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Malnutrition

Quantifying the health impact at national and local levels

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A Microsoft Excel spreadsheet for calculating the estimates described in this document can be obtained from WHO/PHE.
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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 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 related to the environment 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 volumes 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 a 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.

In the present volume, we describe how to estimate the burden of malnutrition at national and local levels, using the framework described in the *World Health Report*. Estimates of the burden of malnutrition at global level have already been published (WHO, 2002; Fishman, 2004) and are summarized in Annex 1 of this guide. Unlike other risk factors addressed in the EBD series, malnutrition is only partly linked to the environment. Nevertheless, the environment can affect the nutritional status of individuals in several ways. Vector-borne diseases that cause diarrhoea, for example, are strongly influenced by the environment and they can undermine the ability of an individual to obtain adequate nutrition. This can be a particular problem for people living in poverty, who may already be undernourished. Malnutrition, in turn, can reinforce poverty and lead to unsustainable resource use and environmental degradation (WEHAB, 2002). Adverse environmental conditions, such as environmental contamination, destruction of ecosystems, loss of biodiversity, climate change and globalization can also affect the nutritional status of populations (Johns & Eyzaguirre, 2000). The effects of climate change on malnutrition are addressed in another volume of the EBD series.

Affiliations and acknowledgements

This guide was prepared by Monika Blössner and Mercedes de Onis, and edited by Annette Prüss-Üstün, Diarmid Campbell-Lendrum, Carlos Corvalán and Alistair Woodward. Monika Blössner, Mercedes de Onis, Annette Prüss-Üstün, Diarmid Campbell-Lendrum and Carlos Corvalán are at the World Health Organization. Alistair Woodward is at the School of Population Health, University of Auckland, New Zealand.

In preparing this guide, we drew on the methods developed for estimating the global burden of disease caused by malnutrition. We therefore thank the reviewers of that analysis.

We also thank the United States of America Environmental Protection Agency for supporting the development of the approaches used in the EBD series. The present 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.

Glossary and abbreviations

Anthropometry	Human body measurements.
BMI	Body–mass index (kg/m^2).
CI	Confidence interval.
DALY	Disability-adjusted life year.
EBD	Environmental burden of disease.
IUGR	Intrauterine growth retardation.
IUGR-LBW	Refers to infants classified as having experienced retarded intrauterine growth and assessed as having low birth weight (i.e. < 2500 g).
LBW	Low birth weight (i.e. < 2500 g).
NCHS	National Centre for Health Statistics.
PAF	Population attributable fraction.
SD	Standard deviation.
Stunting	Height-for-age below -2 SD from the National Centre for Health Statistics/WHO reference median value.
Underweight	Weight-for-age below -2 SD from the National Centre for Health Statistics/WHO reference median value.
Wasting	Weight-for-height below -2 SD from the National Centre for Health Statistics/WHO reference median value.
YLD	Years lived with disability.

Summary

Malnutrition, defined as underweight, is a serious public-health problem that has been linked to a substantial increase in the risk of mortality and morbidity. Women and young children bear the brunt of the disease burden associated with malnutrition. In Africa and south Asia, 27–51% of women of reproductive age are underweight (ACC/SCN, 2000), and it is predicted that about 130 million children will be underweight in 2005 (21% of all children) (de Onis et al., 2004a). Many of the 30 million low-birth-weight babies born annually (23.8% of all births) face severe short-term and long-term health consequences (de Onis, Blössner & Villar, 1998).

In this guide we outline a method for estimating the disease burden at national or local level that is associated with maternal and child malnutrition. The goal is to help policy-makers and others quantify the increased risk associated with malnutrition, in terms of attributable mortality and morbidity, at country or local levels. The estimates will allow policy-makers to compare the disease burden of malnutrition for different countries, or regions within countries, and enable resources to be deployed more effectively. Repeated assessments will also allow trends to be monitored and the impact of interventions to be evaluated.

To quantify the disease burden, population attributable fractions are derived from the assessed exposure (malnutrition) and from the relative risk estimates of disease and death associated with malnutrition. The level of malnutrition in the population groups is assessed by anthropometry (i.e. measurements of body size and composition), using as indicators low birth weight in newborns, low weight-for-age in preschool children, and low body mass index in women. Relative risk estimates for diarrhoea, malaria, measles, acute respiratory infections and other infectious diseases are based on a meta-analysis that was part of a global comparative risk assessment project conducted by the World Health Organization (WHO) and its partners. Checklists for collecting and analysing data are also suggested, and a step-by-step example of how to quantify the health impact associated with malnutrition is given for Nepal, a country in the WHO SEAR D subregion.

Estimates of the disease burden of malnutrition give policy-makers an indication of the burden that could be avoided if malnutrition were to be eliminated. Disaggregated estimates (e.g. by age, sex, degree of malnutrition) can also help policy-makers identify the segments of a population most at risk, such as women and children, and direct