The Review of Health and Nutrition Indicators in Early Childhood

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REVIEW OF HEALTH AND NUTRITION INDICATORS IN EARLY CHILDHOOD

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Dr Helia Molina MPH, MD
Pontifical Catholic University of Chile
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Early Childhood Health and Nutrition Indicators

Preface

The aim of this document is to make a comprehensive review of early childhood health and nutrition indicators as a contribution and input to the process of devising a holistic child development index.

The first part of the paper introduces the topic of child health and development from the standpoint of early childhood health and nutrition determinants and the global situation in general.

A conceptual framework for the indicators is developed and some operational definitions are given.

Furthermore, early childhood health and nutrition indicators are described in detail, international statistics used in the main United Nations agencies and other institutions are routinely provided and account is taken of some noteworthy indications of partial use.

Each indicator or group of related indicators is analysed in terms of rationale, source of data, data collection methodology, strengths and weaknesses.

Lastly, recommendations are made concerning the indicators that seem most appropriate for devising a comprehensive holistic early childhood development index.
INTRODUCTION

General health and nutrition considerations

Early childhood health and nutrition is a true reflection of countries’ level of development. These health indicators are directly linked through existing policies, plans and programmes to countries’ investment in early childhood and respect for children’s rights.

Analysis of health and nutrition indicators should include the environmental and social determinants of disease, mortality, poor population groups’ quality of life and the yawning inequality gaps between and within countries.

Social determinants of health and nutrition are factors that characterize environments to which individuals and the population are “exposed” and which can influence lifelong developmental and health outcomes. Social determinants act at different levels of influence, interact with each another and represent a broad array of characteristics that are not biologically or genetically based but rather are entrenched in interactions between individuals and socio-physical environments. Examples of the most important social determinants of child health, nutrition and development include living conditions, child-parents-peers interpersonal relations, family socio-demographics, learning environments in day care centres and schools, access to premises, neighbourhood safety and socio-political context.
The first few years of life are a critical period during which lifelong patterns of health vulnerability are determined by the complex interplay of social determinants. As action can be taken on environmental conditions in order to improve the people’s health outcomes, researchers, governments and policy makers have increasingly been attempting to improve their understanding of the conditions under which children achieve optimal health and developmental outcomes.1

Variables relating to birth and early childhood are particularly sensitive to policy changes and the state of well-being. Child health indicators are strongly related to economic and political indicators.2 It is difficult to separate health from nutrition, as both are intrinsically linked and have common social determinants.

Unfortunately, most indicators concern mortality rates, vaccine coverage and coverage of other types of services such as antenatal care. There is little systematized information on

1 Stefania Maggi, Lori J. Irwin, Arjumand Siddiqi and Clyde Hertzman 1Institute of Interdisciplinary Studies and Department of Psychology, Carleton University, Ottawa, Canada, 2Human Early Learning Partnership, The University of British Columbia, Vancouver, Canada, 3Department of Health Behavior and Health Education, University of North Carolina, Chapel Hill, USA.
morbidity, that is to say, the diseases that afflict children. It is difficult to compile records on these matters. The diseases that raise mortality rates and have the greatest impact on the quality of life are malaria, diarrhoea and acute infectious respiratory diseases.

It is very difficult to separate health from nutrition because the two are intimately linked to each other. Malnutrition affects health significantly by raising the frequency and severity of diseases while, concomitantly, diseases affect the child’s nutrition status directly during the critical early-childhood period, taking their toll on growth, maturation and development.

One area of significance to the selection of indicators, since it is a powerful determinant of the quality of life and of the frequency of primarily gastrointestinal diseases, is basic sanitation. The availability of safe drinking water is of the essence in morbimortality caused by acute diarrhoea in small children (mainly under one year of age), while greater access to potable water is associated with a sharp fall in infant mortality.

Pneumonia and diarrhoeal diseases are the two major killers of children under five years of age, accounting for 18% and 15% respectively of all deaths in 2008. These rates include neonatal deaths.

The burden of mortality due to pneumonia and diarrhoea is heaviest in the WHO African Region and the WHO South-East Asia Region. The provision of crucial child health care against often fatal diseases remains inadequate. Such care includes oral rehydration therapy for diarrhoea and case management with antibiotics for pneumonia. Most child deaths due to pneumonia could be avoided if effective care were provided on a large scale and reached the most vulnerable population groups.  

Cost-effective care can save the lives of millions of children yearly. Immunization campaigns still fail to reach 30 million children, despite success in in reducing polio, tetanus and measles through immunization. Measles and tetanus still kill more than 1 million children under five years of age each year. Vitamin A supplementation costs only $0.02 cents per capsule and, if administered twice or thrice yearly, prevents blindness and death. Yet, although vitamin A supplementation saved an estimated 2.3 million lives between 1999 and

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2004, only half of young children in poor countries receive such treatments. Between 250,000 and 500,000 children become blind every year, with 70% of them dying within 12 months. Oral rehydration therapy (ORT) has helped to halve diarrhoea deaths, saving an estimated 1 million lives annually; yet more than 2 million children still die yearly from diarrhoea-related causes.

Basic newborn care include immunizing mothers against tetanus, ensuring clean delivery practices in a hygienic birthing environment, drying and wrapping the baby immediately after birth, thus providing the necessary warmth: The promotion of immediate and continuous breastfeeding, immunization and treatment of infections with antibiotics could save the lives of 3 million newborns annually. Improved sanitation and access to clean drinking water can reduce childhood infections and diarrhoea. More than 40% of the world’s population do not have access to basic sanitation, and more than one billion people use unsafe sources of drinking water.4

Hunger and malnutrition are an unfortunate reality of the world. While people in industrialized societies live in plenty, malnutrition contributes yearly to the death of 5.6 million children under five years of age in non-industrialized societies. In the developing world, millions of children develop too slowly and millions of people cannot develop their potential to the fullest. Malnutrition has particularly serious effects on children, above all, infectious secondary immune deficiency, learning deficits and, subsequently, school drop-out. Furthermore, malnutrition threatens girls’ ability to have healthy children in the future and perpetuates the generational cycle of poverty.5

Good nutrition, in turn, is the cornerstone of survival, health and development—not only for current but also future generations. Well-nourished women face fewer risks during pregnancy and labour, and their children develop much better physically and mentally.

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Good nutrition also has a significant impact on economic conditions, as a well-nourished population is more productive individually and has lower health care costs and higher economic performance levels.⁶

Definitions of malnutrition abound. It must be clarified, however, that malnutrition can be primary, due to lack of food, or secondary, due to diseases that alter the intake, absorption or use of food and nutrients. This paper is concerned mainly with primary malnutrition. Some define malnutrition merely as "a nutritional deficiency associated with increased morbidity and mortality".

Malnutrition takes several forms – marasmus, kwashiorkor and marasmic kwashiorkor. The term “marasmus” means, "consumption" and applies to persons suffering chronic loss of muscle mass and subcutaneous fat owing to insufficient energy and protein intake. Kwashiorkor occurs when the diet contains enough energy but little to no protein. Aspects of each of the above-mentioned types of malnutrition are found in marasmic kwashiorkor. In fact, “pure” malnutrition disorders are rarely seen today.

From the point of view of time, in its early acute stages, malnutrition affects only weight and body composition. When it becomes more deeply chronic, individuals suffer from altered stunted growth, height and impaired physical and intellectual ability. There may be compensation (weight for normal size) or decompensation in intercurrent acute episodes (weight affecting height for age and sex) during a diarrhoeal or respiratory infection, for example.

The likelihood of a sharp decline in food access or consumption is known as "food vulnerability" and it reflects the link to a critical value that defines minimum levels of human welfare. The most vulnerable are those who face an increased risk of deprivation of access and consumption and simultaneously have a lower capacity to respond to that risk. Vulnerability analysis should therefore cover environmental (rural, natural disasters and basic sanitation), sociocultural (education – especially the mother’s, ethnicity and

immigration), economic (poverty, income, access to credit and access to health care) and biological (low maternal weight and insufficient breastfeeding) factors.\textsuperscript{7}

Primary malnutrition entails being caught up in a near-unbreakable vicious circle involving poor nutrition, poverty and disease. Poor diet, both quantitatively (scarcity) and qualitatively (proper balance of macronutrients, micronutrients and safety), causes low weight at the most acute stage and stunting at the chronic stage. This contributes permanently to factors determined by poverty, poor sanitation and environmental concerns, lack of adequate housing and difficulties in gaining access to health and work.\textsuperscript{8}

\textsuperscript{7} Challenges: Child malnutrition in Latin America and the Caribbean. Bulletin of childhood and adolescence on the progress of the Millennium Development Goals Number 2, April 2006, ISSN 1816-7527.

\textsuperscript{8} Food, Nutrition and Health, Patricia Montoya Sáez, Prosalus 2002.
Malnutrition in pregnant women increases the risk of low birthweight, significantly raising the risk of neonatal death. Babies weighing 2000 to 2499 grams at birth face a neonatal death risk that is more than four times higher than those weighing 2,500 to 2,999 grams and 10 to 14 times higher than those weighing 3,000 to 3,499 grams at birth. Furthermore, several studies have shown that malnutrition is a major contributor to infant and childhood mortality (50-60%), while the percentage of cases of disease due to

malnutrition is 61% for diarrhoea, 57% for malaria, 53% for pneumonia and 45% for measles, and significantly increases the risk of developing, in adulthood, chronic diseases such as heart disease, hypertension and diabetes, and diseases such as tuberculosis.\footnote{To reduce the rate of low birth weight by at least one third. Childinfo, 2009; The State of the World’s Children. Maternal and Newborn Health, UNICEF, 2009.}

Overweight is a matter of growing concern worldwide. For the first time in history, the number of undernourished people is beginning to equal that of overweight people worldwide. A United Nations study has shown that overweight is a problem in all developing regions, growing apace even in countries where hunger persists. Overweight increases worldwide in step with rising income. The result is sadly paradoxical, as countries still struggling to feed their population are forced to cope with the costs of treating overweight and its train of chronic diseases.

**World health and nutrition trends**

The world’s health situation is portrayed by indicators on infant mortality rate, mortality under the age of five, immunization coverage and prevalence of selected diseases, for example.

In regard to nutritional indicators, many aspects can be measured to characterize children’s nutritional status, namely food availability, safe food and others.

Access to and quality of health services determine which indicators will be included in this paper together with environmental indicators such as sanitation and others.

In this document, indicators used by agencies that monitor the world health and nutrition situation (WHO, UNICEF, WB and FAO) and selected countries’ potentially useful or more specific indicators will be analysed in order to broaden the approach to early childhood health and nutrition, duly taking social determinants, the community and family influences into consideration.

An estimated 29,000 children die every day in the world (21 per minute) for preventable reasons. More than 70% of the nearly 11 million child deaths that occur each year are attributed to five causes, namely diarrhoea, malaria, neonatal infection, pneumonia and...
premature birth. These deaths are concentrated in the developing world. For example, a child in Ethiopia is 30 times more likely to die before the age of five than a child in Western Europe. According to UNICEF, 38% of deaths of children under the age of five worldwide occur during the first four weeks of life in the neonatal period. Ninety-nine per cent of neonatal deaths occur in developing countries, in which there are inequalities between children from low- and high-income families.¹¹

Child mortality has fallen significantly in most countries in recent decades. WHO 2009 figures show that deaths among children under five years of age fell from 12.4 million in 1990 to 8.1 million. In 2009, mortality in this group dropped from 89 per 1,000 live births to 60 per 1,000 live births, thus declining by one third. The average rate of decline accelerated between 2000 and 2009 compared with the 1990-2000 decade. Nevertheless, the global average sets Africa apart, with 127 per 1,000 live births, and low-income countries,¹² 117 per 1,000 live births, which are still above the 1990 global average of 89 per 1,000 live births.

¹¹ The State of the World's Children 2008-2010, UNICEF.
¹² World Bank League Table.
Average annual rate of decline (%) in mortality in children under 5 years old -1990-1999 and 2000-2008
Measles immunization coverage among 1-year-olds by WHO region

Percentage of population using improved drinking-water sources and sanitation facilities in 2008 by WHO region and country-income group
Children aged <5 years underweight (%)*

Maternal and neonatal mortality remain unchanged.

The lives of some 6 million of the nearly 11 million who die each year could be saved by ordinary, evidence-based and cost-effective measures such as vaccines, antibiotics, nutrient supplements, insecticide-treated mosquito nets, improved maternity care practices, breastfeeding and family care.
UNICEF and other international organizations and agencies have been monitoring the
progress of children, with achievement of the Millennium Development Goals (MDGs) in mind.

There has been an encouraging decline in infant and child mortality under five years of age. Despite this, five years from the deadline for achieving the Millennium Development Goals, the greatest reductions have occurred among groups with the best resources in urban areas. The MDG reduction goal, set in 1990, is 67% to be achieved by the year 2015.

To achieve this goal, low-income countries should increase their average annual rate of decrease from 1.9% to 10.9%.

The neonatal component is increasingly important. Globally, 40% of deaths among children under 5 years of age occur in the first month and primarily in the first week of life.

There is an increase in coverage and relatively cost-effective new means of action such as use of insecticide-treated nets to prevent malaria, strategies to prevent vertical HIV transmission, hepatitis B vaccination and pneumonia caused by *Haemophilus influenzae* Type B. Furthermore, micronutrient supplementation and global coverage of measles immunization have grown. Health service provision of oral rehydration therapy (ORT) to treat diarrhoea and acute respiratory infections (ARI) is still very insufficient. These two diseases continue to kill nearly 3 million children under the age of 5, mainly in low-income countries.

