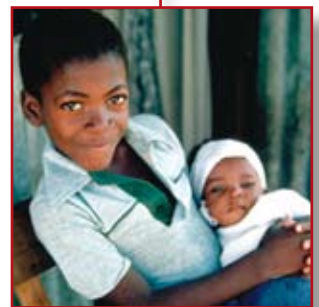


Worldwide prevalence of anaemia 1993–2005

*WHO Global Database
on Anaemia*



**World Health
Organization**



**Centers for Disease
Control and Prevention
Atlanta**

Worldwide prevalence of anaemia 1993–2005

WHO Global Database
on Anaemia

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Preface

Anaemia is a public health problem that affects populations in both rich and poor countries. Although the primary cause is iron deficiency, it is seldom present in isolation. More frequently it coexists with a number of other causes, such as malaria, parasitic infection, nutritional deficiencies, and haemoglobinopathies.

Given the importance of this pathology in the world, numerous countries conduct interventions to reduce anaemia; particularly in the groups most susceptible to its devastating effects: pregnant women and young children. In order to assess the impact of these interventions, the adequacy of the strategies implemented, and the progress made in the fight against anaemia, information on anaemia prevalence must be collected. This is the primary objective of the WHO Global Database on Anaemia. However, estimates of anaemia prevalence by themselves are only useful if they are associated with a picture of the various causal factors that contribute to the development of anaemia in specific settings. Indeed these factors are multiple and complex, and it is critical to collect accurate information about them to provide the basis for developing the best interventions for anaemia control.

In the last three decades, there have been various attempts to produce estimates of the prevalence of anaemia at different levels including at the global level, but until the present time, there has never been a systematic review of all of the data collected and published with the objective of deriving regional and global estimates. The WHO Global Database on Anaemia has filled this gap: data from 93 countries, representing as much as 76% of the population in the case of preschool-age children, were analysed and used to develop statistical models to generate national prevalence estimates for countries with no data within the time frame specified.

It is surprising that given the public health importance of anaemia, there are numerous countries lacking national prevalence data. Moreover, most survey data are related to the three population groups: preschool-age children, pregnant women, and non-pregnant women of reproductive age, which is why the report focuses on these groups.

The data available for school-age children, men, and the elderly were not sufficient to generate regional or country-level estimates for these groups, and therefore only global estimates for these groups are presented.

In addition, despite the fact that iron deficiency is considered to be the primary cause of anaemia, there are few data on the prevalence of this deficiency. The likely reason is that iron assessment is difficult because the available indicators of iron status do not provide sufficient information alone and must be used in combination to obtain reliable information on the existence of iron deficiency. Furthermore, there is no real consensus on the best combination of indicators to use. Another reason is that the role of factors other than iron deficiency in the development of anaemia has been underestimated by public health officials, because for a long time anaemia has been confused with iron deficiency anaemia, and this has influenced the development of strategies and programmes designed to control anaemia.

In this report, the prevalence of anaemia is presented by country and by WHO regions. Because these prevalence data may be used to identify programme needs by other United Nations agencies, we have presented the estimates classified by United Nations regions in the annexes. In addition, one chapter is dedicated to the criteria used to identify, revise, and select the surveys, and the methodology developed to generate national, regional, and global estimates.

A lesson learned from producing this report is that in order for the database to reach its full potential, data should be collected on other vulnerable population groups such as the elderly and school-age children, and surveys should be more inclusive and collect information on iron status and other causes of anaemia.

This report is written for public health officials, nutritionists, and researchers. We hope that readers find it useful and feel free to share any comments with us.

Bruno de Benoist

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WHO wishes to thank the numerous individuals, institutions, governments, non-governmental, and international organizations for providing data for the database. Without continual international collaboration in keeping the database up-to-date, this compilation on the global situation and trends in anaemia prevalence would not have been possible. Special thanks are due to ministries of health of the WHO Member States, WHO regional offices, and WHO country offices.

Abbreviations

CDC	Centers for Disease Control and Prevention
Hb	Haemoglobin
HDI	Human Development Index: a composite indicator of wealth, life expectancy and education developed by the United Nations Development Programme.
IDA	Iron deficiency anaemia
NHANES	National Health and Nutrition Examination Survey
NPW	Non-pregnant women (15.00–49.99 yrs)
PreSAC	Preschool-age children (0.00–4.99 yrs)
PW	Pregnant women
SD	Standard deviation
UN	United Nations
VMNIS	Vitamin and mineral nutrition information system
WHO	World Health Organization
CRP	C-reactive protein

1. Introduction

1.1 Anaemia: a public health problem

Anaemia is a global public health problem affecting both developing and developed countries with major consequences for human health as well as social and economic development. It occurs at all stages of the life cycle, but is more prevalent in pregnant women and young children. In 2002, iron deficiency anaemia (IDA) was considered to be among the most important contributing factors to the global burden of disease (1).

1.1.1 Etiology

Anaemia is the result of a wide variety of causes that can be isolated, but more often coexist. Globally, the most significant contributor to the onset of anaemia is iron deficiency so that IDA and anaemia are often used synonymously, and the prevalence of anaemia has often been used as a proxy for IDA. It is generally assumed that 50% of the cases of anaemia are due to iron deficiency (2), but the proportion may vary among population groups and in different areas according to the local conditions. The main risk factors for IDA include a low intake of iron, poor absorption of iron from diets high in phytate or phenolic compounds, and period of life when iron requirements are especially high (i.e. growth and pregnancy).

Among the other causes of anaemia, heavy blood loss as a result of menstruation, or parasite infections such as hookworms, ascaris, and schistosomiasis can lower blood haemoglobin (Hb) concentrations. Acute and chronic infections, including malaria, cancer, tuberculosis, and HIV can also lower blood Hb concentrations. The presence of other micronutrient deficiencies, including vitamins A and B12, folate, riboflavin, and copper can increase the risk of anaemia. Furthermore, the impact of haemoglobinopathies on anaemia prevalence needs to be considered within some populations.

1.1.2 Health consequences

Anaemia is an indicator of both poor nutrition and poor health. The most dramatic health effects of anaemia, i.e., increased risk of maternal and child mortality due to severe anaemia, have been well documented (3–5). In addition,

the negative consequences of IDA on cognitive and physical development of children, and on physical performance – particularly work productivity in adults – are of major concern (2).

1.1.3 Assessing anaemia

Hb concentration is the most reliable indicator of anaemia at the population level, as opposed to clinical measures which are subjective and therefore have more room for error. Measuring Hb concentration is relatively easy and inexpensive, and this measurement is frequently used as a proxy indicator of iron deficiency. However, anaemia can be caused by factors other than iron deficiency. In addition, in populations where the prevalence of inherited haemoglobinopathies is high, the mean level of Hb concentration may be lowered. This underlines that the etiology of anaemia should be interpreted with caution if the only indicator used is Hb concentration. The main objective for assessing anaemia is to inform decision-makers on the type of measures to be taken to prevent and control anaemia. This implies that in addition to the measurement of Hb concentration, the causes of anaemia need to be identified considering that they may vary according to the population.

1.2 Control of anaemia

1.2.1 Correcting anaemia

Given the multifactorial nature of this disease, correcting anaemia often requires an integrated approach. In order to effectively combat it, the contributing factors must be identified and addressed. In settings where iron deficiency is the most frequent cause, additional iron intake is usually provided through iron supplements to vulnerable groups; in particular pregnant women and young children. Food-based approaches to increase iron intake through food fortification and dietary diversification are important, sustainable strategies for preventing IDA in the general population. In settings where iron deficiency is not the only cause of anaemia, approaches that combine iron interventions with other measures are needed.

Strategies should include addressing other causes of

anaemia (6,7),^{1,2} and should be built into the primary health care system and existing programmes. These strategies should be tailored to local conditions, taking into account the specific etiology and prevalence of anaemia in a given setting and population group.

¹ <http://www.who.int/malaria/docs/TreatmentGuidelines2006.pdf>

² <http://www.who.int/wormcontrol/documents/en/Controlling%20Helminths.pdf>

2. Methods

2.1 Data sources – The WHO Global Database on Anaemia

The estimates presented are based on data from the WHO Global Database on Anaemia; a part of the Vitamin and Mineral Nutrition Information System (VMNIS), maintained at WHO.

Data are collected from the scientific literature and through collaborators, including WHO regional and country offices, United Nations organizations, ministries of health, research and academic institutions, and non-governmental organizations. MEDLINE and WHO regional databases were searched systematically, and manual searches were conducted to find articles published in non-indexed medical and professional journals. For inclusion in the database, Hb must be measured in capillary, venous, or cord blood using quantitative photometric methods or automated cell counters. In addition, anaemia prevalence or mean Hb concentrations have to be reported. Surveys were excluded if they measured only clinical signs of anaemia or haematocrit. Data are included in the database if they are representative of any administrative level within a country, including nationally representative data and surveys representative of a region, the first administrative level boundary, second administrative level boundary or local surveys. As of December 31, 2005, 696 surveys were available in the database; the majority of these in women or preschool-age children.

2.2 Selection of survey data

The time frame for the current estimates is 1993–2005 and survey data for WHO's 192¹ Member States were extracted from the database. Data on anaemia were selected for each

country using two variables: the administrative level for which the survey was representative, and the population group surveyed.

2.2.1 Administrative level

Surveys were selected based on the administrative level they represented. Surveys were classified as national when they were based on a nationally representative sample. Sub-national surveys were also available in the database and were classified according to the population that they represented as regional (multiple states), state (representative of the first administrative level boundary), district (representative of the second administrative level boundary), or local surveys.

Data from the most recent national survey was used in preference to subnational surveys. For one country, where an area had been left out of a national survey because of security concerns, available data from the missing region was pooled with the national data and weighted by the general population estimate for that area to provide a national estimate for that country. This proportion was determined by using the most recent census data from the country. If two national surveys were conducted in the same year, survey results were pooled into a single summary measure and weighted by the survey sample size.

In the absence of national data, surveys representative of at least the first administrative level boundary were used if two or more surveys at this level were available for the population group and country concerned within the acceptable time frame. Results were pooled into a single summary measure, weighted by the total general population for that region or state, and based on the most recent and available census data between 1993 and 2005. Local- and district-level surveys were not used in these estimates since they have the potential for more bias.

Surveys with prevalence data based on a sample size of less than 100 subjects were excluded in most cases. This was done because with a sample size of 100 and a confidence level of 95%, the error around an estimate of anaemia prevalence of 50% would be +/-10 percentage points. A smaller sample size would have an even larger error. How-

¹ On 3 June 2006, the Permanent Representative of the Republic of Serbia to the United Nations and other International Organizations in Geneva informed the Acting Director-General of the WHO that “the membership of the state union Serbia and Montenegro in the United Nations, including all organs and the organizations of the United Nations system, is continued by the Republic of Serbia on the basis of Article 60 of the Constitutional Charter of Serbia and Montenegro, activated by the Declaration of Independence adopted by the National Assembly of Montenegro on 3 June 2006”. Estimates used or referred to in this document cover a period of time preceding that communication.

ever, a few exceptions were made. National surveys with fewer than 100 subjects but more than 50 subjects were only accepted where the results were being extrapolated to fewer than 500,000 people; or to pregnant women, since the numbers in this group are frequently small, especially in populations with a lower rate of reproduction.

2.2.2 Population groups

Population groups are as follows: preschool-age children (0–4.99 yrs), school-age children (5.00–14.99 yrs), pregnant women (no age range defined), non-pregnant women (15.00–49.99 yrs), men (15.00–59.99 yrs), and elderly (both sexes >60 yrs). Wherever possible, children below 0.5 yrs were excluded from the estimate for preschool-age children since the cut-off for anaemia is not defined in this age group. However, the estimate was applied to the entire population of children less than 5 yrs of age. Occasionally, in the non-pregnant women group, pregnant women could not be excluded because all women were included in the figure provided in the country report; but pregnant women were often a small proportion of the group and their exclusion would not be expected to change the figure significantly. If a survey reported results by physiological status, lactating women were combined with non-pregnant non-lactating women to provide the estimate for non-pregnant women.

Data disaggregated by age closest to the defined age range for the population groups were used. If the age range overlapped two population groups, the survey was placed with the group with the greatest overlap in age. When the age range was unavailable, the mean age of the sample was used to classify the data. If this was unavailable or if the age range equally spanned two population groups, the population-specific Hb concentration threshold was used to classify the data. If data represented less than 20% of the age range of a population group, the survey was excluded.

2.3 Defining anaemia

2.3.1 Haemoglobin threshold

Normal Hb distributions vary with age, sex, and physiological status, e.g., during pregnancy (8). WHO Hb thresholds were used to classify individuals living at sea level as anaemic (Table 2.1) (2). Statistical and physiological evidence indicate that Hb distributions vary with smoking (9)

Table 2.1 Haemoglobin thresholds used to define anaemia

Age or gender group	Haemoglobin threshold (g/l)
Children (0.50–4.99 yrs)	110
Children (5.00–11.99 yrs)	115
Children (12.00–14.99 yrs)	120
Non-pregnant women (≥15.00 yrs)	120
Pregnant women	110
Men (≥15.00 yrs)	130

Source: adapted from reference (2)

and altitude (10), and therefore the prevalence of anaemia corrected for these factors was used when provided by the survey. No other corrections were accepted.

Some surveys did not present data using the WHO Hb thresholds to define anaemia. When this occurred, prevalence was estimated by assuming that the Hb concentration was normally distributed within the population and estimating anaemia prevalence by using one of the following methods in order of preference:

1. The mean and standard deviation (SD) of the Hb concentration were used to estimate the proportion of individuals falling below the appropriate Hb cut-off for the population group (n=20 surveys). The correlation between the estimated and predicted prevalence of anaemia was determined using surveys from the database where a mean, an SD, and a prevalence for the WHO age- and sex-specific cut-off were provided. The relationship was plotted (n=508 surveys), and for most surveys, the two figures were extremely close ($r^2 \geq 0.95$, $p < 0.001$) for all four Hb thresholds (110, 115, 120, 130 g/l). On average, the predicted prevalence overestimated actual prevalence by 3.8 percentage points. For 6.5% of the surveys in the analysis, actual anaemia prevalence was overestimated by 10 percentage points or more.
2. When no SD was provided, but the prevalence for a non-WHO cut-off and mean Hb concentrations were available (n=3 surveys), we used these two figures to calculate the SD of the Hb concentration by assuming a normal distribution within the population and deriving the Z score in order to back calculate the SD [$SD = (\text{Provided cut-off} - \text{Mean Hb}) / Z \text{ score for proportion}$]. Following this calculation, the mean and SD were used as above to derive the prevalence for the WHO cut-off.
3. For surveys (n=23) that did not present the mean and SD, nor the prevalence at the recommended threshold, the prevalence of anaemia was estimated from the prevalence at an alternative threshold. An average SD for the same population group was assumed to be similar to the actual SD in the survey. The mean SD of the Hb concentration for each population group was calculated from surveys included in the estimates, which had data available for subjects within the defined age range of the population group (preschool-age children, SD=13.8 g/l; school-age children, 11.3 g/l; non-pregnant women, 13.7 g/l; pregnant women, 14.0 g/l; and men, 14.5 g/l). The population mean Hb concentration was estimated from the prevalence at the cut-off provided in the survey and the assumed SD.

Sometimes it was necessary to make adjustments for aggregated or disaggregated data. For example, one estimate was sometimes provided for school-age children utilizing 1)

one non-WHO cut-off for anaemia where two should have been used; or 2) using two non-WHO cut-offs. In the first case, the prevalence was adjusted for the WHO cut-off that applied to the group in the majority. In the second case, the prevalence was adjusted by assuming that the cut-off applied to the group in the majority had been used for the entire group.

Data provided for separate groups frequently had to be combined, such as data for women by physiological status or any other population group disaggregated by age. Prevalence estimates were combined and weighted by sample size, and where this information was unavailable for one of the groups, it was assumed to have the average number of subjects of the other groups. If sample size information was missing from all data pooled, equal weight was given to each survey.

2.3.2 Estimated anaemia prevalence for countries with no survey data

Some countries did not have any survey data that met the criteria for the estimates. Therefore, a regression model was developed using countries with anaemia prevalence data and the 2002 United Nations Human Development Index (HDI) (11) – which is a composite indicator of a life expectancy index, an education index, and a wealth index (12) – and health indicators from the World Health Statistics Database (13), so that anaemia prevalence could be predicted for the countries without data.

Separate prediction equations for each population group were based on countries with anaemia prevalence data for that group. Seventeen countries did not have an HDI, and so HDI was estimated using two of the components and a proxy indicator for education (average years of schooling in adults) (14–16). HDI and estimated HDI were used to predict the prevalence of anaemia using a multiple regression model.

