

Levels & Trends in  
**Child  
Malnutrition**

**UNICEF-WHO-The World Bank  
Joint Child Malnutrition  
Estimates**



This report was prepared at the World Health Organization and UNICEF by Mercedes de Onis, David Brown, Monika Blössner and Elaine Borghi.

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## KEY FACTS AND FIGURES

### *Stunting*

- Globally, an estimated 165 million children under-five years of age, or 26%, were stunted (i.e., height-for-age below  $-2$  SD) in 2011 — a 35% decrease from an estimated 253 million in 1990.
- High prevalence levels of stunting among children under-five years of age in Africa (36% in 2011) and Asia (27% in 2011) remain a public health problem, one which often goes unrecognized.
- More than 90% of the world's stunted children live in Africa and Asia.

### *Underweight*

- Globally, an estimated 101 million children under-five years of age, or 16%, were underweight (i.e., weight-for-age below  $-2$ SD) in 2011 — a 36% decrease from an estimated 159 million in 1990.
- Although the prevalences of stunting and underweight among children under-five years of age worldwide have decreased since 1990, overall progress is insufficient and millions of children remain at risk.

### *Wasting*

- Globally, an estimated 52 million children under-five years of age, or 8%, were wasted (i.e., weight-for-height below  $-2$ SD) in 2011 — a 11% decrease from an estimated 58 million in 1990.
- Seventy percent of the world's wasted children live in Asia, most in South-Central Asia. These children are at substantial increased risk of severe acute malnutrition and death.

### *Overweight*

- Globally, an estimated 43 million children under-five years of age, or 7%, were overweight (i.e., weight-for-height above  $+2$ SD) in 2011 — a 54% increase from an estimated 28 million in 1990.
- Increasing trends in child overweight have been noted in most world regions, not only developed countries, where prevalence is highest (15% in 2011). In Africa, the estimated prevalence under-five overweight increased from 4% in 1990 to 7% in 2011. The prevalence of overweight was lower in Asia (5% in 2011) than in Africa, but the number of affected children was higher in Asia (17 million) than in Africa (12 million).
- Proper nutrition contributes significantly to declines in under-five mortality rates. Improving nutritional status is essential for achieving the Millennium Development Goals (MDGs).

# Introduction

Adequate nutrition is essential in early childhood to ensure healthy growth, proper organ formation and function, a strong immune system, and neurological and cognitive development. Economic growth and human development require well-nourished populations who can learn new skills, think critically and contribute to their communities. Child malnutrition impacts cognitive function and contributes to poverty through impeding individuals' ability to lead productive lives. In addition, it is estimated that more than one-third of under-five deaths are attributable to undernutrition (Liu et al, 2012; Black et al, 2008).

Nutrition has increasingly been recognized as a basic pillar for social and economic development. The reduction of infant and young child malnutrition is essential to the achievement of the Millennium Development Goals (MDGs)—particularly those related to the eradication of extreme poverty and hunger (MDG 1) and child survival (MDG 4). Given the effect of early childhood nutrition on health and cognitive development, improving nutrition also impacts MDGs related to universal primary education, promotion of gender equality and empowerment of women, improvements of maternal health and combating HIV/AIDS.

Three years remain to achieve the MDGs. Nutrition is at the top of the global development agenda and political commitments to scale up programmes aimed at reducing the scourge of child malnutrition have been made. The **Scale Up Nutrition (SUN)**<sup>1</sup> movement, launched in 2010, calls for intensive efforts to improve global nutrition in the period leading up to 2015. The movement has brought together government authorities from countries with a high burden of malnutrition, and a global coalition of partners committed to working together to mobilize resources, provide technical support, perform high-level advocacy and develop innovative partnerships.

More recently, during the 2012 World Health Assembly (WHA), a 13-year comprehensive implementation plan (2012-2025) to address maternal, infant and child nutrition was endorsed.<sup>2</sup> The aim of the plan is to alleviate the double burden of malnutrition in children, starting from the earliest ages. The plan includes six global nutrition targets: child stunting, wasting, and overweight; anaemia in women of reproductive age; low birth weight; and exclusive breastfeeding.

