# Measuring the Impact of Health Systems Strengthening

## A Review of the Literature

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# Acronyms and Abbreviations

| | |
|---|---|
| CGD | Center for Global Development |
| CPI | Corruption perceptions index |
| CPIA | Country Policy and Institutional Assessment |
| CSO | Civil society organization |
| DfID | U.K. Department for International Development |
| DHS | Demographic and Health Surveys |
| DOS | Department of State |
| DPT | Diphtheria-pertussis-tetanus |
| E&E | Europe and Eurasia |
| ECHI | European Community Health Indicators |
| ECHIM | European Community Health Indicators Monitoring |
| EO | European Observatory |
| EPHF | Essential public health functions |
| EU | European Union |
| GGE | General government expenditure |
| GGHE | General government health expenditure |
| HAI | Health Action International |
| HFC | Health Facility Census |
| HIS | Health information system |
| HISPIX | Health information system performance index |
| HMIS | Health management information systems |
| HMN | Health Metrics Network |
| HSAA | Health Systems Assessment Approach |
| HSS | Health systems strengthening |
| JSI | John Snow, Inc. |
| LAPM | Long-acting and permanent method |
| LSMS | Living Standards Measurement Study |
| M&E | Monitoring and evaluation |
| MCA | Millennium Challenge Account |
| MCC | Millennium Challenge Corporation |
| MCH | Maternal and child health |
| MDG | Millennium Development Goal |
| MICS | Multiple Indicator Cluster Surveys |
| MOH | Ministry of health |
| MSH | Management Sciences for Health |
| NGO | Nongovernmental organization |
| NHA | National Health Account |
| OECD | Organization for Economic Cooperation and Development |
| OPD | Outpatient department |
| PAHO | Pan American Health Organization |
| PEPFAR | U.S. President's Emergency Plan for AIDS Relief |
| PHRplus | Partners for Health Reform Plus |
| QAP | Quality Assurance Project |
| RPM | Rational Pharmaceutical Management |
| SAM | Service Availability Mapping |
| SBA | Skilled birth attendance |
| SFA | Strategic Framework for Foreign Assistance |

| | |
|---|---|
| SPA | Service Provision Assessment |
| SWEF | System-Wide Effects of the Fund |
| TB | Tuberculosis |
| THE | Total health expenditure |
| TI | Transparency International |
| UNICEF | United Nations Children's Fund |
| URC | University Research Corporation |
| USAID | United States Agency for International Development |
| WHO | World Health Organization |
| WHO/EMRO | World Health Organization Regional Office for the Eastern Mediterranean |
| WHOSIS | World Health Organization's Statistical Information System |
| WHO/WPRO | World Health Organization Regional Office for the Western Pacific |
| WHS | World Health Surveys |

# Introduction

Funding for the health sector in developing countries has grown significantly in the last decade. While health sector investments have increasingly focused on alleviating the impact of HIV/AIDS, tuberculosis, and malaria, both development actors and the governments of developing countries are shifting their priorities toward linking disease-specific interventions with longer-term investments in health systems strengthening (HSS). With increased funding, there comes a greater need for evidence-based decisionmaking and rigorous monitoring and evaluation of HSS programs.

The purpose of this literature review is to summarize current efforts in measuring health system performance and to highlight the indicators and performance benchmarks most frequently used by the global community. The review also aims to serve as a resource for health system experts working on building consensus around a core set of indicators for monitoring and evaluating health system performance. The literature review is particularly useful in the context of the Millennium Development Goals and the "Countdown to 2015" initiative, as well as in the context of current U.S. Government presidential initiatives, bilateral programs, and host-country planning processes.

The review builds on the latest available published work on health system performance indicators and existing data sources. Part I summarizes the review findings, and part II provides a detailed overview of each of the six health system building blocks identified by the World Health Organization.

The current version of this document has benefited from discussions with the United States Agency for International Development technical experts and implementing partners. Because of the growing global emphasis on monitoring and evaluating health system performance, the document will be periodically updated to reflect the most current thinking in the field. Future versions will build on the current one and incorporate feedback received through the online portal, as well as from published updates from academia, multilateral organizations, nongovernmental organizations, and special initiatives.

# Part I: Summary of Findings

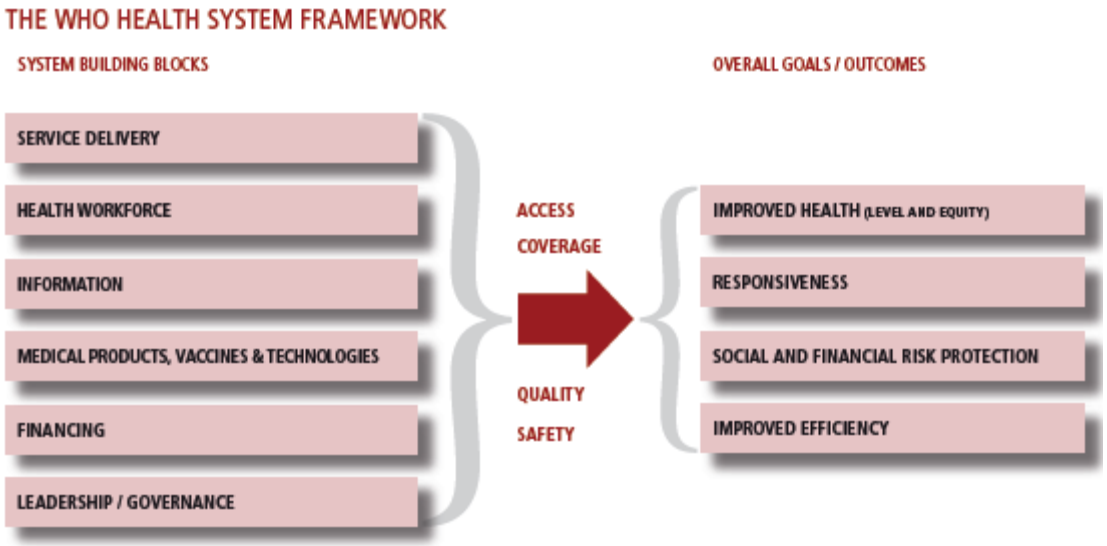
Over the years, the World Health Organization (WHO) has placed increased importance on health systems, treating them as the means to deliver effective and affordable interventions to those in need. This is particularly relevant to meeting the Millennium Development Goals (MDGs) and to achieving better health equity among all population sectors, especially the poor. The principal aim of health systems strengthening (HSS) interventions is to improve three aspects of priority health services: access, quality, and utilization. However, another crucial element of HSS is to strengthen host-country health systems in order to ensure sustainability over time and to eventually phase out donor assistance to the health sector. The HSS at the country level is based on high-impact and cost-effective interventions in maternal and child health (MCH), family planning and reproductive health, HIV/AIDS, tuberculosis (TB), malaria, and other infectious diseases.

The United States Agency for International Development (USAID) plays a key role in strengthening health systems in developing countries by working with individual governments, nongovernmental organizations (NGOs), and donor agencies. USAID utilizes various contract mechanisms to support health systems through bilateral projects in individual countries as well as through centrally funded activities that support multiple countries. The Agency partners with international organizations and other bilateral donors to strengthen health systems to maximize the effectiveness of its efforts. USAID's current central project activities on HSS include Health Systems 20/20, Strengthening Pharmaceutical Systems, the Health Care Improvement Project, Drug Quality and Information, MEASURE DHS, and MEASURE Evaluation. The main contributions of these projects have been assessment methodologies and instruments such as the Demographic and Health Surveys, Service Provision Assessment, and National Health Accounts. They also have produced practical guidelines, for example, about health facility assessment methods (MEASURE Evaluation, 2006) and performance indicators (MEASURE Evaluation, 2007). A more comprehensive list can be found in Table 1. The guidelines and tools are used in several of USAID's bilateral projects that support health systems, for example, in Armenia, Bolivia, Ethiopia, Guatemala, Indonesia, Kyrgyzstan, Nepal, Nicaragua, Tanzania, Zambia, and many other countries.

