# LOW BIRTHWEIGHT



COUNTRY, REGIONAL AND GLOBAL ESTIMATES





# ACKNOWLEDGEMENTS

This document was prepared by:

Tessa Wardlaw, Senior Programme Officer, Statistics and Monitoring, Division of Policy and Planning, UNICEF, New York;

Ann Blanc, Demographer, Blancroft Research International, New York;

Jelka Zupan, Medical Officer, Department of Reproductive Health and Research (RHR), WHO, Geneva; and

Elisabeth Åhman, Technical Officer, Department of Reproductive Health and Research (RHR), WHO, Geneva.

Valuable input and assistance were provided by colleagues from UNICEF and WHO.

© The United Nations Children's Fund and World Health Organization, 2004

UNICEF and WHO welcome requests for permission to reproduce or translate this publication.

Applications and enquiries should be addressed to:

UNICEF, Editorial and Publications Section Division of Communication 3 UN Plaza, New York, NY 10017, USA Tel: 212-326-7434 or 7286 Fax: 212-303-7985 E-mail: nyhqdoc.permit@unicef.org

or

WHO, Publications
20 Avenue Appia
1211 Geneva 27, Switzerland
Tel: 41-22-791-2476
Fax: 41-22-791-4857
E-mail: permissions@who.int

Permission will be freely granted to educational or non-profit organizations. Others will be requested to pay a small fee.

ISBN: 92-806-3832-7

United Nations Children's Fund and World Health Organization, *Low Birthweight: Country, regional and global estimates.* UNICEF, New York, 2004.

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 and the United Nations Children's Fund concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

Cover photo: © UNICEF/HQ00-0944/Roger LeMoyne

# LOW BIRTHWEIGHT COUNTRY, REGIONAL AND GLOBAL ESTIMATES

# CONTENTS

EXECUTIVE SUMMARY1	
I.	INTRODUCTION
п.	CAUSES AND CONSEQUENCES OF LOW BIRTHWEIGHT
III.	LOW BIRTHWEIGHT AS AN INDICATOR
IV.	MEASURING LOW BIRTHWEIGHT.4Definitions.4Data sources.4Adjustment procedures for household survey data.4Estimating low birthweight incidence.5National household surveys.5Routine service statistics.6No recent data available.6Country, regional and global estimates.6Reliability of estimates.6
V.	ANALYSIS AND INTERPRETATION       .7         Incidence of low birthweight       .7         Number of low birthweight infants       .8         Percentage of infants not weighed at birth       .9         Trends in low birthweight incidence       .9
TABLES	
Table 1: Sources of data and adjustment procedures for country estimates	
regions, 2000	
ANNEXES	
Anr Anr Anr Anr <b>BF</b>	nex A: Recommendations on how to improve the measurement of birthweight       .21         nex B: Countries and territories grouped by United Nations regions       .23         nex C: WHO Member States grouped by WHO regions       .24         nex D: Countries and territories grouped by UNICEF regions       .25         FERENCES       .27

## **EXECUTIVE SUMMARY**

Low birthweight has been defined by the World Health Organization (WHO) as weight at birth of less than 2,500 grams (5.5 pounds). This is based on epidemiological observations that infants weighing less than 2,500 g are approximately 20 times more likely to die than heavier babies. More common in developing than developed countries, a birthweight below 2,500 g contributes to a range of poor health outcomes.

The goal of reducing low birthweight incidence by at least one third between 2000 and 2010 is one of the major goals in 'A World Fit for Children', the Declaration and Plan of Action adopted by the United Nations General Assembly Special Session on Children in 2002. The reduction of low birthweight also forms an important contribution to the Millennium Development Goal (MDG) for reducing child mortality. Activities towards the achievement of the MDGs will need to ensure a healthy start in life for children by making certain that women commence pregnancy healthy and well nourished, and go through pregnancy and childbirth safely. Low birthweight is therefore an important indicator for monitoring progress towards these internationally agreed-upon goals.

A baby's low weight at birth is either the result of preterm birth (before 37 weeks of gestation) or due to restricted foetal (intrauterine) growth. Low birthweight is closely associated with foetal and neonatal mortality and morbidity, inhibited growth and cognitive development, and chronic diseases later in life. Many factors affect the duration of gestation and foetal growth, and thus, the birthweight. They relate to the infant, the mother, or the physical environment and play an important role in determining the birthweight and the future health of the infant.

