WHO Global Database on Child Growth and Malnutrition

Compiled by

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Programme of Nutrition

World Health Organization
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" We are guilty of many errors and
many faults, but our worst crime
is abandoning the children,
neglecting the foundation of life.
Many of the things we need can wait.
The child cannot.
Right now is the time his bones are
being formed, his blood is being made
and his senses are being developed.
To him we cannot answer "Tomorrow".
His name is "Today". **"**

Gabriela Mistral, 1948

*We dedicate this work to the world's children in the hope
that it will alert decision-makers to how much remains to
be done to ensure children's healthy growth and
development.*

Acknowledgements

Abbreviations and Definitions

NCHS	National Center for Health Statistics
SD	Standard deviation
WHO	World Health Organization
Z-score (or SD-score)	The deviation of an individual's value from the median value of a reference population, divided by the standard deviation of the reference population.

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Zimbabwe

Preface

It was nearly 20 years ago that a group of scientists met under the aegis of the World Health Organization to examine ways to use anthropometry for assessing the nutritional status of children. In their report (1) the group suggested new parameters allowing international comparisons of nutritional data. This marked the beginning of WHO's organized collection and standardization of information on the nutritional status of the world's under-five population. Initial results, published in 1983 (2), were followed in 1989 (3) and 1993 (4) by updated global reviews of the magnitude of impaired child growth. WHO's present database vastly expands the information presented in these earlier reports, both in terms of geographical spread, and the scope and quality of available data.

Numerous, usually small-scale, anthropometric surveys had of course been previously undertaken in a number of countries. Interest was considerably heightened in 1976, however, with the introduction by the United States National Center for Health Statistics (NCHS) of the results of a compilation of large-scale child-growth studies, which established a reference for comparing anthropometric data. The adoption of the working group's recommendation (1) that the NCHS data set become the common yardstick led to its being referred to as the "WHO/NCHS international reference population". In the space of two decades, child growth monitoring, to assess health and nutritional status, has become a powerful tool for identifying those individuals and groups for which particular nutrition interventions are needed.
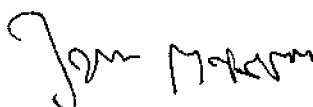
The WHO/NCHS reference has been the subject of close technical scrutiny, and a number of limitations have been identified, for example its limited geographical coverage. It is now probable that a new reference will be developed by incorporating new data on the growth of healthy children from several countries (5). Meanwhile, a major question of principle remains: Is it appropriate to compare the growth of children living in deprived environments with their counterparts in the radically different environment of affluent populations? If, as is frequently pointed out, a reference is no more than a comparison-making tool–as opposed to a standard to be upheld or a target to be attained–does this really answer the question or merely evade the larger issue?

The WHO/NCHS reference relates to healthy children. It is now widely, if not universally, accepted that children the world over have much the same growth potential, at least to seven years of age. Environmental factors, including infectious diseases, inadequate and unsafe diet, and all the handicaps of poverty appear to be far more important than genetic predisposition in producing deviations from the reference.

We are more aware than ever before that the underlying causes of impaired growth are deeply rooted in poverty and lack of education. To

continue to allow underprivileged environments to affect children's development not only perpetuates the vicious cycle of poverty; it also contributes to an enormous waste of human potential–a waste which no society can afford.

The achievement of growth potential can be regarded as a basic human right, part of the right of everyone to full development of their personality, enshrined in two United Nations covenants (6,7). WHO's Global Database on Child Growth and Malnutrition provides an excellent objective index of the encouraging progress being made towards achieving this goal in so far as it relates to physical development and nutritional status. It is also a stark reminder of just how much work remains to be done.

John C. Waterlow
London, 1997

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(3) *Global nutritional status, anthropometric indicators update 1989.* NUT/ANTREF/1/89. Geneva: World Health Organization, 1989.

(4) de Onis M, Monteiro C, Akré J, Clugston G. The worldwide magnitude of protein-energy malnutrition: an overview from the WHO Global Database on Child Growth. *Bulletin of the World Health Organization* 1993;71:703-712.

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(6) Convention of the Rights of the Child. New York, United Nations Assembly document A/RES/25, 20 November 1989.

(7) Human rights: the international bill of human rights, Universal declaration of human rights, International covenant on economic, social, and cultural rights, International covenant on civil and political rights and optional protocol. New York: United Nations, 1988.

1 Introduction

Malnutrition is frequently part of a vicious cycle that includes poverty and disease. These three factors are interlinked in such a way that each contributes to the presence and permanence of the others. Socioeconomic and political changes that improve health and nutrition can break the cycle; as can specific nutrition and health interventions. The WHO Global Database on Child Growth and Malnutrition seeks to contribute to the transformation of this cycle of poverty, malnutrition and disease into a virtuous one of wealth, growth and health.

Malnutrition usually refers to a number of diseases, each with a specific cause related to one or more nutrients, for example protein, iodine, vitamin A or iron. In the present context malnutrition is synonymous with protein-energy malnutrition, which signifies an imbalance between the supply of protein and energy and the body's demand for them to ensure optimal growth and function. This imbalance includes both inadequate and excessive energy intake; the former leading to malnutrition in the form of wasting, stunting and underweight, and the latter resulting in overweight and obesity.

Malnutrition in children is the consequence of a range of factors, that are often related to poor food quality, insufficient food intake, and severe and repeated infectious diseases, or frequently some combinations of the three. These conditions, in turn, are closely linked to the overall standard of living and whether a population can meet its basic needs, such as access to food, housing and health care. Growth assessment thus not only serves as a means for evaluating the health and nutritional status of children but also provides an indirect measurement of the quality of life of an entire population.

The WHO Global Database on Child Growth and Malnutrition illustrates malnutrition's enormous challenge and provides decision-makers and health workers alike with the baseline information necessary to plan, implement, and monitor and evaluate nutrition and public health intervention programmes aimed at promoting healthy growth and development. Since the Global Database is a dynamic surveillance system and new information is continually being collected, screened and entered, data collection can never be considered complete. Despite the considerable effort made to compile all available information, gaps in knowledge are inevitable. Users are therefore encouraged to send additional information to the following address:

WHO Global Database on Child Growth and Malnutrition
Programme of Nutrition/ World Health Organization
CH - 1211 Geneva 27

2 The importance of global nutritional surveillance

Nutritional surveillance has commonly been defined as the continual monitoring of the nutritional status of a population, based on repeated nutritional surveys or on data from child health or growth-monitoring programmes. However, with its emphasis on the nature of measurement activities, this is a rather narrow definition. A broader concept would emphasize the use of nutritional information to promote, manage, and evaluate programmes aimed at improving health and nutritional status. This broader view includes programmes and interventions as essential components of nutritional surveillance, with the data collection and monitoring system being only one part of the overall surveillance activities.

Nutritional surveillance should thus be understood as a major operational approach for population-based applications, including targeting interventions and assessing their effectiveness, as well as research on the determinants and consequences of malnutrition. All these specific activities are essential for the planning, implementation, and management of nutrition programmes. Decision-makers need to know on which geographic area and socioeconomic group to focus their development programmes, just as the success of timely warning and intervention programmes depends on accurate data to trigger appropriate action. Continual monitoring of nutritional status helps to detect early on health or nutrition problems in a population. Early detection in turn permits quick response and intervention, which can prevent further deterioration and help re-establish sound nutritional status.

There are two principal approaches to the collection of nutritional surveillance information: special surveys (single or repeated), and continual monitoring systems based on child growth data from existing programmes. The WHO Global Database on Child Growth and Malnutrition concentrates on the former, population-based nutrition surveys of under-5-year-olds, based on representative samples, applying standardized procedures. The major objectives of these nutrition surveys are (1):

n **To characterize nutritional status**: to measure the overall prevalence of growth retardation as well as variations with age, sex, socioeconomic status, and geographical area.

n **Targeting**: to identify populations and sub-populations with increased nutritional need.

n **Evaluation of interventions**: to collect baseline data before and at the end of programmes aimed at improving nutrition.

n **Monitoring**: to monitor secular trends in nutritional status.

n **Advocacy**: to raise awareness of nutritional problems, define policy, and promote programmes.

n **Training and education**: to motivate and train local teams to undertake nutritional assessment.
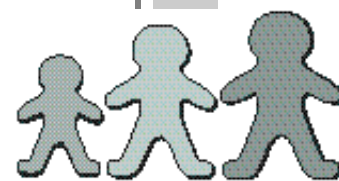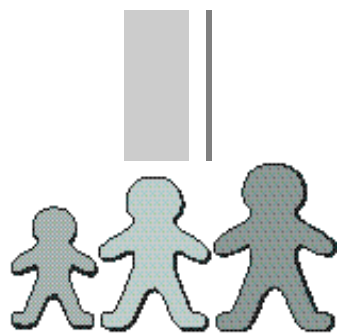
3 Rationale for promoting healthy growth and development

The health and social consequences of the current high prevalence of impaired child growth in developing countries are severe. The major outcomes of malnutrition during childhood may be classified in terms of morbidity (incidence and severity), mortality, and psychological and intellectual development; there are also important consequences in adult life in terms of body size, work and reproductive performances, and risk of chronic diseases.

Childhood morbidity

Several authors have examined the association between anthropometry and morbidity. While there is some debate about whether malnutrition leads to a higher incidence of diarrhoea, there is little doubt that malnourished children tend to have more severe diarrhoeal episodes—in terms of duration, risk of dehydration or hospital admission—and associated growth faltering (2-5). The risk of pneumonia is also increased in these children (6).

Childhood mortality

A number of studies carried out during emergency and non-emergency situations have demonstrated the association between increased mortality and increasing severity of anthropometric deficits (7,8). Data from six longitudinal studies on the association between anthropometric status and mortality of children aged 6-59 months revealed a strong log-linear or exponential association between the severity of weight-for-age deficits and mortality rates (9). Indeed, out of the 11.6 million deaths among children under-five in 1995 in developing countries, it has been estimated that 6.3 million—or 54% of young child mortality—were associated with malnutrition, the majority of which is due to the potentiating effect of mild-to-moderate malnutrition as opposed to severe malnutrition (10)(Figure 1).

Child development and school performance

There is strong evidence that poor growth or smaller size is associated with impaired development (11), and a number of studies have also demonstrated a relationship between growth status and school performance and intellectual achievement (12,13). However, this cannot be regarded as a simple causal relationship because of the complex environmental or socioeconomic factors that affect both growth and development. An intervention study in Jamaica indicates that the developmental status of underweight children can be partly improved by food supplementation or by intellectual stimulation, but that greatest improvements are achieved through a combination of both (14).

Adult-life consequences

Childhood stunting leads to a significant reduction in adult size, as demonstrated by a follow-up of Guatemalan infants who, two decades

Figure 1
Distribution of 11.6 million deaths among children less than 5 years old in all developing countries, 1995
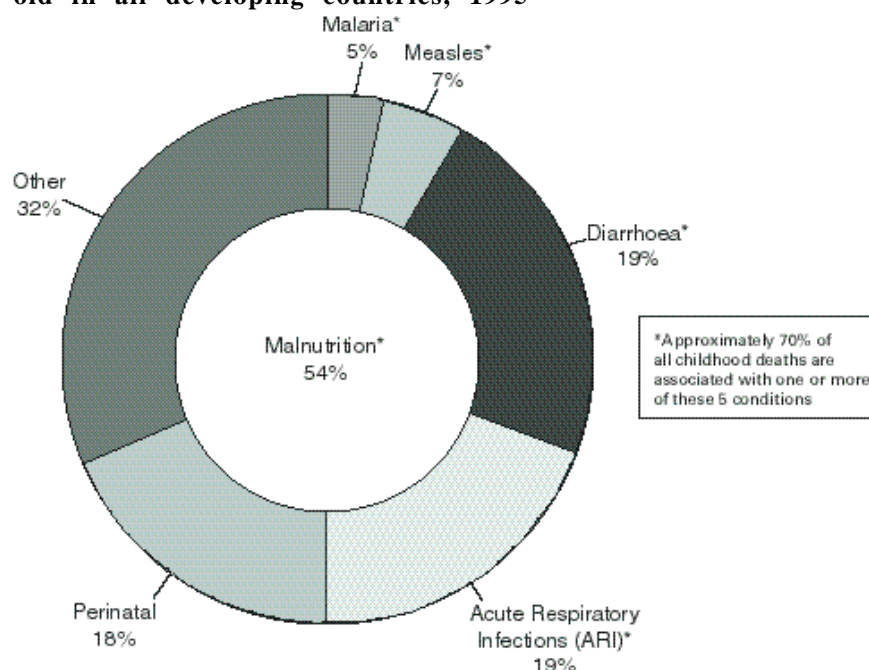
Based on data taken from Bailey K, de Onis M, Blössner M. Protein-energy malnutrition in: Murray CJL, Lopez AD, eds. Malnutrition and the Burden of Disease: the global epidemiology of protein-energy malnutrition, anaemias and vitamin deficiencies. Volume 8, The Global Burden of Disease and Injury Series, 1998 (in press), and Pelletier DL, Frongillo EA and Habicht JP, Epidemiologic evidence for a potentiating effect of malnutrition on child mortality, Am J Public Health 1993; 83: 1130-1133.

earlier, had been enrolled in a supplementation programme (13). One of the main consequences of small adult size resulting from childhood stunting is reduced work capacity (15), which in turn has an impact on economic productivity.

In addition, maternal size is associated with specific reproductive outcomes. Short women, for example, are at greater risk for obstetric complications because of smaller pelvic size (1). There is also a strong association between maternal height and birth weight which is independent of maternal body mass (16). There is thus an inter-generational effect (17), since low-birth-weight babies are themselves likely to have anthropometric deficits at later ages (18). On the other end of the spectrum, limited evidence is available linking overweight in childhood to adult morbidity and mortality (19-21).

Given the importance of the health consequences associated with impaired child growth, what will be the potential benefits of a strategy to promote healthy growth? As stated by Reynaldo Martorell (22), a leading scientist in this area, most benefits of achieving healthy growth are indirect and arise because the interventions necessary to improve growth also affect other functional domains. A child who is growing well will most likely be more physically active and interact more with his or her environment than one who is growing poorly. Apathy, whether induced by energy dietary deficits or infection, place a child at risk of developmental retardation. The conditions that improve growth will also improve cognitive development, especially if emphasis is placed on interventions to promote behavioural stimulation.

A child who is growing well is likely to have healthy immunological defences against infection. Healthy growth thus means decreased risk of severe infections, case fatality rates, and child mortality. In effect, a focus on the quality of life will lead to lower infant and child mortality rates and extend the gains made by child survival programmes.

Over the long term, youths who have been growing adequately during childhood will perform better in school than those who grew poorly. Again, this is not a causal relationship but simply a reflection of the fact that altering the environment to promote healthy growth also enhances development and learning capacity which will result in youths with a greater potential for being productive members of society.

Youths and adults, as a result of improved growth in early childhood, will have enhanced working capacity leading to increased productivity. Another important benefit of larger body size in women is lower risk of delivering low-birth-weight infants and, hence, lower risk of infant mortality as well as other health consequences associated with this condition (23). Improved maternal stature will also lead to fewer delivery complications and thus, most likely to lower maternal mortality rates.

In summary, if we want to improve child health and survival on a global scale, priority should be given to the identification and/or development of effective community-based strategies to improve child growth and development. The greatest impact can be expected when targeting **all** children in populations at risk and not just those individuals below a specific cut-off point. This is what ultimately will break the cycle that leads to malnutrition and increased morbidity and mortality.

4 The global picture

4.1 Coverage of the database

At present, the Global Database covers 95% of the total population of under-5-year-olds (about 510 million children) living in developing countries in 1995, or 84% of this age group worldwide. These percentages of coverage refer only to nationally representative surveys and thus do not take into account the large number of other surveys at regional, province, state, district or local levels included in the database and presented in the country data printouts in section 9.

Table 1 shows the population coverage attained by the database relative to national surveys performed between 1980 and 1996. Coverage is very high—95% or more—for northern, eastern, western and southern Africa; eastern, south-central and south-eastern Asia; central and south America; and Melanesia. Coverage is around 80% for middle Africa, western Asia, and the Caribbean. Micronesia and Polynesia are the only two subregions in developing countries that remain inadequately represented by national surveys. Overall, regional coverage is as follows: Africa (93.6%), Asia (94.1%), Latin America (98.9%) and Oceania (82.6%).

It is important to recall that the Global Database is a dynamic data collection system which is updated regularly. This implies that by the time this section is read coverage will in fact be more comprehensive than when it was prepared.

Table 1
Population coverage in the WHO Global Database on Child Growth and Malnutrition based on available national surveys, 1980-1996.

UN-regions and subregions	Total population (in millions)[a]	Population surveyed	coverage (%)	No. of countries covered	total
Africa	**121,941**	**114,125**	**93.6**	**43**	**53**
Eastern Africa	40,452	38,502	95.2	16	17
Middle Africa	15,632	12,130	77.6	5	9
Northern Africa	21,010	20,972	99.8	6	6
Southern Africa	6,605	6,372	96.5	4	5
Western Africa	38,242	36,149	94.5	12	16
Asia[b]	**363,270**	**342,004**	**94.1**	**29**	**46**
Eastern Asia[b]	109,920	103,902	94.5	2	4
South-central Asia	174,385	165,770	95.1	9	14
South-eastern Asia	57,012	55,011	96.5	7	10
Western Asia	21,953	17,321	78.9	11	18
Latin America & Caribbean	**54,265**	**53,685**	**98.9**	**25**	**33**
Caribbean	3,750	3,237	86.3	6	13
Central America	16,100	16,099	100.0	8	8
South America	34,415	34,349	99.8	11	12
Oceania[c]	**966**	**798**	**82.6**	**6**	**15**
Melanesia	823	778	94.5	4	5
Micronesia	72	20	27.8	1	5
Polynesia	70	0	0.0	1	5
Developing countries	**540,439**	**510,612**	**94.5**	**103**	**147**
Global	**611,559**	**511,639**	**83.7**	**107**	**192**

[a]   Under-5-year-old population estimates refer to 1995 based on the United Nations World Population Prospects - The 1996 Revision.
[b]   Excluding Japan.
[c]   Excluding Australia and New Zealand.