The percentage of the world’s population with access to improved drinking-water sources rose from 77% to 87% between 1990 and 2008. One component of Target 7.C of MDG 7 is to halve the proportion of the population without sustainable access to safe drinking water. Given the current rate of achievement, it is likely that this component will be met. Nevertheless, in 2008 some 884 million people – 84% of whom lived in rural areas – still relied on unimproved water sources. The other component of Target 7.C is to halve the proportion of the population without sustainable access to basic sanitation. Current rates of progress towards achievement are insufficient. In 2008, 2600 million people were not using improved sanitation facilities, including more than 1,100 million people with no access to toilets or sanitation facilities of any kind. If current trends continue, this component of Target 7.C will not be met. There remains considerable variation not only between WHO regions and
country-income groups in the attainment of these components but also between the two components themselves.\textsuperscript{13}

An evaluation of nutrition worldwide, using the prevalence of underweight children under five years of age as a basic indicator, shows that although the world community pledged to halve the proportion of underweight children between 1990 and 2015, it is not yet on track to achieve that goal. This assessment shows clearly that the world must change its priorities if it is to meet the MDG of halving child malnutrition and that malnutrition can be reduced by turning to the lessons learnt in the last 15 years. The goal could not be more important: a world in which children are free from poverty and hunger.\textsuperscript{14}

Proper childhood nutrition is directly linked to achieving the Millennium Development Goals (MDGs). Indeed, if no special effort is made to resolve early childhood nutritional problems such as chronic malnutrition and micronutrient deficiencies, achievement of all MDGs will be seriously compromised. MDG 1, designed to eradicate extreme poverty and hunger, reflects the fundamental interrelation between the two since hunger is often both a cause and an effect of poverty. In all regions of the world, low-income people generally have a poorer diet than wealthier people, and those who lack proper nutrition struggle harder to escape poverty than those who are fed properly and are in better health.\textsuperscript{15}

To achieve any of the other MDGs, the global problem of malnutrition must be addressed. It is regarded as a root cause of 53% of all deaths of children under five, which means that MDG 4 and its associated goal of reducing the rate of mortality among children under five by two thirds can be achieved only if steps are taken to improve the nutrition of young children and their mothers. Other health-related goals – MDG 5 on maternal health and MDG 6 on combating key diseases – also have with a great bearing on nutrition, as an undernourished body is more prone to disease. Malnutrition affects children’s school performance and attendance and reflects biases in access to food and health services - areas in which women play a central role within the family. So if the problem of malnutrition is not resolved, the education (MDG 2) and gender parity (MDG 3) goals are unlikely to be met.\textsuperscript{16}

\begin{flushleft}
\textsuperscript{13} WHO, World Health Statistics, 2011.
\textsuperscript{14} The Millennium Development Goals Report, United Nations, 2011.
\textsuperscript{15} Ibid.
\end{flushleft}
According to WHO 2011 statistics compiled from various sources in the developing world, 115 million children under 5 years of age are underweight and 178 million have short stature. Of these children, 70% live in Asia (mainly South and Central), 26% in Africa and 4% in Latin America and the Caribbean. The prevalence of underweight children under 5 years of age in developing countries is 18% (2005 figure), down from 47.1% in 1980. While there has been a decline, progress has been uneven in the various regions of the world and has been slower than expected. In Africa, for example, the number of underweight children (combination of prevalence, stagnant mortality trends and high population growth) has increased from 24 million in 1990 to 30 million in 2010. In Asia, the figure is even higher – 71 million in 2010. In Latin America and the Caribbean, 16% of children are still chronically malnourished. Although there is enough food to meet the needs of the entire population, it is noteworthy that the countries of this region have both intake problems, owing to insufficient food, and imbalances in the composition of the diet – the latter expressed as lack of micronutrients (iron, iodine, zinc and vitamin A) and a growing excess of other nutrients such as saturated fat, sodium and sugars, which result in overweight and other chronic diseases.\(^\text{17}\)

In order to analyse children’s nutritional status, chronic malnutrition (low size for age) must be considered as an additional indicator of overall malnutrition (low weight for age) included in the Millennium Development Goals.

Regarding the status of micronutrients,\(^\text{18}\) iron deficiency anaemia is a widespread public health problem that has far-reaching implications for human health and social and economic development. It mainly affects children under 24 months of age and pregnant women.

Although estimates of the prevalence of anaemia vary widely and often, as there is no exact data, it can be assumed that a significant proportion of young children and women of childbearing age in poor resource regions suffer from anaemia. According to WHO estimates, approximately 2,000 million people worldwide are anaemic and about 50% of cases can be attributed to iron deficiency. There is well-documented information about its dramatic effects, which include increased risk to maternal and child health and adverse effects on children’s

\(^{17}\) World Health Statistics, WHO, 2011.
cognitive and physical development and adults’ labour productivity.\textsuperscript{19} On the other hand vitamin A deficiency reduces responsiveness to various infections, causes blindness and increases the risk of maternal and infant mortality by as much as 25%.\textsuperscript{20} Furthermore, iodine deficiency is the leading cause of mental retardation and reduces intellectual quotient by some 10 points.\textsuperscript{21} Many of these deficiencies are corrected easily and inexpensively by fortifying foods, to which millions of mothers and children today do not have access. For example, more than 30% of households worldwide do not consume iodized salt.\textsuperscript{22} Also, 450 million children who need vitamin A supplementation do not receive any in their daily diets.\textsuperscript{23}

\textsuperscript{19} Anaemia as a centre of attention, WHO UNICEF, 2004.
\textsuperscript{20} Vitamin A deficiency, Childinfo 2009.
\textsuperscript{21} Sustainable elimination of iodine deficiency disorders, Childinfo 2005.
\textsuperscript{22} Ibid.
\textsuperscript{23} Vitamin A deficiency, Childinfo 2009.
### Early and exclusive breastfeeding

<table>
<thead>
<tr>
<th>Region</th>
<th>Percentage of infants under 6 months exclusively breastfed, 2000-2007</th>
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<tbody>
<tr>
<td>West/Central Africa</td>
<td>23</td>
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<tr>
<td>Eastern/Southern Africa</td>
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<tr>
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<td>World</td>
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</tr>
<tr>
<td>Sub-Saharan Africa**</td>
<td>21</td>
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<tr>
<td>Developing countries*</td>
<td>38</td>
</tr>
<tr>
<td>Least developed countries</td>
<td>37</td>
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</tbody>
</table>

* *Excludes China. ** Sub-Saharan Africa comprises the regions of Eastern/Southern Africa and West/Central Africa.

Source: Demographic and Health Surveys, other national household surveys and UNICEF.

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### UNICEF global databases 2010, from Multiple Indicator Cluster Surveys (MICS) Demographic and Health Surveys (DHS) and other national surveys.

#### Number of newborns not protected against iodine deficiency disorder, in millions, 2003-2009

- Latin America & Caribbean: 1.2
- South Asia: 17.1
- Eastern & Southern Africa: 6.0
- Western & Central Africa: 4.0
- Middle East & North Africa: 4.0
- East Asia & Pacific: 2.5
- CEE/CIS: 2.5

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21
UNICEF global databases 2010, from MICS, DHS and other national surveys.

Percentage of households consuming adequately iodized salt, 2003–2009

- Latin America and Caribbean: 89%
- East Asia and Pacific: 67%
- West and Central Africa: 74%
- Middle East and North Africa: 60%
- South Asia: 55%
- Eastern and Southern Africa: 53%
- CEE/CIS: 51%
- Africa: 60%
- Asia: 73%
- Developing countries: 72%
FRAMEWORK FOR EARLY CHILDHOOD HEALTH AND NUTRITION INDICATORS 24

As the word suggests, an indicator gives an "indication" that is intended to reflect a particular situation or an underlying reality, usually by providing an order of magnitude, which means that it is difficult to meet the criteria directly. Indicators are variables that attempt to measure or objectify a quantitative or qualitative collective (especially biodemographic) event in order to support political action and evaluate achievements and goals.

WHO defines them as "variables used to measure changes".25 Some indicators may be sensitive to more than one situation or phenomenon; for example, the infant mortality rate is a population health indicator and it is also sensitive enough for use in assessing the general population welfare. However, it may not be specific to any particular health measure because the reduction rate may be the result numerous factors of social and economic development. Health indicators are used to evaluate the effectiveness of courses of action and effects.

Information sources

An indicator requires a reliable source of information and technical rigour in its construction and interpretation. The principal sources of data used universally are the following:

1. records of demographic events;
2. population and housing census;
3. routine health services records;
4. epidemiological surveillance data;
5. sample surveys (survey population);
6. disease registers;
7. other data sources from other sectors (economic, political and social welfare).

25 WHO "preparation of indicators to look at the progress performed in the achievement of health for all in the year 2000." 1981.
The above are sources of routinely and regularly compiled primary data. If these data are unreliable or non-existent, alternative sources may be sought that are generally indirect estimates of the real value.

The various health-related items for which indicators are constructed are the following:

- health policy (resource allocation, % of GDP invested in child health services, and number of hospital beds per x number of inhabitants, etc.);
- socioeconomic conditions (housing, poverty, food availability, literacy rate etc.);
- performance in Public Health Care Health Status:
  
  (a) activity – availability of services, accessibility, indicators of quality of care, coverage indicators could and hopefully would be disaggregated by population subgroup so that gateways for strategic action could be identified;

- health status indicators – these are the most used and can be divided operationally into 4 types:

(1) mortality indicators – widely used, since death is universal, occurs only once and is recorded frequently and systematically;

(2) birth – population’s reproducibility, there being a clear correlation between birth rate and health, socioeconomic and cultural standard;

(3) morbidity – indicators that attempt to estimate the risk of disease (disease burden) to quantify the magnitude and impact; they are difficult to obtain owing to problems of definition, phenomena to be measured and protracted change over time;

(4) quality of life – generally composed of indicators designed to objectify a complex fact such as people’s functional capacity, life expectancy, adaptability to their surroundings, and others.
Quantitative or qualitative variables may be included and collected in the form of measurements, questions and comments, depending on the nature of the phenomena to be described. In general, the more complex the reality to be reflected, the greater the need for a range of indicators. Moreover, an indicator can often have little bearing on the real-life situation that is to be considered. It may be a rough indicator, in which case, it will be used both to measure the reality in question and to reflect variations, which in turn relate to changes in these hard-to-know situations. This explains the need to use a variety of indicators and to devise new ones constantly, alone or in combination, to ensure interpretative accuracy.

Quantitative indicators (the raw variables or numerical indices calculated from them) are used in a standardized way to describe situations and related trends. An indicator constructed from a continuous variable is sometimes broken down into dichotomous forms (yes/no) or categories, with emphasis on relative values (ranks) rather than on absolute values.

In some cases, qualitative indicators are expressed as proportions (or percentages) to indicate an order of magnitude of the phenomena observed or its variations. Additional indicators are used directly for elementary units (individuals, households, houses, etc.). Can a synthetic indicator be made by placing all of these units together make (average percentage of units below a certain threshold, etc.)? This type of indicator is the one most generally used to monitor population situations.

An indicator is not confined to data on which it is based; it usually contains elements (a threshold, a point of reference, a mode of expression, etc.) that can be used universally to assess the information transmitted and facilitate comparisons in time and space. The use of such indicators has been covered extensively by literature in the various sectors concerned. In fact, information associated with an indicator can cover more than the mere quantification of phenomena and should therefore be selected, analysed and interpreted by a specialist. Data on the malnutrition prevalence rate will, for example, evaluate its severity in public health terms or its likely implications for the broader development context, taking into account its known effects on health, productivity, schooling and social dynamics. The analysis must therefore be conducted by intersectoral groups, when many indicators are involved.
Progress in understanding the role of health care, nutrition and social determinants constitute a field of action in the search for appropriate indicators that include the context. As it has been acknowledged that there are enormous inequality gaps between and within countries, indicators on variables such as gender, ethnicity, geographic location, income quintile and others must be disaggregated. Health and nutrition indicators refer to measures that quantify and evaluate aspects of the population's health and nutrition.

Anthropometric measurements are often predicated on an adjustment for age, sex and type of measurement. Raw measurements (brachial circumference) or calculated indices (weight for age, weight for height or size for age) are expressed in relation to a reference value and a threshold that may be summarized as averages, standard deviations and confidence intervals (for example, the average size for age is expressed as Z-scores to a reference population), as percentages of people below a critical threshold (% of children < -2 Z-scores of size for age) or as continuous distributions (curves) or by nutritional status categories. All of these forms of expression provide relevant indicators of nutritional status on the parameters studied (emaciation, stunted growth, etc.).

Appropriate early childhood health and nutrition indicators permit:
- awareness of the population's health status;
- comparisons between and within countries;
- comparison of trends in the same population over time;
- stratification of risk groups;
- identification of inequities;
- identification of critical areas;
- evaluation of courses of action;

The dimensions addressed through health and nutrition indicators are:
- impact on health - mortality, morbidity or nutritional status;
- coverage – immunization, access to services and others;
- efficiency;
- quality;
- resources.
Indicators of the nutritional situation

These indicators should be suitable to characterize each type of malnutrition, which is associated with features of malnutrition itself, the people who suffer from it, where they are, etc., to obtain an indication of the level of risk to various population groups and thus obtain an overview of the situation for the purposes of diagnosis and formulation of overall evaluation strategies – some differentiated and others targeted.

It is difficult to determine a person’s nutritional status accurately, and even more so that of a population. This is a global concept that can be gauged only through a series of clinical, physical or functional characteristics, which may be used as additional indicators if a threshold value for separating the malnourished from the well-nourished is incorporated. This task was accomplished after achieving a consensus, mainly on child and adult malnutrition and the widespread lack of three micronutrients with serious implications for people’s health (vitamin A, iodine and iron). First, the individual’s parameters or indices (e.g. weight, arm circumference, haemoglobin level, etc.) were measured. Then, the information was expressed for the population group concerned as a prevalence rate or as the percentage of well-nourished or malnourished people showing the particular type of malnutrition, according to the selected thresholds.

There is no single global indicator to provide a picture of "nutrition". Therefore, the particular aspect of nutrition to be characterized – energy state, protein, iron, vitamin A – must be stated specifically. That said, there is no synthetic indicator, even on the energy state for example. For this reason, the indicator most relevant to the priority issue will be collected: physical, biochemical, functional, and so on. With regard to the measurement of the population’s general nutritional status, a number of individual physical measurements must be taken to be compared with reference values for determining the status of persons (or the population at large) and constitute the set of relevant indicators to be used in preference to any other. However, in using these indicators, their limited validity must be borne in mind: they provide synthetic nutrition information but do not represent all aspects.

Cause indicators

Once the population groups’ nutritional status and their geographical or socioeconomic distribution are known and goals for improvement have been set, information
is needed on the factors that have determined such situation, for example the factors, events or characteristics that affect to some extent the nutritional status of individuals in a particular population.

(a) **Nutritional insecurity** – includes food production or supply problems, issues of family and community access to food of good nutritional value, in particular regard to purchasing power, but also includes access to fortified foods, supplementation and treatment in certain cases. These data are collected regularly through information systems in ministries of agriculture and trade.

(b) **Environmental health, access to health services** – covers water supplies and healthy foods, environmental sanitation, including infectious and parasitic diseases, health care systems and their use. The various ministry of health units are responsible for collecting these indicators.

(c) **Provision of care and care practices** – this concerns care within the family, social protection afforded by the community or State, of household or community members' attitudes and practices in providing maternal and child care for the most vulnerable, and the providers' level of education. This type of indicator is rarely collected on a regular basis. In most cases, information collected through specific community surveys must be supplemented, with emphasis on qualitative aspects.

**Monitoring of general trends in the nutritional situation**

The aim here is not to test the effectiveness of either programme, but rather to ascertain whether or not things are moving in the right direction and whether adjustments are required. Examples of these indicators include the prevalence of low birthweight (<2500 g), prevalence of severe underweight (weight for age < -3 Z score points), prevalence of moderate malnutrition (weight for age between < -1 and -3 Z score points) and prevalence of underweight children under five years of age who attend ambulatory health care programmes, children in nutritional rehabilitation centres, prevalence of iron deficiency anaemia, primary health coverage for pregnant women and children under the age of two, prevalence of iodine and vitamin A deficiency and calcium intake among pregnant women. Ideally, there should be a "baseline" for the prevalence of malnutrition in hospitalized patients, but activity planning must go ahead and action must be taken on the basis of existing data. It will be an opportunity to establish a tracking system.
Indicator characteristics

Not all indicators have the same value. This will depend upon that which they reflect and their implementation feasibility, on the basis of which they will be prioritized when the time comes for them to be applied.

