



# Country Health Information Systems

A review of the current  
situation and trends



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# Table of Contents

<b>Preface</b> . . . . .	v
<b>Executive summary</b> . . . . .	ix
<b>Health Information Systems: general situation in countries</b> . . . . .	1
Introduction . . . . .	1
Policies and plans are beginning to emerge . . . . .	2
Limited resources: money and skills . . . . .	3
The epidemic of indicators and reporting . . . . .	5
The health information cycle: closing the loop . . . . .	8
Conclusion . . . . .	16
<b>The status of health data sources</b> . . . . .	19
More countries than ever conduct a census . . . . .	19
Civil registration and vital statistics systems: still too many gaps . . . . .	21
Increased coverage and frequency of health surveys . . . . .	23
Health management information system: new solutions to an old problem . . . . .	26
Systematic documentation of contextual and qualitative data . . . . .	31
Health research . . . . .	31
Conclusion . . . . .	33
<b>Monitoring of health systems</b> . . . . .	37
Monitoring health financing . . . . .	37
Monitoring human resources for health . . . . .	45
Monitoring access to essential medicines . . . . .	48
Monitoring health service delivery . . . . .	51
Conclusion . . . . .	51

Monitoring health and disease programmes . . . . .	57
Introduction . . . . .	57
Child health and nutrition . . . . .	57
Immunization . . . . .	59
Maternal mortality and reproductive health . . . . .	61
HIV/AIDS . . . . .	63
Malaria . . . . .	64
Tuberculosis . . . . .	67
Neglected tropical diseases . . . . .	68
Water and sanitation . . . . .	69
Noncommunicable diseases and risk factors . . . . .	71
Disease outbreak and the IHR core capacity monitoring . . . . .	72
Road safety . . . . .	73
Conclusion . . . . .	74
<b>Policy implications . . . . .</b>	<b>77</b>

# Preface

The findings set out in this report on the current status and trends in country health information systems are not unexpected. But they are nevertheless shocking.

Attention to health information systems has never been greater in the history of global health. Part of the reason for this heightened awareness is bad – the global health recession we are experiencing, thanks to the international financial crisis. The emphasis among donors is now on value for money. As their taxpayers endure declining standards of living, politicians are trimming budgets to make their current accounts balance. Government spending reviews are reordering priorities. The result is that development budgets are under scrutiny. While public opinion in most high-income countries supports aid expenditure, it does require that development spending should not be immune to cuts. This understandable response means that ministers have to make doubly sure that their spending is making the differences they claim. As a result, accountability is now a fashionable word in global health.

From a country perspective, health information systems are no less important. As donors demand proof of success, countries now have to work harder

for the aid they depend upon. It is in their intrinsic interest, as representatives of their own peoples, and their extrinsic interests – as a member of a community of nations – to build reliable ways of measuring births and deaths, and the causes of those deaths. Meanwhile, many policy-makers in aid recipient countries are possibly fed up with their role as pawns in a game of estimates, as competing methods to measure child and maternal mortality, to quote two recent controversial examples, become the focus of international debate instead of the issues themselves.

But there are more positive reasons to welcome this greater attention to health information systems. The great success of the global AIDS movement has encouraged other health sectors to pull the evidence together to show politicians that their concerns should be taken as seriously as AIDS. The new focus on noncommunicable disease is one example of the birth of a new social movement in global health. A critical lesson from the history of AIDS is that we need reliable means to measure success accurately. Without that apparatus of measurement, it is impossible to track the evolution of a disease epidemic, even a non-infectious epidemic. Errors in measurement

can lead to wrong priorities being set and wrong policies being implemented.

Perhaps the most important shift in attention regarding global health this past decade has been in relation to women's and children's health. Although Millennium Development Goals (MDG) 4 and 5 gave recognition to child and maternal health respectively (and eventually to reproductive health), neither goal was taken seriously enough by the international community. For most of the first MDG decade, the world's attention remained firmly fixed, and perhaps with good reason, on AIDS and malaria, with an occasional timid nod to tuberculosis. But thanks to a remarkable network of public health scientists, the evidence was slowly put together to convince presidents and prime ministers that maternal and child health was an incredibly worthwhile investment. In September, 2010, this work culminated in the launch of the UN Secretary General's Global Strategy for Women's and Children's Health. A total of US\$40 billion has been pledged by countries and non-state actors to this cause.

But again, we are in the realms of accountability. The political green light has been given to an era of integration in global health. AIDS is no longer an exceptional disease. It is an exceptional opportunity to integrate with other spheres of global health, the first among equals being women's and children's health. But without proper systems for tracking health information – notably the continuous counting of births and deaths – little progress will be made. We need to know precisely where and why women's and children's deaths occur, and whether and which interventions are succeeding in accelerating gains in survival. This is why strengthening civil registration and health information systems is a key recommendation from the UN Commission on Information and

Accountability for Women's and Children's Health, led by the Prime Minister of Canada and the President of the United Republic of Tanzania.

The Health Metrics Network was established to fill what was seen as a critical gap in the global health architecture during the MDG era. Its role was to advocate and provide the tools for health information system building. It quickly created a successful brand and became the focal point for discussion about how to put health information on country and global political agendas. Having succeeded in these tasks, the second phase of the Network's history is now underway. The next step is to mobilize partners around country-led plans to establish health information systems and vital events monitoring, using new tools of information technology to cut decades from the traditional history of system building (an initiative called 'MOVE-IT', Monitoring of Vital Events – Information Technology).

But the Health Metrics Network cannot succeed alone. It will depend on the motivation and actions of its partners. WHO, the Network's host agency, offers the strongest base for convening and mobilizing these partners. The review of the situation and the trends in country health information systems published in the current report represents the first product of this newly aligned relationship between the Health Metrics Network and WHO. Its results are stark. The foundations of health information systems in most low-income countries are absent. Data sources are highly variable in their quality and massive information gaps still exist.

With fewer than five years to go to the MDG target year of 2015, an electric shock is passing through the global health community. We are now realizing that many goals and targets will not be met. We are also realizing that our information systems are not equipped for accurately tracking

if and to what extent we are on course. We can see that despite the great success of some disease-focused programmes, the failure to invest in systems – or to invest successfully in systems – has led to only fragile and unsustainable health gains. The lesson from this recent history is not that vertical health initiatives failed, but that they have succeeded.

The Global Fund to Fight AIDS, Tuberculosis, and Malaria, for example, has been the most successful health financing facility bar none. The lesson surely is that vertical initiatives require parallel investments in systems for their successes to be protected and augmented. Health information is one such system, and perhaps the most fundamental of all.

**Richard Horton**

Chair of the Health Metrics Network Board



# Executive summary<sup>1</sup>

This report aims to provide an overview of the status of country health information systems in low- and (lower) middle-income countries.<sup>2</sup> It uses the various components of the Health Metrics Network/WHO framework for health information systems to describe the general system aspects, data sources, monitoring of the health system as well as health- and disease-specific practices.

The general situation and trends in country health information systems show that the basic foundations of a good health information system, i.e. a policy, a comprehensive plan, coordination mechanisms, sufficient investment, and a health information workforce, are inadequate in many countries.

Most countries are using plans with core indicators and targets to monitor progress and performance, but availability and quality of data hamper the ability to accurately do so. Virtually, no low- or (lower) middle-income country has a

full system of data sharing and transparent quality control in place.

Global indicator proliferation and onerous reporting requirements related to monitoring of global declarations, monitoring of health and disease programmes and of specific grants, have resulted in a considerable burden for countries.

Information and communication technology (ICT) is no magic bullet, but an increasing number of local examples are showing that faster and better information can help overcome some of the persistent obstacles for health information systems.

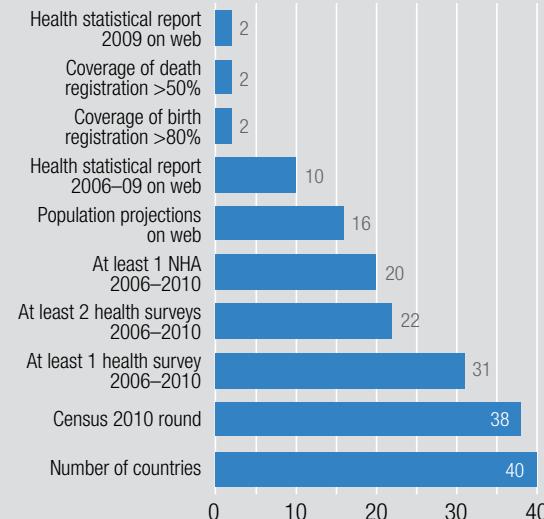
The availability and quality of data varies between sources and between countries. While good progress has been made in health surveys and censuses, in most countries health facility reporting systems continue to be plagued by data quality problems. Civil registration and vital statistics are the weakest data sources in almost all low- and (lower) middle-income countries (**Figures 1 and 2**).

The imbalance between the increasing demand for indicators and reporting and the actual efforts to strengthen country health information systems and its core data sources is a major problem for the majority of low- and (lower) middle-income countries.

<sup>1</sup> This report has been produced by staff from the World Health Organization, coordinated by the Department of Health Statistics and Informatics, on behalf of the Health Metrics Network. Staff from MEASURE Evaluation/John Snow Inc. and the University of Oslo are acknowledged for reviewing.

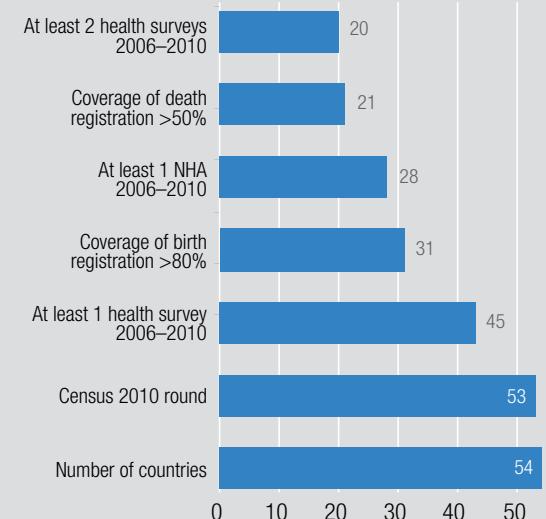
<sup>2</sup> Income group aggregates are calculated using the 2010 World Bank list of economies.

**Figure 1: State of health information systems in 40 low-income countries, selected indicators, 2010**



Source: Department of Health Statistics and Informatics, WHO

**Figure 2: State of health information systems in 54 (lower) middle-income countries, selected indicators, 2010**



Source: Department of Health Statistics and Informatics, WHO

Monitoring of health systems has improved in some areas but major information gaps remain. An increasing number of countries are conducting national health accounts (NHA), although the majority of low- and (lower) middle-income countries do not have an institutionalized system yet. Monitoring of the health workforce and access to medicines and services has improved only gradually in several countries. A comprehensive system for monitoring of public and private sectors is also often lacking.

The main health and disease programmes require a different mix of data – from surveys, facilities and administrative sources. And, because they all aim to draw from the same health data sources, there are common deficiencies. The absence of functioning civil registration and vital statistics systems, and the often poorly operating health facility reporting system, affect the ability to monitor progress of virtually all programmes. There

have been common improvements in tracking the coverage of health interventions in several disease programmes, mainly through more frequent surveys and promising developments for facility and administrative reporting systems through reforms including the introduction of ICT. There is, however, still a tendency to seek separate programme-specific solutions for common problems.

The findings of this report underscore the recommendations made by the heads of eight global health agencies (the H8) and the Global Health Information Forum (GHIF) in 2010 (1,2). Both the H8 plan of action and the Call to Action of the Bangkok GHIF have identified several priority areas for action:

- Increasing investments to strengthen country health information systems, through ongoing routine funding, global health partnerships and special disease initiatives. Special attention needs to be directed to the currently weak data sources,

such as civil registration and vital statistics, and health facility-based information systems, as well as to strategies to ensure adequate monitoring of equity.

- **Improving the efficiency of health information investments** by closer collaboration between partners in support of one strong country health information system that covers all major disease and health programmes and all data sources. This should include minimization of numbers of indicators and harmonization of reporting requirements.
- **Enhancing access to data in the public domain**, with appropriate security and confidentiality measures, and covering the public and private sectors. This should include investment in appropriate information technology supported by a country-owned data architecture that

assures interoperability between data systems and real time access to information for health action.

- **Strengthening of country capacity** to collect, compile, manage, analyse and use health data among a wide range of stakeholders, including health, statistical and research institutions.

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1. Chan M, et al. Meeting the demands for results and accountability: a call for action on health data from eight health agencies. *PLoS Medicine* 2010;7(1):e100023.
2. Global Health Information Forum. *Call to Action*. Bangkok, 2010 ([http://www.pmaconference.mahidol.ac.th/index.php?option=com\\_content&view=article&id=201%3Acall-to-action-final&catid=966%3A2010-conference&Itemid=152](http://www.pmaconference.mahidol.ac.th/index.php?option=com_content&view=article&id=201%3Acall-to-action-final&catid=966%3A2010-conference&Itemid=152), accessed on 30 March, 2011).



## MAIN FINDINGS

- The very countries that face the greatest health challenges generally have the weakest systems for gathering, managing, analysing and using information.
- The basic foundations of a good health information system, i.e. a policy and comprehensive plan, coordination mechanisms, sufficient investment, and a health information workforce, are inadequate in many low- and (lower) middle-income countries.
- Most countries are using plans with indicators and targets to monitor progress and performance, but availability and quality of data hamper the ability to accurately do so.
- Global indicator proliferation and reporting requirements related to monitoring of global declarations, health and disease programmes, as well as monitoring and specific grants, have resulted in a considerable burden for countries.
- Virtually no low- or (lower) middle-income country has transparent systems for data sharing and quality control in place.
- Information and communication technology (ICT) is no magic bullet, but there are an increasing number of local examples showing that faster and better information can improve health-care delivery and public health information.

# CHAPTER 1

## Health Information Systems: general situation in countries

### Introduction

Reliable and timely health information is one of the foundations of effective health service management and public health action. Increases in national and international funding for health have been accompanied by greater demands for data and statistics to monitor programme implementation and performance, evaluate progress and ensure accountability. This has led to greater investments in health information, especially data collection. Many countries, however, still lack basic and effective health information systems.

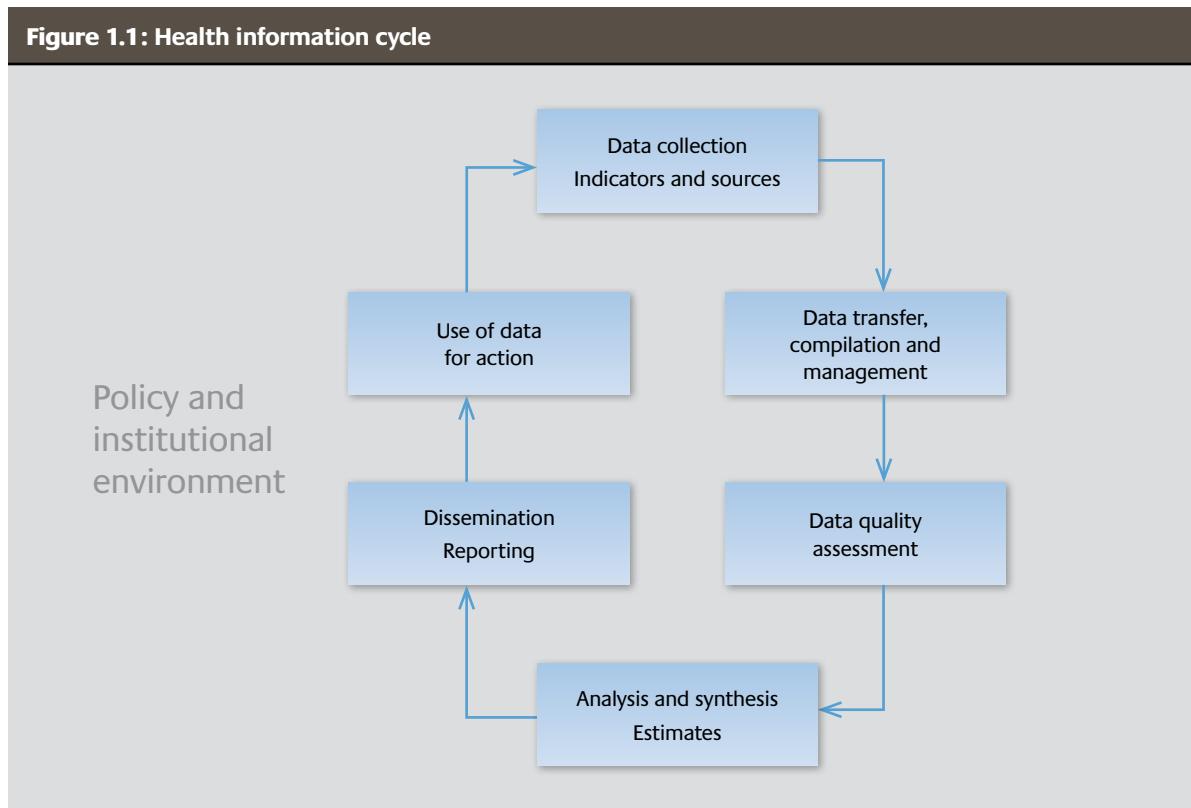
Indeed, the very countries that face the greatest health challenges generally have the weakest systems for gathering, managing and using information. This gap, often referred to as the “information paradox”, is most apparent in the reliable documentation of vital events, such as births and deaths. An estimated 40 million births, representing about a third of the world’s annual total, and 40 million deaths, representing about two thirds of the world’s annual total, go unrecorded each year; most of these occur in Africa and Asia.

Before embarking on a report on the status of country health information systems, it is worth defining the term. According to the Health Metrics Network (HMN), a WHO-hosted global partnership

dedicated to strengthening health information, a health information system is “an integrated effort to collect, process, report and use health information and knowledge to influence policy-making, programme action and research”(1). In other words, a health information system is as much about using information as it is about collecting, storing and analysing it – it is an “effort” that moves beyond specific diseases and programmes to embrace the health system and its component parts in its entirety as the basis for effective use of resources. The health information cycle shows how each function flows into the next (**Figure 1.1**). The cycle is often referred to as monitoring and evaluation and includes regular measurement of progress of projects and programmes using a defined set of indicators. Monitoring and evaluation, however, needs to be part of a health information system and supported by a conducive policy and institutional environment.

The health information system primarily aims to describe the health situation and trends and assess health system performance, using a wide range of data sources including health facility data, administrative returns, household surveys, civil registration, national health accounts (NHA) and health research (2).

**Figure 1.1: Health information cycle**



### Policies and plans are beginning to emerge

A country health information system requires a supportive policy and institutional environment, with clearly defined roles and responsibilities for the different stakeholders. Multiple institutions produce and use health-related data. The core institutions are the health ministries and national statistical offices, but the private sector, civil society organizations, academic institutions, donors and UN agencies also play important roles.

Given the large number of actors in a fully functioning health information system, high-level leadership and coordination are critical to avoid overlap and duplication of efforts as well as to ensure efficient collection and use of data. In many

countries this kind of leadership and coordination is inadequate.

Recent self-assessments using the HMN assessment tool<sup>1</sup> – a systematic tool for countries to assess the strengths and weaknesses of the health information system in an inclusive process that involves key stakeholders – revealed that a national coordination mechanism, often a committee comprising key stakeholders, either did not exist or was not functional in 16 of 25 low- and

<sup>1</sup> From an analysis conducted by HMN in 2010 of health information system assessment results using HMN Assessment Tool version 4.00. The self-assessment by key stakeholders in countries were conducted during 2008–2010. The tool is available at: [http://www.who.int/healthmetrics/tools/Version\\_4.00\\_Assessment\\_Tool3.pdf](http://www.who.int/healthmetrics/tools/Version_4.00_Assessment_Tool3.pdf), accessed on 31 March 2011.

middle-income countries. The self-assessments also indicated that the lack of health information policies and comprehensive plans is a major handicap. However, there has been some progress to address this issue. Since 2008, more than 20 countries have been working on health information strategic plans with costing, supported by HMN. These plans are developed by the country's ministry of health and tend to focus on health management information systems. An increasing number of countries, such as those that are part of the International Health Partnership, are developing comprehensive monitoring and evaluation plans to inform the implementation of the national five-year health sector strategic plan (3).

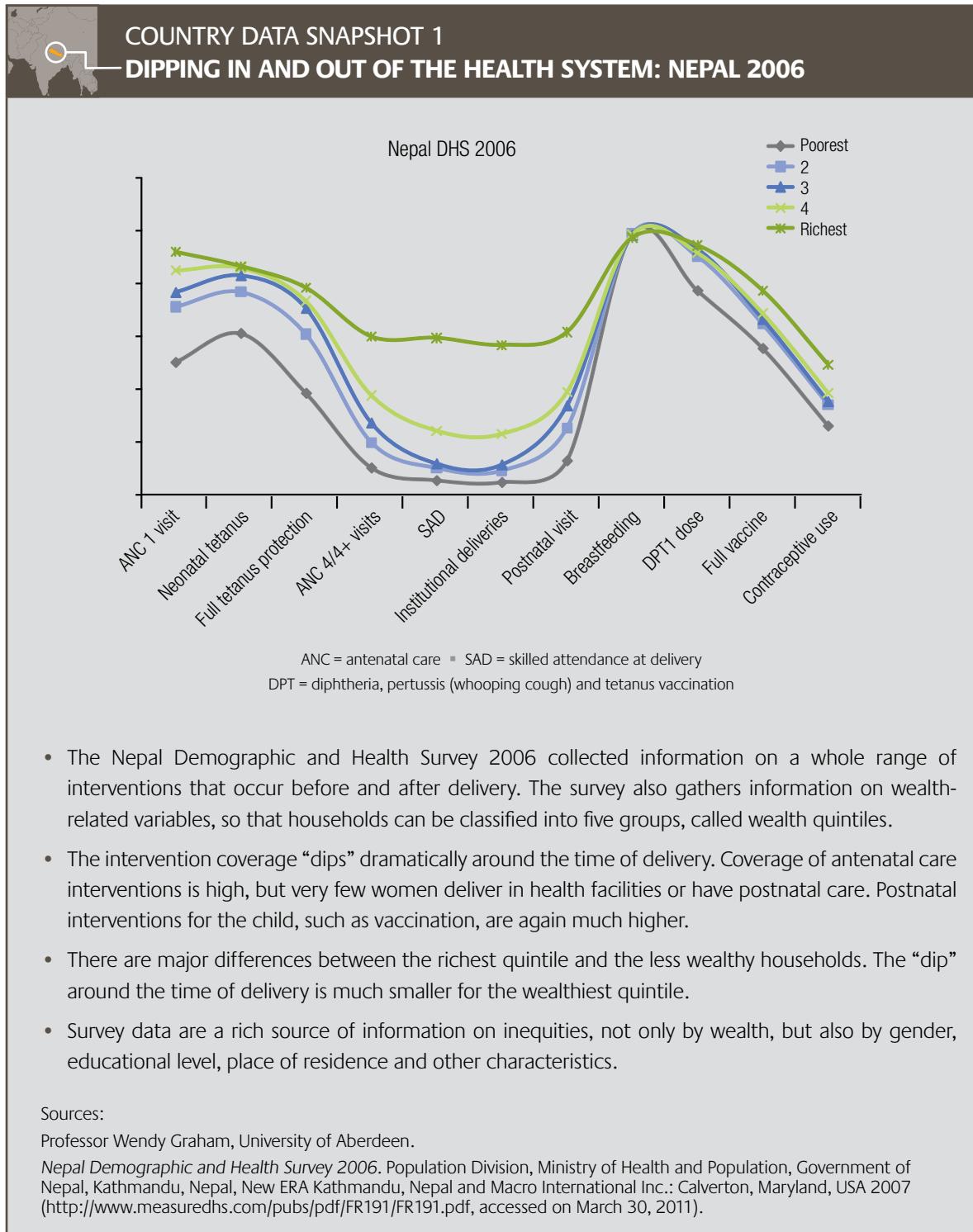
Progress is also noted in the statistical sector as a whole, of which the health information system is a part. The approach proposed by the Partnership in Statistics for Development in the 21st Century (PARIS21), known as the National Strategies for the Development of Statistics (NSDS), has become the benchmark in recent years. The NSDS is meant to be a truly dynamic process that takes into account evolving user needs and serves as a coherent framework for sectoral statistical strategies and statistical capacity development efforts carried out by both national stakeholders and the donor community. PARIS21 has particularly focused on advocating the NSDS approach in 118 low- and middle-income countries. Of these countries, over 93% adopted the NSDS approach; of which 98% were African countries. Globally, 52% of countries were implementing a statistical strategy, 31% were designing a strategy and 10% were planning one. Most countries that are not in the midst of an NSDS process are special cases, such as fragile or small island states. However, despite these efforts, most countries have yet to draw up sound health sector-specific monitoring and evaluation plans as part of NSDS.

## Limited resources: money and skills

There have been very few efforts to calculate the costs of all aspects of a national health information system. It is estimated that health information requires at least US\$ 0.53 per capita in low-income countries and US\$ 2.99 per capita in high-income countries (4). These figures may be on the low side. For example, in the five-year health sector strategic plan 2011–2015 in Sierra Leone, the cost of running a comprehensive health information system was budgeted at about US\$ 1 per capita per year. Data on the level of investment in health information systems in low- and middle-income countries are lacking, but anecdotal evidence suggests that, with notable exceptions such as Thailand and Mexico, it is significantly lower than the 5% of total health resources called for by the Global Health Information Forum (GHIF) in Bangkok in 2010. It should be noted that 2% of this is to be allocated to sound civil registration and vital statistics systems (5).

External resources play an important role in many low- and middle-income countries, especially with regard to the funding provided for surveys and censuses. The United States government, through the United States Agency for International Development (USAID) and Centers for Disease Control and Prevention (CDC), has been providing the largest funds, especially through its long-term support of the Demographic and Health Surveys (DHS) and disease surveillance.