## Defining Health Systems

WHO describes a health system as consisting of all the organizations, institutions, resources, and people whose primary purpose is to improve health. It needs staff, funds, information, supplies, transport, communications, and overall guidance and direction. And it needs to provide services that are responsive and financially fair, while treating people decently (WHO, 2007). Strengthening health systems involves addressing key constraints related to health worker staffing, infrastructure, health commodities (such as equipment and medicines), logistics, tracking progress, and effective financing.

The 2000 WHO *World Health Report* examines and compares aspects of health systems around the world. It provides conceptual insights into the complex factors that explain how health systems perform and offered practical advice on how to assess performance and achieve improvements with available resources. The report focuses on the performance (ultimate outcomes) of health systems, described health system functions (stewardship, resource creation, service provision, and financing), emphasizing the stewardship role of the government. However, the key failing elements of the report are that it provides little information on why a particular system setup yields a certain outcome, what features of that system contribute the most to the outcome, and how one could restructure the system to achieve a better outcome. Later WHO reports have focused on health systems performance – the 2006 *World Health Report*, for example, covers the need for human resources for health (WHO, 2006a), and the 2007 report, *Everybody's Business: Strengthening Health Systems to Improve Health Outcomes: WHO's Framework for Action*, develops a conceptual framework for understanding how health systems operate, which also provides the basis for a toolkit of HSS monitoring indicators (WHO, 2007).




Source: WHO, 2007.

The framework developed in the 2007 report depicts a health system in terms of six core building blocks, shown in the diagram on page 8.

The main purpose of the framework is to portray what a health system is and what constitutes HSS. Using a single framework is important for understanding where investment is necessary to provide better access, coverage, quality, and safety, resulting in improved health.

These building blocks represent the basic functions of health systems. They cannot function independently of one another; systems strengthening activities in one building block have repercussions on the functions of another. This interconnectedness is particularly evident in the case of governance and information systems. Information provides the evidence base for overall sector policies, although not always observed in practice, and leadership and governance impacts the performance of all the other health system blocks. Financing and human resources for health are core inputs that affect all other building blocks. Medical products, vaccines, and technologies impact service delivery and reflect the availability and distribution of care, which are immediate outputs of the health system. Based on this framework, WHO developed a toolkit for monitoring HSS that contains six sections with draft indicators, each section corresponding with a building block (WHO, 2008).

## Why Do Health Systems and Their Performance Matter?

A health system is a means to an end. The main objective of a good health system is to improve people's lives tangibly every day. The health system is the means to achieve better health outcomes, such as better child survival through immunization, improved maternal health through emergency obstetric care and birth spacing, and lower levels of incidence of HIV, malaria, and other infectious diseases through prevention.

The characteristics of a well-performing health system are greater equitability, efficiency, and sustainability of health service outputs by delivering accessible, high-quality, and affordable curative and preventive services (Rockefeller Foundation, 2008). As a recent review commissioned by the U.K. Department for International Development (DfID) explains, the purpose of improved measurements of health systems performance is threefold:

- To provide better accountability for expenditures on health

- To increase aid effectiveness through more efficient allocation of resources and better performance management
- To increase interest in performance- and results-based aid, especially when aid disbursements are related to results (Walford, 2007)

As a result, health systems performance rather than just health funding is all the more important for enabling improvements in health outputs. Following this line of thought, strengthening health systems and making them more equitable have been recognized as key strategies for fighting poverty and fostering development. A review by Marchal et al. (2009) finds that global health actors implement very different interventions in their field projects. These can be categorized as:

(1) providing inputs or resources;
(2) reinforcing capacities of health services that are directly related to implementation of disease-control programs; and
(3) integrating program activities into general health services.

This process, whether implemented by individual governments, NGOs, or donor agencies, is under way in many countries to better respond to their population's needs. A growing number of WHO member states and the world's political and international health leaders also recognize the urgent need to make a major, sustained commitment to strengthening health systems.

## Past and Current Efforts in Measuring Health Systems Performance

With the increased emphasis on health systems performance, WHO has taken a lead role in identifying appropriate measurement indicators that can be used for multiple purposes, such as:

- In-country planning and monitoring
- Assessment of country performance
- Results-based funding
- Making intercountry comparisons to aid funding allocations

Organizations such as the GAVI Alliance and The Global Fund to Fight AIDS, Tuberculosis and Malaria already use indicators for these purposes. GAVI encourages proposals on HSS where the link to immunization coverage can be established. The Global Fund uses health information systems (HIS) for performance-based disbursements (HMN, 2006).

Other organizations and working groups, such as the WHO Health Metrics Network (HMN), The World Bank, the Global Health Indicators Working Group of the Center for Global Development (CGD), the University of Washington Institute of Health Metrics and Evaluation, and USAID, also have developed country indicators of health system performance, with plans to test them in selected countries (Walford, 2007). The Interagency Group on Health System Metrics, which comprises WHO, The World Bank, HMN, The Global Fund, and GAVI, are working together to compile summary indicators of health systems performance as well as a longer list of indicators for countries to choose from, with the objective of monitoring support to countries, provided by The Global Fund and GAVI. Beside these collaborative efforts, organizations have devised indicators and tools to measure health systems performance to meet their program needs. For example, The World Bank has developed indicators as part of its results-based financing for health; USAID projects have developed health system assessment tools covering MCH services; and the Organization for Economic Cooperation and Development (OECD) tracks health care quality as part of its Health Care Quality Indicators project through internationally comparable indicators.

Table 1 summarizes past and current efforts in measuring health systems performance. The tools and indicators developed by various organizations that examine the indicators proposed for each of the health systems building blocks according to the WHO framework also will be cited in the remaining sections of this paper.

| Table 1: Past and Current Efforts in Measuring Health Systems Performance | | |
|---|---|---|
| | **Organization** | **Publications, Tools, and Assessment Methods** *(in italics)* |
| 1. | WHO | • *Everybody's Business: Strengthening Health Systems to Improve Health Outcomes: WHO's Framework for Action (WHO, 2007)*<br>• *Toolkit on Monitoring Health Systems Strengthening (WHO, 2008)*<br>• *Service Availability Mapping (SAM) (http://www.who.int/healthinfo/systems/serviceavailabilitymapping/en/index.html)*<br>• *Prevention SAM (*http://www.who.int/healthinfo/systems/sampsam/en/index.html)<br>• *Action Program on Essential Drugs, Indicators for Monitoring National Drug Policies: A Practical Manual (WHO, 1999)*<br>• *WHO Medicines Strategy (WHO, 2008a)*<br>• *Level I and Level II Indicators to Assess Country Pharmaceutical Situations (WHO, 2006)*<br>• *Public Education in Rational Drug Use: A Global Survey (Fresle & Wolfheim, 1997)*<br>• *Developing Health Management Information Systems: A Practical Guide for Developing Countries (WHO, 2004)*<br>• *Alliance for Health Policy and Systems Research (http://www.who.int/alliance-hpsr/en/)*<br>• *Framework for Assessing Health System Governance (WHO/EMRO, 2007)*<br>• *Essential Public Health Function Measurement (WHO/PAHO, 2008)*<br>• *World Health Surveys (WHS) (http://www.who.int/healthinfo/survey/en/index.html)* |
| 2. | WHO/HMN | • *Health Metrics Network (HMN) Framework and Standards For Country Health Information Systems (HMN, 2008)*<br>• *HMN Health Information System Assessment Tool (HMN, 2008a)* |
| 3. | UNICEF | • *Multiple Indicator Cluster Surveys (MICS) (http://www.unicef.org/statistics/index_24302.html)* |
| 4. | USAID | MEASURE DHS: *(http://www.measuredhs.com/)*<br>• *Service Provision Assessment (SPA)*<br>• *Demographic and Health Surveys (DHS)* |
| 5. | USAID | MEASURE Evaluation/International Health Facility Assessment Network (IHFAN) *(http://www.cpc.unc.edu/measure/networks/ihfan)*<br>• *Profiles of Health Facility Assessment Methods*<br>• *Guidance for Selecting and Using Core Indicators for Cross-Country Comparisons of Health Facility Readiness to Provide Services*<br>• *Facility Audit of Service Quality (FASQ)*<br>• *Signature Domain and Geographic Coordinates: A Standardized Approach for Uniquely Identifying a Health Facility*<br>• *Quick Investigation of Quality (QIQ): A User's Guide for Monitoring Quality of Care in Family Planning*<br>• *Performance of Routine Information System Management (PRISM)* |
| 6. | USAID | • Child Survival and Technical Support Plus: *Rapid Health Facility Assessment (R-HFA) (http://www.childsurvival.com/rhfa_1.cfm)* |
| 7. | USAID | • *Logistics System Assessment Tool (LSAT) (DELIVER, 2009)* |
| 8. | USAID | • *Strategic Pathway to Reproductive Health Commodity Security (SPARHCS) (Hare, Hart, Scribner, & Sheperd, 2004)* |
| 9. | USAID | • *Contraceptive Security Index (DELIVER, 2006)*<br>• *Family Planning Effort Index (Ross & Stover, 2001)* |
| 10. | USAID | ACQUIRE Project: *(http://www.engenderhealth.org/our-work/major-projects/acquire.php)*<br>• *ACQUIRE Evaluation of LAPM Services (ELMS)* |
| 11. | USAID | • Capacity Project: *Human Resource Information System (HRIS) Strengthening (http://www.capacityproject.org/)* |