In May 2012, the UN Secretary General, declared the **Zero Hunger Challenge (ZHC)**<sup>3</sup>, which initiated powerful, high-level advocacy for a major advance in global efforts on food and nutrition security. The ZHC aims to encourage different stakeholders — governments, regional organizations, farmers, business, civil society, donors, foundations and the research community — to join the Secretary General to promote effective policies, increased investments and provide sustained development that support hunger reduction.

At the close of the 2012 Olympic Games, the United Kingdom's Prime Minister hosted a summit on global child malnutrition, the **Global Hunger Event**, that brought together leaders from the developing world, the private sector and international development agencies to chart a new course of action aimed at slashing the number of stunted children by 25 million before the 2016 Olympic Games in Brazil.

<sup>1</sup> See <http://www.scalingupnutrition.org/>.

<sup>2</sup> See [http://apps.who.int/gb/ebwha/pdf\\_files/WHA65/A65\\_R6-en.pdf](http://apps.who.int/gb/ebwha/pdf_files/WHA65/A65_R6-en.pdf)

<sup>3</sup> See <http://un-foodsecurity.org/node/1356>.

**Essential to the accountability of these global movements is monitoring progress towards agreed upon international targets.**

Generating accurate estimates of child malnutrition is difficult. Trustworthy estimates require reliable data collected using recognized international standards and best practices, employing standardized data collection systems that enable comparison between countries and over time, and applying sound state-of-the-art statistical methods to derive global and regional population estimates. UNICEF and WHO initiated a process in 2011 to respond to the challenge of providing accurate estimates by harmonizing the data and statistical methods used to derive child malnutrition estimates.

The process involves a joint annual review of available data to produce a single child

malnutrition dataset to which a unique, peer-reviewed, multi-level model is applied in order to produce estimates for various agencies' regional and income groupings. The World Bank joined the effort after the annual review meeting in 2012. One of the most important outcomes to emerge from this partnership is the unification of estimated prevalence and numbers estimates of stunting, underweight, wasting and overweight for **Global and All developing countries**<sup>4</sup> averages. This publication presents the results of the harmonization effort and reports, for the first time, joint UNICEF-WHO-World Bank prevalence and number estimates of child malnutrition for 2011 and trends since 1990. Estimates for the four anthropometric indicators are presented by United Nations, Millennium Development Goal, UNICEF, WHO regional and The World Bank income group classifications.



Measuring recumbent length in a child below 2 years of age in Chad.

<sup>4</sup> Per classification provided by the United Nations Statistical Division,  
<http://unstats.un.org/unsd/methods/m49/m49regin.htm>



# Methodology

## Data sources and adjustments

In 2011, UNICEF and the WHO Department of Nutrition initiated an annual joint data review and prepared a global database of national child prevalence estimates to be used for computing regional and global averages and examining regional and global trends in child malnutrition.

UNICEF and WHO receive and review survey data from the published and grey literature as well as reports from national authorities on a continual basis. WHO maintains the WHO Global Database on Child Growth and Malnutrition ([www.who.int/nutgrowthdb](http://www.who.int/nutgrowthdb)), a repository of standardized anthropometric child data which has existed for 20 years (de Onis and Blössner, 2003). UNICEF maintains a global database populated in part through its annual data collection exercise that draws on submissions from more than 150 country offices.



Measuring standing height in a child above 2 years of age in the Maldives.

Based on these data, with due consideration to potential biases and the views of local experts, UNICEF and WHO developed, and now maintain, a joint analysis dataset of national child malnutrition prevalence estimates for children under-five years of age for all countries or territories using available survey data since 1985. Prevalences are based on the WHO Child Growth Standards (WHO, 2006) median for

- stunting – proportion of children with height-for-age below  $-2$  standard deviations (SD);
- underweight – proportion of children with weight-for-age below  $-2$  SD;
- wasting – proportion of children with weight-for-height below  $-2$  SD; and
- overweight – proportion of children with weight-for-height above  $+2$  SD.

Because of the different prevalence estimates obtained using the NCHS/WHO growth reference and the WHO Child Growth Standards (de Onis et al, 2006), historical survey estimates based on the NCHS/WHO growth reference, for which no raw data are available, have been converted to WHO-based prevalences using an algorithm developed by Yang and de Onis, 2008.