Anaemia prevalence was estimated by using the prediction equations (Table 2.2) in countries where only explanatory variables were known. For one country, none of the covariates were available and therefore, a country-level estimate was not generated.

2.3.3 Uncertainty of estimates

For estimates based on survey data, each estimate was considered to be representative of the entire country whether from a national or subnational sample, and the variance was calculated in the logit scale using the sample size. A design effect of 2 was applied since most surveys utilized cluster sampling. From the prevalence, the variance and the design effect, a 95% confidence interval was generated in logit scale and then transformed to the original scale (17,18).

For regression-based estimates, a point estimate and 95% prediction interval were computed by using the logit transformations in the regression models (19) and then back-transforming them to the original scale (20).

2.3.4 Combining national estimates

Country estimates were combined to provide estimates at the global level as well as by WHO region for women and preschool-age children by pooling the data and weighting it by the population that each estimate represented. Ninety-five percent confidence intervals were constructed using the estimated variance of the weighted average. For one country without data, no proxy indicators were available and so no country estimate was generated, but the UN subregional estimate had to be applied to that country to make regional and global estimates.

2.3.5 Global anaemia prevalence

The global prevalence of anaemia was calculated by combining the estimates for all population groups, which covered the entire population except for one segment (women

Table 2.2 Prediction equations used to generate anaemia estimates for countries without survey data

Population group	Number of countries	Equation	R ²	p-value for model
Preschool-age children ^a	82	= 3.5979-4.9093*HDI ^b -0.0657*Exp on health-0.0003*Exp on health per capita-0.0009*Adult Female mortality	0.550	<0.0001
School-age children	35	= 1.4248-2.6894*HDI+0.0087*Urban population-0.0129*Imm Measles-0.0005*Exp on health per capita	0.583	<0.0001
Non-pregnant women	79	= 0.9475-2.3447*HDI+0.1643*Population growth rate-0.0697 Exp on health	0.453	<0.0001
Pregnant women	60	= 2.7783-2.8352*HDI-0.0085*Imm DTP3-0.0004*Exp on health per capita-0.0017*Adult Male mortality	0.323	<0.0001
Men	32	= 0.0991-4.6160*HDI+0.0209*Imm DTP3-0.0828*Gov Exp on health	0.577	<0.0001
Elderly	13	= -1.6693+0.2872*HDI-0.1359*Exp on health+0.0047*Adult Male mortality	0.385	0.0627

^a Population groups: Preschool-age children (0.00–4.99 yrs), Pregnant women (no age range defined), Non-pregnant women (15.00–49.99 yrs), School-age children (5.00–14.99 yrs), Men (15.00–59.99 yrs), Elderly (≥60.00 yrs).

^b HDI = United Nations Human Development Index, Exp = expenditure, Imm DTP3 = immunization for diphtheria, tetanus and pertussis.

50.00–59.99 yrs). The estimate of anaemia prevalence in the elderly was applied to this segment of the population. Because the median age of menopause in women is approximately 50.5 yrs (21), menstrual iron losses have stopped for the majority of women in this age group, and we considered that the prevalence of anaemia may be more similar to the elderly than to women of reproductive age. Furthermore, the data from the National Health and Nutrition Examination Survey (NHANES) in the United States of America were compared among women 20–49 yrs, 50–59 yrs, and 60+ yrs, and women 50–59 yrs had a Hb distribution more similar to women 60+ yrs than to women 20–49 yrs.¹ In addition, the distribution of C-reactive protein (CRP) was most similar between women 50–59 yrs and women 60+ yrs. However, the proportion of anaemia attributable to elevated CRP in women 50–59 yrs was more similar to women 20–49 yrs.

2.3.6 Classification of anaemia as a problem of public health significance

The prevalence of Hb values below the population-specific Hb threshold was used to classify countries by the level of the public health problem (Table 2.3) (2).

Table 2.3 **Classification of anaemia as a problem of public health significance**

Prevalence of anaemia (%)	Category of public health significance
≤4.9	No public health problem
5.0–19.9	Mild public health problem
20.0–39.9	Moderate public health problem
≥40.0	Severe public health problem

Source: adapted from reference (2)

2.4 Population coverage, proportion of population, and the number of individuals with anaemia

2.4.1 Population coverage

The population covered by survey data at the regional and global level was calculated by summing the number of individuals in the population group in countries with survey data divided by the total number of individuals in the population group in the entire region or globally for each population group.

Coverage when including countries with a regression-based estimate is not presented, since it was similar for all population groups and included all countries except for one (99.7–99.9%).

2.4.2 Proportion of population and the number of individuals affected

The number of individuals with anaemia was estimated in each population group for each country and each grouping of countries based on each country's proportion of the population with anaemia. The proportion of the population group with anaemia was multiplied by the national population to provide the number of subjects with anaemia at the country level, and the 95% confidence interval was used as a measure of uncertainty. The population figures are for the 2006 projection from the 2004 revision of the United Nations population estimates (22). Population figures for pregnant women were derived from the total number of births (time period 2005–2010) by assuming one child per woman per year, not taking into account spontaneous and induced abortions. For 15 countries with a small total population (0.01% of all women), birth data were not provided in tabulations of the UN population division, and the number of pregnant women was estimated by applying a WHO regional average of births per reproductive-age woman (15.00 to 49.99 yrs) to the total number of reproductive-age women.

¹ M. Cogswell, unpublished data, 2006.

3. Results and Discussion

3.1 Results

3.1.1 Population coverage

Almost the entire population was covered by survey data or regression-based estimates, since all countries except for one had an estimate. The proportion of the population covered by survey data was high for preschool-age children (76.1%) and pregnant (69.0%) and non-pregnant women (73.5%), but lower for school-age children (33.0%), men (40.2%), and the elderly (39.1%) (Table 3.1). By WHO region, the coverage was highest in the Western Pacific and lowest in Europe. Based on this population coverage, it was decided that there were insufficient data in school-age children, men, and the elderly to generate regional estimates.

3.1.2 Proportion of population and number of individuals with anaemia

Globally, anaemia affects 1.62 billion people (95% CI: 1.50–1.74 billion), which corresponds to 24.8% of the population (95% CI: 22.9–26.7%) (Table 3.2). The highest prevalence is in preschool-age children (47.4%, 95% CI: 45.7–49.1), and the lowest prevalence is in men (12.7%, 95% CI: 8.6–16.9%). However, the population group with the greatest number of individuals affected is non-pregnant women (468.4 million, 95% CI: 446.2–490.6).

WHO regional estimates generated for preschool-age children and pregnant and non-pregnant women indicate that the highest proportion of individuals affected are in Africa (47.5–67.6%), while the greatest number af-

Table 3.1 Population coverage (%) by anaemia prevalence surveys (national or subnational) conducted between 1993 and 2005

WHO region	PreSAC ^a	PW	NPW	SAC	Men	Elderly	All
Africa (46) ^b	74.6 (26) ^c	65.8 (22)	61.4 (23)	13.2 (8)	21.9 (11)	0.0 (0)	40.7
Americas (35)	76.7 (16)	53.8 (15)	56.2 (13)	47.1 (9)	34.3 (2)	47.6 (1)	58.0
South-East Asia (11)	85.1 (9)	85.6 (8)	85.4 (10)	13.6 (3)	4.1 (2)	5.2 (1)	14.9
Europe (52)	26.5 (12)	8.3 (4)	28.0 (12)	9.3 (3)	14.1 (3)	8.0 (2)	22.9
Eastern Mediterranean (21)	67.4 (11)	58.7 (7)	73.5 (11)	15.5 (6)	27.5 (6)	3.2 (3)	84.3
Western Pacific (27)	90.4 (10)	90.2 (8)	96.9 (13)	83.1 (7)	96.2 (10)	93.3 (6)	13.8
Global (192)	76.1 (84)	69.0 (64)	73.5 (82)	33.0 (36)	40.2 (34)	39.1 (13)	48.8

^a Population groups: PreSAC, preschool-age children (0.00–4.99 yrs); PW, pregnant women (no age range defined); NPW, non-pregnant women (15.00–49.99 yrs), SAC, school-age children (5.00–14.99 yrs), Men (15.00–59.99 yrs), Elderly (≥60.00 yrs).

^b Number of countries in each grouping.

^c Total number of countries with data, no figure is provided for All since each country may be partially covered by some population groups, but few countries have data on all 6 population groups and no countries have data for women 50–59 yrs of age.

Table 3.2 Global anaemia prevalence and number of individuals affected

Population group	Prevalence of anaemia		Population affected	
	Percent	95% CI	Number (million)	95% CI
Preschool-age children	47.4	45.7–49.1	293	283–303
School-age children	25.4	19.9–30.9	305	238–371
Pregnant women	41.8	39.9–43.8	56	54–59
Non-pregnant women	30.2	28.7–31.6	468	446–491
Men	12.7	8.6–16.9	260	175–345
Elderly	23.9	18.3–29.4	164	126–202
Total population	24.8	22.9–26.7	1620	1500–1740

Table 3.3 Anaemia prevalence and number of individuals affected in preschool-age children, pregnant women, and non-pregnant women in each WHO region

WHO region	Preschool-age children ^a		Pregnant women		Non-pregnant women	
	Prevalence (%)	# affected (millions)	Prevalence (%)	# affected (millions)	Prevalence (%)	# affected (millions)
Africa	67.6 (64.3–71.0) ^b	83.5 (79.4–87.6)	57.1 (52.8–61.3)	17.2 (15.9–18.5)	47.5 (43.4–51.6)	69.9 (63.9–75.9)
Americas	29.3 (26.8–31.9)	23.1 (21.1–25.1)	24.1 (17.3–30.8)	3.9 (2.8–5.0)	17.8 (12.9–22.7)	39.0 (28.3–49.7)
South-East Asia	65.5 (61.0–70.0)	115.3 (107.3–123.2)	48.2 (43.9–52.5)	18.1 (16.4–19.7)	45.7 (41.9–49.4)	182.0 (166.9–197.1)
Europe	21.7 (15.4–28.0)	11.1 (7.9–14.4)	25.1 (18.6–31.6)	2.6 (2.0–3.3)	19.0 (14.7–23.3)	40.8 (31.5–50.1)
Eastern Mediterranean	46.7 (42.2–51.2)	0.8 (0.4–1.1)	44.2 (38.2–50.3)	7.1 (6.1–8.0)	32.4 (29.2–35.6)	39.8 (35.8–43.8)
Western Pacific	23.1 (21.9–24.4)	27.4 (25.9–28.9)	30.7 (28.8–32.7)	7.6 (7.1–8.1)	21.5 (20.8–22.2)	97.0 (94.0–100.0)
Global	47.4 (45.7–49.1)	293.1 (282.8–303.5)	41.8 (39.9–43.8)	56.4 (53.8–59.1)	30.2 (28.7–31.6)	468.4 (446.2–490.6)

^a Population subgroups: Preschool-age children (0.00–4.99 yrs); Pregnant women (no age range defined); Non-pregnant women (15.00–49.99 yrs).

^b 95% Confidence Intervals.

affected are in South-East Asia where 315 million (95% CI: 291–340) individuals in these three population groups are affected (Table 3.3).

3.1.3 Classification of countries by degree of public health significance of anaemia

There are almost no countries where anaemia is not at least a mild public health problem in all three of the population groups for which country-level estimates were generated (Table 3.4). For pregnant women, over 80% of the countries have a moderate or severe public health problem.

The level of the public health problem across countries is illustrated by maps for preschool-age children and pregnant and non-pregnant women in Figure 3.1.

Table 3.4 Number of countries categorized by public health significance of anaemia

Public health problem ^a	Preschool-age children ^b Number of countries	Pregnant women Number of countries	Non-pregnant women Number of countries
None	2	0	1
Mild	40	33	59
Moderate	81	91	78
Severe	69	68	54

^a The prevalence of anaemia as a public health problem is categorized as follows: <5%, no public health problem; 5–19.9%, mild public health problem; 20–39.9%, moderate public health problem; ≥40%, severe public health problem.

^b Population groups: Preschool-age children (0.00–4.99 yrs); Pregnant women (no age range defined); Non-pregnant women (15.00–49.99 yrs).

3.2 Discussion

3.2.1 Population coverage

The population covered by survey data is high for the three population groups considered to be the most vulnerable; preschool-age children, pregnant women, and non-pregnant women of childbearing age. A greater number of countries have undertaken surveys to assess anaemia in non-pregnant women than in pregnant women. However, since some of the surveys conducted in pregnant women are from countries with a large population, the proportion of the global population covered by these surveys is similar between the two population groups.

3.2.2 Strengths of estimates

These estimates are based on a high proportion of nationally representative survey data. For the three most vulnerable population groups, preschool-age children, pregnant women, and non-pregnant women, nationally representative data covered more than two thirds of the population in each group. This eliminates the bias that comes from local data, which may greatly over- or under-represent the national situation.

Regression-based estimates were used for countries without data, and these estimates explained a large amount of the variation in anaemia prevalence among countries with survey data (32–58%).

3.2.3 Limitations of estimates

There were fewer surveys that collected data in school-age children, men, and the elderly, and in some cases there were no data for an entire region. Thus, country- or regional-

Figure 3.1a Anaemia as a public health problem by country: Preschool-age children