| Table 1: Past and Current Efforts in Measuring Health Systems Performance | | |
|---|---|---|
| | **Organization** | **Publications, Tools, and Assessment Methods** *(in italics)* |
| 12. | USAID | Population Council: *Population Council Health Facility Assessment (PCHFA)* (*http://www.populationcouncil.org*) |
| 13. | USAID | Health Systems 20/20 *(http://www.healthsystems2020.org/):*<br>• *Health Systems Assessment Approach* (with Rational Pharmaceutical Management Plus /QAP)<br>• *National Health Accounts (NHAs)*<br>• *Health systems database*<br>• The *System-Wide Effects of the Fund (SWEF)* research protocol with the SWEF Research Network *(Bennett & Fairbank, 2003)* |
| 14. | USAID | Rational Pharmaceutical Management Plus/QAP (*http://www.msh.org/projects/rpmplus/*)*:*<br>• *Rapid Pharmaceutical Management Assessment: An Indicator-based Approach* |
| 15. | USAID | • *Strategic Framework for Foreign Assistance (SFA) Governance Indicators* (*http://www.state.gov/f/c23053.htm*) |
| 16. | USAID | • *Graduation Report on Increased Health Promotion and Access to Quality Health Care in the Europe and Eurasia (E&E) Region* (internal document, developed by E&E Bureau's Program Objective Team for Strategic Objective 3.2) *(USAID Program Objective Team 3.2, 2001)* |
| 17. | U.S. President's Emergency Plan for AIDS Relief (PEPFAR) | • *Health Facility-based Survey of Human Resource for Health in HIV/AIDS, TB, Malaria and MCH Services* |
| 18. | Japan International Cooperation Agency (JICA) | • *Health Facility Census* |
| 19. | The World Bank | • *Statistical Capacity Indicator*<br>• *Results-based Financing in Health*<br>• *Country Policy and Institutional Assessment (CPIA) Index*<br>• *Living Standards Measurement Study (LSMS)*<br>• *Public Expenditure Review (PER)*<br>• *Quantitative Service Delivery Surveys (QSDS)*<br>• *Public Expenditure Tracking Survey (PETS)*<br>• *Performance Monitoring Indicators: A Handbook for Task Managers (Mosse & Sontheimer, 1996)*<br>• *Benefit Incidence Analysis (BIA):* BIA tools and evaluations have been made publicly available as part of the Research Department of the World Bank. |
| 20. | The Global Fund to Fight HIV/AIDS, Tuberculosis and Malaria | • *Global Fund Monitoring and Evaluation Toolkit (The Global Fund, 2006 and 2008)* |
| 21. | The Global HIV/AIDS Initiatives Network (GHIN) | • Country studies examine the national and subnational effects of global HIV/AIDS initiatives (by The World Bank Global HIV/AIDS Program, Global Fund, and PEPFAR) at the country level. *(Gottret & Schieber, 2006)* |
| 22. | GAVI Alliance | • *Guidelines for GAVI Alliance Health System Strengthening (HSS) Applications (GAVI Alliance, 2007)* |
| 23. | DfID | • Future Health Systems consortium, with the aim of publishing health systems evaluations (*http://www.futurehealthsystems.org*)<br>Health Systems Resource Centre (*http://www.dfidhealthrc.org/*) |

| Table 1: Past and Current Efforts in Measuring Health Systems Performance | | |
|---|---|---|
| | **Organization** | **Publications, Tools, and Assessment Methods** *(in italics)* |
| 24. | RAND | • *Quality of Care Assessment Tools (QA Tools) (http://www.rand.org/health/surveys_tools/qatools/index.html)* |
| 25. | United Nations MDGs | • *MDG indicator list (http://www.un.org/millenniumgoals/)* |
| 26. | University of Washington Institute of Health Metrics and Evaluation | • *Evaluation criteria for health systems currently in development (http://www.healthmetricsandevaluation.org/)* |
| 27. | Harvard University School of Public Health | • *International Health Systems Program*: Carried out small-scale health systems evaluations *(http://www.hsph.harvard.edu/ihsg/research.html)* |
| 28. | Center for Global Development | • *Measuring Commitment to Health. Global Health Indicators Working Group Report (Becker, Pickett & Levine, 2006).* Recommended Millennium Challenge Account indicators for country selection. |
| 29. | Millennium Challenge Corporation (MCC) | • *MCC Selection Criteria (http://www.mcc.gov/mcc/selection/index.shtml)* |
| 30. | European Community Health Indicators Monitoring (ECHIM) Project | • *ECHIM Shortlist of Indicators (http://www.healthindicators.org/healthindicators/root/o13.html)*<br>• *ECHIM Comprehensive List of Indicators (http://www.healthindicators.org/healthindicators/object_document/o5415n28314.html)* |
| 31. | International Health Partnership Plus (IHP +) | • International Health Partnership Plus was launched in 2007 to respond to the MDG challenges that called for action to scale up coverage and use of health services and deliver improved outcomes against the health-related MDGs and universal access commitments. The focus is on health-related MDG outcomes. The Partnership produces monitoring and evaluation frameworks and country-level reports. A focus of the partnership is on health systems performance. *(http://www.internationalhealthpartnership.net/en/home)* |
| 32. | European Observatory on Health Systems and Policies | • The Observatory is a partnership of the WHO Regional Office for Europe; the Governments of Belgium, Finland, Norway, Slovenia, Spain, and Sweden; the Veneto Region of Italy; the European Investment Bank; The World Bank; the London School of Economics and Political Science; and the London School of Hygiene and Tropical Medicine. Its work includes the "Health Systems in Transition (HiTs)" country profiles and other analyses of the dynamics of health care systems in Europe. *(http://www.euro.who.int/observatory)* |
| 33. | OECD | • OECD's Health Care Quality Indicators Project's aim is to collect internationally comparable data reflecting health outcomes and health improvements attributable to medical care delivered in OECD countries. It produced five technical papers on health care quality indicators, covering cardiac care, diabetes, primary care and prevention, mental health, and patient safety. It also participated in the ECHIM effort. *(http://www.oecd.org/document/31/0,2340,en_2649_33929_2484127_1_1_1_1,00.html)* |
| Note: Household surveys such as USAID's Demographic and Health Surveys (DHS), the Multiple Indicator Cluster Surveys (MICS) of the United Nations Children's Fund (UNICEF), and WHO's World Health Surveys (WHS) are included because they contain information related to health systems performance and overall goals and outcomes shown in the WHO framework. | | |

The past and current efforts in measuring health systems performance listed in table 1 serve different needs. Some are broad assessments of health systems performance, such as the WHO *Toolkit on Monitoring Health Systems Strengthening*, while others target specific systems components, such as the logistics of distributing essential products or the quality of care provided for a specific disease category. The tools addressing a specific systems component usually cover performance measures in much greater detail than the comprehensive systems assessment tools. As can be expected from such a multitude of efforts, considerable overlap exists between various tools. While some tools complement each other (for example, rapid assessment tools and more comprehensive health facility audits), there exists little agreement on a standard set of indicators and assessment methods that can be used for a cross-country comparison. The WHO *Toolkit* and several publications from USAID's MEASURE Evaluation and DHS projects are the most recent efforts toward standardization.