Birthweight is affected to a great extent by the mother's own foetal growth and her diet from birth to pregnancy, and thus, her body composition at conception. Mothers in deprived socio-economic conditions frequently have low birthweight infants. In those settings, the infant's low birthweight stems primarily from the mother's poor nutrition and health over a long period of time, including during pregnancy, the high prevalence of specific and non-specific infections, or from pregnancy complications, underpinned by poverty. Physically demanding work during pregnancy also contributes to poor foetal growth.

More than 20 million infants worldwide, representing 15.5 per cent of all births, are born with low birthweight, 95.6 per cent of them in developing countries. The level of low birthweight in developing countries (16.5 per cent) is more than double the level in developed regions (7 per cent).

Half of all low birthweight babies are born in South-central Asia, where more than a quarter (27 per cent) of all infants weigh less than 2,500 g at birth. Low birthweight levels in sub-Saharan Africa are around 15 per cent. Central and South America have, on average, much lower rates (10 per cent), while in the Caribbean the level (14 per cent) is almost as high as in sub-Saharan Africa. About 10 per cent of births in Oceania are low birthweight births.

One of the major challenges in measuring the incidence of low birthweight is the fact that more than half of infants in the developing world are not weighed. In the past, most estimates of low birthweight for developing countries were based on data compiled from health facilities. However, these estimates are biased for most developing countries because the majority of newborns are not delivered in facilities, and those who are represent only a selected sample of all births.

In recent years, household survey data have become much more widely available, and procedures have been applied to these data that adjust for the underreporting and misreporting of birthweights. The analysis presented in this report includes these data for the first time and thus represents a major improvement over past assessments. The rates, nonetheless, are still likely to underestimate the true magnitude of the problem.

# I. INTRODUCTION

Low birthweight has been defined by the World Health Organization (WHO) as weight at birth of less than 2,500 grams (5.5 pounds).<sup>\*, 1</sup> This practical cut-off for international comparison is based on epidemiological observations that infants weighing less than 2,500 g are approximately 20 times more likely to die than heavier babies.<sup>2</sup> More common in developing than developed countries, a birthweight below 2,500 g contributes to a range of poor health outcomes.

The goal of reducing low birthweight incidence by at least one third between 2000 and 2010 is one of the major goals in 'A World Fit for Children,' the Declaration and Plan of Action adopted at the United Nations General Assembly Special Session on Children in 2002. The reduction of low birthweight also forms an important contribution to the Millennium Development Goal (MDG) for reducing child mortality. Activities towards the achievement of the MDGs will need to ensure a healthy start in life for children by making certain that women commence pregnancy healthy and well nourished, and go through pregnancy and childbirth safely. Low birthweight is therefore an important indicator for monitoring progress towards these internationally agreed-upon goals.

WHO and UNICEF published the first global, regional and country estimates of low birthweight rates in 1992.<sup>3</sup> At that time, the low birthweight rate for industrialized countries was around 7 per cent, and in less developed countries it ranged between 5 and 33 per cent, with an average of 17 per cent. Around the year 2000, UNICEF and WHO accelerated efforts to estimate global and country rates. The process of monitoring progress towards international goals on low birthweight reduction led to a greater recognition of the limitations of the available data, in particular the relatively small proportion of infants weighed at birth. In response, UNICEF proposed using household survey data adjusted for underreporting of low birthweight, a procedure originally developed by Boerma et al.<sup>4</sup> In addition, the unprecedented household survey activity, which occurred around the end-decade assessment of progress towards the World Summit for Children goals, provided a wealth of new data. The application by UNICEF of a modification of the original estimation procedure to these data provided the basis for the joint large-scale revision of the estimates of low birthweight presented in this document.

This report presents country, regional and global estimates of low birthweight for 2000, together with a detailed description of the methodology used. Some limited data on trends are also included. The limitations of low birthweight data are described and recommendations are made for further improvements in the data for this important indicator (see Annex A, page 21).

## II. CAUSES AND CONSEQUENCES OF LOW BIRTHWEIGHT

A baby's low weight at birth is either the result of preterm birth (before 37 weeks of gestation) or of restricted foetal (intrauterine) growth.<sup>5</sup> Low birth-weight is closely associated with foetal and neonatal mortality and morbidity, inhibited growth and cognitive development, and chronic diseases later in life.<sup>6</sup>

Many factors affect the duration of gestation and of foetal growth, and thus, the birthweight. They relate to the infant, the mother or the physical environment and play an important role in determining the infant's birthweight and future health.<sup>7</sup>

- For the same gestational age, girls weigh less than boys, firstborn infants are lighter than subsequent infants, and twins weigh less than singletons;
- Birthweight is affected to a great extent by the mother's own foetal growth and her diet from birth to pregnancy, and thus, her body composition at conception;
- Women of short stature, women living at high altitudes, and young women have smaller babies;

<sup>\*</sup> The WHO definition of low birthweight mainly serves for comparative health statistics and is not appropriate for clinical care. For clinical purposes, individual countries may choose alternative cut-off values.