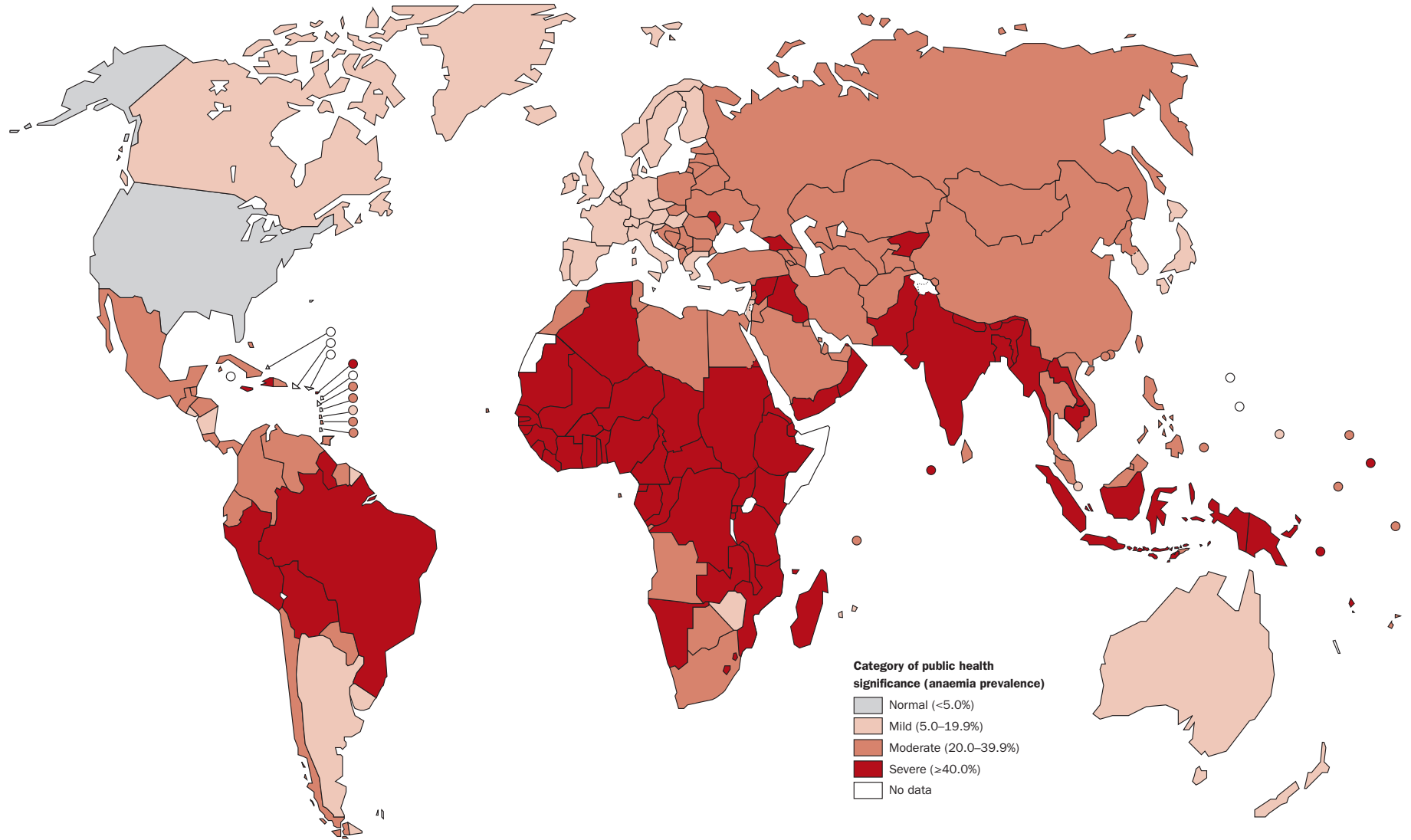


Figure 3.1b Anaemia as a public health problem by country: Pregnant women

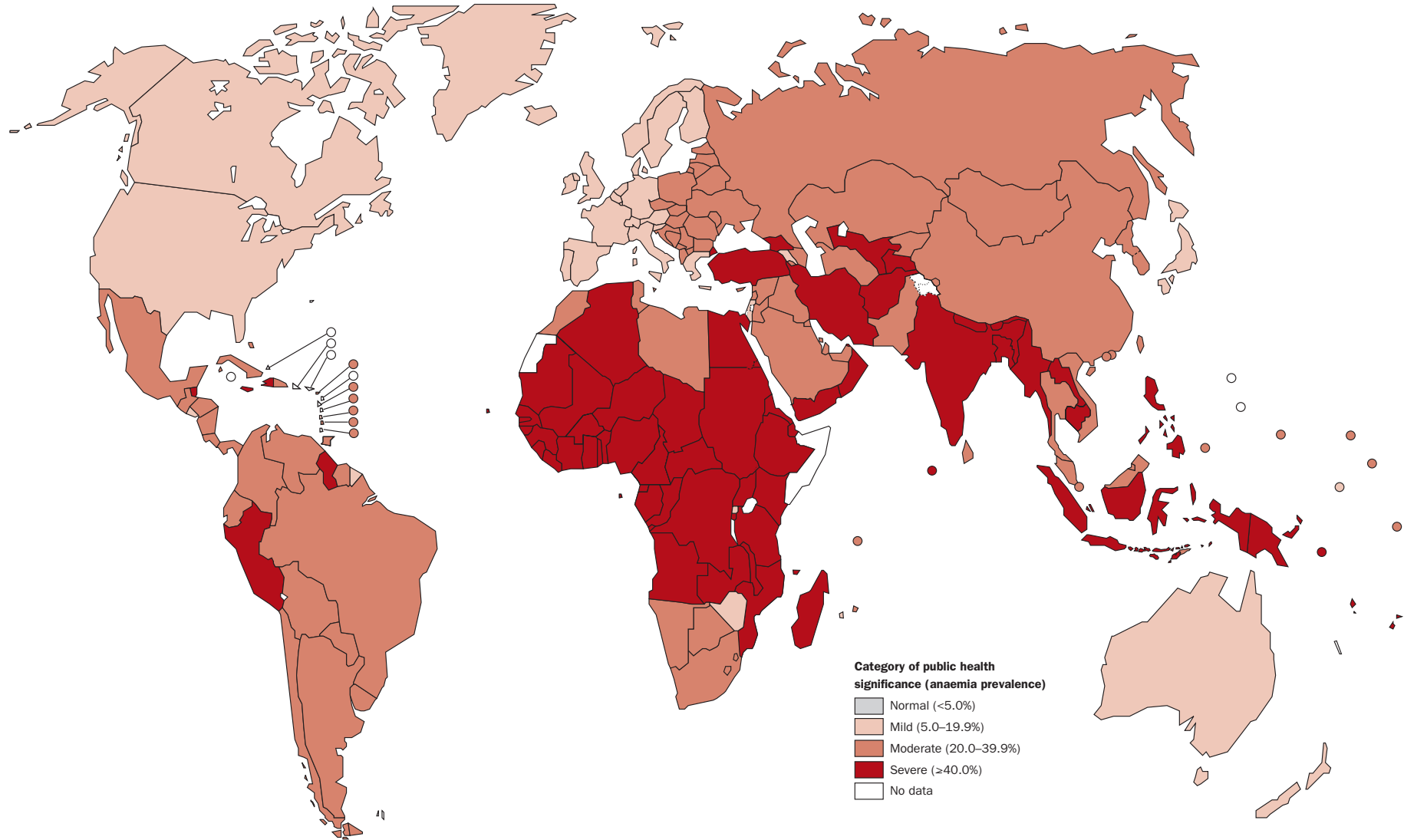
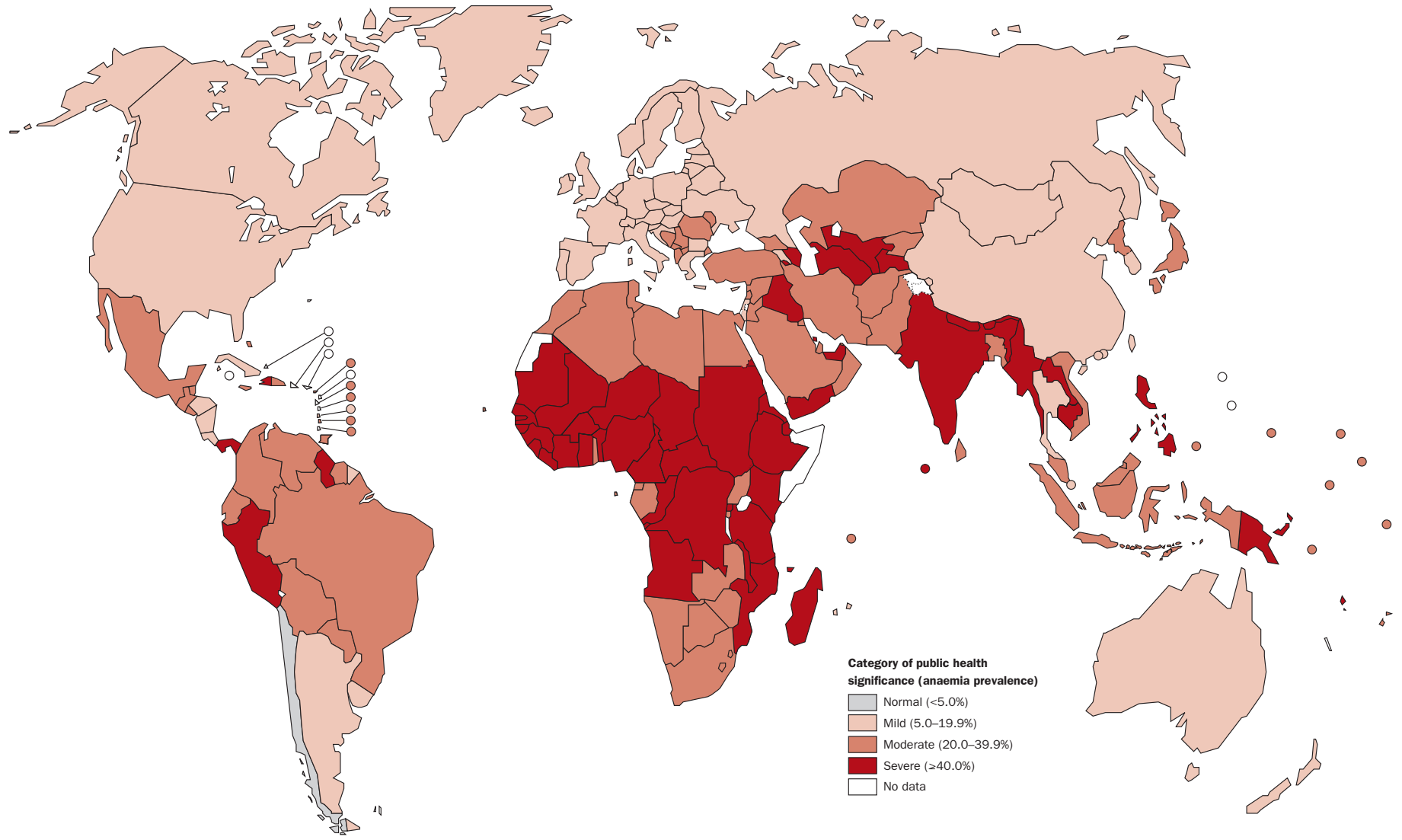


Figure 3.1c Anaemia as a public health problem by country: Non-pregnant women of reproductive age



level estimates for these population groups were not presented. Even the global estimates should be interpreted with caution since they are based primarily on regression-based estimates for these population groups.

Furthermore, the estimates generated for women (50–59 yrs) were not based on any data from this population group since it is not routinely collected. It is why this estimate was used for the global figure only and not as an estimate for this group of women.

These estimates were based on a number of assumptions. All surveys were treated equally, although in fact their quality varied greatly. For example, some surveys used sampling proportionate to the population distribution within the country, while others did not, and in some national surveys, specific areas had to be left out due to security or accessibility issues. Furthermore for some population groups (e.g., children 0.5–4.99 yrs), the population sampled covered only a portion of the desired age range (e.g., children 1–1.99 yrs). For the purpose of our analysis, these surveys were considered equal to those that covered the entire age range. However, an estimate from children in only the lower or higher end of the range would significantly impact the prevalence estimate, since children below two years of age are much more likely to be anaemic than those above this age.

While there were only three countries for which subnational data were used to generate prevalence estimates in preschool-age children, these data may result in an over- or under-estimation of anaemia prevalence for those countries.

In some cases, anaemia prevalence was calculated using Hb concentration and assuming that it was distributed normally. This may have led to a slight over-estimation of anaemia prevalence, since Hb distributions tend to be negatively skewed in populations with a high prevalence of deficiency.

The estimates for pregnant women did not account for the trimester of pregnancy since this information is not routinely reported in publications. Prevalence would be expected to vary by trimester, and thus the estimates for pregnant women may have been biased if there was not an even distribution of women at various stages of pregnancy. Furthermore, we do not have prevalence figures for the third trimester when anaemia is most likely to affect the risk of maternal mortality.

3.2.4 Proportion of population and the number of individuals with anaemia

One in four people is affected by anaemia, and pregnant women and preschool-age children are at the greatest risk. The WHO regions of Africa and South-East Asia have the highest risk, where about two thirds of preschool-age children and half of all women are affected. In numbers,

the main burden is concentrated in South-East Asia, where about 40% of anaemic preschool-age children and non-pregnant women, and about 30% of pregnant women reside.

3.2.5 Classification of countries by degree of public health significance of anaemia, based on haemoglobin concentration

Anaemia is a public health problem for pregnant women in all of WHO's Member States. Given the consequences of anaemia during pregnancy, this problem urgently needs to be addressed. The situation is similar in preschool-age children and non-pregnant women for whom only one or two countries do not have an anaemia public health problem. For women and young children, the majority of WHO Member States (132 to 159, depending on the population group) have a moderate-to-severe public health problem with anaemia; meaning that over 20% of the population group in these countries is affected. This should draw the attention of the public health authorities on the need to re-evaluate current strategies to control anaemia by making sure that the various factors contributing to anaemia have been identified and addressed properly through an integrated approach.

3.2.6 Comparison to previous estimates

It is a challenge to assess global progress in the control of anaemia, since the methodology used for these estimates is so different from those used in previous estimates. Previous global estimates made by DeMaeyer in 1985 indicated that approximately 30% of the world's population was anaemic (23). These estimates seem to be based on an extrapolation of the prevalence in preschool-age children, school-age children, women, and men. These estimates, which excluded China where 20% of the global population resides, indicated that 43% of preschool-age children, 35% of all women, and 51% of pregnant women were anaemic. Current estimates, excluding China, are 52%, 34%, and 44%, respectively. Variations in the methods employed, and a larger proportion of nationally representative data, are more likely to account for the differences between these estimates than a change in anaemia prevalence.

In 1992, WHO estimates for the year 1988 indicated that 37%, 51%, and 35% of all women and pregnant and non-pregnant women were anaemic (24). These estimates included subnational data for China. The current estimates which use nationally representative data for China (31%, 42%, and 30%) may or may not be lower, since the methodologies used are substantially different.

3.3 Conclusion

The data available for these estimates are the most representative data to date, and we can consider that these esti-

mates are the most accurate reflection of the global anaemia prevalence published so far. However, countries without survey data should be encouraged to collect data, since regression-based estimates are good at the regional and global level, but may not be the most accurate reflection of the situation for an individual country.

The generation of these estimates and the maintenance of the anaemia database provide a reliable tool to track the global progress towards the elimination of anaemia and the effectiveness of the current strategies for anaemia control. However, since information on causal factors is

not routinely collected, the database does not provide information on the ability of the strategies to address these factors. Hopefully, these estimates will encourage countries to plan surveys which assess the prevalence of factors that contribute to anaemia – not only iron deficiency, but also infectious diseases and other micronutrient deficiencies. The understanding of how these factors vary by geography, level of development, and other social and economic factors will make it easier to design interventions that are more effective and integrative in addressing multiple contributing factors at the same time.

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ANNEX 1

WHO Member States grouped by WHO region as of 2005

Table A1.1 WHO Member States grouped by WHO region

Africa	Sierra Leone	Saint Vincent and the Grenadines	Bulgaria
Algeria	South Africa	Suriname	Croatia
Angola	Swaziland	Trinidad and Tobago	Cyprus
Benin	Togo	United States of America	Czech Republic
Botswana	Uganda	Uruguay	Denmark
Burkina Faso	United Republic of Tanzania	Venezuela (Bolivarian Republic of)	Estonia
Burundi	Zambia		Finland
Cameroon	Zimbabwe	South-East Asia	France
Cape Verde		Bangladesh	Georgia
Central African Republic		Bhutan	Germany
Chad	Americas	Democratic People's Republic of Korea	Greece
Comoros	Antigua and Barbuda	India	Hungary
Congo	Argentina	Indonesia	Iceland
Côte d'Ivoire	Bahamas	Maldives	Ireland
Democratic Republic of the Congo	Barbados	Myanmar	Israel
Equatorial Guinea	Belize	Nepal	Italy
Eritrea	Bolivia	Sri Lanka	Kazakhstan
Ethiopia	Brazil	Thailand	Kyrgyzstan
Gabon	Canada	Timor-Leste	Latvia
Gambia	Chile		Lithuania
Ghana	Colombia		Luxembourg
Guinea	Costa Rica		Malta
Guinea-Bissau	Cuba	Europe	Monaco
Kenya	Dominica	Albania	Netherlands
Lesotho	Dominican Republic	Andorra	Norway
Liberia	Ecuador	Armenia	Poland
Madagascar	El Salvador	Austria	Portugal
Malawi	Grenada	Azerbaijan	Republic of Moldova
Mali	Guatemala	Belarus	Romania
Mauritania	Guyana	Belgium	Russian Federation
Mauritius	Haiti	Bosnia and Herzegovina	San Marino
Mozambique	Honduras		Serbia and Montenegro ¹
Namibia	Jamaica		
Niger	Mexico		
Nigeria	Nicaragua		
Rwanda	Panama		
Sao Tome and Principe	Paraguay		
Senegal	Peru		
Seychelles	Saint Kitts and Nevis		
	Saint Lucia		

¹ On 3 June 2006, the Permanent Representative of the Republic of Serbia to the United Nations and other International Organizations in Geneva informed the Acting Director-General of the WHO that "the membership of the state union Serbia and Montenegro in the United Nations, including all organs and the organizations of the United Nations system, is continued by the Republic of Serbia on the basis of Article 60 of the Constitutional Charter of Serbia and Montenegro, activated by the Declaration of Independence adopted by the National Assembly of Montenegro on 3 June 2006". Estimates used or referred to in this document cover a period of time preceding that communication.