Coverage in Africa. Currently the Global Database has national data for 43 out of 53 African countries, covering 93.6% of the under-5-year-olds in this region. Compared to the previous overview (24), 9 more countries have national data, which represents a 16% increase in population coverage. National surveys are still lacking from Somalia in eastern Africa; Angola, Chad, Equatorial Guinea, and Gabon in middle Africa; Botswana in southern Africa; and Gambia, Guinea, Guinea-Bissau, and Liberia in western Africa.

Coverage in Asia. There have been many changes in this region during the last five years. New countries such as Azerbaijan, Kazakstan, Tajikistan, and Turkmenistan have joined the newly created south-central Asian subregion and, consequently, the total number of countries in the region has increased from 37 to 46. At present the coverage attained by the database for Asia as a whole (excluding Japan) is 94.1%, which represents a 5% increase from the previous overview (24). Compared to 1992 data are now available for 10 more countries, or a total of 29 out of 46 countries. The countries for which information is still lacking are Afghanistan, Kyrgyzstan, Tajikistan, and Turkmenistan, in south-central Asia; Armenia, Cyprus, Georgia, Israel, Palestinian self-rule areas, Saudi Arabia, and the United Arab Emirates in western Asia; Brunei Darussalam, Cambodia, and Singapore in south-eastern Asia; and Democratic People's Republic of Korea, Japan, and Republic of Korea in eastern Asia.

Coverage in Europe. Paradoxically, there is relatively little information from Europe (25% coverage), with national nutrition data available for only 4 out of 40 countries in this region. Low coverage does not imply, however, that information on child growth status is lacking; rather that for most countries data are not available in the required standardized format. National data are currently available for the Czech Republic, Hungary, Romania, and the Russian Federation.

Coverage in Latin America. There are national survey data for 25 out of 33 countries, covering 98.9% of the region's total under-5-year-olds. Coverage is almost complete (³100%) for central and south America; it is 86.3% for the Caribbean, where 7 out of 13 countries still lack national data. Since 1992 two additional countries (Argentina and Belize) have provided national nutrition data, while many others have updated previous national surveys. Data are still missing for Antigua and Barbuda, Bahamas, Dominica, Grenada, Saint Kitts and Nevis, Saint Lucia, and Saint Vincent and the Grenadines in the Caribbean, and for Suriname in south America.

Coverage in Oceania. Coverage in Oceania (excluding Australia and New Zealand) is quite high (82.6%) mainly reflecting the very high coverage for Melanesia (94.5%), the most populous subregion in Oceania. However, compared to the last overview (24), Micronesia remains inadequately represented by national surveys (27.8%), and no Polynesian country has provided data thus far. Since 1992, results of

national nutrition surveys from two countries in Melanesia (Fiji and Solomon Islands) have been added to the database. The following developing countries are still not included in the database: Cook Islands, Niue, Tuvalu, and Samoa in Polynesia; the Marshall Islands, Federated States of Micronesia, Nauru, and Palau in Micronesia; and New Caledonia in Melanesia. Data are also missing from the two developed countries in this region, Australia and New Zealand. However, in 1995 Australia conducted a national nutrition survey, and the results will be included in the database as soon as they are released.

4.2 Overview of national surveys

Table 2 presents the prevalence of underweight, stunting, wasting, and overweight for boys, girls, and both sexes combined, based on national surveys (latest year available) from 111 countries. It is important to disaggregate data by sex to monitor gender differences in child growth and malnutrition. As shown in Table 2, no consistent differences are found between prevalence rates for boys and girls. However, prevalence rates are consistently higher in rural than in urban areas, and can vary considerably by age and region within countries. Detailed information on national surveys, i.e. data disaggregated by age, sex, urban/rural residence, and region, can be found in the country data printouts in section 9.

Figures 2-4 show the geographical distribution of countries according to their prevalence of underweight, stunting, and wasting (percentage below -2 SD from the reference median value). Prevalences have been grouped according to the "trigger" levels of public health importance (see section 5.4).

Distribution of underweight (Figure 2). Overall, there is a wide range of prevalence levels across countries ranging from 1% in Chile to 56% in Bangladesh. However, there are generally low to medium underweight prevalence levels in Latin America, with the exception of Guatemala and Haiti where high rates of underweight children are found. Africa presents high variability with low and medium levels in the northern and southern subregions, but primarily high to very high prevalence rates in other countries of the continent. In Asia there is also a great variability between countries, with countries in the eastern subregion showing low and medium levels, whereas the countries in the south-central and south-eastern subregion continue to have high to very high prevalences of underweight. Western Asia has mainly low to medium prevalence levels, with the exception of Yemen whose rate is very high.

Distribution of stunting (Figure 3). In Latin America the severity of stunting is low for the majority of countries but a number of countries have medium (Bolivia, El Salvador, Mexico, and Sao Tome and Principe) or high (Ecuador, Haiti, Honduras, and Peru) prevalence rates, and only one (Guatemala) has a very high prevalence rate. In Africa the variability of prevalence rates is high for stunting as it is for underweight;

however, the distribution differs slightly: low prevalence rates for stunting can be found only in the north, while all other sub-Saharan countries show medium, high and very high prevalences of stunting. In Asia, the south-central and south-eastern subregions primarily show high to very high rates of stunting; Thailand and Sri Lanka are the only countries in these subregions with medium prevalence rates. China, with a national prevalence rate of 31.4% is in the high range category.

Distribution of wasting (Figure 4). There is little variation in Latin America as regards wasting, with most countries having low or medium prevalence rates. In Africa the variability across countries is high for this indicator, with low rates found in some northern and southern countries, whereas medium, high and very high prevalences prevail in countries in eastern, middle, and western Africa. In Asia all levels of severity can be found, with lower levels primarily in eastern and western Asia, and a dominance of medium, high and very high levels in the other subregions.

Prevalence of underweight children in developing countries

Legend:
- < 10.0%
- 10.0 – 19.9%
- 20.0 – 29.9%
- 30.0% +
- Data not available

Source: WHO Global Database on Child Growth and Malnutrition, 1997
WHO 97449 bw

The designations employed and the presentation of material on this map 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 represent approximate border lines for which there may not yet be full agreement.

Very high (≥30%)

Bangladesh
Bhutan
Burkina Faso
Burundi
Democratic Republic of the Congo
Eritrea
Ethiopia
India
Indonesia
Lao People's Democratic Republic
Madagascar
Maldives
Mali
Myanmar
Nepal
Niger
Nigeria
Pakistan
Sri Lanka
Sudan
United Republic of Tanzania
Viet Nam
Yemen
Mauritania
Mozambique
Namibia
Papua New Guinea
Philippines
Rwanda
Senegal
Sierra Leone
Solomon Islands
Thailand
Togo
Uganda
Zambia

High (20-29%)

Benin
Central African Republic
Comoros
Congo
Côte d'Ivoire
Djibouti
Ghana
Guatemala
Haiti
Kenya
Lesotho
Malawi
Malaysia

Medium (10-19%)

Algeria
Azerbaijan
Bolivia
Cameroon
Capo Verde
China
Dominican Republic
Ecuador
Egypt
El Salvador
Guyana
Honduras
Iran (Islamic Republic of)
Iraq
Jamaica
Kiribati
Mauritius
Mexico
Mongolia
Nicaragua
Oman
Sao Tome and Principe
Syrian Arab Republic
Turkey
Uzbekistan
Vanuatu
Zimbabwe

Low (<10%)

Argentina
Bahrain
Barbados
Belize
Brazil
Chile
Colombia
Costa Rica
Cuba
Czech Republic
Fiji
Hungary
Jordan
Kazakstan
Kuwait
Lebanon
Libyan Arab Jamahiriya
Morocco
Panama
Paraguay
Peru
Qatar
Romania
Russian Federation
Seychelles
South Africa
Swaziland
Trinidad and Tobago
Tunisia
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Brunei Darussalam
Bulgaria
Cambodia
Canada
Chad
Cook Islands
Croatia
Cyprus
Democratic People's Republic of Korea
Denmark
Dominica
Equatoria Guinea
Estonia
Finland
France
Gabon
Gambia
Georgia
Germany
Greece
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Guinea
Guinea-Bissau
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Micronesia (Federated States of)
Monaco
Nauru
Netherlands
New Zealand
Niue
Norway
Palau
Palestinian self-rule areas
Poland
Portugal
Republic of Korea
Republic of Moldova
Saint Kitts and Nevis
Saint Lucia
Saint Vincent and the Grenadines
Samoa
Saudi Arabia
Singapore
Slovakia
Slovenia
Somalia
Spain
Suriname
Sweden
Switzerland
The Former Yugoslav Republic of Macedonia
Tajikistan
Tonga
Turkmenistan
Tuvalu
United Arab Emirates
Ukraine
United Kingdom of Great Britain and Northern Ireland

No national data

Afghanistan
Albania
Andorra
Angola
Antigua and Barbuda

Prevalence of stunted children in developing countries

Legend:

- < 20.0%
- 20.0 – 29.9%
- 30.0 – 39.9%
- 40.0% +
- Data not available

Source: WHO Global Database on Child Growth and Malnutrition, 1997
WHO 97450 b/w

The designations employed and the presentation of material on this map 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 represent approximate border lines for which there may not yet be full agreement.

Very high (≥40%)

Bangladesh
Bhutan
Burundi
Democratic Republic of the Congo
Ethiopia
Guatemala
India
Indonesia
Lao People's Democratic Republic
Madagascar
Malawi
Mauritania
Mozambique
Myanmar
Nepal
Nigeria
Pakistan
Papua New Guinea
Rwanda
United Republic of Tanzania
Viet Nam
Yemen
Zambia

Sierra Leone
Sudan
Swaziland
Tajikstan
Uganda
Uzbekistan

High (30-39%)

Burkina Faso
China
Comoros
Ecuador
Eritrea
Haiti
Honduras
Kenya
Lesotho
Maldives
Mali
Niger
Philippines

Medium (20-29%)

Azerbaijan
Benin
Bolivia
Cameroon
Cape Verde
Central African Republic
Congo
Côte d'Ivoire
Djibouti
Egypt
El Salvador
Ghana
Iraq
Kiribati
Mexico
Mongolia
Morocco
Namibia
Nicaragua
Peru
Sao Tome and Principe
Senegal
Solomon Islands
South Africa
Sri Lanka
Syrian Arab Republic
Thailand
Togo
Tunisia
Turkey
Zimbabwe

Low (<20%)

Algeria
Argentina
Bahrain
Barbados
Brazil
Chile
Colombia
Cuba
Czech Republic
Dominican Republic
Fiji
Hungary
Iran (Islamic Republic of)
Jamaica
Jordan
Kazakstan
Kuwait
Lebanon
Libyan Arab Jamahiriya
Mauritius
Oman
Panama
Paraguay
Qatar
Romania
Russian Federation
Seychelles
Tonga
Trinidad and Tobago
United States of America
Uruguay
Vanuatu
Venezuela
Yugoslavia

Australia
Austria
Bahamas
Belarus
Belgium
Belize
Bosnia and Herzegovina
Botswana
Brunei Darussalam
Bulgaria
Cambodia
Canada
Chad
Cook Islands
Costa Rica
Croatia
Cyprus
Democratic People's Republic of Korea
Denmark
Dominica
Equatorial Guinea
Estonia
Finland
France
French Guiana
Gabon
Gambia
Georgia
Germany
Greece
Grenada
Guinea
Guinea-Bissau
Guyana
Iceland
Ireland
Israel
Italy
Japan
Kyrgyzstan
Latvia
Liberia

Liechtenstein
Lithuania
Luxembourg
Malaysia
Malta
Marshall Islands
Microresia (Federated States of)
Monaco
Nauru
Netherlands
New Zealand
Niue
Norway
Palau
Palestinian self-rule areas
Poland
Portugal
Republic of Korea
Republic of Moldova
Saint Kitts and Nevis
Saint Lucia
Saint Vincent and the Grenadines
Samoa
Saudi Arabia
Singapore
Slovakia
Slovenia
Somalia
Spain
Suriname
Sweden
Switzerland
The former Yugoslav Republic of Macedonia
Turkmenistan
Tuvalu
United Arab Emirates
Ukraine
United Kingdom of Great Britain and Northern Ireland

No national data

Afghanistan
Albania
Andorra
Angola
Antigua and Barbuda
Armenia

Prevalence of wasted children in developing countries

< 5.0%

5.0 – 9.9%

10.0 – 14.9 %

15.0 % +

Data not available

Source: WHO Global Database on Child Growth and Malnutrition, 1997
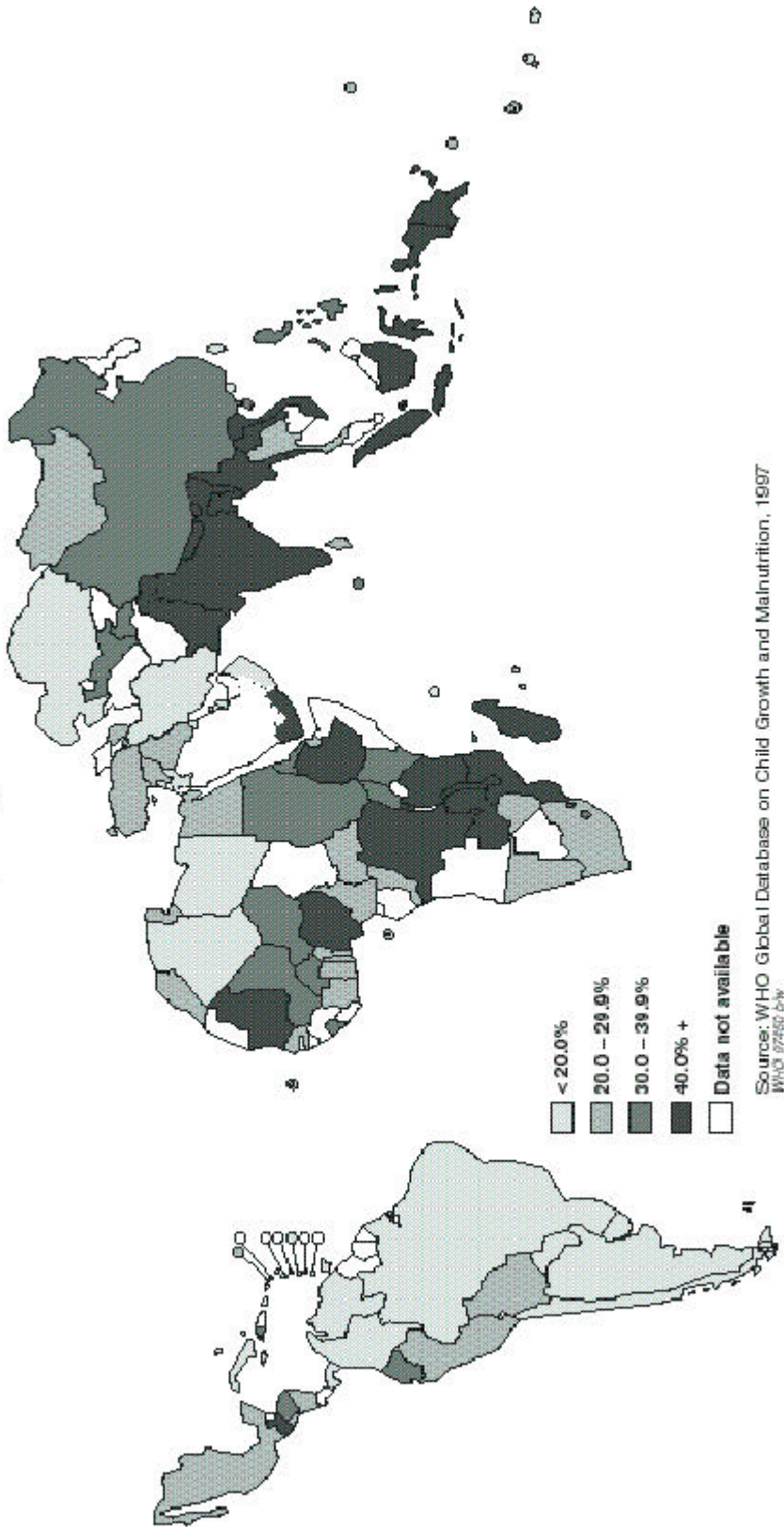WHO 97285 bw