The Global Fund to Fight HIV, Tuberculosis and Malaria (referred to as the Global Fund in this document) has estimated that just under 5% of its grants are allocated to health-related monitoring and evaluation activities. A review of 18 countries conducted in 2008, however, concluded that the resources have not been spent in a way that strengthened country systems (6). This may be changing as in recent rounds the Global Fund has



awarded grants to support more structural efforts to improve health information.

Many countries suffer from shortage of staff with the relevant training and skills in statistics, epidemiology, demography, public health and informatics. Such skills are particularly weak in many low- and (lower) middle-income countries, partly because too few people have been trained, and partly because of the inability of the public sector to retain qualified staff due to low remuneration levels relative to the private sector. Also, at the subnational level there are often shortages of mid-level staff in health information. Among the 25 low- and middle-income countries that recently conducted self-assessments using the HMN tool, only eight reported that 10% or more of districts had a cadre of trained health information staff in place with at least two years of specialized training. Assessments of the health staff in Cote d'Ivoire, Haiti, Pakistan, Paraguay and Uganda, using the Performance of Routine Information System Management (PRISM) tool, also showed shortages of skilled human resources (and of data collection forms) for health management information systems using facility and administrative data (7).

However, a number of countries, including Algeria, Bolivia, Cambodia, Cote d'Ivoire, Ghana, Mali, Peru and Viet Nam, are taking pragmatic steps to improve staffing capacity, skills and motivation for national statistics development, notably in the development of vital statistics systems. In some cases these initiatives are being taken as part of the PARIS21-supported NSDS (8), which include making statistical offices a parastatal entity and introducing greater flexibility on salaries.

In Brazil, the *Instituto Brasileiro de Geografia e Estatística* (Brazilian Institute of Geography and Statistics) provides an interesting example of what can be achieved by implementing structural

change in human resource policies. The institute implemented a career-training programme, including a financial incentive linked to career development, and observed a significant increase in the proportion of Masters and PhD-level employees from 16% of the total in 2000 to 30% in 2010. In a recent survey of new employees, 87% cited professional development as the main motivation for joining the Institute (9).

## The epidemic of indicators and reporting

The increased focus on monitoring and evaluation has given rise to a number of challenges. One is the unhelpful proliferation of indicators and onerous reporting requirements (10). Countries must not only deal with a huge volume of reporting, but also with diverse reporting periodicities and formats. The Rwandan Ministry of Health, for example, reports having to furnish a range of donors with 890 separate health data items, 595 relating to HIV and malaria alone (11).

**Table 1.1** presents the number of indicators proposed for a selection of currently active health and disease programmes. Specific disease programmes tend to monitor indicators covering: “inputs” such as resources invested and activities undertaken; “outputs” such as services provided, and in some instances, the quality of those services; “outcomes” such as intervention coverage and risk factors; and a smaller number of “impact” indicators such as the health status of a population and the financial consequences of using health care. There is an overlap between the indicators in the different guidelines. For example, the Global Fund toolkit is largely made up of indicators derived from WHO guidelines for acquired immunodeficiency syndrome (AIDS), tuberculosis (TB) and malaria.

**Table 1.1: Number of indicators recommended in guidelines for monitoring and evaluation of selected health and disease programmes**

Topic	Agencies	Total	Input	Output	Outcome	Impact
Tuberculosis <sup>a</sup>	Stop TB Partnership	57	16	28	12	1
HIV/AIDS for UNGASS <sup>b</sup>	UNAIDS	25	2	3	16	4
Malaria <sup>c</sup>	Roll Back Malaria Partnership	29	14	4	5	6
Malaria (2010) <sup>d</sup>	WHO	17	1	4	6	6
Child health (2005) <sup>e</sup>	USAID/MEASURE	100	8	10	62	20
HIV, tuberculosis, malaria, health systems (2009) <sup>f</sup>	Global Fund (and partners)	175	19	57	78	21
Health workforce (2009) <sup>g</sup>	WHO, World Bank, USAID	54	54	0	0	0
Health systems building blocks (2010) <sup>h</sup>	WHO (and partners)	17	7	9	0	1

a Compendium of indicators for monitoring and evaluating national TB programmes. Geneva, World Health Organization, 2004.

b HIV/AIDS: Guidelines on construction of core indicators: 2010 reporting. Geneva, Joint United Nations Programme on HIV/AIDS, 2009.

c Roll Back Malaria partnership. Malaria: framework for monitoring progress and evaluating outcomes and impact. Geneva, World Health Organization, 2000.

d World malaria report 2009 (Table 2.1 Malaria indicators, targets and sources of data). Geneva, World Health Organization, 2010.

e Gage AJ, Ali D, Suzuki C. A guide for monitoring and evaluating child health programs. MEASURE evaluation. Carolina Population Center, University of North Carolina at Chapel Hill, 2005.

f Monitoring and evaluation toolkit: HIV, tuberculosis and malaria and health systems strengthening (3rd ed.). Geneva, The Global Fund to Fight AIDS, Tuberculosis and Malaria, 2009.

g Handbook on monitoring and evaluation of human resources for health. Geneva, World Health Organization, 2009.

h Monitoring the building blocks of health systems: a handbook of indicators and their measurement strategies. Geneva, World Health Organization, 2010.

MEASURE = Monitoring and Evaluation to Assess and Use Results ■ UNGASS = United Nations General Assembly Special Session ■ UNAIDS = Joint United Nations Programme on HIV/AIDS ■ USAID = United States Agency for International Development ■ HIV = human immunodeficiency virus

## Why so many?

At least four requirements have led to the large number of indicators and reporting requirements. The first is progress monitoring with regard to international declarations of commitment in which government leaders have committed their countries to the achievement of specific goals. The Millennium Development declaration in 2000, signed by 192 countries, annually tracks the 60 development indicators to monitor progress towards the eight millennium goals. Among these are 21 health indicators, with six targets, such as

a three quarter reduction of maternal mortality by 2015. The Millennium Development Goals (MDGs) monitoring process is generally considered a success, in part because of its focus on a relatively small set of indicators (12), even though the availability of quality data from low- and middle-income countries is a major challenge (13).

Two additional examples illustrate the diversity of declarations and reporting requirements. The monitoring of the 2001 UNGASS declaration on HIV/AIDS involves bi-annual reporting on 25 indicators, including a narrative report. The financial indicators

require AIDS spending data, broken down by spending category and financing source, derived from a national funding spreadsheet of about 1600 cells. The national policy index is a composite index that requires around 400 data items related to various aspects of a country's HIV/AIDS policy and its implementation.

The International Health Regulations (IHR) that came into force in mid-2007 requires countries to report certain disease outbreaks and public health events to the WHO. The implementation of the IHR is primarily monitored by a set of 20 mandatory global indicators of core capacity and 10 additional indicators. Data are collected through key informant surveys on an annual basis and reported to the World Health Assembly to monitor progress in country implementation of the IHR in the area of core capacities.

The second requirement is related to specific health and disease programmes, including maternal, newborn and child health, HIV/AIDS, malaria, nutrition, mental health, medicines and procurement to name a few. For TB control, annual reporting includes 156 questions, some disaggregated by age, sex, public/private, treatment outcomes, etc., adding up to nearly 700 separate items to fill out in total. For immunization, WHO and United Nations Children's Fund (UNICEF) jointly collect information from countries through a standard questionnaire consisting of 220 questions, which increase the number of entries to around 1200.

The third group of requirements is associated with grants that involve reporting on a specific set of indicators. The number of indicators to be tracked and the reporting frequency for countries significantly increases. For example, Global Fund recipients are required to submit progress updates along with disbursement requests every three, six or 12 months depending on the reporting frequency agreed for the grant. The President's Emergency

Plan for AIDS Relief (PEPFAR)-related reporting for HIV/AIDS tends to be accompanied by a very large number of indicators and detailed reporting.

Lastly, countries themselves use large numbers of health indicators that are needed by different users, for different purposes, and at different levels. Health facility, district, provincial and national monitoring and planning processes are guided by a wide range of mostly input, process and output indicators.

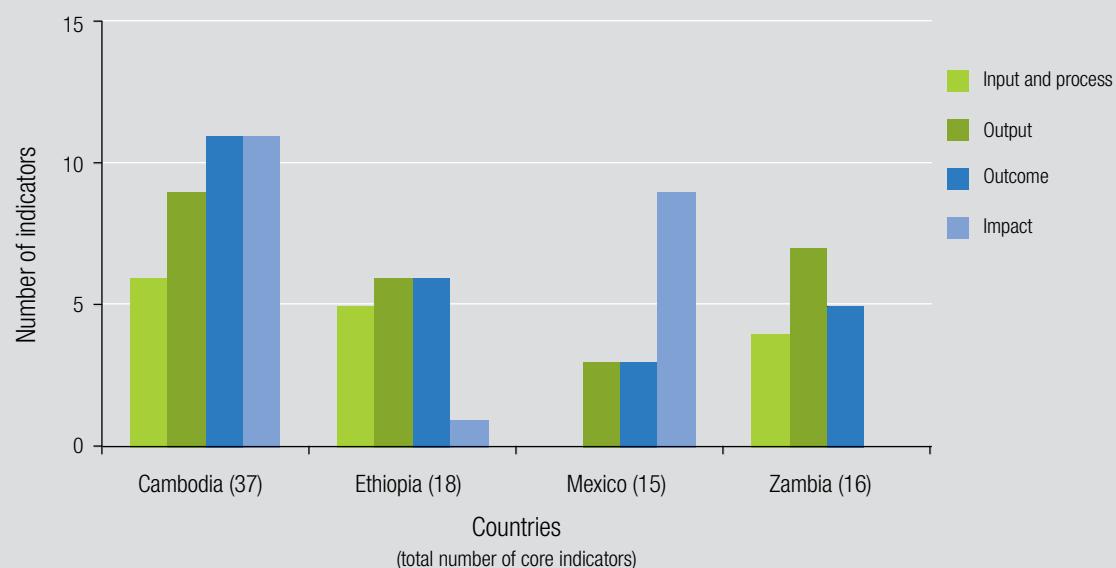
Thus, selecting a core set of indicators that can be used to monitor progress towards the key objectives of health plans presents particular challenges. **Figure 1.2** shows the number of core indicators used in the development of the national health plans of selected countries.

Most countries have selected between 15 and 40 core indicators with baselines and targets to monitor their national health sector strategic five-year plans. The full national health plan however often has hundreds of indicators that serve to monitor the implementation of the plan's different aspects. In addition, specific health and diseases programme plans, which are often not well integrated into the overall national health sector strategic plan, have their own indicators and targets.

### **Standards are required for comparability**

Comparability of data is also an issue. The ability to compare one indicator with another is obviously essential when using an indicator to monitor progress over time or when comparing situations across different locations. The first requirement of comparable data is comparable definitions. A number of international manuals and guidelines have been issued with a view to facilitate the harmonization of indicator definitions and the standardization of measurement and estimation methods. Specific data exchange protocols, such as Statistical Data and Metadata Exchange – Health Domain (SDMX-HD), are being developed to allow

**Figure 1.2: Number of core indicators in national health strategies, by result framework level**



Sources:

Health Strategic Plan 2008–2015: accountability, efficiency, quality, equity. Phnom Penh, Ministry of Health of Cambodia, 2008.

Health Sector Strategic Plan (HSDP III) 2005/6–2009/10. Federal Ministry of Health, Ethiopia, 2005.

Programa Nacional de Salud 2007–2012. Por un México sano: construyendo alianzas para una mejor salud. Secretaría de Salud, Mexico, 2007.

National Health Strategic Plan 2006–2010. Towards attainment of the Millennium Development Goals and national health priorities. Ministry of Health, Republic of Zambia, 2005.

monitoring systems to exchange indicator values and metadata.<sup>2</sup>

It is often assumed that high-income countries have well-established indicators and reporting systems. The European Community Health Indicators (ECHI) project, however, took seven years to review almost 500 indicators and used explicit selection criteria to come up with a shortlist of 82 (14). The subsequent ECHI monitoring project (15), which worked on implementing the selected indicators

revealed that, even though the ability to track and compare countries improved, actual measurement and comparability remained a problem for several indicators because data collection and analysis were not sufficiently standardized.

### The health information cycle: closing the loop

The health information cycle consists of data collection, management, analysis, dissemination and use (Figure 1.1).

<sup>2</sup> The WHO Indicator and Measurement Registry was launched in 2009 to address both the issue of indicator harmonization and indicator data interoperability, as well as to promote development of monitoring and evaluation activities. (<http://www.who.int/gho/indicatorregistry/>, accessed on 30 March 2011).

## Data collection

Health data are usually derived from multiple sources. The most prominent data source in many countries is the household survey, conducted under the responsibility of their national statistical offices. Administrative data, such as health workforce or financing data, and health facility reporting are the responsibility of the health ministry, and are the basis for annual monitoring and health management at national, district and facility levels. The quality of such data is often an issue. Birth and death registration, with a cause of death, is the weakest source of data in most countries. The status of data sources is further explored in Chapter 2.

## Data compilation, storage, management

Data compilation and storage, usually the responsibility of the health ministries and the national statistical offices, needs to be supported by robust data management policies backed by adequate resources. Many low- and middle-income countries lack both. In recent self-assessments of the health information system using the HMN assessment tool, stakeholders in 10 of 25 countries stated that while data management protocols were in place, they were not being implemented.

New investments in data management have often been fragmented. There is, for example, plenty of evidence from countries that donors have supported parallel data management systems, either in the context of specific projects and grants or disease programmes.

## Data sharing and access

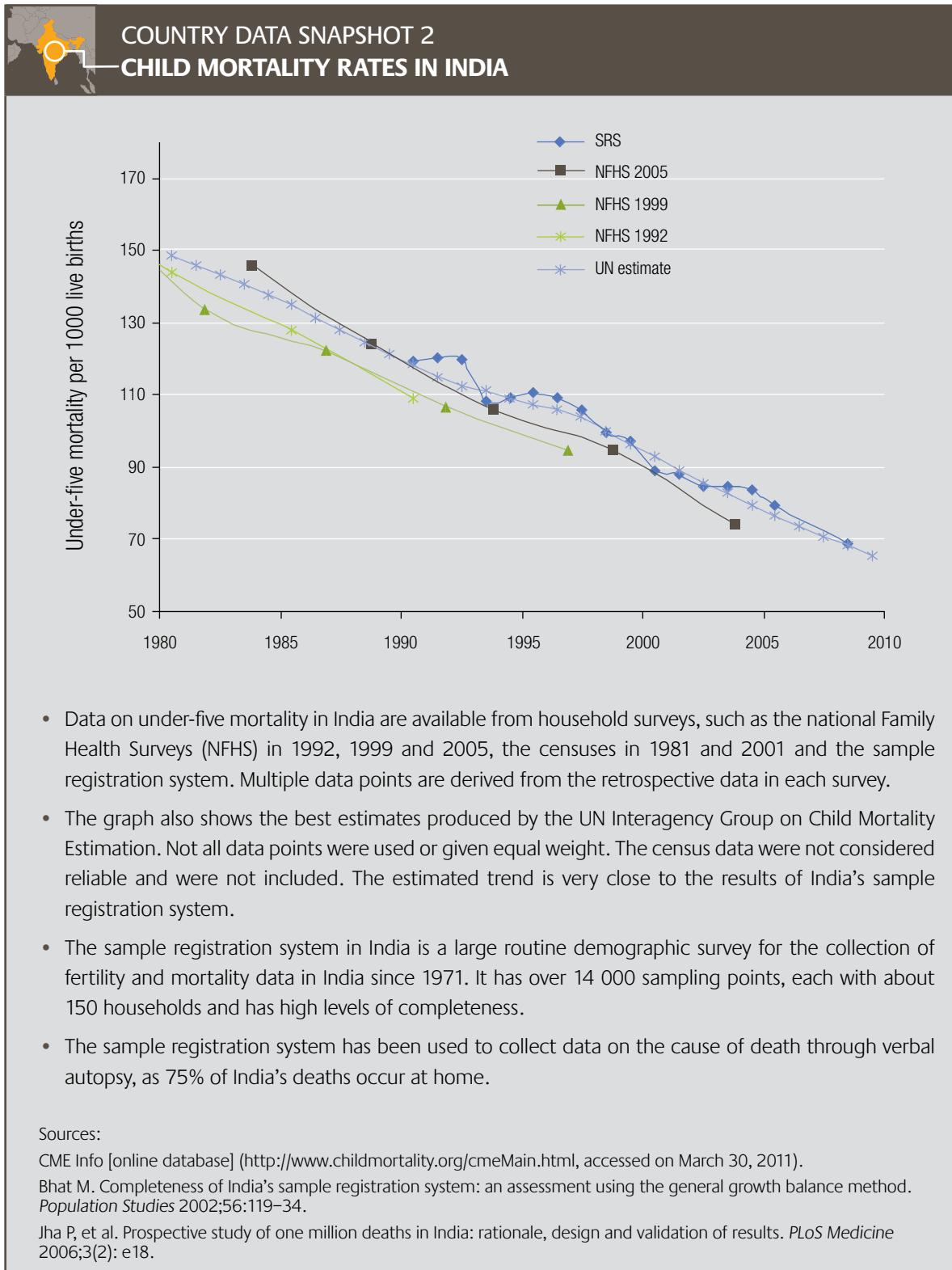
Public access to health data is essential to ensure accountability. The sharing of aggregate data, such as district level data on TB or vaccinations, or facility data on the number of antiretroviral therapy users, facilitates the compilation of reliable statistics, which can become the basis for effective advocacy,

policy and action. Recently, several high-income countries, including Australia, Canada, the United Kingdom and the United States, established online data repositories of government data. In most countries however little data are publicly available. For example, very few countries make district reported health facility data on say immunization, TB treatment outcome or institutional deliveries available on their health ministry web site.

The archiving of household survey data is essential to ensure public access and facilitate use. In Ghana, Haiti, Sri Lanka and the United Republic of Tanzania, national statistical offices have taken steps to catalogue and disseminate survey and census data using open source National Data Archive (NADA) software developed by the International Household Survey Network at the World Bank (16).

Access to individual level health-care data, with appropriate protection of confidentiality, is greatly facilitated by the use of electronic health records and electronic registers. In most countries the availability of such data for public health and/or research purposes is still limited. The exceptions usually occur in research settings, such as the individual level database of people on antiretroviral





therapy in a cluster of districts in Zambia, which allows detailed assessment of survival and adherence indicators (17).

## Data quality and analysis

Data quality for health service and administrative data remains a serious concern for policy-makers. While there are a number of different tools available for data quality review, quality assurance is rarely an integral part of data processing in most low- and middle-income countries. Poor data quality has been identified as a major factor affecting the utility of health facility data for local and national decision-making (18). Virtually no low-income country appears to have a regular and transparent process for data verification and adjustment.

The Global Alliance for Vaccines and Immunisation (GAVI), the Global Fund and PEPFAR promote their own data quality assessment mechanisms for health information systems. GAVI conducted 59 data quality audits during 2002–2009; 75% of these were conducted between 2002 and 2004. The Global Fund completed 25 data quality assessments (DQAs) in 2008 and 2009, and a further 13 in 2010. Both GAVI and the Global Fund also have data quality self-assessment tools that can be used by countries as a supervisory tool. An essential component is the rapid data quality assessment tool (RDQA) that aims to verify the accuracy of facility reported data through facility record reviews. In some countries, such as Mozambique, efforts are being made to systematize the RDQA as part of the annual review process (19).

Data analysis is one of the core functions of health information systems. Without it the collection and compilation of data would be of little value. Many high- and middle-income countries have the institutional capacity to undertake regular independent assessments of health progress and system performance. Examples of such institutions

include the Canadian Institute for Health Information (CIHI), the National Institute for Public Health and the Environment (RIVM), Netherlands, the Thai Health Promotion Foundation (ThaiHealth), and the Health Systems Trust in South Africa. All these are mainly government funded, but maintain a level of independence.

Analytical capacity is often flagged as a major weakness by low- and middle-income countries, due to the limited capacity in their health ministries, national statistical offices and other institutions. Estimation and statistical modelling, and application of global standards, tools and methods to correct for bias and missing values to generate estimates and forecasts for planning purposes, are rarely used. Global estimation methods are often perceived as a “black-box”, too complex and difficult to replicate, with only limited country involvement in the estimation processes.

However, country estimations of HIV/AIDS epidemiological indicators are now quite widespread after several years of persistent training by the international community, which started in 2003. Training workshops are held in all UN regions once every two years, involving many global partners including academic and private institutions, coordinated by UNAIDS and WHO. Epidemiologists and others working in the HIV/AIDS field from more than 100 countries bring their own data. For estimations they all use the Estimation and Projection Package (EPP) and Spectrum (AIDS ImpactModel-AIM module). The methods and software are updated every two years, a process supported by a UNAIDS reference group (20). Over the years, a critical mass of expertise has been achieved in countries that can now do their own estimates of HIV prevalence, incidence and mortality projections, as well as project treatment needs and numbers of AIDS orphans, while still meeting international standards of comparability (21).

## Data dissemination and use

Most countries produce annual health statistical reports, which tend to focus on health statistics generated by health facilities.

- By the end of 2010, 15 of 40 low-income countries presented an annual health statistical report for the period 2006–2009 on their ministry of health or national statistical office web site.
- Only two of the 40 countries had the most recent report (for 2009) available.

On the positive side, there is a demand for data at different levels of the health system. For example, a survey among health workers at different levels of the health system in four states of India indicated that health data were used to monitor key objectives (91%) and for daily programme management (87%) (22). Lack of analytic and data use skills was considered the greatest challenge (62%), much more than data quality issues (34%). Data use was lowest at the facility level.

Subnational dissemination and use of health data are still relatively poor in many countries. However, in several countries (for instance, Belize, China, Cote d'Ivoire, Ethiopia, Honduras, India, Pakistan, Paraguay, Sierra Leone and Thailand), a process of health system information reform has been engaged, with the streamlining of data collection and the introduction of ICT to facilitate recording, reporting, quality control and analysis; there are also improvements in access to and use of statistics at district and provincial levels.

Regular reviews, evaluations and health system performance assessments, are all forms of assessments of the progress and performance of the national health system and require that data are brought together and analysed. In many low- and middle-income countries annual health sector reviews have become the most common platform

for pulling data together, to review progress with multiple stakeholders and for effecting change. The annual review is focused on the indicators and targets specified in annual operational plans – mainly the input, process and output indicators, although coverage and impact indicators are also used where available. Equity analysis and within- or between-country comparisons are often part of the process. Examples of other kinds of assessments include the annual Balanced Scorecard produced by Afghanistan since 2004 (23), the annual District Health Barometer produced by the organization Health Systems Trust in South Africa since 2005 (24), and health systems performance assessments focusing on reforms such as those conducted in Armenia, Georgia and Kyrgyzstan (25).

## New opportunities: information and communication technology

There has been significant growth in the use of ICT to enhance the capacity and performance of health information systems since 2000 (26). The development in this area is neither uniform nor ubiquitous, with countries in the high- and (upper) middle-income groups being notably more advanced in their eHealth<sup>3</sup> development than those in the (lower) middle- and low-income groups. According to the second Global Survey on eHealth conducted by WHO in 2009, more than half of the 114 participating countries indicated that they had adopted a national eHealth policy.<sup>4</sup> Such policies tend to focus the use of ICT on health-care delivery through activities such as remote consultation and telemedicine.

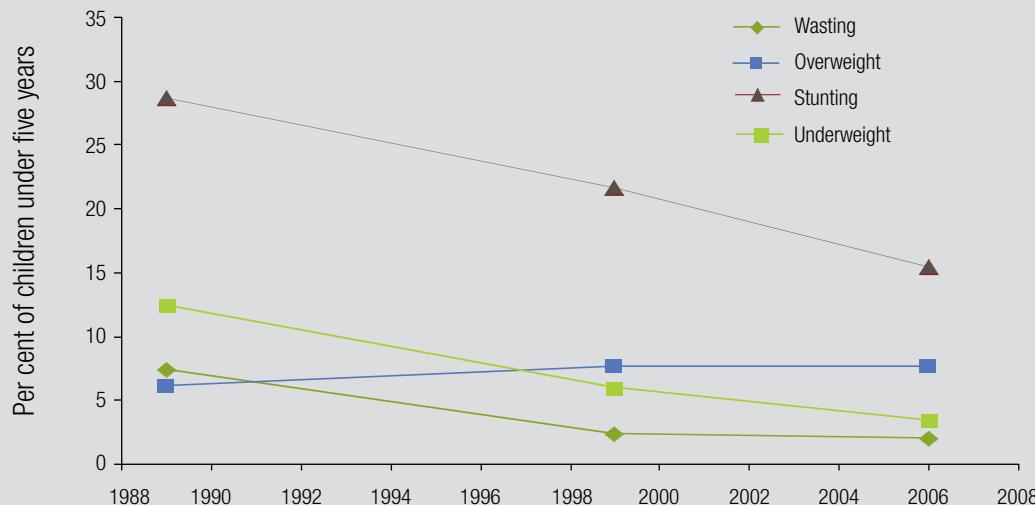
<sup>3</sup> eHealth is defined by WHO as the use of information and communication technologies for health.

<sup>4</sup> eHealth policy is defined as a framework and approach for developing eHealth in a country, established by government with the intent of achieving health goals. In this survey it referred specifically to the use of ICT in the health sector.



## COUNTRY DATA SNAPSHOT 3

### TRENDS IN CHILD NUTRITION IN MEXICO



- Mexico conducted national nutrition surveys in 1988 and 1999. In 2006, the Mexican National Health and Nutrition Survey (ENSANut) made it possible to capture the evolution of the nutritional status of the Mexican population over an 18-year period.
- Wasting, a sign of acute undernutrition, declined between 1988 and 1999 to 2%. Stunting, a sign of chronic undernutrition, declined dramatically and almost linearly between 1988 and 2006 to 15.5%. The proportion of children who were overweight outnumbered those who were underweight from about 1997, and the gap has grown over time.
- The surveys also showed that the gaps between the socioeconomic groups, rural and urban populations, and indigenous and non-indigenous populations were substantially reduced, although considerable disparities persist. It was considered likely that the social programme (*Oportunidades*) including conditional cash transfers to the poor and provision of micronutrient fortified foods contributed to the narrowing of the nutrition gap in the past decade.
- All calculations in the figure are based on the new WHO growth standards.