Slovakia	Eastern Mediterranean	Syrian Arab Republic	Marshall Islands		
Slovenia		Tunisia		Micronesia (Federated States of)	
Spain		United Arab Emirates		Mongolia	
Sweden		Yemen		Nauru	
Switzerland		Western Pacific		Australia	New Zealand
Tajikistan				Brunei Darussalam	Niue
The former Yugoslav Republic of Macedonia				Cambodia	Palau
Turkey				China	Papua New Guinea
Turkmenistan				Cook Islands	Philippines
Ukraine				Fiji	Republic of Korea
United Kingdom of Great Britain and Northern Ireland				Japan	Samoa
Uzbekistan				Kiribati	Singapore
				Lao People's Democratic Republic	Solomon Islands
				Malaysia	Tonga
					Tuvalu
					Vanuatu
					Viet Nam

Table A1.2 WHO Member States grouped by UN region and subregion¹

Africa	Eastern Africa	Gabon	Niger	Pakistan		
		Sao Tome and Principe			Sri Lanka	
	Burundi	Northern Africa	Nigeria	South-eastern Asia		
	Comoros		Senegal		Brunei Darussalam	
	Djibouti		Sierra Leone		Lao People's Democratic Republic	
	Eritrea		Togo		Malaysia	
	Ethiopia		Asia		Myanmar	
	Kenya				Central Asia	Philippines
	Madagascar				Kazakstan	Singapore
	Malawi				Kyrgyzstan	Thailand
	Mauritius				Tajikistan	Timor-Leste
	Mozambique				Turkmenistan	Viet Nam
	Rwanda	Uzbekistan	Western Asia			
	Seychelles	Eastern Asia		Armenia		
	Somalia			China	Azerbaijan	
	Uganda			Democratic People's Republic of Korea	Bahrain	
	United Republic of Tanzania			Japan	Cyprus	
	Zambia	Mongolia		Georgia		
	Zimbabwe	Republic of Korea		Iraq		
	Middle Africa	Western Africa		Southern Asia	Israel	
					Benin	Jordan
					Burkina Faso	Kuwait
Cape Verde			Lebanon			
Côte d'Ivoire			Oman			
Gambia						
Ghana						
Guinea						
Guinea-Bissau						
Liberia						
Mali						
Mauritania						

¹ <http://unstats.un.org/unsd/methods/m49/m49regin.htm>

Qatar
Saudi Arabia
Syrian Arab Republic
Turkey
United Arab Emirates
Yemen

Europe

Eastern Europe

Belarus
Bulgaria
Czech Republic
Hungary
Poland
Republic of Moldova
Romania
Russian Federation
Slovakia
Ukraine

Northern Europe

Denmark
Estonia
Finland
Iceland
Ireland
Latvia
Lithuania
Norway
Sweden
United Kingdom of Great
Britain and Northern
Ireland

Southern Europe

Albania
Andorra
Bosnia and Herzegovina
Croatia
Greece
Italy
Malta
Portugal
San Marino
Serbia and Montenegro
Slovenia
Spain
The former Yugoslav
Republic of Macedonia

Western Europe

Austria
Belgium
France
Germany
Luxembourg
Monaco
Netherlands
Switzerland

Americas

Latin America and the Caribbean

Caribbean

Antigua and Barbuda
Bahamas
Barbados

Cuba
Dominica
Dominican Republic
Grenada
Haiti
Jamaica
Saint Kitts and Nevis
Saint Lucia
Saint Vincent and the
Grenadines
Trinidad and Tobago

Central America

Belize
Costa Rica
El Salvador
Guatemala
Honduras
Mexico
Nicaragua
Panama

South America

Argentina
Bolivia
Brazil
Chile
Colombia
Ecuador
Guyana
Paraguay
Peru
Suriname

Uruguay
Venezuela (Bolivarian
Republic of)

Northern America

Canada
United States of America

Oceania

Australia-New Zealand

Australia
New Zealand

Melanesia

Fiji
Papua New Guinea
Solomon Islands
Vanuatu

Micronesia

Kiribati
Marshall Islands
Micronesia (Federated
States of)
Nauru
Palau

Polynesia

Cook Islands
Niue
Samoa
Tonga
Tuvalu

ANNEX 2

Results by UN region

Table A2.1 **Population coverage (%) by anaemia prevalence surveys (national or subnational) conducted between 1993 and 2005, by UN region**

UN region ^a	PreSAC ^a	PW	NPW	SAC	Men	Elderly	All
Africa (53) ^b	76.7 (30) ^c	65.3 (25)	63.6 (26)	18.6 (10)	32.0 (14)	1.8 (1)	40.7
Asia (47)	82.1 (30)	80.9 (21)	88.8 (34)	37.0 (11)	47.6 (13)	54.1 (7)	58.0
Europe (41)	19.2 (5)	0.9 (1)	23.9 (5)	12.9 (3)	15.9 (2)	8.7 (2)	14.9
L Am and the Caribbean (33)	70.5 (15)	38.4 (14)	37.5 (12)	28.9 (8)	0.1 (1)	0.0 (0)	22.9
N America (2)	92.4 (1)	92.8 (1)	89.9 (1)	91.3 (1)	89.9 (1)	89.6 (1)	84.3
Oceania (16)	5.1 (3)	4.7 (2)	16.5 (4)	15.1 (3)	15.6 (3)	15.1 (2)	13.8
Global (192)	76.1 (84)	69.0 (64)	73.5 (82)	33.0 (36)	40.2 (34)	39.1 (13)	48.8

^a Population groups: PreSAC, preschool-age children (0.00–4.99 yrs); PW, pregnant women (no age range defined); NPW, non-pregnant women (15.00–49.99 yrs), SAC, school-age children (5.00–14.99 yrs), Men (15.00–59.99 yrs), Elderly (≥60.00 yrs).

^b Number of countries in each grouping.

^c Total number of countries with data. No figure is provided for 'All' since each country may be partially covered by some population groups, but few countries have data on all 6 population groups and no countries have data for women 50–59 yrs of age.

Table A2.2 **Anaemia prevalence and number of individuals affected in preschool-age children, pregnant women, and non-pregnant women in each UN region**

UN region ^a	Preschool-age children ^b		Pregnant women		Non-pregnant women	
	Prevalence (%)	# affected (millions)	Prevalence (%)	# affected (millions)	Prevalence (%)	# affected (millions)
Africa	64.6 (61.7–67.5) ^c	93.2 (89.1–97.4)	55.8 (51.9–59.6)	19.3 (18.0–20.7)	44.4 (40.9–47.8)	82.9 (76.5–89.4)
Asia	47.7 (45.2–50.3)	170.0 (161.0–178.9)	41.6 (39.0–44.2)	31.7 (29.7–33.6)	33.0 (31.3–34.7)	318.3 (302.0–334.6)
Europe	16.7 (10.5–23.0)	6.1 (3.8–8.4)	18.7 (12.3–25.1)	1.4 (0.9–1.8)	15.2 (10.5–19.9)	26.6 (18.4–34.9)
LAC	39.5 (36.0–43.0)	22.3 (20.3–24.3)	31.1 (21.8–40.4)	3.6 (2.5–4.7)	23.5 (15.9–31.0)	33.0 (22.4–43.6)
NA	3.4 (2.0–4.9)	0.8 (0.4–1.1)	6.1 (3.4–8.8)	0.3 (0.2–0.4)	7.6 (5.9–9.4)	6.0 (4.6–7.3)
Oceania	28.0 (15.8–40.2)	0.7 (0.4–1.0)	30.4 (17.0–43.9)	0.2 (0.1–0.2)	20.2 (9.5–30.9)	1.5 (0.7–2.4)
Global	47.4 (45.7–49.1)	293.1 (282.8–303.5)	41.8 (39.9–43.8)	56.4 (53.8–59.1)	30.2 (28.7–31.6)	468.4 (446.2–490.6)

^a UN regions: Africa, Asia, Europe, Latin America and the Caribbean (LAC), Northern America (NA), and Oceania.

^b Population groups: PreSAC, preschool-age children (0.00–4.99 yrs); PW, pregnant women (no age range defined); NPW, non-pregnant women (15.00–49.99 yrs).

^c 95% Confidence Intervals.

National estimates of anaemia

Table A3.1 Country estimates of anaemia prevalence in preschool-age children

Member State	Population 2006 ^a		Survey Information						Proportion of the population with Hb<110 g/L		Population with anaemia (number of individuals)(000)		Public health problem
	0-4.9y (000)	General (000)	Date of survey (years)	Level of survey ^b	Age range	Sample Size	Reference ^c	Notes	Estimate	95% CI	Estimate	95% CI	
Afghanistan	5732	31082	2004	N	0.50-4.99	870	5173	Adjusted for altitude	37.9	33.5-42.6	2172	1918-2439	Moderate
Albania	252	3147		R					31.0	9.4-65.9	78	24-166	Moderate
Algeria	3218	33354		R					42.5	14.7-76.1	1369	473-2448	Severe
Andorra	4	67		R					12.0	2.9-38.4	0	0-1	Mild
Angola	3058	16400	1998-1999	N	0.00-4.99	825	2839		29.7	25.5-34.3	908	779-1048	Moderate
Antigua and Barbuda	8	82	1996-1997	N	1.00-4.99	81	3758	Sample size <100	49.4	34.5-64.4	4	3-5	Severe
Argentina	3346	39134		R					18.1	4.8-49.2	605	160-1646	Mild
Armenia	162	3007	2000	N	0.50-4.99	1334	3208	Adjusted for altitude	23.9	20.8-27.3	39	34-44	Moderate
Australia	1252	20366		R					8.0	1.8-29.6	101	22-371	Mild
Austria	379	8205		R					10.5	2.5-35.3	40	9-134	Mild
Azerbaijan	604	8471	2001	N	1.00-4.99	2017	4682		31.8	29.0-34.7	192	175-210	Moderate
Bahamas	30	327		R					21.9	6.1-54.8	7	2-17	Moderate
Bahrain	64	739		R					24.7	7.0-58.9	16	4-38	Moderate
Bangladesh	17491	144437	2001	N	0.50-4.99	1148	3256	National survey in rural areas	47.0	42.9-51.1	8221	7512-8937	Severe
Barbados	16	270		R					17.1	4.5-47.3	3	1-8	Mild
Belarus	452	9700		R					27.4	8.1-61.9	124	37-280	Moderate
Belgium	559	10437		R					8.7	2.0-31.0	48	11-173	Mild
Belize	34	275		R					35.9	11.6-70.6	12	4-24	Moderate
Benin	1478	8703	2001	N	0.50-4.99	2284	3461	Adjusted for altitude	81.9	79.6-84.0	1210	1176-1242	Severe
Bhutan	297	2211	2002	N	0.50-5.07	100	5150	1800 subjects recruited, final sample size not specified, adjusted for altitude.	80.6	67.3-89.3	239	200-265	Severe
Bolivia	1243	9354	2003-2004	N	0.50-4.99	2693	5095		51.6	48.9-54.3	641	608-675	Severe
Bosnia and Herzegovina	182	3912		R					26.8	7.6-61.9	49	14-113	Moderate
Botswana	215	1760	1994	N	0.50-4.99	149	2805		38.0	27.7-49.5	82	60-106	Moderate
Brazil	18074	188883	1993, 1997, 1998	F	NS 4.99	6556	2375, 2843, 614	Prevalence pooled from three studies at state level	54.9	53.2-56.6	9923	9614-10229	Severe
Brunei Darussalam	40	382		R					24.2	6.8-58.5	10	3-24	Moderate
Bulgaria	334	7671		R					26.7	7.8-61.1	89	26-204	Moderate
Burkina Faso	2527	13634	2003	N	0.50-4.99	2786	4948		91.5	89.9-92.9	2313	2273-2347	Severe
Burundi	1394	7834	2003	N	0.00-4.99	1150	5782		56.0	51.9-60.0	780	723-836	Severe
Cambodia	1869	14351	2000	N	0.50-4.99	1461	3206		63.4	59.8-66.8	1185	1118-1249	Severe
Cameroon	2465	16601	2004	N	0.50-4.99	3530	5214	Adjusted for altitude	68.3	66.1-70.4	1684	1629-1736	Severe
Canada	1691	32566		R					7.6	1.6-28.9	129	28-489	Mild
Cape Verde	73	519		R					39.7	13.3-73.8	29	10-54	Moderate
Central African Republic	644	4093	1999	N	0.50-2.99	1055	1722		84.2	80.8-87.1	542	520-561	Severe
Chad	1927	10032		R					71.1	36.0-91.5	1370	694-1763	Severe
Chile	1233	16465		R					24.4	6.9-58.2	301	86-718	Moderate
China	83929	1331217	2002	N	0.00-4.99	15073	5287	Weighted prevalence	20.0	19.1-20.9	16786	16041-17556	Moderate
Colombia	4718	46279		R					27.7	8.1-62.4	1307	383-2945	Moderate
Comoros	129	819		R					65.4	30.0-89.2	84	39-115	Severe
Congo	773	4117		R					66.4	31.0-89.7	513	240-693	Severe
Cook Islands	2	18		R					24.7	7.0-58.8	0	0-1	Moderate

Table A3.1 Country estimates of anaemia prevalence in preschool-age children

Member State	Population 2006 ^a		Survey Information						Proportion of the population with Hb<110 g/L		Population with anaemia (number of individuals)(000)		Public health problem
	0-4.99y (000)	General (000)	Date of survey (years)	Level of survey ^b	Age range	Sample Size	Reference ^c	Notes	Estimate	95% CI	Estimate	95% CI	
Costa Rica	393	4399	1996	N	1.00-4.99	590	3555	Pooled data disaggregated by age, adjusted for altitude.	20.9	16.6-25.9	82	65-102	Moderate
Cote d'Ivoire	2794	18454		R					69.0	33.9-90.6	1928	946-2533	Severe
Croatia	205	4556		R					23.4	6.6-56.9	48	13-116	Moderate
Cuba	674	11294		R					26.7	7.7-61.5	180	52-415	Moderate
Cyprus	49	845		R					18.6	5.0-49.9	9	2-25	Mild
Czech Republic	455	10209		R					18.4	4.9-49.6	84	22-226	Mild
Democratic People's Republic of Korea	1682	22583	1998	N	0.50-6.99	1787	3090	Survey covers 71% of population, exclusion for accessibility	31.7	28.7-34.8	533	483-586	Moderate
Democratic Republic of Congo	11602	59320	2005	N	0.00-4.99	4435	5764		70.6	68.7-72.5	8191	7967-8407	Severe
Denmark	322	5446		R					9.0	2.0-32.1	29	7-103	Mild
Djibouti	121	807		R					65.8	30.7-89.3	79	37-108	Severe
Dominica	7	80	1996-1997	N	1.00-4.99	157	3758		34.4	24.8-45.5	3	2-3	Moderate
Dominican Republic	1008	9021		R					34.6	11.0-69.4	349	111-699	Moderate
Ecuador	1440	13419		R					37.9	12.5-72.4	546	180-1043	Moderate
Egypt	9054	75437	2000	N	0.50-4.99	4708	1940		29.9	28.1-31.8	2707	2543-2877	Moderate
El Salvador	805	6999	2002-2003	N	1.00-4.99	3882	5171	Adjusted for altitude	18.4	16.7-20.2	148	135-162	Mild
Equatorial Guinea	91	515		R					40.8	13.7-75.9	37	12-69	Severe
Eritrea	782	4560		R					69.6	34.4-90.9	544	269-710	Severe
Estonia	66	1325		R					23.4	6.5-57.0	15	4-37	Moderate
Ethiopia	13269	79289		R					75.2	40.7-93.1	9979	5403-12347	Severe
Fiji	91	854	1993	N	0.50-4.99	512	2699		39.1	33.3-45.2	36	30-41	Moderate
Finland	278	5262		R					11.5	2.8-37.1	32	8-103	Mild
France	3723	60723		R					8.3	1.8-30.5	310	69-1135	Mild
Gabon	193	1406		R					44.5	15.7-77.5	86	30-150	Severe
Gambia	233	1556	1999	N	1.00-5.99	1111	2806		79.4	75.8-82.6	185	177-193	Severe
Georgia	237	4434		R					40.6	13.7-74.7	96	32-177	Severe
Germany	3489	82716		R					7.8	1.7-29.3	273	60-1022	Moderate
Ghana	3128	22556	2003	N	0.50-4.99	2992	4943		76.1	73.9-78.2	2380	2311-2446	Severe
Greece	511	11140		R					12.1	3.0-38.3	62	15-196	Mild
Grenada	10	104		R					32.0	9.9-66.8	3	1-6	Moderate
Guatemala	2049	12911	2002	N	0.50-4.99	4016	4586	Data disaggregated by age pooled, prevalence calculated for recommended Hb cut-off; adjusted for altitude	38.1	36.0-40.2	781	738-824	Moderate
Guinea	1615	9603	2000	N	0.50-4.99	1446	2780		79.0	75.9-81.8	1276	1225-1321	Severe
Guinea-Bissau	320	1634		R					74.9	40.3-93.0	240	129-298	Severe
Guyana	73	752	1996-1997	N	0.00-4.99	140	3094		47.9	36.5-59.5	35	27-44	Severe
Haiti	1156	8650	2000	N	0.50-4.99	2751	3264	Adjusted for altitude	65.3	62.7-67.8	755	725-783	Severe
Honduras	984	7362	2001	N	1.00-4.99	4605	3096		29.9	28.1-31.8	294	276-313	Moderate
Hungary	474	10071		R					18.8	5.0-50.1	89	24-237	Mild
Iceland	21	297		R					7.8	1.7-29.2	2	0-6	Mild
India	119906	1119538	1998-1999, 2000	N, F	0.50-2.99	20221	2972, 3780a	Prevalence pooled from national survey and one state survey excluded from it and completed later, adjustment for altitude.	74.3	73.4-75.1	89090	88059-90100	Severe
Indonesia	21598	225465		R					44.5	15.6-77.6	9608	3378-16758	Severe
Iran (Islamic Republic of)	6204	70324		R					35.0	11.2-69.8	2174	695-4328	Moderate
Iraq	4364	29551		R					55.9	22.3-84.8	2440	974-3702	Severe
Ireland	310	4210		R					10.3	2.4-35.2	32	7-109	Mild