Individual characteristics

(1) **Validity** it is a matter describing a phenomenon correctly. For example, anthropometry reflects a person's or population group's nutritional status in relation to an accepted standard. A valid indicator of food safety is food consumption.

(2) **Objectivity** – the results are independent of the operator or instrument used. It further relates to replicability.

(3) **Sensitivity** is the ability to detect the risk or effect of a particular feature and it requires an indicator of gold or reference. For example, in the body mass index (BMI) or weight for height, the higher the benchmark, the more sensitive the detection of deficits. Performance also depends on the prevalence of the condition in the population.

(4) **Sensitivity to change** – acute changes are reflected well; for example, acute deficit in arm circumference, assessment of urinary iodine and fortification with iodine.

(5) **Specificity** is the ability to eliminate those not affected by the property in question and it requires an indicator of gold or reference. For example, in the BMI above case, the lower the standard of reference, the more specific the detection of the deficit will be.

Operational characteristics

(1) **Availability** is the practical likelihood of having the indicator, in other words, the data has been routinely recorded.

(a) available or managed centrally;
(b) available only locally.

(2) **Reliability** concerns the quality of information sources, accuracy and precision of the data and their representativeness. For example, the accuracy of anthropometric measurements or the determination of age. In relation to food consumption, it is more accurate to weigh food and meals than merely remember and list foods eaten.

(3) **Simplicity** is required in collecting and recording of measurements.

(4) **Cost** will depend on the above points; however the cost of not collecting data must also be considered, in terms of cost of a programme that is not evaluated under such a nutrition programme.

**HEALTH INDICATORS**

The health indicators in the following tables have been selected because they are used universally by WHO, UNICEF and other agencies that systematically report on the health situation to the world and monitor the achievement of international goals such as the MDGs.

Indicators in this document are designed to evaluate, directly or indirectly, early childhood health, access to health services and physical environmental characteristics in terms of availability of safe drinking water and basic sanitation.

Each indicator is defined and possible sources of information and data collection are provided.

A group of related indicators is analysed in terms of rationale, strengths and weaknesses and by data collection source. The main social determinants of health that are involved have been identified. Indicators that focus on the quality of health services or on health expenses are not be incorporated because they detract from the desk review's objective.
Indicators specific to countries or agencies are addressed separately and, although they are not universally used, they are alternatives to be considered in devising an early child development indicator or index.

The most important indicators dimensions considered are set out below.

Access and coverage of health services:
- antenatal care;
- immunization coverage;
- birth attended by skill personnel;
- antiretroviral prophylaxis;
- infectious diseases attended: ARI, diarrhoea and malaria;

Health status:
- mortality (infant, neonatal, perinatal, under five years of age);
- maternal mortality.

Environmental conditions:
- population using improved drinking water sources;
- population using improved sanitation facilities;
- population using solid fuels.

Other indicators used by some countries or selected agencies will be listed separately for consideration, but on the understanding that they are not universally compiled.
### Antenatal care (health services coverage indicator) (MDG 5)

<table>
<thead>
<tr>
<th>Indicator name</th>
<th>Abbreviated</th>
<th>Definition</th>
<th>Possible data sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Antenatal care coverage-more than 6 antenatal care sessions (PAHO benchmark).</td>
<td>% of life births to mothers who underwent over 6 antenatal care sessions, from awareness of pregnancy to delivery, over total number of live births in a given time period.</td>
<td>26 The State of Brazil’s Children 2006, The Child Development Index, pp.108-123. WHO, World Health Statistics 2011, Indicator Compendium.</td>
<td></td>
</tr>
<tr>
<td>2 Antenatal care coverage-at least 4 visits (%) (WHO recommendation) (MDG 5).</td>
<td>% of women aged 15-49 with a live birth in a given time period who received antenatal care by skilled health personnel (doctors, nurses, midwives) at least once during pregnancy, over total Number of women aged 15-49 with a live birth in the same period.</td>
<td>27 WHO, World Health Statistics 2011, Indicator Compendium. Standard questions asking if and how many times, the woman’s health was checked during pregnancy. Questions are asked about each live birth for a period of up to five years before the interview. Other surveys also ask by whom the health of the woman was checked. WHO and UNICEF compile empirical data from household surveys. Other: facility/service reporting system, where the coverage is high (especially for ANC-at least one visit). 28 DHS: Demographic and health surveys; MICS: Multiple indicator cluster surveys (international nationally-representative household survey programme developed by UNICEF); FFS: Fertility and family surveys; RHS: Reproductive Health Surveys. WHO, World Health Statistics 2011, Indicator Compendium. 29 Ibid. 30 Ibid. 31 WHO, World Health Statistics 2011, Indicator Compendium.</td>
<td></td>
</tr>
<tr>
<td>3 Antenatal care coverage-at least 1 visit (%) (MDG 5).</td>
<td>% of women aged 15-49 with a live birth in a given time period that received at least one antenatal care visit [with a skilled health provider (doctor, nurse, midwife)] during pregnancy, over total Number of women aged 15-49 with a live birth in the same period.</td>
<td>32 WHO, World Health Statistics 2011, Indicator Compendium. Idem</td>
<td></td>
</tr>
</tbody>
</table>
Rationale

“Indicates access and use of health care during pregnancy; antenatal period is an opportunity for interventions vital to well-being of infants; prepares for delivery, breastfeeding and child caring; prevention and early detection of problems (ensures necessary testing; detect infections and immunize child); increases survival first year of life; reduces maternal, perinatal and infant mortality; promotes mother-child bond: key for individual’s development; provides support network; antenatal care can help to protect women and children from sexually transmitted infections, such as HIV; opportunity for preventive interventions such as immunisation against tetanus, and bed nets and antimalarial drugs. Antenatal care indicators should be closely followed together with a set of other related indicators, such as proportion of deliveries attended by skilled health worker, or deliveries occurring in health facilities. Antenatal care is a Millennium Development Goals (MDG) indicator.”

Strengths and weaknesses of the indicator

- Receiving antenatal care does not guarantee receipt of all care that is effective in improving maternal health.
- Attendance of least four antenatal care sessions increases the likelihood of receiving effective maternal health care.
- Antenatal care coverage - at least four visits (%) - includes care given by any provider, not just skilled health personnel.

Strengths and weaknesses of data sources

- Household surveys
  - They do not collect information on type of provider for each visit.
  - They may be affected by recall bias.
  - Standardization of definition of skilled health personnel difficult because of differences in training across countries.
- Facility reporting systems
  - They can be used when coverage is high, usually in industrialized countries. Not used internationally.

33 Ibid.  
34 Ibid.  
• Discrepancies possible if national figures are compiled at the health facility level, as they would differ from overall figures based on health service data.

“UNICEF and the WHO produce regional and global estimates based on population-weighted averages weighted by the total number of births. These estimates are presented only if available data cover at least 50% of total births in the regional or global groupings.”

Variations
(1) - Births to women receiving late or no antenatal care (1989 standard birth certificate).
(2) - Timely antenatal care (first term) also: early antenatal care.

Determinants
Mother’s education.
Family income.
Provision of public health services.

37 Ibid.
38 Used in “Kids count” report.
40 The State of Brazil’s Children 2006, The Child Development Index, pp.108-123.
(b) **Immunization coverage** (health services coverage indicator)

<table>
<thead>
<tr>
<th>Indicator name abbreviated</th>
<th>Definition</th>
<th>Possible data sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Diphtheria tetanus toxoid and pertussis (DTP3) immunization coverage among 1-year-olds (%)</td>
<td>Percentage of 1-year olds who have received 3 doses of the combined D-T-P vaccine in a given year.</td>
<td>Preferred: Facility Reporting System (&quot;administrative data&quot;: reports of vaccinations performed by service providers.). Estimate= total number of vaccinations given/number of children in the target population, often based on census projections. Other: Household surveys. Examples: EPI, MICS, DHS. Survey items correspond to children’s history in coverage surveys. Estimate= % of children aged 12-23 months who received 3 doses of the DPT vaccine time before the survey.</td>
</tr>
<tr>
<td>2 Hepatitis B (HepB3) immunization coverage among 1-year-olds (%)</td>
<td>Percentage of 1-year-olds who have received 3 doses of hepatitis vaccine in a given year.</td>
<td>Preferred: Idem Other: Idem</td>
</tr>
<tr>
<td>3 Hib (Hib3) immunization coverage among 1-year-olds (%)</td>
<td>Percentage of 5-year-olds who have received 3 doses of <em>Haemophilus influenzae</em> type B vaccine in a given year.</td>
<td>Preferred: Idem Other: Idem</td>
</tr>
<tr>
<td>4 Measles (MCV) immunization coverage [among 1-year-olds (%)] (MDG 4)</td>
<td>Percentage of children &lt; 1 year of age who have received at least one dose of measles-containing vaccine in a given year. “For countries recommending the first dose of measles vaccine in children ages 12-23 months of age, the indicator is calculated as the</td>
<td>Preferred: Idem Other: percentage of children ages 12–23 months who received at least one dose of measles vaccine either any time before the survey or before the age of 12 months.</td>
</tr>
</tbody>
</table>

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42 EPI: Expanded Programme on Immunization 30-cluster survey; MICS: Multiple indicator cluster surveys; DHS: Demographic and health surveys.  
44 Ibid. p.107.  
46 Ibid. p.123.
### Early Childhood Health and Nutrition Indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Description</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>5</strong> Neonates protected at birth against neonatal tetanus (PAB) (%)</td>
<td>Proportion of neonates in a given year that can be considered as having been protected against tetanus as a result of maternal immunization. Estimated as a proportion of births.</td>
<td>Preferred: special studies. Estimates= using a mathematical model, as the proportion of births in a given year that can be considered as having been protected against tetanus as a result of maternal immunization. Estimates based on annual cohorts of women followed from infancy through their life, assessing immunization with DPT in infancy, TT when pregnant, or TT during supplementary immunization activities (SIAs). Model for estimates uses several inputs, each of which may have imprecise estimates.</td>
</tr>
</tbody>
</table>

#### Rationale

“Ensures health as child grows; ensures survival during the first year of life; Indicates access to other maternal and child care health services; immunization essential for reducing <5 mortality; indicators monitor coverage of immunization services; vaccination relatively easy to measure.”

- **DPT** “is delivered routinely and so helpfully measures a child’s first interaction with the health system”.
- **Measles** “remains a leading cause of death among young children globally, despite the availability of a safe and effective vaccine”.
- **Neonates protected against neonatal tetanus**, “same as immunization in general; tetanus is specially common and serious in newborns (neonatal tetanus); neonatal tetanus is

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48 Ibid.
49 Ibid.. p.80.
50 Ibid.
particularly common in rural areas where deliveries are at home without adequate sterile procedures”. 52

**Strengths and weaknesses of the indicator**

For immunization coverage - data collected may indicate number of doses, but not number of children immunized.53

In regard to neonates protected against neonatal tetanus, the indicator is based on protection provided by tetanus-toxoid (TT) immunization only, and not on clean deliveries.

**Strengths and limitations of data sources**

Both data sources, FRS and HS, have the potential to provide accurate and reliable measurements. Also, both are subject to biases. If FRS and HS are implemented jointly, they provide a validation of coverage levels.

HS are adjusted by recall bias. Also, data are supplemented by local consultations to explain inconsistencies and anomalies.

The quality of estimates is determined by the quality and availability of empirical data. Two weaknesses of current estimates are the lack of linkages and uncertainty: not all data are equally precise and certain (rooted in the quality of data and in the models themselves). Currently WHO/UNICEF are exploring ways and means of resolving this matter.

Weakness of estimates relating to the subjective nature of methods used:

(1) choice of rules;

(2) decision on the rule applicable to a given circumstance; rules are not based on theory and have not been validated as reliable. WHO/UNICEF are currently drafting formal rules.54

Estimates are constrained by the following:

- data are country-specific (not borrowed from other countries);

53 The State of Brazil’s Children 2006, The Child Development Index, pp.108-123.
- consistency of trends and patterns is checked;
- recall bias adjusted for accuracy;
- coverage >100% not acceptable.

Source: Survey data. NIS uses a quarterly, random-digit-dialled sample of telephone numbers for the 50 States and selected urban areas and territories, followed by a mail survey of the children’s vaccination providers, from whom vaccination information is collected.

Other
- Number of cases of reportable vaccine preventable diseases among children under 5 years of age.\textsuperscript{55}
- % of children < 1 year of age immunized with Tetramune (DTP-Hib).\textsuperscript{56}

\textsuperscript{55} Institute of Medicine (IOM) Board on Children, Youth and Families (BOCYF). Children's Health, the Nation's Wealth: Assessing and Improving Child Health (2004).

\textsuperscript{56} The State of Brazil’s Children 2006, The Child Development Index, pp.108-123.
### Mortality (health status indicator)

<table>
<thead>
<tr>
<th>Indicator name abbreviated</th>
<th>Definition</th>
<th>Possible data sources and method of estimation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perinatal mortality rate [\text{57}]</td>
<td>Number of deaths in the perinatal period/over total number of births (including live and still births).</td>
<td>Death registers</td>
</tr>
</tbody>
</table>
| Stillbirth rate [(per 1000 total births)] \[\text{58}\] | Third-term foetal deaths (> or = 1000 grams or > or = 28 weeks) per 1000 total births in the period [antepartum or intrapartum]. Dissemination every 3-5 years. | Preferred:  
- Civil registration: number of still births divided by number of total births.  
- Population-based surveys (PBS): number of pregnancy losses during or after the seventh month of pregnancy for the 5 years preceding the interview, over the sum of live births and late pregnancy losses in the same time period.  
Other:  
- Administrative reporting system: number of still births divided by number of total births.  
- Health facility assessments: number of stillbirths divided by number of total births documented in the facility.  
- Special studies. |
| Neonatal mortality rate [(per 1000 live births)] \[\text{59}\] | 1. Number of deaths during the first 28 completed days of life per 1000 live births in a given year or period.  
1a. Early neonatal deaths.  
1a. Deaths occurring during the first 7 days of life.  
1b. Deaths occurring after the | Preferred:  
- Civil registration (CR) with complete coverage (Death registers). Provides annual data.  
Other:  
- Household surveys (DHS): birth history on each child a women has given birth to during the 5 or 10 years preceding the survey.  
- Other: when CR or HS do not provide data, neonatal mortality may be estimated from |

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59 Ibid. p.130.
<table>
<thead>
<tr>
<th>1b. Late neonatal deaths.</th>
<th>seventh but before the 28th completed day of life.</th>
<th>under-five mortality by means of regressions adjusted for AIDS mortality.</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Infant mortality rate (MDG 4) [(probability of dying by age 1 per 1000 live births)].</td>
<td>Deaths before the first birthday per 1,000 live births.</td>
<td>HS: DHS, MICS.</td>
</tr>
<tr>
<td>5 Under-five mortality rate [(probability of dying by age 5 per 1000 live births)] (MDG).</td>
<td>Probability of a child born in a specific year or period dying before reaching the age of five, per 1000 live births.</td>
<td>Preferred: -Civil registration (CR) with complete coverage: computed directly from data of the civil registry. Provides annual data. Other: -Nationally representative empirical data from different sources (civil registration, household surveys (e.g., DHS, MICS), population censuses) are consolidated to obtain estimates of the level and trend in under-five mortality by fitting a curve to the observed mortality points. - WHO produces trend of under-5 mortality rate with standardized methodology by group of countries depending on the type and quality of source of data available.</td>
</tr>
<tr>
<td>6 Distribution of causes of death among children &lt;5 years (%).</td>
<td>Distribution of main causes of death (“underlying cause of death”) among children &lt;5 years, expressed as % of total deaths. Report:</td>
<td>Preferred: -Vital registration with complete coverage (≥80%) and medical certification of cause of death. Other: -Special studies: nationally representative epidemiological studies of cause of death based on verbal autopsy studies or other sources for countries without civil registration data.</td>
</tr>
</tbody>
</table>

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62  Ibid.
63  Ibid.
64  Ibid.
65  Ibid. p.83.
Rationale

- Neonatal mortality is a "relevant indicator of children’s level of health and of countries’ general development."67 “Accounts for large proportion of child deaths; useful indicator of maternal and newborn neonatal health and care; proportion of neonatal deaths among under-5 years of age is expected to increase as child mortality declines.”68 “In terms of health effect, a general indicator on the extent of these diseases is clearly useful. For this purpose we might use a measure such as the perinatal mortality rate.”69

- Under-5 mortality – measures child survival and; reflects social, economic and environmental conditions in which children (and others) live, including their health care; because morbidity data frequently are unavailable, mortality rates are often used to identify vulnerable populations”.70

- Causes of death – “Effective efforts to improve child survival are based on accurate information.” 71

- Stillbirths “may reflect inadequacies in antenatal care coverage or good quality intrapartum care.”

