4</sup>. In 1999 the Department of Protection of the Human Environment intensified its efforts and started a project to specifically address the Environmental Burden of Disease (EBD). This is the first meeting dedicated to this project.

Annex 1 contains the background document on this project for the consultation.

A special session on EBD was organized in the 12<sup>th</sup> Annual Meeting of the International Society for Environmental Epidemiology on 22 August 2000. Its objective was to report on progress in these activities and bring the project to the attention of environmental health professionals.

Programme and summaries of the presentations of the special session are presented in Annex 6 of this document.

### 3. Organization of the meeting

A total of 39 participants, with various specialities in environmental health, participated in the 1½-day consultation (a list of participants is presented in Annex 2). It was chaired by Professor Tony McMichael, London School of Hygiene and Tropical Medicine, UK. Professor David Kay, Centre for Research into Environment and Health, UK, acted as rapporteur.

The meeting was composed of plenary sessions of discussions and brief presentations to introduce each topic (agenda in Annex 3, summaries of presentations in Annex 4). The main topics discussed included:

- Framework & challenges
- Concepts and examples
- Describing level of uncertainty and evidence
- Further steps and improvements

The group was split into the following working groups during part of the meeting:

- Water & sanitation
- Air quality
- Global environment
- Chemicals

The working groups were asked to address the following issues:

- List useful categories of risk factors to consider
- Propose relevant alternative scenarios
- Address the strength of evidence in each area
- Address the geographical resolution, i.e. the feasibility of size of the area at which the burden of disease assessment can be performed
- Recommendations on the methodology – with reference to the background document
- Other relevant issues – way forward.

<sup>3</sup> Murray CJL, Lopez AD. On the comparable quantification of health risks: lessons from the global burden of disease study. *Epidemiology*, 1999, 10(5):594-605.

<sup>4</sup> Guideline for comparative risk assessment, web site <http://www.ctr.u.auckland.ac.nz/CRA/>

The results of the working groups are presented in Annex 5.

#### 4. Meeting recommendations

The main recommendations which emerged during the discussion sessions are summarized below.

##### *General issues*

- Decision-making in environmental health should be based on national or regional EBD<sup>5</sup> estimates (with the exception of a number of global risk factors, such as climate change, or greenhouse gas emissions); therefore, the emphasis will lie on national and regional EBD assessment.
- The distribution of EBD within a population should be assessed in addition to the total numbers per age category. The distribution will provide information about the equity in exposures and health outcomes. Such information for policy making in view of the protection of vulnerable groups or high-risk communities.
- Limited transferability of the evidence to populations where empirical data are lacking may restrict the assessment of EBD of “data-poor” populations. Before assessing burden of disease, the applicability of available dose-response relationships to the study population needs to be evaluated.
- Although a general methodology is needed for the sake of comparability, it should be flexible enough to allow for making the most sensible choices regarding categorization of risk factors, summary measures of population health, etc.; The parameters and methods currently used in the global assessment of risk factors would be too restrictive for a number of potential applications in environmental health.

##### *Categorizing risk factors*

Various types of categories can be chosen for estimating the related health impacts: the type of human activity (e.g. energy generation, transportation), the type of pollutant (e.g. exposure to lead, arsenic) or by pathway (e.g. air pollution, water). Also, the categories can be more or less aggregated or split into subcategories. For instance water & sanitation could theoretically be split into exposure to recreational water, drinking water intake, access to sanitation etc.

- Categorizing risk factors should be carefully considered, as they may have an impact on the use of resulting estimates of disease burden. In particular, the grouping of risk factors or their splitting into several subcategories may seemingly reduce or increase their importance.
- The choice of risk factor categories should be policy relevant and seek to address parameters policy makers can directly influence (e.g. include sector policies as risk factors, such as transportation policy or energy policy, in addition to risk factors such as ‘air quality’, ‘noise’ etc.). In particular, for assessment at regional

预览已结束，完整报告链接和二维码如下：

[https://www.yunbaogao.cn/report/index/report?reportId=5\\_30457](https://www.yunbaogao.cn/report/index/report?reportId=5_30457)