Indicators also have been developed to evaluate specific health outcomes, particularly in the areas of HIV/AIDS and reproductive health. Some examples are:

<u>Reproductive Health:</u>

- Bertrand, J., & Escudero, G. (2002). *Compendium of Indicators for Evaluating Reproductive Health Programs.* Vol. I

<u>HIV/AIDS:</u>

- Management Sciences for Health/World Health Organization. (2006). *Tools for Planning and Developing Human Resources for HIV/AIDS and Other Health Services*
- U.S. President's Emergency Plan for AIDS Relief (PEPFAR). (2009). *Next Generation Indicators Reference Guide*. Version 1.0

Furthermore, specific indicators listed in table 1, such as the Family Planning Effort Index, the Contraceptive Security Index, and SPARHCS, are relevant only to specific health outcomes, such as those related to reproductive health.

## Health Systems Indicators and Data

The international health community has come to a consensus regarding the key indicators representing health outputs and outcomes (see appendix 2). This paper summarizes past and current efforts on HSS indicators and aims to capture broad recommendations across development organizations. The WHO *Toolkit on Monitoring Health Systems Strengthening* serves as the organizing framework for the

HSS indicators included in this review because the *Toolkit* is based on a simple framework, and there appears to be some consensus among development actors around several of its indicators. Where such a consensus has not been reached yet, the following sections provide options for further discussion. These options include indicators recommended by other agencies, such as the USAID Health Systems Assessment Approach (HSAA), SWEF Research Network, MCC, MDG indicators, the ECHIM Project, etc., which are captured to some degree in the indicators presented by the WHO *Toolkit*. The indicators recommended by the *Toolkit*, as well as by other sources, are described in the respective sections on each of the building blocks in this report. A summary of indicators per building block that were most often recommended by these organizations follows in table 2. These indicators are recommended by key organizations engaged in HSS and usually by multiple sources. Appendix 1 presents a detailed list of all indicators by donor and other organization, and includes information on thresholds, benchmarks, and targets.

The challenge in selecting a few indicators measuring health systems performance from a large number of potential candidates lies in the fact that no single indicator can capture the performance of a systems building block adequately. Instead, the selection compromises between a parsimonious set of indicators and covering health systems core functions comprehensively. One approach to keeping the number of indicators small is the creation of composite indices. While this effectively leads to fewer indicators, indices pose several challenges that need to be carefully addressed. Firstly, composite indices are constructed of several – sometimes many – indicators and therefore do not reduce the burden of data collection. Secondly, indicators contributing to an index may not all be of equal importance and may require some form of weighted averages; weighing the components of an index could be perceived as arbitrary. Thirdly, interpreting indices might be difficult without breaking them into their individual components, especially when data are intended to inform decisionmaking and actions. Lastly, different indicators may be included in an index to reflect a higher or lower level of health system development, which could limit comparability across countries even when indices are normalized. Table 2 shows which indicators are composite indices (or where no consensus exists yet) and which indicators could be used to create a new index. While these indicators are generally applicable to all countries and are useful for cross-country comparisons, there may be other indicators that are more specific to conflict or post-conflict settings that are beyond the scope of this review. Furthermore, they are primarily limited to indicators that can be aggregated to the national level for easier application and analysis, although theoretically, measures of facility- or community-level care and services may be relevant.

Some summary observations from the information presented in table 2 for each building block of the WHO framework follow:

- The quality of health **service delivery** or service capacity is of concern to many development organizations, including USAID, WHO, and The World Bank. Projects often develop their own assessment instruments that measure a specific health systems component supported by them. For example, several tools focus on HIS or family planning services. USAID and other organizations have used numerous indicators measuring these and other health systems functions, often combining specific health systems areas with logistics functions; the latter falls under a separate building block in the WHO *Toolkit*. Consensus about quality-of-service indicators or an appropriate composite index has not been reached yet. One reason for this might be that measurements of quality of care are likely to differ by region and by the level of a country's development. Some consensus seems to exist about indicators measuring availability of services, although, as table 2 shows, these indicators do not capture the unequal distribution of services in many developing countries well.

- The issue of unequal distribution is addressed by indicators under **health workforce**, including geographic availability by type of health worker. While important, a uniform measure of country actions to strengthen its health workforce has not yet been agreed upon.

- The WHO *Toolkit*, as well as HMN publications, emphasizes **health information systems** performance. A proposed HIS performance index consists of 29 individual measurements. Other indicators require simple qualitative assessments and yes or no answers, such as the existence of reports or certain institutional responsibilities. The indicators shown in table 2 are discussed by WHO and other organizations. They are a subset of a larger number of indicators recommended by WHO. The large number of indicators related to information gathering and processing in the health sector seems somewhat disproportionate to the relatively small number of indicators proposed under service delivery.

- While some consensus seems to exist about indicators measuring **medical products, vaccines, and technologies**, these face challenges similar to those of the quality-of-service indicators under the service delivery building block. Which commodities are considered "essential" or "tracer products" will vary by region and a country's level of development; this means that different items may contribute to an index in a different context, and this may limit cross-country comparability even when indices are normalized. The proposed index for measuring the availability of tracer medicines and commodities can be composed of as many as 61 individual items. Some potential

supplemental indicators are much less demanding and require simple qualitative assessments and yes or no answers, such as the existence of guidelines or policies.

- Health **financing** is covered by a relatively small number of indicators; WHO proposes three. Two of the three, total health expenditure per capita and general government health expenditure as a proportion of total government expenditure, are well established and reported annually by international organizations. USAID routinely uses these indicators and variations of them. The main challenges relate to the need to better measure inequities in health service financing and whether resources reach the poorest and most vulnerable population groups.

- **Leadership/governance** (stewardship) is another building block characterized by a large number of proposed measurements. A proposed policy index consists of 10 components that are qualitative and relatively easy to assess and report as yes or no answers (although the latter could be refined by assessing whether individual policy components meet minimum standards of effectiveness). In addition to the policy index, WHO proposes six marker indicators for governance that overlap to some extent with other health systems building blocks, such as financing, medical products, and health workforce. The World Bank is using a country policy and institutional assessment index composed of 16 subcomponents. As for health service financing, the challenge remains of measuring whether the needs of the poorest and most vulnerable population groups are identified and met.