Strengths and weaknesses of the indicator

Under-five mortality is not really a rate but a probability of death in a life table index, expressed as deaths per 1000 live newborns.72

Neonatal mortality rate – the reliability of estimates depends on the accuracy and completeness of reporting and recording births and deaths. Underreporting and misclassification are common, especially for deaths early in life.

Stillbirth rate estimates are based on unadjusted data only for CR with good coverage. For all other sources, a mathematical model is used. Reliability of estimates of stillbirths

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72 Ibid.
depends on the accuracy and completeness of reporting and recording of births and deaths. Underreporting of stillbirths is common.

The under-5 mortality indicator is produced for the United Nations by the Inter-agency Group for Mortality Estimation (IGME); IGME is currently working to harmonize country data and carry out joint estimation. In most countries where no annual data are available from a civil registry, estimates are based on projections derived from a data point that goes back to at least three or four years. 73

**Determinants**

Under-5 mortality rate – (1) lack of political will to prioritize child health; (2) financial gap between funding needed and aid received; (3) no formal political voice for children and women; (4) failure to address other social determinants of health; (5) decisions about health exclude families in real need. 74

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74 Child Health Now, 2010.
### (d) Delivery and birth

<table>
<thead>
<tr>
<th>Indicator name abbreviated [full name]</th>
<th>Definition</th>
<th>Possible data sources and method of estimation</th>
</tr>
</thead>
</table>
| 1 Births attended by skilled health personnel (%)\(^{75}\) | The number of births attended by skilled health personnel (doctors, nurses or midwives) trained in providing life-saving obstetric care, including giving the necessary supervision, care and advice to women during pregnancy, childbirth and the post-partum period, to conduct deliveries on their own and to care for newborns, over the total number of live births in the same period. | **Preferred**: Household surveys\(^{76}\): respondents are asked about each live birth and who had helped them during delivery for a period up to five years before the interview.  
**Other**: Facility reporting system: Service/facility records could be used where a high proportion of births occur in health facilities and therefore they are recorded. |
| 2 Number of reported cases of congenital rubella syndrome [Congenital rubella syndrome-number of reported cases]\(^{77}\) | Confirmed congenital rubella syndrome cases, including those confirmed clinically, epidemiologically or by laboratory investigation. Cases discarded by laboratories should be excluded. | **Preferred**: surveillance systems  
WHO compiles data as reported by national authorities. |
| 3 Number of reported cases of neonatal tetanus\(^{78}\) | Confirmed neonatal tetanus cases. | **Preferred**: Surveillance systems  
(www.who.int/immunization_monitoring/data/en/). |
| 4 Premature births\(^{79}\) /pre-term birth rate\(^{80}\) | Proportion of live births born below 37 weeks\(^{81}\) per 100 live births.\(^{82}\) | Not regularly used by WHO statistics reports. |

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\(^{75}\) WHO, World Health Indicators, 2011. Indicator Compendium.  
\(^{76}\) Demographic and Health Surveys, Multiple Indicator Cluster Surveys, and Reproductive Health Surveys.  
\(^{78}\) Ibid.
Rationale

- Births attended by skilled health personnel means “the proportion of births attended by skilled health personnel is used as a proxy indicator of maternal mortality; the indicator is a measure of a health system's ability to provide adequate care during birth, a period of elevated mortality and morbidity risk for both mother and newborn.” 83

- Premature births - “Rates have risen since 1980s in Canada. Early pre-term birth is associated with perinatal illness, neonatal death, long-term complications including disability.”84

- Congenital malformations - “Environmental health indicators. The number of children born with congenital malformations requiring surgical correction is also a useful indicator of more extreme birth defects, including problems such as neural tube defects and gastroschisis, which are on the increase in several countries. Neural tube defects cause long-term disability and death.” 85

- Congenital rubella syndrome is a major “cause of severe birth defects; infected women have a 90% chance of passing the virus on to the foetus; can cause death of foetus or CRS; causes many birth defects: the most common being deafness.” 86

- Perinatal diseases –“consequently represent one of the major causes of loss of life and illness among children worldwide; in terms of health effect, a general indicator on the extent of these diseases is clearly useful. For this we might use a measure such as the perinatal mortality rate. For more specific applications, however, it is useful to define other health effect indicators.” 87

81 Ibid.
82 Ibid.
85 Ibid.
**Strengths and weaknesses of the indicator**

- **Births attended by skilled health personnel** - This indicator may not adequately capture women’s access to good quality care, particularly when complications arise.

- **Congenital malformations** – Rates may reflect, in part, reporting and health care services, particularly in terms of access to antenatal screening. It also reflects access to termination for serious defects.\(^{88}\) Reduction in neural tube defects attributable, in part, to early detection and subsequent termination, in part to better diets, vitamin supplements.\(^{89}\)

- **Congenital rubella syndrome** - Case numbers are generally a poor indication of the true burden of disease. To interpret these numbers, both epidemiological patterns and data collection efforts in specific countries must be considered. For vaccine-preventable diseases, case numbers are affected by immunization rates. Despite ongoing efforts to enhance disease surveillance and response, many countries face challenges in accurately identifying, diagnosing and reporting infectious diseases, owing to the remoteness of communities, lack of transport and a communication infrastructure, and shortage of skilled health care workers and laboratory facilities to ensure accurate diagnosis. No inference can be drawn from these figures about a country's effort or progress in controlling particular diseases.\(^{90}\)

- **Neonatal tetanus** - Case numbers are generally a poor indication of the true burden of disease. To interpret these numbers, both epidemiological patterns and data collection efforts in specific countries must be considered. For vaccine-preventable diseases, case numbers are affected by immunization rates. Despite ongoing efforts to enhance disease surveillance and response, many countries face challenges in accurately identifying, diagnosing and reporting infectious diseases, owing to the remoteness of communities, lack of transport and a communication infrastructure, and shortage of skilled health care workers and laboratory facilities to ensure accurate diagnosis. No inference can be drawn from these figures about a country's effort or progress in controlling particular diseases.\(^{91}\)

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\(^{88}\) Ibid.

\(^{89}\) Ibid.

\(^{90}\) Ibid.

Strengths and weaknesses of data sources

- Congenital rubella syndrome - “to interpret these numbers, both epidemiological patterns and data collection efforts in specific countries must be considered. Case numbers are affected by immunization rates. Many countries face challenges in accurately identifying, diagnosing and reporting infectious disease. No inference can be drawn from these figures about a country's effort or progress in controlling particular diseases.

Other

- Congenital malformations requiring surgical correction in children under one year of age. This indicator is important as it provides insights into the severity of birth defects.
  - Number of congenital anomalies over 100,000.
  - Rate of congenital anomalies.
  - Congenital anomalies or birth defects.
  - Neural tube defect rates.

Indicators proposed by WHO for children's environmental health indicators:

- Gestational problems (e.g. prematurity, post-prematurity and stillbirths);
- Intrauterine growth retardation;
- Neonatal infections (e.g. sepsis, pneumonia);
- Foetal blood loss;
- Physical injuries before or during birth (e.g. asphyxia or birth trauma);
- Chromosomal conditions;
- Intrauterine growth retardation in newborns identifies those most at risk;
- Number of children born with congenital malformations requiring surgical correction is also a useful indicator of more extreme birth defects;
- Number of hospital admissions for maternal intrauterine or rubella infection, which provides a measure of maternal infections likely to cause birth defects or gestational problems.

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93 Ibid.
94 Ibid.
95 Ibid.
### (e) Antiretroviral prophylaxis (health service coverage indicator)

<table>
<thead>
<tr>
<th>Indicator name abbreviated [full name]</th>
<th>Definition</th>
<th>Possible data sources</th>
</tr>
</thead>
</table>
| Antiretroviral therapy coverage among HIV-infected pregnant women for PMTCT (%) | Number of HIV-infected pregnant women who received antiretroviral medicines to reduce the risk of mother-to-child transmission in the last 12 months, over estimated number of HIV-infected pregnant women in the last 12 months. | Preferred: Facility reporting system.  

"Number of pregnant women living with HIV receiving antiretrovirals for PMTCT is based on national programme data aggregated from facilities or other service delivery sites and as reported by the country.  

Number of pregnant women living with HIV who need antiretroviral medicine for PMTCT is estimated using standardized statistical modelling based on UNAIDS/WHO methods that consider various epidemic and demographic parameters and national programme coverage of antiretroviral therapy in the country (such as HIV prevalence among women of reproductive age, effect of HIV on fertility and antiretroviral therapy coverage). These statistical modelling procedures are used to derive a comprehensive population-based estimate of the number of all pregnant women living with HIV who need antiretrovirals for PMTCT in the country." |

### Rationale

"In the absence of any preventative interventions, infants born to and breastfed by HIV-infected women have roughly a one-in-three chance of acquiring infection themselves. This can happen during pregnancy, during labour and delivery or after delivery through breastfeeding. The risk of mother-to-child transmission can be significantly reduced through the complementary approaches of antiretroviral regimens for the mother with or without prophylaxis to the infant, implementation of safe delivery practices and use of safer infant..."
feeding practices. The purpose of this indicator is to assess progress in preventing mother-to-child transmission of HIV (PMTCT).” 100

“Antiretroviral treatment: The use of a combination of 3 or more antiretroviral drugs for purpose of treatment in accordance with nationally approved treatment protocols (or WHO/UNAIDS standards). ARV regimen prescribed for post exposure prophylaxis is excluded.” 101

**Weaknesses of the indicator**

- “Predominant type of statistics: predicted”.

- “This indicator permits monitoring trends in antiretroviral drug provision that addresses PMTCT. However, since countries provide different regimens of antiretroviral drugs for PMTCT, cross-country comparisons of aggregate estimates must be interpreted with caution and with reference to the regimens provided.” 102

- “In 2006, international guidelines were updated to recommend more efficacious regimens for prevention of mother-to-child transmission, and countries may be at different phases in adopting the newer recommendations.” 103

- “In some countries, large numbers of pregnant women do not have access to antenatal clinic services or choose not to make use of them. Pregnant women living with HIV may be more or less likely to use antenatal clinic services (or public rather than private antenatal clinic services) than those who are not infected, particularly where antiretroviral therapy can be accessed via such services or where levels of stigma are particularly high. National estimates of HIV-infected pregnant women should be derived by adjusting surveillance data from antenatal clinic sentinel sites and other sources, taking into consideration characteristics such as rural/urban patterns of HIV prevalence that may affect the representation of surveillance sites. Methods for monitoring coverage of this service are therefore also evolving.” 104

100 WHO Indicator Compendium 2011.
101 Ibid.
102 Ibid.
103 Ibid.
104 To access the most current information available please consult: http://www.who.int/hiv/topics/mtct/guidelines/en/index.html”.
**EARLY CHILDHOOD HEALTH AND NUTRITION INDICATORS**

(f) **Infectious diseases: ARI (Health service coverage indicator)**

<table>
<thead>
<tr>
<th>Indicator name abbreviated</th>
<th>Definition</th>
<th>Possible data sources and method of estimation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children aged &lt;5 years with ARI symptoms taken to facility.</td>
<td>Proportion of children aged 0–59 months who had ‘presumed pneumonia’ (ARI) in the last 2 weeks and were taken to an appropriate health-care provider.</td>
<td>Household surveys: DHS, MICS.WHO compiles empirical data from household surveys. Predominant type of statistics: adjusted.</td>
</tr>
</tbody>
</table>

**Rationale**

- “Acute respiratory infections (ARI) are responsible for almost 20% of all deaths of children aged less than 5 years worldwide. The proportion of under-fives with ARI that are taken to an appropriate health-care provider is a key indicator for coverage of intervention and care-seeking, and provides critical inputs to the monitoring of progress towards child survival-related Millennium Development Goals and Strategies.”  

  106

- Respiratory illness - “After perinatal diseases, respiratory illness represents the most important source of ill-health and mortality in young children.”  

  107

- Children <5 with ARI taken to facility - “Acute respiratory infections (ARI) are responsible for almost 20% deaths of children <5 worldwide; key indicator for coverage of intervention and care-seeking; provides critical inputs to the monitoring progress towards child survival-related MDGs and strategies.”  

  108

**Weaknesses of the indicator**

“Strictly speaking, ‘ARI’ stands for ‘acute respiratory infection’. During the UNICEF/WHO Meeting on Child Survival Survey-based Indicators, held in New York, 17–18 June 2004, it was recommended that ARI be described as ‘presumed pneumonia’ to better

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105 WHO, World Health Statistics 2011, p.46.
106 Ibid.
reflect probable cause and the recommended interventions. The definition of ARI used in the Multiple Indicator Cluster Surveys (MICS) was chosen by the group and is based on mothers' perceptions of a child who has a cough, is breathing faster than usual with short, quick breaths or is having difficulty breathing, excluding children that had only a blocked nose. The definition of ‘appropriate’ care provider varies between countries.”

Strengths and weaknesses of data sources

“The accuracy of reporting in household surveys varies and is likely to be prone to recall bias. Seasonality related to the prevalence of ARI may also affect the results and their comparability between and within countries.”

Variations/Future challenges

- Care-seeking for acute respiratory infection.
- Respiratory illness:
  - mortality rate due to acute respiratory illness in children aged 0–4 years;
  - morbidity rate due to acute respiratory illness of children aged 0–4 years;
  - prevalence of chronic respiratory illness in children aged 0–14 years.
- Acute respiratory infection prevalence.
- ARI carer recognition (under 5) appropriate action.
- Antibiotics for pneumonia - the “coverage indicator indicates access to treatment; case management is an important measure of success.”