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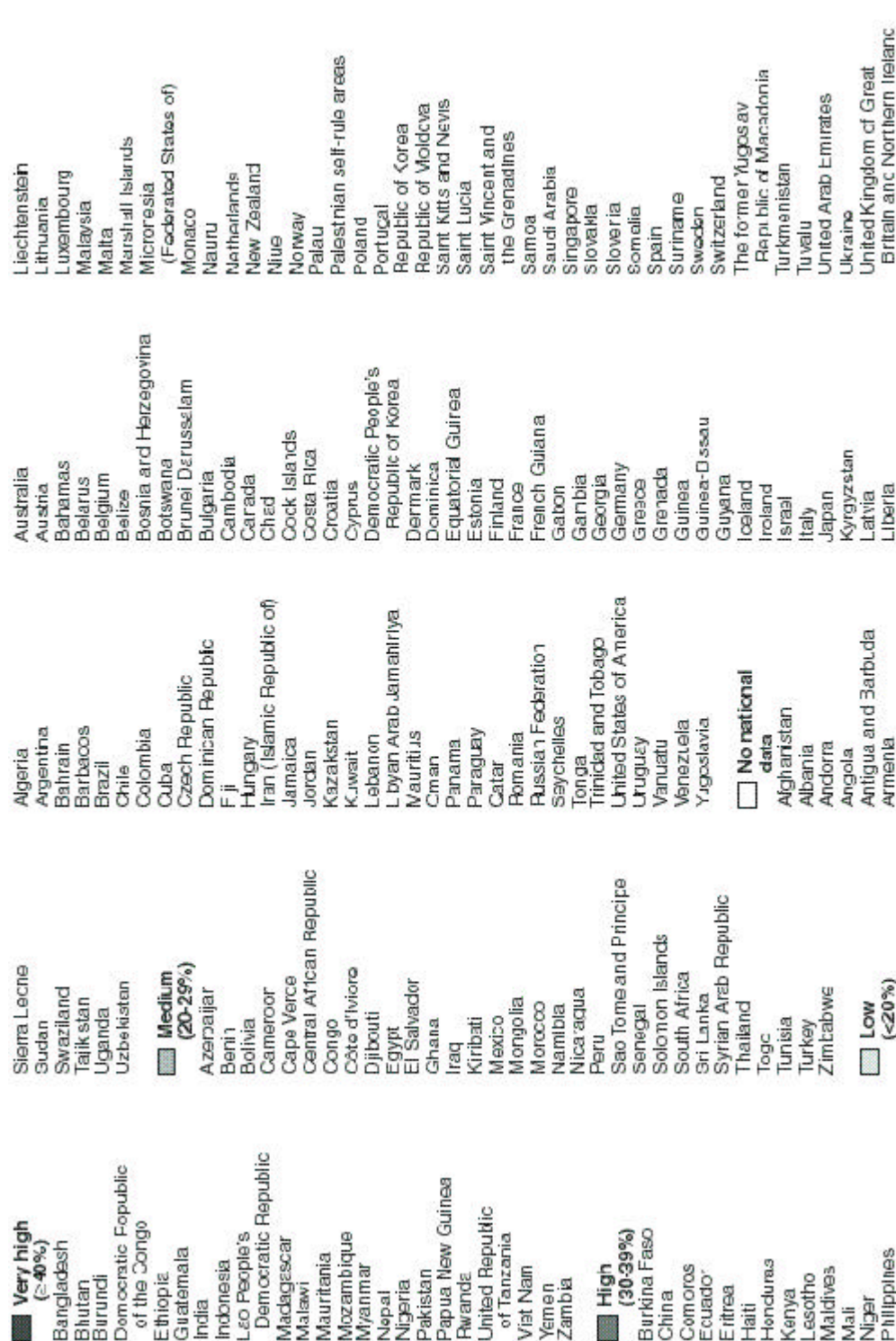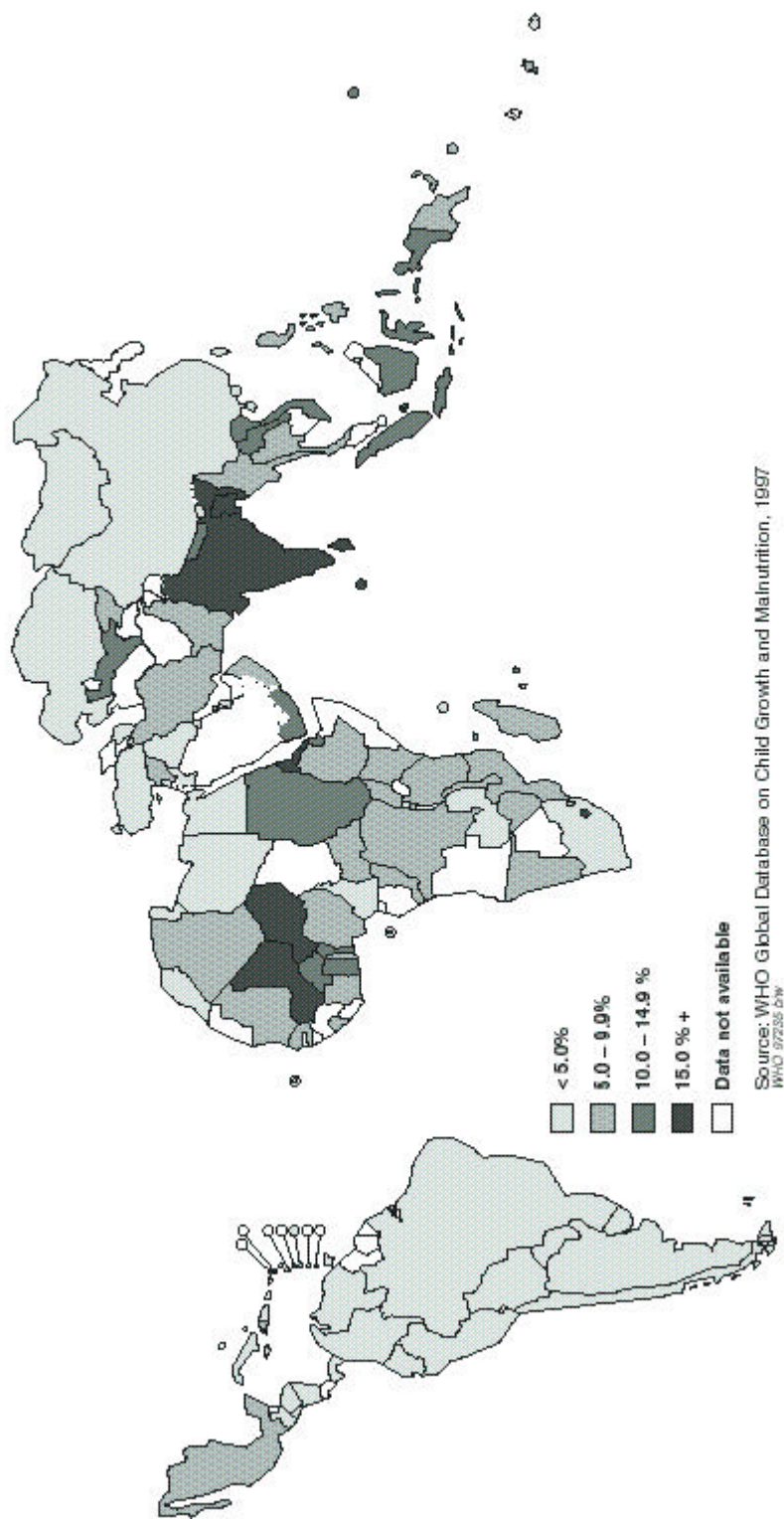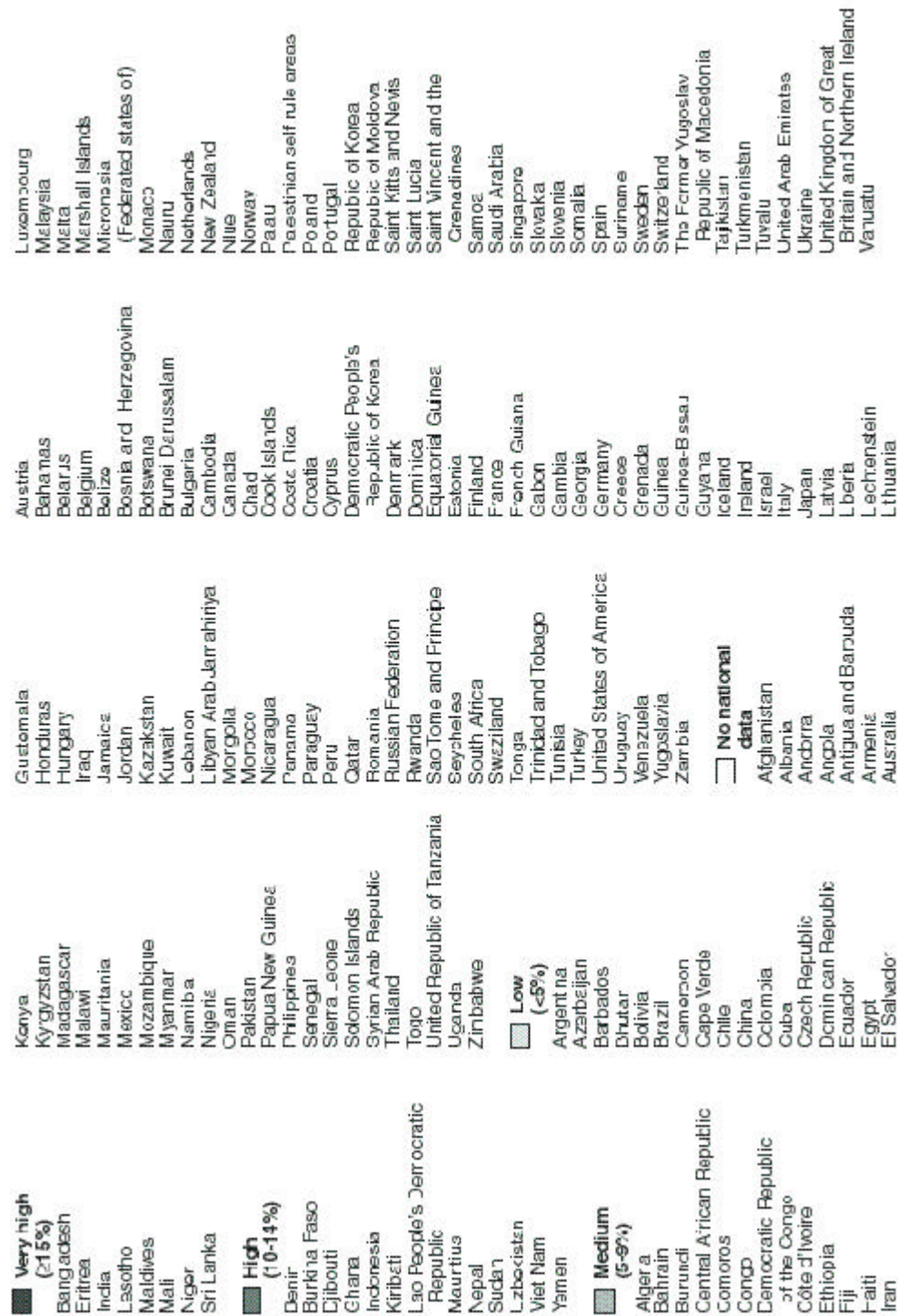
Very high (≥15%)
Bangladesh
Eritrea
India
Lesotho
Maldives
Mali
Niger
Sri Lanka

High (10-14%)
Benin
Burkina Faso
Djibouti
Ghana
Indonesia
Kiribati
Lao People's Democratic Republic
Mauritius
Nepal
Sudan
Uzbekistan
Viet Nam
Yemen

Medium (5-9%)
Algeria
Bahrain
Burundi
Central African Republic
Comoros
Congo
Democratic Republic of the Congo
Côte d'Ivoire
Ethiopia
Fiji
Haiti
Iran

Kenya
Kyrgyzstan
Madagascar
Malawi
Mauritania
Mexico
Mozambique
Myanmar
Namibia
Nigeria
Oman
Pakistan
Papua New Guinea
Philippines
Senegal
Sierra Leone
Solomon Islands
Syrian Arab Republic
Thailand
Togo
United Republic of Tanzania
Uganda
Zimbabwe

Low (<5%)
Argentina
Azerbaijan
Barbados
Bhutan
Bolivia
Brazil
Cameroon
Cape Verde
Chile
China
Colombia
Cuba
Czech Republic
Dominican Republic
Ecuador
Egypt
El Salvador

Guatemala
Honduras
Hungary
Iraq
Jamaica
Jordan
Kazakhstan
Kuwait
Lebanon
Libyan Arab Jamahiriya
Mongolia
Morocco
Nicaragua
Panama
Paraguay
Peru
Qatar
Romania
Russian Federation
Rwanda
Sao Tome and Principe
Seychelles
South Africa
Swaziland
Tonga
Trinidad and Tobago
Tunisia
Turkey
United States of America
Uruguay
Venezuela
Yugoslavia
Zambia

No national data
Afghanistan
Albania
Andorra
Angola
Antigua and Barbuda
Armenia
Australia

Austria
Bahamas
Belarus
Belgium
Belize
Bosnia and Herzegovina
Botswana
Brunei Darussalam
Bulgaria
Cambodia
Canada
Chad
Cook Islands
Costa Rica
Croatia
Cyprus
Democratic People's Republic of Korea
Denmark
Dominica
Equatorial Guinea
Estonia
Finland
France
French Guiana
Gabon
Gambia
Georgia
Germany
Greece
Grenada
Guinea
Guinea-Bissau
Guyana
Iceland
Ireland
Israel
Italy
Japan
Latvia
Liberia
Liechtenstein
Lithuania

Luxembourg
Malaysia
Malta
Marshall Islands
Micronesia (Federated states of)
Monaco
Nauru
Netherlands
New Zealand
Niue
Norway
Palau
Palestinian self rule areas
Poland
Portugal
Republic of Korea
Republic of Moldova
Saint Kitts and Nevis
Saint Lucia
Saint Vincent and the Grenadines
Samoa
Saudi Arabia
Singapore
Slovakia
Slovenia
Somalia
Spain
Suriname
Sweden
Switzerland
The Former Yugoslav Republic of Macedonia
Tajikistan
Turkmenistan
Tuvalu
United Arab Emirates
Ukraine
United Kingdom of Great Britain and Northern Ireland
Vanuatu

Source: WHO Global Database on Child Growth and Malnutrition, 1997

Table 2
Latest national prevalence of underweight, stunting, wasting and overweight in preschool children by country and sex[1].

Country	Sex	Underweight [a]	Stunting [b]	Wasting [c]	Overweight [d]
Algeria	F	12.5	18.2	8.8	9.8
	M	13	18.3	9	8.5
	T	12.8	18.3	8.9	9.2
Argentina	F	0.5	2.2	0.3	9.6
	M	3.4	7.4	1.8	4.8
	T	1.9	4.7	1.1	7.3
Azerbaijan	F	10.5	20	2.5	3.2
	M	9.7	24	3.3	4
	T	10.1	22.2	2.9	3.7
Bahrain	F	6.7	9.6	5.2	5.9
	M	7.8	10.3	5.7	3.5
	T	7.2	9.9	5.5	4.7
Bangladesh	F	58	55	16.9	0.4
	M	54.6	54.2	18.6	0
	T	56.3	54.6	17.8	0.2
Barbados	F	7.4	7.4	4.9	4.9
	M	4.5	6.7	4.8	2.9
	T	5.9	7	4.9	3.9
Belize	F	—	—	—	—-
	M	—	—	—	—-
	T	6.2	—	—	—-
Benin	F	26.2	22.7	12.6	1.4
	M	32.1	27.2	16	1.1
	T	29.2	25	14.3	1.3
Bhutan	F	38.3	54.9	4.2	1.9
	M	37.6	57.2	4	2.2
	T	37.9	56.1	4.1	2
Bolivia	F	14.7	27	3.1	4.9
	M	15	26.6	5.2	3.8
	T	14.9	26.8	4.2	4.3
Brazil	F	5.4	9.4	2.4	5.1
	M	5.9	11.5	2.3	4.7
	T	5.7	10.5	2.3	4.9
Burkina Faso	F	32.2	32.1	13.2	1.4
	M	33.2	34.5	13.2	1.7
	T	32.7	33.3	13.2	1.6

Country	Sex	Underweight [a]	Stunting [b]	Wasting [c]	Overweight [d]
Burundi	F	38	47.1	5.1	1.1
	M	37.1	47.7	6.2	1.1
	T	37.5	47.4	5.7	1.1
Cameroon	F	16.5	24.6	2.8	3
	M	13.8	27.3	3	2.8
	T	15.1	26	2.9	2.9
Cape Verde	F	18	24.1	3.5	—-
	M	19.6	27.5	3.1	—-
	T	18.8	25.8	3.3	—-
Central African Republic	F	23.7	29.5	6.2	1.1
	M	22.6	27.2	6.6	0.6
	T	23.2	28.4	6.4	0.8
Chile	F	—	—	—	—-
	M	—	—	—	—-
	T	0.9	2.4	0.3	7.2
China	F	18.1	30.7	3.3	4.4
	M	16.7	32	3.5	4.1
	T	17.4	31.4	3.4	4.3
Colombia	F	7.6	13.7	1.3	3
	M	9.1	16.2	1.4	2.3
	T	8.4	15	1.4	2.6
Comoros	F	24	31.7	7	4.3
	M	27.6	35.7	9.4	3.3
	T	25.8	33.8	8.3	3.8
Congo (rural)	F	23.2	26.2	4.6	—-
	M	24.7	28.8	6.4	—-
	T	23.9	27.5	5.5	0.7
Costa Rica	F	—	—	—	—-
	M	—	—	—	—-
	T	2.2	—	—	—-
Côte d'Ivoire	F	21.1	23.6	6.7	1.8
	M	26.4	25.2	9.7	1.3
	T	23.8	24.4	8.3	1.5
Croatia	F	—	—	—	—-
	M	—	—	—	—-
	T	0.6	0.8	0.8	5.9
Czech Republic	F	0.9	1.8	1.8	4.2
	M	1.1	2.1	2.4	4.1
	T	1	1.9	2.1	4.1

Country	Sex	Underweight [a]	Stunting [b]	Wasting [c]	Overweight [d]
Democratic Republic of the Congo	F	34.2	43.5	10.1	—-
	M	34.7	47	9.1	—-
	T	34.4	45.2	9.6	—-
Djibouti	F	—	—	—	—-
	M	—	—	—	—-
	T	22.9	22.2	10.7	—-
Dominican Republic	F	9.5	15.4	1.5	3.7
	M	11.1	17.5	1.4	1.9
	T	10.3	16.5	1.4	2.8
Ecuador	F	—	—	—	—-
	M	—	—	—	—-
	T	16.5	34	1.7	—-
Egypt	F	12.2	28.4	4.5	9.9
	M	12.7	31	4.7	7.4
	T	12.4	29.8	4.6	8.6
El Salvador	F	10.8	23.5	1	2.7
	M	11.5	22.7	1.6	1.8
	T	11.2	23.1	1.3	2.2
Eritrea	F	45.2	40.5	16.7	—-
	M	42.3	36.4	16.2	—-
	T	43.7	38.4	16.4	—-
Ethiopia (rural)	F	45.9	62.7	7.2	—-
	M	49.3	65.7	8.7	—-
	T	47.7	64.2	8	—-
Fiji	F	7.4	3.6	4.7	0.7
	M	8.4	1.8	11.4	1.6
	T	7.9	2.7	8.2	1.2
Ghana	F	25.8	23.9	10.8	2.1
	M	28.9	27.8	11.9	1.6
	T	27.3	25.9	11.3	1.9
Guatemala	F	27.3	49.1	2.9	4
	M	25.9	50.4	3.6	4
	T	26.6	49.7	3.3	4
Guyana	F	16.9	19.6	9.4	1.5
	M	19.6	21.7	7.5	3
	T	18.3	20.7	8.5	2.3
Haiti	F	28	32	7.2	3.6
	M	26.9	31.8	8.4	2
	T	27.5	31.9	7.8	2.8

