Occupational carcinogens

Assessing the environmental burden of disease at national and local levels

Tim Driscoll Kyle Steenland Annette Prüss-Üstün Deborah Imel Nelson James Leigh

Series Editors Annette Prüss-Üstün, Diarmid Campbell-Lendrum, Carlos Corvalán, Alistair Woodward



World Health Organization Protection of the Human Environment Geneva 2004

WHO Library Cataloguing-in-Publication Data

Occupational carcinogens: assessing the environmental burden of disease at national and local levels / Tim Driscoll ... [et al.].

(Environmental burden of disease series / series editors: Annette Prüss-Üstün ... [et al.]; no. 6)

1.Carcinogens, Environmental - adverse effects 2.Occupational exposure 3.Lung neoplasms - chemically induced 4.Leukemia - chemically induced 5.Mesothelioma chemically induced 6.Cost of illness 7.Epidemiologic studies 8.Risk assessment methods 9.Manuals I.Driscoll, Tim. II.Prüss-Üstün, Annette. III.Series.

ISBN 92 4 159147 1 ISSN 1728-1652 (LC/NLM classification: QZ 202)

Suggested Citation

Tim Driscoll, et al. *Occupational carcinogens: assessing the environmental burden of disease at national and local levels.* Geneva, World Health Organization, 2004. (Environmental Burden of Disease Series, No. 6).

© World Health Organization 2004

All rights reserved. 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: <u>bookorders@who.int</u>). 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: <u>permissions@who.int</u>).

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 by the WHO Document Production Services, Geneva, Switzerland.

Table of Contents

Pre	face		. vii			
Aff	filiations	and acknowledgements	viii			
Summary						
1.	Introduction					
	1.1 1.2 1.3	Overview Identification of the risk factors The burden of disease from occupational exposures	1 1 2			
2.	Summa	ary of the methods	5			
3.	Choice	of health outcomes	6			
4.	Relativ	re risk estimates from the literature	8			
5.	Estima	tion of exposure	. 10			
	5.1	The proportion of the workforce employed in each sector	. 10			
	5.2	The proportion of workers exposed to individual carcinogens	. 10			
	5.3	Occupational turnover	. 11			
	5.4	The level of exposure	. 12			
	5.5	The proportion of the population in the workforce	. 12			
6.	Estima	ted average relative risks for lung cancer and leukaemia	. 13			
	6.1	Lung cancer	. 13			
	6.2	Leukaemia	. 13			
7.	Estima	ting the disease burden	. 15			
	7.1	Estimating the attributable fraction	. 15			
	7.2	Estimating the number of deaths and DALYs	. 16			
	7.3	Malignant mesothelioma	. 17			
8.	Source	s of uncertainty	. 19			
	8.1	Relative risk	. 19			
	8.2	Sex	. 20			
	8.3	Age	. 20			
	8.4	Smoking	. 20			
	8.5	Nutrition	. 20			
	8.6	Latency	. 21			
	8.7	Omitted exposures	. 21			
	8.8	Omitted conditions	. 21			
	8.9	Occupational turnover	. 21			
	8.10	Mesothelioma estimates	. 22			
9.	Worke	d example: occupational cancer in Africa D	. 23			
	9.1	Occupational lung cancer	. 23			

	9.2 9.3	Occupational leukaemia Malignant mesothelioma	30 37
10.	Policy	actions to reduce the burden	39
11.	Referen	nces	40
An	nex 1.	Evidence for substance-specific relative risk values	45
	A1.1 A1.2 A1.3	Carcinogens for lung cancer Leukaemogens Malignant mesothelioma	45 47 48
An	nex 2.	Country groupings for the WHO Global Burden of Disease study, by WHO subregion	50
An	nex 3.	Assessment of the global disease burden from occupational carcinogens	51