| Table 2: Most Recommended Health Systems Indicators by Building Block (BB) – WHO & Other Sources | | |
|---|---|---|
| **BB** | **Health Systems Indicators** *(indicator in italics)* | **Sources** |
| **Service delivery** | • *Number and distribution of inpatient beds per 10,000 population* (service availability)<br>• *Number and distribution of health facilities per 10,000 (or 1,000) population* (service availability)<br>• *Proportion of health facilities that meet basic service capacity standards* – a composite index of five components with 20 items in total (service capacity)<br>• *Proportion of health facilities that meet basic service capacity standards/number and distribution of health facilities with basic service capacity per 10,000 population* – a composite index of a maximum of nine program components with 15 items in total (service capacity)<br>• *Number of outpatient department (OPD) visits per 10,000 population per year* (service utilization)<br>• Service quality: 14 sample indicators suggested, plus 13 additional data sources | • WHO, multiple<br>• WHO, multiple<br>• WHO, USAID, multiple<br>• WHO<br>• WHO, multiple<br>• WHO |
| **Health workforce** | • *Number of health workers/health professionals per 10,000 population/per capita/per 1,000 population*<br>• *Distribution of health workers – by profession/specialization, region, place of work, and sex*<br>• *Annual number of graduates of health professions' educational institutions per 100,000 population – by cadre*<br>• Selected indicators for monitoring country actions for strengthening the health workforce – WHO suggests an additional 10 indicators for country monitoring. | • WHO, multiple<br>• WHO, multiple<br>• WHO<br>• WHO |
| **Information** | • *Health information system performance index (HISPIX)* – a summary measure based on 29 standardized indicators for assessing data quality and the overall performance of the health information systems (HIS). The indicators below are part of the 29 standardized indicators.<br>• *Existence of demographic or household surveys* – an indicator proposed, in addition to five indicators measuring health surveys<br>• *Percent of births and deaths registered in the country* – two of three indicators measuring birth and death registration<br>• *Percentage of districts that submit timely, complete, accurate reports to national level* – one of seven indicators measuring health facility reporting<br>• *Completion of at least one national health account in last five years* – one of four indicators measuring health systems resource tracking<br>• *Existence of designated mechanisms charged with analysis of health statistics* – one of eight indicators measuring the capacity for analysis, synthesis, and validation of health data<br>• *Availability of a national summary report that contains HIS information* – one of eight indicators measuring the capacity for analysis, synthesis, and validation of health data | • WHO/HMN<br>• Central Statistics Office<br>• UNICEF/MICS, DHS, WHO/ WHS, Census Bureau<br>• MOH<br>• NHA program, Abt Associates<br>• MOH<br>• MOH |
| **Medical products, vaccines, and technologies** | • *Proportion of population with access to affordable essential drugs on a sustainable basis* – The MDG indicator on health service delivery has not been monitored regularly, but WHO recommends nine indicators to measure the structure and process components of access to essential drugs.<br>The **availability and price of essential medicines** is measured through the following three indicators:<br>• *Percent of facilities that have all tracer medicines and commodities in stock on the day of visit, and in the last three months* – a composite index based on 61 essential medicines, commodities, and vaccines (availability of essential medicines)<br>• *Supplemented by median proportion of tracer drugs that are in stock on the day of visit, and in the last three months* (availability of essential medicines)<br>• *Ratio of median local medicine price to international reference price (median price ratio) for core list of drugs* (price of essential medicines)<br>Supplemental indicators recommended by various sources:<br>• *The existence and year of last update of a published national medicines policy*<br>• *Existence and year of last update of a published national list of essential medicines*<br>• *Existence of standard treatment guidelines*<br>• *Percent of drugs purchased through competitive bidding of total pharmaceutical expenditures*<br>• *Appropriate prescription practices and rational drug use* | • MDG<br>• HFS<br>• SPA<br>• EMPP<br>• HFS<br>• WHO/HAI<br>• IDPG/MSH<br>• MOH<br>• WHO/HAI<br>• Research studies<br>• WHO/WHS |

| Table 2: Most Recommended Health Systems Indicators by Building Block (BB) – WHO & Other Sources | | |
|---|---|---|
| **BB** | **Health Systems Indicators** *(indicator in italics)* | **Sources** |
| **Financing** | • *Total health expenditures (THE) per capita in international and US$*<br>• *THE as a percent of gross domestic product (GDP)*<br>• *General government health expenditure as a proportion of total general government expenditure (GGHE/GGE)*<br>• *The ratio of household out-of-pocket payments for health to total health expenditures*<br>Supplemental indicators [Walford (2007), Kruk and Freedman (2008)]:<br>• *Amount of total donor spending on health as a percent of THE*<br>• *Percent of government health spending that reaches the poorest income quintile*<br>• *Selected indicators for monitoring country actions for strengthening health financing* – WHO suggests an additional six indicators for country monitoring. | • WHO, multiple<br>• USAID, multiple<br>• WHO, multiple<br>• WHO<br>• USAID, multiple<br>• MCC/MCA, USAID<br>• WHO |
| **Leadership/governance (stewardship)** | • *WHO Policy index* – consists of 10 items, each of which would be rated as zero (adequate policy does not exist or cannot be assessed) or one (adequate policy is available). With a maximum score of 10, the index consists of the following components:<br>1. National health strategy<br>2. Essential medicines list<br>3. Policies on drug procurement<br>4. National strategic plan for TB<br>5. National malaria strategy/policy<br>6. United Nations General Assembly Special Session (UNGASS) national composite policy index questionnaire for HIV/AIDS<br>7. Comprehensive reproductive health policy<br>8. Comprehensive multiyear plan for childhood immunization<br>9. Key health sector documents<br>10. Surveys for obtaining timely client input<br>• Marker indicators of governance (six core indicators and one supplemental):<br>- *Human Resources for Health: Health worker absenteeism in public health facilities*<br>- *Health Financing: Proportion of government funds that reach district-level facilities*<br>- *Health Service Delivery: Stock-out rates (absence) of essential drugs in health facilities*<br>- *Health Service Delivery: Proportion of informal payments within the public health care system*<br>- *Pharmaceutical Regulation: Proportion of pharmaceutical sales that consist of counterfeit drugs*<br>- *Voice & Accountability: Existence of effective civil society organizations in countries with mechanisms in place for citizens to express views to government bodies* (social responsiveness and accountability)<br>- Supplemental: *Disparity in coverage between lowest- and highest-income groups/regions/rural/urban areas*<br>• *Country Policy and Institutional Assessment (CPIA) Index* – measured by The World Bank and based on a set of criteria that are captured in 16 subcomponents | • WHO<br>• MOH<br>• WHO<br>• HFS<br>• MOH<br>• NHA<br>• HFS<br>• Research studies<br>• MOH<br>• Transparency International<br>• WB, USAID<br>• WB |

**Key to Sources:** DHS = Demographic and Health Surveys; EMPP = WHO Essential Medicines and Pharmaceutical Policies; HAI = Health Action International; HFS = Health Facility Survey; IDPG = International Drug Price Guide; MCC/MCA = Millennium Challenge Corporation/Millennium Challenge Account; MICS = UNICEF Multiple Indicator Cluster Surveys; MOH = Ministry of health; MSH = Management Sciences for Health; NHA = National Health Account; SPA = Service Provision Assessment; WB = The World Bank; WHS = WHO World Health Surveys

## Data and Indicators: Limitations, Uses, and Criteria

While identifying key health systems indicators is an important step, equally essential is the availability of cross-national data, as well as country-specific data, for these indicators. Unfortunately, reliable data are often not available for many indicators. Several reasons account for this paucity of data. While a multitude of indicators and tools exist to measure various aspects of health systems performance (see tables 1 and 2), there is hardly any consensus on a core set of indicators that are measured across programs and countries. Furthermore, investments in monitoring health systems indicators have been inadequate, leading to a sketchy information base.

This limited availability of data led to a multipartner effort to develop, fund, and support the future implementation of a global survey on health systems, such as the Country Health Systems Survey (CHeSS), that would contribute to strengthening HIS and countries' capacities to monitor their progress. This recent effort by WHO and HMN seeks to close the information gap by focusing on data collection methods that will be useful at the country level. Their objective is to identify methods that provide reliable data to assess program performance, including district-level health systems surveys and other health facility surveys. As another part of its survey program, WHO has developed and implemented the World Health Surveys (WHS) to compile comprehensive baseline information on the health of populations and on the outcomes associated with the investment in health systems, including data about the way health systems are currently functioning and the ability to monitor health systems inputs, functions, and outcomes.