Country	Sex	Underweight [a]	Stunting [b]	Wasting [c]	Overweight [d]
Honduras	F	17.8	39.8	1.9	—-
	M	18.8	39.4	2.1	—-
	T	18.3	39.6	2	—-
Hungary	F	2	2.7	1.4	2.2
	M	2.4	3.1	1.8	1.8
	T	2.2	2.9	1.6	2
India	F	53.4	51.7	16.1	—-
	M	53.3	52.3	18.8	—-
	T	53.4	52	17.5	—-
Indonesia	F	33.5	41.3	12.1	4.1
	M	34.4	43	13.6	4
	T	34	42.2	12.9	4
Iran (Islamic Republic of)	F	16.3	18.4	7.1	—-
	M	15	19.5	6.1	—-
	T	15.7	18.9	6.6	—-
Iraq	F	—	—	—	—-
	M	—	—	—	—-
	T	11.9	21.8	3.4	—-
Jamaica	F	—	—	—	—-
	M	—	—	—	—-
	T	10.2	9.6	3.5	6
Jordan	F	6.2	15.5	2.5	6.2
	M	6.6	16.2	3.7	5.1
	T	6.4	15.8	3.1	5.7
Kazakstan	F	6.6	14.1	2.3	3.5
	M	10.3	17.8	4.4	5.2
	T	8.3	15.8	3.3	4.3
Kenya	F	20.7	32	6.7	4.2
	M	24.3	35.3	8.9	2.8
	T	22.5	33.6	7.8	3.5
Kiribati	F	11	27.5	9.3	12.6
	M	14.7	29.1	12.4	9.7
	T	12.9	28.3	10.8	11.1
Kuwait	F	—	—	—	—-
	M	—	—	—	—-
	T	6.4	12.2	2.6	—-
Kyrgyzstan	F	—	—	8.4	—-
	M	—	—	8.7	—-
	T	—	—	8.6	—-

Country	Sex	Underweight [a]	Stunting [b]	Wasting [c]	Overweight [d]
Lao People's Democratic Republic	F	39.8	46.5	9.4	—-
	M	40.1	48	11.5	—-
	T	40	47.3	10.5	—-
Lebanon	F	2.8	11.8	2.8	—-
	M	3.3	12.6	3	—-
	T	3	12.2	2.9	—-
Lesotho	F	—	—	—	—-
	M	—	—	—	—-
	T	21.4	32.9	15.8	—-
Libyan Arab Jamahiriya	F	4.4	13.8	2.7	—-
	M	5	16.4	2.7	—-
	T	4.7	15.1	2.7	—-
Madagascar	F	33.7	48.4	7.3	1
	M	34.6	51.2	7.4	0.9
	T	34.1	49.8	7.4	1
Malawi	F	27.1	47	5.6	7.3
	M	32.7	49.7	8.5	6.1
	T	29.9	48.3	7	6.7
Malaysia	F	—	—	—	—-
	M	—	—	—	—-
	T	20.1	—	—	—-
Maldives	F	39.2	29.8	14.3	—-
	M	38.5	29.2	17.2	—-
	T	39	29.6	16	—-
Mali	F	40.3	29.2	22.2	1.3
	M	39.7	31	24.5	1.3
	T	40	30.1	23.3	1.3
Mauritania	F	—	—	—	—-
	M	—	—	—	—-
	T	23	44	7.2	—-
Mauritius	F	—	—	—	—-
	M	—	—	—	—-
	T	14.9	9.7	13.7	4
Mexico	F	13.8	22.7	6.5	3.8
	M	14.7	22.8	5.6	3.6
	T	14.2	22.8	6	3.7
Mongolia	F	12	27.1	1.7	—-
	M	12.7	25.8	1.8	—-
	T	12.3	26.4	1.7	—-

Country	Sex	Underweight [a]	Stunting [b]	Wasting [c]	Overweight [d]
Morocco	F	8.9	24.2	1.9	7.6
	M	10.1	24.2	2.5	6
	T	9.5	24.2	2.2	6.8
Mozambique	F	—	—	—	—-
	M	—	—	—	—-
	T	27	55	8	—-
Myanmar	F	28.4	42	7.4	—-
	M	33.8	46.9	8.1	—-
	T	31.2	44.6	7.8	—-
Namibia	F	25.6	26.7	8.5	3.1
	M	26.8	30.3	8.7	3.6
	T	26.2	28.5	8.6	3.3
Nepal	F	48	50.2	10.2	0.4
	M	45.8	46.6	12.3	0.6
	T	46.9	48.8	11.2	0.5
Nicaragua	F	11.3	22.4	1.6	—-
	M	12.5	25	2.1	—-
	T	11.9	23.7	1.9	—-
Niger	F	42.4	38.1	14.5	1.2
	M	42.8	40.7	15.5	1.1
	T	42.6	39.5	15	1.1
Nigeria	F	35.4	42.4	8.3	1.6
	M	35.2	43	9.6	1.5
	T	35.3	42.7	8.9	1.5
Oman	F	10.1	12.7	7.3	1.6
	M	17.9	18.6	10.8	0.3
	T	14.1	15.7	9.1	0.9
Pakistan	F	38.4	48.7	8.2	3.1
	M	38	50.4	10.2	3
	T	38.2	49.6	9.2	3.1
Panama	F	—	—	—	—-
	M	—	—	—	—-
	T	6.1	9.9	2.7	—-
Papua New Guinea (rural)	F	29.3	40.6	5.4	1.7
	M	30.3	45.7	5.6	1.5
	T	29.9	43.2	5.5	1.6
Paraguay	F	4.1	13.5	0.4	4
	M	3.2	14.3	0.2	3.8
	T	3.7	13.9	0.3	3.9

Country	Sex	Underweight [a]	Stunting [b]	Wasting [c]	Overweight [d]
Peru	F	7.4	25.1	1.1	7
	M	8.1	26.4	1.2	5.9
	T	7.8	25.8	1.1	6.4
Philippines	F	28.6	31.3	6.8	1.1
	M	30.5	33.9	8	0.6
	T	29.6	32.7	7.5	0.8
Qatar	F	4.7	8.4	1.4	8.6
	M	6.9	8.3	1.7	5.3
	T	5.5	8.1	1.5	6.8
Romania	F	5.6	7.6	2	2.5
	M	5.7	8	3	2.2
	T	5.7	7.8	2.5	2.3
Russian Federation	F	3.3	13.2	4	23
	M	2.8	12.1	3.8	18.6
	T	3	12.7	3.9	20.9
Rwanda	F	29.8	47.4	3.2	2
	M	29	50	4.4	2.1
	T	29.4	48.7	3.8	2.1
Sao Tome and Principe	F	—	—	—	—-
	M	—	—	—	—-
	T	16.6	25.9	4.8	—-
Senegal	F	21.1	23.5	7.2	3
	M	23.4	25.9	9.7	2.2
	T	22.2	24.7	8.4	2.6
Seychelles	F	5.9	4.2	1.5	3.4
	M	5.4	6	2.3	3.7
	T	5.7	5.1	2	3.5
Sierra Leone	F	—	—	—	—-
	M	—	—	—	—-
	T	28.7	34.7	8.5	—-
Solomon Islands	F	19.9	26.3	5.5	1.3
	M	22.6	28.2	7.7	1
	T	21.3	27.3	6.6	1.1
South Africa	F	8.7	21.5	2.3	7.4
	M	9.8	24.1	2.6	5.9
	T	9.2	22.8	2.5	6.7
Sri Lanka	F	40.9	25.1	15.4	0.1
	M	34.8	22.7	15.6	0.2
	T	37.7	23.8	15.5	0.1

Country	Sex	Underweight [a]	Stunting [b]	Wasting [c]	Overweight [d]
Sudan	F	35.4	34.4	13.8	—-
	M	32.3	34.3	12.4	—-
	T	33.9	34.3	13.1	—-
Swaziland	F	8.6	27.5	0.6	—-
	M	10.6	31.1	1.1	—-
	T	9.7	30.3	0.9	—-
Syrian Arab Republic	F	11.3	25.8	7.7	—-
	M	12.9	27.8	8.5	—-
	T	12.1	26.6	8.1	—-
Thailand	F	25.4	21.1	5.3	1.5
	M	25.3	21.9	5.3	1
	T	25.3	21.5	5.3	1.2
Togo	F	23.5	26.4	4.3	2.1
	M	25.3	31.9	6.3	2.9
	T	24.5	29.2	5.3	2.5
Tonga	F	—	—	—	—-
	M	—	—	—	—-
	T	—	1.3	0.9	—-
Trinidad and Tobago	F	7.4	4.6	3.7	3
	M	5.9	4.9	3.7	3
	T	6.7	4.8	3.7	3
Tunisia	F	9.3	22.6	4.3	4.2
	M	8	22.3	3.5	2.8
	T	9	22.5	3.9	3.5
Turkey	F	10.5	19.8	2.5	2.7
	M	10.3	21.1	3.3	3
	T	10.4	20.5	2.9	2.9
Uganda	F	24.1	36.7	4.6	2.6
	M	27.1	40	6.1	3
	T	25.5	38.3	5.3	2.8
United Republic of Tanzania	F	30.4	41.9	6.4	2.9
	M	30.8	44.9	8.1	2.2
	T	30.6	43.4	7.2	2.5
United States of America	F	1.5	2	0.5	4.9
	M	1.3	2.1	0.7	3.5
	T	1.4	2.1	0.6	4.1
Uruguay	F	4.5	8.7	1.4	6.6
	M	4.3	10.2	1.4	5.9
	T	4.4	9.5	1.4	6.2

Country	Sex	Underweight [a]	Stunting [b]	Wasting [c]	Overweight [d]
Uzbekistan	F	16.8	28.5	10.6	—-
	M	20.7	33.9	12.6	—-
	T	18.8	31.3	11.6	—-
Vanuatu	F	—	—	—	—-
	M	—	—	—	—-
	T	19.7	19.1	—	—-
Venezuela	F	4.3	11.8	2.9	2.8
	M	4.7	14.5	2.9	3.2
	T	4.5	13.2	2.9	3
Viet Nam	F	46	46.8	11.6	—-
	M	43.8	46.9	11.6	—-
	T	44.9	46.9	11.6	—-
Yemen	F	29.8	49.2	11.4	—-
	M	30.3	38.6	14.3	—-
	T	30	44.1	12.7	—-
Yugoslavia	F	1.4	6.8	2	5.6
	M	1.8	6.8	2.3	4.5
	T	1.6	6.8	2.1	5
Zambia	F	22.5	41.7	3.3	3.5
	M	24.5	43.1	5	3
	T	23.5	42.4	4.2	3.3
Zimbabwe	F	13.8	21.1	4.5	4.6
	M	17.3	21.7	6.5	3.8
	T	15.5	21.4	5.5	4.2

[1]   Note: Detailed information on national surveys, i.e. data disaggregated by age, sex, urban/rural residence, and region, can be found in the data printouts in section 9.

[a]   Weight-for-age <-2 SD from the international reference median value.

[b]   Height-for-age <-2 SD from the international reference median value.

[c]   Weight-for-height <-2 SD from the international reference median value.

[d]   Weight-for-height >+2 SD from the international reference median value.

F   =   female
M   =   male
T   =   total (both sexes combined)

4.3 Regional and global estimates of underweight, stunting, wasting, and overweight

Tables 3-5 present regional and global estimates for the prevalence and number of underweight, stunted, wasted and overweight under-5-year-old children by UN regions, WHO regions and level of development. These estimates are derived from nationally representative data using the same methodology applied in the past (24), therefore these estimates update earlier assessments on the basis of recent data. The distribution of countries according to the different classifications can be found in sections 8.1 (UN regions), 8.2 (WHO regions), and 8.3 (Level of development).

Based on data available as of September 1997, it is estimated that about 31% of children under 5 years of age in developing countries, or 167 million, are malnourished when measured according to weight-for-age; about 38%, or 206 million, are stunted; and 9%, or 49 million, are wasted. Asia is the most affected region for all three indicators. Based on the estimates shown in Table 3, the risk of being malnourished as measured by underweight is 1.2 times higher in Asia than in Africa, and 3 times higher in Africa than in Latin America. The number of under-5-year-olds living in each geographical area—54 million in Latin America, 121 million in Africa, and 363 million in Asia—renders the regional distribution even more unequal. Currently, over two-thirds (76%) of the world's malnourished (underweight) children live in Asia—especially south-central Asia—while 21% are found in Africa and 3% in Latin America. Oceania, despite its high prevalence of underweight and stunting, contributes very little to the absolute number of malnourished children, since there are fewer than 1 million under-5-year-olds living in the developing countries in this region.

Estimates of underweight, stunting, and wasting have also been made for all subregions in Africa, Asia, and Latin America (Table 3). South-central Asia has by far the highest malnutrition levels, both in terms of prevalence rates and absolute numbers. In this subregion alone, about 50%, or 86 million under-fives are malnourished, accounting for half of the total number of malnourished children in developing countries. Within Asia, the south-eastern subregion follows next, also with very high rates of malnutrition. Its contribution in terms of absolute numbers is considerably less, however, since there are much fewer under-5-year-olds living in this subregion (174 million in south-central and 57 million in south-eastern Asia).

Eastern and western Africa rank next highest in prevalence and numbers of malnourished children. About 26 million, or 33% of children under five, are underweight in these two subregions. Within Africa, middle Africa ranks third with about 30% of affected children, or 5 million. Northern and southern Africa have considerably lower underweight rates and jointly these two subregions account for only 4 million affected children. Significantly lower levels are found in Latin America with an average prevalence level of 9.5% or around 5 million malnourished children.

Table 3 provides also regional and global estimates of stunting and wasting. Although stunting levels are higher than underweight, the pattern of regional differences is quite similar; wasting levels, by comparison, are significantly lower. It should be noted that wasting is very sensitive to seasonal changes, food availability, and infectious disease prevalence, and can change rapidly in response to these factors. The wasting estimates reported here may not reflect these rapid changes and should therefore be interpreted with caution.

Table 3
Regional and global prevalence and numbers of underweight, stunted, wasted and overweight children under five years of age by UN regions and subregions in 1995.

UN regions and subregions	underweight [a]	stunting [b]	wasting [c]	overweight [d]
Africa	**28.4 (34.7)** [e]	**38.6 (47.0)**	**8.0 (9.7)**	**3.2 (3.9)**
Eastern Africa	33.0 (13.3)	48.0 (19.4)	7.1 (2.9)	2.8 (1.1)
Middle Africa	29.9 (4.7)	40.2 (6.3)	8.1 (1.3)	NA [f]
Northern Africa	15.5 (3.3)	26.6 (5.6)	6.5 (1.4)	6.8 (1.4)
Southern Africa	10.5 (0.7)	23.7 (1.6)	3.4 (0.2)	6.3 (0.4)
Western Africa	33.2 (12.7)	37.1 (14.2)	10.5 (4.0)	1.6 (0.6)
Asia [g]	**35.0 (127.2)**	**41.0 (149.1)**	**10.3 (37.4)**	**2.6 (9.6)**
Eastern Asia [g]	17.4 (19.1)	31.4 (34.5)	3.4 (3.7)	4.3 (4.7)
South-central Asia	49.3 (86.0)	49.6 (86.5)	15.2 (26.5)	1.6 (2.8)
South-eastern Asia	33.5 (19.1)	39.7 (22.6)	10.4 (5.9)	2.5 (1.4)
Western Asia	13.8 (3.0)	24.9 (5.5)	5.5 (1.2)	NA [f]
Latin America & Caribbean	**9.5 (5.2)**	**17.9 (9.7)**	**3.0 (1.6)**	**4.4 (2.4)**
Caribbean	13.7 (0.5)	17.3 (0.6)	3.6 (0.1)	3.7 (0.1)
Central America	15.1 (2.4)	26.7 (4.3)	5.0 (0.8)	3.5 (0.6)
South America	6.5 (2.2)	13.8 (4.7)	2.0 (0.7)	4.9 (1.7)
Oceania [h]	**22.8 (0.2)**	**31.4 (0.3)**	**5.0 (0.05)**	**1.3 (0.0)**
Developing countries	31.0 (167.3)	38.1 (206.2)	9.0 (48.8)	2.9 (15.9)
Global	27.4 (167.9)	34.0 (208.1)	8.1 (49.4)	NA [f]

[a] Weight-for-age <-2 SD from the international reference median value.
[b] Height-for-age <-2 SD from the international reference median value.
[c] Weight-for-height <-2 SD from the international reference median value.
[d] Weight-for-height >+2 SD from the international reference median value.
[e] Figures in parentheses are millions of children.
[f] NA = Not available (insufficient population coverage to derive estimates).
[g] Excluding Japan.
[h] Excluding Australia and New Zealand.

For the first time an attempt is made to quantify the magnitude of overweight in children. In general, overweight prevalences during early childhood are low, although some countries and geographical subregions are already starting to present medium prevalence levels (Tables 2 and 3). These preliminary estimates show that careful attention should be paid to monitoring trends and patterns of levels of overweight in children so as to establish early preventive measures where needed. This, however, should not be done at the expense of decreasing international commitment to alleviating child undernutrition; growth impairment will remain for many years to come a major public health problem worldwide.

Table 4

Regional and global prevalence and numbers of underweight, stunted, wasted and overweight children under five years of age by WHO regions in 1995.

WHO regions	underweight [a]	stunting [b]	wasting [c]	overweight [d]
Africa	30.4 (31.2) [e]	40.2 (41.3)	8.3 (8.5)	2.8 (2.9)
Americas	7.6 (5.8)	13.5 (10.3)	2.8 (2.1)	4.8 (3.6)
Eastern Mediterranean	24.9 (17.3)	34.3 (23.9)	7.5 (5.2)	4.2 (2.9)
South-East Asia	50.1 (82.7)	50.2 (82.9)	15.9 (26.3)	1.7 (2.8)
Western Pacific	20.6 (28.9)	32.8 (46.0)	4.4 (6.2)	3.8 (5.3)
All WHO regions	27.8 (169.5)	34.9 (213.1)	8.4 (50.2)	NA [f]

[a] Weight-for-age <-2 SD from the international reference median value.
[b] Height-for-age <-2 SD from the international reference median value.
[c] Weight-for-height <-2 SD from the international reference median value.
[d] Weight-for-height >+2 SD from the international reference median value.
[e] Figures in parentheses are millions of children.
[f] NA = Not available (insufficient population coverage to derive estimates).