109 WHO. World Health Statistics 2011, p.46.
110 Ibid.
115 Update on the Commission.pdf
(g) Infectious diseases: Diarrhoea

<table>
<thead>
<tr>
<th>Indicator name abbreviated [full name]</th>
<th>Definition</th>
<th>Possible data sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children aged &lt;5 years with diarrhoea receiving oral rehydration.(^{116})</td>
<td>Proportion of children aged 0–59 months who had diarrhoea in the last 2 weeks and were treated with oral rehydration salts or an appropriate household solution (ORT).(^{117})</td>
<td>Preferred: household surveys: DHS, MICS. WHO compiles empirical data from household surveys.(^{118})</td>
</tr>
</tbody>
</table>

**Rationale**

“Diarrhoeal diseases remain one of the major causes of mortality among under-fives, accounting for 1.8 million child deaths worldwide, despite all the progress in its management and the undeniable success of the oral rehydration therapy (ORT). Therefore monitoring of the coverage of this very cost-effective intervention is crucial for the monitoring of progress towards the child survival-related Millennium Development Goals and Strategies.”\(^{119}\)

**Weaknesses of the indicator**

These indicators are usually collected in DHS and MICS surveys; however, the accuracy of reporting in household surveys varies and is likely to be prone to recall bias. Also, seasonal influences relating to the prevalence of diarrhoeal disease may affect the results of data collection for this indicator. The comparability of results across countries and over time may therefore be affected. Frequent changes in the definition of this indicator have seriously compromised the ability to assess trends reliably over time. There are two specific weaknesses with some of the associated terms of this indicator:

\(^{117}\) Ibid.
\(^{118}\) Ibid.
\(^{119}\) Ibid p.46.
(1) discussions have been held on whether treatment should be considered effected when the child has been “given” or “offered” the electrolyte solution or when it has been “received” or “ingested” by the child;

(2) comparability of data on appropriate household solution.  

**Strengths and weaknesses of data sources**

“According to DHS, the term(s) used for diarrhoea should encompass the expressions used for all forms of diarrhoea, including bloody stools (consistent with dysentery), watery stools, etc. It encompasses the mother’s definition as well as the local term(s).”  

“The definition of ‘appropriate household solution’ may vary between countries.”

**Variations/Future challenges**

- Care-seeking for diarrhoea.
- Diarrhoeal diseases.
- Diarrhoea prevalence.
- Treatment of gastroenteritis.
- The diarrhoea mortality rate in children aged 0–4 years.
- The diarrhoea morbidity rate in children aged 0–4 years.
- The recurrence rate of outbreaks of diarrhoeal disease among children aged 0–4 years.
- The number of children aged 0–4 years able to obtain rehydration therapy within 24 hours of need.

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120 WHO, World Health Statistics 2011, p.46.
121 Ibid.
122 Ibid.
128 Ibid.
129 Ibid.
(h) Infectious diseases: Malaria (health services coverage)

<table>
<thead>
<tr>
<th>Indicator name abbreviated [full name]</th>
<th>Definition</th>
<th>Possible data sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Children aged &lt;5 years sleeping under insecticide-treated nets (%) (MDG 6)</td>
<td>Percentage of children under five years of age in malaria endemic areas who slept under an insecticide-treated net (ITN) the previous night.</td>
<td>Preferred: Household surveys: DHS, MICS; MIS “and `rider” questions on other representative population-based surveys, that include questions on whether children under five years of age slept under an ITN the previous night”. Numerator= number of children aged 0-59 months who slept under an insecticide-treated mosquito net the night prior to the survey. Denominator= total number of children aged 0-59 months included in the survey. Data are collected every 3-5 years and compiled in the UNICEF global databases. “The data are reviewed in collaboration with Roll Back Malaria (RBM) partnership, launched in 1998 by WHO, UNICEF, UNDP and the World Bank.”</td>
</tr>
<tr>
<td>2 Children with fever treated with anti-malarial drugs [Children aged &lt;5 years with fever who received treatment with any antimalarial (%)] (MDG 6).</td>
<td>Percentage of children aged &lt; 5 years with fever in malaria-risk areas being treated with effective antimalarial drugs.</td>
<td>Preferred: Household surveys: DHS, MICS; MIS. Numerator= number of children aged 0-59 months with fever in the 2 weeks prior to the survey who received any anti-malarial medicine. Denominator= number of children aged 0-59 months reported to have fever in the two weeks prior to the survey. Data are collected every 3-5 years and compiled in the UNICEF global databases. “The data are reviewed in collaboration with Roll Back Malaria (RBM) partnership, launched in 1998 by WHO, UNICEF, UNDP and the World Bank.”</td>
</tr>
</tbody>
</table>

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131  WHO; World Health Statistics 2011, p.38.  
132  Ibid. p.50.  
133  Ibid.  
134  WHO; World Health Statistics 2011, p.50.  
135  Ibid.
Malaria-risk areas - Areas of stable malaria transmission (allowing the development of some level of immunity) and areas of unstable malaria transmission (seasonal and less predictable transmission impeding the development of effective immunity).137

MIS: Malaria indicator surveys.

**Rationale**

- Insecticide treated nets - “In areas of intense malaria transmission, malaria-related morbidity and mortality are concentrated in young children, and the use of insecticide-treated nets (ITN) by children under 5 has been demonstrated to considerably reduce malaria disease incidence, malaria-related anaemia and all cause mortality in infants under the age of five. In addition to being listed as an MDG indicator under Goal 6, the use of ITNs is identified by WHO as one of the main interventions to reduce the burden of malaria.” 138

  "The symptoms of malaria overlap with other diseases so one cannot always be certain that a death is due to malaria particularly as many deaths occur in children who may simultaneously suffer from a range conditions including respiratory infections, diarrhoea, and malnutrition. Effective interventions exist to reduce the incidence of malaria including the use of insecticide treated mosquito nets and indoor residual spraying with insecticide.” 139

- Treatment with antimalarial drugs - “Prompt treatment with effective antimalarial drugs for children with fever in malaria-risk areas is a key intervention to reduce mortality. In addition to being listed as a global Millennium Development Goals Indicator under Goal 6, effective treatment for malaria is also identified by WHO, UNICEF and the World Bank as one of the main interventions to reduce the burden of malaria in Africa. In areas of sub-Saharan Africa with stable levels of malaria transmission, it is essential that prompt access to treatment is ensured to prevent the degeneration of malaria from its onset to a highly lethal complicated

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136  Ibid.
137  Ibid.
138  WHO; World Health Statistics 2011, p.38.
139  Ibid.
picture. This requires drug availability at household or community level and, for complicated cases, availability of transport to the nearest equipped facility.” 140

**Weaknesses of the indicator**

- Treatment of fever - “As malaria burden reduces as a result of control efforts, all fever cases are not necessarily malaria. In addition, many countries are increasing their diagnostic capacity. Therefore, interpretation of the indicator becomes less important to measure access to anti-malarial treatment. This indicator is being revised by MERG to allow disaggregated evaluation of access to those who were diagnosed. The accuracy of reporting in household surveys may vary. The indicator reports on receiving any anti-malarial medicine and includes all anti-malarial medicines, such as chloroquine, that may be less effective due to widespread resistance and treatment failures.” 141

- Insecticide treated nets - “The accuracy of reporting in household surveys may vary. Also, seasonal influences related to fluctuations in vector and parasite prevalence may affect level of coverage depending on timing of the data collection. Because of issues of date recall of last impregnation with insecticide, this indicator may not provide reliable estimates of net retreatment status. Furthermore, the standard survey instrument does not collect information on whether the net was washed after treatment, which can reduce its effectiveness. Typically, estimates are provided for the national level, which may underestimate the level of coverage among subpopulations living in localized areas of malaria transmission.” 142

“It is important to note that while the MDG indicator only refers to children aged <5 years, WHO recommends that all household members sleep under ITNs in malaria-risk areas.”143

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140  WHO, World Health Statistics 2011, p.50.
141  Ibid. p.38.
142  Ibid.
### (i) Maternal mortality (health status)

<table>
<thead>
<tr>
<th>Indicator name abbreviated</th>
<th>Definition</th>
<th>Possible data sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal mortality ratio (per 100 000 live births) (MDG 5).</td>
<td>&quot;The maternal mortality ratio (MMR) is the annual number of female deaths from any cause related to or aggravated by pregnancy or its management (excluding accidental or incidental causes) during pregnancy and childbirth or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, per 100,000 live births, for a specified year.&quot;</td>
<td>Preferred: Vital registration with complete coverage and medical certification of cause of death. Other: Household surveys, population census, Sample or sentinel registration systems, special studies. Estimated dividing recorded (or estimated) maternal deaths by total recorded (or estimated) live births in the same period and multiplying by 100,000. Measurement requires information on pregnancy status, timing of death (during pregnancy, childbirth, or within 42 days of termination of pregnancy), and cause of death. Predominant type of statistics: predicted. &quot;The maternal mortality ratio (whose denominator is the number of live births) indicates the risk once a woman becomes pregnant, thus does not take fertility levels in a population into consideration.&quot;</td>
</tr>
</tbody>
</table>

#### Rationale

"Complications during pregnancy and childbirth are a leading cause of death and disability among women of reproductive age in developing countries. The maternal mortality ratio represents the risk associated with each pregnancy, i.e. the obstetric risk. It is also a Millennium Development Goal Indicator for monitoring Goal 5, improving maternal health."

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145 Ibid.  
146 Ibid.  
147 Ibid.  
148 Ibid.  
149 Ibid.  
150 Ibid.
Weaknesses of the indicator

“Maternal mortality is difficult to measure. Vital registration and health information systems in most developing countries are weak, and thus, cannot provide an accurate assessment of maternal mortality. Even estimates derived from complete vital registration systems, such as those in developed countries; suffer from misclassification and underreporting of maternal deaths. Due to the very large confidence limits of maternal mortality estimates, the MDG statistics track trends only at the regional level. The country estimates are not suitable for assessing trends over time or for making comparisons between countries. As a result, it is recommended that process indicators, such as attendance by skilled health personnel at delivery and use of health facilities for delivery, be used to assess progress towards the reduction in maternal mortality.”

Weakeness of data sources

“There are often data quality problems, particularly related to the underreporting and misclassification of maternal deaths. Therefore, data are often adjusted in order to take into account these data quality issues. Adjustments for underreporting and misclassification of deaths and model based estimates should be made in the cases where data are not reliable. Because maternal mortality is a relatively rare event, large sample sizes are needed if household surveys are used. This is very costly and may still result in estimates with large confidence intervals, limiting the usefulness for cross-country or overtime comparisons.”

“To reduce sample size requirements, the sisterhood method used in the DHS surveys measures maternal mortality by asking respondents about the survival of sisters. It should be noted that the sisterhood method results in pregnancy-related mortality: regardless of cause of death, all deaths occurring during pregnancy, birth, or the six weeks following the termination of the pregnancy are included in the numerator of the maternal mortality ratio. Reproductive Age Mortality Studies (RAMOS) is a special study that uses varied sources, depending on the context, to identify all deaths of women of reproductive age and ascertain which of these are maternal or pregnancy-related.”

152 Ibid.
"Data on maternal mortality and other relevant variables are obtained through databases maintained by WHO, UNPD, UNICEF, and WB. Data available from countries varies in terms of the source and methods. Given the variability of the sources of data, different methods are used for each data source in order to arrive at country estimates that are comparable and permit regional and global aggregation. Currently, only about one third of all countries/territories have reliable data available, and do not need additional estimations."
### (j) Environmental conditions: drinking-water, sanitation and household use of solid fuels (risk factor indicators)

<table>
<thead>
<tr>
<th>Indicator name abbreviated [full name]</th>
<th>Definition</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Population using improved drinking-water sources (%) (MDG 7.)</td>
<td>The percentage of population using an improved drinking water source. Improved drinking water sources include: - piped water into dwelling, plot or yard; - public tap/stand pipe; - tube well/borehole; - protected dug well; - protected spring; and - rainwater collection. Unimproved drinking water sources are: - unprotected dug well; - unprotected spring; - cart with small tank/drum; - tanker truck; - surface water (river, dam, lake, pond, stream, canal, irrigation channel and any other surface water); and - bottled water (if it is not accompanied by another improved source).</td>
<td>Preferred: Household surveys 156 Population census. Other: Administrative reporting system. Estimated as the ratio of the number of people who use an improved drinking water source, urban and rural, expressed as a percentage. The percentage of total population using an improved drinking water source is the population weighted average of the previous two numbers. “The use of drinking water sources and sanitation facilities is part of the wealth index used by household surveys to divide the population into wealth quintiles. As a result, most nationally representative household surveys include information about water and sanitation.” The WHO/UNICEF Joint Monitoring Programme on Water Supply and Sanitation (JMP) “assembles reviews and assesses data collected by national statistics offices and other relevant institutions through nationally representative household surveys and national censuses.” “For each country, survey and census data are plotted on a time series: 1980 to present.” “Regional estimates are weighted averages of the country data, using the number of population for the reference year in each country as the weight. No figures are reported if less than 50% of the population in the region is covered.”</td>
</tr>
</tbody>
</table>

156 Demographic and Health Surveys (DHS), Multiple Indicator Cluster Surveys (MICS), World Health Surveys, Living Standards Measurement Surveys, Core Welfare Indicator Questionnaires, Health and Nutrition Surveys, Household Budget Surveys, Pan Arab Project for Family Health Surveys, Reproductive Health Surveys and many other nationally representative household surveys.

| Population using improved sanitation facilities (%) (MDG 7.) | The percentage of population using an improved sanitation facility. An improved sanitation facility is one that likely hygienically separates human excreta from human contact. Sanitation facilities are | Preferred: Household surveys 159 Population: census. Other: Administrative reporting system. Computed as the ratio of the number of people who use an improved sanitation facility, urban and rural, expressed as a percentage. The percentage of total population using an improved sanitation facility is the population weighted average of |

159 Demographic and Health Surveys (DHS), Multiple Indicator Cluster Surveys (MICS), World Health Surveys, Living Standards Measurement Surveys, Core Welfare Indicator Questionnaires, Health and Nutrition Surveys, Household Budget Surveys, Pan Arab Project for Family Health Surveys, Reproductive Health Surveys and many other nationally representative household surveys.
<table>
<thead>
<tr>
<th></th>
<th>EARLY CHILDHOOD HEALTH AND NUTRITION INDICATORS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>not considered improved when shared with other households, or open to public use. Improved sanitation facilities include: - flush or pour-flush to piped sewer system; septic tank or pit latrine; - ventilated improved pit latrine; - pit latrine with slab and - composting toilet. Unimproved sanitation include: - flush or pour-flush to elsewhere; - pit latrine without slab or open pit; - bucket, hanging toilet or hanging latrine; and - no facilities or bush or field (open defecation). The previous two numbers. “The use of drinking water sources and sanitation facilities is part of the wealth-index used by household surveys to divide the population into wealth quintiles. As a result, most nationally representative household surveys include information about water and sanitation.” The WHO/UNICEF Joint Monitoring Programme on Water Supply and Sanitation (JMP) “assembles reviews and assesses data collected by national statistics offices and other relevant institutions through nationally representative household surveys and national censuses.” “For each country, survey and census data are plotted on a time series: 1980 to present.” “Regional estimates are weighted averages of the country data, using the number of population for the reference year in each country as the weight. No figures are reported if less than 50% of the population in the region is covered.”</td>
</tr>
<tr>
<td></td>
<td>3 Population using solid fuels. The percentage of the population that relies on solid fuels as the primary source of domestic energy for cooking and heating. Solid fuels: Biomass fuels, such as wood, charcoal, crops or other agricultural waste, dung, shrubs and straw, and coal. Preferred: Household surveys Population census “Calculated as the number of people using solid fuels divided by total population, expressed as percentage.” “Solid fuel use data are routinely collected at the national and sub national levels in most countries using censuses and surveys.” “Since 2009, as the number of nationally representative data has increased, the methods developed and implemented by the WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation (WHO and UNICEF 2006) were followed: - Where solid fuel use information is available for a single year, a horizontal line is drawn six years into the past and six years into the future; - Where solid fuel use information is available for two or more years that are spaced four or fewer years apart, an average is calculated. This average is extrapolated six years into the past and six years into the future. - Where solid fuel use information is available for two or more years that are spaced at least five years apart, linear regression is performed. The linear regression line is extrapolated up to two years after the latest survey point and up to two years before the earliest survey point. Outside of these time limits, the extrapolated regression line is based on a trend analysis of available data.”</td>
</tr>
</tbody>
</table>

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160 Ibid. p.203.
161 United States Agency for International Development (USAID)- supported Demographic and Health Surveys (DHS); United Nations Children’s Fund (UNICEF)-supported Multiple Indicator Cluster Surveys (MICS); WHO-supported World Health Surveys (WHS); and other reliable and nationally representative country surveys.
line is flat for four years in either direction. Where coverage reaches 0% or 100%, a horizontal line is drawn from the year before coverage reaches 0% or 100%.”