- Once pregnant, the mother's nutrition and diet, lifestyle (e.g., alcohol, tobacco or drug abuse) and other exposures (e.g., malaria, HIV or syphilis), or complications such as hypertension can affect foetal growth and development, as well as the duration of pregnancy;
- Mothers in deprived socio-economic conditions frequently have low birthweight infants. In those settings, the infant's low birthweight stems primarily from the mother's poor nutrition and health over a long period of time, including during pregnancy, the high prevalence of specific and non-specific infections, or from pregnancy complications underpinned by poverty. Physically demanding work during pregnancy also contributes to poor foetal growth.

Low birthweight thus defines a heterogeneous group of infants: some are born early, some are born growth restricted, and others are born both early and growth restricted. It is generally recognized that being born with low birthweight is a disadvantage for the baby.

Short gestation (preterm birth) is the main cause of death, morbidity and disability. The shorter the gestation, the smaller the baby and the higher the risk of death, morbidity and disability. It has been shown that the mortality range can vary 100-fold across the spectrum of birthweight and rises continuously with decreasing weight.<sup>8</sup>

Low birthweight due to restricted foetal growth affects the person throughout life and is associated with poor growth in childhood and a higher incidence of adult diseases, such as type 2 diabetes, hypertension and cardiovascular disease. An additional risk for girls is having smaller babies when they become mothers.

## III. LOW BIRTHWEIGHT AS AN INDICATOR

Low birthweight has long been used as an important public health indicator. Low birthweight is not a proxy for any one dimension of either maternal or perinatal health outcomes. Globally, the indicator is a good summary measure of a multifaceted public health problem that includes long-term maternal malnutrition, ill health, hard work and poor pregnancy health care.

On an individual basis, low birthweight is an important predictor of health; efforts must therefore go into measuring it as accurately as possible at birth and organizing and planning infant care accordingly. The smaller the baby, the more important it is to monitor his or her growth in the weeks after birth. This is particularly important for infants at high risk of poor feeding and inadequate growth. Countries should therefore be encouraged to ensure accurate and reliable weighing of infants as close to birth as possible.

While in industrialized countries the epidemiology of low birthweight has been extensively studied, in less developed countries reliable data on low birthweight remain limited. The primary reason is that more than 40 per cent of babies are born at home and without a skilled attendant,<sup>9</sup> and in these circumstances babies are rarely weighed. The registration of a vital event such as birth is incomplete in many developing countries, with only about 60 per cent of births registered worldwide.<sup>10</sup> Even when babies are weighed at birth – although birthweight is relatively easy to measure - their weight is not always measured accurately, or recorded, reported and tabulated correctly. Caution is therefore warranted in comparing data across countries, regions and time periods.

Recent knowledge about the impact of intrauterine and early-life events on infant development, cognitive development and lifelong sequelae, indicates that a broader definition of the outcome of pregnancy is needed than birthweight alone. While low birthweight continues to be useful in focusing attention on a healthy start to independent life, it has also become increasingly evident that the cut-off value of 2,500 g may not be appropriate for all settings. Some countries with high incidence of low birthweight do not necessarily have high mortality rates, as for example in Sri Lanka.<sup>11</sup>

## IV. MEASURING LOW BIRTHWEIGHT

### **Definitions**<sup>12</sup>

**Birthweight** is the first weight of the foetus or newborn obtained after birth. For live births, birthweight should preferably be measured within the first hour of life, before significant postnatal weight loss has occurred.

**Low birthweight** is defined as less than 2,500 g (up to and including 2,499 g).\*

#### The incidence of low birthweight in a

population is defined as the percentage of live births that weigh less than 2,500 g out of the total of live births during the same time period. The low birthweight incidence rate therefore is:

> Number of live born babies with birthweight less than 2,500 g X 100 Number of live births

#### **Data sources**

For industrialized countries, the main sources of information on low birthweight are service-based data and national birth registration systems. For developing countries, low birthweight estimates are primarily derived from national household surveys, as well as data from routine reporting systems. The data used in this report were published by June 2004; reported data generally referred to the period 1997–2001.