Table A3.1 Country estimates of anaemia prevalence in preschool-age children

Member State	Population 2006 ^a		Survey Information						Proportion of the population with Hb<110 g/L		Population with anaemia (number of individuals)(000)		Public health problem
	0-4.99y (000)	General (000)	Date of survey (years)	Level of survey ^b	Age range	Sample Size	Reference ^c	Notes	Estimate	95% CI	Estimate	95% CI	
Israel	669	6847		R					11.8	2.9-37.7	79	19-253	Mild
Italy	2658	58140		R					10.9	2.6-36.1	291	69-959	Mild
Jamaica	254	2662	1997-1998	N	1.00-4.99	272	3093		48.2	39.9-56.6	123	102-144	Severe
Japan	5840	128219		R					10.6	2.5-35.2	617	146-2056	Mild
Jordan	732	5837	2002	N	0.50-4.99	2573	3389, 4382	Prevalence pooled from two national surveys carried out in the same year, adjusted for altitude (3389 only).	28.3	25.9-30.8	207	190-225	Moderate
Kazakhstan	1073	14812	1999	N	NS-4.99	574	2675		36.3	30.9-42.0	390	332-451	Moderate
Kenya	5927	35106	1999	N	0.17-5.99	2734	3442	Data disaggregated by age pooled, adjusted for altitude.	69.0	66.5-71.4	4089	3941-4231	Severe
Kiribati	12	101		R					41.9	14.2-75.8	5	2-9	Severe
Kuwait	247	2765	1998-2002	N	0.50-4.99	3693	4375	Data disaggregated by sex pooled, prevalence calculated from mean	32.4	30.3-34.6	80	75-85	Moderate
Kyrgyzstan	543	5325	1997	N	NS-2.99	1021	2295	Adjusted for altitude	49.8	45.5-54.1	270	247-294	Severe
Lao People's Democratic Republic	906	6058	2000	N	0.00-5.99	100	770		48.2	34.8-61.8	437	315-560	Severe
Latvia	102	2295		R					26.7	7.7-61.1	27	8-62	Moderate
Lebanon	320	3614	1997-1998	N	1.00-4.99	234	3221	Prevalence pooled from data disaggregated by age, adjusted for altitude.	28.3	20.9-37.1	90	67-119	Moderate
Lesotho	229	1791	2004-2005	N	0.50-4.99	1435	5356	Adjusted for altitude	48.6	45.0-52.3	111	103-120	Severe
Liberia	647	3356	1999	N	0.50-2.99	708	1242		86.7	82.8-89.9	561	536-582	Severe
Libyan Arab Jamahiriya	649	5968		R					33.9	10.5-69.1	220	68-448	Moderate
Lithuania	148	3417		R					23.8	6.7-57.5	35	10-85	Moderate
Luxembourg	29	471		R					9.4	1.9-35.2	3	1-10	Mild
Madagascar	3149	19105	2003-2004	N	0.50-4.99	1793	5190	Adjusted for altitude	68.3	65.2-71.3	2151	2053-2244	Severe
Malawi	2363	13166	2004-2005	N	0.50-4.99	2173	5201	Adjusted for altitude.	73.2	70.5-75.7	1730	1666-1790	Severe
Malaysia	2725	25796		R					32.4	10.0-67.5	883	271-1841	Moderate
Maldives	47	337	1994	N	NS-4.99	1932	831		81.5	78.9-83.8	38	37-39	Severe
Mali	2667	13918	2001	N	NS-4.99	2826	3446		82.8	80.7-84.7	2208	2153-2258	Severe
Malta	20	403		R					16.3	4.2-46.4	3	1-9	Mild
Marshall Islands	8	64		R					30.0	8.7-65.8	2	1-5	Moderate
Mauritania	539	3158		R					68.2	33.1-90.3	368	178-487	Severe
Mauritius	98	1256	1995	N	3.00-6.99	523	395	Prevalence pooled from the Islands of Mauritius and Rodrigues	16.8	12.7-21.8	16	12-21	Mild
Mexico	10726	108327	1998-1999	N	0.50-4.99	5526	2997	Data disaggregated by age pooled, prevalence calculated for recommended cut-off, adjusted for altitude	29.4	27.7-31.1	3153	2974-3339	Moderate
Micronesia (Federated States of)	16	111	1993, 2000	F	2.00-4.99	841	4942, 2548	Data pooled from 2 surveys at state level	18.7	15.3-22.7	3	2-4	Mild
Monaco	2	36		R					5.0	0.9-23.8	0	0-1	Mild
Mongolia	270	2679	2004	N	0.50-4.99	1241	5247	Adjusted for altitude	21.4	18.4-24.8	58	50-67	Moderate
Morocco	3408	31943	2000	N	0.50-4.99	1486	3469		31.5	28.3-34.9	1073	963-1190	Moderate
Mozambique	3325	20158	2001-2002	N	0.50-4.99	707	589		74.7	69.9-79.0	2483	2324-2625	Severe
Myanmar	4586	51009		R					63.2	28.1-88.3	2899	1290-4050	Severe
Namibia	265	2052		R					40.5	13.4-75.0	107	35-199	Severe
Nauru	2	14		R					20.0	5.4-52.5	0	0-1	Moderate

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Member State	Population 2006 ^a		Survey Information						Proportion of the population with Hb<110 g/L		Population with anaemia (number of individuals)(000)		Public health problem
	0-4.99y (000)	General (000)	Date of survey (years)	Level of survey ^b	Age range	Sample Size	Reference ^c	Notes	Estimate	95% CI	Estimate	95% CI	
Nepal	3646	27678	1997-1998	N	0.50-4.99	3900	1083	Adjusted for altitude	78.0	76.1-79.8	2844	2775-2909	Severe
Netherlands	962	16367		R					8.7	2.0-31.3	84	19-301	Mild
New Zealand	273	4063		R					11.3	2.7-36.5	31	8-100	Mild
Nicaragua	734	5600	2002-2003	N	0.50-4.99	494	4466	Adjusted for altitude	17.0	12.8-22.2	125	94-163	Mild
Niger	2925	14426		R					81.3	49.1-95.1	2377	1435-2783	Severe
Nigeria	22548	134375	1993	N	0.50-4.99	2287	50	Data disaggregated by age pooled	76.1	73.5-78.5	17159	16583-17697	Severe
Niue	0	1		R					21.6	5.7-55.7	0	0-0	Moderate
Norway	280	4643		R					6.4	1.3-26.3	18	4-73	Mild
Oman	303	2612	1995	N	0.00-4.99	5015	5204		50.5	48.5-52.5	153	147-159	Severe
Pakistan	21339	161209	2001	N	0.50-4.99	7015	4640		50.9	49.2-52.6	10862	10509-11214	Severe
Palau	2	20		R					22.2	6.1-55.6	1	0-1	Moderate
Panama	344	3288	1999	N	1.00-4.99	1010	3097		36.0	31.9-40.3	124	110-139	Moderate
Papua New Guinea	810	6001		R					59.8	25.7-86.5	485	208-701	Severe
Paraguay	836	6301		R					30.2	9.0-65.3	252	75-546	Moderate
Peru	2996	28380	2004	N	NS-4.99	12788	5359	Adjusted for altitude	50.4	49.2-51.6	1510	1473-1547	Severe
Philippines	9839	84477	2003	N	0.50	4.99	2962	5242	36.3	33.9-38.8	3572	3335-3816	Moderate
Poland	1804	38499		R					22.7	6.4-56.0	410	115-1010	Moderate
Portugal	559	10545		R					12.7	3.1-39.4	71	18-220	Mild
Qatar	69	839	1995	N	NS-NS	1449	820	Age ranges from < 1 to >2 y of age	26.2	23.1-29.5	18	16-20	Moderate
Republic of Korea	2335	47983	1995	N	0.00-6.99	443	3327	Prevalence calculated for recommended cut-off	16.5	12.2-22.0	385	284-513	Mild
Republic of Moldova	206	4195		R					40.6	13.7-74.6	83	28-153	Severe
Romania	1046	21629	2004-2005	N	See note	100	164	Prevalence calculated from 2 age groups: 1.00-1.99 and 4.92-4.99 yrs	39.8	27.3-53.8	416	285-563	Moderate
Russian Federation	7384	142537		R					26.5	7.7-60.9	1959	571-4496	Moderate
Rwanda	1532	9230	1996	N	0.00-4.99	969	2558	Data disaggregated by age pooled	41.9	37.6-46.3	642	576-710	Severe
Saint Kitts and Nevis	4	43		R					22.9	6.4-56.3	1	0-2	Moderate
Saint Lucia	15	162		R					32.2	9.9-67.1	5	1-10	Moderate
Saint Vincent and the Grenadines	12	120		R					32.3	10.0-67.2	4	1-8	Moderate
Samoa	25	186	1999	N	0.50-4.99	224	3226	Data disaggregated by age pooled	35.5	27.2-44.8	9	7-11	Moderate
San Marino	1	28		R					9.1	1.9-34.0	0	0-0	Mild
Sao Tome and Principe	23	160		R					36.7	11.2-72.7	9	3-17	Moderate
Saudi Arabia	3225	25193		R					33.1	10.3-68.1	1067	332-2196	Moderate
Senegal	1870	11936		R					70.1	34.8-91.1	1310	651-1703	Severe
Serbia and Montenegro ^d	603	10497	2000	N	0.50-4.99	369	2441		29.5	23.4-36.5	178	141-220	Moderate
Seychelles	6	81		R					23.8	6.7-57.6	2	0-4	Moderate
Sierra Leone	985	5679		R					83.2	51.9-95.8	819	511-943	Severe
Singapore	208	4380		R					18.9	5.0-51.0	39	10-106	Mild
Slovakia	253	5401		R					23.4	6.6-56.9	59	17-144	Moderate
Slovenia	86	1966		R					14.0	3.5-41.9	12	3-36	Mild
Solomon Islands	72	490		R					51.7	19.9-82.1	37	14-59	Severe
Somalia	1518	8496						No estimate possible					
South Africa	5183	47594	1994	N	0.50-4.99	3597	48	Data disaggregated by age pooled	24.1	22.2-26.1	1249	1150-1354	Moderate
Spain	2262	43379		R					12.9	3.2-39.8	292	73-901	Mild
Sri Lanka	1622	20912	2001	N	0.50-4.99	1749	4972	Adjusted for altitude	29.9	27.0-33.0	485	437-536	Moderate
Sudan	5252	36992	1994, 1995	F	0.50-6.99	1970	1553, 1443	Pooled data from one regional and one state level survey	84.6	82.2-86.7	4443	4317-4554	Severe

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Member State	Population 2006 ^a		Survey Information						Proportion of the population with Hb<110 g/L		Population with anaemia (number of individuals)(000)		Public health problem
	0-4.99y (000)	General (000)	Date of survey (years)	Level of survey ^b	Age range	Sample Size	Reference ^c	Notes	Estimate	95% CI	Estimate	95% CI	
Suriname	45	452		R					25.7	7.3-60.3	12	3-27	Moderate
Swaziland	134	1029		R					46.7	15.6-80.6	63	21-108	Severe
Sweden	492	9070		R					8.6	1.9-30.7	42	10-151	Mild
Switzerland	346	7264		R					6.3	1.3-26.1	22	4-90	Mild
Syrian Arab Republic	2563	19512		R					41.0	13.9-74.9	1050	357-1918	Severe
Tajikistan	831	6591	2003	N	0.50-4.99	1910	4182	Adjusted for altitude	37.7	34.7-40.8	313	288-339	Moderate
Thailand	4992	64762	1995	N	0.00-5.99	3260	3961		25.2	23.2-27.4	1258	1156-1366	Moderate
The Former Yugoslav Republic of Macedonia	116	2037	1999	N	0.50-4.99	1079	1609		25.8	22.3-29.7	30	26-34	Moderate
Timor Leste	198	1007	2003	N	0.00-4.99	5029	5050	Adjusted for altitude	31.5	29.7-33.3	62	59-66	Moderate
Togo	1030	6306		R					52.4	19.6-83.3	540	202-858	Severe
Tonga	12	103		R					27.6	8.1-62.3	3	1-7	Moderate
Trinidad and Tobago	91	1309		R					30.4	9.1-65.5	28	8-59	Moderate
Tunisia	808	10210	1996-1997	N	0.00-5.99	965	2485		21.7	18.2-25.6	175	148-207	Moderate
Turkey	7195	74175		R					32.6	10.1-67.4	2344	728-4853	Moderate
Turkmenistan	491	4899	2000	N	0.00-4.99	2950	3209		35.8	33.4-38.3	176	164-188	Moderate
Tuvalu	1	10		R					34.2	10.6-69.4	0	0-1	Moderate
Uganda	6210	29857	2000-2001	N	0.50-4.99	5833	3207		64.1	62.3-65.8	3981	3871-4087	Severe
Ukraine	1922	45986	2002	N	0.50-3.07	896	5172		22.2	18.6-26.3	427	357-505	Moderate
United Arab Emirates	346	4657		R					27.7	8.0-62.9	96	28-218	Moderate
United Kingdom of Great Britain and Northern Ireland	3339	59847	1992-1993	N	1.50-4.57	951	3279		8.0	5.9-10.8	267	196-361	Mild
United Republic of Tanzania	6079	39025	2004-2005	N	0.50-4.99	7300	5221	Adjusted for altitude.	71.8	70.3-73.2	4365	4275-4452	Severe
United States of America	20568	301029	1999-2002	N	1.00-4.99	1357	4738		3.1	2.0-4.7	638	418-968	No public health problem
Uruguay	281	3487		R					19.1	5.0-51.3	54	14-144	Mild
Uzbekistan	2861	26980	2002	N	0.50-4.99	2305	4950	Data disaggregated by age, prevalence calculated for recommended cut-off for age group 3-4 years, adjusted for altitude.	38.1	35.3-40.9	1090	1011-1171	Moderate
Vanuatu	30	215		R					59.0	24.9-86.2	18	7-26	Severe
Venezuela	2877	27216		R					33.1	10.3-68.1	953	297-1958	Moderate
Vietnam	8002	85344	2000-2001	N	0.00-4.99	7024	3408		34.1	32.6-35.7	2729	2605-2855	Moderate
Yemen	3762	21639		R					68.3	33.0-90.5	2571	1240-3403	Severe
Zambia	2033	11861	2003	N	0.50-4.99	729	5098		52.9	47.8-58.0	1075	971-1179	Severe
Zimbabwe	1750	13085	1999	N	1.00-5.99	327	2641		19.3	14.0-26.1	338	244-456	Mild

^a Population figures are based on the 2006 projection from the 2004 revision from the United Nations Population Division.

^b Level of survey: N=nationally representative, F=2+ surveys at the first administrative level boundary, R=regression-based estimate.

^c Corresponds to the numerical reference available in the WHO Global Database on Anaemia (<http://www.who.int/vmnis/en/>).

^d On 3 June 2006, the Permanent Representative of the Republic of Serbia to the United Nations and other International Organizations in Geneva informed the Acting Director-General of the WHO that "the membership of the state union Serbia and Montenegro in the United Nations, including all organs and the organizations of the United Nations system, is continued by the Republic of Serbia on the basis of Article 60 of the Constitutional Charter of Serbia and Montenegro, activated by the Declaration of Independence adopted by the National Assembly of Montenegro on 3 June 2006". Estimates used or referred to in this document cover a period of time preceding that communication.