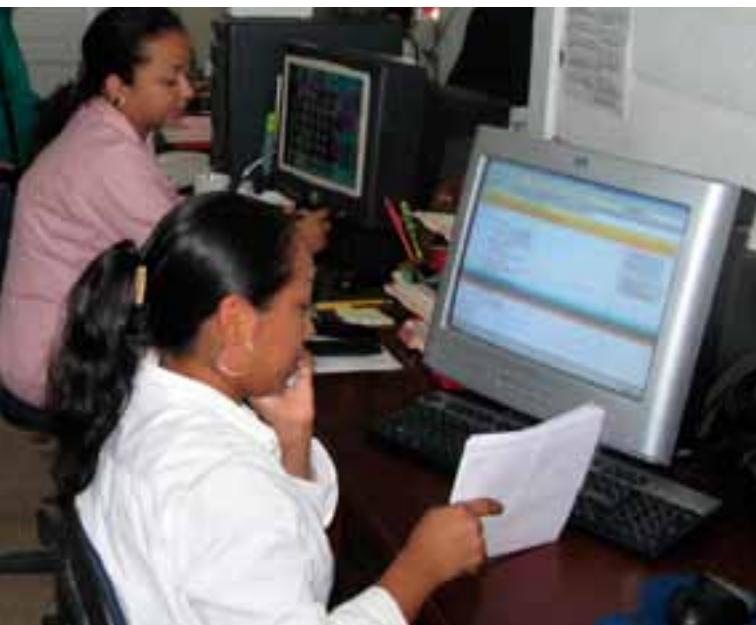
#### Sources:

Rivera JA, Irizarry LM, González-de Cossío T. Overview of the nutritional status of the Mexican population in the last two decades. *Salud Pública de México* 2009;51:S645–56.

The WHO Child Growth Standards. World Health Organization (<http://www.who.int/childgrowth/standards/en/>, accessed on March 30, 2011).

Evidence of what works best to improve care is still debatable, as only a few evaluations have been conducted (27). Several studies have shown a

positive impact from the use of laboratory reporting tools and electronic medical records in low- and middle-income countries. For example, in Peru



the inclusion of a large randomized controlled trial showed that the collection, management and use of TB laboratory data significantly improved with a laboratory reporting system (28). In Rwanda, the collection and use of CD4 cell count data in HIV care improved with the use of the Open Medical Record System's (OpenMRS) electronic medical record (EMR) system with a new laboratory data collection component (29). In Kenya, printed patient summaries with reminders produced by the OpenMRS EMR system improved the ordering of CD4 cell counts (30) and treatment adherence (31). Loss to follow-up is a very serious problem in long-term disease management, particularly in the management of HIV and multidrug-resistant TB. Some studies have shown that the use of EMRs can help monitor the loss to follow-up rates and track and locate such patients (32). A study in Nepal showed how different open source technology platforms can be used to bring together the information required for improving transparency and operations research at the service delivery level (33).

Mobile health or mHealth (i.e. medical care and public health supported by mobile devices, such as mobile phones, patient monitoring devices, personal digital assistants (PDAs), and other wireless devices), is a rapidly growing branch of eHealth. Nearly 83% of countries responding to the Global Survey on eHealth reported that they are host to at least one mHealth initiative. Once nationwide coverage is achieved, mHealth may boost country capacity to monitor the incidence of public health threats and enable a more timely and effective response.

Information technology applications are changing the scope and modalities of data collection, transmission, storage, analysis, dissemination and sharing (34). UN organizations have invested much in, for example, standards for data collection, such as the International Statistical Classification of Diseases and Related Health Problems (ICD), and for data transmission, notably the Standard Data and Metadata Exchange (SDMX). But the lack of common data architecture hampers the efficient generation and use of health information. While there can be no general blueprint, it is essential to enhance interoperability between different data systems. An explicit data architecture – describing how data are collected, stored, managed and used, by whom and for what purposes – is needed to ensure that the increasing diversity of actors and resources contributes evenly and in a sustainable manner to resolving the information gaps at country and global levels.

### Boosting the health information cycle

From a public health perspective, information technology can help boost each step of the health information cycle displayed in Figure 1.1. Positive experiences are being reported for data collection facilitated using handheld and global positioning system (GPS) devices in health surveys and electronic

records and registries in health facilities. The potential of using mobile phones in the recording and reporting of pregnancies, birth and deaths, as well as a short verbal autopsy, to strengthen the coverage and quality of civil registration systems is also being explored (see Chapter 2).

Common standards in data collection and management are vital in that they allow for easier interoperability between health data sets. According to results from the second Global Survey on eHealth, many countries have adopted one or more of the international standards for data management and exchange, including metadata standards (such as Dublin Core Metadata Initiative (DMCI), SDMX and Data Documentation Initiative (DDI)), health messaging standards (such as Health Level Seven International (HL7) and SDMX-HD), vocabulary standards for diseases (i.e. ICD), clinical terms (i.e. Systematized Nomenclature of Medicine (SNOMED)) and laboratory data (i.e. Logical Observation Identifiers Names and Codes (LOINC)). Although standardization is often focused at the national level, recently member countries of the Central America Statistical Commission discussed implementing DDI as a regional standard as recommended by the Accelerated Data Program of the International Household Survey Network.

Many countries are making greater use of technology to facilitate health facility data management, compilation and storage. The University of Western Cape in South Africa in collaboration with the University of Oslo, for example, have developed an approach to improve the quality, management and dissemination of facility and district data. This District Health Information System (DHIS) approach starts with a process to rationalize data collection, develop a minimum indicator set and stress the importance of data quality checks. DHIS includes an open source software package (used in an increasing number of countries in Africa

and Asia) that facilitates the integration of data on population, facility infrastructure and human resources with routine service reports from facilities, and effective communication of results for the indicators.

The archiving of household survey data is essential to ensure public access and facilitate use. National statistical offices in Ghana, Haiti, Sri Lanka and the United Republic of Tanzania have taken steps to catalogue and disseminate survey and census data using open source NADA software developed by the International Household Survey Network (which is a joint effort of the World Bank and the PARIS21 partnership) (35).

ICT is one of the main drivers in the trend towards greater data access and sharing. Digitalization and the power of telecommunications present a number of possibilities for data exchange. Access to individual level health data for public health purposes, however, is still limited. Access to data is typically limited to authorized users and bound by technological or infrastructure constraints. There are multiple software packages for storage, sharing and dissemination of statistics. A survey of health ministry web sites during January 2011, however, showed that no low-income country has an operational database with district data on for example, institutional deliveries and vaccinations. For the compilation of national statistics of the MDGs, United Nations Development Programme (UNDP) and UNICEF support a software package (DevInfo), which is used by many national statistical offices.

Finally, satellite-derived early warning data, geographic information systems (GIS) and mapping are being increasingly used to map the distribution of diseases in relation to risks and health-care resources, and to support risk assessment, management and response. The use of GIS and mapping have been greatly simplified over the past

decade and are now routinely used to map disease burden, populations at risk and health service delivery points in many countries in Africa.

Good examples are malaria (36) and neglected tropical diseases, such as human African trypanosomiasis (HAT), also known as sleeping sickness. In the last decades of the twentieth century, lack of surveillance and funds for treatment programmes allowed the HAT incidence to progress to alarming levels. Thirty-six countries in sub-Saharan Africa are considered endemic for one or another form of HAT, although some of them have reported no cases in the past decade. Angola, the Democratic Republic of the Congo, and Sudan are the most severely affected. Updated, accurate and comprehensive information on the distribution of HAT is critically important to plan and monitor control activities. In 2007, WHO and Food and Agriculture Organization of the United Nations (FAO) joined efforts to map sleeping sickness in sub-Saharan Africa. Hundreds of local epidemiological reports and files with spatial information were compiled in a data repository. The geo-referenced, village-level epidemiological data allowed the production of maps that form the basis for improved estimation of the population at risk and the burden of disease and ultimately more effective targeting of interventions (37).

## Conclusion

As this chapter shows, the world of health information is evolving, though not everywhere or at the same rate. Largely driven by increased investments in health and the associated demand for results and accountability at the global level, significant progress has been made in low- and middle-income countries, but information needs still far outweigh current data availability and country capacities to make use of it. As shown

by the health information cycle, a weakness in one function affects the next, hampering optimal generation and use of quality health information. In Chapter 2 the sources of data that form the basis of health information systems is examined.

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## MAIN FINDINGS

- The 2010 round of census was the most successful ever with the participation of 97% of all countries.
- Civil registration and vital statistics are the weakest data sources in almost all low- and middle-income countries, and as a result one third of births and two thirds of the deaths are not counted, and two thirds of countries have no reliable cause-of-death information.
- Data collection through health surveys has increased dramatically and forms the basis for monitoring intervention coverage and health outcomes in most countries, although there is considerable scope for increasing efficiency and better addressing country priority data needs.
- Facility-based recording and reporting systems have continued to be plagued by data quality problems in most countries, but there is increasing evidence from local studies that careful system design with innovation through information and communication technology (ICT) can provide a solution.

## CHAPTER 2

# The status of health data sources

### Introduction

We live in the information age and the amount of data available to us grows exponentially each year, so much so that it is ‘an information overload’. This is as true in health as in every other sector. However, as stated in Chapter 1, data are not abundant everywhere, and there is an enormous difference in the collection, compilation and analyses of data undertaken in high-income countries compared with their low- and middle-income counterparts. There is thus a marked health information divide. This chapter shows the current status of health data sources in low- and middle-income countries.

Health data are derived from population- and/or institution-based sources (**Figure 2.1**) (1). Population-based data are mostly derived from household surveys with representative samples. National censuses and complete civil registration systems provide information on vital events occurring in the whole population. Institution-based data are generated, as the name suggests, from administrative and operational activities of institutions, such as health-care facilities.<sup>1</sup> The status

of administrative data sources used to inform health system inputs, such as financing, human resources and medicines is discussed in Chapter 3.

### More countries than ever conduct a census

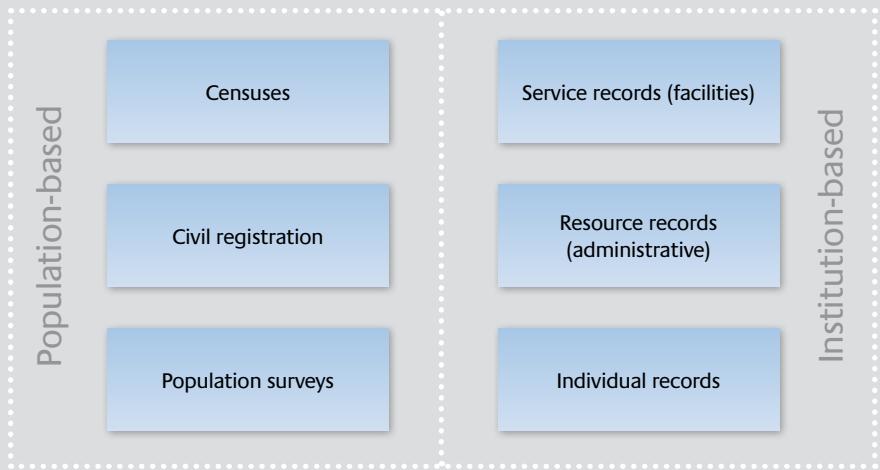
An increasing number of countries are conducting a decennial census. In a drive to promote census implementation, the Statistics Division of the United Nations Economic and Social Council (ECOSOC) launched the 2010 World Programme on Population and Housing Censuses in February 2009, encouraging Member States to conduct a population and housing census at least once between 2005 and 2014 (called the 2010 census round) and to widely disseminate the results. The number of countries and areas that have conducted a census<sup>2</sup> rose significantly in the 2010 round compared to the two previous rounds, increasing from 86% and 85% in the 1990 and 2000 rounds, respectively to 97% (**Figure 2.2**). The 2010 round also included 13 countries and areas that conducted a census for the first time in decades. The development of censuses in Africa has

<sup>1</sup> Surveillance is sometimes also considered a data source. The Health Metrics Network (HMN) Framework, however, emphasizes instead the importance of regarding surveillance in much broader (and more integrated) terms, i.e. as a special set of methods for handling data from a wide range of different data sources. Surveillance draws on many data sources, both population-based and institution-based. (Source: Health Metrics Network and World

Health Organization. *Framework and standards for country health information systems*, Second Edition. Geneva, World Health Organization, 2008.)

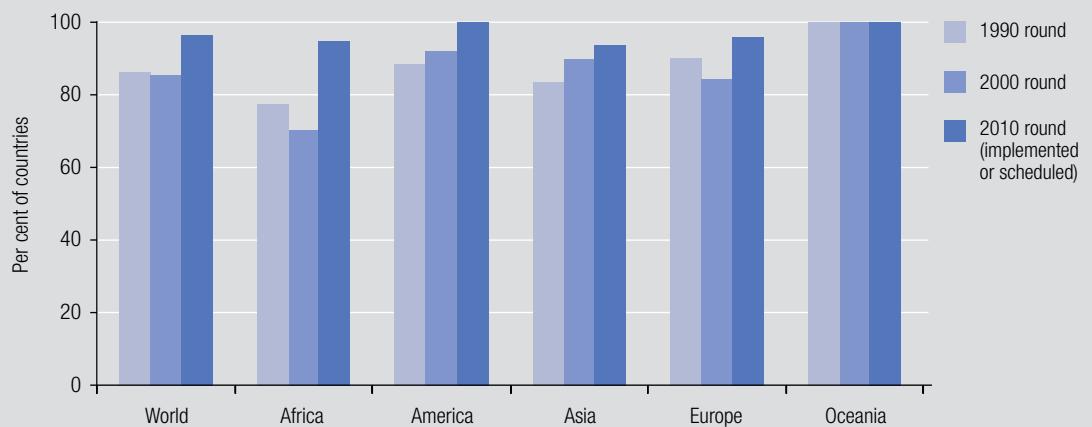
<sup>2</sup> Data as of November 2010.

**Figure 2.1: Health information data sources**



Source: Health Metrics Network and World Health Organization. *Framework and standards for country health information systems, Second Edition*. Geneva, World Health Organization, 2008.

**Figure 2.2: Trends in census taking: Per cent of 232 countries and areas with a census, during 1990, 2000 and 2010 round of census**



Source: United Nations Statistics Division (<http://unstats.un.org/unsd/demographic/sources/census/censusdates.htm>, accessed on 19 November 2010).

been particularly encouraging: 96% of countries conducted the census in 2010, up from 70% in 2000. The only countries not to have conducted or scheduled a census thus far are Equatorial Guinea, Somalia, Lebanon, Myanmar and Uzbekistan.<sup>3</sup>

Health-system decision-makers need annual population projections broken down by district or equivalent administrative areas to obtain accurate estimates of target populations. At the end of 2010, a survey of the web sites of national statistical offices of 40 low-income countries indicated that 10-year population projections broken down by district were available on the web for only 16 countries.

The census can also be used to measure mortality, which is important if there is no effective civil registration system. At least 25 low- and middle-income countries have included adult mortality questions in their censuses, while 15 of these have included questions on maternal mortality (2,3). Since 2000, 28 low- and middle-income countries have used the census to generate child mortality estimates. In Mozambique, the most recent census included both questions on recent deaths in households as well as a post-census survey to obtain data on the distribution of the leading causes of death (4). The survey included 17 000 households that reported 18 103 deaths in the year preceding the census. A verbal autopsy interview, using the standard WHO methodology, conducted for 10 080 deaths provided a general estimate of mortality by age, sex and cause of death. This survey generated province-level data for the first time on the distribution of causes of death by age and sex in Mozambique.

## Civil registration and vital statistics systems: still too many gaps

Civil registration, the continuous, compulsory and universal recording of the occurrence and characteristics of vital events, such as births and deaths, as stipulated by decree or through regulation, is the best source of fertility and mortality statistics. Civil registration fulfils a dual purpose: it creates the legal documents needed to establish and protect the civil rights of individuals; and creates a data source that is used for the compilation of vital statistics. It also provides for the medical certification and coding of causes of death according to the International Statistical Classification of Diseases and Related Health Conditions (ICD) rules.

Only around a third of the global population lives in an area where more than 90% of births and deaths are registered, i.e. Europe, Northern America and Oceania. In Africa and Asia, and to a lesser extent Latin America and the Caribbean, the situation is quite different with only a small minority of vital events being registered (**Figure 2.3**). There are, however, some notable exceptions (5). South Africa, for example, has since 1995 made a concerted effort to improve the coverage of birth and death registrations, which increased from about 50% in the mid 1990s to nearly 90% by 2008 (6). The two most populous countries of the world, China and India, do not have fully functional civil registration systems (see Country data snapshot 2) (7,8). Both countries make use of sample registration to generate representative mortality statistics.

- 6 of 40 (15%) low-income countries and 15 of 54 (57%) (lower) middle-income countries had a coverage of birth registration that exceeded 80%;

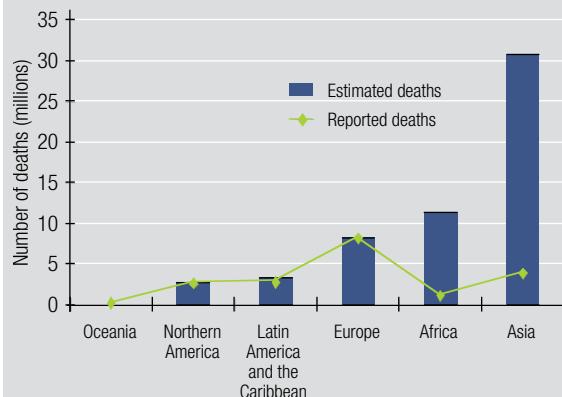
<sup>3</sup> In Andorra and San Marino, continuous population registers are the source of detailed population statistics. Pitcairn Islands, with a population of only around 50, does not conduct formal census, but a count of numbers of each family group by name, sex, and age is made on 30 or 31 December each year.

- 2 of 40 (5%) low-income and 21 of 54 (39%) (lower) middle-income countries had a coverage of death registration that exceeded 50%.

The global health information divide is even more pronounced for cause-of-death statistics (**Figure 2.4**). According to an analysis conducted in 2007, only 31 countries, representing 13% of the world population, had high-quality cause-of-death data, while 85 countries, representing 66% of the world population, had inadequate quality cause-of-death data or lacked such data altogether (9).

Despite this generally unsatisfactory situation there are some encouraging signs of increased awareness of the need for better vital statistics among decision-makers and development partners of countries. There are also signs of growing political momentum for change. In 2007, the Pan-American Health Organization (PAHO) developed and launched a regional strategy to improve vital statistics (10). The UN Economic Commission for Africa (ECA) convened a ministerial level meeting in 2010 that adopted a resolution to improve civil registration systems on the continent (11). The meeting was followed by an event at which government statisticians of all countries declared the development and strengthening of civil registration and vital statistics systems a priority. The UN Economic and Social Commission for Asia and the Pacific (ESCAP), WHO and other organizations, convened a Forum on the Improvement of Vital Statistics and Civil Registration in Asia-Pacific in June 2010 with the aim of developing a regional programme of action (12). Also, the South Pacific Commission hosted a meeting of regional heads of statistics and planning, which prioritized the improvement of vital statistics. Twenty-six countries in the Asia-Pacific Region have undertaken rapid assessments, using a tool developed by WHO and the University of Queensland, as a first step in

**Figure 2.3: Reported deaths versus estimated deaths by United Nations regions, 2007**

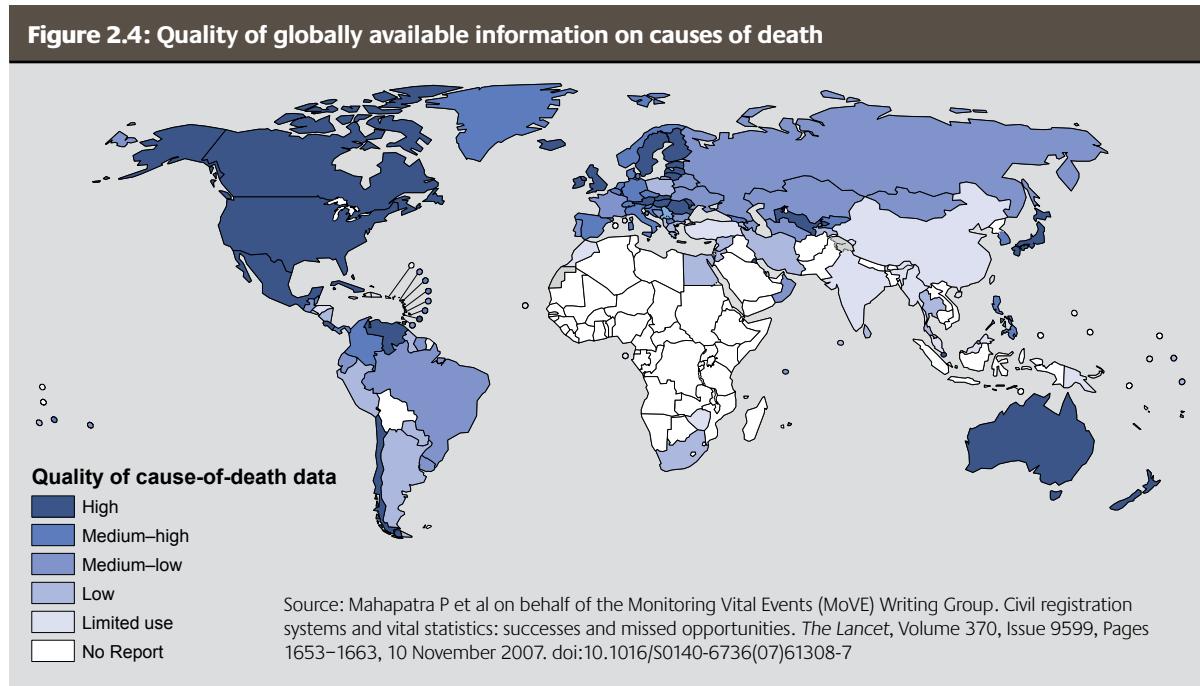


Source: Department of Health Statistics and Informatics, WHO

diagnosing major problems in civil registration and vital statistics systems.

Since its establishment in 2005, HMN has drawn attention to the continuing inactivity of birth and death registration systems in low- and middle-income countries, which hampers efforts to build a reliable evidence base for health planning and monitoring of health goals, such as the MDGs. In 2007, HMN successfully coordinated a multipartner effort called Monitoring of Vital Events or MoVE that led to a series of papers in *The Lancet* to diagnose the situation, identify obstacles and set out a strategy for strengthening civil registration systems in countries. To accelerate progress in 2010, the HMN Board decided to spearhead a major push forward, building upon MoVE, and with a strong focus on innovation and use of information technologies. An amount of US\$ 3.6 million funding provided by the Bill and Melinda Gates Foundation has been allocated to a series of activities designed to support country efforts to strengthen their civil registration and vital statistics systems. To further support this, funding has also been allocated to the development of tools

**Figure 2.4: Quality of globally available information on causes of death**



and standards to facilitate progress in countries. With strong partner support from international development agencies, funds, foundations and technical experts, substantial progress in this neglected area is anticipated in the future.

### Increased coverage and frequency of health surveys

In many low- and middle-income countries, household surveys are the single most important source of population health information. Of the 21 health-related MDG indicators, 17 are, for the most part, generated in this way. Household surveys are also used to gather information about socioeconomic characteristics of households, nutritional status and coverage of interventions. Surveys also provide disaggregated statistics, documenting health equity.

The number of national health surveys (**Figure 2.5**) increased from just 30 during 1985–1989 to over 100 a decade later and to 200 during 2005–2009.<sup>4</sup> In recent years, the number and variety of surveys has increased considerably, with many surveys focusing on specific issues, such as HIV prevalence and risk behaviours, violence, obesity, use of tobacco and other risks to health. During 2002–2003, WHO conducted the World Health Survey in 70 countries, which focused on a broad array of health issues especially related to noncommunicable diseases.

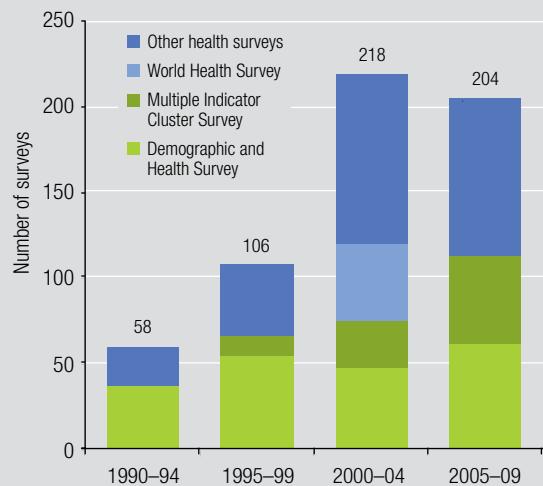
<sup>4</sup> The database of surveys was put together using the catalogue of survey reports available from the International Household Survey Network (IHSN), and the listings from Demographic and Health Survey (DHS), Multiple Indicator Cluster Survey (MICS), Centers for Disease Control and Prevention/Reproductive Health Surveys (CDC/RHS), World Health Survey (WHS), Pan Arab Family Health Survey and a screening of country web sites. It is likely to be less complete for national surveys conducted outside of international household survey programmes.

- 31 of 40 (78%) low-income countries conducted at least one national health survey in the past five years (2006–2010), and 22 (55%) conducted at least two surveys.
- 43 of 54 (80%) (lower) middle-income countries conducted at least one national health survey in the past five years (2006–2010), and 20 (37%) conducted at least two surveys.

An increasing number of surveys focus on single diseases, such as HIV/AIDS, malaria and TB. Special HIV/AIDS indicator surveys with blood collection for HIV testing were most frequent during 2004–2007 when 14 such surveys were conducted. Since 2007, most HIV/AIDS-related data collection has increasingly been integrated into multitopic health surveys. TB prevalence surveys, in which household visits are made to collect sputum for TB testing, were only sporadically conducted between 1990 and 2005. Currently however, 13 national TB prevalence surveys are planned or already in the field in African and Asian countries, mostly supported by the Global Fund. Stand-alone malaria indicator surveys have become popular in malaria endemic countries, and are often conducted at the end of the rainy season with blood sample collection for parasite testing. During 2006–2009 at least 14 countries conducted surveys of this kind. In many other countries, a malaria module is included in a general health survey, such as Demographic and Health Survey (DHS) or Multiple Indicator Cluster Survey (MICS).