Surveys presenting anthropometric data for age groups other than 0–59 months or 0–60 months are adjusted using national survey results – gathered as close in time as possible – from the same country that include the age range 0–59/60 months. Details of the adjustment process are available online at [www.childinfo.org/files/Technical\\_Note\\_age\\_adj.pdf](http://www.childinfo.org/files/Technical_Note_age_adj.pdf).

National rural estimates are adjusted similarly using another national survey for the same country as close in time as possible with available data on national urban and rural data to derive an "adjusted national estimate".

In those instances where conversion of a prevalence estimate based on the NCHS/WHO growth reference is needed in addition to age adjustment, the age adjustment is completed first, followed by conversion to the WHO Child Growth Standards. All adjustments and conversions are documented in the analysis dataset. Survey data extracted from reports for which the raw data are not yet available are labeled as "pending re-analysis".

Where multiple survey results exist for the same country-year combination, preference is given to a re-analyzed result (using the raw data) over a converted result; to a survey result with *all* available indicators over results for only some indicators; and to a survey result which includes the full age range (e.g., 0–59/60 months) over one which includes a partial age range (e.g., 0–36 months).

Because of the need for re-analysis and/or adjustments (e.g., for age and/or urban-rural residence, or conversion from NCHS/WHO growth reference to the WHO Child Growth Standards), national malnutrition prevalence estimates included in the joint UNICEF-WHO analysis dataset may differ slightly from those in original reports. Re-analysis and adjustments are completed for the sole purpose of obtaining comparable data. The re-analysis or adjustment does not imply the expression of any opinion whatsoever on the part of UNICEF or WHO concerning the integrity of the originally reported data. Lastly, the mere availability of data on child malnutrition for a given country-year combination does not warrant inclusion into the joint analysis dataset. UNICEF and WHO evaluate survey estimates for inclusion in the joint analysis dataset on a case-by-case basis. In some cases, survey estimates have been excluded due to lack of comparable data for deriving global and regional trends.

The joint analysis dataset contains country classifications for UN regions and sub-regions, MDG, UNICEF, WHO regions and World Bank income groups. Estimates are presented for each of these classifications. An annex to this document lists the countries included in each of the regional classifications.

Lastly, the dataset includes the latest under-five population estimates from the United Nations Population Division corresponding to the survey year (variable YEAR1). Survey year is based on the time period during which a survey was conducted, except when surveys are conducted over two or more years, in which case the survey year is the mean when odd or the nearest year above the mean when even. For the joint analysis dataset constructed using survey data available through May 2012 (UNICEF-WHO Joint Global Nutrition Database, 2011 revision, completed



Weighing an infant in India.

July 2012), population estimates are from the 2010 revision of the World Population Prospects released in April 2011 by the United Nations Department of Economic and Social Affairs, Population Division.

(N.B. The dataset presents the code of "-1.0" for prevalence estimates and sample sizes with missing data. The dataset also includes information on author and primary reference of the surveys as well as the reference number under which the data appear in the WHO Global Database on Child Growth and Malnutrition.)

### **Estimating trends multi-level modelling by regions or income groups**

The joint analysis dataset completed in July 2012 includes 639 nationally representative surveys from 142 countries/territories conducted over the period 1985 to 2011 (N.B. one exception, a survey from Papua New Guinea conducted during 1982-83). For 17 countries, only one national survey was available; 24 countries had two surveys, and 101 countries had three or more surveys.

About 48% (n=304) of the surveys were conducted before 2000 and 52% (n=335) were completed during 2000 or later. Of the 142 countries/territories represented in this dataset, no survey data was available since 2005 for 28 countries: Afghanistan, Bahrain, Bulgaria, Cape Verde, Comoros, Cuba, Czech Republic (The), Ecuador, Equatorial Guinea, Eritrea, Fiji, Gabon, Iran, Kiribati, Lebanon, Mauritius, Qatar, Romania, Samoa, Seychelles, Singapore, Tonga, Trinidad and Tobago, Turkmenistan, Ukraine, United States of America, Uruguay and Yemen.

Linear mixed-effect modeling is used to estimate prevalence rates by region or income group from 1990 to 2015. This method has been used in previous trend analyses and is described in detail in de Onis et al. (2004). Briefly, for the UN regions, a single linear mixed-effect model is fit to the data for each group of sub-regions belonging to the same region.



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