Table A3.2 Country estimates of anaemia prevalence in pregnant women

Member State	Population 2006 ^a		Survey Information						Proportion of the population with Hb<110 g/L		Population with anaemia (number of individuals)(000)		Public health problem
	PW (000)	General (000)	Date of survey (years)	Level of survey ^b	Age range	Sample Size	Reference ^c	Notes	Estimate	95% CI	Estimate	95% CI	
Afghanistan	1567	31082		R					61.0	28.8-85.9	956	451-1345	Severe
Albania	54	3147		R					34.0	12.0-66.1	18	6-35	Moderate
Algeria	712	33354		R					42.8	16.6-73.8	305	118-525	Moderate
Andorra	1	67		R					15.5	4.1-44.0	0	0-0	Mild
Angola	811	16400		R					57.1	25.4-83.9	463	206-680	Severe
Antigua and Barbuda	2	82		R					29.5	10.0-61.3	1	0-1	Moderate
Argentina	696	39134		R					25.4	8.1-56.9	177	56-396	Moderate
Armenia	37	3007	2000	N	15.00-49.99	169	3208	Adjusted for altitude.	12.0	6.6-20.8	4	2-8	Mild
Australia	254	20366		R					12.4	2.7-41.6	32	7-106	Mild
Austria	72	8205		R					15.5	3.8-45.6	11	3-33	Mild
Azerbaijan	141	8471	2001	N	15.00-44.99	157	4682	Different Hb cut-off for gestational age (Hb <110 g/L gestation 1-3, 7 mo, <106 g/L 4 mo, <105 g/L 5 mo, <107 g/L 6 mo, <114 g/L 8 mo, <119 g/L 9 mo)	38.4	28.3-49.6	54	40-70	Moderate
Bahamas	6	327		R					23.3	7.2-54.2	1	0-3	Moderate
Bahrain	12	739		R					27.7	9.1-59.4	3	1-7	Moderate
Bangladesh	3759	144437	2001	N	16.00-45.99	108	3256	National survey in rural areas	47.0	34.2-60.2	1767	1286-2263	Severe
Barbados	3	270		R					23.0	7.0-54.1	1	0-2	Moderate
Belarus	92	9700		R					25.8	8.2-57.6	24	7-53	Moderate
Belgium	108	10437		R					12.9	3.0-41.7	14	3-45	Mild
Belize	7	275	1994-1995	N	NS-NS	4661	1062		51.7	49.7-53.7	4	3-4	Severe
Benin	366	8703	2001	N	15.00-49.99	364	3461	Adjusted for altitude	72.7	65.8-78.7	266	241-288	Severe
Bhutan	66	2211		R					49.6	20.3-79.2	33	13-53	Severe
Bolivia	263	9354	2003-2004	N	15.00-49.99	357	5095		37.0	30.2-44.3	97	79-116	Moderate
Bosnia and Herzegovina	36	3912		R					34.8	12.4-66.9	13	4-24	Moderate
Botswana	44	1760		R					21.3	5.6-55.1	9	2-24	Moderate
Brazil	3697	188883		R					29.1	9.8-60.8	1077	363-2248	Moderate
Brunei Darussalam	8	382	1995	N	13.00-NS	817	3328		38.9	34.3-43.7	3	3-4	Moderate
Bulgaria	64	7671		R					29.7	10.0-61.5	19	6-40	Moderate
Burkina Faso	655	13634	2003	N	15.00-49.99	441	4948		68.3	61.9-74.1	448	405-486	Severe
Burundi	395	7834	2003	N	NS-NS	153	5782		47.1	36.2-58.2	186	143-230	Severe
Cambodia	444	14351	2000	N	15.00-49.99	209	3206		66.4	56.8-74.8	295	252-332	Severe
Cameroon	562	16601	2004	N	15.00-49.99	535	5214	Adjusted for altitude	50.9	44.9-56.8	286	253-320	Severe
Canada	327	32566		R					11.5	2.4-40.9	38	8-134	Mild
Cape Verde	16	519		R					41.3	15.7-72.6	6	2-11	Severe
Central African Republic	151	4093	1999	N	15.00-49.99	330	1722		54.8	47.2-62.2	83	71-94	Severe
Chad	508	10032		R					60.4	28.1-85.6	307	143-435	Severe
Chile	251	16465		R					28.3	9.4-60.1	71	24-151	Moderate
China	17566	1331217	2002	N	NS-NS	3160	5287		28.9	26.7-31.2	5076	4693-5478	Moderate
Colombia	962	46279		R					31.1	10.7-63.0	299	103-606	Moderate
Comoros	28	819		R					55.0	24.3-82.3	16	7-23	Severe
Congo	190	4117		R					55.3	24.2-82.7	105	46-157	Severe
Cook Islands	0	18		R					27.2	8.9-58.8	0	0-0	Moderate
Costa Rica	80	4399	1996	N	NS-NS	68	1634	Adjusted for altitude.	27.9	15.5-45.0	22	12-36	Moderate
Cote d'Ivoire	670	18454		R					55.1	24.2-82.5	369	162-553	Severe
Croatia	41	4556		R					28.4	9.5-60.2	12	4-25	Moderate
Cuba	129	11294		R					39.1	14.0-71.6	51	18-93	Moderate

Table A3.2 Country estimates of anaemia prevalence in pregnant women

Member State	Population 2006 ^a		Survey Information						Proportion of the population with Hb<110 g/L		Population with anaemia (number of individuals)(000)		Public health problem
	PW (000)	General (000)	Date of survey (years)	Level of survey ^b	Age range	Sample Size	Reference ^c	Notes	Estimate	95% CI	Estimate	95% CI	
Cyprus	10	845		R					25.2	8.0-56.5	3	1-6	Moderate
Czech Republic	91	10209		R					22.3	6.9-52.9	20	6-48	Moderate
Democratic People's Republic of Korea	326	22583	1998	N	NS-NS	72	3090	Survey covers 71% of population, exclusion of counties due to accessibility	34.7	21.1-51.3	113	69-167	Moderate
Democratic Republic of Congo	3094	59320	2005	N	NS-NS	949	5764		67.3	63.0-71.4	2082	1948-2208	Severe
Denmark	60	5446		R					12.4	2.8-41.0	7	2-25	Mild
Djibouti	27	807		R					56.2	25.3-83.0	15	7-23	Severe
Dominica	2	80	1996-1997	N	NS-NS	148	3758		35.1	25.1-46.6	1	0-1	Moderate
Dominican Republic	211	9021		R					39.9	14.6-72.1	84	31-152	Moderate
Ecuador	292	13419		R					37.8	13.9-69.6	110	41-203	Moderate
Egypt	1939	75437	2000	N	15.00-49.99	602	1940		45.4	39.9-51.1	880	773-990	Severe
El Salvador	165	6999	1998	N	15.00-49.99	451	3107	Data disaggregated by trimester pooled, prevalence calculated for recommended cut-off from non-WHO cut-off, adjusted for altitude.	10.5	7.1-15.2	17	12-25	Moderate
Equatorial Guinea	23	515		R					41.7	13.6-76.5	10	3-18	Severe
Eritrea	180	4560		R					55.3	24.2-82.7	100	44-149	Severe
Estonia	14	1325		R					22.7	6.9-53.8	3	1-7	Moderate
Ethiopia	3201	79289		R					62.7	30.1-86.7	2006	965-2776	Severe
Fiji	19	854	1993	N	15.00-NS	54	2699		55.6	37.0-72.8	10	7-14	Severe
Finland	55	5262		R					15.0	3.9-43.3	8	2-24	Moderate
France	731	60723		R					11.5	2.5-39.6	84	18-290	Mild
Gabon	41	1406		R					46.2	17.0-78.3	19	7-32	Severe
Gambia	52	1556	1999	N	15.00-49.99	401	2806		75.1	68.7-80.6	39	36-42	Severe
Georgia	47	4434		R					41.6	15.7-73.1	19	7-34	Severe
Germany	671	82716		R					12.3	2.6-42.2	83	18-283	Mild
Ghana	688	22556	2003	N	15.00-49.99	400	4943		64.9	58.0-71.2	447	400-490	Severe
Greece	100	11140		R					18.6	5.1-49.2	19	5-49	Moderate
Grenada	6	104		R					31.4	10.8-63.2	2	1-4	Moderate
Guatemala	447	12911	2002	N	15.00-49.99	541	4586	Hb <110 g/L for 1-3 months gestational age, Hb <106, 105, 107, 110, 114, 119 g/L for 4, 5, 6, 7, 8, 9 months of gestational age respectively, adjusted for altitude.	22.1	17.6-27.4	99	78-122	Moderate
Guinea	396	9603	2000	N	NS-49.99	291	2780		63.2	55.1-70.6	250	218-280	Severe
Guinea-Bissau	85	1634		R					57.7	25.9-84.2	49	22-71	Severe
Guyana	14	752	1996-1997	N	NS-NS	269	3094		52.0	43.6-60.3	7	6-9	Severe
Haiti	257	8650	2000	N	15.00-49.99	381	3264	Adjusted for altitude.	63.2	56.1-69.7	162	144-179	Severe
Honduras	209	7362	1996	N	NS-NS	105	3095		32.4	21.2-46.1	68	44-96	Moderate
Hungary	92	10071		R					20.7	6.2-50.6	19	6-46	Moderate
Iceland	4	297		R					11.8	2.5-40.8	0	0-2	Mild
India	25753	1119538	1998-1999, 2000	N, F	15.00-49.99	5718	2972, 3780a	Data pooled from national survey and state survey excluded from national survey and completed later, adjustment for altitude, smoking.	49.7	47.9-51.5	12799	12328-13271	Severe
Indonesia	4399	225465		R					44.3	17.3-75.2	1950	761-3308	Severe
Iran (Islamic Republic of)	1447	70324	1994-1995	N	15.00-49.99	79	3015	Adjusted for altitude.	40.5	26.5-56.2	586	384-814	Severe

Table A3.2 Country estimates of anaemia prevalence in pregnant women

Member State	Population 2006 ^a		Survey Information						Proportion of the population with Hb<110 g/L		Population with anaemia (number of individuals)(000)		Public health problem
	PW (000)	General (000)	Date of survey (years)	Level of survey ^b	Age range	Sample Size	Reference ^c	Notes	Estimate	95% CI	Estimate	95% CI	
Iraq	987	29551		R					38.2	14.0-70.1	377	138-692	Moderate
Ireland	66	4210		R					14.8	3.6-45.1	10	2-30	Mild
Israel	134	6847		R					17.4	4.7-47.4	23	6-64	Mild
Italy	516	58140		R					15.5	3.9-45.1	80	20-232	Mild
Jamaica	51	2662	1999	N	13.00-46.99	541	3759		40.7	35.0-46.7	21	18-24	Severe
Japan	1146	128219		R					14.8	3.8-43.6	170	43-500	Mild
Jordan	151	5837	2002	N	15.00-49.99	336	3389, 4382	Data pooled from two national surveys carried out in same year. Adjusted for altitude (3389 only).	38.7	31.6-46.3	58	48-70	Moderate
Kazakhstan	238	14812		R					26.0	8.2-58.1	62	19-138	Moderate
Kenya	1447	35106	1999	N	NS-50.99	390	3442	Adjusted for altitude	55.1	48.1-61.9	797	695-896	Severe
Kiribati	2	101		R					38.4	14.2-70.1	1	0-2	Moderate
Kuwait	54	2765		R					31.3	10.7-63.5	17	6-34	Moderate
Kyrgyzstan	116	5325		R					34.1	12.0-66.3	40	14-77	Moderate
Lao People's Democratic Republic	208	6058		R					56.4	24.9-83.4	117	52-173	Severe
Latvia	21	2295		R					25.0	7.9-56.4	5	2-12	Moderate
Lebanon	66	3614		R				National data, but small sample size, 20.	31.6	10.9-63.5	21	7-42	Moderate
Lesotho	49	1791	2004	N	15.00-49.99	172	5356	Prevalence adjusted for altitude and smoking.	25.4	17.3-35.6	12	8-17	Moderate
Liberia	175	3356	1999	N	14.00-49.99	199	1242		62.1	52.2-71.1	109	91-124	Severe
Libyan Arab Jamahiriya	140	5968		R					34.5	12.2-66.7	48	17-93	Moderate
Lithuania	31	3417		R					24.2	7.5-55.5	7	2-17	Moderate
Luxembourg	6	471		R					10.3	2.0-38.8	1	0-2	Mild
Madagascar	732	19105	2003-2004	N	15.00-49.99	229	5190	Adjusted for altitude and smoking.	50.1	41.0-59.1	367	301-433	Severe
Malawi	567	13166	2004	N	15.00-49.99	352	5201	Adjusted for altitude and smoking.	47.3	40.0-54.7	268	227-310	Severe
Malaysia	540	25796	2004	N	NS-NS	224958	5795		38.3	38.0-38.6	207	205-208	Moderate
Maldives	10	337	2001	N	15.00-49.99	74	2987		55.4	39.4-70.4	6	4-7	Severe
Mali	698	13918	2001	N	15.00-49.99	524	3446		73.4	67.7-78.4	513	473-547	Severe
Malta	4	403		R					26.1	8.4-57.7	1	0-2	Moderate
Marshall Islands	1	64		R					38.1	13.9-70.1	1	0-1	Moderate
Mauritania	131	3158		R					52.7	22.8-80.7	69	30-105	Severe
Mauritius	20	1256	1995	N	NS-NS	664	395	Data pooled from the Islands of Mauritius and Rodrigues	37.5	32.5-42.8	7	6-8	Moderate
Mexico	2099	108327	1998-1999	N	12.00-49.99	697	2997	Adjusted for altitude.	26.2	21.9-31.1	550	459-652	Moderate
Micronesia (Federated States of)	3	111		R					37.8	14.0-69.4	1	0-2	Moderate
Monaco	0	36		R					6.3	0.9-34.7	0	0-0	Mild
Mongolia	57	2679		R					37.3	13.6-69.1	21	8-40	Moderate
Morocco	723	31943	2000	N	15.00-44.99	462	3469		37.2	31.2-43.6	269	226-315	Moderate
Mozambique	781	20158		R					52.4	22.2-81.0	409	173-632	Severe
Myanmar	938	51009		R					49.6	20.8-78.6	465	196-738	Severe
Namibia	55	2052		R					30.6	10.0-63.6	17	6-35	Moderate
Nauru	0	14		R					19.2	5.4-50.0	0	0-0	Mild
Nepal	793	27678	1997-1998	N	NS-NS	418	1083	Adjusted for altitude.	74.6	68.3-80.0	591	541-634	Severe
Netherlands	178	16367		R					12.5	2.9-41.0	22	5-73	Moderate
New Zealand	54	4063		R					17.6	4.8-47.7	9	3-26	Moderate
Nicaragua	155	5600	2000	N	15.00-NS	149	3109		32.9	23.2-44.3	51	36-69	Moderate
Niger	793	14426		R					65.5	32.3-88.3	520	257-701	Severe
Nigeria	5481	134375	1993	N	15.00-45.99	318	50		66.7	59.0-73.6	3656	3235-4033	Severe

Table A3.2 Country estimates of anaemia prevalence in pregnant women

Member State	Population 2006 ^a		Survey Information						Proportion of the population with Hb<110 g/L		Population with anaemia (number of individuals)(000)		Public health problem
	PW (000)	General (000)	Date of survey (years)	Level of survey ^b	Age range	Sample Size	Reference ^c	Notes	Estimate	95% CI	Estimate	95% CI	
Niue	0	1		R					31.7	10.7-64.2	0	0-0	Moderate
Norway	54	4643		R					9.3	1.7-38.4	5	1-21	Mild
Oman	66	2612	2000	N	15.00-49.99	375	4218		42.7	35.8-49.9	28	24-33	Severe
Pakistan	4890	161209	2001	N	NS-NS	179	4640		39.1	29.6-49.5	1912	1446-2422	Moderate
Palau	0	20		R					27.3	9.0-58.7	0	0-0	Moderate
Panama	70	3288	1999	N	NS-NS	143	3097		36.4	26.1-48.1	26	18-34	Moderate
Papua New Guinea	172	6001		R					55.2	24.2-82.6	95	42-142	Severe
Paraguay	181	6301		R					39.3	14.6-71.1	71	26-129	Moderate
Peru	632	28380	2004	N	15.00-49.99	962	5359	Adjusted for altitude.	42.7	38.4-47.2	270	242-298	Severe
Philippines	1997	84477	2003	N	NS-NS	585	5242		43.9	38.3-49.6	877	765-991	Severe
Poland	371	38499		R					25.3	8.1-56.5	94	30-210	Moderate
Portugal	109	10545		R					17.3	4.8-46.6	19	5-51	Moderate
Qatar	15	839		R					29.1	9.7-61.2	4	1-9	Moderate
Republic of Korea	447	47983		R					22.6	7.0-53.2	101	31-238	Moderate
Republic of Moldova	44	4195		R					36.5	13.2-68.4	16	6-30	Moderate
Romania	206	21629		R					30.0	10.2-61.9	62	21-128	Moderate
Russian Federation	1580	142537		R					20.8	6.0-51.8	329	95-818	Moderate
Rwanda	393	9230	1996	N	NS-NS	161	2558		10.6	5.5-19.4	42	22-76	Mild
Saint Kitts and Nevis	1	43		R					25.6	8.3-56.9	0	0-1	Moderate
Saint Lucia	3	162		R					33.4	11.7-65.5	1	0-2	Moderate
Saint Vincent and the Grenadines	2	120		R					32.7	11.4-64.7	1	0-2	Moderate
Samoa	5	186		R				National data, but small sample size, 20.	33.4	11.7-65.4	2	1-3	Moderate
San Marino	0	28		R					11.3	2.2-41.5	0	0-0	Mild
Sao Tome and Principe	5	160		R					40.4	15.3-71.8	2	1-4	Severe
Saudi Arabia	684	25193		R					32.0	11.1-63.9	219	76-437	Moderate
Senegal	432	11936		R					57.6	26.1-83.9	249	113-363	Severe
Serbia and Montenegro ^d	118	10497		R					33.6	11.8-65.8	40	14-78	Moderate
Seychelles	4	81		R					24.9	7.9-56.1	1	0-2	Moderate
Sierra Leone	268	5679		R					59.7	27.1-85.5	160	73-229	Severe
Singapore	38	4380		R					23.8	7.4-55.1	9	3-21	Moderate
Slovakia	51	5401		R					25.2	8.1-56.3	13	4-29	Moderate
Slovenia	17	1966		R					18.9	5.4-48.8	3	1-8	Mild
Solomon Islands	15	490		R					51.1	21.6-79.9	8	3-12	Severe
Somalia	382	8496						No estimate possible					
South Africa	1048	47594		R					21.8	6.3-53.8	229	66-563	Moderate
Spain	463	43379		R					17.6	4.9-46.9	82	23-217	Mild
Sri Lanka	324	20912	2001	N	NS-NS	1696	4972	Adjusted for altitude.	29.3	26.3-32.5	95	85-105	Moderate
Sudan	1167	36992		R					57.7	26.0-84.1	674	304-982	Severe
Suriname	9	452		R					32.4	10.9-65.1	3	1-6	Moderate
Swaziland	29	1029		R					24.3	6.6-59.2	7	2-17	Moderate
Sweden	97	9070		R					12.9	3.0-41.6	13	3-40	Mild
Switzerland	65	7264	1999	N	16.00-42.99	381	3402	Prevalence calculated from mean and SD	9.7	6.2-14.8	6	4-10	Mild
Syrian Arab Republic	545	19512		R					39.3	14.6-71.0	214	80-387	Moderate
Tajikistan	186	6591		R					44.6	17.7-75.2	83	33-140	Severe
Thailand	993	64762	1995	N	NS-NS	242	3961		22.3	15.8-30.6	221	157-304	Moderate
The Former Yugoslav Republic of Macedonia	23	2037		R					31.8	11.0-63.8	7	3-15	Moderate

