

The logo features a central globe with a grid of latitude and longitude lines. The globe is surrounded by a wreath of olive branches. In the background, there are silhouettes of a person holding a staff and a person sitting at a desk with a computer. The text 'Millennium Development Goals' is overlaid on the globe in a large, bold, teal font.

# Millennium Development Goals

*The health indicators:  
scope, definitions and  
measurement methods*

World Health Organization

Geneva

2003

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## MILLENNIUM DEVELOPMENT GOALS

### THE HEALTH INDICATORS: SCOPE, DEFINITIONS AND MEASUREMENT METHODS

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#### Useful sources of technical information related to MDG health indicators

Nutrition (WHO):	<a href="http://www.who.int/nut/">http://www.who.int/nut/</a>
Infant mortality (WHO):	<a href="http://www3.who.int/whosis/menu.cfm">http://www3.who.int/whosis/menu.cfm</a>
Measles (WHO):	<a href="http://www.who.int/vaccines-surveillance/StatsAndGraphs.htm">http://www.who.int/vaccines-surveillance/StatsAndGraphs.htm</a>
Maternal mortality (WHO):	<a href="http://www.who.int/reproductive-health/">http://www.who.int/reproductive-health/</a>
HIV/AIDS (WHO):	<a href="http://www.who.int/hiv/en/">http://www.who.int/hiv/en/</a>
HIV/AIDS (UNAIDS):	<a href="http://www.unaids.org/">http://www.unaids.org/</a>
Malaria (WHO):	<a href="http://mosquito.who.int/">http://mosquito.who.int/</a>
Tuberculosis (WHO):	<a href="http://www.who.int/gtb/">http://www.who.int/gtb/</a>
Water and sanitation (WHO):	<a href="http://www.who.int/water_sanitation_health/index.html">http://www.who.int/water_sanitation_health/index.html</a>
Essential drugs (WHO):	<a href="http://www.who.int/medicines/">http://www.who.int/medicines/</a>
Official UN (Department of Social and Economic Affairs) site for definition and data of MDG:	<a href="http://millenniumindicators.un.org/unsd/mi/mi_goals.asp">http://millenniumindicators.un.org/unsd/mi/mi_goals.asp</a>

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## Millennium Development Goals – The health indicators: scope, definitions and measurement methods

### Millennium Development Goals – the health indicators

At the Millennium Summit in 2000, representatives from 189 countries committed themselves toward a world in which sustaining development and eliminating poverty would have the highest priority.<sup>1</sup> The millennium development goals (MDGs), with their targets and indicators, summarize these commitments and have been commonly accepted as a framework for measuring development progress. Of the total of 48 indicators, 18 are directly related to health.

### What are the MDG health-related indicators and how many are there?

The MDG indicators related to health are a mix of health outcome (prevalence and death rates) and service output measures (coverage and use of specific health interventions).

There are 18 health and health-related indicators (see the complete list in the Annex). “Health” and “health-related” refer to indicators that are truly “health” such as “malaria prevalence” or that concern critical factors for health, e.g. “access to improved water supply” or “dietary energy consumption”. In this document, all indicators, whether “health” or “health-related” will simply be referred to as “health indicators”.

WHO is responsible for reporting on 17 of the 18 health indicators. The 18th health indicator, “proportion of population below minimum level of dietary energy consumption”, is the responsibility of FAO, although WHO is involved in the definition of the “minimum level of dietary consumption” which is part of this indicator.

### Who decided on the list of indicators and will it change?

In 2001, the United Nations system, including the World Bank and the IMF, as well as the Development Assistance Committee of the Organisation for Economic Co-operation and Development (OECD-DAC) came together under the Office of the Secretary-General, and agreed on 48 quantitative indicators for monitoring progress towards the eight MDGs. Several criteria were used for selecting the indicators, including building upon other global indicator lists related to global conference follow-up. More specifically the five criteria were that they should:

- provide relevant and robust measures of progress towards achieving the MDGs;
- be clear and straightforward to interpret, and provide a basis for international comparison;
- be broadly consistent with other global lists while not imposing an unnecessary burden on country teams, the government and other partners;
- be based to the greatest extent possible on international standards, recommendations and best practices; and
- be constructed from well-established data sources, be quantifiable and reliable to enable measurement over time.

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<sup>1</sup> United Nations General Assembly resolution A/RES/55/2, September 2000.

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Subsequently the goals, targets and indicators were presented by the Secretary-General to the General Assembly in September 2001 in a *Road map towards the implementation of the United Nations Millennium Declaration*, which was endorsed by the United Nations General Assembly<sup>2</sup>.

WHO has worked with other organizations of the United Nations system and with the Department of Economic and Social Affairs to identify the indicators associated with each health-related goal and target. A major outcome of these discussions is a high profile for health, which is represented in 18 out of the total of 48 indicators. The role of the Working Group on Indicators, which is part of the United Nations Development Group (UNDG), is to propose the indicators and establish a reporting system for monitoring the MDGs. This includes providing guidance to the UN Country Teams and national and international stakeholders on the definitions, rationale, concepts and sources of the data for those indicators.<sup>3</sup> UNDG guidance builds on an earlier exercise to provide the metadata for the socioeconomic indicators contained in the Common Country Assessment (CCA) Indicator Framework. The indicators for the first seven MDGs are a subset of this Framework. The CCA is an established evidence-based process for reviewing and analysing a country's development situation with a focus on people, especially the poor.