In some countries, poor planning has led to considerable duplication of efforts. A striking example is the United Republic of Tanzania where five large-scale household surveys were implemented between October 2007 and September 2008 to measure outcome and impact indicators related to malaria control interventions. Most of these surveys were conducted using different sample designs and

**Figure 2.5: Number of population-based health surveys in low- and middle-income countries, by five-year period**



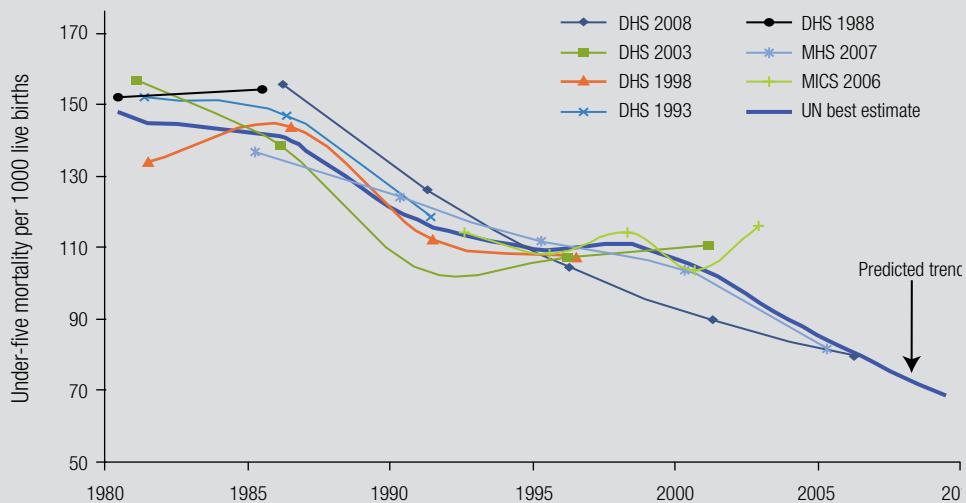
Source: Department of Health Statistics and Informatics, WHO

partners, but with similar questionnaires so that the results could be compared (13). Poor coordination was also identified by stakeholders in 25 low- and middle-income countries conducting recent Health Metrics Network Health Information System (HMN HIS) assessments. Results revealed an absence of planning or inadequate planning in 18 countries, notably with regard to the coordination of timing, indicators and funding. Poor or inadequate collaboration between health and statistical offices in planning, implementing and analysing surveys was reported by 16 of the 25 countries.

As child mortality declines and populations age, chronic conditions and noncommunicable diseases in adults become an increasingly large public health issue. Better data on adult health are needed to track these changes and develop programmes to address them. Household surveys designed to gather such information should include biological and clinical data collection (e.g. weight, height,



## COUNTRY DATA SNAPSHOT 4 CHILD MORTALITY DECLINE IN GHANA



- Ghana has conducted regular DHS surveys at five-year intervals since 1988. Each survey included a full birth history and allowed estimation of child mortality during the 25 years preceding the survey. Ghana also collected child mortality data in other surveys, such as the MICS 2006, and the maternal health survey conducted in 2007.
- There are marked differences in child mortality levels for the same year between the surveys, which may be due to survey quality and methodological issues. The existence of multiple regular surveys however permits the derivation of a clear overall trend.
- From these data points the UN Interagency Group on Child Mortality, in consultation with the country, estimated the trend in mortality, showing a leveling off in the mortality decline in the 1990s but a strong recovery since 2000. The results of the Ghana DHS 2003 most convincingly showed a slowing down of the mortality decline. This was extensively discussed at the time by the government and partners, and affected planning and programming.
- The sampling errors of the survey data and the uncertainty range of the estimates are not shown in the graph. For 2006, the child mortality was 80 per 1000 live births, with an uncertainty range of 72–87. Because Ghana has multiple large nationally representative surveys with results that are relatively consistent, the uncertainty is small.
- It is important to note that the most recent data point refers to 2006, obtained from the birth history of the 2008 DHS. The child mortality trend beyond that point in time is predicted and needs to be verified by a new survey, which is planned for 2013.

Sources:

CME Info [online database] <http://www.childmortality.org/cmeMain.html> (accessed on 1 April 2011).

United Nations Inter-agency Group for Child Mortality Estimation (IGME). *Levels and trends in child mortality*. New York, UNICEF, 2010.

blood pressure, grip strength, blood tests), which provide much more accurate and reliable data on health outcomes than is generated through self-reporting.

Many high-income countries conduct regular health examination surveys of this kind to measure health, risk factors and intervention coverage in the adult population, but for the most part, low- and middle-income countries do not. However, some middle-income countries have already shown the value in this regard. In Mexico, for example, the national health examination surveys carried out in 2000 and 2006 were the main data sources for the evaluation of health system performance (14). In Thailand, four rounds of health examination surveys have been conducted since the early 1990s, documenting the rapid epidemiological transition occurring there. In South Africa, the 1998 health examination surveys also showed the complexity of the disease burden in the population (15). Large child mortality differences were observed within the country, with sixfold child mortality differences between the lowest (Western Cape) and highest mortality (Eastern Cape) provinces. The survey also revealed high national levels of risk factors for noncommunicable diseases, including a 42% smoking rate among men over 15 years, 29% prevalence of obesity among women 15 years and older and 16% prevalence of hypertension among women, in a country where HIV and TB infection rates were rampant as well.

On the whole, socioeconomic surveys are conducted more frequently than health surveys and may include a section on health with questions on utilization of services, coverage of selected interventions and health expenditure, e.g. World Bank supported surveys, such as the Core Welfare Indicator Questionnaire (CWIQ), the Living Standards Measurement Study surveys and household budget surveys. Such data are seldom used by the health

sector, partly because indicators and data collection methods have not been standardized, and partly because the health sector is unaware of their existence.

### **Health management information system: new solutions to an old problem**

In institution-based data sources, data collection is a routine activity and health-care facilities tend to collect large amounts of information as a by-product of patient care. In addition, information is produced through the administrative systems for managing staff, facilities, medicines procurement and disbursement, as well as finances. Although most countries have functioning facility-based health management information systems (HMIS) these data continue to have a number of weaknesses.

Health facility data are often the primary source of district level data on health variables that are used for national level planning, monitoring and evaluation and are reported in annual health statistics reports. These data cover a wide range of topics, including causes of death, acute and chronic diseases, health interventions and health service management and are essential for patient, facility and district management (**Table 2.1**).

In many countries, HMIS remains incomplete due to inaccurate and delayed reporting, lack of accessible databases and poor data quality control procedures (16–18). These could be because of often poorly trained staff that receive little management support, or health staff struggling with systems overburdened by excessive data collection and thus spending hours completing multiple monthly reporting forms, or due to creation of multiple disease programmes-based reporting systems that further increase the data collection and reporting burden on health workers.

**Table 2.1: Current situation for selected commonly used indicators-based health facility reporting system in low- and (lower) middle-income countries**

	Indicator (area)	Situation
Mortality and morbidity	Causes of death in hospitals (ranked)	Commonly used, but poor quality because of poor use of ICD
	Maternal deaths	Institutional mortality rate often poorly reported, except if special systems are in place to ensure completeness
	HIV prevalence among pregnant women	Sentinel surveillance in antenatal clinics, increasing the use of PMTCT data with more variable quality
	Prevalence of malaria parasitaemia	Sentinel clinics may provide reliable trend data, but only few countries have reliable national trend data
Service coverage	Immunization coverage	Countries have either separate or integrated reporting of vaccinations; data quality is variable
	Maternity care: deliveries, birth weight	Underutilization and poor quality of maternity register data
	Tuberculosis notification and treatment success	Functions well in most countries, through a separate tuberculosis control programme reporting system
	HIV/AIDS: ART, PMTCT	Monitoring systems are problematic but improving, but statistics on adherence and outcomes are often poor
Service utilization	Hospital admission/discharge rates	Poor reporting by large government hospitals, private sector are often not included
	Outpatient visit rate per person per year	Completeness of reporting often a problem
Service management	Length of stay and bed occupancy rates for hospitals	Commonly reported but not by diagnosis, and data quality is variable
	Drug availability	Reporting of stockouts of tracer medicines increasingly used but data quality is variable

ART = antiretroviral therapy ■ ICD = International Statistical Classification of Diseases and Related Health Problems

PMTCT = prevention of mother-to-child transmission

An application of the Performance of Routine Information System Management (PRISM) tools, which focus on the organizational and behavioural constraints of HMIS, in a limited number of health facilities and districts in four countries illustrates the size of the problem and its causes. Data verification showed very poor data accuracy levels in Uganda (49%), Pakistan (40%) and Mexico (38%), while China scored high (90%) (19). Interviews with health workers revealed the major reason for this being their inability to describe any method that could be

used to check the data quality. In China, knowledge levels were similar to the other three countries, but a computerized system with data checking at higher levels of the system was successful in improving data quality. A similar result was reported from a study on a large prevention of mother-to-child HIV transmission programme in South Africa (20).

The problems of data collection and reporting by facilities and to a lesser extent from districts affect not only the ability to use data to manage services at the local level, but also the quality of statistics



for core indicators. The main issues for the leading indicators that can be generated from facility reports are summarized in Table 2.1.

To improve the quality of data and statistics generated by health facilities, countries and international partners are adopting different strategies. Most countries have developed multiple reporting systems, often divided along programmatic lines, such as acute disease surveillance, TB control, immunization and HIV/AIDS. These systems give the programmes greater control of content and reporting, but unfortunately increase the burden for health workers.

Recently, several countries have taken measures to promote greater integration of all reporting systems into one HMIS. Past experience indicates that this is only likely to be successful if there is a rationalization and restructuring of the HMIS itself. In addition, many countries have developed sentinel sites for specific monitoring activities. Sentinel systems, such as antenatal clinic HIV surveillance and malaria surveillance systems, use selected

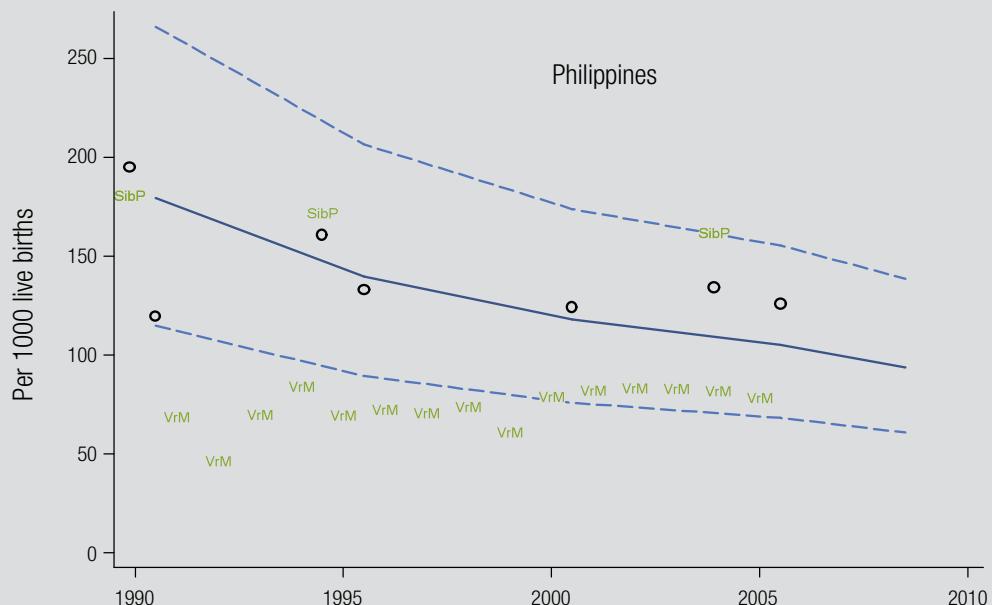
health facilities to monitor trends in disease over time and special efforts are made to improve data collection, supervision and reporting.

Having described some of the challenges faced by the HMIS, it is also important to note that there have been a number of positive developments in recent years. First and foremost, many countries have initiated reforms in the HMIS, as noted in Chapter 1. These developments are often supported by the introduction of information technology which has allowed a movement away from paper-based systems. Till date, however, many of these efforts have been costly and possibly not scalable. It is important to remember that whatever technological innovation is introduced, a critical assessment of user needs is the essential foundation for its success.

Paper-based systems continue to dominate. According to the second Global Survey on eHealth conducted by WHO in 2009, nearly 90% of the responding countries reported relying on paper-based individual patient records at the health facility level, and less than 30% of countries reported using



## COUNTRY DATA SNAPSHOT 5 MATERNAL MORTALITY TRENDS IN THE PHILIPPINES



VrM = vital event registration of maternal deaths • SibP = sibling history data on pregnancy-related deaths from surveys

- The Philippines has a civil registration system that records birth, deaths and causes of death. Each year between 1400 and 1800 maternal deaths are recorded. The completeness of the system has improved over time, although there is still some underreporting.
- Household surveys with sibling histories (with information on pregnancy-related deaths collected from the sisters of the respondent), were conducted in 1993 (DHS), 1998 (DHS) and 2006 (family planning survey). The maternal mortality ratios were slightly higher than those based on the civil registration data.
- The best estimates, according to the WHO, UNICEF, United Nations Population Fund (UNFPA) and World Bank maternal mortality estimation inter-agency group, were 180, 120, 100 and 94 for 1990, 2000, 2005 and 2008, respectively. There is however still considerable uncertainty, as indicated by the dotted lines.

Source:

[http://www.who.int/gho/maternal\\_health/countries/en/index.html#P](http://www.who.int/gho/maternal_health/countries/en/index.html#P), accessed on 1 April 2011.

digital records that could be transmitted between sites (21). At the subnational level, where aggregate patient information is essential for resource management, paper-based systems are prevalent

in almost 60% of the responding countries, while slightly over 40% of countries report that their aggregate patient information is digitalized and can be transmitted electronically.

The recent emergence of projects with results-based financing schemes, which link financial incentives with performance, provides an opportunity to improve the quality of health facility-based recording and reporting (22). The schemes can take many forms but all seek to pay the health service delivery system for results, such as services delivered, or coverage achieved. Payments can be made to institutions (hospitals, district health offices, etc.) or to individuals, and depend upon the delivery of complete, accurate and timely data. For such schemes to work, independent and regular verification of the reports delivered is necessary.

An increasing number of countries are exploring and embracing information technology as a way of improving data collection, analysis and use (23). In India, for example, the HMIS of the National Rural Health Mission was created to streamline data entry, and automate data processing, expanding to all 634 districts. The HMIS became accessible to all levels of government and introduced new analytical tools as well as data validation procedures. While this system is focusing on reproductive and child health and infectious diseases, which are priority issues in rural India, it is designed to accommodate expansion and could eventually include other health programmes.

In Sao Paulo, Brazil the SIGA Saude system has been implemented to enable efficient management of health-care services in the city. SIGA Saude works along the lines of an enterprise resource planning system with electronic records designed to manage resource allocation and patient flow. It is currently being used by administrative staff and medical professionals at health facilities as well as by city health officials.

Belize is an example of a small country that has made a success of going digital. Until 2004 the country struggled with a rudimentary, paper-based HMIS, but today has perhaps one of the most

comprehensive systems in the world. At the core is a personal electronic health record, which is provided for all citizens and contains comprehensive medical background, treatment history and health status records. The module-based system captures the vast majority of individual encounters with the health-care system by linking the ministry of health with the country's health facilities. The system comprises patient-flow, laboratory, pharmacy, HIV/AIDS and human resource management modules that are interactive.

Several large EMR systems projects have been implemented in African countries. Most of these systems have at least in part been developed in Africa and therefore incorporate many requirements from their local environment. Baobab Health systems have developed touch screen based medical records used at point-of-care by doctors, nurses and pharmacists in Malawi for the management of HIV patients (24). In Zambia, the Smartcare system, using cards with digital information kept by the patients, has expanded to HIV clinics in a growing number of districts to support patient care. Open Medical Record System's (OpenMRS) modular electronic medical record (EMR) system, is now used to support clinical care for HIV, multidrug-resistant TB, and primary care for other diseases in more than 24 countries (25–27). In Haiti, two main EMR systems support HIV care. The first is HIV-EMR, developed by Partners In Health (PIH) and deployed in eight clinics and hospitals, which includes support for drug supply management. The second is the ISante system (28) developed by iTech and being used in more than 65 health-care facilities. Both systems are being upgraded to support primary care and women's health. PIH and iTech are collaborating to improve interoperability and sharing of data in Haiti.

## Systematic documentation of contextual and qualitative data

Health systems observatories and similar entities or initiatives aim to systematically review all qualitative and quantitative information to assess the performance of the health system. There are many examples of such efforts. For instance, the European Observatory on Health Care Systems has produced Health Care Systems in Transition (HiT) profiles for 47 countries since the late 1990s, including three countries with at least four HiTs. The profiles provide an analytical description of each health-care system and review reform initiatives in progress or under development. Intervals between profiles are generally rather long: the median year of the last HiT profile was 2005 for the 47 countries that have undertaken them.

PAHO also produces health sector analysis as part of a collective and participatory process which seeks to strengthen the capacity of the technical and political levels within the country to steer and conduct the health sector. The health sector analysis document outlines the country's health situation as well as the performance of the health system. Analyses of seven countries (Bolivia, Costa Rica, Cuba, Guyana, Haiti, Nicaragua and Paraguay) were published between 1996 and 2004. In several instances, these were reviews of the achievements of the past five years and were used to inform the development of a new health sector strategic plan.

WHO has developed an ontology- and Wikimedia-based platform, as well as a participatory process of engagement to systematically document qualitative and other information on health systems, the intention being to inform a policy dialogue. Currently, the method is used in more than 10 countries, most of which are in sub-Saharan Africa.

## Health research

In many countries, there is still a poor link between population-based research and the monitoring and evaluation of the health situation and trends. Cross-sectional and longitudinal studies (national or subnational) may be of considerable use for monitoring and evaluation of the national programmes. However, the extent to which the results are disseminated in countries is highly variable and the timeliness of results from research studies is a major issue, given delays caused by data processing, cleaning, analysis and publication.

Community cohort studies with a demographic surveillance component can generate important data and more is being done to improve the use of such data in the health sector. For example, the International Network for the Demographic Evaluation of Populations and Their Health in Developing Countries (INDEPTH), has 31 sites in 17 countries, and conducts longitudinal health and demographic evaluations of populations in low- and middle-income countries (29). INDEPTH is including more health data in its data collection work (e.g. through verbal autopsy or use of local clinic data) and improving the timely dissemination of vital statistics and health coverage data for national audiences.

Health systems research is a broad field focusing on issues related to coverage, quality, efficiency and equity in health systems. Such research is a much neglected source of health information, and provides valuable data on the health status of the population, coverage of interventions, and the status of the health system under study. Few countries have an institutionalized mechanism to support, translate and disseminate health system research to the relevant stakeholders.



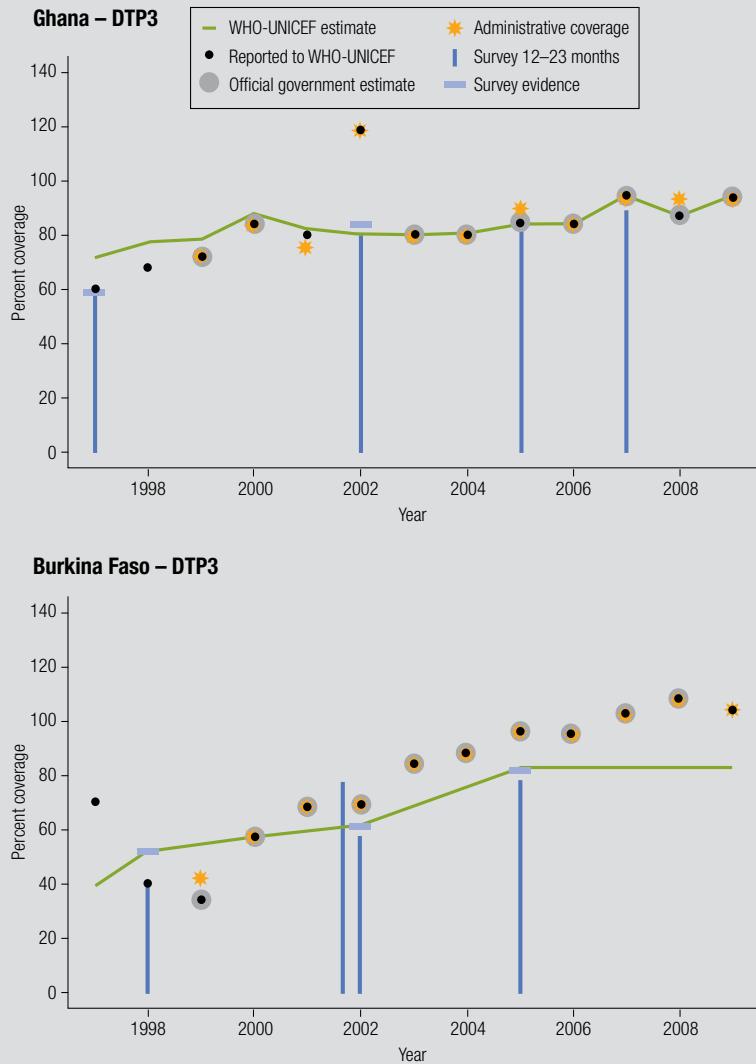
## COUNTRY DATA SNAPSHOT 6 TRENDS IN DTP3 IMMUNIZATION COVERAGE FROM DIFFERENT SOURCES IN BURKINA FASO AND GHANA

- The best way to regularly monitor coverage trends is by using both surveys and facility reports.
- In Ghana, the health facility reporting of immunization, also called administrative reporting, works very well. The facility reports on “the number of children under one year of age who have received three doses of DTP3”; a good basis for the administrative coverage rate. Three surveys also provide diphtheria toxoid, tetanus toxoid and pertussis vaccine (DTP3) coverage rates for 2002, 2004 and 2007. All rates were very consistent with the figures based on the facility reports.
- In Burkina Faso, however, the situation is different. First, the DTP3 coverage rates calculated from the facility reports exceeded 100% for several years, which seems impossible. This may have resulted due to overreporting or because the population denominators based on projections were too small. The immunization coverage rates in the surveys tend to be much lower.
- An in-depth study comparing the results of a large immunization coverage survey in 2003 with the facility reports by district showed large differences at the district level, sometimes up to 30%, and both under- and over-estimations occurred.

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## Conclusion

Monitoring the health situation and trends and the progress and performance of health systems requires data from multiple sources on a wide variety of health topics. The review of health information systems shows that many countries make good use of these sources, but major weaknesses remain, especially with regard to civil registration and vital statistics systems and health facility reporting systems. Each data source presents its own challenges but there are many opportunities to improve their use in the coming years. ICT provides one of those opportunities to strengthen data collection and transfer, as well as to process, analyse and communicate the results. However ICT should not be seen as a magic bullet, but rather as a valuable tool to enable system development and transformation. The following chapters will consider the situation of monitoring of health inputs, including financing, human resources and medicines.

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## **MAIN FINDINGS**

- An increasing number of countries are conducting national health accounts (NHA), although the majority of low- and middle-income countries do not have an institutionalized system in place yet.
- Health workforce monitoring in most countries is inadequate, as the public sector workforce monitoring systems using multiple data sources are still being developed and private sector data are often of poor quality.
- An increasing number of countries are producing statistics on access to essential medicines, obtained through facility assessments, but major information gaps remain.
- The monitoring of service availability is gradually improving through the development and updating of facility databases and increased use of geographic information systems. More countries are conducting facility assessments to assess the readiness of services, but monitoring of the private sector and actual quality of services is still poor.

# CHAPTER 3

## Monitoring of health systems

### Introduction

The multifaceted nature of health systems – the collection of organizations, institutions, resources and people whose primary purpose is to improve health (1) – poses considerable challenges in monitoring performance. The task would be a lot easier if there is broad agreement on what are the key indicators of that performance and the most effective methods available to measure the components or building blocks of a health system (2). This chapter focuses on monitoring of four components of health systems: financing, human resources, medicines and service delivery.

### Monitoring health financing

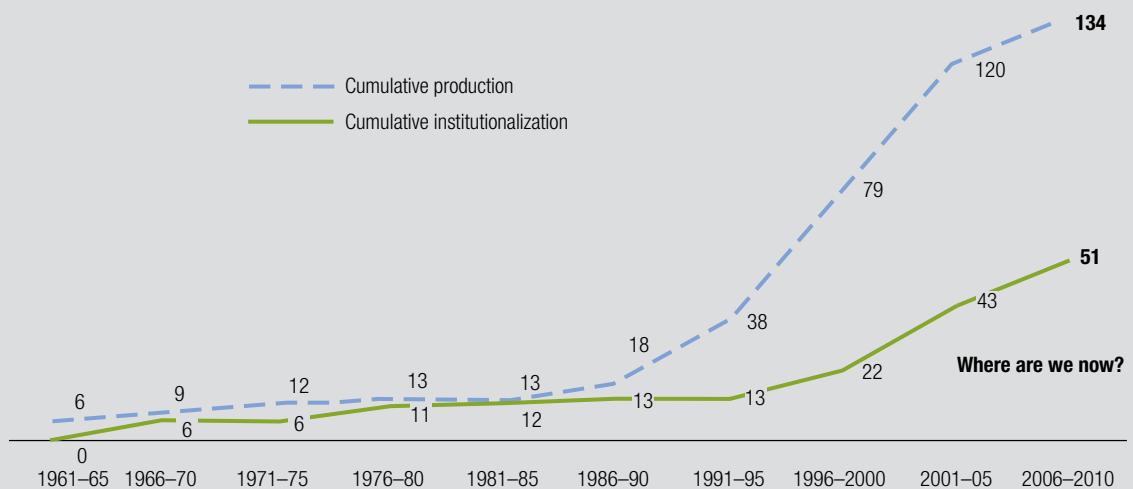
Health care has to be paid for. However, the way it is paid for – directly out of the patient's pocket at the point of consumption, for example, or through the prepayment and pooling of resources – has a profound impact on utilization rates and user health outcomes. A good health financing system ensures that people have access to services when they need them, and are not discouraged by cost or exposed to the risk of impoverishment or financial catastrophe (3). In striving for this goal, governments face three fundamental questions:

1. How is the health system to be financed?
2. How can people be protected from the financial consequences of ill-health and paying for health services?
3. How can the optimum use of available resources be encouraged?