Notes: The European region does not have sufficient population coverage to present overall estimates. However, it is anticipated that there are very low levels of underweight, stunting and wasting in this region. On the other hand, overweight levels are expected to be quite high in these populations.

For the complete list of countries included in the different WHO regions, please refer to section 8.2.

Table 5

Regional and global prevalence and numbers of underweight, stunted, wasted and overweight children under five years of age by level of development in 1995.

Level of development	underweight [a]	stunting [b]	wasting [c]	overweight [d]
2	29.3 (128.1) [e]	36.2 (158.2)	8.8 (38.5)	3.2 (14.0)
3	40.4 (38.4)	48.8 (46.4)	10.5 (10.0)	1.7 (1.6)
4	4.3 (1.1)	13.4 (3.6)	3.6 (1.0)	NA [f]
All	27.5 (168.7)	34.1 (208.2)	8.1 (49.4)	NA [f]

[a] Weight-for-age <-2 SD from the international reference median value.
[b] Height-for-age <-2 SD from the international reference median value.
[c] Weight-for-height <-2 SD from the international reference median value.
[d] Weight-for-height >+2 SD from the international reference median value.
[e] Figures in parentheses are millions of children.
[f] NA = Not available (insufficient population coverage to derive estimates).
Level 1 =Developed market economies. This level does not have sufficient population coverage to present overall estimates. However, it is anticipated that there are very low levels of underweight, stunting and wasting in this group of countries. On the other hand, overweight levels are expected to be quite high in these populations.
Level 2 = Other developing countries.
Level 3 = Least developed countries.
Level 4 = Economies in transition.

For the WHO list of countries included in each of the four levels of development, please refer to section 8.3.

4.4 Nutritional trends

Historical nutritional trends (i.e. 1975-1985) have been derived by using a regression model based on nutritional survey data and other available data (e.g. per capita calorie supply, infant mortality rate, population density) for each country and year. The rationale for applying statistical models is that there are insufficient nationally representative data points within a reasonable time span to calculate population-weighted averages. Given the inherent limitations of estimates derived using mathematical models, historical trends are presented only in a graphic format. A description of the methods and variables used in the regression model is available on request from the Programme of Nutrition.

Recent nutritional trends (i.e. 1990-1995) have been derived as a population-weighted average for countries with nationally representative data as of September 1997. Estimates of countries' under-5-year-old populations in 1990 and 1995 were obtained from the 1996 revision of the World Population Prospects prepared by the United Nations Population Division. Estimates of underweight and stunting have been calculated only for those subregions where the proportion of children covered by national surveys was at least ž75%, and in most cases >85%. A detailed description of the methodology used is presented elsewhere (24).

The prevalence of malnutrition in children under 5 years of age, as measured by low weight-for-age, has progressively fallen in developing countries from 42.6% in 1975 to 31.0% in 1995. However, the latest evidence shows a deceleration in improved nutritional status in many regions, and in some regions of Africa the previous decreasing trend has actually begun to reverse itself. The stagnation of nutritional improvement combined with a rapid rise in population has resulted in an increase in the total number of malnourished children in all subregions of Africa. Recent trends (1990-1995) in underweight and stunting by UN regions are presented in Tables 6 and 7. Table 8 presents recent trends (1990-1995) in underweight by WHO regions. Global and regional historical trends (1975-1995) in underweight and stunting are found in Figures 5-9.

The global rate of progress in overcoming malnutrition among under-fives is entirely inadequate for achieving the year-2000 goal of a 50% reduction in 1990 prevalence levels of moderate and severe malnutrition (Figures 10a and 10b). If current trends continue, Latin America will be the only region possibly to reach the year-2000 goal. For Asia and Africa, if the goal is to be approached, the current prevalence of malnutrition needs to be reduced by about half, i.e. from 28.4% to 13.0% (35 million to approximately 17 million children) in Africa, and from 35.0% to 18.6% (127 million to approximately 68 million children) in Asia.

Figure 5a: Global trends in prevalences of underweight in
children under five years of age, 1975-1995
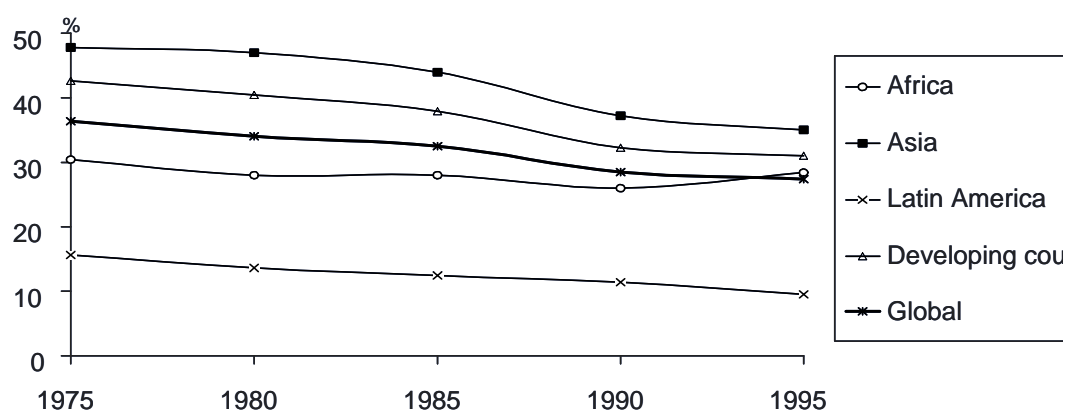
Figure 5b: Global trends in numbers of underweight in
children under five years of age, 1975-1995
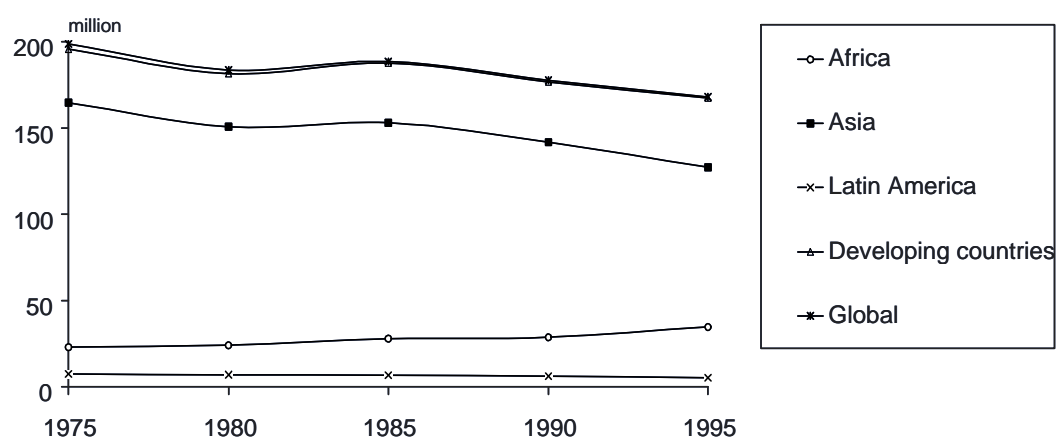
Figure 6a: Global trends in prevalences of stunting in
children under five years of age, 1975-1995
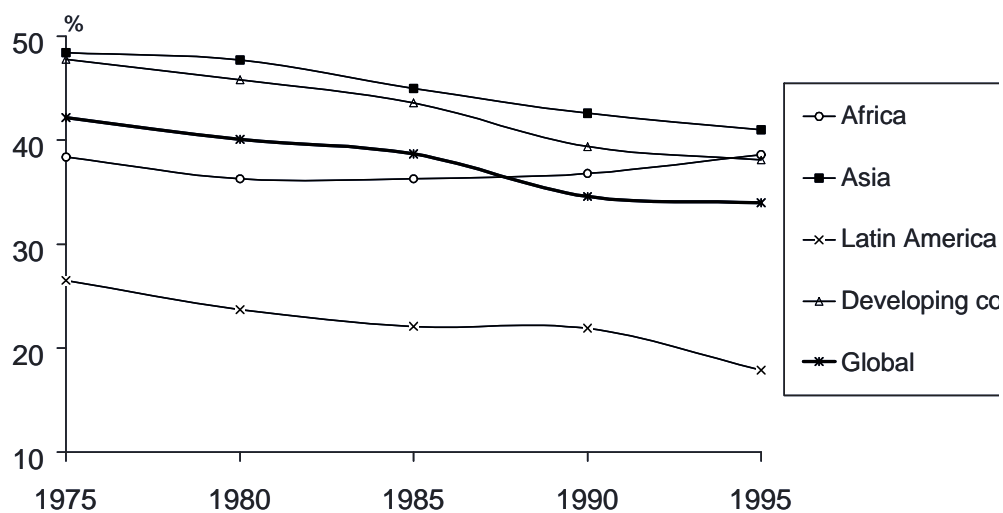
Figure 6b: Global trends in numbers of stunted
children under five years of age, 1975-1995
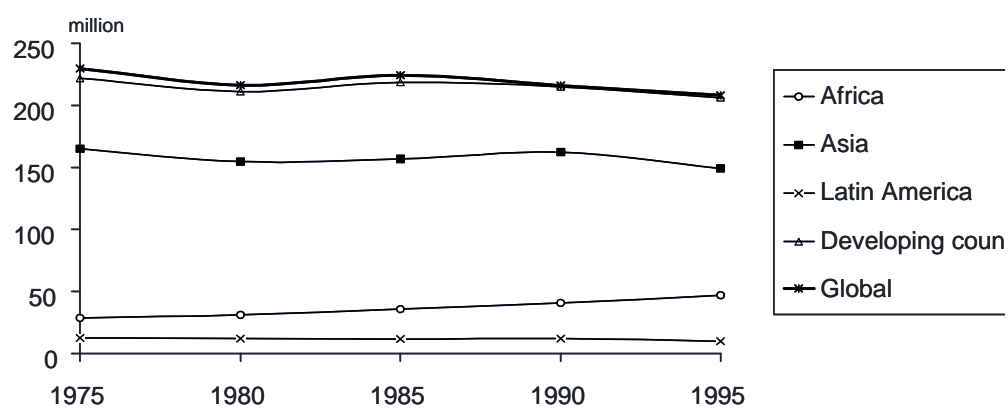
Figure 7a: Trends in Africa of prevalences of underweight
children under five years of age, 1975-1995
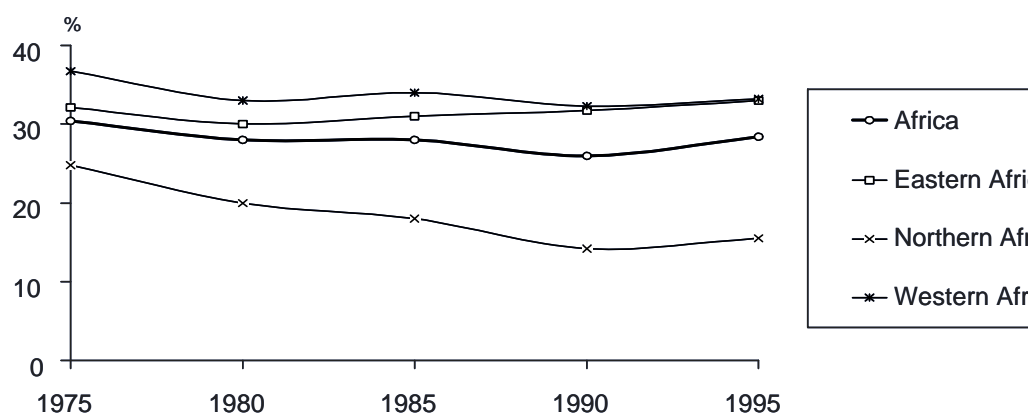
Note: The regions of middle and southern Africa have insufficient coverage to produce trend estimates

Figure 7b: Trends in Africa of numbers of underweight
children under five years of age, 1975-1995
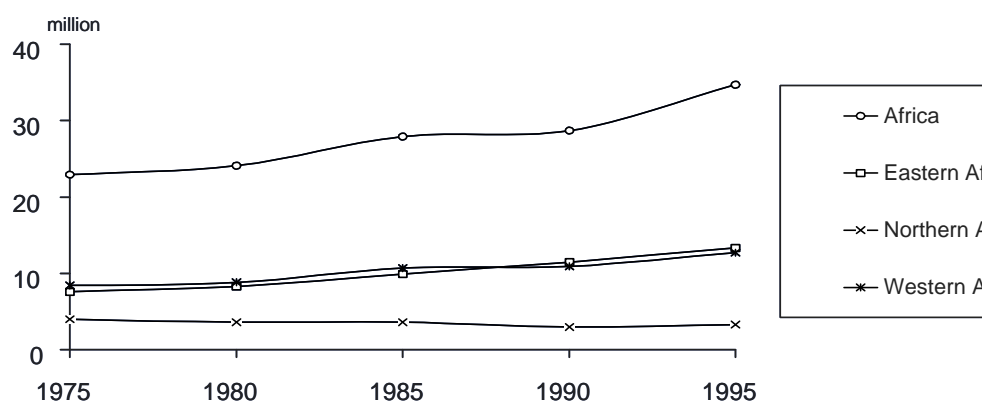
Note: The regions of middle and southern Africa have insufficient coverage to produce trend estimates

Figure 8a: Trends in Asia of prevalences of underweight
children under five years of age, 1975-1995

%
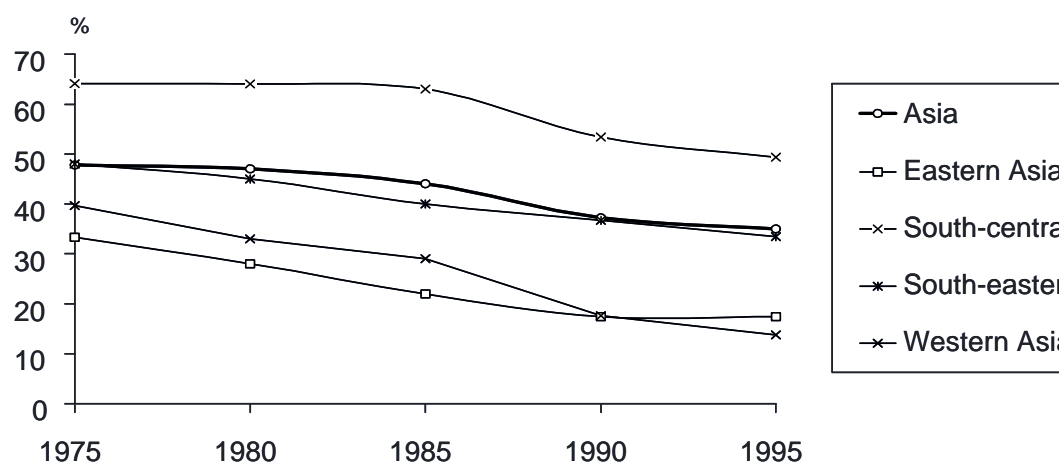
Note: Estimates for Asia and south-eastern Asia exclude Japan.

Figure 8b: Trends in Asia of numbers of underweight
children under five years of age, 1975-1995

million
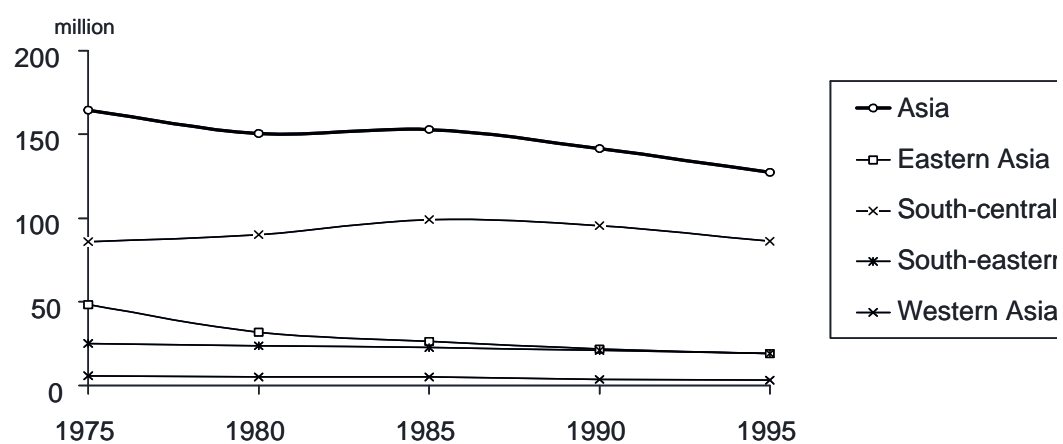
Note: Estimates for Asia and south-eastern Asia exclude Japan.

Figure 9a: Trends in Latin America of prevalences of underweight children under five years of age, 1975-1995
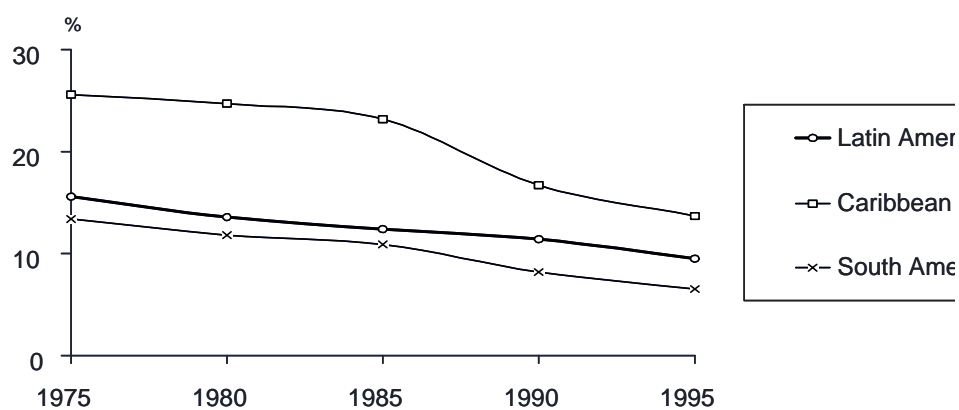
Note: The subregion of central America has insufficient data to producetrend estimates.