The monitoring and progress towards the MDGs are discussed on a regular basis with the Member States of the United Nations system. During the 111th Session of the Executive Board of WHO in January 2003<sup>4</sup> and at the Fifty-sixth World Health Assembly<sup>5</sup>, a number of Member States asked for the inclusion of a specific target for reproductive health. Other Member States have pointed to the need for process indicators, such as indicators for health system development interventions.

The current list of indicators, as adopted by the UN General Assembly, will probably not change before the evaluation of the UN strategy for achieving the MDGs in 2005. However, it is recognized that the list is dynamic and will necessarily evolve in response to changes over time in concepts, definitions and methodologies. The list of indicators is therefore not intended to be prescriptive, but to be used taking into account the country-specific context and the views of various stakeholders in preparing country level reports. The UNDG recommends that a consultation process be initiated, generally around the national statistical office or other national authority, for the selection and compilation of country-specific indicators taking into account the national development priorities, the suggested list of indicators and the availability of data. The United Nations Country Team (UNCT) should work collaboratively to help build ownership and consensus on the indicators selected.

### What is the scope of the MDG health indicators and what are some of their limitations?

Decisions to address health problems are founded upon information about diseases, risk factors, interventions (covering health services and other health systems aspects), and health outcomes. A major challenge in coming up with a list of indicators is to find the right balance between "too little" and "too much".

While the MDG health-related indicators cover a large span of public health domains (nutrition, mother and child health, communicable diseases, and water and sanitation), several important questions have arisen during the process of selecting the indicators. These questions relate to:

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<sup>2</sup> United Nations document A56/326, September 2001.

<sup>3</sup> United Nations Development Group. Department of International Economic and Social Affairs - Statistics Division. *Indicators for monitoring the millennium development goals: definitions, rationale, concepts and sources*. New York, United Nations, 2003 (draft document, 3 June 2003).

<sup>4</sup> World Health Organization, Executive Board document EB111/3 and EB111/3 Corr.1, 2003.

<sup>5</sup> World Health Organization, World Health Assembly document A56/11, 2003.

- ways of incorporating in the development goals key international commitments that have been made since the UN Millennium Summit. For example, many stakeholders are concerned that the goals, targets and indicators agreed on at the special session of the United Nations General Assembly on HIV/AIDS have not been integrated into Goal 6. There is also continuing discussion about the extent to which the development goals reflect the outcomes of the World Summit on Sustainable Development (Johannesburg, South Africa, August/September 2002).
- the use of disease-specific mortality as the best indicator to measure progress against malaria and other major diseases (Goal 6, target 8). WHO has proposed that a footnote be added to this indicator noting that estimates of health life expectancy at birth should be used to permit monitoring progress of major diseases.
- the relevance of certain indicators. For example, WHO noted that the current indicators used in relation to HIV/AIDS – contraceptive prevalence rate – has little relevance to HIV/AIDS and would be better associated with Goal 5 on improving maternal health.
- the absence of indicators for noncommunicable diseases, chronic conditions, behaviour-related risk factors, mental health, occupational health, and health systems.

To help fill these gaps, WHO has defined a *Strategy for long-term development of core health indicators* to be reported on periodically in the statistical annex of the regularly published world health reports. It will gradually identify essential indicators for health, health systems' performance, and those areas inadequately reflected in the development goals. This strategy also takes into account indicators recommended by international initiatives, such as the Global Fund to Fight HIV/AIDS, Tuberculosis and Malaria (GFATM) and the Global Alliance for Vaccines and Immunization (GAVI).

Many countries, as reflected in their MDG country reports, are already using an expanded list of indicators to show progress and country-specific bottlenecks to achievement of the development goals.

Finally, other important issues related to the MDG health indicators are:

- the low priority given to monitoring inequities: the MDG indicators refer only to average national levels of achievement and not to equity across the population. While the MDGs are meant to address poverty with all its dimensions, the health-related indicators, as currently designed, do not allow for making the link between health and poverty.
- the practical difficulties in measuring a number of indicators (see below).
- missing information and poor quality of data.

To overcome these issues, WHO has designed its measurement instruments so as to include the capacity to disaggregate achievements and trends by poor and non-poor, and has developed estimation methods for a number of indicators which are more valid, reliable and comparable than methods relying on incomplete data sets such as vital registration. These issues, as well as issues related to measurement and estimation methods are further discussed below.

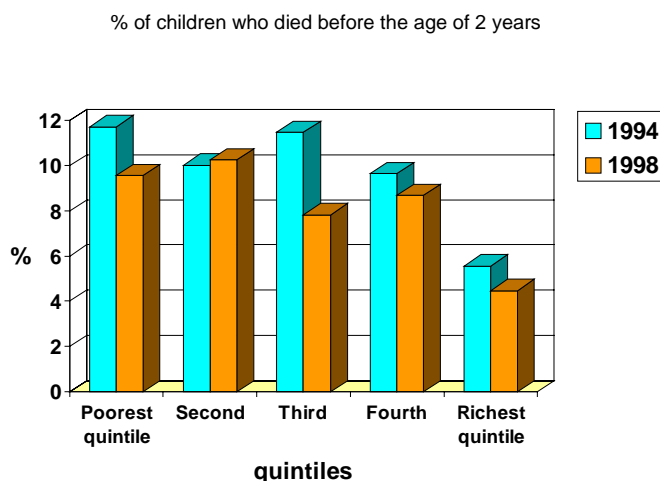
### How does WHO look at inequities in health?