USAID also has made efforts to standardize the measurement of health systems performance, often in collaboration with WHO and HMN. Considerable effort has already gone into the standardization of Service Provision Assessments (SPAs), which are implemented by MEASURE DHS. The MEASURE Evaluation project has published several guidelines and tools that include systematic reviews of health facility assessments and commonly used performance indicators. In recent years, WHO has expanded its efforts to encourage the use of data from facility surveys to fill gaps in information on health resources, including infrastructure, workforce, and service delivery, in many developing countries, thus providing a comprehensive picture of health systems in the areas of service status and availability of services. Other health systems strengthening (HSS)-related activities examine best practices and indicators of performance-based incentives as a means to address the problem of poor quality of services, low productivity of health workers, dysfunctional management behaviors, and low utilization of essential

services by the poor; all contribute to poor health outcomes. The Center for Global Development Working Group on Performance-Based Incentives has addressed these issues.

When reviewing these indicators, it may be helpful to keep in mind the main criteria for selection. A review by DfID suggests that an indicator should perform well on dimensions such as data availability, comparability, ability to collect with accuracy and independence (reliability), relevance to health systems performance, association with final outcome indicators, possibility of aggregation with other indicators, and the likelihood that it will distort behavior negatively (Walford, 2007). Another literature review (including work from WHO) of the top criteria for assessing indicators identifies validity, relevance, precision (accuracy), reliability, sensitivity, timeliness, and cost, as well as the ability to quantify the measure, interpret it without modifiers, and collect it often enough for it to have statistical power (Hutton, 2000). Equally important is the need to balance the need for information with the time and cost of data collection, keeping in mind the consequences on data quality when sufficient resources are not available (Martinez, 2008). As information on all the above-mentioned criteria are not always available, recommended indicators also are based on consensus by reviews performed by the major sources of the indicators. While data constraints for each set of indicators are addressed in the discussion of each building block, they also will be examined in greater details in the next step in this analysis when specific indicators will be identified.

The following sections describe in detail health systems indicators for each of the six building blocks of the WHO framework. Subsections for each building block identify the sources from which the indicators were taken and summarize the key indicators recommended by these sources. The last section of this paper presents health output indicators and relevant thresholds that can be linked to the HSS indicators. These are taken from the MDGs, the CGD's Global Health Indicators Working Group, and USAID.

# Part II: Detailed Findings by Health System Building Block

## Service Delivery

WHO defines service delivery as the way inputs are combined to allow the delivery of a series of interventions or health actions (WHO, 2001a). Service delivery is the main function the health system has to perform, and it is often thought of as the only function of a health system. Service delivery is an immediate output of the inputs of the other building blocks, such as health workforce, medical products, and finances (Islam, 2007).

The measurement of service delivery has a more ambiguous scope, in part due to the less quantifiable nature of service delivery. There is also no one model of good service delivery, which allows for many variations in different settings. However, WHO defines a list of requirements that a service delivery system must meet (WHO, 2007). There must be efforts to increase the demand for care through public health outreach; a package of integrated health services that is offered based on need and availability; an organized provider network; effective management; and the infrastructure and logistical control to support providers in supplying health care. Indicators of health service delivery need to measure these various characteristics, as well as the adequacy of the structure of the service delivery system, while also collecting indicators of service delivery outputs (Islam, 2007).

Measures of service delivery outputs include access, utilization, and coverage, which indicate whether people are receiving the services they need (WHO, 2008). Access includes a wide array of measures, including physical, financial, and sociopsychological access to services.

Physical access to services is often called the availability of services. Availability of services can be measured based on whether services are available within a certain maximum distance or by availability per capita. Data on the population distribution of health service resources are required to estimate physical access, and estimates of types of services rendered need to be reported by facilities (WHO, 2008). Data about service delivery infrastructure are easier to collect than data about other aspects of service delivery because they are mostly durable, tangible, and less mobile. Financial affordability of services is covered in the health finance section. The last dimension of access, sociopsychological access, is considered the acceptability of the service. Acceptability is an area that is often included as a component of the “quality of care” measures in service delivery indicator lists.

WHO, as well as many other sources cited below, focuses primarily on the physical availability of services. Ideally, other aspects of service delivery should be covered as well, such as acceptability and quality of care (safety, efficiency, and effectiveness of selected interventions) (WHO, 2008). Because of the difficulty in collecting these data, however, fewer indicators are available on these dimensions. Several sources also include coverage indicators. These types of "output" indicators are not considered by WHO to be part of monitoring service delivery. Therefore, they are not included here under the health systems building blocks but rather discussed in the last section, where health systems performance indicators are linked to these health systems outputs (WHO, 2008).

***Recommended Indicator Sources***

The WHO ***Toolkit on Monitoring Health Systems Strengthening*** includes a list of draft indicators for service delivery (WHO, 2008). The *Toolkit* focuses largely on availability and utilization among the overall population of a country. In addition to the indicators on the number of hospital beds and inpatient facilities described later, this source also suggests a measure of the number and distribution of health facilities that meet basic service capacity standards. WHO notes that this measure depends on the availability of detailed data about basic amenities (access to water, etc.), basic equipment, infection control, human resources, and tracer drugs and diagnostics. This may be a measure better used within a country at the facility level as a checklist, rather than aggregated for cross-country comparison because many countries have moved toward a higher level of service delivery that requires a more sophisticated tool for measuring differences in service capacity.

The USAID-funded **Health Systems Assessment Approach (HSAA)** effort of Rational Pharmaceutical Management (RPM) Plus, Health Systems 20/20, and the Quality Assurance Project (QAP) matches the WHO framework on several indicators but also includes a greater number of indicators intended for in-country purposes (Islam, 2007). This tool was designed so that USAID Missions could choose a smaller set of indicators from a larger list to better match their program activities closely. In addition to health systems performance indicators, the approach includes many coverage and health outcome indicators, such as mortality rates, immunization coverage, and contraceptive prevalence that WHO does not consider part of health systems indicators.

USAID also put together a health systems indicator list for its 2001 **graduation report on increased health promotion and access to quality health care** in the Europe and Eurasia (E&E) Region (USAID Program Objective Team 3.2, 2001). This report used the indicator list to rate the health systems of countries in the E&E region. Even for this group of relatively more developed countries, there were significant limitations to health systems data and information. This lack of reliable data resulted in the

inclusion of more qualitative indicators in the report. Like the **HSAA**, the report uses a number of output indicators for service delivery related to graduation criteria, but it does have one input measure related to the quality assurance process.

Finally, the **ECHIM Project** is part of an effort to develop and implement health indicators in Europe and to develop the European Union (EU) HIS as a whole. Participants in this project include EU member states, Eurostat, OECD, and WHO. The list of indicators is geared toward evaluating health systems in more developed countries, but many of the indicators are still relevant and overlap with the health service delivery indicators designed for the developing world. In its focus on high-level measures of care, ECHIM largely matches the WHO approach to service delivery indicators. It covers the availability and utilization indicators in the WHO *Toolkit* but also go beyond with more precise measures of care, such as equity of access and disease-specific outcomes (ECHIM, 2008). Many of these specific indicators may require more data collection than is possible at present in developing countries and thus are excluded from this review.

Regarding sources of data for the indicators suggested by these assessment tools, the USAID-supported **Service Provision Assessment (SPA)**, conducted by ICF Macro, is a detailed and reliable source of service delivery data. This is a respected source for this type of data because of the relatively large number of facilities that are included in its sample, which covers all facility types in a country. The downside is that samples for the client exit interview are small. Moreover, SPAs are not conducted in nearly as many countries as DHS or National Health Accounts (NHAs). In addition, client exit interviews will only capture the portion of the population who chose to receive care and therefore miss vital information about the reasons why people choose not to seek care when needed.