Figure 9b: Trends in Latin America of numbers of underweight children under five years of age, 1975-1995
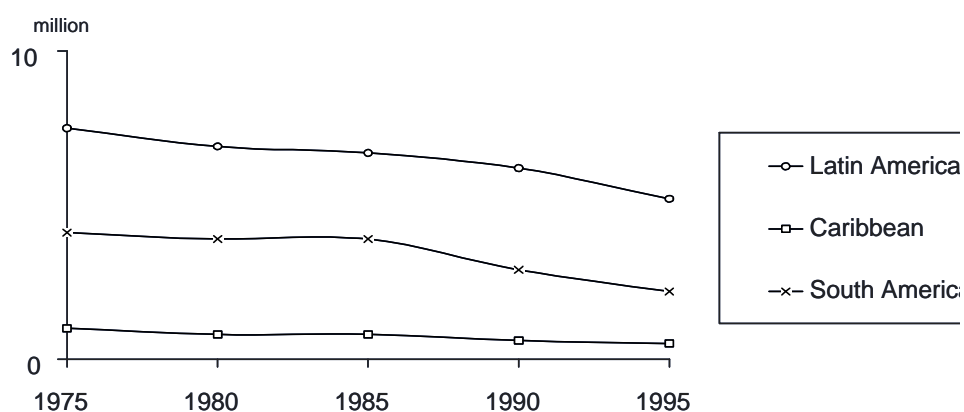
Note: The subregion of central America has insufficient data to producetrend estimates.

Figure 10a: Progress in achieving the year-2000 Goal to halve 1990
levels of malnutrition prevalence: underweight
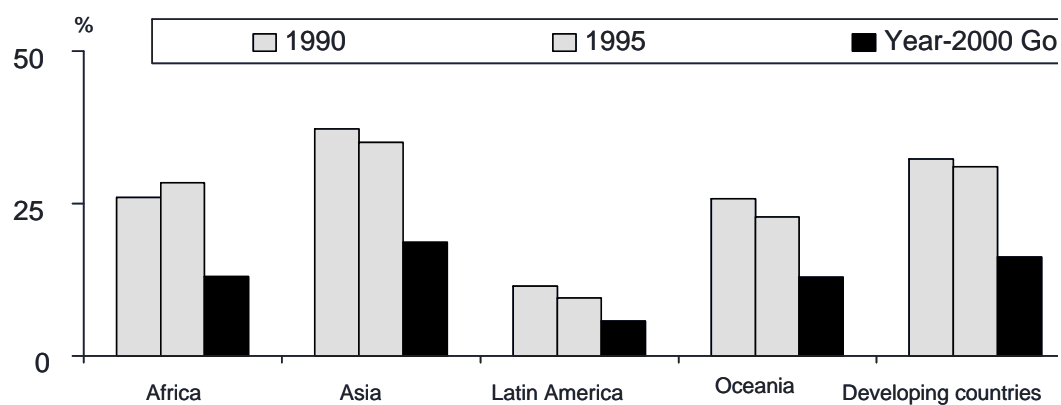
Figure 10b: Progress in achieving the year-2000 Goal to halve 1990
levels of malnutrition prevalence: stunting
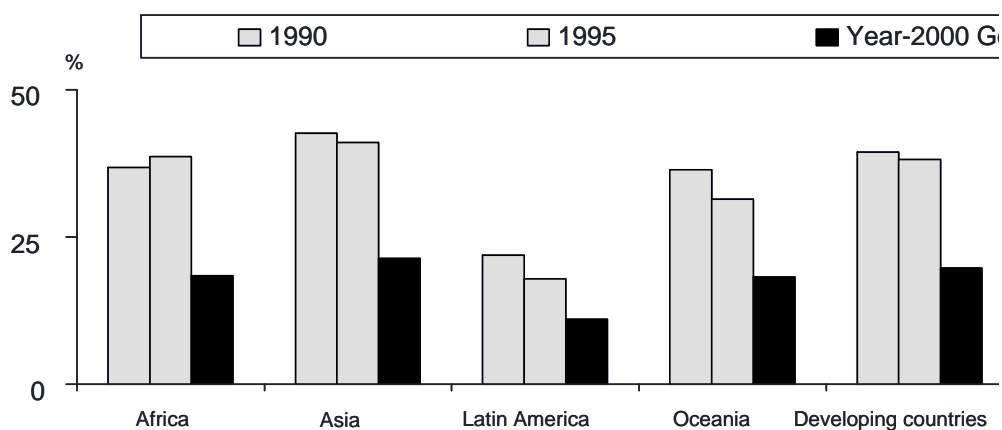
Progress towards reducing malnutrition varies widely across countries. Trend information for those countries with multiple national survey data are presented in Table 9 for underweight (62 countries) and Table 10 for stunting (59 countries). In the fourth column of the tables, the overall trend is presented as rising, static or falling. Some 26 countries show significant declines in malnutrition since the 1980s; they are mainly in Latin America and south-central and south-east Asia. Malnutrition has notably increased in 10 other countries, all in Africa. Given the impact of population growth on the total number of malnourished children, data for some of the 10 countries apparently showing no change should perhaps be interpreted as rising due to population growth. For 16 countries no obvious trend can be derived from the available nutritional survey data.

In summary, the importance of malnutrition cannot be overemphasized; it is a major determinant of human development because of its impact on child survival and poor physical and cognitive development. Any debate about the precise extent of malnutrition is secondary to the urgent need to do something meaningful about it; the numbers, whatever they are exactly, are simply unacceptable. What actions should be taken and in what order, nevertheless remains fertile ground for discussion in view of the limited success of traditional nutrition education and food supplementation programmes.

Given the complexity of the malnutrition problem, new efforts must be made to understand the specific economic, behavioural, dietary, and other factors affecting child growth and development. There is an urgent need for developing and/or identifying effective community-based interventions for improving child growth and development. A good technical package has proved to be insufficient by itself; a distinguishing feature of successful programmes is community involvement in identifying problems and in mobilizing action to resolve them. Future interventions designed to combat malnutrition should thus be strongly community-based. Furthermore it is vital that these programmes include appropriate monitoring and evaluation systems. Special effort should be made to improve the situation of women—as primary child caregivers—with particular attention to their health and nutrition throughout the life cycle. Similarly, a focus on complementary feeding, combined with continued attention to the protection, promotion and support of breast-feeding, remains a key component for reducing malnutrition. Finally, population-wide interventions aimed at preventing intrauterine growth retardation are urgently required (23).

Table 6
Trends based on regional estimates for 1990 and 1995 in prevalence and numbers of underweight children (<-2 SD weight-for-age) and the Year-2000 Goal

UN regions and subregions	1990		1995		Year-2000 Goal
	%	millions[a]	%	millions	%
Africa	**26.0**	**28.7**	**28.4**	**34.7**	**13.0**
Eastern Africa	31.7	11.5	33.0	13.3	15.8
Middle Africa	NA[b]	NA[b]	29.9	4.7	NA[b]
Northern Africa	14.2	3.0	15.5	3.3	7.1
Southern Africa	NA[b]	NA[b]	10.5	0.7	NA[b]
Western Africa	32.3	10.9	33.2	12.7	16.2
Asia[c]	**37.2**	**141.6**	**35.0**	**127.2**	**18.6**
Eastern Asia[c]	17.4	21.6	17.4	19.1	8.7
South-central Asia	53.4	95.4	49.3	86.0	26.7
South-eastern Asia	36.7	20.9	33.5	19.1	18.4
Western Asia	NA[b]	NA[b]	13.8	3.0	NA[b]
Latin America & Caribbean	**11.4**	**6.2**	**9.5**	**5.2**	**5.7**
Caribbean	16.7	0.6	13.7	0.5	8.4
Central America	17.3	2.7	15.1	2.4	8.7
South America	8.2	2.9	6.5	2.2	4.1
Oceania[d]	**25.8**	**0.2**	**22.8**	**0.2**	**12.9**
Developing countries	32.3	176.7	31.0	167.3	16.2
Global	28.5	177.6	27.4	167.9	14.3

[a] Total population under five years of age based on the World Population Prospects - The 1996 Revision.

[b] NA = Not available (insufficient population coverage to derive estimates).

[c] Excluding Japan.

[d] Excluding Australia and New Zealand.

Table 7
Trends based on regional estimates for 1990 and 1995 in prevalence and numbers of stunted children (<-2 SD height-for-age) and the Year-2000 Goal

| UN regions and | 1990 | | 1995 | | Year-2000 Goal |
	%	millions[a]	%	millions	%
Africa	**36.8**	**40.6**	**38.6**	**47.0**	**18.4**
Eastern Africa	48.3	17.5	48.0	19.4	24.2
Middle Africa	NA[b]	NA[b]	40.2	6.3	NA[b]
Northern Africa	25.4	5.3	26.6	5.6	12.7
Southern Africa	NA[b]	NA[b]	23.7	1.6	NA[b]
Western Africa	36.8	12.4	37.1	14.2	18.4
Asia[c]	**42.6**	**162.2**	**41.0**	**149.1**	**21.3**
Eastern Asia[c]	31.4	39.1	31.4	34.5	15.7
South-central Asia	52.7	94.2	49.6	86.5	26.4
South-eastern Asia	40.8	23.2	39.7	22.6	20.4
Western Asia	NA[b]	NA[b]	24.9	5.5	NA[b]
Latin America & Caribbean	**21.9**	**11.9**	**17.9**	**9.7**	**11.0**
Caribbean	22.2	0.8	17.3	0.6	11.1
Central America	30.4	4.7	26.7	4.3	15.2
South America	18.1	6.4	13.8	4.7	9.1
Oceania[d]	**36.4**	**0.3**	**31.4**	**0.3**	**18.2**
Developing countries	39.4	215.0	38.1	206.2	19.7
Global	34.6	216.0	34.0	208.1	17.3

[a] Total population under five years of age based on the World Population Prospects - The 1996 Revision.
[b] NA = Not available (insufficient population coverage to derive estimates).
[c] Excluding Japan.
[d] Excluding Australia and New Zealand.

Table 8
Recent trends in prevalence and absolute numbers of underweight children below 5 years of age by WHO regions.

| Region | Underweight[a] | |
	1990	1995
Africa	30.1 (27.4)[b]	30.4 (31.2)
Americas	8.9 (6.7)	7.6 (5.8)
Eastern Mediterranean	27.4 (17.9)	24.9 (17.3)
South-east Asia	51.4 (89.0)	50.1 (82.7)
Western Pacific	20.4 (31.4)	20.6 (28.9)
All WHO regions	**28.1 (174.9)**	**27.8 (169.5)**

[a] Weight-for-age below -2 SD from the international reference median value.
[b] Figures in parentheses are millions of children.

Table 9

National country survey data on trends of underweight (<-2 SD weight-for-age) in children under five years of age

Country	Year of survey	% <-2 SD weight-for-age	Trend	Rate (pp/yr)
Algeria	1987, 1992, 1995	9.1, 9.2, 12.8	Rising	+0.46
Bangladesh	1982-83, 1985-86, 1989-90, 1992, 1996-97	68.0, 70.9, 65.8, 68.3, 56.3	Rising, falling, rising, falling	+0.97 -1.28 +1.25 -3.00
Bolivia	1981, 1988, 1989, 1990, 1991, 1992, 1993-94	14.5, 11.2, 13.2, 11.1, 11.7, 12.0, 14.9	Falling, rising	-0.38 +0.95
Brazil	1975, 1989, 1996	18.4, 7.0, 5.7	Falling	-0.60
Cameroon	1977-78, 1991	17.3, 15.1	Static	-0.17
Cape Verde	1983, 1985	19.5, 18.8	Falling	-0.35
Central African Republic	1994-95, 1995	27.3, 23.2	Falling	-4.10
Chile	1984, 1985, 1986, 1993, 1994, 1995	2.1, 2.3, 2.5, 1.6, 0.9, 0.9	Static, static	-0.12 0.00
Colombia	1965-66, 1977-80, 1986, 1989, 1995	21.1, 16.8, 12.0, 10.1, 8.4	Falling	-0.44
Comoros	1991-92, 1995-96	18.5, 25.8	Rising	+2.43
Costa Rica	1982, 1989, 1990, 1991, 1992, 1993, 1994	6.0, 2.7, 2.8, 2.5, 2.3, 2.3, 2.2	Falling	-0.32
Côte d'Ivoire	1986, 1994	12.4, 23.8	Rising	+1.43
Dominican Republic	1986, 1991	12.4, 10.3	Falling	-0.42
Egypt	1978, 1988, 1990, 1992-93, 1994-95, 1995-96	15.9, 13.4, 10.4, 9.9, 16.8, 12.4	Falling, rising, falling	-0.40 +3.45 -4.40
El Salvador	1988, 1993	15.2, 11.2	Falling	-0.80
Ethiopia (rural)	1983, 1992	37.3, 47.7	Rising	+1.16
Ghana	1987-88, 1988, 1993-94	27.1, 30.3, 27.3	Rising, falling	+3.20 -0.50
Guatemala	1987, 1995	33.2, 26.6	Falling	-0.83
Guyana	1971, 1981, 1993	24.9, 22.1, 18.3	Static	-0.30
Haiti	1978, 1990, 1994-95	37.4, 26.8, 27.5	Falling, static	-0.88 +0.14
Honduras	1987, 1991-92, 1993-94	20.6, 18.0, 18.3	Falling, static	-0.52 +0.15
India (rural)	1974-79, 1988-90, 1991-92	71.3, 63.9, 61.0	Falling	-0.79
Indonesia	1987, 1995	39.9, 34.0	Falling	-0.74

Country	Year of survey	% <-2 SD weight-for-age	Trend	Rate (pp/yr)
Jamaica	1978, 1989, 1991, 1992, 1993	9.3, 7.2, 4.6, 8.0, 10.2	Falling, rising	-0.36 +2.80
Kenya	1993, 1994	22.6, 22.5	Static	-0.10
Lao People's Democratic Republic	1993, 1994	44.0, 40.0	Falling	-4.00
Lesotho	1976, 1992, 1994	17.3, 15.8, 21.4	Static, rising	-0.09 +2.80
Madagascar	1983-84, 1992, 1993-94, 1995	33.3, 40.9, 45.2, 34.1	Rising, falling	+1.19 -11.10
Malawi	1981, 1992, 1995	23.9, 27.6, 29.9	Rising	+0.43
Malaysia	1990, 1991, 1992, 1993, 1994, 1995	25.0, 26.1, 25.6, 23.3, 22.4, 20.1	Falling	-0.98
Mali	1987, 1995-96	30.6, 40.0	Rising	+1.18
Mauritania	1990-91, 1995-96	47.6, 23.0	Falling	-4.92
Mauritius	1985, 1995	23.9, 14.9	Falling	-0.81
Mexico (rural)	1974, 1979, 1988, 1989	17.4, 21.9, 20.3, 19.0	Rising, static	+0.90 -0.29
Morocco	1987, 1992	12.1, 9.5	Falling	-0.52
Myanmar	1980-81, 1983-85, 1990, 1991, 1994, 1995	46.5, 38.0, 32.4, 36.7, 31.2, 42.9	Falling, rising, falling, rising	-1.57 +4.30 -1.83 +11.7
Nepal	1975, 1995, 1996	69.1, 48.7, 46.9	Falling	-1.06
Nicaragua	1980-82, 1993	10.0, 11.9	Static	+0.17
Niger	1985, 1992	49.4, 42.6	Falling	-0.97
Nigeria	1990, 1993	35.3, 39.1	Rising	+1.27
Oman	1991, 1994-95	24.3, 14.1	Falling	-2.55
Pakistan	1977, 1985-86, 1990-91, 1995	52.8, 48.8, 40.2, 38.2	Falling	-0.81
Panama	1980, 1992	15.8, 6.1	Falling	-0.81
Peru	1975, 1984, 1991-92, 1996	16.1, 13.4, 10.7, 7.8	Static, falling	-0.30 -0.47
Philippines	1971-75, 1982, 1987, 1989-90, 1992, 1993	49.9, 33.2, 32.9, 33.5, 33.4, 29.6	Falling	-1.13
Rwanda	1976, 1992	27.9, 29.4	Static	+0.09

Country	Year of survey	% <-2 SD weight-for-age	Trend	Rate (pp/yr)
Russian Federation	1993, 1995	4.2, 3.0	Falling	-0.60
Senegal	1986, 1991-92, 1992-93	22.0, 21.6, 22.2	Static	+0.03
Sierra Leone	1974-75, 1977-78, 1989, 1990	28.2, 23.2, 26.8, 28.7	Falling, rising	-1.67 +0.46
Solomon Islands	1970, 1989	21.1, 21.3	Static	+0.01
Sri Lanka	1977-78, 1987, 1993	54.3, 37.3, 37.7	Falling, static	-1.89 +0.07
Togo	1976-77, 1988	26.1, 24.6	Static	-0.14
Trinidad and Tobago	1976, 1987	16.3, 6.7	Falling	-0.87
Tunisia	1973-75, 1988, 1994-95	20.2, 10.3, 9.0	Falling	-0.56
Turkey	1993, 1995	10.4, 10.3	Static	-0.05
Uganda	1988-89, 1995	23.0, 25.5	Rising	+0.42
United Republic of Tanzania	1991-92, 1996	28.9, 30.6	Rising	+0.43
Uruguay	1987, 1992-93	7.4, 4.4	Falling	-0.50
Venezuela	1981-82, 1987, 1990, 1991, 1992, 1993, 1994	10.2, 4.5, 7.7, 6.2, 5.1, 4.6, 4.5	Falling, rising, falling	-1.14 +1.07 -0.80
Viet Nam	1983-84, 1987-89, 1994	51.5, 45.0, 44.9	Falling, static	-1.30 -0.02
Zambia	1992, 1996-97	25.2, 23.5	Falling	-0.43
Zimbabwe	1988, 1994	11.5, 15.5	Rising	+0.67

Table 10

National country survey data on trends of stunting (<-2 SD height-for-age) in children under five years of age