The figures reported on MDGs are national averages. They do not provide any information on whether progress has been made equally for each population group. Poverty, access to services, level of education, social protection, age, gender, as well as environmental factors, are considered as important determinants for health and can thus explain progress made towards achieving the health MDGs.

In order to assess the respective contribution of these factors to MDG achievements, it is necessary to quantify them and establish population categories. Analysis can be complex due to the inter-action between all these factors.

For example, while mortality in children may have improved on average at national level, it might not necessarily be the case for everybody. Only a disaggregation of child mortality, e.g. by income group, may confirm this hypothesis. In Ghana, mortality is higher in low income versus high income groups, using asset quintiles as a measure of poverty. A comparison between 1994 and 1998 also shows that progress has not been the same across different population groups.

Fig. 1. Health inequalities in Ghana



Each MDG health indicator can be broken down by a variety of explanation variables. This requires additional information on these variables which is not always readily available, except for some household surveys.

### What are some of the measurement issues?

A number of the MDG health-related indicators are difficult to measure as formulated within the official UN documents. The main reasons for these difficulties are that:

- some MDG health indicators include more than one entity to be measured
- some MDG health indicators are not disaggregated for the population groups most affected by or vulnerable to the targeted disease, or most in need of a specific health intervention
- some MDG health indicators have a numerator and/or a denominator which needs to be better defined.

#### **Examples of indicators which include more than one entity to be measured**

- Indicator no. 21, *Prevalence and death rates associated with malaria*, contains two rates to be measured, one concerning prevalence and the other death. For this indicator two different measures are therefore required: a measure for prevalence and another measure for mortality. The under-five mortality rate is actually taken as a recommended proxy for assessing the impact on malaria-specific mortality among children under five. The under-five mortality rate is monitored in combination with the coverage of the three interventions of the Roll Back Malaria initiative.
- Indicator no. 22, *Proportion of population in malaria risk areas using effective malaria prevention and treatment measures*, contains two entities to be measured: malaria prevention and malaria treatment. For this indicator two different measures are therefore required: a measure for prevention and another for treatment of malaria.

- Indicator no. 23, *Prevalence and death rates associated with tuberculosis*, contains two rates to be measured: prevalence and death. For this indicator two different measures are therefore required: a prevalence measure and another measure for mortality.
- Indicator no. 24, *Proportion of tuberculosis cases detected and cured under Directly Observed Treatment, Short-course (DOTS)*, contains two entities to be measured: a measure for detection and another for the success of the treatment.

**Examples of indicators which are not sufficiently disaggregated or do not take into account the most affected population groups**

- Indicator no. 18, *HIV prevalence among pregnant women aged 15 to 24 years*: Countries with concentrated or low-level epidemics (the majority in the world) do not have reliable data on 15–24 year-old pregnant women, but usually have information on the prevalence of HIV/AIDS in high-risk population groups, such as “injecting drug users”, “female sex workers”, or “men who have sex with men”. The relevance of this indicator depends therefore on each country’s context.
- Indicator no. 30, *Percent of population with sustainable access to an improved water source, urban and rural*, contains two types of population zones, which consequently require that the information be disaggregated into two different figures.

**Examples of indicators which have a problem with their numerator and/or denominator**

- Indicator no. 19, *Condom use rate of the contraceptive prevalence rate*, has neither a well-defined numerator nor denominator. Following the adoption of the Declaration of Commitment on HIV/AIDS at the United Nations General Assembly Special Session on HIV/AIDS in 2001 (UNGASS) a framework for HIV/AIDS monitoring was developed. Most indicators are now being re-formulated in order to match the UNGASS HIV/AIDS reporting standards. “Condom use in 15–24 year-old groups at last high-risk intercourse” broken down by sex conforms with UNGASS. “Misconceptions about HIV/AIDS among people aged 15–24 by sex” is also recommended for completing condom use indicators, both being more appropriate than the contraceptive-related MDG indicators which are too narrow in focus.
- Indicator no. 20, *Number of children orphaned by HIV/AIDS*: UNGASS recommends measuring this indicator by looking at the ratio of orphaned and non-orphaned school children between 10 and 14 years of age.
- Indicator no. 22, *Proportion of population in malaria risk areas using effective malaria prevention and treatment measures*: As mentioned above there is a need to define the numerator of “malaria preventive and treatment measures”. WHO has proposed that “access to insecticide-treated nets (ITNs) for under-five children” and “access to anti-malarial drugs for under-five children”, be used respectively, as the definition of the numerators for the malaria output MDG indicator. This refers to the core indicators used to monitor progress of the Roll Back Malaria Initiative.

## How does WHO measure the MDG health indicators?

In order to address the above-mentioned issues, WHO has proposed to the Statistical Division of the UN Department of Economic and Social Affairs, the UN central repository of data on MDGs, to complete the MDG health indicators list by specifying the measurements to be used for all 17 health indicators which are under its reporting responsibility (see table 1 in the annex).