Prior to about 1990, most estimates of low birthweight for developing countries were based on data compiled from health facilities. However, such estimates are biased for most developing countries because the majority of newborns are not delivered in facilities and those that are delivered in health facilities are a selected sample of all births. As an alternative to facility-based data, information on birthweight has been collected systematically since about 1990 from mothers participating in nationally representative household surveys, mostly the USAIDsupported Demographic and Health Surveys (DHS) and the UNICEF-supported Multiple Indicator Cluster Surveys (MICS).

# Adjustment procedures for household survey data

Survey data are limited since the majority of infants in developing countries are not weighed at birth. However, various methods have been developed to adjust for this problem and establish national estimates. An adjustment procedure originally proposed in 1996 by Boerma et al. used the mother's subjective assessment of the infant's size at birth (i.e., very large, larger than average, average, smaller than average, very small) in addition to the birthweight data.<sup>13</sup> The mother's assessment of the infant's size at birth is available for virtually all children in the survey. The adjustment is essentially a straightforward weighting procedure in which the proportion with low birthweight in each category of size is multiplied by the total proportion of births in the corresponding category and summed to obtain overall estimates of the prevalence of low birthweight. This methodology provides significantly improved estimates because it attempts to correct for the bias due to underreporting of birthweight by using information on all children, including those who are not weighed. Nevertheless, it was not adopted on a large scale until recently.

The assumptions implicit in this adjustment are:

1) that the births with numerical birthweights reported are as likely to be low birthweight births as those without birthweight reported, and

2) within the same country, the relationship between birthweight and the mother's assessment of infant size does not depend on whether the infant was weighed.

In an assessment of survey data from more than 40 countries, Blanc and Wardlaw<sup>14</sup> examined these assumptions and documented that the characteristics of infants with numerical birthweights were not representative of all births. Births that were weighed were more likely to involve mothers who

<sup>\*</sup> In 1976, the 29th World Health Assembly agreed on the following definition: "Low birthweight is a weight at birth of less than 2,500 g (up to and including 2,499 g) irrespective of gestational age." This replaced the earlier definition of 2,500 g or less.

were better educated and resided in urban areas. They were also more likely to be in a medical facility and with assistance from skilled health personnel. These characteristics are generally associated with higher birthweights and, therefore, the resulting estimates were still likely to underestimate the level of low birthweight.

In addition, Blanc and Wardlaw<sup>15</sup> noted significant misreporting (or 'heaping') of survey data of recorded birthweights on multiples of 500 g. For purposes of estimating low birthweight, it is the heaping at 2,500 g, the cut-off point for low birthweight, that affects the estimates. Based on an assessment of the distribution of births weighing between 2,001 g and 2,999 g in 88 surveys, they recommended that one quarter of the births recorded as exactly 2,500 g should be reclassified as low birthweight.

Applying both adjustments (i.e., mother's assessment of size at birth and heaping on 2,500 g) is likely to yield higher estimates of the incidence of low birthweight. Results from 114 DHS and MICS surveys showed that the adjustments for birth size and for heaping resulted, on average, in an increase of 24 per cent in the incidence of low birthweight compared with the reported data with no adjustments.

## **Estimating low birthweight incidence**

National estimates of the incidence of low birthweight were pursued using a range of data sources and methods for 174 countries or territories with a population of more than 300,000.

The first step in generating the estimates involved

#### National household surveys

To the extent possible, original survey data files were reanalysed to apply a consistent methodology for adjusting numerical birthweight data for underreporting and heaping at 2,500 g. However, for those countries where it was not possible to obtain the original survey data files, published estimates were adjusted using methods that differed according to the nature of the published figures.

# A. Adjusted for relative birth size and heaping at 2,500 grams

When surveys included questions on both numerical birthweight and relative size, and the data files were available for further analysis<sup>\*</sup> (38 DHS and 23 MICS) the methodology developed by Blanc and Wardlaw<sup>16</sup> was used to adjust the low birthweight data. If more than one survey was available within a two-year period, the one with the larger sample size was used.

#### B. Adjusted for relative birth size only/ published estimate used

There were eight countries for which data files were not available for further analysis but the published estimate was adjusted for underreporting of numerical birthweight. There were two DHS adjusted for relative birth size only, and six CDCsupported Reproductive Health Surveys (RHS) based on numerical birthweight and mothers' assessment of whether the infant weighed less than 2,500 g.<sup>17</sup> For these countries, estimates were taken directly from the survey reports.

# C. Average adjustment of 24 per cent applied to published data

For four DHS and six MICS surveys, the data files

# 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\_29999