“Missing data are estimated based on the following criteria:
- all countries with a Gross National Income (GNI) per capita above US $10,500 are assumed to have made a complete transition to using non-solid fuels as the primary source of domestic energy for cooking and heating;
- missing data are not estimated for countries with a GNI per capita below US $10,500, and for which no household solid fuel use data are available.”

“Countries are population-weighted to obtain regional aggregates; for countries with no data, the regional mean exposure is assumed; for countries with less than 5% of solid fuel use (SFU), 0% is assumed for the calculation of regional or global means; for countries with more than 95% of SFU, 95% is assumed in the calculation of the mean.”

Rationale
- Population using improved drinking-water sources and population using improved sanitation facilities: “Access to drinking water and basic sanitation is a fundamental need and a human right vital for the dignity and health of all people.” Health and economic benefits of improved water supply and improved sanitation facilities to households and individuals are well documented. Use of an improved drinking water source and use of improved sanitation facility are proxies for the use of safe drinking water and for the use of improved sanitation facilities, respectively. “An improved drinking water source, by nature of its construction and design, is likely to protect the source from outside contamination, in particular from faecal matter.”

- Population using solid fuels - “The use of solid fuels in households is associated with increased mortality from pneumonia and other acute lower respiratory diseases among children, as well as increased mortality from chronic obstructive pulmonary disease and lung cancer (where coal is used) among adults.”

Weaknesses of the indicator

- Population using improved drinking-water sources - use of an improved drinking water source is a proxy for access to safe drinking water.

- Population using improved sanitation facilities - use of an improved sanitation facility is a proxy for access to basic sanitation.

- Population using solid fuels - “The indicator uses solid fuel use as a proxy for indoor air pollution, as it is not currently possible to obtain nationally representative samples of indoor concentrations of criteria pollutants, such as small particles and carbon monoxide. The indicator is based on the main type of fuel used for cooking as cooking occupies the largest share of overall household energy needs. However, many households use more than one type of fuel for cooking and, depending on climatic and geographical conditions, heating with solid fuels can also be a contributor to indoor air pollution levels.”

Limitations of data sources

- Population using improved drinking-water sources and population using improved sanitation facilities - Surveys and censuses, data sources used by JMP, measure "use" and not "access", since the data is collected directly from the users of the facilities. Measurability of sustainable access to safe drinking water and sustainable access to basic sanitation at the national scale, as warranted by the MDG target, poses a huge challenge for JMP. No information is available for many developed countries.

- Population using solid fuels - There may be discrepancies between internationally reported and nationally reported figures”, owing to use of different definitions of solid fuel (wood only or wood and any other biomass, e.g. dung residues), use of different total population estimates, estimates being expressed as percentage of population using solid fuels (as per MDG indicator) as compared to percentage of household using solid fuels (as assessed by surveys such as DHS or MICS).

Where several survey results were available, averages or linear regressions over time were made for reporting for a given year, which may differ from a single national survey data point.

\[164\] Ibid. p.204.
\[165\] WHO and UNICEF, 2010.
OTHER HEALTH INDICATORS

The following indicators are not collected regularly internationally but represent a challenge for the future.

(a) Dental care

Indicators
- Children ages 2-6 years receiving dental care in the last 12 months.\(^{166}\)
- Children who have received preventive dental care in the past year.\(^{167}\)
- Children whose teeth are in excellent or very good condition (%).\(^{168}\)

(b) Emotional conditions

Indicators
- Children who have one or more emotional, behavioural or developmental conditions (%).\(^{169}\)
- Children aged 2 to 17 with a parent who reports that a doctor has told them their child has autism, developmental delays, depression or anxiety, ADD/ADHD or behavioural/conduct problems.\(^{170}\)
- Children under 6 years of age being screened for developmental and mental health issues.\(^{171}\)

(c) Injuries

Rationale “Of all forms of illness, injuries to children are perhaps the most pernicious. Injuries to children reflect individual or collective neglect; or may be the product of deliberate abuse.”\(^{172}\)

Indicators
- Physical injuries.\(^{173}\)
- Number of injuries in children under one year of age, 1-4 years, 5-9 years.\(^{174}\)

\(^{166}\) [Link](http://nccp.org/publications/pub_822.html) ; [Link](http://nccp.org/publications/pdf/text_822.pdf)
\(^{168}\) Used in “Kids count” report. [Link](http://datacenter.kidscount.org/data/acrossstates/Rankings.aspx?ind=6032)
\(^{169}\) Used in “Kids count” report. [Link](http://datacenter.kidscount.org/data/acrossstates/Rankings.aspx?ind=6031)
- Injury hospitalization rates for children under one year of age, 1-4 years, 5-9 years/100,000.\textsuperscript{175}
- Injury death rates (occurring in a hospital) for children aged 5-9 years/100,000.\textsuperscript{176}
- Pedestrians killed or injured in traffic collisions.\textsuperscript{177}

\textbf{(d) Disability}

\textbf{Indicators}
- Disability\textsuperscript{178} rates (\%) = number and \% of children living with a limitation of activity (ages 0 – 9).\textsuperscript{179}

\textbf{(e) Post-natal care (coverage indicator)}

\textbf{Rationale}
- Well-child paediatric visits "promote good health and development. During a well-child visit, a paediatrician provides preventive care by assessing a child's physical, behavioural, developmental and emotional status. A well-child visit is a critical opportunity to detect a possible developmental delay or disability, early treatment of which can lessen the future impact on both the child and family. Well-child visits allow physicians to promote behaviours conducive to healthy development, and to give age-appropriate counselling or anticipatory guidance".\textsuperscript{180}

\textbf{Indicators}
- Postnatal visit.\textsuperscript{181}
- Post-natal care for mothers and babies concerns the percentage of mothers and babies who received postnatal care visit within 2 days of childbirth.\textsuperscript{182}
- Well-child visits concern the proportion of children under the age of six who received a well-child check-up in the past year.\textsuperscript{183}

\textsuperscript{175} Ibid.
\textsuperscript{176} Ibid.
\textsuperscript{177} Ibid.
\textsuperscript{178} WHO, Equity, social determinants and public health programmes \texttt{http://whqlibdoc.who.int/publications/2010/9789241563970_eng.pdf}
\textsuperscript{180} Well-child visits, Child Trends Data Bank, \texttt{http://www.childtrendsdatabank.org/?q=node/310}
\textsuperscript{181} WHO, Equity, social determinants and public health programmes \texttt{http://whqlibdoc.who.int/publications/2010/9789241563970_eng.pdf}
\textsuperscript{182} Update on the Commission.pdf.
\textsuperscript{183} Well-child visits, Child Trends Data Bank, \texttt{http://www.childtrendsdatabank.org/?q=node/310.}
(f) Cancer

- Cancer incidence rates, children under one year of age, 1 to 4 years, 5-9 years\textsuperscript{184} 

The following is an example of early childhood health indicators:

**EARLY CHILDHOOD INDICATORS – PROJECT THRIVE PROTOTYPE\textsuperscript{185}**

<table>
<thead>
<tr>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infants born to mothers who receive late or no antenatal care</td>
</tr>
<tr>
<td>Percentage of toddlers (aged 13 to 36 months) who receive at least one EPSDT periodic screen in a year</td>
</tr>
<tr>
<td>Young children (aged 19-36 months) who complete the basic series of age appropriate immunizations against measles, mumps, rubella, polio, diphtheria, tetanus, pertussis, haemophilus influenzae, and hepatitis B (series 4-3-1-3-3).</td>
</tr>
<tr>
<td>Children aged 2-6 years receiving dental care in the last 12 months.</td>
</tr>
<tr>
<td>Children hospitalized for asthma (ICD-9 Codes: 493.0-493.9) per 100,000 children under five years of age.</td>
</tr>
<tr>
<td>Children under six years of age with blood lead levels at or more than 10 micrograms per decilitre.</td>
</tr>
<tr>
<td>Children under six years of age receiving developmental and mental health screenings.</td>
</tr>
<tr>
<td>Substantiated cases of child abuse and neglect among children from birth to six years of age.</td>
</tr>
<tr>
<td>Mothers of children under six years of age who are screened and referred for depression.</td>
</tr>
</tbody>
</table>


NUTRITION INDICATORS

Many indicators have been found to differ mainly in terms of availability; some of them are more complex too. Therefore the choice of indicator must be restricted to decision makers’ or programme planners’ real needs. Indicators should also be used for inter-country comparison.

The main factors that will guide choice are: (1) use of a programme-specific reference conceptual framework linking the situation, lines of action and expected impact; (2) the availability of a "baseline"; and (3) the required characteristics of the indicators.

Below are tables with selected nutrition indicators based on the points raised, definition, possible data sources, references, strengths and weaknesses of each indicator, strengths and weaknesses of data sources and social determinants.

For a better understanding, these indicators are divided into nourishment indicators and nutrition indicators and by age group and by physiological state, if appropriate.

1. Nourishment Indicators
   (a) Breastfeeding:
       • early initiation of breastfeeding;
       • exclusive breastfeeding for less than six months;
       • continued breastfeeding throughout the first year of life.

   (b) Complementary feeding:
       • introduction of solid, semi-solid or soft foods;
       • minimum meal frequency;
       • minimum acceptable diet;
       • consumption of iron-rich or iron-fortified foods.

2. Nutrition indicators
   (a) Children’s nutrition status:
       • low weight in children under five years of age;
       • low stature in children under five years of age;
EARLY CHILDHOOD HEALTH AND NUTRITION INDICATORS

- overweight in children under five years of age;
- low birthweight.

(b) Women's nutritional status:
- malnutrition in pregnant women;
- anaemia in pregnant women.

(c) Status of micronutrients:
- iodine deficiency;
- children between 6 and 59 months who receive vitamin A supplements;
- iron deficiency and anaemia in younger child under two or five years of age.

The above nourishment and nutritional indicators are the ones most commonly used in all countries and are recommended by WHO and UNICEF because they have been validated and are available.

The indicators below are not compiled regularly and are optional: they provide more information when the basic indicators do not suffice. They are a challenge for the future.

- Children breastfed at some point.
- Breastfeeding by mother continued until two years of age.
- Age-appropriate breastfeeding.
- Predominant breastfeeding before six months of age.
- Duration of breastfeeding.
- Bottle feeding.
- Energetic density.
- Frequency of milk feeds for breastfed children.
- Risk of malnutrition.
- Anaemia in the mother.
- Anaemia in women of child-bearing age.
(k) Nourishment indicator: Breastfeeding

<table>
<thead>
<tr>
<th>Indicator name abbreviated [full name]</th>
<th>Definition</th>
<th>Possible data sources^{186}</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Early initiation of breastfeeding. 187 188 189</td>
<td>Proportion of children born during the last 24 months who were breastfed within one hour of birth. The denominator and the numerator includes children currently living and deceased who were born during the last 24 months.</td>
<td>Demographic and Health Surveys Surveys and Multiple Indicator Cluster. Studies of Knowledge Practice and Coverage Interviews conducted at the household level (household survey methodology). Information on child feeding practices can be collected by recall or by observation.</td>
</tr>
<tr>
<td>2 Exclusive breastfeeding in less than 6 months.(^{188})^{190}191, 192 193</td>
<td>Proportion of children between 0 and 5 months who are exclusively breastfeeding (breast milk or nurse directly or by extraction, with no other liquids except vitamin supplements). Based on recall of the previous day.</td>
<td>World Health Statistics 2011</td>
</tr>
<tr>
<td>3 Continued breastfeeding throughout the first year of life. 194 195</td>
<td>Proportion of children 12 to 15 months who are breastfed. This indicator includes breastfeeding by nurse and feeding with mother’s extracted milk.</td>
<td></td>
</tr>
</tbody>
</table>

Rationale

The nutritional status of a child under two years of age and survival to five years of age are directly dependent on feeding practices. Natural breastfeeding is a unique way of providing ideal food for infants’ growth and development; it is also part of the reproductive process with important implications for mothers’ health. In 2001 WHO recommended exclusive breastfeeding for the first six months of life on account of its emotional (bonding), nutritional, immunological and other benefits. Children breastfed for six months grow better and have lower morbidity and mortality rates.

^{186} “Indicators for assessing infant and young child feeding practices: Conclusions of a consensus meeting held 6-8 November 2007 in Washington, DC, USA”. USAID, AED, UCDAVIS, IFPRI, UNICEF, WHO.
^{187} Ibid.
^{188} The State of the World’s Children 2009. Maternal and Newborn Health.. UNICEF.
^{189} Tracking progress on child and maternal nutrition. A survival and development priority. UNICEF. 2009.
^{190} “Indicators for assessing infant feeding practices and young children: findings of the consensus meeting held from November 6 to 8, 2007 in Washington, DC, USA.” from USAID, AED, UCDAVIS, IFPRI, UNICEF, WHO from 2009.
^{191} World Health Statistics 2011.
^{193} Tracking progress on child and maternal nutrition. A survival and development priority. UNICEF. 2009.
^{194} “Indicators for assessing infant feeding practices and young children: findings of the consensus meeting held from November 6 to 8, 2007 in Washington, DC, USA.” from USAID, AED, UCDAVIS, IFPRI, UNICEF, WHO from 2009.
Strengths and weaknesses of the indicator

These are indicators of early bonding and binomial management policies in the immediate postpartum period; they are also a good reflection of young children's dietary practices and of existing programme policies. They directly affect the survival and nutritional status of this age group and of infants breastfed after the first year.