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For the indicators for which WHO is responsible, please refer to a separate document, the WHO Compendium of MDG Health Indicators, which includes, for each indicator:

- the definition WHO uses for its measurement
- the rationale for use of the indicator
- the method of computation
- the sources of data
- the periodicity of measurement
- additional references.

This information will also be available soon in the handbook on *Indicators for monitoring the millennium development goals* by the United Nations Development Group. This handbook, which covers the entire set of MDGs, is broader than the WHO Compendium, since it also covers gender issues, limitation of use and reporting mechanisms across UN agencies for each indicator.

### What criteria does WHO use for ensuring quality of data?

WHO has developed a framework to ensure quality of health statistics on the basis of five basic principles: validity, quantified reliability, comparability, consultation and explicit data audit trail. Each of these principles and the implications are explored in detail.

Not all of these principles apply equally in all cases, but in general they lay the foundation for an improved communication across disciplines, countries and topics on the evidence for public health action.

#### **Proven validity**

Validity is the extent to which a figure measures the quantity of interest. In other words a measurement is valid if it measures the construct that it was intended to measure. A corollary is that a valid measurement should in principle not be biased, although some amount of bias might be accepted for the sake of statistical efficiency. Two of the many common limitations to the validity of evidence are worth noting here.

First, in public health and more generally in development, proxy measures are often used to assess an important quantity of interest. For example, the axillary temperature is measured as an indication of the body temperature by measuring the temperature prevailing under the upper arm. In this case, the quantity of interest is the body temperature and the measurement the axillary temperature. The latter is a valid proxy for the former, because there is a well-established direct correlation between the two.

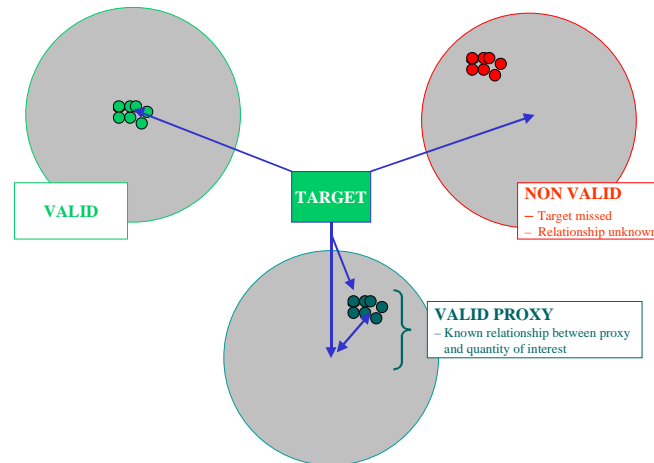
Another example is the monitoring of the spread of HIV/AIDS in Africa. HIV prevalence in pregnant women attending a small sample of antenatal care clinics is being used as a proxy for male and female adult HIV prevalence in many African countries. This example shows how available information – prevalence data among a sentinel population (for ease of collection) – can become a proxy for what is of real interest, i.e. the overall prevalence in the general population.

To justify the use of a proxy as a means to measure a particular indicator, the validity of this relationship needs to be established. If we now consider an average figure of axillary temperature in a population sample, the validity of that sample should be assessed. For instance, if that sample is limited to those consulting health services for fever, it misrepresents the general population since what is actually being measured is “the average axillary temperature among population accessing health services for fever” which will result in an over-estimation of the average temperature in the overall population.

Second, the validity of evidence on an important quantity of interest, such as coverage with DPT3 immunization, can also be profoundly affected by community level selection bias. For many diseases or risk factors, evidence may only be available from a limited number of local studies. Overall this creates a real prospect of selection bias when no national data are available. Selection biases are so common that more efforts need to be made in using more robust techniques to predict uncertainty. Those generating and disseminating evidence, like WHO, therefore have to establish the validity of their measurement methods.

The figure below provides a visual representation of the concept of proven validity.

Fig. 2. Validity



### Quantified reliability

Reliability is the extent to which repeated measurement will give the same result. Reliability is a function of the instrument measurement error. Instruments with low reliability have large measurement error and vice-versa. If uncertainty intervals are routinely reported, the user of information is implicitly provided with information on the reliability of the measurement.

Pursuing the example of body temperature, a non-reliable measure would result from using a bad thermometer. The figures below provide a visual representation of the concept of reliability, and a visual representation of the reliability/validity combination.

Fig. 3. Reliability

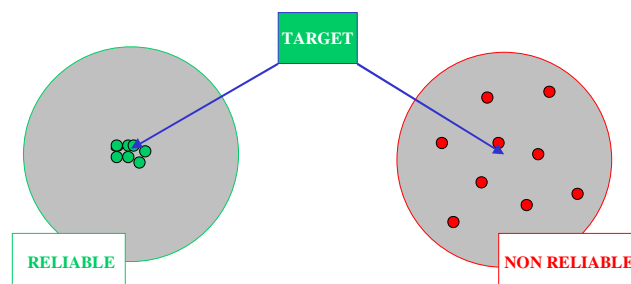
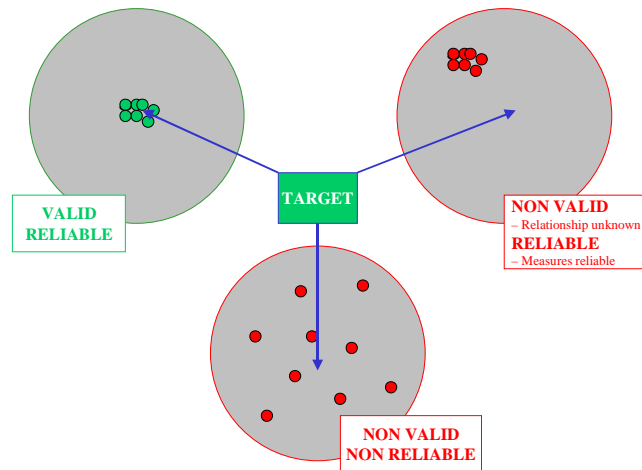