While some countries started producing health expenditure information in the 1960s, the use of a standard framework, namely national health accounts (NHA), to collect comparable health expenditure information began only a decade ago with the publication of guidelines by Organisation for Economic Co-operation and Development (OECD) and WHO (4,5). NHA is now the globally accepted framework for tracking the flow of funds in a country's health system.

NHA is a comprehensive monitoring tool with matrices that, if applied to all dimensions (financing sources, agents, providers, functions, regions, disease categories and population groups), can provide valuable information on the flow of funds in the health system and data for over 1000 variables. It can also be of value for policy-making purposes as suggested by a World Bank list of 30 indicators (6). WHO publishes trends for 12 of these 30 indicators for all its Member States and the OCED publishes 38

**Figure 3.1: Number of countries that conducted NHA at least once and those that conduct NHA regularly**



Source: Human Development Network. Promoting the institutionalization of national health accounts: a global strategic action plan. Washington DC, The World Bank, 2010 (<http://siteresources.worldbank.org/INTHSD/Resources/376278-1261143298590/GSAPVersion2.0.pdf>, accessed on 1 April 2011).

indicators for its Member countries.<sup>1</sup>

To meet the two main objectives of health financing (i.e. raising sufficient funds and providing financial risk protection to the population), WHO recommends that countries track at the very least the three core indicators: (i) total expenditure on health; (ii) general government expenditure on health as a proportion of general government expenditure; and (iii) the ratio of household out-of-pocket (OOP) payments for health to total expenditure on health (7).

The number of countries producing at least one NHA rose from 38 in 1995 to 134 in 2010

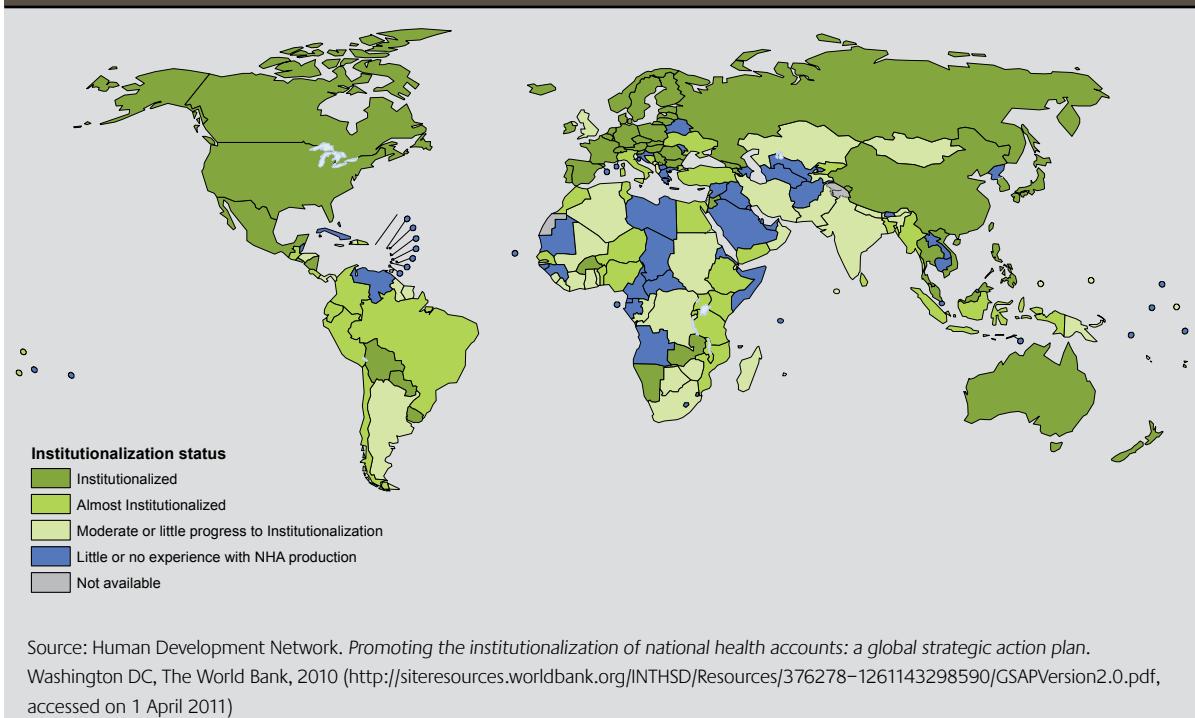
(**Figure 3.1**). By 2010, 20 of 40 low-income countries and 29 of 54 (lower) middle-income countries conducted at least one NHA in the past five years.

The “institutionalization” of NHA production, defined by the World Bank as government-mandated production, and employing NHA using a minimum set of globally agreed health expenditure data and a standard accounting framework, has become more common. The countries conducting NHA increased from 20 in 1990 to 51 countries in 2010 (Figures 3.1 and 3.2). Institutionalization is estimated to generate cost savings of about 66% relative to ad hoc production, and also facilitates comparisons, permits the identification of gaps, helps in the monitoring of targets and in planning for future resources (8,9).

As a general rule a country’s ministry of health takes responsibility for conducting NHA, although statistical offices, government institutes,

<sup>1</sup> Aggregate data for these indicators along with macro data is also compiled and published by WHO in World Health Statistics and WHO web site [www.who.int/nha](http://www.who.int/nha). OECD has listed over 170 indicators on health expenditures on which it requests information from countries. ([http://www.oecd.org/document/9/0,3746,en\\_2649\\_34631\\_2085193\\_1\\_1\\_1,00.html](http://www.oecd.org/document/9/0,3746,en_2649_34631_2085193_1_1_1,00.html)). Trend data on 38 key indicators and 2 NHA matrices are available at <http://www.ecosante.org/index2.php?base=OCDE&langh=ENG&angs=ENG&sessionid=>

**Figure 3.2. Countries in varying stages of national health accounts institutionalization, 2010**



nongovernmental organizations and international organizations also produce them. In the World Bank survey undertaken in 2010, 22 of the 45 countries that responded reported the ministry of health taking the lead.

Currently, standard data management and analytic tools are lacking for NHA. Most countries use ad hoc spreadsheets in constructing their tables. The disaggregated data needed to generate the main NHA tables are available for only a few countries and for a few years. There are exceptions to this general rule, such as Georgia, which has a sophisticated system that records data sources, facilitates inter-country and international comparisons and explains estimation methods (10); and Sri Lanka, which facilitates the tracking of government health spending with direct electronic access to the treasury financial accounting systems. Also several OECD countries provide considerable

details, such as sources of data, estimation methods, etc. (11).

Policy-makers may fail to fully exploit NHA data as a result of limited analytical capacity. As a solution to this problem, some countries have established links between the data production and analysis teams. In Thailand, for example, the technical arm of the government (Institute for Health Policies and Programmes, IHPP) is supported by academic institutes and policy think-tanks. In Australia and Canada, the public sector agency producing the data also does the analytical work.

Another challenge that many countries face relates to the dissemination of NHA data. Generally, high-income countries use web sites (country and international organization web sites) as well as publications (press releases, NHA reports, analytical reports and papers, statistical reviews) for this purpose. But, low-income countries typically

present NHA data at one-time stakeholder meetings organized as part of the project.

According to a recent World Bank survey, 80 countries often make use of health expenditure information in multiple areas, such as health policy formulation and planning, budgeting and financial sustainability, and monitoring and tracking of resources (12). Countries that have produced NHA even once tend to apply it for some policy use – most reported using it for health policy formulation, especially problem identification and to address the needs of specific programmes, such as AIDS and malaria. The most common users are government, research and academic institutions.

In most countries *data on public expenditures* are readily available in sources such as budget reports and the audit statements are issued by governments. However, these are not always systematically compiled and tend to have a two to three years lag in reporting. Further, while the expenditures for ministries of health are easily available, government health expenditures incurred through non-health ministries, local governments and quasi governmental organizations are not easy to capture. The World Bank public expenditure reviews are also a good source of government health expenditure data when available, but do not always fit the health accounts framework. While international agencies strive to get actual expenditure numbers from NHA reports and government sources, the lack of reliable publicly available information sometimes obliges researchers to make imputations, mainly based on past trends (13).

*Data on household OOP expenditures* are put together from household surveys, facility-level data and assessments, and data from insurance agencies and drug retailers. The surveys most frequently used to gather household expenditure data are living standards, health utilization and health facility surveys, although surveys with broader merits, such

as World Health Surveys (data available for 2002 for 71 countries), Multiple Indicator Cluster Survey (MICS) and Demographic and Health Surveys (DHS) have also started compiling data that are useful for these estimations.

One of the biggest challenges faced in compiling these data is survey incompatibility. **Table 3.1** gives an indication of the number of countries that have household income and expenditure/consumption surveys (HIES) and socioeconomic surveys (SES) from which data can be compiled for OOP expenditures. It should be noted however that the list is not complete as there are other country-level surveys with data on OOP expenditures. Figure 2.5 in Chapter 2 reports over 200 health surveys being conducted since 2005. Many of these health surveys also include information on OOP expenditure though not all have the same level of detail. Some countries have triangulated the information from these different sources and made it available in the NHA reports. Another major challenge that researchers face is making estimations for interim years when surveys or actual data from facilities are not available for countries.

There is an increasing demand for tracking resources and expenditures for specific programmes. **Table 3.2** provides some details on countries that have captured health expenditure information for some specific programmes.

The National AIDS Spending Assessment (NASA) has been extensively promoted by UNAIDS to accurately capture health expenditure for AIDS. Currently domestic and international AIDS spending levels are reported from 137 countries, representing 71% of UN Member States, up from 95 countries reporting in 2006 to 106 reporting in 2008. Response rates are notably improved in Eastern Europe and Central Asia, Central and South America, South and South-East Asia and sub-Saharan Africa. A total of 112 countries reported spending on some or

**Table 3.1: Number of countries that have household surveys to compile out-of-pocket expenditure information**

	1995–1999		2000–2004		2005–2009	
	Surveys	Countries	Surveys	Countries	Surveys	Countries
Household income and expenditure surveys	126	63	166	79	81	53
Socioeconomic surveys	12	7	10	5	14	11

Source: Author analysis from International Health Survey network: <http://www.internationalsurveynetwork.org/home/?q=activities/catalog/surveys> (accessed on 1 April 2011).

**Table 3.2: Status of production of health expenditure data for specific disease programmes using standard tools**

Subaccounts	Country and years
Reproductive health	Armenia (in process), Burkina Faso (ongoing), Egypt (1994/95), Ethiopia (2004/05), Georgia (2001–2005), India (Rajasthan (1998/99, 2003) and Karnataka), Jordan (2001/02), Kenya (2005/06), Liberia (2007/08), Malawi (2003–2005), Mexico (2003), Rwanda (2002, 2006), Senegal (2007/08), Sri Lanka (1997, 2003), the United Republic of Tanzania (2002/03, 2005/06), Uganda (2006), Ukraine (2002–2004),
Child health	Bangladesh (2000), Democratic Republic of Congo (ongoing), Ethiopia (2004/05, ongoing), India (Rajasthan (1998/99)), Kenya (2005/06), Liberia (2007/08), Malawi (2003–2005), Rwanda (2008/09), Sri Lanka (1990–2003), the United Republic of Tanzania (2002/03, 2005/06),
Tuberculosis	Burkina Faso (2003–2006, 2007/08), Ethiopia (ongoing), Georgia (2001–2005), Kyrgyzstan (ongoing), Liberia (2007/08), Malawi (2003–2005), Namibia (ongoing), The Russian Federation (2003–2005), the United Republic of Tanzania (2002/03, 2005/06), Zambia (ongoing)
Malaria	Burkina Faso (2003–2006, 2007/08), Cambodia, Ethiopia (ongoing), Haiti (ongoing), Liberia (2007/08), Malawi (2003–2005), Mexico (2003–2006), Morocco (1998), Namibia (ongoing), Peru (ongoing), Philippines (2004), Rwanda (2003, 2006), the United Republic of Tanzania (2002/03, 2005/06); Zambia (ongoing)
AIDS	137 countries, out of which 122 use NASA

Source: Author analysis based on expert information and available reports and information from NHA web sites of WHO, World Bank and Health Systems 20/20.

all of the subcategories of the eight AIDS spending categories – notably on antiretroviral therapy, home-based care, prevention of mother-to-child transmission, blood safety, research, community development, programme management and social protection.<sup>2</sup>

<sup>2</sup> UNAIDS.

Data on the use of external resources, i.e. nondomestic resources, can be compiled from surveys of external agencies active in particular countries, ministries of finance and foreign affairs in countries or from international web sites of donors or multilateral organizations. The web sites of some of the bilateral and multilateral agencies active in a country can provide country-specific data for

health programmes, such as from the Global Fund web site.<sup>3</sup>

Most agencies report data to the OECD Development Assistance Committee (DAC). Sometimes data can be available from donors' annual reports by programme and recipient country.<sup>4</sup> For the most part disbursement of information on each donor web site is available for the latest year. Foreign assistance information may not always be comparable across countries.

Unless the data on actual use of funds are regularly compiled from all donor agencies in NHA reports of the country, the OECD DAC database is a good source of information for external health flows in the country. It should be noted however that the disbursement data reported by most donor agencies does not represent the actual use of funds in recipient countries.

Disbursements by external agencies may not reach the recipient countries, for example in payment for technical support outside the country; or part of the external funds for health may be given through general budget support and may be difficult to disaggregate; and finally not all donor countries are included as part of official development assistance (ODA) – most significantly China and India (14).

WHO compiles data from countries' NHA reports and several other sources. The indicators are updated every year based on data available from these sources and through extensive consultation with the governments and experts in the countries concerned. The World Bank's World Development Indicators currently report the same data along with two additional indicators for the number of years for which the NHA data exist and the last year of NHA

data reported for each country. OECD health data compiles and presents information on 31 indicators including seven indicators for functions and eight indicators for providers. OECD also presents health expenditure data by age and gender for some of its Member countries. WHO and OECD data are compatible as they are obtained from the same survey instrument administered jointly with Eurostat. The International Monetary Fund (IMF) compiles data from country statistical offices and reports general government and central government health expenditure for several countries.<sup>5</sup> Difficulties in using the data arise if consolidated expenditures are not reported and the potential for double counting exists.

The OECD DAC reported commitment and disbursement of external resource flows for health for 172 recipient countries from 54 donor countries and agencies (including private flows) during 2003–2009.<sup>6</sup> Data on commitment of ODA is available from 1960 onwards. The Institute for Health Metrics and Evaluation (IHME) has also recently compiled data on development assistance for health and has data on commitments and disbursements for 173 recipient countries and 13 regions for 1990–2008 and preliminary estimates for 2009 and 2010. The data compiled by IHME covers ODA and also other significant funding coming from foundations and private sources.<sup>7</sup> Unlike IHME, OECD DAC provides microdata for each donor by programme, type of aid and channel of funding.

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<sup>5</sup> IMF GFS online provides health expenditure data for 51 countries for 2007/2008. (<http://www.imfstatistics.org/imf/>, accessed on 4 February 2011).

<sup>6</sup> For OECD DAC online database see [http://www.oecd.org/document/16/0,3746,en\\_2649\\_34447\\_42396496\\_1\\_1\\_1\\_1,00.html](http://www.oecd.org/document/16/0,3746,en_2649_34447_42396496_1_1_1_1,00.html).

<sup>7</sup> IHME data is available at <http://www.healthmetricsandevaluation.org/resources/datasets/2010/dah/dah.html>.

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<sup>3</sup> <http://portfolio.theglobalfund.org/?lang=en>, accessed on 1 April 2011.

<sup>4</sup> [http://gbk.eads.usaidallnet.gov/about/reporting\\_comparison.html](http://gbk.eads.usaidallnet.gov/about/reporting_comparison.html), accessed on 1 April 2011.

## Monitoring the equitable and efficient use of resources

Health systems requiring direct payment at the time people seek care – including user fees and payments for medicines – prevents millions from accessing services and results in financial hardship and even impoverishment for millions more. Direct payments or OOP expenditures are the least equitable form of financing. Besides direct payments, two indicators – catastrophic health expenditure and poverty impact of OOP payments – are important to measure the financial protection that households are afforded in making health payments. Catastrophic health expenditure is defined as a household spending more than 40% of its non-subsistence spending on health services. Poverty impact includes differences in headcount and poverty gap before and after health payments. WHO suggests that if direct payments fall to less than 15–20% of total health expenditures, the incidence of financial catastrophe routinely falls to negligible levels (see Country data snapshot 7).

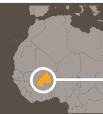
Many countries have been using these indicators to monitor and evaluate health reforms. For instance, WHO has analysed information on these indicators for 90 countries (15). Existing household surveys, such as the Living Standard Measurement Study (LSMS), income and expenditure surveys, socioeconomic surveys and health surveys are the main data sources, but information on direct payments can also be obtained from facility records and insurance agencies.

WHO reports trends data on OOP expenditure for all Member States. However, in most cases these are extrapolations as surveys are conducted only intermittently, facility level data are scarce and insurance data on direct payments are not easily available.

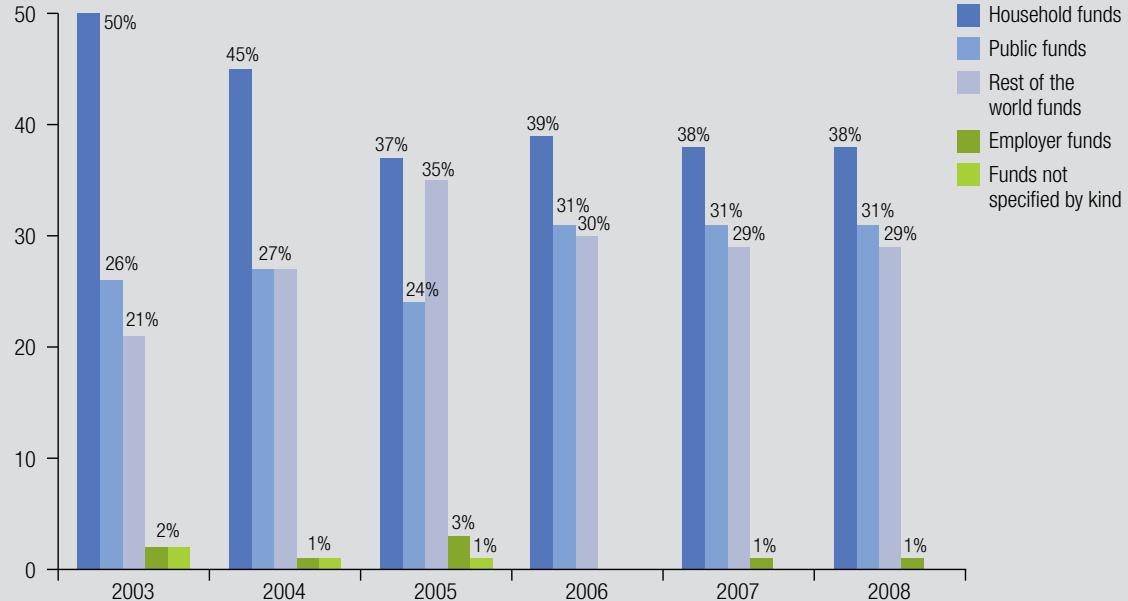
Monitoring efficiency is important not only for resource-constrained economies but also



high-income countries where more and better quality health can be achieved with the same level of resources. There are no specific indicators to measure efficiency and the existing broad indicators can vary depending on the country. However, potential efficiency gains can be derived in each of these areas by assessing the costs and likely impact of the possible solutions. The *World Health Report 2010* provides a potential range of efficiency savings as a percentage of total health spending for high-, mid- and low-income countries in human resources, medicines, hospitals, leakages and intervention mix (16).



## COUNTRY DATA SNAPSHOT 7 HEALTH FINANCING IN BURKINA FASO



Note: The comparison of 2003 and 2008 NHA findings should be viewed with caution because the methodology used to calculate NHA was not the same. Methodologically rigorous comparison can be made between 2005 and 2008, when total health expenditures increased from FCFA 202 billion to FCFA 254 billion (i.e., a 26 percent increase over three years).

- In Burkina Faso, NHA is conducted on an annual basis. The figure shows the contribution of financing sources to total health expenditures during 2003–2008.
- Household funds, i.e. out-of-pocket (OOP) expenditure declined from 50% in 2003 to 37% in 2005 and remained at that level during the subsequent years.
- The high OOP expenditures led to government subsidy for certain services, such as obstetric care, reducing these payments to one fifth of previous levels. Similarly, the 2005 NHA encouraged governments to institute policies to reduce medical expenditures and enhance preventive and promotive care. NHA trend data was also used to monitor and review the health development plan.
- In 2010, the evidence on distribution of funds resulted in a ministerial decree to reallocate expenditures to district governments.

### Sources:

Zida A, Bertone MP, Lorenzetti L. Using national health accounts to inform policy change in Burkina Faso, Policy Brief. Bethesda MD, USA: Health Systems 20/20, Abt Associates Inc; 2010.

WHO/UNICEF review of national immunization coverage ([http://www.who.int/immunization\\_monitoring/data/bfa.pdf](http://www.who.int/immunization_monitoring/data/bfa.pdf), accessed on 1 April 2011).

## Monitoring human resources for health

Health systems depend critically on the size and skills of the health workforce. Information on human resources for health (HRH) is required not just for the planning and implementation of health sector policy, but also to monitor and evaluate programmes. The monitoring of HRH status and trends can help identify opportunities and reveal constraints for the scaling up of health interventions.

WHO recommends two core indicators to monitor HRH (17).

1. Number of health workers per 10 000 population; with distribution of health workers by occupation/specialization, region, place of work and sex.
2. Annual number of graduates of health professions educational institutions per 100 000 population, by level and field of education.

There is no specific ‘target’ relating to the adequacy of the health workforce to respond to the health-care needs of a given population. However, it has been estimated that countries with fewer than 23 physicians, nurses and midwives per 10 000 population generally fail to achieve adequate coverage rates for selected primary health-care interventions, as prioritized by the MDGs (18).

A broader selection of key indicators is recommended to provide a more comprehensive picture of the HRH situation in a given country context (19).

- Stock and distribution = Stock (total number of HRH resources relative to the population size) of HRH, skills mix, geographical distribution, age distribution, sex distribution.
- Labour activity = labour force activity rate, employment/unemployment rate, distribution of HRH by industrial sector, distribution of HRH

by institutional sector, distribution of HRH in dual employment, occupational earnings and income.

- Productivity = days of absenteeism among health workers, provider productivity (relative number of specific tasks performed among health workers).
- Renewal and loss = workforce generation ratio (ratio of entry to the health workforce), national HRH self-sufficiency (proportion of nationally trained health workers), workforce loss ratio (ratio of exits from the health workforce).

Any attempt to compare the size and characteristics of the health workforce across countries or over time requires some level of harmonization of the available information. Although some countries disseminate data using national educational, occupational or industrial classifications that are not always comparable, most use classification systems that are either based on or linked to internationally standardized classifications, such as the International Standard Classification of Education (ISCED), the International Standard Classification of Occupations (ISCO) and the International Standard Industrial Classification of All Economic Activities (ISIC). The use of non-physician clinicians offers an interesting example of the challenges faced in deriving comparable statistics.<sup>8</sup>

Monitoring and evaluation of the health workforce using one source or method is rarely sufficient. Multiple data sources, each with their own strengths and limitations, are often required to obtain a reliable estimate of the density and distribution of health workers (see Country data snapshot 8).

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<sup>8</sup> Non-physician clinicians, often referred to as clinical officers or assistant medical officers, are those who have received a shorter training than physicians and perform a less extensive array of clinical functions.

The main data sources for HRH are:

- Census: almost all census surveys include questions on occupation and employment and can be considered a full enumeration of health worker data based on a count of the number of people reporting a health-related occupation and/or working in the health services industry at the time of the census. Census-based data on occupation can be used to map health workforce distribution problems, as well as to calculate a range of summary measures of workforce imbalance (20,21). The disadvantage with census surveys is that they are only carried out once every 10 years.
- Labour force surveys: generally go into greater detail than the census on, for example, place of work, industrial sector, remuneration, time worked and secondary employment (22). A similar method is used to count health workers from labour force survey data, with the additional application of a sampling weight to calibrate for national representativeness. Many countries conduct regular labour force surveys, although the results are not always used by the health sector.
- Health facility assessments: a facility census provides detailed information on HRH statistics, but is rarely conducted; a survey of a sample of all facilities can provide data on some indicators, but not on density and distribution.
- Administrative sources: include databases of head-counts of employees, duty rosters, staffing records, payroll records, registries of health professional regulatory bodies, or tallies from other types of administrative and professional records. In many countries, the private sector is not adequately covered. Also, the accuracy of health workforce databases has sometimes been challenged.

Ideally, all HRH data sources should be integrated into one comprehensive system, whereby routine administrative records such as registries are complemented with regularly conducted population-based and facility-based surveys and censuses. Support for a centralized national HRH database has been identified as among the potentially effective means to enhance national monitoring and evaluation performance. Yet the analysis of HIS assessment results using the HMN assessment tool in 24 low- and middle-income countries revealed that in half of these countries the national HRH database is considered weak compared to other elements of the HIS, or is non-existent.<sup>9</sup>

Countries most in need of HRH strengthening tend to have the most fragmented and unreliable data. Most low- and middle-income countries lack a harmonized, dedicated system for collecting, processing and disseminating comprehensive and timely information on their health workforce. Many countries also lack timely and reliable information on the various dimensions of HRH imbalances, such as distribution by sector, geography, sex, labour force activity, place of work and remuneration.