Few countries record the indicator of early onset lactation, which should be based on surveys. As to its weaknesses, the exclusive sixth-month breastfeeding indicator is based on a cross-section of children in a particular age group and so does not represent the proportion of infants who are breastfed exclusively until six months of age and should not be construed as such. Owing to the underestimated number of infants breastfed in this age group, the breastfeeding indicator is applicable until the first birthday.

Strengths and limitations of data sources

- Household surveys
  - They do not collect information on type of provider for each visit.
  - They may be affected by recall bias.
  - Standardization of definition of skilled health personnel is difficult because training differs from one country to another.

- Facility reporting systems
  - They can be used when coverage is high, usually in industrialized countries. Not used internationally.
  - Discrepancies are possible if national figures are compiled at the health facility level, in which case they would differ from overall figures based on health service data.

- Most indicators are obtained by recollection of the previous day's activities and can be generated using data from live children under 24 months of age. (The exception is the "Early initiation of breastfeeding" indicator, which includes live and deceased children.)

Determinants

- Mother’s education.
- Family income.
- Provision of public health services.
(l) Nourishment indicator: Complementary feeding

<table>
<thead>
<tr>
<th>Indicator name abbreviated [full name]</th>
<th>Definition</th>
<th>Possible data sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Introduction of solid, semi-solid or soft foods</td>
<td>Proportion of infants 6-8 months of age who received solid, semisolid or soft foods.</td>
<td>Demographic and Health Surveys. Surveys and Multiple Indicator Cluster. Studies of Knowledge Practice and Coverage. Interviews conducted in households (household survey methodology). Information on child feeding practices can be collected by recall or by observation.</td>
</tr>
<tr>
<td>2 Minimum nourishment diversity</td>
<td>Proportion of children 6 to 23 months of age who receive foods from 4 or more food groups. The 7 food groups are: -grains, roots and tubers, legumes and nuts; -dairy (milk, yogurt, cheese) -meat (meat, fish, poultry and organ meats); -eggs; -fruits and vegetables rich in vitamin A; -other fruits and vegetables. Excludes milk. The consumption of any amount of food from each food group is enough to &quot;count&quot;.</td>
<td></td>
</tr>
<tr>
<td>3 Minimum meal frequency</td>
<td>Proportion of children breastfed and non-breastfed from 6 to 23 months of age who received solid, semisolid or soft, the minimum number of times or more. Includes milk for the children not breastfed. Minimum Frequency is: -2 times for breastfed children from 6 to 8 months; -3 times for breastfed children 9 to 23 months; -4 times for non-breastfed children 6 to 23 months; -&quot;meals&quot; includes milk and substantial meals and snacks for non-breastfed children</td>
<td></td>
</tr>
<tr>
<td>4 Minimum acceptable diet</td>
<td>Proportion of children 6 to 23 months of age who receive a minimum acceptable diet. Excludes milk. This composite indicator is calculated for children 6 to 23 months of age who did not have a highly varied diet and</td>
<td></td>
</tr>
</tbody>
</table>

197 Tracking progress on child and maternal nutrition. A survival and development priority. UNICEF. 2009.
198 “Indicators for assessing infant feeding practices and young children: findings of the consensus meeting held from November 6 to 8, 2007 in Washington, DC, USA.” from USAID, AED, UCDAVIS, IFPRI, UNICEF, WHO from 2009.
199 Ibid.
were fed meals at the minimum frequency on the previous day.

| 5 | Consumption of iron-rich or iron-fortified foods. | Proportion of children 6 to 23 months of age who are fed iron-rich foods or iron-fortified food specially designed for infants and young children, or are prepared at home. Is based on the previous day's intake. The right foods or foods high in iron include iron-fortified foods, meat products, commercially fortified foods, which contain iron and are specially designed for infants and young children, or fortified foods at home with a micronutrient powder containing iron or supplement nutrient iron. |

**Rationale**

A child's nutritional status under two years of age and survival to five years of age are directly dependent on feeding practices. These new indicators indicate more specific qualitative and quantitative dietary characteristics in terms of macronutrients and micronutrients. As children's diet has improved more slowly than expected in some countries, it is important to monitor these practices, report on their progress, identify areas of greatest vulnerability and propose courses of action that can be evaluated and compared.

**Strengths and weaknesses of the indicator**

These indicators reflect optimum timing for changes to feeding patterns and for the introduction of public policies. They are associated with qualitative dietary improvements, in that the child will tend to eat at least one food item of animal origin, at least one fruit or vegetable and a staple (grain, root or tuber).

The indicators do not quantify intake and do not reveal whether minimum needs and requirements are met, but they can be analysed in relation to such standards. There are also composite indicators. These groups of indicators are complementary.

Those who exclude milk, as distinct from breastfed and non-breastfed children infants, should be considered when evaluating the results. These indicators should not be used to compare population groups with disparate breastfeeding prevalence levels.

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200 “Indicators for assessing infant feeding practices and young children: findings of the consensus meeting held from November 6 to 8, 2007 in Washington, DC, USA.” USAID, AED, UCDAVIS, IFPRI, UNICEF, WHO 2009.
In regard to the iron-intake indicator, related safety data have not yet been validated.

The methods used to quantify the nutrient amounts and composition of complementary foods are usually time- and resource-intensive; they are also subject to recall bias (when measurements are based on interviews) and to normal day-to-day variability in children’s intake.

In the indicators that have a very narrow age range, estimates based on studies with small samples tend to have wide confidence intervals.

**Strengths and limitations of data sources**

- **Household surveys**
  - They do not collect information on type of provider for each visit.
  - They may be affected by recall bias.
  - Standardization of the definition of skilled health personnel is difficult because of the differences in the types of training across countries.

- **Facility reporting systems**
  - They can be used when coverage is high, usually in industrialized countries. Not used internationally.
  - Discrepancies are possible if national figures compiled at the health facility level, in which case they would differ from figures based on health-service overall data.

- Most indicators are obtained by recollection of the previous day’s activities and the main weakness is that they do not reflect a whole period. They can be generated by using data on live children under 24 months of age.

- All of these data collection methods are expensive because they require specialized staff and long working hours. The major disadvantage of collecting quantitative dietary-intake data is that dietary methods are tedious and labour-intensive. Direct observation or weighing is more accurate and precise than recall history, but an observer must be present for long periods of time (including overnight to record nocturnal breast milk intake), which is costly and could possibly induce changes in normal feeding behaviour (reactivity). Recall histories require less
time for data collection than observational studies, but the data collector must be skilled to elicit accurate recall information. Food records require a literate, highly motivated population.

**Determinants**

- Mother’s education.
- Family income.
- Provision of public health services.
- Socioeconomic level.
### Nutrition indicators: Children’s nutrition state

<table>
<thead>
<tr>
<th>Indicator name abbreviated [full name]</th>
<th>Definition</th>
<th>Possible data sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low weight in children under five years of age, 203, 204, 205, 206</td>
<td>Percentage of children under five years of age who are underweight (less than 2 standard deviations) for age and sex, according to WHO standards. This indicator may also be used in relation to weight for height. Percentage of children under five years of age who are underweight (less than 2 standard deviations) for height and sex, according to WHO terms: “wasting”; this is most recommended in children over 1 year (some say 2 years). However, as not many measure this, the relationship of weight for age is more widespread. Inactive in chronically undernourished (weight normal size) the relationship of weight to height helps to diagnose acute intercurrent processes again unbalancing the relationship of weight to height.</td>
<td>National nutrition surveys. Public monitoring systems of nutritional food. Randomized studies representative of the population. Annual Millennium Development Goals Reports. World Health Statistics 2011.</td>
</tr>
<tr>
<td>Low stature in children under five years of age, 207, 208, 209</td>
<td>Percentage of children under five years of age with a lower size (less than 2 standard deviations) for age and sex, according to WHO standards.</td>
<td></td>
</tr>
<tr>
<td>Overweight in children under five years of age, 210, 211</td>
<td>Percentage of children under five years of age who are overweight (more than 2 standard deviations) for age and sex, according to WHO standards.</td>
<td></td>
</tr>
<tr>
<td>Low birthweight, 212, 213, 214</td>
<td>Percentage of live newborns weighing less than 2550 g at birth. Low birthweight is up to 2499 g weight independent of gestational age.</td>
<td></td>
</tr>
</tbody>
</table>

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203 World Health Statistics 2011.

204 The Millennium Development Goals (MDGs), MDG 1.

205 The state of the world’s children 2009 maternal and newborn health. UNICEF.

206 Tracking progress on child and maternal nutrition. A survival and development priority. UNICEF. 2009.


208 The state of the world’s children 2009 maternal and newborn health. UNICEF.

209 Tracking progress on child and maternal nutrition. A survival and development priority. UNICEF. 2009.


211 Tracking progress on child and maternal nutrition. A survival and development priority. UNICEF. 2009.


213 The state of the world’s children 2009 maternal and newborn health. UNICEF.

214 Tracking progress on child and maternal nutrition. A survival and development priority. UNICEF. 2009.
Rationale

These indicators can be used to evaluate the effectiveness of child-centred projects, programmes, strategies and policies, through an analysis of nutritional assessments and their bearing on weight and height at critical stages of life. Both birthweight and early childhood weight are prognostic indicators of survival and morbidity associated with respiratory and gastrointestinal infections. Birthweight and weight during the first 2 years are also indicators of the risk of chronic non-communicable diseases faced by low-weight and overweight children. Their size, on the other hand, is an indicator of improved development and future opportunities.

Strengths and weaknesses of the indicator

These indicators reflect nutritional imbalance and hence malnutrition. They are nutritional status indicators, widely used in the world and are used to monitor and compare population groups. They are very sensitive indicators of dietary deficiencies and poor health. The indicator of low birthweight is a reflection of various health problems, including maternal malnutrition, diseases and antenatal care; it is also a predictor of newborn health and survival.

The indicators do not reflect which process has failed. They merely objectify the result, but not the stage at which the damage occurred. Although they also reflect the damage sustained, they are not suitable indicators for showing signs of damage.

Strengths and weaknesses of data sources

Facility reporting systems

They can be used when coverage is high, usually in industrialized countries. Not used internationally.

Discrepancies are possible if national figures are compiled at the health facility level, in which case they would differ from overall figures based on health service data.
The source of low birthweight is recorded only in places that provide professionalized childbirth care, implement a newborn-baby measurement policy and uses the proper equipment and expertise to do so.

**Determinants**
- Mother's education.
- Family income.
- Provision of public health services.
- Socioeconomic level.
(n) Nutrition indicators: women nutritional status

<table>
<thead>
<tr>
<th>Indicator name abbreviated</th>
<th>Definition</th>
<th>Possible data sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Malnutrition in pregnant women</td>
<td>Percentage of pregnant women underweight for their gestational age, compared to the national standard.</td>
<td>National nutrition surveys. Public monitoring systems of nutritional food. Randomized studies representative of the population.</td>
</tr>
</tbody>
</table>
| 2 Anaemia in pregnant women | Percentage of pregnant women with haemoglobin levels under the standard for their physiological and gestational age. | Rationale

These indicators can be used to evaluate the effectiveness of implemented projects, programmes, strategies and policies, through an analysis of nutritional assessment conducted on women in respect of weight and anaemia status. The importance of these two indicators lies in their impact on foetal development, the frequency of low birthweight and neonatal mortality. These indicators reflect nutritional imbalance during pregnancy, and so action can be taken early.

Strengths and weaknesses of the indicator

The strength of these indicators is that they allow action to be taken early on the foetus. A system must be in place to monitor pregnant women regularly and thus detect problems, schedule remedial action and evaluate results.

Responsiveness to remedial action is high during pregnancy, but may not suffice depending on the severity of the problem.

Strengths and weaknesses of data sources

Birth control and detection of anaemia-screening policies must be introduced. Nutritional assessment is inexpensive, but the haemoglobinemia is more expensive, requires trained personnel and appropriate facilities including laboratories to conduct tests.

215 “Indicators for assessing infant feeding practices and young children: findings of the consensus meeting held from November 6 to 8, 2007 in Washington, DC, USA.” from USAID, AED, UCDAVIS, IFPRI, UNICEF, WHO from 2009.
216 Tracking progress on child and maternal nutrition. A survival and development priority. UNICEF. 2009.
217 Ibid.
Determinants

- Mother’s education.
- Family income.
- Provision of public health services.
- Socioeconomic level.
(o) Nutrition indicators: Micronutrient status

<table>
<thead>
<tr>
<th>Indicator name abbreviated [full name]</th>
<th>Definition</th>
<th>Possible data sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iodine deficiency, 220 221 222</td>
<td>Percentage of households with access to iodized salt.</td>
<td>Household surveys 24 hour recall.</td>
</tr>
<tr>
<td>Children between 6 and 59 months who receive vitamin A supplements, 223 224 225 226</td>
<td>Proportion of children between 6 and 59 months who received high-dose vitamin A supplementation in the last six months. According to the International Advisory Panel on vitamin A, high doses of vitamin A are doses greater than or equal to 25000 IU.</td>
<td></td>
</tr>
<tr>
<td>Iron deficiency and anaemia in young children under two years or five years of age, 227 228</td>
<td>Percentage of children under 2 to 5 years of age with haemoglobinæmia under the standards for their age.</td>
<td>National studies.</td>
</tr>
</tbody>
</table>

Rationale

These indicators can be used to evaluate action taken to ensure national fortification and supplementation. As micronutrient deficiencies have been found in various population groups, food fortification or supplementation should be integral to public policy. Such deficiencies are also associated with growth deficits expressed as cognitive, psychomotor and intellectual impairment, leaving serious sequels and raising the risk of infections.

Strengths and weaknesses of the indicator

These are very specific indicators that generally reflect local realities, but few countries put them routinely into practice.

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219 "Indicators for assessing infant feeding practices and young children: findings of the consensus meeting held from November 6 to 8, 2007 in Washington, DC, USA." USAID, AED, UCDAVIS, IFPRI, UNICEF, WHO 2009.

220 The state of the world’s children 2009 maternal and newborn health. UNICEF.

221 UNICEF global databases 2010, from Multiple Indicator Cluster Surveys (MICS) Demographic and Health Surveys (DHS) and other national surveys.

222 Tracking progress on child and maternal nutrition. A survival and development priority. UNICEF. 2009.

223 The state of the world’s children 2009 maternal and newborn health. UNICEF.


225 UNICEF global databases 2010, from Multiple Indicator Cluster Surveys (MICS) Demographic and Health Surveys (DHS) and other national surveys.


227 Tracking progress on child and maternal nutrition. A survival and development priority. UNICEF. 2009.

When such information is available, a remedial action plan can be evaluated every three to four years and need not be repeated as often for further evaluation.

In remedial action taken under public food fortification health plans, an impact indicator can be used to assess the entire process. When results are poor, they do not reflect which stage of the process is flawed.

**Strengths and weaknesses of data sources**
Data based on generally unrepresentative studies.

**Determinants**
- Mother’s education.
- Family income.
- Provision of public health services.
- Socioeconomic level
OTHER NUTRITION INDICATORS

The following indicators are not compiled regularly; they are optional, provide more information when the basic indicators are not met and are a challenge for the future.