Fig. 4. Validity and reliability

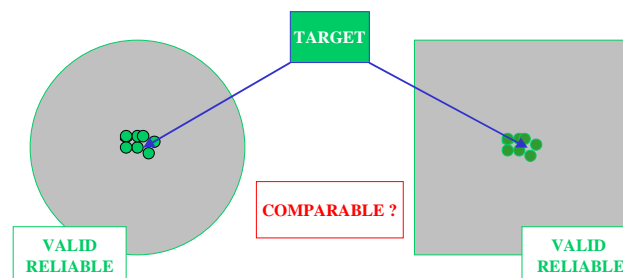


### Comparability

Evidence for monitoring or evaluation requires that it be comparable over time, across communities within a population and across populations.

Comparability is an independent criterion from validity and reliability. Two thermometers, one in Celsius and the other in Fahrenheit, may both provide valid and reliable measures of temperature, but the results of the two are not comparable. Comparability requires a common scale. Establishing cross-population or inter-temporal comparability requires an explicit strategy in the development and operationalization of measurement methods for a particular quantity of interest.

Fig. 5. Comparability



### Explicit data audit trail

In an era where there are calls on governments and international organizations for increased transparency, a very important principle for evidence is the concept of an explicit data audit trail. For every figure, whether evidence for strategic decision-making or evidence for evaluation or research, the trail from primary data collection to adjustments for known biases and statistical modeling should be replicable. For complete transparency, primary data should be in the public domain along with the analytical steps from primary data to the evidence on an indicator that is disseminated. Implementation of a policy of an explicit data audit trail has important implication for the practice of many public health organizations, and especially for WHO.

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Take a country where the estimate for child mortality for the year 2000 is 150 per 1000 live births. The data audit trail should indicate the exact source of data (survey or other source), the year of data collection, sample size, and the model used to update the estimates based on these surveys to the year 2000. It should also show the primary data.

The data audit trail should be specific for each figure. General statements on types of sources and methods used are not sufficient. For example, the data audit trail for registry data of publicly (or privately) managed health services, such as immunizations, should indicate the completeness of facilities covered by the national registry data. Where Bayesian methods are used in the development of figures, priors and the basis for priors should be provided and justified.

### **Consultation**

With reference to evidence in which the unit of analysis is a country or a subnational unit within a country, WHO is committed to a process of explicit consultation with the relevant health authorities. This consultation provides an opportunity for national experts to identify new data sources, discuss limitations of existing data sources and identify known biases that should be taken into account in the analysis. This dialogue also serves to reinforce a culture of evidence in international public health. WHO has used this explicit consultation process successfully in the production of the Annex Tables in *The world health report 2001*<sup>6</sup> and *The world health report 2002*<sup>7</sup>. This consultation has led to a more informed debate and broader ownership of the results for critical health outcomes. The nature of the dialogue focuses attention on the analysis of available data and a common understanding of their strengths and weaknesses. Consultation with national health authorities is simply an application of a more general principle: those most centrally involved in the collection, collation and analysis of primary data should be consulted.

### **What are the best sources to be used for the MDG health indicators?**

Country data should be used for compiling the selected indicators where such data are available and of reasonably acceptable quality. The data source for a given indicator and the quantitative value of the indicators should be decided by consensus among the key stakeholders, especially involving the national statistical system. It is important that the ownership of the data and related indicators reside with the national statistical system.

For any given indicator there may be a wide range of data sources available within the country and each of these should be critically reviewed. The recommendations of UNDG are that existing data sources and reporting systems should be used where possible, particularly where line ministries have their own statistical systems. International data sources should be consulted both for validation and in the absence of national sources.

### **A typology of data collection modes<sup>8</sup>**

A key aspect of health information systems is the mode through which needed information is collected for a range of purposes, topics, and levels of aggregation. The figure below illustrates

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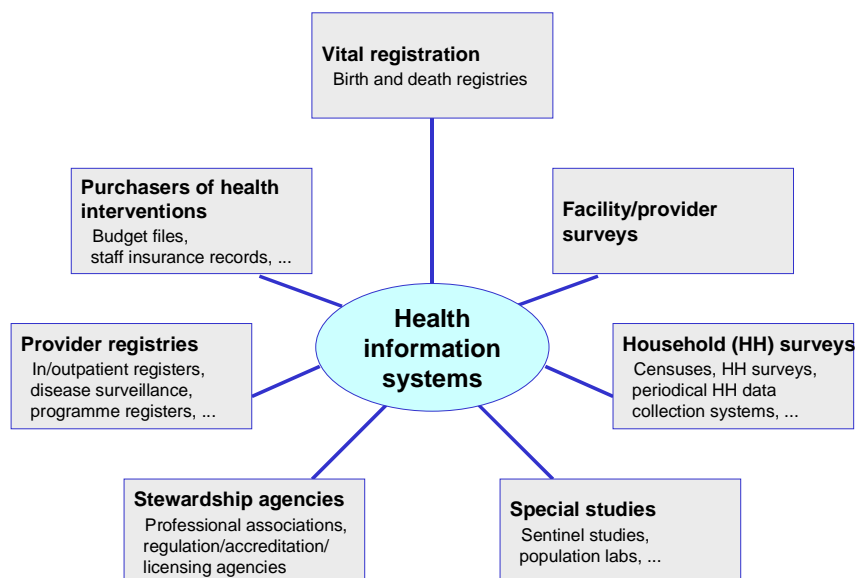
<sup>6</sup> *The world health report 2000: health systems: improving performance*. Geneva, World Health Organization, 2000.