In addition to SPAs, there are a few other sources of service delivery data. WHO's Statistical Information System (WHOSIS) collects data on hospital beds in each region through its core indicators. Some of the WHO regions also collect outpatient visit data, but that information is not reported in WHOSIS. Data about health care facilities might be obtained from the ministry of health (MOH) in each country. Some service delivery data also can be found in The World Bank's Quantitative Service Delivery Surveys and Public Expenditure Tracking Surveys, **although these surveys have only been conducted in a few countries.**

***Most Recommended Service Delivery Indicators***

Besides a general agreement on the need for quality-of-care indicators, which are discussed below, several specific service delivery indicators were recommended by many of the aforementioned sources.

- The **number and distribution of inpatient beds per 10,000 population** is the single most-mentioned indicator by major sources. This indicator can serve as a proxy for the availability of health services, where more direct measures are not available. It also provides information on health care institutions' capacities for care and their resource use (ECHIM, 2008b). It can be used to assess the adequacy of beds in relation to the population and as a measure of whether inpatient services are even available in the most resource-poor settings. This indicator measured relative to population size better represents the adequacy of services available as compared to a measure of the total number of beds in the country. There is no specific threshold for this indicator; generally, a greater number of hospital beds suggest greater availability of inpatient health services.

- **Number and distribution of health facilities per 10,000 (or 1,000) population** is mentioned by several sources, but each has its own variation on the measure. USAID's HSAA chose this indicator but suggested measuring only primary care facilities, not all health facilities. A 2008 literature review cites this measure in terms of 1,000 population, not 10,000 population (Kruk & Freedman, 2008). Regardless of the permutation, the rationale behind this measure is that it collects data on the ratio of health resources to the total population. It is more rudimentary than the first indicator and more easily measurable. There are few benchmarks available for this indicator; a comparison with regional or peer-country averages may be the most useful way to gauge it.

- Measuring **basic service capacity** is an area highlighted by WHO in the 2008 *Toolkit*, suggesting a measure based on an index of availability of basic amenities, basic equipment, infection control, health workers, and tracer drugs and diagnostics in a facility. This idea has been echoed by other sources, although how they define the index and what they include vary by source. USAID's HSAA looks only at primary care facilities and states that country standards should dictate the minimum equipment that facilities at each level of care should have available. This tool recommends that "the standard should be obtained directly from the MOH and may include standards or conditions other than presence of certain equipment (e.g., materials, electricity, running water, and laboratory services), in which case this situation should be explained." Walford also notes that WHO supports the use of management capacity indicators but comments that there is limited availability and comparability across countries, due to the wide variations in

what can be considered basic service capacity, and suggests that it would be best to choose these indicators in country (Walford, 2007). The SWEF Research Network does not suggest an index but gives a specific indicator relating to the number of new services offered by type of facility. It also asks about tracer drugs, but does so in the pharmaceutical section. Collecting data on service capacity is important to ensure that the full range of services is available to clients. The absence of capacity standards at the MOH would indicate lack of management capacity for the health system.

- WHO also suggests another **basic service capacity** indicator, this one more **specific to a disease**, such as malaria control, Integrated Management of Childhood Illness, safe motherhood, family planning, HIV/AIDS, control of sexually transmitted diseases, TB control, or control of noncommunicable diseases. These can be measured on their own or in any combination, given the type of facility that is being evaluated. It suggests that a short set of indicators should be devised to measure all the areas mentioned above and suggests indicators for the areas of services offered, staff and training, equipment, diagnostics, and treatment/prevention for each disease. USAID's HSAA does not include such an indicator but does ask about the availability of updated clinical standards for MOH-priority areas, high-burden disease areas, and/or areas responsible for high morbidity and mortality**.** The modularity of this indicator would allow for other high-risk diseases specific to a particular country, such as neglected tropical diseases, to be added. Both of the basic service capacity indices require detailed facility-level information, which increases the difficulty of collecting these data. A facility audit such as the SPA would be the best source for such information.

- The only utilization measure to be cited across multiple sources is the **number of outpatient department (OPD) visits per 10,000 population per year.** In several countries, OPD visit rates significantly increase when constraints to using health services are removed, suggesting this is a good proxy indicator for improved access to care, although only for countries that start with very low rates (WHO, 2007). This measure also can suggest a basic level of functioning in the health system, if poverty is not an overriding concern, because use of OPD visits would stay low despite increased per capita income if services are poor or staff are not present. It is important to note the interaction of this indicator with inpatient beds/visits; in some cases, OPD visits can increase because of constricted supply of inpatient services, reflecting the substitution of ambulatory procedures for inpatient admission. This is not necessarily desirable. However, in most developing countries, especially those where OPD visit rates are strikingly low (such as Uganda,

Burundi, and others), increases in OPD visits would mean increases in primary health care use, so rises in OPD visits would suggest positive movement (Sjönell, 1984).

- **Quality of care** is an area characterized by lack of clarity on indicator definitions. Many sources, including WHO, suggest there are a wide range of indicators to choose from, and each situation may call for different combinations. The WHO-recommended list includes a variety of indicators to choose from, such as providers questioning patients about medications, providers' knowledge of hand hygiene/safety procedure, providers adhering to treatment protocols, patient success at seeing a provider before having to leave a facility, etc. (WHO, 2008). USAID's HSAA also includes a secondary group of indicators that delve more deeply into quality-of-care measures for health service delivery (Islam, 2007). Walford's review for DfID suggests an indicator to cover patient satisfaction and/or wait times (Walford, 2007), but further work is needed to create a usable indicator from this guidance. Kruk and Freedman cite quality-of-care indicators most often used in the literature: providers treating patients with respect, the quality of physician-patient communication, length of wait for care, use of evidence-based diagnostics and therapies, and the rate of avoidable hospitalization (Kruk & Freedman, 2008). RAND Health's *Quality of Care Assessment Tools* is the most well-documented and verified listing of indicators for this area (McGlynn, et al., 2000), but, like ECHIM's more specific indicators, many of these measures are more suitable for the more advanced health and information systems of Eastern Europe and Latin America than for those in the more resource-poor settings of sub-Saharan Africa and South Asia. The context of each evaluation will have to be considered when choosing which quality-of-care indicators to include.

***Issues and Concerns***

A major consideration with all quality-of-care and service capacity indicators is again data availability. Particularly in the case of measuring quality of care, there is a need to consider these indicators in the context of evidence-based guidelines. Not only are these indicators not widely collected at present, some are also very subjective, and poor collection could result in noncomparable or, at worst, useless data. Furthermore, little data on newly emerging diseases may be available or, when available, are limited to endemic areas. For **all** of these indicators, a major stumbling block will be to get data for not only a country's public facilities but also its private facilities. In addition, significantly more value would be gained by gathering these data by facility type, so that these indicators could be disaggregated. For example, it would be very useful to know whether the majority of OPD visits are occurring in rural primary care clinics or in hospital OPDs. Currently, few sources call for this level of detail to be reported.

## Health Workforce

The ability of a country to meet its goals in health depends on the workforce responsible for organizing and delivering health services (WHO, 2008). They are the gatekeepers to health. There is ample evidence that the size and quality of the health workforce are positively associated with immunization coverage, outreach of primary care, and infant, child, and maternal survival, among other outcomes (WHO, 2006a). Unfortunately, there is wide variation in the type, skill, and gender mix in the health workforce across and even within countries (WHO, 2007). This can create chasms in care where the workforce is not sufficient to produce positive gains in health outcomes. Reasons for workforce shortages include geographic biases, migration of health workers within and across countries, poor mix of skills, lack of domestic training capacity, HIV/AIDS and other pandemic-related deaths, and demographic imbalances. Better knowledge of the composition of the health workforce will help countries optimize their use of what is currently available and also plan for changes to be made in the future.

According to WHO, the health workforce includes not only clinically trained health professionals but also nonclinical health management and support workers. They serve in both the public and private sectors. Each country has different workforce needs, which will have to be estimated while taking into consideration the limitations of range, skill mix, and demographics of the currently available workforce.