1. **Children breastfed at some point** – concerns the proportion of children born in the last 24 months who were breastfed at some point. The denominator and the numerator include children, both alive and deceased, who were born during the last 24 months. This indicator is used to assess breastfeeding intentions.

2. **Breastfeeding by mother continued until 2 years of age** – concerns the proportion of children breastfed until 20 to 23 months old.

3. **Age-appropriate breastfeeding** – concerns the proportion of children 0 to 23 months who were breastfed properly. The calculation is based on infants 0 to 5 months of age fed breast milk only (as expected) on the previous day and children 6 to 23 months of age who were fed breast milk and solid, semisolid or soft foods on the previous day.

4. **Predominant breastfeeding before 6 months** – concerns the proportion of predominantly breastfed infants 0 to 5 months of age. Under the “predominantly breastfed” concept, in addition to suckled or extracted breast milk, some liquids such as water, juices, rehydration salts and supplements, but no other milk sources, may be given

5. **Duration of breastfeeding** – concerns the median duration of breastfeeding among children under 36 months old. It is the only indicator that collects data on feeding practices for children above 23 months of age.

6. **Bottle feeding** – concerns the proportion of bottle-fed infants 0 to 23 months of age. Children under 24 months of age who were bottle-fed any food or drink (including milk) on the previous day are included in the numerator of this indicator, regardless of whether they were breastfed or not.

7. **Energetic density** – the average energy density should be \( \geq 0.8 \text{ kcal/g} \)

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229 “Indicators for assessing infant feeding practices and young children: findings of the consensus meeting held from November 6 to 8, 2007 in Washington, DC, USA.” USAID, AED, UCDAVIS, IFPRI, UNICEF, WHO 2009.
8. **Frequency of milk feeds to breastfed children** – concerns the proportion of non-breastfed children 6 to 23 months of age fed milk, including dairy milk, at least twice. A minimum of two feedings was selected on the basis that average energy intake from breast milk is 400 kcal/day between 6 and 11 months and 350 kcal/day between 12 and 23 months.

9. **Risk of malnutrition** – concerns the percentage of children under five years of age who are underweight (between -1 and -2 standard deviations) for age and sex, according to WHO standards. This indicator may also be used in relation to weight for height and it is an early indicator of damage – action can thus be taken early, before malnutrition sets in.

10. **Anaemia in the mother** – concerns the percentage of nursing mothers with below-standard haemoglobin levels for their physiological condition.

11. **Anaemia in women of child-bearing age** – concerns the percentage of women of child-bearing age with below-standard haemoglobin levels for their age.
### Selection of child well-being indicators: summary

<table>
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<tr>
<th>Indicator characteristics</th>
<th>Complementarity in dimension</th>
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<td></td>
<td>Country coverage</td>
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<td></td>
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<tr>
<td><strong>Material well-being</strong></td>
<td></td>
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<tr>
<td>Average disposable income</td>
<td>✗</td>
</tr>
<tr>
<td>Children in poor housing</td>
<td>✗</td>
</tr>
<tr>
<td>Educational deprivation</td>
<td>✓</td>
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<tr>
<td><strong>Housing and environment</strong></td>
<td></td>
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<tr>
<td>Overcrowding</td>
<td>✓</td>
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<tr>
<td>Poor environmental conditions</td>
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<tr>
<td><strong>Educational well-being</strong></td>
<td></td>
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<tr>
<td>Average mean literacy score</td>
<td></td>
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<tr>
<td>Literacy inequality</td>
<td>✓</td>
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<tr>
<td>Youth NEET rates</td>
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<tr>
<td><strong>Health and safety</strong></td>
<td></td>
</tr>
<tr>
<td>Low birth weight</td>
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<tr>
<td>Infant mortality</td>
<td>✓</td>
</tr>
<tr>
<td>Breastfeeding rate</td>
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<tr>
<td>Vaccination rate (pertussis)</td>
<td></td>
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<tr>
<td>Vaccination rate (measles)</td>
<td></td>
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<tr>
<td>Physical activity</td>
<td>✓</td>
</tr>
<tr>
<td>Mortality rate</td>
<td>✓</td>
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<tr>
<td>Suicide rate</td>
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<tr>
<td><strong>Risk behaviours</strong></td>
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<td>Smoking</td>
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<tr>
<td>Drunkeness</td>
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<tr>
<td>Teenage births</td>
<td>✓</td>
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<tr>
<td><strong>Quality of school life</strong></td>
<td></td>
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<tr>
<td>Bullying</td>
<td>✓</td>
</tr>
<tr>
<td>Liking school</td>
<td>✓</td>
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</tbody>
</table>

Fundamentals for new nourishment indicators

The source of many nourishment indicators is "Indicators for assessing infant feeding practices and young children: findings of the consensus meeting held from 6 to November 8, 2007 in Washington, DC, USA "USAID, AED, UCDavis, IFPRI, UNICEF, WHO, 2009.

This review stemmed from the need to revise and expand the group of indicators of child feeding compiled in 1991,\textsuperscript{230} as there had been major developments in the recommendations and scientific knowledge about best practices in breastfeeding and complementary feeding.

The document published in 1991 comprised only one complementary food indicator - the rate of timely complementary feeding. It was an indicator of whether or not food consumption was complementary, but not of food quantity or quality. In 2001, however, the World Health Organization\textsuperscript{231, 232} recommended exclusive breastfeeding for six months, which was a change from the previous recommendation of introducing complementary foods between the fourth and sixth months.

In 2002, the World Health Organization\textsuperscript{233, 234} began to review and develop indicators of complementary feeding practices and published a conceptual framework for the identification of potential indicators of complementary feeding practices.

In 2004, members of the Working Group on Indicators of Infant and Young Child began to define and validate indicators reflecting dietary quality and quantity; the results were released after extensive consultations.

Infant and young child feeding practices directly affect the nutritional status of children under two years of age. The purpose of these new indicators was to improve feeding practices for infants and young children aged 0–23 months because it is critical to improve child nutrition, health and development at that stage. The new indicators are the result of a

\textsuperscript{232} Resolution WHA54.2. Infant and young child nutrition. Geneva, World Health Organization.
five-year effort to develop a set of simple, valid and reliable indicators to assess infant and young child feeding practices. They focus on selected food-related aspects of child feeding, amenable to population-level measurement.

The indicators described in the above-mentioned document are meant to be considered together because of the multi-dimensional aspects of appropriate feeding at this age. It is therefore recommended that in surveys, efforts be made to assess data on the full set of indicators for any given population.

The proposed indicators should be derived from interviews conducted at the household level using a household survey methodology.

**Core indicators**
1. Early initiation of breastfeeding.
2. Exclusive breastfeeding under six months.
3. Continued breastfeeding at one year.
4. Introduction of solid, semi-solid or soft foods.
5. Minimum dietary diversity.
7. Minimum acceptable diet.
8. Consumption of iron-rich or iron-fortified foods.

**Optional indicators**
10. Continued breastfeeding until two years of age.
11. Age-appropriate breastfeeding.
12. Predominant breastfeeding under six months.
15. Milk feeding frequency for non-breastfed children.
**Top reporting priorities for core indicators**

As it may not always be feasible to report on all core indicators, the following four indicators are recommended in order of priority for two critical age groups, on the basis of evidence of their positive association with child survival and/or nutrient intakes.

To assess breastfeeding practices for infants:

(1) exclusive breastfeeding under six months;

(2) early initiation of breastfeeding.

To assess feeding practices among children 6–23 months of age:

(1) minimum acceptable diet;

(2) consumption of iron-rich or iron-fortified foods.

There are some studies about the role of stature at birth as a predictor of health, nutrition and development status throughout life.235

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CONCLUSIONS AND RECOMMENDATIONS

Indicators are instruments that provide sought-after information compendiously and comprehensibly. As the word suggests itself, an indicator gives an “indication” that reflects a particular situation or an underlying reality that is difficult to qualify directly, usually by stating an order of magnitude.

It was very difficult to select only a few indicators to summarize the health and development situation. It was necessary to include mothers and children because a truer picture is obtained when they are considered together and they are both part and parcel of the new early-concern approach to the “first 1000 days”, which comprise pregnancy and the first two years of life.

To enhance understanding, the facts were classified into closely related groups.

- The first 450 days, comprising pregnancy, birth and first months of life.

Mother approach

- Antenatal care coverage.
- Malnutrition in pregnant women

Baby approach

- Low birthweight.
- Exclusive breastfeeding until the sixth month of life.
- Early initiation of breastfeeding.
- Under the age of five, includes the next 550 days for “1000” and even more.
- Health indicator - mortality in a child under the age of five.
- Nutritional indicators - nutritional status (low or high), stunting; anaemia and iron deficiency in children under five years of age.

This selection is explained one by one in the paragraphs below.
Nutrition and health indicators currently used to measure early childhood health and nutrition are reviewed periodically. They comprise indicators on access to health services such as antenatal care and immunization coverage, while other indicators focus more on the results of individual and socioeconomic factors, such as infant mortality and mortality among children under five years of age, nutrient availability and nutritional status. The operationalization of the concepts underpinning each indicator has been agreed by various United Nations organizations. Other systemic information can be used to visualize trends over time, compare countries over time and make comparisons between and within countries.

In some countries some indicators are measured routinely, and in many, especially low-income, countries, data are obtained from specific surveys in which complex methodologies and statistical models must be used to calculate the real special indicator value, such as infant mortality.

Health and nutrition indicators are wide-ranging, however, with emphasis mainly on damage (nutrition, illness and death), there being no indicators of quality of life and well-being in use.

The more complex the reality to be reflected the greater the need for more than one indicator, some being rather qualitative and others rather quantitative.

The survival of children under five years of age is known to depend on their nutritional status and ultimately on their dietary practices, among other things. Therefore, to prevent morbidity and mortality, nutrition and food for early childhood development must be improved. Owing to the lack of consensus on scientific and easily measurable indicators on adequate food practices, little progress has been made in measuring and improving those practices.

Selecting a few indicators that reflect nutritional status and nourishment in infancy, while also tracking programmes and policies from implementation to actual impact on the ground, necessarily imply that they be chosen on the basis of information accessibility and measurability of valid indicators that reflect key early childhood features and achievement of the Millennium Development Goals and targets set by countries.
Moreover, much of a child’s future is determined by the child’s development in “the first 1000 days” from pregnancy to the second birthday, not only in regard to food and nutrition, but also cognition and behaviour. (Professor David Barker, a doctor and professor of clinical epidemiology at the University of Southampton, has said that the initial 1,000 days of a person’s life have implications for their long-term health.)

In the field of health, indicators must be selected to represent specific population determinants and predict certain development patterns, in addition to the variable involved. Availability, validity and sensitivity must also be taken into consideration in order to visualize changes.

In the light of the above considerations on health, nutrition and nourishment, the indicators below are considered to be the best ones for a holistic index.

1. Child mortality for under-fives. This indicator concerns key early child development factors.

**Mortality rates for under-fives** measure an outcome as a result of a wide variety of inputs:

- mothers’ nutritional status and health knowledge;
- immunization level, oral rehydration therapy and treatment of diseases;
- availability of maternal and child health services (including antenatal care;
- family income and food availability;
- availability of safe drinking water and basic sanitation;
- overall safety of the child’s environment.

This indicator is less susceptible to the fallacy of averages, in other words it is much more difficult for a wealthy minority to affect the nation’s infant mortality rate indicator for

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under-fives, and it therefore gives a more accurate, albeit far from perfect, picture of the health status of most children (and of society as a whole).

2. Nutritional situation of children under five years of age

The three components measured are low birthweight, malnutrition-induced stunting and underweight and malnutrition associated with excess. These indicators reflect the reality of poverty and hunger that began during pregnancy, but also a new problem associated with qualitatively poor nourishment and poverty, namely overweight.

- Nutritional situation of children under five years of age\(^\text{237}\):

  (a) **low birthweight** (for gestational age) - this indicator, which reflects the maternal situation (nutrition and morbidity), care during pregnancy (primary health care) and possible foetal diseases, is useful both in developing and developed countries;

  (b) **malnutrition evidenced by a weight deficit** (insufficient weight for age and height, by gender) - this indicator is useful in developing countries because it reflects the child's holistic life conditions, not only in terms of nutrition and nourishment but also in terms of infections and environmental hygiene, and it predicts mortality and morbidity risks;

  (c) **malnutrition evidenced by stunting** (short height for age, by gender) - this is an indicator for countries with higher levels of development, where low weight is a problem resolved or on the decline; it reflects the food situation in respect of meeting energy requirements and involves both macronutrients and micronutrients;

  (d) **malnutrition associated with excess (overweight for height, by gender)** - this indicator is generally useful in countries emerging from underdevelopment in that underweight coexists with overweight for, owing to nutritional changes, both situations associated with poverty and poor diet are

to be found within the population. This indicator should be added to others and also predicts the risk of diet-related non-communicable diseases.

3. Prevalence of exclusive breastfeeding until the sixth month of life

This indicator reflects early-nourishment practices, indicative of food quality (breastfeeding is the exclusive food indicated at this stage of life, as recommended by WHO), but it also reflects the level of maternal education, access to quality primary health care services and antenatal education on the importance of breastfeeding.

4. Anaemia and iron deficiency in children under five years of age

These indicators reflect a people’s level of development inasmuch as developing countries that still have a high prevalence of infectious diseases will also have a high prevalence of anaemia, the latter being attributed to diseases and not to iron deficiency. In more highly developed countries, anaemia and iron deficiency may be linked to the practices and quality of complementary feeding. In countries with food programmes and food fortification, the impact of the end product will be reflected by a chain of processes (fortification, control, quality, availability, access and intake). Individually, anaemia is associated with infection and death risks and also with impaired cognitive development.

5. Antenatal care coverage - at least four visits (%) (WHO recommendation)

This indicator sheds light on the availability of and access to health services that ensure, to some degree, early diagnosis of maternal and foetal problems and educate mothers (4 tests) to prevent low birthweight, strengthen mother-child bonding and encourage exclusive breastfeeding.

6. Maternal health

(a) Malnutrition in pregnant women - maternal undernutrition affects a woman's chances of surviving pregnancy and endangers her child's health. Women who were stunted as girls, whose nutritional status was poor when they conceived or who did not gain sufficient weight during pregnancy may deliver low-birthweight babies predisposed both to acute infectious diseases and to chronic diseases. The mother's
health is in turn linked to the woman’s status in the society in which she lives and her family’s nutrition. This is true for undernutrition and for overweight.

(b) **New nourishment indicators: early initiation of breastfeeding** seems to be an interesting indicator because it reflects health care and is linked to nutrition status and emotional signs, such as early “bonding” with the infant. For the moment, however, only a few countries are prepared to register this kind of indicator and more time and abilities are required to put it into practice. It may be a challenge for the future.

There are several international early childhood development indices, which include nutrition and health indicators, such as mortality rate and stunting among under-fives. The rationale for using these indicators is not only their availability but also because indicators can indirectly measure socioeconomic conditions, mothers’ level of education, access to health and other services. Thought can be given today on ways and means of devising a highly representative mix of sufficiently sensitive and specific indicators for countries with disparate development and income levels. Infant mortality rates or stunting are not relevant to many countries because they do not face such problems at present.