

Water, sanitation and hygiene

Quantifying the health impact at national and local levels in countries with incomplete water supply and sanitation coverage

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A Microsoft Excel spreadsheet for calculating the estimates described in this document can be obtained from WHO/PHE. E-mail contact: EBDassessment@who.int



Public Health and the Environment
Geneva 2007

WHO Library Cataloguing-in-Publication Data

Water, sanitation and hygiene : quantifying the health impact at national and local levels in countries with incomplete water supply and sanitation coverage / Lorna Fewtrell ... [et al.].

(Environmental burden of disease series ; no. 15)

1.Gastrointestinal diseases - prevention and control. 2.Diarrhea - prevention and control 3.Malnutrition - complications. 4.Water supply - statistics. 5. Parasitic diseases - prevention and control. 6.Cost of illness. I.Fewtrell, Lorna. II.Series.

ISBN 978 92 4 159575 9

(NLM classification: WA 675)

ISSN 1728-1652

Suggested Citation

Fewtrell L, Prüss-Üstün A, Bos R, Gore F, Bartram. Water, sanitation and hygiene: quantifying the health impact at national and local levels in countries with incomplete water supply and sanitation coverage. World Health Organization, Geneva, 2007. (WHO Environmental Burden of Disease Series No. 15)

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Printed by the WHO Document Production Services, Geneva, Switzerland.

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Preface

In the formulation of rational risk management policies, policy-makers increasingly rely on estimates of the disease burden attributable to certain risk factors. Decision-makers consider such estimates and the distribution of the burden within populations to create frameworks for effective interventions.

Obtaining objective, reliable and accurate measurements of such attributable fractions of disease burdens is therefore of growing importance. Yet, the complexities of the links between environmental risk factors and their health effects continue to hamper the quantification of attributable fractions. This quantification itself and the opportunities it creates for potential health gains from implementing targeted interventions will not only support rational policy making. It will also facilitate, through raising awareness of the environmental risk dimensions of the disease burden, intersectoral collaboration needed to carry out environmental health interventions to the maximum of their potential impact. In the context of the present publication, the environmental focus is on water (access to safe water and integrated water resources management), sanitation and hygiene

The World Health Organization (WHO) carried out an assessment of the global disease burden from unsafe water, sanitation and hygiene, as part of a larger initiative to assess the impact of 25 risk factors in a standardized manner (WHO, 2002; Prüss et al., 2002; Murray and Lopez, 1996a). It also commissioned systematic literature reviews of the fraction of the estimated burden of four water-associated vector-borne diseases that can be attributed to water resources development (irrigation schemes and dams) (Keiser et al., 2005a; Erlanger et al., 2005; Keiser et al., 2005b; Steinmann et al., 2006). This guide builds on these, by providing a tool for public health professionals to carry out more-detailed estimates of the disease burden associated with water, sanitation and hygiene at both national and sub-national levels. It is complemented by an introductory volume on methods for assessing the environmental burden of disease (Prüss-Üstün et al., 2003). It is part of a series providing guidance on quantifying disease from various environmental risks.

Work on estimating the health impacts of interventions to tackle water sanitation and hygiene related disease is one component of the activities of WHO in the subject area. It complements and builds on other activities including:

- monitoring status and trends on use of basic water supply and sanitation and building national capacities for national and local monitoring (with UNICEF through the WHO/UNICEF 'Joint Monitoring Programme');
- normative 'Guidelines' analogous to international standards on drinking water quality, safe use of wastewater and excreta in agriculture, aquaculture and urban areas; safe recreational water environments;
- guidance on 'good practice' based on lessons learned in effectively managing water sanitation and hygiene hazards;
- supporting networks for practitioners in areas such as safe household water, small community water supply and safety, sanitation, and drinking-water regulators;

- information and publications in these and other areas are downloadable from the WHO website at www.who.int/water_sanitation_health/.

Affiliations and acknowledgements

Lorna Fewtrell is with the Centre for Research into Environment and Health, University of Wales, Aberystwyth, UK. Annette Prüss-Üstün, Robert Bos, Fiona Gore and Jamie Bartram are with the World Health Organization in Geneva, Switzerland.

In preparing this document, we drew on methods developed for estimating the global burden of disease caused by exposure to unsafe water, sanitation and hygiene and the systematic literature review of the association between water resources development and vector-borne diseases. We therefore thank David Kay of the University of Wales, Aberystwyth, contributor to the global analysis, and Jürg Utzinger, Jennifer Keiser and their team at the Swiss Tropical Institute, Basel for the adaptation and application of the systematic review approach.

Abbreviations

DALY Disability-adjusted life years

WSH Water, sanitation and hygiene

Summary

This guide aims to assist in the development of a quantitative estimate of health impacts attributable to water, sanitation and hygiene (WSH) related risks at country or local level. Most of data available for the methods used cover developing countries, and this guide is therefore mainly relevant to developing countries. Eleven diseases or injuries are reviewed. For diarrhoea, a calculation method based on access levels to safe water and adequate sanitation service levels is used. The disease burden from malnutrition is linked to WSH risks because of repeated diarrhoea and intestinal nematode infections especially affecting children. Several infectious diseases such as intestinal nematode infections, schistosomiasis, trachoma or dengue in certain regions are almost entirely attributable to WSH-related risks. The fraction of the other diseases, including malaria, lymphatic filariasis, onchocerciasis, Japanese encephalitis and drowning that is attributable to WSH should be estimated based on the basis of expert judgement and, where possible, a systematic review of the literature. Methods for pooling of expert judgement and for systematic literature reviews are outlined in this guide.

The fractions of disease attributable to WSH obtained by the methods outlined in this guide should be combined with national disease statistics for those diseases (deaths, prevalence/incidence or DALYs). Where such national disease statistics are unavailable or of poor quality, approximate estimates may also be obtained from WHO¹.

The quantification of health impacts and development of understanding of the potential benefits of interventions provide an opportunity to highlight the disease burden that could be prevented through actions in water, sanitation and hygiene. This can assist in directing interventions, and more generally motivate policy action to prevent this disease burden that disproportionately affects children in the lower socio-economic segments of the population.

¹ <http://www.who.int/whosis/en/>, under "Burden of disease estimates", "GBD 2002 estimates" and "Revised GBD 2002 estimates for countries".

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