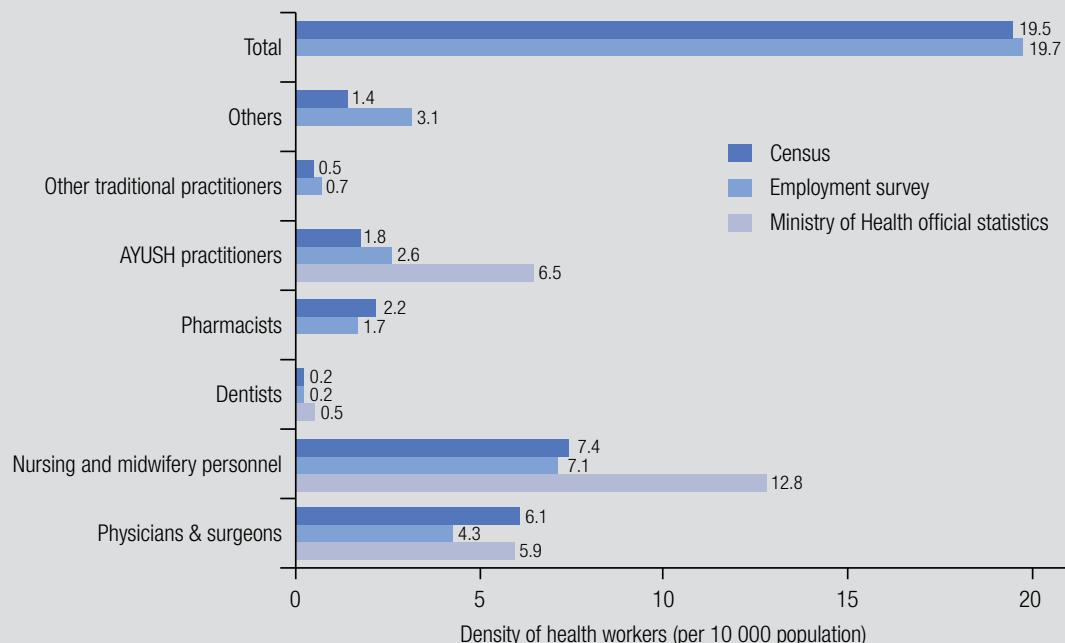
While information on health workers who provide health care and are trained in service provision may be available, few countries routinely collect and disseminate official statistics on their health system management and support workforce. Yet, these workers are estimated to account for close to a third of all HRH worldwide. Excluding them from official counts results in a substantial underreporting of the health workforce stock. It also neglects an important area of potential health system strengthening.

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<sup>9</sup> From an analysis conducted by HMN in 2010 of HIS assessment results using HMN Assessment Tool version 4.00 in 24 low- and middle-income countries. The assessments in countries were conducted during 2008–2010.



## COUNTRY DATA SNAPSHOT 8 HEALTH WORKER DENSITY IN INDIA



- The number and density of health workers in India in 2005 can be obtained from three independent sources: the population census 2001 (with population projections to 2005), a national employment and unemployment survey in 2004–2005 and the official statistics produced by the Ministry of Health and Family Welfare “Density of the health workforce by cadre, according to data source, India 2005”. The figure above compares the results for the year 2005.
- The official health ministry estimates are higher than those based on the census and survey sources and, significantly, there is better agreement between the latter two. Overall, the census appears to be the best available source for health workforce estimates.
- The routine information on the national health workforce suffers from several limitations. Reports from state professional regulatory bodies tend to be inaccurate as a result of non-adjustment for health workers leaving the workforce due to death, migration or retirement, or of double-counting of workers registered in more than one state. Further, not all states follow the same registering procedure, which raises issues of comparability. Finally, certain categories of health workers (such as biomedical researchers, physiotherapists and laboratory technologists) are not recorded in official statistics, thereby making it difficult to estimate the overall size and composition of the health workforce.

### Sources:

Rao KD, Bhatnagar A, Berman P. India's health workforce: size, composition, and distribution. *India Health Beat*. Public Health Foundation of India and World Bank 2009;1(3).

Dal Poz MR, et al (eds). *Handbook on monitoring and evaluation of human resources for health: with special applications for low-and middle-income countries*. Geneva, World Health Organization, 2009.

**Table 3.3: Summary of the Brazil Observatory Network's role in influencing national human resources for health (HRH) policies**

Health workforce study or analysis	Resulting policy decisions
Profile of HRH stock and distribution: snapshot and cohort studies	Incentives for health workers in rural areas
Trends in education and training for health professions (expansion, mix)	Creation of a joint high-level working group with the Ministry of Health and Ministry of Education
Assessment of managerial skills of district (municipal) health teams	Long-distance training programmes
Contractual arrangements of the national health system in the public sector (federal and state levels)	Policy dialogue and governmental proposal for regulatory norms (decree/law)
Assessment of workforce skills mix, with attention to selected health professions (e.g. team composition of dental workforce, including dentists, auxiliary dentists and dental hygiene technicians)	Expansion of education and training programmes for selected health professions (including nursing and certain medical specialization programmes)
Professional practices and interests (e.g. conflicts in scopes of practice)	Permanent negotiation round table Regulation of new health professions

At the national level, health workforce observatories are being increasingly recognized as a potentially valuable mechanism to improve the information and knowledge base on the HRH situation and to facilitate policy development and monitoring. National observatories involve networks of all partners in health workforce development in the country.

Brazil, Ghana and Sudan are among the countries with operational HRH observatories. A summary of the Brazil Observatory Network's roles in influencing national HRH policies is shown in **Table 3.3**.<sup>10</sup>

At the regional level, the implementation of widespread health-care reforms and increasing recognition of the need for better monitoring in the late 1990s resulted in the emergence of observatories on health systems and human resources, notably the European Observatory on Health Systems and Policies and the Observatory

of Human Resources in Health Sector Reforms (among countries of Latin America and the Caribbean). Recently, with increasing global attention and resource mobilization to address the health workforce crisis in Africa, the Africa Health Workforce Observatory has evolved as part of the action agenda. Similarly, with support from WHO, the Eastern Mediterranean Region Observatory on Human Resources for Health grew out of an existing regional observatory on health systems.

Since 2004, WHO has been collecting and compiling cross-nationally comparable data on health workers in its Member States from the data sources described above. Most of the data from administrative sources are derived from published national health sector reviews and/or official country reports to WHO offices. It is however still difficult to provide reliable data over time for the key HRH indicators.

<sup>10</sup> Rede ObservaRH: Observatório de Recursos Humanos en Saúde do Brasil (<http://www.ObservaRH.org.br>)

## Monitoring access to essential medicines

A well-functioning health system ensures access to essential medical products, vaccines and technologies of assured quality, safety, efficacy and cost effectiveness. The complexity of the pharmaceutical sector, with multiple and cross-cutting factors that can influence access to and rational use of quality medicines, makes it important to have a systematic method for assessing the pharmaceutical situation at country, regional and global levels (23). Pharmaceutical sector assessment, monitoring and evaluation aim to answer the following vital questions. Do people have access to essential medicines? Are people getting medicines that are safe, effective and of good quality? Are these medicines being used properly?

Access to medicines is included in the MDGs under MDG 8, specifically Target 8.E: In cooperation

with pharmaceutical companies, provide access to affordable essential drugs in developing countries. Access has been defined as “having medicines continuously available and affordable at public or private health facilities or medicine outlets that are within one hour’s walk of the population”. Given its complexity, an overall picture of access to medicines can only be generated using a range of indicators that provide data on medicine availability and price, in both public and private sectors, in combination with key policy indicators. **Table 3.4** lists the indicators recommended for a full pharmaceutical profile, including the two core indicators for access to essential medicines.

The indicators listed in Table 3.4 are collected through various data sources and methodologies, including health facility assessments, key informant surveys, household surveys, administrative reports and the NHA methodology described above. The status of the main data sources is as follows:

**Table 3.4: Indicators for a full pharmaceutical profile, including core indicators for access to essential medicines**

Indicators
1. Access to essential medicines/technologies as part of the fulfilment of the right to health, recognized in the constitution or national legislation
2. Existence and year of last update of a published national medicines policy
3. Existence and year of last update of a published national list of essential medicines
4. Legal provisions to allow/encourage generic substitution in the private sector
5. Public and private per capita expenditure on medicines
6. Percentage of population covered by health insurance
7. Average availability of 14 selected essential medicines in public and private health facilities <sup>a</sup>
8. Median consumer price ratio of 14 selected essential medicines in public and private health facilities <sup>a</sup>
9. Percentage mark-up between manufacturers’ and consumer prices

<sup>a</sup> Core indicators to measure access to essential medicines.

Source: Dal Poz MR, et al (eds). *Handbook on monitoring and evaluation of human resources for health: with special applications for low-and middle-income countries*. Geneva, World Health Organization, 2009.

**Health facility assessments:** The collection of data on the availability of essential medicines and commodities and on the use of these medicines is an essential part of health facility surveys. WHO and Health Action International (HAI) have developed a standardized methodology for facility-based surveys of medicine prices, availability, affordability and price components (24,25). In the survey, data on the availability and price of approximately 50 medicines is collected through visits to medicines outlets in the public sector, private sector and any other sectors that serve as important medicine dispensing channels (e.g. nongovernmental organizations, mission hospitals). The list of survey medicines includes 14 medicines in use worldwide and 16 regionally specific medicines. In addition, countries are encouraged to collect data on a further 20 medicines of national importance.

Facility-based assessments are done using the WHO/HAI standardized methodology, which is the main methodology currently available to provide comparable data across countries, and can be used to analyse the specific baskets of medicines included in the survey. Recent reviews showed that 36 countries had conducted 45 surveys, providing policy- and management-relevant information for the health system (26,27).

**Key informant surveys:** Surveys by experts with extensive knowledge of the medicines situation in a country can be used to generate information about pharmaceutical policies and practices. While this method has a low cost and is relatively easy to implement, the disadvantage is its subjectivity, which introduces measurement errors and affects comparability both between countries and over time within the same country. Data on national medicines policies and their components (including legislation and regulations, quality control of medicines, essential medicines lists, supply systems, financing, access to medicines, production, rational

use and protection of intellectual property rights) can be obtained using the WHO Pharmaceutical Sector Country Profile that was recently endorsed by the Global Fund.<sup>11</sup>

**National health accounts:** The NHA methodology enables the collection of data on public and private per capita expenditure on medicines. More information on NHA is available in the first section of this chapter.

**Facility reporting systems:** Many countries have included an indicator of the availability of tracer medicines in their monthly health facility reporting system. For instance, the United Republic of Tanzania and Zambia have selected six and four medicines, respectively, to report on monthly stockouts. There are quality issues, however, with such indicators, as recently observed in the United Republic of Tanzania (Ministry of Health and Social welfare, Health Sector Performance Profile Report 2008 Update). Independent verification through health facility assessments is needed but infrequently done.

Many countries include some indicators on essential medicines in their annual health sector reviews. Commonly used indicators include expenditure allocation and disbursement for medicines (and other medical supplies), mostly focused on the public sector and availability of tracer medicines (or in some cases stockouts).

As part of MDG reporting, WHO has been compiling data on the availability and price of selected essential medicines, from countries that have conducted surveys using the standard WHO/HAI methodology. According to data available to the WHO in December 2010, 48 low- and middle-income countries, conducted and reported results from such surveys. WHO also reports data on the

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<sup>11</sup> [http://www.who.int/medicines/areas/coordination/coordination\\_assessment/en/index.html](http://www.who.int/medicines/areas/coordination/coordination_assessment/en/index.html) (accessed on 1 April 2011).

national expenditures on pharmaceuticals in the public and private sectors. For the MDG Gap Task Force Report 2010, data on average spending per capita in 2005–2006 from 161 countries were analysed.<sup>12</sup>

## Monitoring health service delivery

Ensuring the availability of and access to health services that meet a minimum quality standard is a key function of a health system. Service delivery is an immediate output of the inputs, such as health workforce, health financing and procurement of medicines, into the health system. With the increased demand for accountability and the need to demonstrate results at the country and global levels, information that can accurately track the way health services respond over time to increased inputs is needed.

A core indicator for the availability of services is the density and distribution of health facilities and infrastructure, such as hospital beds (28). The minimum data requirements for this indicator are a database of health facilities, preferably with global positioning system (GPS) coordinates and population projections (by district). An increasing number of countries are developing a registration system for all public and private facilities. However, despite the level of investment in health systems, only few countries have accurate and up-to-date information, especially from the private sector. In Kenya for instance, the Division of Health Information Systems works with the Provincial and District Health Records Information Officers to maintain an online database of health facilities with unique identifiers. A combination of methods including global positioning systems was used to

map health facilities by type, ownership and services offered. In Rwanda, all facilities from both the public and private sectors are required to register either online or via a downloadable form. Once registration is approved, each facility is assigned a unique identification number that can be used across all computerized systems, thereby improving interoperability and comparison of results. Malawi and Zambia have conducted a facility census to update the listing and status of public facilities.

Several countries have gone a step further in assessing access to services by measuring the proportion of people who live within a certain distance or travel time. These indicators are mostly based on self-reported survey data. For example, the China Health Services survey results indicated that 97% of urban and 86% of rural respondents said they could reach a health facility within 20 minutes.

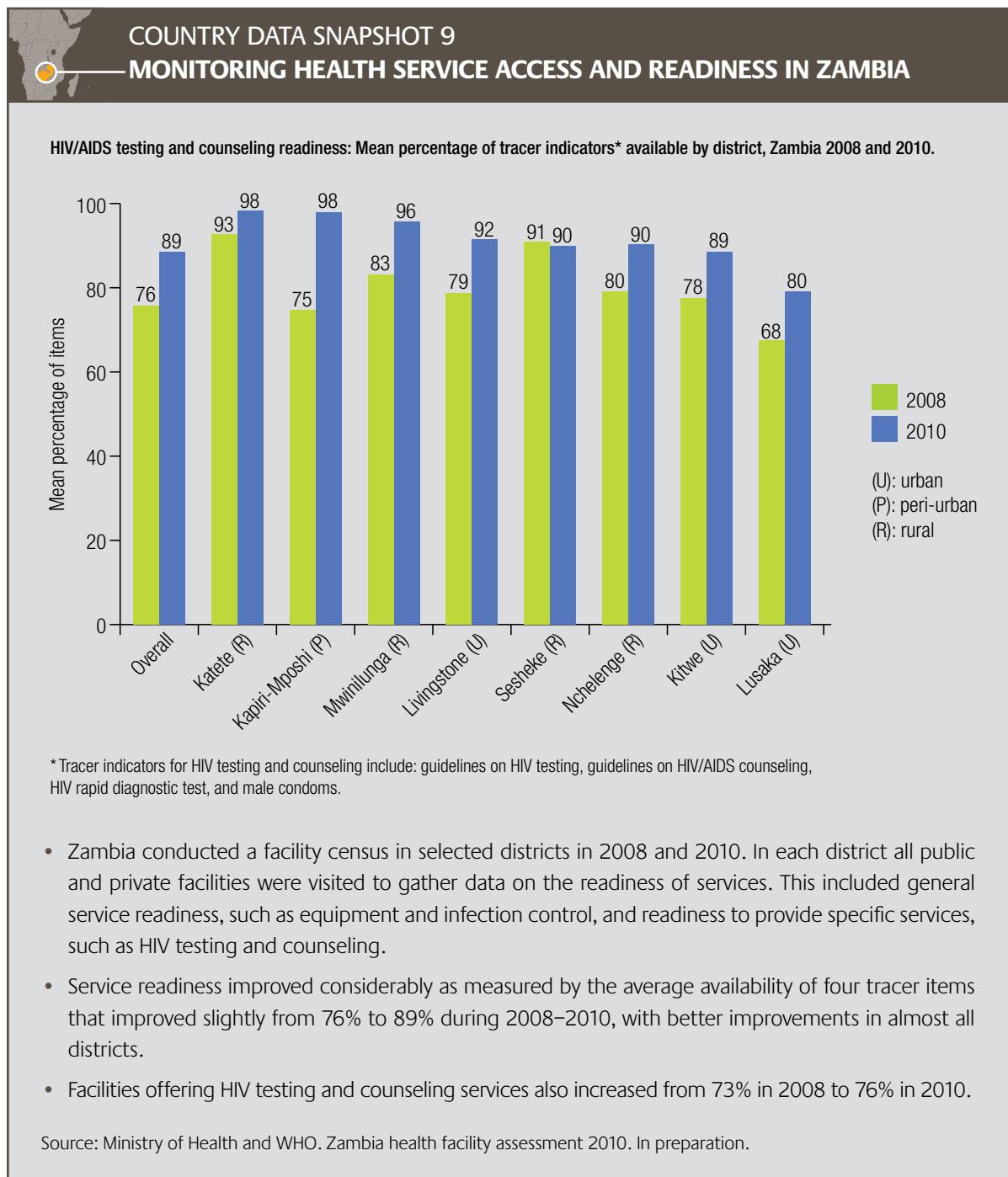
The precondition for quality services is readiness or preparedness. This implies the presence of basic amenities and equipment, trained health workers, medicines and commodities and diagnostic aids. Self-reported statistics, as part of the HMIS, are used by several countries, mostly to monitor the availability of a set of tracer medicines. *Health facility assessments* provide a more objective methodology for collecting and verifying data on service delivery. According to the International Health Facility Assessment Network (IHFAN) survey catalogue, 85 health facility assessments were conducted in 42 countries between 1994 and 2008.<sup>13</sup> These were either programme-specific, such as emergency obstetric care, child health or HIV/AIDS, or cross-cutting, such as Service Provision Assessment (SPA) or Service Availability Mapping (SAM). WHO and USAID are developing a standardized methodology

<sup>12</sup> [http://www.who.int/medicines/mdl/mdl8report2010\\_engw.pdf](http://www.who.int/medicines/mdl/mdl8report2010_engw.pdf) (accessed on 1 April 2011).

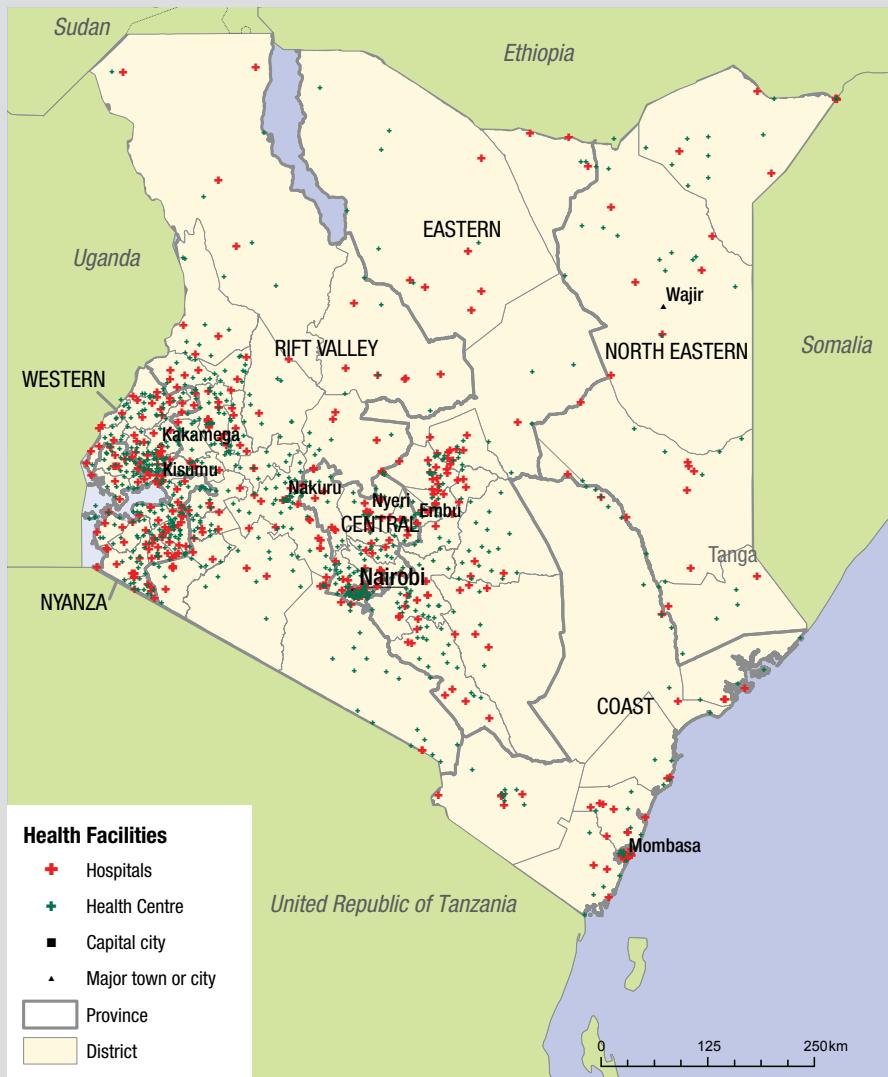
<sup>13</sup> Data as of January 2011 from [http://ihfan.org/home/index.php?editable=yes&page\\_type=catalogsurveys](http://ihfan.org/home/index.php?editable=yes&page_type=catalogsurveys) (accessed on 1 April 2011).

for assessing general and service-specific service readiness. This methodology, known as Service Availability and Readiness Assessment, is designed

to provide an overview of country health-care facilities and their capacity to provide services (see Country data snapshot 9).



**Figure 3.3: Location of health facilities by type of facility, Kenya, 2010**



Source: Ministry of Health, Kenya, 2010.

Very few countries have a system of monitoring the quality and safety of services. In some facility assessments observation of client-provider interactions or record reviews are used to assess the quality of specific services. A system of confidential enquiries, such as those conducted for maternal deaths in South Africa since 1998, are an important

way to obtain critical insights into the quality of the health system.<sup>14</sup> In general, quality and safety

<sup>14</sup> National Committee on Confidential Enquiries into Maternal Deaths (NCCEMD). Saving Mothers 2005–2007. Fourth Report on Confidential Enquiries into Maternal Deaths in South Africa. Expanded Executive Summary. (<http://www.doh.gov.za/docs/reports/2007/savingmothers.pdf>, accessed on 1 April 2011).

of care are neglected areas, in part because it is difficult and costly to measure quality. High-income countries use health facility statistics to compute and publish facility-specific and national case fatality or survival rates for specific conditions.

## Conclusion

All four health system components discussed in this chapter (i.e. financing, human resources, medicines and service delivery), need multiple data sources for monitoring situations and trends. These include administrative data, facility reports, facility assessments and population-based surveys. There has been some progress in the availability and quality of data on these subject areas, but many gaps remain. The monitoring of specific disease programmes presents a number of different challenges and will be dealt with in the next chapter.

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## MAIN FINDINGS

- All main health and disease programmes have a small set of core indicators and a much larger set of programmatic indicators, and often require a different mix of data, i.e. surveys and facility data.
- Because all programmes draw from the same data sources they have common problems. The absence of functioning civil registration and vital statistics systems, with causes of death, and the often poorly functioning health facility reporting system, affect the ability to monitor progress for virtually all programmes.
- Improvements in tracking the coverage of health interventions have been noted in several disease programmes, mainly through more frequent surveys and promising developments for facility and administrative reporting systems by way of reforms including the introduction of information and communication technology (ICT). There is however still a tendency to develop separate solutions for common problems.

# CHAPTER 4

## Monitoring health and disease programmes

### Introduction

The monitoring of particular diseases, such as malaria or HIV/AIDS, or public health issues, such as maternal mortality, presents a number of specific challenges. Each disease or health issue has its own set of defining characteristics and affects different populations differently across a range of countries and settings, so deciding on a methodology for data capture and choosing the appropriate indicators can be difficult.

Each health and disease programme also requires reliable data on a wide range of issues including the epidemiology of the disease, the coverage of interventions, access to services, the risk factors, etc. The information is needed for management of services at national and local levels, resource allocation, public health planning and policy-making, and evaluation of what works best. This chapter presents a brief assessment of the current situation concerning public health statistics in the main health and disease programmes.

Monitoring and evaluation of specific health and disease programmes is part of a comprehensive health information system. Too often, such monitoring is conducted in a fragmented manner.

For instance, a parallel system is created for programme-specific reporting by health facilities, e.g. antiretroviral therapy, to obtain rapid reliable results rather than relying on the reports from the overall facility reporting system. Or, a single disease survey is conducted to meet monitoring needs for the specific programme. Sometimes, there are very good reasons for such approaches, but too often opportunities to develop a more efficient and integrated approach are missed.

### Child health and nutrition

Child health is an important yardstick for overall public health assessment. The main MDG for child health, i.e. child mortality, has a target of two thirds reduction between 1990 and 2015.

Data collection on child deaths, including causes of death, as part of civil registration systems is inadequate in almost all low-income and the majority of middle-income countries. Household surveys are the main data source for child mortality monitoring as mothers are asked questions about the survival of their children (called a birth history) (**Table 4.1**). The number of such health surveys has increased dramatically in the past decades, notably

**Table 4.1: Selected indicators and data sources for child health and nutrition**

Selected indicator areas	Main data sources
Child mortality	Household surveys, census and civil registration systems
Child nutrition (e.g. underweight)	Household surveys
Preventive intervention coverage (e.g. vitamin A supplements) <sup>a</sup>	Household surveys and health facility reports
Feeding patterns (e.g. breastfeeding)	Household surveys
Treatment coverage (e.g. for oral rehydration therapy for diarrhoea, antibiotics for pneumonia)	Household surveys

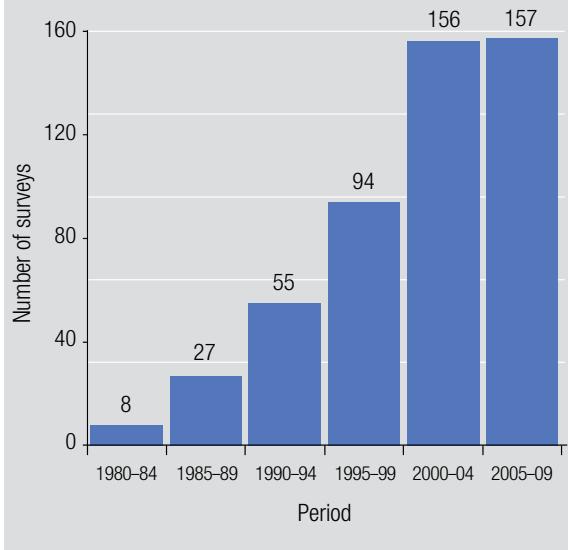
<sup>a</sup> Immunization is presented in a separate section.

because of two international survey programmes: the Demographic and Health Surveys (DHS) and Multiple Indicator Cluster Survey (MICS) (see Country data snapshot 4 in Chapter 2). The number of national health surveys with child mortality data collection also increased rapidly in the past two decades (**Figure 4.1**).