Country	Year of survey	% <-2 SD height-for-age	Trend	Rate (pp/yr)
Algeria	1987, 1992, 1995	12.4, 18.1, 18.3	Rising, static	+1.14 +0.07
Bangladesh	1982-83, 1985-86, 1989-90, 1992, 1996-97	67.7, 67.5, 64.6, 64.2, 54.6	Falling, falling	-0.44 -1.43
Bolivia	1981, 1989, 1993-94	42.7, 37.7, 26.8	Falling, falling	-1.60 -2.18
Brazil	1975, 1989, 1996	32.0, 15.4, 10.5	Falling, falling	-1.19 -0.70
Cameroon	1977-78, 1991	35.6, 26.0	Falling	-0.74
Cape Verde	1983, 1985	15.3, 25.8	Rising	+5.25
Central African Republic	1994-95, 1995	33.6, 28.4	Falling	-5.20

Country	Year of survey	% <-2 SD height-for-age	Trend	Rate (pp/yr)
Chile	1984, 1985, 1986, 1993, 1994, 1995	9.9, 9.5, 9.6, 6.6, 2.6, 2.4	Falling, static	-0.73 -0.20
Colombia	1965-66, 1977-80, 1986, 1989, 1995	31.9, 22.4, 25.3, 16.6, 15.0	Falling, rising, falling, static	-0.79 +0.32 -2.90 -0.26
Comoros	1991-92, 1995	33.0, 33.8	Static	+0.27
Costa Rica (1st grade schoolchildren)	1979, 1981, 1983, 1985, 1989	20.4, 15.4, 12.7, 11.3, 9.2	Falling	-1.12
Côte d'Ivoire	1986, 1994	17.2, 24.4	Rising	+0.90
Dominican Republic	1986, 1991	20.6, 16.5	Falling	-0.82
Egypt	1978, 1988, 1990, 1992-93, 1994-95, 1995-96	37.7, 30.9, 30.0, 26.0, 21.6, 29.8	Falling, rising	-0.95 +8.20
El Salvador	1988, 1993	29.9, 23.1	Falling	-1.36
Ethiopia (rural)	1983, 1992	59.8, 64.2	Rising	+0.49
Ghana	1987-88, 1988, 1993-94	30.5, 29.4, 25.9	Falling	-0.77
Guatemala	1987, 1995	57.7, 49.7	Falling	-1.00
Guyana	1971, 1981	23.7, 20.7	Static	-0.30
Haiti	1978, 1990, 1994-95	39.6, 33.9, 31.9	Falling	-0.45
Honduras	1987, 1991-92, 1993-94	37.2, 36.3, 39.6	Static, rising	-0.18 +1.65
India (rural)	1974-79, 1988-90, 1991-92	72.3, 62.1, 61.2	Falling	-0.85
Jamaica	1978, 1989, 1991, 1992, 1993	12.1, 8.7, 6.2, 10.6, 9.6	Falling, rising, falling	-0.45 +4.40 -1.00
Kenya	1978-79, 1993, 1994	35.4, 33.3, 33.6	Static	-0.12
Lao People's Democratic Republic	1993, 1994	48.0, 47.3	Falling	-0.70
Lesotho	1976, 1992, 1994	41.4, 33.0, 32.9	Falling, static	-0.53 -0.05
Madagascar	1983-84, 1992, 1993-94, 1995	33.8, 54.1, 48.6, 49.8	Rising, falling, rising	+2.54 -2.75 +0.60
Malawi	1981, 1992, 1995	56.4, 49.2, 48.3	Falling, static	-0.65 -0.30
Mali	1987, 1995-96	23.8, 30.1	Rising	+0.70
Mauritania	1988, 1990-91, 1995-96	34.0, 56.9, 44.0	Rising, falling	+7.63 -2.58

Country	Year of survey	% <-2 SD height-for-age	Trend	Rate (pp/yr)
Mauritius	1985, 1995	21.5, 9.7	Falling	-1.18
Mexico (rural)	1974, 1979, 1988, 1989	42.6, 26.7, 36.4, 35.1	Falling, rising, falling	-3.18 +1.08 -1.30
Morocco	1987, 1992	24.9, 24.2	Static	-0.14
Myanmar	1980-81, 1983-85, 1991, 1994	48.0, 49.7, 40.0, 44.6	Rising, falling, rising	+0.43 -1.62 +1.53
Nepal	1975, 1995, 1996	69.4, 63.5, 48.8	Falling	-0.98
Nicaragua	1980-82, 1993	21.7, 23.7	Static	+0.18
Niger	1985, 1992	37.7, 39.5	Static	+0.26
Nigeria	1990, 1993	42.7, 39.0	Falling	-1.23
Oman	1991, 1994-95	20.7, 15.7	Falling	-1.25
Pakistan	1977, 1985-87, 1990-91,	67.0, 57.9, 49.6	Falling	-1.24
Panama	1980, 1992	22.0, 9.9	Falling	-1.01
Peru	1975, 1984, 1991-92, 1996	39.7, 37.8, 31.8, 25.8	Falling	-0.66
Philippines	1971-75, 1982, 1987, 1989-90, 1992, 1993	55.3, 42.8, 38.6, 37.2, 34.7, 32.7	Falling	-1.26
Rwanda	1976, 1992	36.6, 48.7	Rising	+0.76
Russian Federation	1993, 1995	17.0, 12.7	Falling	-2.15
Senegal	1986, 1991-92, 1992-93	23.0, 29.1, 24.7	Rising, falling	+1.02 -4.40
Sierra Leone	1974-75, 1977-78, 1989, 1990	34.1, 42.8, 35.2, 34.7	Rising, falling	+2.90 -0.69
Solomon Islands	1970, 1989	25.7, 27.3	Static	+0.08
Sri Lanka	1975-76, 1977-78, 1980-82, 1987, 1993	49.9, 44.6, 36.2, 27.2, 23.8	Falling	-1.54
Togo	1976-77, 1988	33.7, 33.6	Static	-0.01
Trinidad and Tobago	1976, 1987	12.4, 4.8	Falling	-0.69
Tunisia	1973-75, 1988, 1994-95	39.5, 17.9, 22.5	Falling, rising	-1.66 +0.66
Uganda	1988-89, 1995	44.4, 38.3	Falling	-1.02
United Republic of Tanzania	1991-92, 1996	43.2, 43.4	Static	+0.20
Uruguay	1987, 1992-93	15.9, 9.5	Falling	-1.07
Venezuela	1981-82, 1987, 1990, 1991, 1992, 1993, 1994	6.4, 4.6, 13.8, 13.5, 13.6, 12.8, 13.2	Falling, rising, static	-0.36 +3.07 -0.15

Country	Year of survey	% <-2 SD height-for-age	Trend	Rate (pp/yr)
Viet Nam	1983-84, 1987-89, 1994	59.7, 56.5, 46.9	Falling	-1.28
Zambia	1992, 1996-97	39.8, 42.4	Rising	+0.65
Zimbabwe	1988, 1994	29.0, 21.4	Falling	-1.27

5 Methods and standardized data presentation

The information included in the WHO Global Database on Child Growth and Malnutrition complies with the following standardized format:

n   systematic use of the NCHS/WHO international reference population (25);

n   display of growth retardation prevalence for under-5-year-olds, as measured by the proportion of weight-for-age, height-for-age and weight-for-height below -2 and -3 standard deviations (SDs) (Z-scores);

n   display of the prevalence of overweight, as measured by the proportion of children with weight-for-height above +2 Z-scores;

n   display of Z-score means and SDs for the three indices; and

n   stratification of the results according to age, sex, region, and rural/urban strata.

The required criteria for entering surveys in the database are:

n   A clearly defined population-based sampling frame, permitting inferences to be drawn about an entire population;

n   A probabilistic sampling procedure involving at least 400 children (allowing for an estimation of prevalence with a random error of -5% at a confidence level of 95%);

n   Use of appropriate equipment and standard measurement techniques (25);

n   Presentation of results as Z-scores in relation to the NCHS/WHO reference population.

For those surveys where results are presented using a different classification system, reference population, or prevalence cut-offs, the principal investigators are contacted and encouraged to re-analyze their data sets following WHO standardized presentation or, otherwise, to provide the raw data to the WHO Programme of Nutrition for re-analysis. Survey results are systematically checked for inconsistencies and these are brought to the attention of the investigators, with a request for clarification. A hard copy of the survey documentation, together with any corrigendum or additional item of information received from the

authors is filed under the survey reference number. The aim is to keep the database as fully documented and comprehensive as possible, so that queries concerning compiled data can be answered quickly.

5.1 Child growth indicators and their interpretation

In children the three most commonly used anthropometric indices to assess their growth status are weight-for-height, height-for-age and weight-for-age. These anthropometric indices can be interpreted as follows:

Low weight-for-height: Wasting or thinness indicates in most cases a recent and severe process of weight loss, which is often associated with acute starvation and/or severe disease. However, wasting may also be the result of a chronic unfavourable condition. Provided there is no severe food shortage, the prevalence of wasting is usually below 5%, even in poor countries. The Indian subcontinent, where higher prevalences are found, is an important exception. A prevalence exceeding 5% is alarming given a parallel increase in mortality that soon becomes apparent (7). On the severity index, prevalences between 10-14% are regarded as serious, and above or equal 15% as critical. Typically, the prevalence of low weight-for-height shows a peak in the second year of life. Lack of evidence of wasting in a population does not imply the absence of current nutritional problems: stunting and other deficits may be present (26).

High weight-for-height: «Overweight» is a preferred term for describing high weight-for-height. Even though there is a strong correlation between high weight-for-height and obesity as measured by adiposity, greater lean body mass can also contribute to high weight-for-height. On an individual basis, therefore, «fatness» or «obesity» should not be used to describe high weight-for-height. However, on a population-wide basis, high weight-for-height can be considered as an adequate indicator of obesity, because the majority of individuals with high weight-for-height are obese. Strictly speaking, the term obesity should be used only in the context of adiposity measurements, for example skinfold thickness.

Low height-for-age: Stunted growth reflects a process of failure to reach linear growth potential as a result of suboptimal health and/or nutritional conditions. On a population basis, high levels of stunting are associated with poor socioeconomic conditions and increased risk of frequent and early exposure to adverse conditions such as illness and/or inappropriate feeding practices. Similarly, a decrease in the national stunting rate is usually indicative of improvements in overall socioeconomic conditions of a country. The worldwide variation of the prevalence of low height-for-age is considerable, ranging from 5% to 65% among the less developed countries (24). In many such settings, prevalence starts to rise at the age of about three months; the process of stunting slows down at around three years of age, after which mean heights run parallel to the reference. Therefore, the age of the child modifies the interpretation of the findings: for children in the age group below 2-3 years, low height-for-age probably

reflects a continuing process of "failing to grow" or "stunting"; for older children, it reflects a state of "having failed to grow" or "being stunted". It is important to distinguish between the two related terms, length and stature: length refers to the measurement in recumbent position, the recommended way to measure children below 2 years of age or less than 85 cm; whereas stature refers to standing height measurement. For simplification, the term height is used all throughout the database to cover both measurements.

Low weight-for-age: Weight-for-age reflects body mass relative to chronological age. It is influenced by both the height of the child (height-for-age) and his or her weight (weight-for-height), and its composite nature makes interpretation complex. For example, weight-for-age fails to distinguish between short children of adequate body weight and tall, thin children. However, in the absence of significant wasting in a community, similar information is provided by weight-for-age and height-for-age, in that both reflect the long-term health and nutritional experience of the individual or population. Short-term change, especially reduction in weight-for-age, reveals change in weight-for-height. In general terms, the worldwide variation of low weight-for-age and its age distribution are similar to those of low height-for-age.

5.2 The international reference population

The designation of a child as having impaired growth implies some means of comparison with a «reference» child of the same age and sex. Thus, in practical terms, anthropometric values need to be compared across individuals or populations in relation to an acceptable set of reference values. This need has made the choice of a growth reference population an important issue that has received considerable attention in the last decades (1).

The database uses as a basis for comparison across countries the National Center for Health Statistics (NCHS) growth reference, the so-called NCHS/WHO international reference population. The international reference growth curves were formulated in the 1970s by combining growth data from two distinct data sets, which were originally planned to serve as a reference for the USA. The reference for ages 0 to 23 months is based on a group of children in the Ohio Fels Research Institute Longitudinal Study which was conducted from 1929 to 1975. The height curves for this part of the reference are based on recumbent length measurements. The reference from 2 to 18 years of age is based on data of three cross-sectional USA representative surveys conducted between 1960 and 1975. The height curves for this part of the reference are based on standing height measurements. All samples consisted of healthy well-nourished US children. A detailed account of the historical background of the NCHS/WHO growth charts can be found elsewhere (1, 27).

The World Health Organization adopted the reference curves of the NCHS for international use in the late 1970s (28) based on the then

growing evidence that the growth patterns of well-fed, healthy preschool children from diverse ethnic backgrounds are very similar (29). Differences of genetic origin are evident for some comparisons; however, these variations are relatively minor compared with the large worldwide variation in growth related to health and nutrition (30).

The adoption by WHO of the NCHS-based growth curves resulted in their wide international dissemination. Throughout the 1980s, several microcomputer-based software versions of the NCHS/WHO international growth reference were developed and supported by CDC and WHO (27). These software-based references have contributed to the wide acceptance of the concept of the international growth reference because they simplified the handling of anthropometric data from surveys, surveillance, and clinical studies.

Although the NCHS/WHO international growth curves have served many useful purposes throughout these years, because of a number of serious drawbacks, the suitability of these curves for international purposes has recently been challenged (1,31). Work supported by WHO has demonstrated that the current international reference is sufficiently flawed as to interfere with the sound health and nutritional management of infants and young children. These flaws arise from both technical and biological considerations. In particular, the current reference may lead to the early introduction of complementary foods in exclusively breast-fed infants, which often has adverse consequences for the health and nutritional well-being of infants (32,33). As a result, an international effort is currently underway to develop a new international growth reference (34). Until the new reference is developed, the NCHS/WHO growth reference curves will remain the reference values recommended for international use.

General issues that need to be considered when using international reference values are discussed elsewhere (31). One essential consideration is the appropriate use of the reference data. The way in which a reference is interpreted and the clinical and public health decisions that will be based upon it are often more important than the choice of reference. The reference should be used as a general guide for screening and monitoring and not as a fixed standard that can be applied in a rigid fashion to individuals from different ethnic, socioeconomic, and nutritional and health backgrounds. For clinical or individual-based application, reference values should be used as a screening tool to detect individuals at greater risk of health or nutritional disorders; and they should not be viewed as a self-sufficient diagnostic tool. For population-based application, the reference values should be used for comparison and monitoring purposes. In a given population, a high prevalence of anthropometric deficit will be indicative of significant health and nutritional problems, however, it is not only those individuals below the cut-off point who are at risk; the entire population is at risk, and the cut-off point should be used only to facilitate the application of the indicator.

5.3 The Z-score or standard deviation classification system

There are three different systems by which a child or a group of children can be compared to the reference population: Z-scores (standard deviation scores), percentiles, and percent of median. For population-based assessment—including surveys and nutritional surveillance—the Z-score is widely recognized as the best system for analysis and presentation of anthropometric data because of its advantages compared to the other methods (1). At the individual level, however, although there is substantial recognition that Z-score is the most appropriate descriptor of malnutrition, health and nutrition centers (e.g. supplementary feeding programmes in refugee camps) have been in practice reluctant to adopt its use for individual assessment. A detailed description of the three systems, including a discussion of their strengths and weaknesses, can be found elsewhere (1,35).

In this database, weight-for-height, height-for-age and weight-for-age are interpreted by using the Z-score classification system. The Z-score system expresses the anthropometric value as a number of standard deviations or Z-scores below or above the reference mean or median value. A fixed Z-score interval implies a fixed height or weight difference for children of a given age. For population-based uses, a major advantage is that a group of Z-scores can be subjected to summary statistics such as the mean and standard deviation (see section 5.4). The formula for calculating the Z-score is (1):

Z-score (or SD-score) = $\dfrac{\text{observed value - median value of the reference population}}{\text{standard deviation value of reference population}}$

Interpreting the results in terms of Z-scores has several advantages:

(1) The Z-score scale is linear and therefore a fixed interval of Z-scores has a fixed height difference in cm, or weight difference in kg, for all children of the same age. For example, on the height-for-age distribution for a 36-month-old boy, the distance from a Z-score of -2 to a Z-score of -1 is 3.8 cm. The same difference is found between a Z-score of 0 and a Z-score of +1 on the same distribution. In other words, Z-scores have the same statistical relation to the distribution of the reference around the mean at all ages, which makes results comparable across ages groups and indicators.

(2) Z-scores are also sex-independent, thus permitting the evaluation of children's growth status by combining sex and age groups.

(3) These characteristics of Z-scores allow further computation of summary statistics such as means, standard deviations, and standard error to classify a population's growth status.

5.4 Cut-off points and summary statistics

For population-based assessment, there are two ways of expressing child growth survey results using Z-scores. One is the commonly used cut-off-based prevalence; the other includes the summary statistics of the Z-scores: mean, standard deviation, standard error, and frequency distribution.

Prevalence-based reporting:
For consistency with clinical screening, prevalence-based data are commonly reported using a cut-off value, often <-2 and >+2 Z-scores. The rationale for this is the statistical definition of the central 95% of a distribution as the "normal" range, which is not necessarily based on the optimal point for predicting functional outcomes.

The WHO Global Database on Child Growth and Malnutrition uses a Z-score cut-off point of <-2 SD to classify low weight-for-age, low height-for-age and low weight-for-height as moderate and severe undernutrition, and <-3 SD to define severe undernutrition. The cut-off point of >+2 SD classifies high weight-for-height as overweight in children.

The use of -2 Z-scores as a cut-off implies that 2.3% of the reference population will be classified as malnourished even if they are truly "healthy" individuals with no growth impairment. Hence, 2.3% can be regarded as the baseline or expected prevalence. To be precise the reported values in the surveys would need to subtract this baseline value in order to calculate the prevalence above normal. It is important to note, however, that the 2.3% figure is customarily not subtracted from the observed value. In reporting underweight and stunting rates this is not a serious problem because prevalences in deprived populations are usually much higher than 2.3%. However, for wasting, with much lower prevalence levels, not subtracting this baseline level undoubtedly affects the interpretation of findings.