<sup>7</sup> *The world health report 2001: mental health: new understanding, new hope*. Geneva, World Health Organization, 2001.

<sup>8</sup> Ustun TB, Chatterji S, Mechbal A, Murray C. The World Health Surveys. In: Murray C and Evans D, eds. *Health system performance assessment: debates, methods, and empiricism*. Geneva, World Health Organization, 2003: 797–808 (also at web site <http://www.who.int/pub/2003/hspa/en/>).

the seven main modes of information gathering that should be part of any national health information system (HIS).

Fig. 6. Different information collection modes for health information systems



- Vital registration systems, which capture events such as birth and death, and attribute deaths based on the International Classification of Diseases, are the backbone of most national health information systems. Irrespective of whether a ministry of health manages vital registration, it is an integral component of a functioning health information system.
- The second main mode is information collected from purchasers of health interventions, including ministries of health, which allocate budgets to their own hospitals and clinics. Purchaser information comprises budgets, expenditure accounts, staff lists, and the more richly detailed information purchasers in some high and middle-income countries on specific health system transactions through, for example, insurance records.
- In many countries, HIS investments are focused on the third mode of data collection: provider registries and case reporting. This information, collected at the point of service by health providers, includes case notifications meeting specified criteria as well as registries of specific interventions such as DTP3. Providers can be categorized into ministry of health, other public sector, and private sector. In the vast majority of countries, provider registry information is often received only from ministry of health providers, giving an incomplete picture of morbidity and intervention delivery.
- Fourthly, health information systems also collect information from a number of actors and institutions whose primary role is stewardship. Examples of information collected from stewards of the health system include nurse or physician licensing, hospital accreditation, or occupational safety inspections.
- The fifth mode is collecting information directly from households through national censuses, or more commonly through household surveys. Whether data is collected as part of a broader national survey or focuses only on health topics, household surveys have an important role to play in national health information systems. They represent a low-cost method of addressing some of the main selection bias inherent in provider registries in nearly all countries, as illustrated above. Additionally, household surveys are the only method of obtaining some important types of information, such as household out-of-pocket payments to providers or patient experience of the full spectrum of health system providers.

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With increasing policy concern in health and health system outcomes in the poor and other disadvantaged groups, household surveys are the most practical and low-cost approach to measuring key outcomes for different socio-demographic subgroups including the poor.

- Facility surveys, the sixth mode, provide similar information on quality, resourcing, and efficiency.
- The last mode is about special studies that apply methods that sample specific information items using routinely generated data of the health information system; for example, data on HIV/AIDS among pregnant women come from tests on leftover blood samples taken for other reasons during antenatal visits to clinics which are part of a sentinel surveillance system.

### ***Use of routine versus non-routine data collection methods***

The various information sources for the MDG health indicators and other public health indicators, as described above, are traditionally grouped under two main categories:

- data collected at service level and usually reported on a regular, continual basis (often referred to as routine information systems); and
- data collected through surveys on a one-time basis.

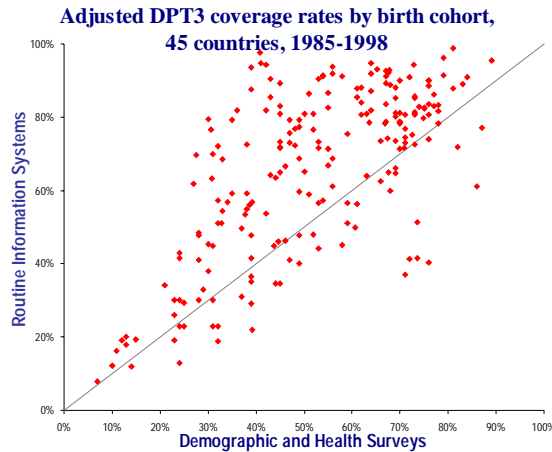
These two methods are often opposed to each other and continue to be at the centre of a considerable debate on which is better than the other. In practice, all countries are using both collection methods. It is recognized that no single data source can provide all the information needed to monitor progress for achieving the MDGs. Each country's data collection strategy should therefore aim at defining the best cost effective mix of these methods taking into account its own needs and capacities, including financial and human resources. Information needs depend on the purpose for which the information will be used and the nature of the issue to be addressed. This requires each country to assess the quality of their different sources and available data in relation to their own information needs.