Table A3.2 Country estimates of anaemia prevalence in pregnant women

Member State	Population 2006 ^a		Survey Information						Proportion of the population with Hb<110 g/L		Population with anaemia (number of individuals)(000)		Public health problem
	PW (000)	General (000)	Date of survey (years)	Level of survey ^b	Age range	Sample Size	Reference ^c	Notes	Estimate	95% CI	Estimate	95% CI	
Timor Leste	56	1007	2003	N	15.00-49.99	549	5050	Prevalence for recommended cut-off calculated from prevalence for 120 g/L, adjusted for altitude.	22.9	18.3-28.2	13	10-16	Moderate
Togo	242	6306		R					50.2	21.1-79.2	121	51-191	Severe
Tonga	2	103		R					34.0	12.0-66.1	1	0-2	Moderate
Trinidad and Tobago	19	1309		R					29.7	10.0-61.7	6	2-12	Moderate
Tunisia	168	10210	1996-1997	N	19.00-40.99	70	2485	Small sample size	32.3	19.0-49.2	54	32-83	Moderate
Turkey	1486	74175		R					40.2	14.8-72.2	597	221-1073	Severe
Turkmenistan	109	4899		R					29.9	10.0-62.2	33	11-68	Moderate
Tuvalu	0	10		R					33.1	11.4-65.5	0	0-0	Moderate
Uganda	1616	29857	2000-2001	N	15.00-49.99	860	3207		41.2	36.6-45.9	666	592-742	Severe
Ukraine	395	45986		R					27.3	8.7-59.6	108	34-235	Moderate
United Arab Emirates	74	4657		R					27.9	9.2-59.6	21	7-44	Moderate
United Kingdom of Great Britain and Northern Ireland	654	59847		R					15.2	3.8-44.7	100	25-292	Moderate
United Republic of Tanzania	1414	39025	2004-2005	N	15.00-49.99	1075	5221	Adjusted for altitude and smoking.	58.2	54.0-62.3	823	763-881	Severe
United States of America	4233	301029	1999-2002	N	13.00-NS	615	4738		5.7	3.6-8.9	241	152-377	Mild
Uruguay	56	3487		R					27.1	8.8-58.7	15	5-33	Moderate
Uzbekistan	623	26980	1996	N	15.00-49.99	100	2293	Prevalence calculated for recommended cut-off from non-WHO cut-off.	53.8	40.0-67.0	335	250-418	Severe
Vanuatu	6	215	1996	N	15.00-49.99	234	3196		57.3	48.2-65.9	4	3-4	Severe
Venezuela	598	27216		R					39.6	14.4-71.9	237	86-430	Moderate
Vietnam	1642	85344	2000-2001	N	NS-NS	2744	3408		32.2	29.8-34.7	529	489-570	Moderate
Yemen	895	21639		R					58.1	26.6-84.1	520	238-753	Severe
Zambia	482	11861	1998	N	NS-NS	100	2477		46.9	33.6-60.6	226	162-292	Severe
Zimbabwe	384	13085	1999	N	15.00-49.99	100	2641		18.8	10.2-32.0	72	39-123	Moderate

^a Population figures are based on the 2006 projection from the 2004 revision from the United Nations Population Division.

^b Level of survey: N=nationally representative, F=2+ surveys at the first administrative level boundary, R=regression-based estimate.

^c Corresponds to the numerical reference available in the WHO Global Database on Anaemia (<http://www.who.int/vmnis/en/>).

^d On 3 June 2006, the Permanent Representative of the Republic of Serbia to the United Nations and other International Organizations in Geneva informed the Acting Director-General of the WHO that "the membership of the state union Serbia and Montenegro in the United Nations, including all organs and the organizations of the United Nations system, is continued by the Republic of Serbia on the basis of Article 60 of the Constitutional Charter of Serbia and Montenegro, activated by the Declaration of Independence adopted by the National Assembly of Montenegro on 3 June 2006". Estimates used or referred to in this document cover a period of time preceding that communication.

Table A3.3 Country estimates of anaemia prevalence in non-pregnant women of reproductive age

Member State	Population 2006 ^a		Survey Information						Proportion of the population with Hb<120 g/L		Population with anaemia (number of individuals)(000)		Public health problem
	Women 15.00-49.99y (000)	General (000)	Date of survey (years)	Level of survey ^b	Age range	Sample Size	Reference ^c	Notes	Estimate	95% CI	Estimate	95% CI	
Afghanistan	6645	31082	2004	N	15.00-49.99	1142	5173	Adjusted for altitude and smoking.	24.7	21.3-28.4	1254	1084-1442	Moderate
Albania	831	3147		R					21.1	7.5-46.8	164	58-364	Moderate
Algeria	9524	33354		R					31.4	12.4-59.8	2770	1090-5272	Moderate
Andorra	17	67		R					16.2	5.5-39.0	3	1-6	Mild
Angola	3764	16400		R					52.3	25.0-78.3	1544	737-2312	Severe
Antigua and Barbuda	22	82		R					26.5	9.9-54.0	5	2-11	Moderate
Argentina	9828	39134		R					18.0	6.3-42.1	1647	571-3841	Mild
Armenia	885	3007	2000	N	15.00-49.99	5968	3208	Data pooled for NPNLW ^a and LW, adjusted for altitude.	12.4	11.3-13.6	105	96-116	Mild
Australia	5114	20366		R					14.7	4.9-36.6	714	238-1780	Mild
Austria	1993	8205		R					14.8	5.0-36.5	283	95-701	Mild
Azerbaijan	2551	8471	2001	N	15.00-44.99	1749	4682		40.2	37.0-43.5	969	892-1048	Severe
Bahamas	91	327		R					22.7	8.3-48.9	19	7-42	Moderate
Bahrain	185	739	2002	N	14.00-49.99	384	5391		51.3	44.3-58.3	88	76-100	Severe
Bangladesh	37148	144437	2001	N	15.00-45.99	1195	3256	National survey in rural areas; data pooled for NPNLW, LW adolescents.	33.2	29.5-37.1	11085	9863-12379	Moderate
Barbados	76	270		R					17.2	5.9-40.6	13	4-30	Mild
Belarus	2643	9700		R					19.4	6.7-44.5	496	172-1136	Mild
Belgium	2421	10437		R					13.5	4.5-34.4	313	104-795	Mild
Belize	72	275		R					31.2	12.2-59.6	20	8-39	Moderate
Benin	1988	8703	2001	N	15.00-49.99	2762	3461	Data pooled for NPNLW and LW, adjusted for altitude.	63.2	60.6-65.7	1025	983-1065	Severe
Bhutan	533	2211	2002	N	16.00-NS		5150	1800 subjects recruited, final sample size not specified, adjusted for altitude.	54.8	41.0-67.9	256	191-317	Severe
Bolivia	2308	9354	2003-2004	N	15.00-49.99	5577	5095	Data pooled for NPNLW and LW	32.9	31.2-34.7	673	638-709	Moderate
Bosnia and Herzegovina	1001	3912		R					21.3	7.6-47.2	206	73-455	Moderate
Botswana	455	1760	1994	N	15.00-49.99	315	2805		32.7	25.8-40.4	135	106-166	Moderate
Brazil	52301	188883		R					23.1	8.4-49.4	11213	4093-24033	Moderate
Brunei Darussalam	110	382	1996-1997	N	15.00-49.99		3334	Data disaggregated by age pooled, prevalence calculated for recommended cut-off from non-WHO cut-off.	20.4	11.4-33.8	21	12-34	Moderate
Bulgaria	1872	7671		R					17.7	6.0-41.9	319	108-757	Mild
Burkina Faso	3038	13634	2003	N	15.00-49.99	3830	4948	Data pooled for NPNLW and LW	52.0	49.8-54.2	1239	1186-1292	Severe
Burundi	1856	7834	2003	N	NS-NS	973	5782		28.0	24.2-32.2	409	354-470	Moderate
Cambodia	3795	14351	2000	N	15.00-49.99	3402	3206	Data pooled for NPNLW and LW	57.3	54.9-59.6	1920	1841-1999	Severe
Cameroon	4009	16601	2004	N	15.00-49.99	4549	5214	Data pooled for NPNLW and LW, adjusted for altitude.	44.3	42.3-46.3	1527	1457-1598	Severe
Canada	8166	32566		R					14.3	4.7-35.9	1122	372-2812	Mild
Cape Verde	137	519		R					32.5	12.8-61.0	39	16-74	Moderate
Central African Republic	953	4093	1999	N	15.00-49.99	2396	1722		49.8	47.0-52.6	399	376-422	Severe
Chad	2202	10032		R					52.4	24.9-78.6	888	422-1331	Severe
Chile	4422	16465	2003	N	17.00-44.99	731	5783		4.8	3.0-7.5	200	126-314	No public health problem
China	365828	1331217	2002	N	15.00-49.99	52463	5287	Weighted prevalence	19.9	19.4-20.4	69304	67638-71001	Moderate
Colombia	12541	46279		R					23.6	8.6-50.2	2729	998-5813	Moderate
Comoros	200	819		R					47.8	21.8-75.1	82	37-129	Severe

Table A3.3 Country estimates of anaemia prevalence in non-pregnant women of reproductive age

Member State	Population 2006 ^a		Survey Information						Proportion of the population with Hb<120 g/L		Population with anaemia (number of individuals)(000)		Public health problem
	Women 15.00-49.99y (000)	General (000)	Date of survey (years)	Level of survey ^b	Age range	Sample Size	Reference ^c	Notes	Estimate	95% CI	Estimate	95% CI	
Congo	906	4117		R					52.8	25.2-78.8	378	180-564	Severe
Cook Islands	4	18		R					18.2	6.1-43.1	1	0-2	Moderate
Costa Rica	1195	4399	1996	N	NS-NS	906	3556, 4524	Data pooled for women reproductive age and LW, adjusted for altitude.	18.9	15.6-22.8	211	173-254	Mild
Cote d'Ivoire	4307	18454		R					47.4	21.5-74.8	1725	783-2721	Severe
Croatia	1090	4556		R					17.5	6.0-41.3	183	63-433	Mild
Cuba	3046	11294		R					19.5	6.9-44.3	570	201-1292	Mild
Cyprus	224	845		R					19.6	6.9-44.5	42	15-95	Mild
Czech Republic	2503	10209		R					16.9	5.8-40.2	408	140-971	Mild
Democratic People's Republic of Korea	6145	22583	2004	N	20.00 NS	1253	5068		34.7	31.1-38.5	2019	1808-2241	Moderate
Democratic Republic of Congo	13096	59320	2005	N	NS-NS	1366	5764		52.8	49.0-56.5	5281	4906-5653	Severe
Denmark	1239	5446		R					14.3	4.8-35.6	168	56-420	Mild
Djibouti	195	807		R					46.4	20.9-73.9	78	35-124	Severe
Dominica	21	80		R					23.7	8.7-50.4	5	2-10	Moderate
Dominican Republic	2447	9021		R					27.1	10.3-54.7	607	231-1222	Moderate
Ecuador	3486	13419		R					29.2	11.3-57.2	931	359-1827	Moderate
Egypt	19480	75437	2000	N	15.00-49.99	9210	1940	Data pooled for NPW, LW and women 15.00-19.99 yrs.	27.6	26.3-28.9	4841	4618-5071	Moderate
El Salvador	1865	6999	2002-2003	N	15.00-49.99	3777	5171	Adjusted for altitude.	26.8	24.9-28.8	455	422-490	Moderate
Equatorial Guinea	114	515		R					38.4	15.8-67.4	35	14-61	Moderate
Eritrea	1081	4560		R					52.1	24.7-78.2	469	223-705	Severe
Estonia	337	1325		R					17.7	6.0-42.1	57	19-136	Mild
Ethiopia	18358	79289		R					52.3	24.9-78.4	7927	3776-11878	Severe
Fiji	224	854	1993	N	15.00-44.99	1039	2699		31.8	27.9-35.9	65	57-74	Moderate
Finland	1174	5262		R					15.3	5.2-37.4	171	58-419	Mild
France	14086	60723	1994	N	35.00-49.99	4000	2392	Data disaggregated by age pooled, prevalence calculated from mean and SD.	9.1	7.9-10.4	1215	1057-1394	Mild
Gabon	343	1406		R					36.7	15.1-65.3	111	46-197	Moderate
Gambia	377	1556	1999	N	15.00-49.99	572	2806	LW	59.1	53.3-64.7	192	173-210	Severe
Georgia	1194	4434		R					22.7	7.8-50.3	260	90-578	Moderate
Germany	19505	82716		R					12.3	4.0-32.3	2322	749-6087	Mild
Ghana	5558	22556	2003	N	15.00-49.99	4872	4943	Data pooled for NPNLW and LW	43.1	41.1-45.1	2099	2004-2195	Severe
Greece	2723	11140		R					14.6	4.9-36.4	384	128-954	Mild
Grenada	28	104		R					24.0	8.8-50.9	5	2-11	Moderate
Guatemala	3103	12911	2002	N	15.00-49.99	3062	4586	NPW, adjusted for altitude.	20.2	18.3-22.3	537	485-592	Moderate
Guinea	2110	9603	2000	N	NS-49.99	1887	2780	NPW	50.4	47.2-53.6	864	809-918	Severe
Guinea-Bissau	356	1634		R					52.9	25.3-78.9	143	69-214	Severe
Guyana	217	752	1996-1997	N	15.00-50.99	447	3094	Data disaggregated by age pooled.	53.9	47.3-60.3	109	96-122	Severe
Haiti	2252	8650	2000	N	15.00-49.99	4449	3264	Data pooled for NPNLW and LW, adjusted for altitude.	54.4	52.3-56.5	1086	1044-1127	Severe
Honduras	1838	7362	2001	N	15.00-49.99	3589	3096	NPW	14.7	13.1-16.4	239	214-267	Mild
Hungary	2433	10071		R					16.6	5.6-39.7	388	132-930	Mild
Iceland	74	297		R					14.1	4.7-35.6	10	3-25	Mild
India	284397	1119538	1998-1999, 2000	N, F	15.00-49.99	74974	2972, 3780a	Data pooled from national survey and 1 state survey excluded from national survey completed later; data pooled for NPNLW and LW, adjusted for altitude and smoking.	52.0	51.5-52.5	134495	133187-135802	Severe

Table A3.3 Country estimates of anaemia prevalence in non-pregnant women of reproductive age