Summary statistics of the Z-scores:
A major advantage of the Z-score system is that a group of Z-scores can be subjected to summary statistics such as the mean and standard deviation. The mean Z-score, though less commonly used, has the advantage of describing the nutritional status of the entire population directly without resorting to a subset of individuals below a set cut-off. A mean Z-score significantly lower than zero—the expected value for the reference distribution—usually means that the entire distribution has shifted downward, suggesting that most, if not all, individuals have been affected. Using the mean Z-score as an index of severity for health and nutrition problems results in increased awareness that, if a condition is severe, an intervention is required for the entire community, not just those who are classified as "malnourished" by the cut-off criteria (36).

The observed SD value of the Z-score distribution is very useful for assessing data quality. With accurate age assessment and anthropometric

measurements, the SD of the observed height-for-age, weight-for-age, and weight-for-height Z-score distributions should be relatively constant and close to the expected value of 1.0 for the reference distribution. An SD that is significantly lower than 0.9 describes a distribution that is more homogenous, or one that has a narrower spread, compared to the distribution of the reference population. If the surveyed standard deviation of the Z-score ranges between 1.1 and 1.2, the distribution of the sample has a wider spread than the reference. Any standard deviation of the Z-scores above 1.3 suggests inaccurate data due to measurement error or incorrect age reporting. The expected ranges of standard deviations of the Z-score distributions for the three anthropometric indicators are as follows (1):

n   height-for-age Z-score: 1.10 to 1.30

n   weight-for-age Z-score: 1.00 to 1.20

n   weight-for-height Z-score: 0.85 to 1.10

Available means and SDs of Z-scores of survey data are included in the Global Database. However, as this has been possible only for a number of surveys, these summary statistics do not appear in the printouts that follow in section 9. Given the importance of the mean and SD of Z-scores, it is hoped that an increasing number of survey reports will include them in the future.

'Trigger-levels' as a basis of public health decisions
Experience with surveillance has contributed to emphasizing the usefulness of identifying prevalence ranges to assess the severity of a situation as the basis for making public health decisions. For example, when 10% of a population is below the -2SD cut-off for weight-for-height, is that too much, too little, or average? The intention of the so-called 'trigger-levels' is to assist in answering this question by giving some kind of guideline for the purpose of establishing levels of public health importance of a situation. Such classifications are very helpful for summarizing prevalence data and can be used for targeting purposes when establishing intervention priorities.

The prevalence ranges shown in Table 11 are those currently used by WHO to classify levels of stunting, underweight, and wasting. It should be borne in mind, however, that this classification is largely arbitrary and simply reflects a convenient statistical grouping of prevalence levels worldwide. Moreover, the designations of a prevalence as "low" or "medium" should be interpreted cautiously and not be taken as grounds for complacency. Since only 2.3% of the children in a well-nourished population would be expected to fall below the cut-off, the "low" weight-for-age group, for example, includes communities with up to four times that expected prevalence, and the "medium" group communities with up to an eightfold excess.

Table 11
Classification for assessing severity of malnutrition by prevalence ranges among children under 5 years of age

Indicator	Severity of malnutrition by prevalence ranges (%)			
	Low	Medium	High	Very high
Stunting	<20	20-29	30-39	ž40
Underweight	<10	10-19	20-29	ž30
Wasting	<5	5-9	10-14	ž15

From reference (1)

6 How to read the database printouts

The country printouts, i.e. data and references, of the WHO Global Database on Child Growth and Malnutrition are found on pages 67 to 710.

6.1 Data

The data printouts are structured in tabular form (see Figure 11) with a top row bearing the name of the country and 11 columns containing the following information:

Column 1   **Administrative level**. Country data are specified as *national, regional, province, district* or *local,* depending on where the survey took place and for which administrative level it is representative:

National: A nationally representative sample.

Regional: The survey covers several sub-national levels.

Province: The survey was performed in a province or state (name presented in the **Notes** column).

District: The survey is representative of a district (name presented in the **Notes** column).

Local: A community, a village or a town was surveyed (name presented in the **Notes** column).

Column 2   **Dates of survey**. This column gives the month and year during which the survey took place.

Column 3   **Area.** *URBAN* and *RURAL* specify the setting. If no specification is given, data refer to both urban and rural areas.

Column 4 **Sex.** Male is signified as *M* and female as *F*. If no specification is given, data refer to both sexes.

Column 5 **Age group (years).** Every data entry refers to a specific age group, specified in years using the decimal system, i.e. the month ranges have been transformed into the decimal system and are presented in years with two decimals. The following age groups appear in the printouts:

0. -4.99 years meaning 0-59 completed months;
0.00-0.49 years meaning 0-5 completed months;
0.50-0.99 years meaning 6-11 completed months;
0.00-0.99 years meaning 0-11 completed months;
1 year meaning 12-23 completed months;
2 years meaning 24-35 completed months;
3 years meaning 36-47 completed months;
4 years meaning 48-59 completed months;
5 years meaning 60-71 completed months.
Several survey reports contain also smaller age group breakdowns, e.g.:
0.00-0.24 years meaning 0-2 completed months;
0.25-0.49 years meaning 3-5 completed months.

Column 6 **Sample size.** This column contains the sample sizes for all disaggregations of the data presented.

Column 7 **Percentage below/above the median: WEIGHT/ HEIGHT**. Prevalence for the cut-offs below -3 SD, below -2 SD (including the % below -3 SD) and above +2 SD are presented. Prevalence data for the three nutritional indicators are presented as percentages with one decimal.

Column 8 **Percentage below the median: HEIGHT/AGE**. Prevalence for the cut-offs below -3 SD and below -2 SD (including the % below -3 SD) are presented.

Column 9 **Percentage below the median: WEIGHT/AGE.** Prevalence for the cut-offs below -3 SD and below -2 SD (including the % below -3 SD) are presented.

Column 10 **Notes.** Any additional information or clarification of the data are presented.

Column 11 **Ref.No.** Which stands for *reference number,* is used to identify data sources (see section 6.2), which are listed in the reference sections following each country's data printout.

Figure 11 Tabular form of data printouts

6.2 References

Data are derived from a variety of sources, e.g. published articles in the scientific press, government health statistics, and survey reports from international and nongovernmental organizations. To complement the scarce nutritional information from some countries data from national surveillance systems, e.g. Chile, Uruguay and Zimbabwe, are also included. For a few countries, e.g. Ecuador and South Africa, height censuses of school children have been included because little other data are available to describe the child growth status. When the data source is either a surveillance system or a height census, this is stated in the NOTES column of the data printout.

Data references follow immediately after the data printout, providing the user with the necessary information to easily trace data sources. Within each country's reference printout there are two separate sections: 1) «data references», i.e. those related to the data included in the data printout, and 2) «additional references», i.e. those that provide supplementary information about status of child growth in the country. These «additional references» contain nutritional data that do not fulfil the database entry criteria but which might, nevertheless, provide relevant information for interested researchers.

Finally, whenever survey data have been reanalysed, either by responsible national authorities or by WHO, this is clearly indicated in the reference section by the words **«and additional analysis»**.

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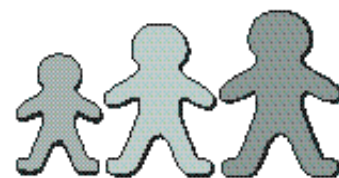
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8 List of countries

8.1 UN regions and subregions

Africa

Eastern Africa	Middle Africa	Northern Africa	Southern Africa	Western Africa
Burundi	Angola	Algeria	Botswana	Benin
Comoros	Cameroon	Egypt	Lesotho	Burkina Faso
Djibouti	Central African	Libyan Arab	Namibia	Cape Verde
Eritrea	Republic	Jamahiriya	South Africa	Côte d'Ivoire
Ethiopia	Chad	Morocco	Swaziland	Gambia
Kenya	Congo	Sudan		Ghana
Madagascar	Democratic	Tunisia		Guinea
Malawi	Republic of	Western Sahara ‡		Guinea-Bissau
Mauritius	the Congo			Liberia
Mozambique	Equatorial Guinea			Mali
Réunion (F)	Gabon			Mauritania
Rwanda	Sao Tome and			Niger
Seychelles	Principe			Nigeria
Somalia				St Helena (UK)
Uganda				Senegal
United Republic				Sierra Leone
of Tanzania				Togo
Zambia				
Zimbabwe				

Asia

Eastern Asia	South-central Asia	South-eastern Asia	Western Asia	
China	Afghanistan	Brunei	Armenia	Syrian Arab
Democratic	Bangladesh	Darussalam	Azerbaijan	Republic
People's	Bhutan	Cambodia	Bahrain	Turkey
Republic	India	East Timor	Cyprus	United Arab
of Korea	Iran (Islamic	Indonesia	Georgia	Emirates
Japan	Republic of)	Lao People's	Iraq	Yemen
Macau†	Kazakstan	Democratic	Israel	
Mongolia	Kyrgyzstan	Republic	Jordan	
Republic of	Maldives	Malaysia	Kuwait	
Korea	Nepal	Myanmar	Lebanon	
	Pakistan	Philippines	Oman	
	Sri Lanka	Singapore	Palestinian self-	
	Tajikistan	Thailand	rule areas	
	Turkmenistan	Viet Nam	Qatar	
	Uzbekistan		Saudi Arabia	

Europe

Eastern Europe	Northern Europe	Southern Europe	Western Europe
Belarus	Channel	Albania	Austria
Bulgaria	Islands (UK)	Andorra	Belgium
Czech Republic	Denmark	Bosnia and	France
Hungary	Estonia	Herzegovina	Germany
Poland	Faeroe	Croatia	Liechtenstein
Republic of	Islands (DK)	Gibraltar (UK)	Luxembourg
Moldova	Finland	Greece	Monaco
Romania	Iceland	Holy See	Netherlands
Russian	Ireland	Italy	Switzerland
Federation	Isle of Man (UK)	Malta	
Slovakia	Latvia	Portugal	
Ukraine	Lithuania	San Marino	
	Norway	Slovenia	
	Sweden	Spain	

Europe (continued)

Northern Europe	Southern Europe
United Kingdom of Great Britain and Northern Ireland	The former Yugoslav Republic of Macedonia
	Yugoslavia

Latin America and the Caribbean

Caribbean		Central America	South America
Anguilla (UK)	Jamaica	Belize	Argentina
Antigua and Barbuda	Martinique (F)	Costa Rica	Bolivia
Aruba (NE)	Montserrat (UK)	El Salvador	Brazil
Bahamas	Netherlands Antilles (NE)	Guatemala	Chile
Barbados	Puerto Rico (US)	Honduras	Colombia
British Virgin Island (UK)	St Kitts and Nevis	Mexico	Ecuador
Cayman Islands (UK)	St Lucia	Nicaragua	Falkland Islands (Malvinas) (UK)
Cuba	St Vincent and the Grenadines	Panama	French Guiana (F)
Dominica	Trinidad and Tobago		Guyana
Dominican Republic	Turks and Caicos Islands (UK)		Paraguay
Grenada	US Virgin Islands (US)		Peru
Guadeloupe (F)			Suriname
Haiti			Uruguay
			Venezuela

Northern America

Bermuda (UK)
Canada
Greenland (DK)
St Pierre and Miquelon (F)
United States of America

Oceania

Australia- New Zealand	Melanesia	Micronesia	Polynesia
Australia	Fiji	Guam (US)	American Samoa (US)
New Zealand	New Caledonia (F)	Kiribati	Cook Islands
	Papua New Guinea	Marshall Islands	French Polynesia (F)
	Solomon Islands	Micronesia (Federated States of)	Niue
	Vanuatu	Nauru	Pitcairn (NZ)
		Northern Mariana Islands (US)	Western Samoa
		Palau	Tokelau (NZ)
			Tonga
			Tuvalu (UK)
			Wallis and Futuna Islands (F)

Source: World Populations Prospects 1994. New York: United Nations, 1995.

(F)	Overseas Departments of France, French territorial collectivity,
(UK)	UK crown dependent territory, British colony, or British protectorate
(US)	United States of America
†	Overseas territory of Portugal
‡	recognized by the Organization of African Unity
(DK)	Kingdom of Denmark
(NE)	Netherlands
(NZ)	Overseas territory of New Zealand

8.2 WHO regions

Africa

Algeria	Democratic Republic of the Congo	Malawi	South Africa
Angola	Equatorial Guinea	Mali	Swaziland
Benin	Eritrea	Mauritania	Togo
Botswana	Ethiopia	Mauritius	Uganda
Burkina Faso	Gabon	Mozambique	United Republic of Tanzania
Burundi	Gambia	Namibia	Zambia
Cameroon	Ghana	Niger	Zimbabwe
Cape Verde	Guinea	Nigeria	
Central African Republic	Guinea Bissau	Rwanda	
Chad	Kenya	Sao Tome and Principe	
Comoros	Lesotho	Senegal	
Congo	Liberia	Seychelles	
Côte d'Ivoire	Madagascar	Sierra Leone	

Americas

Antigua and Barbuda	Costa Rica	Honduras	Suriname
Argentina	Cuba	Jamaica	Trinidad and Tobago
Bahamas	Dominica	Mexico	United States of America
Barbados	Dominican Republic	Nicaragua	Uruguay
Belize	Ecuador	Panama	Venezuela
Bolivia	El Salvador	Paraguay	
Brazil	Grenada	Peru	
Canada	Guatemala	St Kitts and Nevis	
Chile	Guyana	St Lucia	
Colombia	Haiti	St Vincent and the Grenadines	

South-East Asia

Bangladesh	Indonesia	Sri Lanka
Bhutan	Maldives	Thailand
Democratic People's Republic of Korea	Myanmar	
India	Nepal	

Europe

Albania	France	Malta	Switzerland
Armenia	Georgia	Monaco	Tajikistan
Austria	Germany	Netherlands	The former Yugoslav Republic of Macedonia
Azerbaijan	Greece	Norway	Turkey
Belarus	Hungary	Poland	Turkmenistan
Belgium	Iceland	Portugal	Ukraine
Bosnia and Herzegovina	Ireland	Republic of Moldova	United Kingdom of Great Britain and Northern Ireland
Bulgaria	Israel	Romania	Uzbekistan
Croatia	Italy	Russian Federation	Yugoslavia
Czech Republic	Kazakstan	San Marino	
Denmark	Kyrgyzstan	Slovakia	
Estonia	Latvia	Slovenia	
Finland	Lithuania	Spain	
	Luxemburg	Sweden	

Eastern Mediterranean

Afghanistan	Iraq	Oman	Tunisia
Bahrain	Jordan	Pakistan	Unite Arab Emirates
Cyprus	Kuwait	Qatar	Yemen
Djibouti	Lebanon	Saudi Arabia	
Egypt	Libyan Arab	Somalia	
Iran (Islamic	Jamahiriya	Sudan	
Republic of)	Morocco	Syrian Arab Republic	

Western Pacific

Australia	Lao People's	New Zealand	Solomon Islands
Brunei Darussalam	Democratic Republic	Niue	Tonga
Cambodia	Malaysia	Palau	Tuvalu
China	Marshall Islands	Papua New Guinea	Vanuatu
Cook Islands	Micronesia, Federated	Philippines	Viet Nam
Fiji	States of	Republic of Korea	
Japan	Mongolia	Samoa	
Kiribati	Nauru	Singapore	

8.3 Level of development

Developed market economy countries (Level 1)

Andorra	Greece	Norway
Australia	Iceland	Portugal
Austria	Ireland	San Marino
Belgium	Italy	Spain
Canada	Japan	Sweden
Denmark	Luxembourg	Switzerland
Finland	Monaco	United Kingdom of Great
France	Netherlands	Britain and Northern Ireland
Germany	New Zealand	United States of America

Developing countries (excluding least developed countries) (Level 2)

Algeria	Fiji	Nigeria
Antigua and Barbuda	Gabon	Niue
Argentina	Ghana	Oman
Bahamas	Grenada	Pakistan
Bahrain	Guatemala	Palau
Barbados	Guyana	Panama
Belize	Honduras	Papua New Guinea
Bolivia	India	Paraguay
Bosnia and Herzegovina	Indonesia	Peru
Botswana	Iran, Islamic Republic of	Philippines
Brazil	Iraq	Qatar
Brunei Darussalam	Israel	Republic of Korea
Côte d'Ivoire	Jamaica	St Kitts and Nevis
Cameroon	Jordan	St Lucia
Chile	Kenya	St Vincent and the
China	Kuwait	Grenadines
Colombia	Lebanon	Saudi Arabia
Congo	Libyan Arab Jamahiriya	Senegal
Cook Islands	Malaysia	Seychelles
Costa Rica	Malta	Singapore
Croatia	Marshall Islands	Slovenia
Cuba	Mauritius	South Africa
Cyprus	Mexico	Sri Lanka
Democratic People's	Micronesia, Federated	Suriname
Republic of Korea	States of	Swaziland
Dominica	Mongolia	Syrian Arab Republic
Dominican Republic	Morocco	Thailand

Developing countries (continued)

Ecuador	Namibia	The former Yugoslav
Egypt	Nauru	Republic of Macedonia
El Salvador	Nicaragua	Tonga
		Trinidad and Tobago
		Tunisia
		Turkey
		United Arab Emirates
		Uruguay
		Venezuela
		Viet Nam
		Zimbabwe

Least developed countries (Level 3)

Afghanistan	Haiti	Sudan
Angola	Kiribati	Togo
Bangladesh	Lao People's	Tuvalu
Benin	Democratic Republic	Uganda
Bhutan	Lesotho	United Republic
Burkina Faso	Liberia	of Tanzania
Burundi	Madagascar	Vanuatu
Cambodia	Malawi	Yemen
Cape Verde	Maldives	Zambia
Central African Republic	Mali	
Chad	Mauritania	
Comoros	Mozambique	
Democratic Republic of	Myanmar	
the Congo	Nepal	
Djibouti	Niger	
Equatorial Guinea	Rwanda	
Eritrea	Samoa	
Ethiopia	Sao Tome and Principe	
Gambia	Sierra Leone	
Guinea	Solomon Islands	
Guinea-Bissau	Somalia	

Economies in transition (Level 4)

Albania	Kazakstan	Tajikistan
Armenia	Kyrgyzstan	Turkmenistan
Azerbaijan	Latvia	Ukraine
Belarus	Lithuania	Uzbekistan
Bulgaria	Poland	
Czech Republic	Republic of Moldova	
Estonia	Romania	
Georgia	Russian Federation	
Hungary	Slovakia	

9 Country data and references