Some MDG health indicators have traditionally relied on government reported data: prevalence and death rates associated with malaria and tuberculosis, prevalence of HIV/AIDS, reported DOTS-related information, and immunization coverage. All these indicators still rely heavily on surveillance systems, vital registration, and service reports. However, where surveillance or notification systems are inefficient, the use of surveys may correct for the biases that are inherent in routine information systems.

Even in countries where data from the routine information system is generally of good quality, it is important to check for quality on a regular basis. A recent study undertaken by WHO comparing the validity of reported immunization coverages for DTP3 in 45 countries shows significant differences between routinely reported figures and survey estimates (see figure). The differences are particularly important for immunization coverage rates at around 40% and above.

Service based statistics can be biased for a number of reasons: because the recording system is not accurate, the entire population does not use that service equally, or because information from private sector facilities are not captured by the official routine reporting system. These biases are difficult to quantify. Biases also exist with surveys. For example, they may relate to self-reported information on immunization such as the "mother's recall bias"; however, by comparing with information provided on vaccination cards, appropriate adjustments can be made. To address this issue, WHO is now reporting on immunization coverage using both household based surveys and routine reporting.

Fig. 7. Comparison of coverage estimates from DHS versus routine sources



### What methods exist to fill major information gaps?

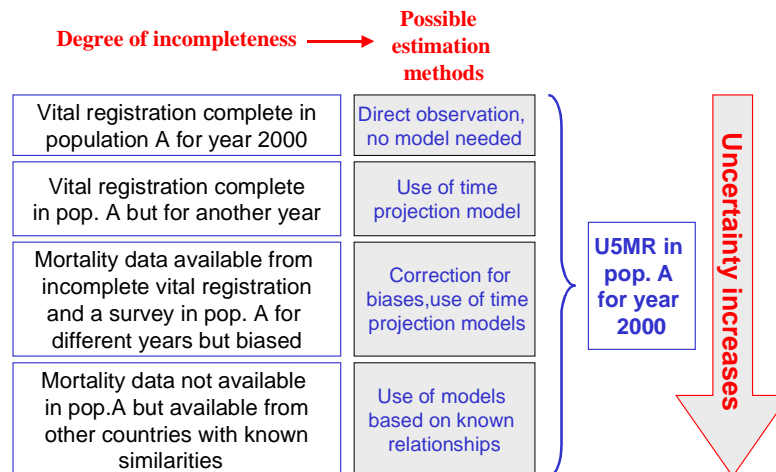
Many countries have only very limited information about the MDG health indicators. How can these countries provide adequate reports on progress towards achieving the MDGs?

The answer to this question depends on data availability and its timeliness. Data about a population can be absent, partially available or complete, for the time period of interest or for an earlier time period.

To generate the best possible evidence from existing data about what we want to know often requires a certain degree of extrapolation. Estimates can come from direct measurements for any quantity of interest in a given place and time, or from indirect measurements obtained through known relationships with another population.

The following figure is an example of how under-five mortality rates (U5MR) in four different situations, i.e. different degrees of data availability, can be estimated.

Fig. 8. Estimating under-five mortality rates from different situations of data completeness



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- Situation 1: This represents the best situation, i.e. where the vital registration system provides mortality data on a regular basis, using well-established criteria for causes of mortality. In this case, the mortality figure comes from a “direct observation of death” and is registered at the time of death.
  - Situations 2 and 3: In cases where the vital registration system is less efficient, because the time of reporting is not accurate, because it covers only part of the population, or because it confounds causes of death, the data can be completed by other sources. Household surveys can be used, where the respondent has to report on child mortality under five years within the family, even if they are from a different year than the most completed year of vital registration. Altogether, the available evidence can be improved by using statistical models that can correct for biases, project in time, and compute from different sources.
  - Situation 4: The worst case is when the only available data covers neither the population of interest nor the same time period. Estimates can then be generated from indirect observations covering another but similar population, using statistical methods based on well-established relationships between the population of interest and the population for which data is available. The strength of the relationship depends essentially on how similar the socioeconomic factors are between both populations.

A common rule is that the more we have to use extrapolation procedures, the more the uncertainty increases and the weaker the final estimate will be. Additionally, the weaker that figure is, the more limiting the capacity is to use it for different purposes.

Evidence can be used for at least four distinct purposes: strategic decision-making, programme implementation or management, monitoring of outcomes or achievements, and evaluation of what works and what does not. The four uses of evidence are interconnected and all feed into the ongoing evidence-policy cycle. Strategic decision-making is based on the cumulative knowledge built up from the evaluation of policies and programmes combined with the best available evidence on the current magnitude and distribution of health problems, health system inputs, processes, and outcomes. Implementation of strategic decisions requires good information and evidence that is used by managers at all levels of health systems. The impact of these programmes should be monitored. Monitoring information feeds back to managers and strategic decision-making directly, but it is also the basis for more systematic evaluation of programme and policy effectiveness.

The time-frames for these different uses range from the immediate for strategic decision-making to the long-term for building a robust evidence base to evaluate alternative strategies to improve health or reduce health inequalities. Likewise, the requirements for strength of evidence vary for the distinct uses. The difference in the evidence necessary for monitoring versus strategic decision-making, however, is more a quantitative than a qualitative one. Even in the setting of uncertainty about trends, governments and other public health actors often need to make some judgement on the extent to which progress is being achieved. Such judgements may fuel reaffirmation of agreed-upon strategies or lead to widespread reappraisal. But, different producers and users of evidence must at all times be aware of the strengths and limitations of the evidence at hand.