Member State	Population 2006 ^a		Survey Information						Proportion of the population with Hb<120 g/L		Population with anaemia (number of individuals)(000)		Public health problem
	Women 15.00-49.99y (000)	General (000)	Date of survey (years)	Level of survey ^b	Age range	Sample Size	Reference ^c	Notes	Estimate	95% CI	Estimate	95% CI	
Indonesia	62530	225465		R				1 study at state level and 3 local studies	33.1	13.1-61.8	19240	7638-35925	Moderate
Iran (Islamic Republic of)	20354	70324	1994-1995	N	15.00-49.99	1351	3015	NPW, adjusted for altitude.	33.0	29.6-36.6	6239	5588-6926	Moderate
Iraq	7263	29551		R					45.3	19.8-73.5	2842	1245-4610	Severe
Ireland	1117	4210		R					17.5	6.0-41.2	183	63-433	Mild
Israel	1650	6847		R					18.6	6.3-43.6	282	96-661	Mild
Italy	13479	58140		R					14.4	4.8-35.9	1868	625-4654	Mild
Jamaica	709	2662		R					23.8	8.8-50.5	157	58-332	Moderate
Japan	28009	128219	2002	N	20.00-49.99	1164	5177a	Data disaggregated by age pooled.	21.3	18.2-24.8	5722	4879-6665	Moderate
Jordan	1474	5837	2002	N	15.00-49.99	2925	3389, 4382	Data pooled for NPNLW, LW and NPW from 2 national surveys from the same year. Adjusted for altitude (3389 only).	28.6	26.3-31.0	378	349-410	Moderate
Kazakhstan	4243	14812	1999	N	15.00-49.99	2269	2675	Sample includes PW	35.5	32.8-38.3	1422	1312-1535	Moderate
Kenya	8454	35106	1999	N	NS-50.99	2735	3442	Prevalence calculated for recommended cut-off from mean and SD, adjusted for altitude.	46.4	43.8-49.0	3251	3067-3437	Severe
Kiribati	26	101		R					30.7	11.9-59.1	7	3-14	Moderate
Kuwait	690	2765	1998-2002	N	15.00-50.99	2993	4375	Data disaggregated by age pooled, prevalence calculated from mean (15.00-18.99 years)	28.7	26.5-31.0	183	168-197	Moderate
Kyrgyzstan	1456	5325	1997	N	15.00-49.99	3767	2295	Sample includes PW, adjusted for altitude.	38.0	35.8-40.2	509	480-539	Moderate
Lao People's Democratic Republic	1480	6058		R					46.1	20.7-73.7	587	263-938	Severe
Latvia	587	2295		R					18.9	6.4-44.0	107	36-249	Mild
Lebanon	985	3614	1997-1998	N	15.00-49.99	539	3221	Data pooled for NPNLW and LW, adjusted for altitude and smoking.	25.2	20.4-30.7	232	187-282	Moderate
Lesotho	474	1791	2004	N	15.00-49.99	2532	5356	Data pooled for NPNLW and LW, prevalence adjusted for altitude and smoking.	27.3	24.9-29.8	116	106-127	Moderate
Liberia	748	3356	1999	N	14.00-49.99	1376	1242		58.0	54.3-61.6	333	311-353	Severe
Libyan Arab Jamahiriya	1647	5968		R					29.9	11.5-58.5	451	173-881	Moderate
Lithuania	893	3417		R					17.9	6.1-42.1	154	53-363	Mild
Luxembourg	118	471		R					18.8	6.5-43.3	21	7-49	Mild
Madagascar	4442	19105	2003-2004	N	15.00-49.99	2383	5190	Data pooled for NPNLW and LW, adjusted for altitude and smoking.	45.6	42.8-48.4	1691	1587-1797	Severe
Malawi	2883	13166	2004-2005	N	15.00-49.99	2268	5201	Data pooled for NPW and LW, adjusted for altitude and smoking.	43.9	41.0-46.8	1017	950-1084	Severe
Malaysia	6670	25796		R					30.1	11.5-58.7	1844	708-3596	Moderate
Maldives	82	337	2001	N	15.00-49.99	1287	2987		49.6	45.7-53.5	35	33-38	Severe
Mali	3066	13918	2001	N	15.00-49.99	3264	3446	Data pooled for NPNLW and LW	61.0	58.6-63.3	1444	1388-1499	Severe
Malta	96	403		R					15.6	5.3-38.1	14	5-35	Mild
Marshall Islands	17	64		R					24.1	8.7-51.4	4	1-8	Moderate
Mauritania	745	3158		R					50.4	23.6-76.9	310	145-473	Severe
Mauritius	344	1256	1995	N	25.00-50.99	128	395	Only Mauritius Island.	14.0	7.4-24.8	45	24-80	Mild
Mexico	30363	108327	1998-1999	N	15.00-49.99	14451	2997	Data disaggregated by age pooled, adjusted for altitude.	20.8	19.9-21.8	5879	5619-6148	Moderate
Micronesia (Federated States of)	28	111		R					24.2	8.9-51.2	6	2-12	Moderate
Monaco	8	36		R					13.3	4.3-34.3	1	0-3	Mild

Table A3.3 Country estimates of anaemia prevalence in non-pregnant women of reproductive age

Member State	Population 2006 ^a		Survey Information						Proportion of the population with Hb<120 g/L		Population with anaemia (number of individuals)(000)		Public health problem
	Women 15.00-49.99y (000)	General (000)	Date of survey (years)	Level of survey ^b	Age range	Sample Size	Reference ^c	Notes	Estimate	95% CI	Estimate	95% CI	
Mongolia	787	2679	2004	N	15.00-49.99	211	5247	Adjusted for altitude.	13.6	8.3-21.5	99	60-157	Mild
Morocco	8839	31943	2000	N	15.00-49.99	1784	3469		32.6	29.6-35.7	2646	2403-2901	Moderate
Mozambique	4843	20158	2001-2002	N	NS-NS	707	589		48.2	43.0-53.4	1958	1748-2169	Severe
Myanmar	14248	51009	2001	N	15.00-44.99	1200	5246	NPNLW	44.9	41.0-48.9	5976	5452-6509	Severe
Namibia	499	2052		R					35.0	14.3-63.6	156	63-283	Moderate
Nauru	4	14		R					25.7	9.5-53.3	1	0-2	Moderate
Nepal	6969	27678	1997-1998	N	NS-NS	3437	1083	NPW, adjusted for altitude.	66.7	64.4-68.9	4120	3980-4255	Severe
Netherlands	3872	16367		R					14.2	4.8-35.6	526	176-1316	Mild
New Zealand	1022	4063	1996-1997	N	15.00-44.99	1088	3192	Data disaggregated by age pooled, prevalence calculated from mean.	10.2	7.9-13.0	99	77-126	Mild
Nicaragua	1447	5600	2002-2003	N	NS-NS	432	4466	Adjusted for altitude.	9.0	5.8-13.6	116	76-176	Mild
Niger	3043	14426		R					62.2	32.8-84.7	1398	739-1904	Severe
Nigeria	30591	134375	1993	N	15.00-45.99	1859	50		62.0	58.8-65.1	15568	14774-16338	Severe
Niue	0	1		R					11.9	3.6-32.6	0	0-0	Mild
Norway	1078	4643		R					13.3	4.4-34.0	136	45-348	Mild
Oman	611	2612	2000	N	15.00-49.99	2766	4218	Data pooled for women and female adolescents 15-19 years.	34.0	31.6-36.5	185	172-199	Moderate
Pakistan	39205	161209	2001	N	NS-NS	1022	4640		27.9	24.2-31.9	9574	8298-10962	Moderate
Palau	5	20		R					21.1	7.5-46.8	1	0-2	Moderate
Panama	865	3288	1999	N	NS-NS	1523	3097		40.3	36.9-43.8	320	293-348	Severe
Papua New Guinea	1483	6001		R					43.1	18.9-71.1	565	248-933	Severe
Paraguay	1580	6301		R					26.2	9.7-54.0	367	136-756	Moderate
Peru	7469	28380	2004	N	15.00-49.99	17058	5359	Data pooled for NPNLW and LW, adjusted for altitude.	40.4	39.4-41.4	2762	2691-2834	Severe
Philippines	21977	84477	2003	N	NS-NS	1189	5242	Only LW	42.1	38.2-46.1	8412	7631-9213	Severe
Poland	9975	38499		R					18.7	6.5-43.1	1792	624-4138	Mild
Portugal	2580	10545		R					15.0	5.0-36.9	370	124-912	Mild
Qatar	165	839		R					36.2	13.7-67.0	54	21-100	Moderate
Republic of Korea	13219	47983	2001	N	15.00-49.99		5249	Data disaggregated by age pooled; sample includes PW.	14.0	6.8-26.6	1788	872-3393	Mild
Republic of Moldova	1193	4195		R					23.4	8.4-50.5	269	97-580	Moderate
Romania	5611	21629		R					20.1	7.0-45.5	1085	379-2461	Moderate
Russian Federation	39140	142537		R					19.8	6.9-45.1	7448	2605-16931	Mild
Rwanda	2335	9230		R					59.4	29.1-83.9	1153	565-1629	Severe
Saint Kitts and Nevis	12	43		R					20.8	7.4-46.2	2	1-5	Moderate
Saint Lucia	45	162		R					25.0	9.3-52.1	10	4-22	Moderate
Saint Vincent and the Grenadines	33	120		R					24.1	8.9-50.9	7	3-16	Moderate
Samoa	42	186	1999	N	NS-NS	240	3226		19.7	13.5-27.8	7	5-10	Mild
San Marino	7	28		R					16.5	5.7-39.5	1	0-2	Mild
Sao Tome and Principe	41	160		R					26.2	9.5-54.4	9	3-19	Moderate
Saudi Arabia	6031	25193		R					32.3	12.6-61.2	1727	673-3275	Moderate
Senegal	2923	11936		R					48.4	22.3-75.4	1206	555-1879	Severe
Serbia and Montenegro ^e	2545	10497	2000	N	15.00-49.99	1296	2441		26.7	23.4-30.2	648	569-734	Moderate
Seychelles	22	81		R					21.1	7.6-46.8	4	1-9	Moderate
Sierra Leone	1315	5679		R					62.9	33.5-85.1	658	350-891	Severe
Singapore	1160	4380	1998	N	18.00-69.99	2467	760	Sample includes PW.	18.4	16.3-20.7	207	183-232	Mild
Slovakia	1433	5401		R					19.4	6.8-44.2	268	94-610	Mild
Slovenia	489	1966		R					15.1	5.1-37.1	71	24-175	Mild

Table A3.3 Country estimates of anaemia prevalence in non-pregnant women of reproductive age

Member State	Population 2006 ^a		Survey Information						Proportion of the population with Hb<120 g/L		Population with anaemia (number of individuals)(000)		Public health problem
	Women 15.00-49.99y (000)	General (000)	Date of survey (years)	Level of survey ^b	Age range	Sample Size	Reference ^c	Notes	Estimate	95% CI	Estimate	95% CI	
Solomon Islands	120	490		R					39.2	16.5-67.8	41	17-71	Moderate
Somalia	2000	8496						No estimate possible.					
South Africa	12675	47594		R					26.4	9.9-54.0	3074	1151-6282	Moderate
Spain	11200	43379		R					16.3	5.6-39.1	1751	598-4203	Mild
Sri Lanka	5665	20912	2001	N	15.00-49.99	4625	4972	Adjusted for altitude.	31.6	29.7-33.5	1688	1588-1790	Moderate
Sudan	9083	36992		R					43.5	19.1-71.5	3443	1515-5656	Severe
Suriname	121	452		R					20.4	7.3-45.7	23	8-51	Moderate
Swaziland	263	1029		R					36.5	14.9-65.4	85	35-153	Moderate
Sweden	2036	9070		R					13.3	4.4-33.8	257	85-656	Mild
Switzerland	1759	7264		R					12.2	3.9-32.1	207	66-544	Mild
Syrian Arab Republic	5199	19512		R					33.4	13.3-62.1	1555	619-2891	Moderate
Tajikistan	1739	6591	2003	N	15.00-49.99	2042	4182	Adjusted for altitude.	41.2	38.2-44.2	640	594-687	Severe
Thailand	18156	64762	1995	N	15.00-59.99	2953	3961	Data pooled for NPNLW, LW and women of working population.	17.8	15.9-19.8	3055	2735-3404	Moderate
The former Yugoslav Republic of Macedonia	530	2037	1999	N	15.00-45.99	1018	1609		12.2	9.6-15.3	62	49-78	Mild
Timor Leste	230	1007	2003	N	15.00-49.99	3745	5050	Adjusted for altitude.	31.5	29.4-33.6	55	51-59	Moderate
Togo	1494	6306		R					38.4	15.5-68.0	481	194-851	Moderate
Tonga	24	103		R					21.5	7.7-47.2	5	2-10	Moderate
Trinidad and Tobago	381	1309		R					24.3	8.9-51.5	88	32-187	Moderate
Tunisia	2939	10210	1996-1997	N	17.00-59.99	1951	2485	Data pooled for women and LW.	26.3	23.6-29.2	729	655-808	Moderate
Turkey	20065	74175		R					26.3	9.9-53.6	4885	1841-9966	Moderate
Turkmenistan	1392	4899	2000	N	15.00-49.99	7714	3209	Sample includes PW.	47.3	45.7-48.9	607	586-627	Severe
Tuvalu	3	10		R					26.3	9.8-53.9	1	0-1	Moderate
Uganda	6254	29857	2000-2001	N	15.00-49.99	5688	3207	Data pooled for NPNLW and LW.	28.7	27.1-30.4	1331	1255-1410	Moderate
Ukraine	12180	45986	2002	N	15.00-44.99	859	5172		9.2	6.8-12.3	1084	802-1452	Mild
United Arab Emirates	922	4657		R					43.9	16.2-76.0	372	138-644	Severe
United Kingdom of Great Britain and Northern Ireland	14426	59847	200-2001	N	19.00-49.99	486	4154	NPNLW	8.8	5.8-13.1	1212	803-1800	Mild
United Republic of Tanzania	9226	39025	2004-2005	N	15.00-49.99	9065	5221	Data pooled for NPNLW and LW, adjusted for altitude and smoking.	47.2	45.8-48.7	3687	3574-3801	Severe
United States of America	74273	301029	1999-2002	N	15.00-59.99	3866	4738	Data disaggregated by age pooled, weighted prevalence.	6.9	5.9-8.1	4833	4099-5686	Mild
Uruguay	842	3487		R					16.9	5.8-40.3	133	45-317	Mild
Uzbekistan	7476	26980	1996	N	15.00-49.99		2293	Prevalence calculated for recommended cut-off ; NPNLW.	64.8	50.8-76.7	4440	3478-5255	Severe
Vanuatu	53	215	1996	N	15.00-49.99	1685	3196	Data pooled for NPNLW and LW.	54.1	50.7-57.4	25	24-27	Severe
Venezuela	7221	27216		R					28.3	10.8-56.3	1874	714-3727	Moderate
Viet Nam	24297	85344	2000-2001	N	15.00-49.99	7135	3408		24.3	22.9-25.7	5505	5193-5830	Moderate
Yemen	4895	21639		R					51.0	24.0-77.5	2042	961-3099	Severe
Zambia	2657	11861	2003	N	15.00-49.99	623	5098		29.1	24.3-34.4	633	529-748	Moderate
Zimbabwe	3281	13085	1999	N	15.00-49.99		2641				994	653-1400	

^a Population figures are based on the 2006 projection from the 2004 revision from the United Nations Population Division.

^b Level of survey: N=nationally representative, F=2+ surveys at the first administrative level boundary, R=regression-based estimate.

^c Corresponds to the numerical reference available in the WHO Global Database on Anaemia (<http://www.who.int/vmnis/en/>).

^d LW = lactating women, NPNLW = non-pregnant non-lactating women, PW = pregnant women

^e On 3 June 2006, the Permanent Representative of the Republic of Serbia to the United Nations and other International Organizations in Geneva informed the Acting Director-General of the WHO that "the membership of the state union Serbia and Montenegro in the United Nations, including all organs and the organizations of the United Nations system, is continued by the Republic of Serbia on the basis of Article 60 of the Constitutional Charter of Serbia and Montenegro, activated by the Declaration of Independence adopted by the National Assembly of Montenegro on 3 June 2006". Estimates used or referred to in this document cover a period of time preceding that communication.

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¹ On 3 June 2006, the Permanent Representative of the Republic of Serbia to the United Nations and other International Organizations in Geneva informed the Acting Director-General of the WHO that “the membership of the state union Serbia and Montenegro in the United Nations, including all organs and the organizations of the United Nations system, is continued by the Republic of Serbia on the basis of Article 60 of the Constitutional Charter of Serbia and Montenegro, activated by the Declaration of Independence adopted by the National Assembly of Montenegro on 3 June 2006”. Estimates used or referred to in this document cover a period of time preceding that communication.

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