List of Tables

Table 1	Selected occupational carcinogens and health outcomes	2
Table 2	Sources used to assess the strength of evidence for causality for selected occupational carcinogens	7
Table 3	Estimated relative risks for lung carcinogens and leukaemogens included in this study	9
Table 4	Proportion of the workforce exposed to carcinogens, by industry sector	11
Table 5	DALYs due to occupational lung cancer and leukaemia, by sex, for all WHO subregions	17
Table 6	DALYs and deaths due to malignant mesothelioma, by sex, for all WHO subregions	18
Table 7	Proportion of the male workforce employed in industry sectors, AFR D	23
Table 8	Proportion of male workers exposed to lung carcinogens, by industry sector	24
Table 9	Proportion of the male workforce exposed to lung carcinogens, AFR D	24
Table 10	Relative risk for lung cancer, AFR D	28
Table 11	Proportion of the male workforce employed in each industry, AFR D	31
Table 12	Proportion of the workforce exposed to leukaemogens, by industry sector	31
Table 13	Proportion of the male workforce exposed to leukaemogens, AFR D	32
Table 14	Leukaemia relative risk, AFR D	34
Table A3. 1	Occupational carcinogens and health outcomes	52
Table A3. 2	Mean proportions of workers in the European Union exposed to selected carcinogens, by industry sector	53
Table A3. 3	Partition factors for high and low exposures to carcinogens, by WHO subregion	53
Table A3. 4	Summary of risk measures for occupational carcinogens	54
Table A3. 5	Examples of sources used to assess the risk factor-disease relationship for selected occupational carcinogens	54
Table A3. 6	Mortality and DALYs attributable to occupational carcinogens for 14 WHO subregions of the world	55

Table A3. 7	Population att carcinogens	tributable fr	actions	s for diseas	ses from	n occupational	55
Table A3. 8	Attributable carcinogens, l	mortality by age grou	and and s	DALYs sex	from	occupational	56

List of Figures

Figura A3	1 Subragional	country grou	nings for t	the global	disaasa hurdan	51
Figure A5.	1 Subregional	country grou	ipings tor i	ine giobai	uiscase builden.	

Preface

The disease burden of a population, and how that burden is distributed across different subpopulations (e.g. infants, women), are important pieces of information for defining strategies to improve population health. For policy-makers, disease burden estimates provide an indication of the health gains that could be achieved by targeted action against specific risk factors. The measures also allow policy-makers to prioritize actions and direct them to the population groups at highest risk. To help provide a reliable source of information for policy-makers, WHO recently analysed 26 risk factors worldwide, including occupational carcinogens, in the *World Health Report* (WHO, 2002).

The Environmental Burden of Disease (EBD) series continues this effort to generate reliable information, by presenting methods for assessing the burden of disease from occupational exposure to carcinogens at national and local levels. The methods in the series use the general framework for global assessments described in the *World Health Report* (WHO, 2002). The introductory volume in the series outlines the general method (Prüss-Üstün et al., 2003), while subsequent guides address specific environmental risk factors. The guides on specific risk factors are organized similarly, first outlining the evidence linking the risk factor to health, and then describing a method for estimating the health impact of that risk factor on the population. All the guides take a practical, step-by-step approach and use numerical examples. The methods described in the guides can be adapted both to local and national levels, and can be tailored to suit data availability. The EBD series of guides aim to provide rational information that can help to design protective measures for reducing workplace risks.

Affiliations and acknowledgements

This document was prepared by Tim Driscoll, Kyle Steenland, Annette Prüss-Üstün, Deborah Imel Nelson and James Leigh, and edited by Annette Prüss-Üstün, Diarmid Campbell-Lendrum, Alistair Woodward and Carlos Corvalán.

Tim Driscoll is from the School of Public Health, University of Sydney and ELMATOM Pty Ltd. Kyle Steenland is at the Rollins School of Public Health. Deborah Imel Nelson is at the School of Civil Engineering and Environmental Science, University of Oklahoma. James Leigh is at the School of Public Health, University of Sydney. Annette Prüss-Üstün, Diarmid Campbell-Lendrum and Carlos Corvalán are at the World Health Organization, Geneva. Alistair Woodward is from the Wellington School of Medicine, New Zealand.

The authors would like to thank Marisol Concha-Barrientos and Marilyn Fingerhut, who contributed to the carcinogens component of the Global Burden of Disease project, and the many reviewers whose comments helped to improve this guide.

We also thank the United States of America Environmental Protection Agency for supporting the development of the EBD approaches. This report has not been subjected to agency review and therefore does not necessarily reflect the views of the agency. Finally, we are grateful to Kevin Farrell and Eileen Brown who put this document into its final format.

Abbreviations

- AF Attributable fraction (equivalent to the IF, or impact fraction).
- CAREX International information system on occupational exposure to carcinogens.
- CRA Comparative risk assessment.
- DALY Disability-adjusted life year.
- EBD Environmental burden of disease.
- IF Impact fraction.

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_30046