The same health surveys are also the primary source of data for child nutrition and child health intervention coverage. Many health surveys now include measurement of height and weight of children (and often their mothers as well) and can be used to document trends in under- and over-nutrition. For example, 75% of 493 national health surveys, mostly DHS and MICS, conducted since 2000 included child measurements of this kind. National nutrition surveys and surveillance systems are a common additional data source for nutrition indicators (see Country data snapshot 3 in Chapter 1). In some Latin American countries, such as Chile, where health services have very high population coverage, growth monitoring in health facilities provides reliable trends data on the nutritional status of children.

Global monitoring of child mortality and other child health indicators is particularly important in the context of the MDGs. Child mortality estimates

**Figure 4.1: Number of surveys in low- and middle-income countries with child mortality data collection, 1980–2009**



are updated on an annual basis by the Inter-agency Group for Child Mortality Estimation (IGME), which includes UNICEF, the United Nations Population Division, the World Bank and WHO. IGME has an independent Technical Advisory Group, comprising academics and independent experts in statistics, demography and international health, which provides technical guidance on estimation and data

analysis methods, including data quality assessment. Its data, methods and results by countries are published on the web and regularly updated (1). Recently, the Institute for Health Metrics and Evaluation (IHME) also published country and global estimates of child mortality levels and trends using different methods and with similar global results but different results for some countries with limited and/or poor data (2).

## Immunization

The monitoring of immunization services at local, national and international levels is an essential part of tracking disease-control initiatives, such as polio eradication, measles control and neonatal tetanus elimination, and allows policy-makers to identify areas that may require extra resources or a change in approach. The coverage levels for three doses of “diphtheria toxoid, tetanus toxoid and pertussis vaccine” (DTP3) are considered among the best indicators of overall health-system performance. Meanwhile coverage of measles immunization has been selected as an indicator of progress towards MDGs. Specific targets have been set in this regard, such as that of the United Nations General Assembly Special Session (UNGASS), which called for full immunization of children under one year of age at 90% coverage nationally with at least 80% coverage in every district or equivalent administrative unit by 2010.

Immunization coverage rates are derived from two sources (**Table 4.2**). Health facilities report the numbers of children immunized on a monthly basis and provide the basis for annual coverage estimates for the country as a whole and for districts. In 2008, 129 reporting countries (70%) used the facility-based immunization coverage estimate as their official country estimate (WHO-Department of Immunization, Vaccines and Biologicals (IVB) database; data reported by the Member States on WHO/UNICEF Joint Reporting Form by November 2010). Household surveys collect information on the vaccination status of children by checking the child's health card and by asking the mother or caregiver questions. This is usually done as part of a larger survey (such as DHS or MICS), but some countries also conduct specific immunization coverage surveys (such as the EPI 30 cluster survey) or collect it as part of economic surveys. Most countries conduct at least one survey including immunization data collection every five years. Neither data source is perfect but it is generally accepted that a high quality household survey provides the best estimate of immunization coverage (see Country data snapshot 6).

Public health surveillance of vaccine preventable diseases necessitates an ongoing, systematic collection of information, and thus requires a good reporting system of new and suspected disease cases and deaths. Public health surveillance is of particular importance for diseases that have been

**Table 4.2: Selected indicators and data sources for immunization**

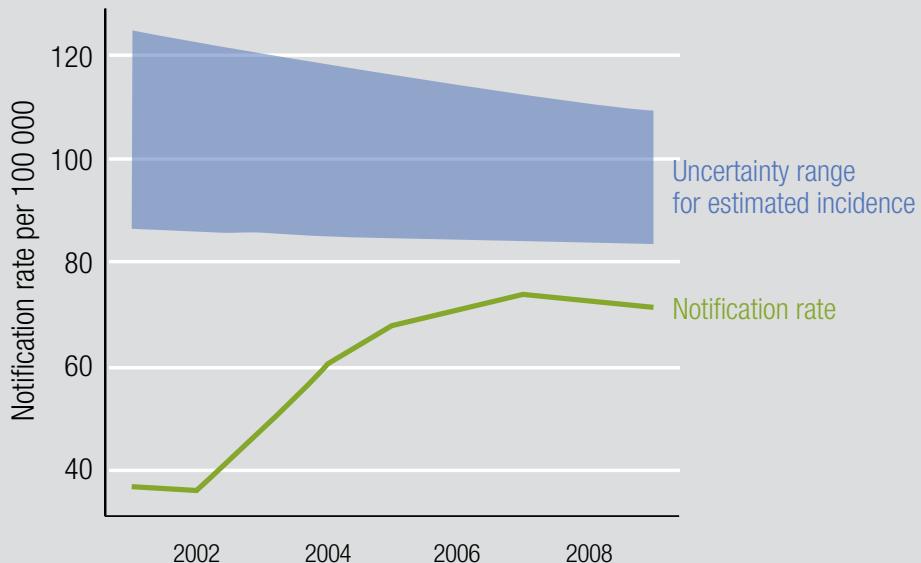
Selected indicator areas	Main data sources
Immunization coverage (e.g. measles, DTP3)	Household surveys, health facility reporting
Vaccine preventable disease incidence and mortality	Disease surveillance, health facility reporting

DTP: diphtheria toxoid, tetanus toxoid and pertussis vaccine



## COUNTRY DATA SNAPSHOT 10

### TUBERCULOSIS NOTIFICATION RATES IN CHINA



- The introduction of electronic recording and reporting in China leads to a rapid decline in underreporting of TB cases.
- Prior to 2004, a large number of TB patients in China were diagnosed in general hospitals but not notified. In addition, there was no systematic mechanism in place for patient follow-up to ensure optimal treatment outcomes after patients were discharged from hospital, and data on treatment outcomes from unregistered patients were not available.
- In 2004, China introduced a case-based, online electronic recording and reporting system for TB. The system is linked to the system for surveillance of all infectious diseases and captures data on TB patients as well as information on activities associated with management of the national TB control programme. The web-based system became mandatory for 37 infectious diseases including TB, with reporting within 24 hours.
- By the end of 2008, the system covered all of China's communicable disease centres, 97% of hospitals at county level or above, and 82% of township level clinics. The results were dramatic, with the number of notifications of smear-positive TB increasing from 205 000 in 2000 to 473 000 in 2005. The estimated case detection rate for all TB cases increased from 34% in 2000, to 69% in 2005 and 75% in 2009. Treatment outcomes are reported for all of these cases, and the cure rates reported to WHO have remained above 90%.

Source: *Global tuberculosis control: WHO report 2010*. Geneva, World Health Organization, 2010.

targeted for eradication (such as acute flaccid paralysis (AFP)/polio) or control/elimination (such as measles and neonatal tetanus). Most countries have made the notification of such diseases obligatory and facilities and districts have to report on at least a weekly basis. Cause-specific mortality data for the general population are still lacking in most countries, because of the inadequacy of civil registration systems with cause-of-death certification.

Towards the end of 2003, 196 of 214 countries and territories operated AFP surveillance systems.<sup>1</sup> These surveillance activities are supported by a network of 145 laboratories that process stool samples from AFP cases – 123 laboratories are at the national level, 15 are regional reference laboratories and seven are global specialized laboratories (3). Two thirds of the countries with AFP surveillance have either used the AFP surveillance system for measles surveillance or modeled their measles surveillance on it. A number of countries also use the AFP surveillance system for the surveillance of neonatal tetanus.

To monitor global progress, WHO and UNICEF jointly collect information on different aspects of their immunization programmes, including a recommended immunization schedule, coverage estimates, reported disease incidence and other indicators, and have been doing so annually since 1998 (4). Global and country estimates are produced using data from different sources and checking quality. In 2009, the WHO/UNICEF immunization coverage estimates were the same as the official country estimates for 65% of countries.

## Maternal mortality and reproductive health

Indicators on maternal mortality and health care have been used for national and global monitoring since the late 1980s, and were updated to encompass sexual and reproductive health following the 1994 Conference on Population and Development.<sup>2</sup> MDG5 – “improve maternal health” – focuses on two main indicators: the first is the maternal mortality ratio, and the second is the proportion of births attended by skilled health personnel. MDG5 also calls for the achievement of universal access to reproductive health by 2015 (5). Supporting indicators include the contraceptive prevalence rate, the adolescent birth rate, antenatal care coverage (at least one visit and at least four visits), and the unmet need for family planning.

Impact indicators on maternal mortality are best generated from civil or sample registration systems that include causes of death (see Country data snapshot 5). As already noted in practice, few low- and middle-income countries have comprehensive registration systems. As a result, maternal mortality is measured through household surveys in most developing countries, and less frequently through censuses (6). A recent analysis showed that almost half of the countries relied on survey data, but 24 countries had no national data whatsoever (7).

The surveys include a sibling survival history with questions about the survival of adult sisters

<sup>2</sup> Report of the International Conference on Population and Development. New York, United Nations, 1994 (A/CONF.171/13/Rev.1).

Reproductive health indicators for global monitoring. Report of an interagency technical meeting. Geneva, World Health Organization, 2001.

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<sup>1</sup> A total of 192 member states, one WHO associate, and 21 reporting entities report to WHO. Only 18 member states do not report AFP cases to WHO: Canada, Comoros, Denmark, Finland, France, Iceland, Japan, Luxembourg, Mauritius, Monaco, Netherlands, Reunion, San Marino, Saint Helena, Seychelles, Sweden, United Kingdom and the United States of America.

**Table 4.3: Selected indicators and data sources for maternal mortality and reproductive health**

Selected indicator areas	Main data sources
Maternal mortality	Civil registration systems and household surveys
Skilled birth attendance	Household surveys
Reproductive health services coverage (e.g. contraceptive prevalence)	Household surveys

**Table 4.4: Sources of maternal mortality data in countries, 2005**

Source of maternal mortality data	Number of countries/territories	Percentage of total births
Civil registration characterized as complete, with good attribution of cause of death	63	15
Disease surveillance or sample registration	2	32
Countries lacking good complete registration data but where other types of data are available, mainly from Demographic and Health Surveys	83	50
No national data on maternal mortality	24	4
<b>Total</b>	<b>172</b>	<b>100</b>

to determine the number of sisters – how many are alive, how many are dead, and how many died during pregnancy, delivery or within six weeks of pregnancy (8). To date, 112 DHS surveys (42% of all surveys) have included a sibling survival history with maternal mortality data collection.

Accurate maternal mortality measurement is difficult because it is a relatively rare event that is associated with less than 1% of all deaths, which implies that large numbers of households need to be interviewed, recall periods need to be long and underreporting is a problem. As a result, actual monitoring of the trends in maternal mortality remains a challenge, especially at the country level.

Household surveys are also the main source of data for maternal and reproductive health-care indicators. With more countries conducting

household surveys more frequently, there are fairly recent estimates of contraceptive prevalence, skilled birth attendance and antenatal care coverage (see Country data snapshot 1 in Chapter 1). Data on the quality of care, however, are often lacking. An increasing number of countries are addressing this gap by conducting health facility assessments to evaluate the readiness of facilities to provide emergency obstetric services.

At the global level, WHO and UNICEF compile data on key indicators on a continuing basis as part of global MDG monitoring. In almost all cases, the statistics are taken directly from national household surveys. The major exceptions are indicators on maternal and perinatal mortality, both of which are derived from global estimation exercises conducted by WHO, UNICEF, United Nations Population Fund

**Table 4.5: Selected indicators and data sources for HIV/AIDS**

Selected indicator areas	Main data sources
AIDS mortality	Civil registration data with cause of death; hospital data; verbal autopsy in community studies
HIV prevalence	HIV sentinel surveillance systems; national surveys with HIV testing
Risk behaviours	General population surveys; surveillance of risk populations (behavioural and biological)
Intervention coverage (ART, PMTCT, etc.)	Health facility reports, supplemented by estimates of people in need

ART = antiretroviral therapy ■ PMTCT = prevention of mother-to-child transmission

(UNFPA) and the World Bank, advised by an expert group.<sup>3</sup> The IHME also recently published country and global estimates of maternal mortality levels and trends using different methods and with different results for several countries that lack reliable data (9).

## HIV/AIDS

Country HIV/AIDS control programmes have to deal with a large numbers of indicators proposed by the international community. The principal MDG indicator aims to turn around the epidemic by 2015, but many indicators have been developed to cover the diversity of epidemics, the different modes of transmission and the multisectorality of the response. The UNGASS declaration on HIV/AIDS in 2001 set out a much larger set of goals and by 2008 the biannual monitoring process included 25 indicators.

Reliable AIDS mortality data are not available for high HIV prevalence countries, almost all of which are located in sub-Saharan Africa. Either there are no comprehensive civil registration systems, or stigma or other factors have resulted in poor capture of

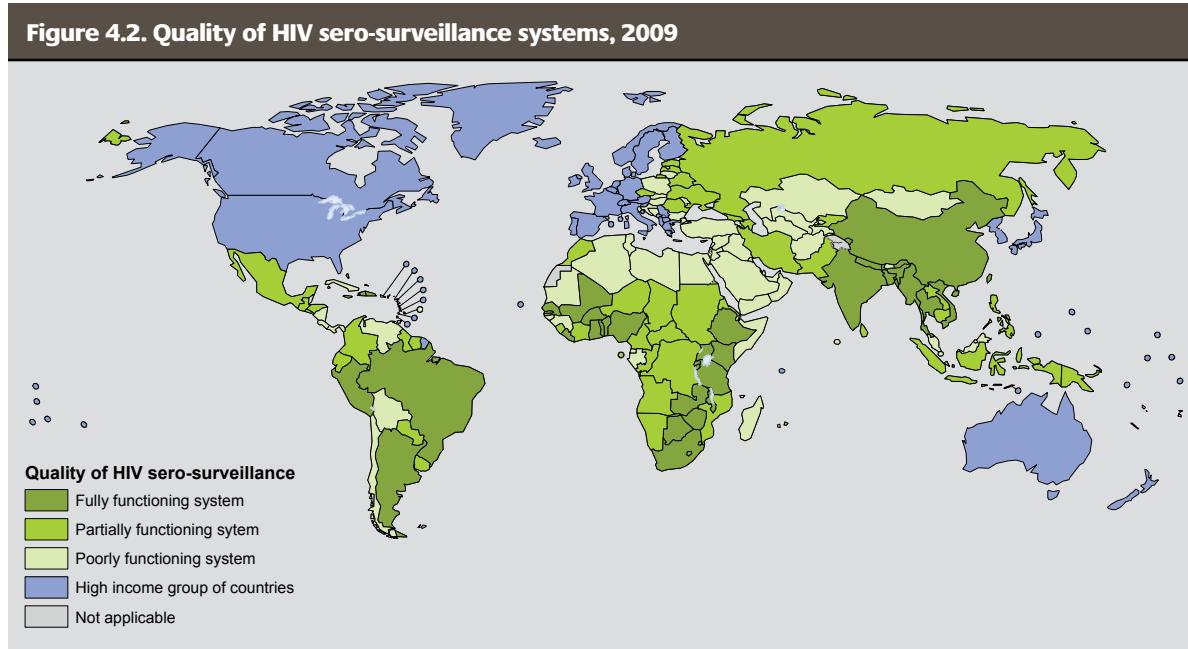
HIV/AIDS-related deaths. In some countries, data obtained from verbal autopsies in local community studies can be used to obtain an idea of the relative importance of AIDS as a cause of death (**Table 4.5**). As a result of the general paucity of data availability, the monitoring of mortality relies on statistical modeling.

HIV surveillance systems are the primary source of data on the course of the epidemic. Such systems rely on HIV testing of pregnant women attending a subset of antenatal clinics (sentinel clinics) during a specified period of the year and testing of most-at-risk populations, such as sex workers, men who have sex with men and injection drug users, depending on the type of epidemic. During the past decade, household health surveys with HIV testing have generated significant additional national and global data.

Since 2001, the quality of HIV surveillance systems has been assessed on a regular basis by WHO and UNAIDS (**Figure 4.2**). In 2009, out of 138 low- and middle-income countries, 26% had fully functioning systems, 36% partially functioning systems, and 40% with systems that were categorized as poorly functioning (10). Most poorly functioning systems were found in Latin America and the Caribbean, Eastern Europe and Central Asian Republics, and in North Africa and the Middle East. In these regions,

<sup>3</sup> [http://www.who.int/gho/maternal\\_health/mortality/maternal/en/index.html](http://www.who.int/gho/maternal_health/mortality/maternal/en/index.html) (accessed on 1 April 2011).

**Figure 4.2. Quality of HIV sero-surveillance systems, 2009**



the epidemic is mostly concentrated in populations with most-at-risk behaviours.

Antiretroviral therapy (ART) is a relatively new intervention, which was rapidly scaled up from 2003 to 2004 in many countries. Accurate monitoring of ART coverage is hampered by data quality problems, although gradual progress is being made. Most countries have set up monitoring and evaluation systems for care and treatment of patients receiving ART or waiting to be eligible for treatment. However, there are a plethora of systems and countries often have different systems depending on the donor or geographical location. Paper-based and electronic management systems for patients co-exist and there is little integration with the other reporting systems (e.g. HMIS). In addition, several countries have separate monitoring and evaluation systems for prevention of mother-to-child transmission (PMTCT) or TB/HIV.

Electronic reporting systems are being introduced, but to date there are few examples

showing how these have resulted in reliable national trend data. Some countries, e.g. Ethiopia, post the numbers reported by facilities of people receiving ART or PMTCT services on the web<sup>4</sup> which helps independent assessment of quality.

## Malaria

WHO, building on the work of several initiatives such as Roll Back Malaria (RBM), the Abuja declaration in 2000 and the MDGs, recommends 30 indicators for use by national malaria programmes. Among these, 20 are derived from health facility and administrative reporting systems, while the remaining 10 will need household surveys (11). Not all indicators are applicable to every epidemiological setting, and individual country programmes typically use a sub-set of the indicators (**Table 4.6**).

<sup>4</sup> [http://hapco.gov.et/index.php?option=com\\_frontpage&Itemid=1](http://hapco.gov.et/index.php?option=com_frontpage&Itemid=1) (accessed on 1 April 2011).

**Table 4.6: Selected indicators and data sources for malaria**

<b>Selected indicator areas</b>	<b>Main data sources</b>
Malaria mortality	Civil registration data with cause of death; hospital data; verbal autopsy in community studies
Malaria cases	Reporting by health facilities Surveys with test for malarial parasites
Prevention: use of ITN, IPTp, and diagnosis with RDT	Surveys, supplemented by facility and administrative data
Treatment of sick children with appropriate antimalarial medicines (e.g. ACT)	Surveys, health facility reporting and administrative data on supply

ITN = insecticide treated nets ■ IPTp = intermittent preventive therapy for pregnant women

RDT = rapid diagnostic test ■ ACT = artemisinin-based combination therapy

The MDG indicators are incidence and death rates due to malaria, coverage of insecticide-treated nets and appropriate treatment for children under five years of age.

Goals and targets for intervention, coverage and impact have become increasingly ambitious in recent years, largely due to the substantial progress being made in malaria control. In April 2008, for example, the UN Secretary-General put forward a vision of halting malaria deaths by ensuring universal coverage of malaria interventions by the end of 2010.

According to WHO only four (Eritrea, Rwanda, Sao Tome and Principe, and United Republic of Tanzania) of the 35 high-burden countries in the African region had good-quality case surveillance data based on facility reporting that provide reliable trend data on malaria mortality, cases and deaths. Improvements in the surveillance system often result in increases in the number of cases reported which makes trend assessments difficult (e.g. Senegal). Malaria is often the number one cause of death reported in hospital data, although such data tend to be of poor quality because of incomplete reporting by hospitals and inadequate use of the International Statistical Classification of Diseases

and Related Health Problems (ICD-10) for coding (see Country data snapshot 11). Community data on malaria mortality are lacking in most countries, as there are no civil registration systems.

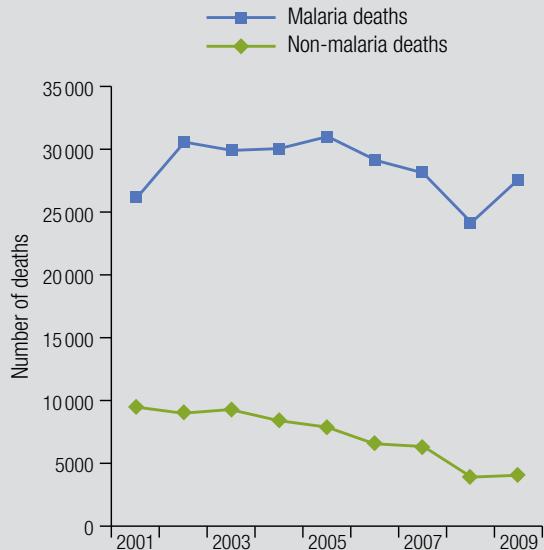
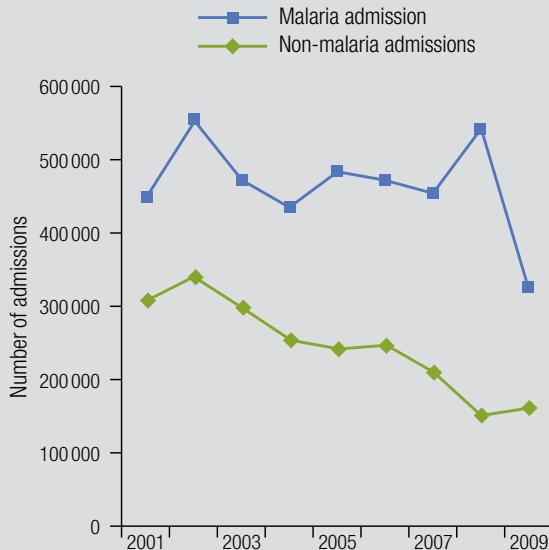
In the past five years major progress has been made in data collection on malaria. For example, during 2007–2009, 21 surveys collected information on bednet use in the African region.<sup>5</sup> National health surveys also include more questions on coverage of malaria interventions and sometimes collect blood to test for malaria parasitaemia and anaemia. Zambia conducted three national malaria indicator surveys in 2006, 2008 and 2010, documenting intervention coverage and parasitaemia levels in the population.

The global monitoring of progress with regard to malaria has benefited from the increasing number of country surveys with malaria modules, which provide a good picture of trends in coverage for the key interventions. There has also been an improvement in the surveillance of malaria cases and deaths in health facilities. Such data are gathered by WHO on an annual basis from national malaria control

<sup>5</sup> Data as of 5 January 2011 from <http://www.malariasurveys.org/> and [http://www.nmcc.org.zm/malaria\\_information\\_system.htm](http://www.nmcc.org.zm/malaria_information_system.htm), accessed on 1 April 2011.

## COUNTRY DATA SNAPSHOT 11

### MALARIA TRENDS IN ZAMBIA



- Health facility reports provide data on the trends in the number of admissions and deaths due to malaria in Zambia. The malaria-associated admissions and deaths show a greater decline than non-malaria admissions and deaths.
- Other data sources provide only some confidence that this is a real trend and not a data quality issue. Children sleeping under an insecticide treated net (ITN) went up from 7% in 2002 to 29% in 2007 and 50% in 2010. Pregnant women who took two doses of intermittent preventive treatment during pregnancy (IPTp) was 59% in 2006 and 70% in 2010.
- Household surveys showed that parasite prevalence in children under five years of age decreased from 22% in 2006, to 10% in 2008. A subsequent national survey in 2010 however showed an increase to 16%. This increase was particularly prominent in two of the nine provinces of Zambia. As household ITN ownership remained high, concerns were raised about the effectiveness of “old” nets which had not been replaced.

#### Sources:

Ministry of Health, Zambia. *Zambia 2010 malaria indicator survey provides evidence for action*. National Malaria Control Programme. Lusaka.

*World malaria report 2010*. Geneva, World Health Organization, 2010.

**Table 4.7: Selected indicators and data sources for tuberculosis**

Key indicator areas	Main data sources
TB incidence	TB case notifications; assessments of extent to which there is underreporting of cases
TB mortality	Civil registration data with cause of death
TB prevalence	Nationwide TB prevalence surveys
Case detection (notifications divided by estimated incidence)	TB case notifications; assessments of extent to which there is underreporting of cases
TB treatment success rate	Treatment outcome data from health facilities

programmes in endemic countries. A standard reporting mechanism requests information on a wide range of issues from the number of cases to commodity (bednets, medicines, etc.) distribution and malaria programme financing.

## Tuberculosis

The MDG target for TB is to halt and begin to reverse the incidence of the disease by 2015. The Stop TB Partnership has set additional targets for reductions in disease burden, which are to halve TB prevalence and death rates by 2015 compared to their 1990 levels (12). The Global Plan to Stop TB, 2011–2015 also includes multiple programmatic targets for 2015 (13).

Most countries have TB programmes with facility-reporting systems that provide data on the number of cases notified and the treatment outcomes of those cases (**Table 4.7**). Typically, these reporting systems rely on paper-based district registers that hold data from patient treatment cards. Data from registers are aggregated every quarter and then forwarded to other levels. According to data quality assessments, these standardized facility and district-based recording and reporting systems have generated reliable data on case notifications and treatment outcomes for more than a decade in

most countries (14).<sup>6</sup> A growing number of countries are adopting case-based computerized systems that are flexible and allow more extensive quality and consistency checks, as well as a disaggregated analysis of data (Country data snapshot 10).