## ANNEX: MDG HEALTH INDICATORS AND MEANS OF MEASUREMENT

### Millennium development goals: targets, health-related indicators and their measures

Goals	Targets	Health-related indicators	WHO recommended measures
1. Eradicate extreme poverty and hunger	1. Halve, between 1990 and 2015, the proportion of people whose income is less than one dollar a day		
	2. Halve, between 1990 and 2015, the proportion of people who suffer from hunger	4. Prevalence of underweight children under five years of age 5. Proportion of population below minimum level of dietary energy consumption (**)	4. Percentage of underweight children among children under five years of age 5. Proportion of population below minimum level of dietary energy consumption (**)
2. Achieve universal primary education	3. Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling		
3. Promote gender quality and empower women	4. Eliminate gender disparity in primary and secondary education, preferably by 2010, and at all levels of education no later than 2015		
4. Reduce child mortality	5. Reduce by two thirds, between 1990 and 2015, the under-five mortality rate	13. Under-five mortality rate	13. Under-five mortality rate (per 1000 live births) per year
		14. Infant mortality rate	14. Infant (aged 0 to 1 year) mortality rate (per 1000 live births) per year
		15. Proportion of 1-year-old children immunized against measles	15. Percentage of 1-year-old children immunized against measles per year
5. Improve maternal health	6. Reduce by three quarters, between 1990 and 2015, the maternal mortality ratio	16. Maternal mortality ratio	16. Maternal mortality ratio (per 100 000 live births) per year
		17. Proportion of births attended by skilled health personnel	17. Proportion of life births attended by skilled health personnel per year
6. Combat HIV/AIDS, malaria and other diseases	7. Have halted by 2015 and begun to reverse the spread of HIV/AIDS	18. HIV prevalence among pregnant women aged 15 to 24 years (*)	18. HIV prevalence among pregnant women aged 15 to 24 years attending antenatal care clinics or among population groups at high risk (used as proxy for young people) (*) per year
		19. Condom use rate of the contraceptive prevalence rate	19.a. Percentage of young people aged 15-24 reporting the use of a condom during sexual intercourse with a non-regular partner(*) per year 19.b. Percentage of young people aged 15-24 who both correctly identify ways of preventing the sexual transmission of HIV and who reject major misconceptions about HIV transmission (*) per year
		20. Number of children orphaned by HIV/AIDS	20. Ratio of current school attendance among orphans to that among non-orphans aged 10 to 14 years (*) per year
		21. Prevalence and death rates associated with malaria	21.a. Number of notified malaria cases per 100 000 population per year Note for malaria mortality: Under-five mortality rate (per 1000 live births) (per year (measure for MDG indicator No. 13), reported together with malaria intervention coverage (22a, 22b, other), used as proxy measure
	8. Have halted by 2015 and begun to reverse the incidence of malaria and other major diseases	22. Proportion of population in malaria-risk areas using effective malaria prevention and treatment measures	22.a. Percentage of population under five years of age in malaria-risk areas using insecticide-treated nets 22.b. Percentage of population under five years of age in malaria-risk areas with fever being treated with effective antimalarial drugs
		23. Prevalence and death rates associated with tuberculosis	23.a. Number of smear-positive cases per 100 000 population per year 23.b. Number of tuberculosis (all forms) deaths per 100 000 population per year
		24. Proportion of tuberculosis cases detected and cured under Directly Observed Treatment, Short-course (DOTS)	24.a. Proportion of estimated new smear-positive TB cases detected under DOTS in a given year 24.b. Proportion of registered smear-positive TB cases successfully treated under DOTS in a given year
		29. Proportion of population using solid fuels	29. Percentage of population using solid fuels in a given year
		30. Proportion of population with sustainable access to an improved water source, urban and rural	30.a. b. c. Percentage of population with sustainable access to an improved water source, in a given year, 30.a. urban; 30.b. rural; 30.c. total
		31. Proportion of urban population with access to improved sanitation	31. Percentage of urban population with access to improved sanitation in a given year
8. Develop a global partnership for development	12. Develop further an open, rule-based, predictable, non-discriminatory trading and financial system		
	13. Address the special needs of the least developed countries		
	14. Address the special needs of landlocked countries and small island developing States		
	15. Deal comprehensively with the debt problems of developing countries through national and international measures in order to make debt sustainable in the long term		
	16. In cooperation with developing countries, develop and implement strategies for decent and productive work for youth		
	17. In cooperation with pharmaceutical companies, provide access to affordable essential drugs in developing countries	46. Proportion of population with access to affordable essential drugs on a sustainable basis	46. Percentage of population with access to affordable essential drugs on a sustainable basis
	18. In cooperation with the private sector, make available the benefits of new technologies, especially information and communication		

#### COLOUR LEGEND

Fully health-related goal	Fully health-related target	Health-related indicators as given in official UN documents related to MDGs	Corresponding quantity of interest WHO will actually report based on scientific definition and measurement methods
Partially health-related goal	Partially health-related target		
Non health-related goal	Non health-related target		Date: 20 October 2003

(\*) Indicators from the MDG list reformulated by WHO and UNGA Special Session on HIV/AIDS, according to footnotes on MDG list.

(\*\*) Health-related indicator reported by FAO only