In most countries, surveillance systems do not capture a large proportion of TB cases. WHO estimates that, on average, public sector clinical TB notification systems in low- and middle-income countries are recording only around 50–70% of the total estimated number of incident cases (15). One reason for underreporting is the lack of or inadequate engagement with the full range of public and private providers by the national TB control programmes. The level of underreporting of TB cases needs to be systematically assessed in all countries, including via inventory studies that quantify the proportion of detected cases that are notified in randomly selected areas. A study in Egypt, that provides a good recent example, used an inventory study combined with capture–recapture analysis and concluded that the case detection rate of the national TB control programme was 55% for all TB cases (16). Besides such studies, WHO is

<sup>6</sup> Macro International and partners. Final report: five year evaluation of the Global Fund. Study area 3: health impact. 2009. (<http://www.theglobalfund.org/en/terg/evaluations/sa3/>, accessed on 1 April 2011.)

working with other partners to develop standard methods and tools for the systematic assessment of surveillance systems and the quality of surveillance data.

The best source of TB mortality data is a civil registration system of high coverage and quality, including accurate cause-of-death certification. Most countries do not have such a system. During 1990–2009, 124 countries did not have any data on TB mortality from civil registration systems (17). Countries that do have data of sufficient quality and coverage account for only 8% of the global number of estimated deaths from TB that occur each year. An additional problem observed in countries with high levels of HIV, is that the attribution of the cause of HIV, TB and other deaths becomes more complex and may be affected by stigma, as in South Africa where civil registration data are lacking or inadequate. WHO estimates of TB mortality are based on estimates of TB incidence and the case fatality rate among notified and non-notified cases.

Besides routine information systems (notification and civil registration systems), national population-based sample surveys, in which all adult participants are screened for TB, can be helpful for providing accurate data on the prevalence of TB disease. Since TB is a relatively rare disease in some parts of the world, large sample sizes (typically in the range 50 000–100 000) are required, making TB prevalence surveys challenging in terms of costs (typically US\$ 1–3 million per survey) and logistics. In the past four decades only a few countries had conducted a national TB prevalence survey. However, the situation has changed considerably since 2008, partly because of financial support through the Global Fund. In the South-East Asia and Western Pacific regions, eight of nine high TB-burden countries have either recently conducted or are planning such surveys by 2013 (the exception is India, where subnational surveys have been

implemented). Ethiopia launched its first survey in October 2010 (the first in more than 50 years in Africa and only the second in total). Around nine other African countries are actively planning to implement surveys in 2011 or 2012.

Global monitoring benefits from a well-established system in which WHO collects data from national TB programmes on an annual basis. Since 2009, data have been collected through a web-based system with very good reporting rates. In the 2010 round of global TB data collection, 168 countries that account for 99% of the world's TB cases reported data by the mid-June deadline. The remainder (mostly high-income countries in western Europe) reported data later in the year. The list of variables for which data are collected has expanded considerably following the launch of the Stop TB Strategy in 2006. The TB dictionary includes over 280 items with age and sex breakdowns for case reporting and specifics on treatment outcomes, as well as financial and programmatic information.<sup>7</sup>

## Neglected tropical diseases

Neglected tropical diseases (NTD) include schistosomiasis (urinary and intestinal), lymphatic filariasis (LF), onchocerciasis, soil-transmitted helminthic infections, such as hookworm (*Ancylostoma duodenale* and *Necator americanus*), roundworm (*Ascaris lumbricoides*) and whipworm (*Trichuris trichiura*), and blinding trachoma (18). Each of these diseases has a set of indicators and targets. For onchocerciasis, for example, the Onchocerciasis Elimination Programme for the Americas (OEPA) has set a target to eliminate the disease by 2016. The global programme to eliminate LF, launched in 2000 by WHO, targets the elimination of LF by 2020.

<sup>7</sup> More information is available at <http://www.who.int/tb/country/data/download/en/index.html> (accessed on 15 February 2011).

**Table 4.8: Selected indicators and data sources for neglected tropical diseases**

<b>Selected indicator areas</b>	<b>Main data sources</b>
Mortality due to NTD	Civil registration data with cause of death
Morbidity due to NTD (e.g. prevalence of microfilaria)	Household and school surveys; health facility reports
Coverage of preventive chemotherapy and treatment	Reports of treatment campaigns; household and school surveys

NTD = neglected tropical diseases

**Table 4.9: Selected indicators and data sources for water and sanitation**

<b>Key indicator areas</b>	<b>Main data sources</b>
Improved water sources	Household survey
Improved sanitation facilities	Household survey

Mortality data for NTDs are generally not available, as functioning civil registration systems are lacking in virtually all countries burdened by these diseases (**Table 4.8**). Household surveys rarely include data collection on NTDs for a number of different reasons: the targeted age group in the survey sample may not include those most at risk or affected by NTDs; disease prevalence may be too low or too local; or diagnostic tests too complex for large-scale surveys. There are a few exceptions, notably the combined malaria and trachoma survey in Ethiopia (19).

Various methods are being implemented to monitor disease prevalence and evaluate interventions. For example, the African Programme for Onchocerciasis Control (APOC), implemented in 19 African countries, has a risk assessment instrument called the Rapid Epidemiological Mapping for Onchocerciasis (REMO) which is applied at the village level (APOC web site). A cluster survey to validate reported coverage rate for the four drugs – albendazole, ivermectin, praziquantel

and azithromycin – has also been implemented in several countries (19).

WHO has a database on preventive chemotherapy for NTDs which includes information on various indicators for schistosomiasis (for 56 countries), soil-transmitted helminth (STH) infections (132 countries) and LF (81 countries) with data broken down by year. However, the availability of information varies by country and indicator.

### Water and sanitation

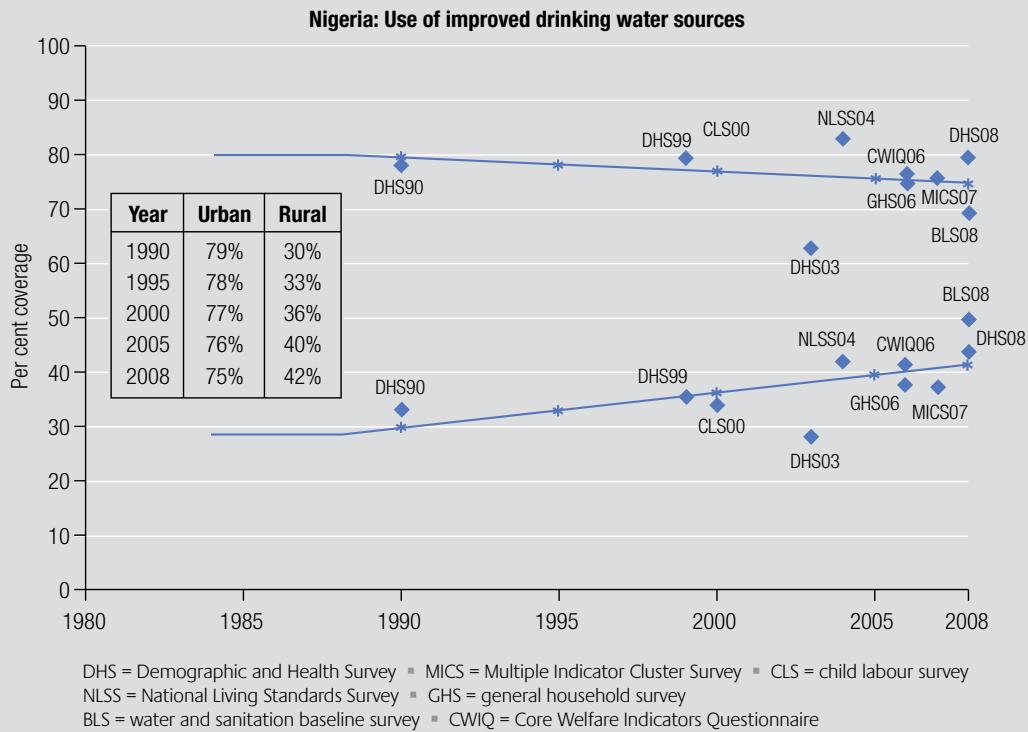
Halving the proportion of people without sustainable access to safe drinking water and basic sanitation is one of the MDGs.

Questions on water and sanitation are included in the main health survey programmes (such as DHS and MICS), generally in a standardized manner, which allows the computation of comparable statistics. Countries, however, also tend to collect data on water and sanitation in socioeconomic household surveys. Such data are often not used



## COUNTRY DATA SNAPSHOT 12

### TRENDS IN USE OF IMPROVED DRINKING WATER SOURCES, URBAN AND RURAL NIGERIA



- Monitoring the core water and sanitation indicators is generally done through household surveys. A systematic assessment of surveys by the WHO/UNICEF Joint Monitoring Programme on water supply and sanitation (JMP) and Accelerated Data Program of the International Household Survey Network in Nigeria showed that many health and socioeconomic surveys collect such data.
- The JMP used the multiple surveys to come up with estimates of use of improved drinking water sources in urban and rural households for 1990–2008. Even though there is variation between the data sources, it can be confidently concluded that urban levels are declining slowly and were at 75% coverage in 2008, while rural coverage increased from 30% in 1990 to 42% in 2008.
- There appears to be potential for further harmonization of survey contents, e.g. a water and sanitation module in six national surveys during 2006–2008. A comprehensive data collection and data sharing plan could have helped rationalize data collection.

Sources:

*Joint monitoring programme for water supply and sanitation. March 2010 update.*

[http://www.wssinfo.org/fileadmin/user\\_upload/resources/NGA\\_wat.pdf](http://www.wssinfo.org/fileadmin/user_upload/resources/NGA_wat.pdf) (accessed on 1 April 2011).

<http://www.ihsn.org/adp/> (accessed on 1 April 2011).

in the health sector. A special effort is needed to gather the statistics from such surveys, which can however contribute to improving the knowledge about national and subnational levels and trends.

The WHO/UNICEF Joint Monitoring Programme (JMP) for Water Supply and Sanitation is the United Nations mechanism tasked with monitoring progress. The JMP publishes updated estimates every two years on the use of various types of drinking water sources and sanitation facilities at the national, regional and global levels (see Country data snapshot 12).

## Noncommunicable diseases and risk factors

Epidemics of noncommunicable diseases (NCDs), such as cancers, cardiovascular diseases, chronic respiratory diseases and diabetes, are growing rapidly, affecting both developed and developing countries, and people of all age groups. The leading causes of the main chronic disease epidemics are well established. The most important modifiable risk factors – unhealthy diet, physical inactivity, tobacco use and harmful use of alcohol – lead to raised blood pressure, raised glucose levels, abnormal blood lipids and overweight and obesity. The monitoring of NCDs involves examining these risk factors and their control measures, in addition to monitoring the disease outcomes themselves.

Mortality data by age, sex and cause of death, as mentioned elsewhere in this report, are ideally derived from complete death registration with cause-of-death certification. Verbal autopsy in community settings is increasingly used to determine the cause of death among adults and older people, but mostly limited to local epidemiological studies, such as those that are part of the International Network for the Demographic Evaluation of Populations and Their Health in Developing Countries (INDEPTH). The lack of such information in most low- and middle-income countries is a major obstacle for policy, planning, and monitoring and evaluation.

Population-based surveys with behavioural questions (such as on diet, physical activity, and alcohol and tobacco use) and biomarkers (such as blood pressure, weight and height, blood test for diabetes) are the main data source for risk factors at the population level. Many high-income countries gather key information by conducting regular health examination surveys, such as the National Health and Nutrition Examination Survey (NHANES) in the USA which has been doing for two decades.

However, in low- and middle-income countries, the information gathering situation is less complete. Recent systematic reviews could not find any population-based data on total cholesterol in 100 countries (20), and no data on blood pressure were obtained for 64 countries worldwide (21). Data on blood pressure is most sparse in the regions where very limited data indicate that the burden

**Table 4.10: Selected indicators and data sources for noncommunicable diseases and risk factors**

Key indicator areas	Main data sources
Mortality due to noncommunicable diseases	Civil registration data with cause of death
Morbidity (e.g. diabetes)	Household surveys (with biomarkers)
Prevalence of risk factors (e.g. hypertension, smoking)	Household surveys (mostly with biomarkers)

is likely to be the highest: national data were found for less than one third of countries in sub-Saharan Africa, Latin America, and central and eastern Europe. Despite expanding the search to include subnational and community studies, no data were available for nearly half of the countries in these regions. Only three of these countries (Mexico, The Russian Federation and South Africa) had more than one national survey that measured blood pressure since 1980.

WHO's STEPS surveys aim to address this data gap through health interview and examination surveys on risk factors for NCDs.<sup>8</sup> More than 25 countries have conducted national STEPS surveys, either as a health interview survey or with physical and biochemical measurements. WHO also supports the Study on Ageing and Health (SAGE), a multiround health examination survey of people aged 50 years and over. SAGE is currently implemented by China, Ghana, India, Mexico, The Russian Federation and South Africa.<sup>9</sup>

## Disease outbreak and the IHR core capacity monitoring

The International Health Regulations (IHR), which entered into force on 15 June 2007, requires countries to report certain disease outbreaks and public health events to the WHO. The IHR is an international legal instrument that is binding on 194 countries across the globe, including all the Member States of WHO. The IHR aims to help the international community prevent and respond to acute public health risks that have the potential to cross borders and threaten people worldwide.

<sup>8</sup> More information is available at <http://www.who.int/chp/steps/en/> (accessed on 4 February 2011).

<sup>9</sup> More information is available at <http://www.who.int/healthinfo/systems/sage/en/index.html> (accessed on 15 February 2011).

In consultation with IHR States Parties, a monitoring tool was developed to track the progress on IHR core capacities strengthening and to identify gaps to address the development and maintenance of these capacities. The tool defines the eight core capacities – national legislation, policy and financing, coordination and National Focal Point (NFP) communications, surveillance, response, preparedness, risk communication, human resources and laboratory. Within each capacity area progress is monitored through defined attributes which measure discrete achievements over time. Implementation status for each capacity is assessed on a four-point scale: Level <1 (foundational); Level 1 (inputs and processes in place); Level 2 (outputs and some outcomes demonstrated); and Level 3 (capacities beyond the State's borders).

A self-assessment questionnaire sent to IHR States Parties in mid-February 2010 elicited 126 responses, representing 65% of the 194 States Parties. A few selected findings are listed below.

- 58% developed national plans to meet the IHR core capacity requirements.
- Among the eight core capacities, States Parties report making good progress in legislation, response and risk communication, with more than 30% of countries reporting to have met the requirements for 2012 (Level 2) and/or higher (Level 3).
- More than half of the reporting countries are still in the foundational level (Level <1) for two core capacities, notably, preparedness and human resources capacities.
- More than half of the reporting countries have the inputs and processes in place (Level 1) for coordination, surveillance and risk communication.
- 71% of countries report systems in place at national and/or subnational levels for capturing and registering public health events from a

variety of sources including the veterinary sector and the media.

- 50% of countries report having developed national public health emergency response plans for IHR-related hazards and Points of Entry (PoE).
- States Parties report having made progress at different rates for each of the hazard types, with more attributes being achieved for zoonotic and food safety events, and less for chemical and radiological events.

IHR States Parties are using monitoring tool and indicators to identify gaps and target capacity strengthening. Self reported data from countries show that there are still major deficiencies, and that limitations of self reported data should also be taken into account.

## Road safety

Reliable road traffic injury data are essential to assess the situation, trends and risk factors, set targets, inform prevention efforts and monitor overall performance. As more countries are taking steps to address their national road safety problem, ongoing monitoring of the situation by using key indicators is required. Road safety programmes aim to monitor health outcomes (mortality and non-fatal outcomes as a result of road traffic accidents)

and intervention coverage as well as risk behaviours. Multiple data sources are required to obtain the best information on the mortality due to road traffic.

In the absence of reliable vital statistics systems police records are used as the primary source of data by 50% of 178 countries which participated in the WHO survey (22). Data from the transport sector were used by 11% of countries, while only 14% used health sector data. The WHO survey also showed that the comparability of data on fatalities is compromised because different definitions are



**Table 4.11: Selected indicators and data sources for road safety**

Selected indicator areas	Main data sources
Road traffic fatality	Civil registration data with cause of death; verbal autopsy in community studies; police and other administrative records
Road traffic injuries	Reporting by health facilities (hospital inpatient records, emergency room records, trauma registries, ambulance or emergency technician records, health clinic records, family doctor records)
Interventions: helmet use, seat belts, etc.	Observational study

used in terms of the time period between a road crash and death. Only 40% of countries used the recommended 30-day time period for a road traffic fatality.

The availability and quality of data on non-fatal injuries is poorer than that for fatalities. These data should generally be provided by the health sector, although police records may also include severe injuries. In most countries, however, there are no reliable data because of poor use of ICD, and variable definitions exist for say severity, and incomplete general reporting is done by health facilities in most countries.

Data on the coverage of interventions are also incomplete, e.g. only 34% of the 178 countries in the WHO survey reported on motorcycle helmet wearing rates; 47% of countries had no data on rates of seat belt use in the front seat; and only half of the countries had any data on the proportion of road traffic deaths attributable to alcohol.

## Conclusion

As this chapter shows, the ultimate key indicator for monitoring of all of the health disease programmes is mortality by cause (and by age and sex). The previous chapter, however, illustrates that the most reliable source of such data, complete civil registration systems with cause-of-death certification, remains weak in most developing countries. This chapter also highlighted the complexity faced by a country health information system to respond to the needs of various health and disease programmes.

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# CHAPTER 5

## Policy implications

The findings of this report underscore the recommendations made in two recent calls for action on health information. In January 2010, the Prince Mahidol Award Conference in Bangkok, co-organized by the Health Metrics Network and WHO, concluded with a call to action (see Box).<sup>1</sup> Participants agreed upon a common diagnosis of the challenges and developed a set of five principles for strengthening health information systems. Also in January 2010, the heads of eight global health agencies (the H8) published a paper urging the need to strengthen key data sources and capacity for analysis, synthesis, validation and use of health data in countries (1).<sup>2</sup> This was essential to enable countries to better monitor and evaluate their own progress and performance and to allow them to respond to the increased emphasis on results and accountability. In support of these country goals, the eight agencies proposed four global actions:

1. Increase levels and efficiency of investments in health information
2. Develop a common data architecture

3. Strengthen performance monitoring and evaluation
4. Increase data access and use.

Both the H8 plan of action and the call to action of the Bangkok Global Health Information Forum have identified several priority areas:

- Increasing investments to strengthen country health information systems, through both ongoing routine funding, global health partnerships and special disease initiatives. Special attention needs to be directed to currently weak data sources, such as civil registration and vital statistics, and health facility-based information systems, as well as in strategies to ensure adequate monitoring of equity.
- Improving the efficiency of health information investments by closer collaboration between partners in support of one strong country health information system that covers all major disease and health programmes and all data sources. This should include minimization of numbers of indicators and harmonization of reporting requirements.
- Enhancing access to data in the public domain, with appropriate security and confidentiality measures, and covering the public and private sectors. This should include investment in

<sup>1</sup> Global Health Information Forum. Call to Action. Bangkok, 2010.

<sup>2</sup> Bill & Melinda Gates Foundation, GAVI Alliance, Global Fund to Fight AIDS, Tuberculosis and Malaria, UNAIDS, UNFPA, UNICEF, World Bank and World Health Organization.

appropriate information technology supported by a country-owned data architecture that assures interoperability between data systems and real time access to information for health action.

- Strengthening of country capacity to collect, compile, manage, analyse and use health data among a wide range of stakeholders, including health, statistical and research institutions.

This review on the state of health information systems in countries has found that while there has been progress in several areas there are also major gaps. It would be essential for countries to develop comprehensive health information systems supported by a sound legal and institutional environment that includes clear policies and a multiyear plan to which all partners contribute. Attention must be paid to the establishment of an explicit data architecture – describing how data are collected, stored, managed and used, by whom and for what purposes – to ensure that the increasing diversity of actors and resources contribute evenly and in a sustainable manner to resolve information gaps at country and global levels. This architecture is the foundation upon which innovations, such as information technology applications can be introduced in ways that promote country ownership and stewardship, and the efficient generation and use of health information, including interoperability between different data systems.

A comprehensive plan should cover all relevant data sources with particular emphasis on:

- strengthening vital events monitoring with causes of death, through civil registration systems, demographic surveillance sites and hospital statistics;
- harmonizing health surveys through a country-led prioritization of population-based health surveys focusing on service coverage, equity and

population health outcomes, and using global standards;

- improving the timeliness, completeness and quality of facility generated data with the help of information technology; and
- monitoring of health system inputs and outputs in a comprehensive manner, comprising both public and private sectors, and including systematic tracking of health expenditures through national health accounts of the health workforce using multiple methods, and of medicines and service delivery through health facility assessments.

A major constraint faced by many countries is the individual and institutional capacities required to ensure high quality data collection, management, analysis and sharing. Capacity-building requires providing support to institutions complemented by investment in individual training. In the health sector, relatively little attention has been given to institutional capacity-building in support of such functions but different organizational forms can be envisaged. The institution can form an integral part of the ministry of health or national statistical office or can be established as an entirely independent, private, non-profit organization. Governance and financing structures may also differ. Evidence from a number of countries suggests that capacity-strengthening efforts should preferably be directed towards institutions that are independent of programme implementation so as to maximize objectivity and minimize risks associated with vested interests. In some countries, national statistical offices that have aligned themselves with the Fundamental Principles of Official Statistics<sup>3</sup> can provide this degree of objectivity and transparency.

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<sup>3</sup> <http://unstats.un.org/unsd/dnss/gp/fundprinciples.aspx> (accessed on 1 April 2011).

Elsewhere, academic, research and public health institutes may be well placed to provide this function.

Improved accountability and focus on results are critical to improve programme implementation

and reach major health goals. Sound health information systems that provide accurate and timely monitoring of data are required and are feasible through concerted and systematic efforts by countries and global partners.

## CALL TO ACTION: GLOBAL HEALTH INFORMATION FORUM 2010

We the participants of the Global Health Information Forum 2010, convened by the Health Metrics Network, the Prince Mahidol Award Conference, the World Health Organization, the World Bank and other development partners, representing national health ministries, academic institutions, intergovernmental agencies, bilateral development agencies, private foundations, global health initiatives and civil society in developed and developing countries:

**Recognizing** the degree to which health information enables national health systems to achieve the best possible health outcomes and return on investment;

**Confronted** by evidence that many national health information systems are poorly equipped to meet current information demands for policy decisions and are ill-prepared to meet future requirements, particularly in the context of emergencies, health crises and climate change;

**Realizing** that increased monitoring and evaluation investments by single-disease programmes in the context of rapid technological advances have the potential to dramatically improve health information systems if properly leveraged;

**Noting** the historical trends and factors contributing to the current gaps in health and population information and that equitable distribution of health outcomes is as important as achieving overall health goals;

**Recognizing** the requirement for national government stewardship of the health information system development and the responsibility of donors and international partners to support these systems;

**Concerned** that globally there are 40 million births (one third of the world's annual total) and 40 million deaths (two thirds of the world's annual total) that are not legally recognized by civil registration systems – and that there has been no appreciable progress in many countries;

**Welcoming** the opportunity presented by new tools, technology and consensus in this area;<sup>1</sup>

<sup>1</sup> Including the Health Metrics Framework endorsed by the World Health Assembly in 2007, the Bellagio eHealth Call to Action, the Paris Declaration, the Marrakech Action Plan on Statistics, the Call for Action on Health Data from Eight Global Health Agencies and the collective efforts to measure and achieve the Millennium Development Goals.

Continues...

**Encouraging** governments to include explicit strategies for national health information system development when preparing their national health strategies;

**Agree** to the following general principles:

#### **1. Transparency and benefits**

- guaranteeing transparency of all health data with due considerations for privacy and confidentiality
- ensuring that the benefits of data collection accrue to the people and communities who are the sources of that data

#### **2. Good governance**

- ensuring that information is collected from all public and private healthcare providers
- basing national health strategies on health information systems that monitor an agreed number of indicators used by all partners
- developing national performance monitoring tools to track progress towards health goals
- monitoring health equity by the application of socio-economic and living standards households surveys
- strengthening intersectoral collaboration and coordination to develop and govern national health information system policies

#### **3. Investments and capacity building**

- fostering a technologically competent health information workforce by appropriate training and recognition of necessary skills and tasks
- establishing national institutes curricula and qualifications to train and certify professionals working in health informatics data collection analysis dissemination and use
- mobilizing resources and investing at least 5% of health resources in national health information systems, with at least 2% allocated to building vital statistics systems – with the aim of achieving by 2020 – 90% completeness of birth and death registration and improved cause-of-death data
- investing in appropriate technology – based on open standards – that permits rapid expansion to rural populations that empowers frontline employees with real time access to information and permits rapid action in public health emergencies
- scaling up investments in the information systems needed to track the emerging epidemiological transition

#### **4. Harmonization and integration**

- fostering integration of data produced by national statistical offices, ministries of health and other sectors

*Continues...*

- facilitating intersectoral collaboration and data sharing through the use of open standards and common data models
- ensuring community participation and ownership through effective and timely feedback

## **5. Planning for the future**

- promoting appropriate technological solutions compliant with open standards to leverage investments within and beyond countries
- negotiating for developing and emerging country access to products of – and collaboration with – standards development organizations
- assessing the probable impact of massive data flows on human resources and finance in terms of the capacity required to store, compute and analyse petabytes of data.

## **Reference**

1. Chan M, et al. Meeting the demands for results and accountability: a call for action on health data from eight health agencies. *PLoS Medicine*, 2010;7(1): e100023.











Country Health Information Systems provides an overview of the status of health information systems (HIS) in low- and middle-income countries. It uses various components of the Health Metrics Network/WHO HIS framework to describe the general status of HIS, data sources, monitoring of the health system as well as disease-specific practices.

The review shows that while there has been progress in several HIS areas there are also major persistent gaps. In particular, the imbalance between increasing demands for reporting against specific indicators and the actual efforts to strengthen country health information systems and their core data sources, remains a major challenge in many countries.

The findings underscore recommendations made by the heads of eight global health agencies (the H8) and the Global Health Information Forum (GHIF) in 2010: Countries must urgently develop comprehensive health information systems supported by a sound policy, legal and institutional environment.

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