Among nonclinical health workers, there has been increased interest in those working in health systems research. Consensus among developing countries at the 2008 World Health Assembly was that health systems financing, policy, and management experts were “extremely needed, and that there was a strong demand in the local job markets for such workers” (Rockefeller Foundation, 2008). In order to measure this section of the workforce, there are several hurdles to overcome. First, there is no concrete definition of what constitutes a health system professional. Second, compared to clinical fields, there are fewer professional associations, universities, and international groups who track these types of professions, specifically in health. There are efforts under way to improve this, with WHO and the World Federation of Public Health Associations working on a global mapping of public health schools, institutes, and associations. WHO also is partnering with the University of Copenhagen on the Avicenna database, a global directory of education institutions for health professionals. Until these tools are fully available, and a definition of health systems workers is agreed upon, any indicators related to measuring this section of the workforce should be interpreted with caution.

Compared with the other building blocks, fewer indicator sources deal with health workforce issues as a separate area of health systems. Some address them under service delivery, while others are concerned

primarily with the financing and planning for human resources for health. Still other sources focus on health workforce management, which is more accurately measured at the facility level. WHO expects workforce indicators to cover whether human resources are allocated fairly and efficiently; whether allocation is responsive to change; and whether there are sufficient resources to achieve the best health outcomes. They also mention that the health workforce should be competent, responsive, and productive (WHO, 2007).

Because of workforce mobility, it is sometimes difficult to collect accurate information on specific cadres of health workers. Where there are domestic institutions for training health professionals, it may be more feasible to collect exit data on the number of graduates, although this will not take into account individuals who leave the country or who do not go on to practice. It also will not count health workers who are trained in other countries but migrate after school. Data on the competency and responsiveness of workforces in developing countries are even harder to find, in part because of the ambiguous definition of these measures but also because it may be difficult to separate provider shortcomings from shortcomings of facilities, the supply pipeline, etc. On this subject, there is significant overlap with the service delivery building block.

***Recommended Indicator Sources***

Most sources deal with indicators pertaining to the number and distribution (density) of health professionals rather than the quality of the workforce. The WHO ***Toolkit on Monitoring Health Systems Strengthening*** devotes the majority of its indicators to this type of measure. Its listing includes both general and cadre-specific worker counts per 10,000 population, along with the density of workers by various subcategories (region, profession, sex, place of work). The suggested indicator list in a review for DfID largely follows this approach (Walford, 2007). This is likely because density indicators are already widely available, whereas quality indicators are harder to collect.

**ECHIM's** workforce indicators are included under its health services category (ECHIM, 2008). It also focuses on the number and distribution of the workforce. It includes subdivisions within professional groups (for example, number of physicians practicing versus not practicing). For countries where it is feasible to collect these data, it would be useful to do so.

USAID's **HSAA** also includes density measures but devotes more time to the planning and financing of the human resources system (Islam, 2007). Its indicators deal with topics that other sources may define as part of information systems or finance. Its secondary component contains some indicators that are more

appropriate for collection at the facility or training institution level rather than the national level. For instance, it asks about the incentives and benefits available to staff, in-service trainings, and the review process; these may vary widely from facility to facility and between private and public employers. To report one national-level result would be uninformative.

The **SWEF** Research Network is the only major source that includes indicators that could be considered quality indicators. These indicators deal with periodic training of health workers and supervision. These indicators tend to rely more on data collected by The Global Fund and/or by human resource information systems, both of which have serious problems as sources of publicly available national data.

More promising sources of health workforce data include WHOSIS and the World Development Indicators Database, both of which have many measures of density for various health professions, although in developing countries, some may not be reported as frequently as others. USAID's HSAA suggests using MOH data, provider surveys, private provider groups, and United Nations agencies in country to get rural and urban density data, but any other within-country disaggregation of data on workforce will be more difficult to collect, with data quality suspect in more remote areas. Countries with SPAs will have more complete information.

***Most Recommended Health Workforce Indicators***

There is only one indicator that is mentioned in more than two major sources: a measure of density of the health workforce. There are, however, two other thematic groups that are often mentioned, although a specific indicator will have to be worked out to make them measurable.

- **Number of health workers/health professionals per 10,000 population/per capita/per 1,000 population** is the most often cited indicator for health workforce. This indicator is a necessary, but not sufficient, measure of coverage (HMN, 2006). There are many variations on this indicator, so further research may be needed to decide which combination of options best fits the indicator selection criteria. Some sources allow for all health workers, clinical and nonclinical, to be included (WHO, 2008). More of these sources call for aggregate totals of clinical staff only, while others require this measure by profession, i.e., physicians, nurses, midwives, etc. More data are generally available on the supply of physicians, so they may be used as a "tracer" population, if needed. Because very few developing countries suffer from oversupply of health professionals, any upward movement of this indicator would be considered a positive movement. WHO has found that a minimum of 2.3 physicians, nurses, and midwives per 1,000 population are needed to meet 80 percent coverage of skilled birth attendance (SBA), and cites another study that found a

similar threshold of 2.5 per 1,000 to reach 80 percent coverage for SBA or measles vaccination (Chen, et al., 2004; WHO, 2006a). These numbers have been cited by other sources as a general workforce threshold, but perhaps more work is needed to test for additional basic output indicators other than SBA and measles. Individually, countries can develop rough estimates of optimum and minimum workforce needs using WHO's staffing requirements model (Hall, 2001).

- **Distribution of health workforce** is an area that many sources touched on with various indicators. Distribution is an important modifier to the density indicator, which can be deceiving if distribution is not taken into account. Some suggest measuring rural versus urban densities of health professionals. However, this may not measure geographic barriers or other impediments to care. Another group of sources suggests measuring densities by region and place of work, which give more detailed information but may be harder to collect. The goal would be to decrease disparities in density per capita/per X population across measurement units.

- **Domestic education of health professionals** is another thematic area for which many sources included indicators, although there is no agreement on how to measure them. The WHO *Toolkit* suggests measuring the annual number of graduates of health professions' educational institutions per 100,000 population, by cadre. Several other sources suggest an indicator to capture the number of graduates from health professional schools, but this type of data is sometimes hard to capture even in developed countries and nearly impossible to collect in more resource-poor settings (WHO, 2006a). It is also important to note that the number of graduates does not directly translate into the number of new health workers in a country. For instance, WHO found that a 10 percent increase in the entering class of medical students will result in only a 2 percent increase in the supply of credentialed doctors in 10 years (WHO 2007a). Another source suggests an indicator relating to the number of health professional schools in a country. This indicator is more easily collected but gives little useful information.

- **Indicators to monitor national workforce management.** The WHO *Toolkit* gives additional "output" indicators related to the above input indicators. These measure the government outputs that would produce measures of density. They note that the list is neither exhaustive nor absolute, but they do point out the value of having indicators that can be disaggregated to monitor health workforce management at the country level. USAID's HSAA includes some additional national workforce management indicators, but further research will be needed to merge the two different groups of measures.

***Issues and Concerns***

One concern with measurement of indicators related to the health workforce is whether workers who are not part of the formal health system should be included in the calculation of the indicator. For instance, community health workers play an important role in influencing health outcomes but are not often included in the measurement of the health workforce. Similarly, there may be others who are not formally trained and hence excluded from measurement, even though they play a key role.

## Information

Reliable and timely health information is an essential foundation of public health action and health systems strengthening, both nationally and internationally. The main objective of health information is to provide data to improve health service delivery and provide evidence for policy decisions that will lead to improved health status of the population. A well-developed information system will include all information relevant for health decisionmaking, including financial, programmatic, and geographic information about health services. The need for sound information is especially urgent in the case of emergent diseases and other acute health threats, where rapid awareness, investigation, and response can save lives and prevent broader national outbreaks and even global pandemics (HMN, 2008). The generation and strategic use of information, intelligence, and research on health and health systems are also integral parts of the leadership and governance function (WHO, 2007). Monitoring of the information "building block" therefore needs to capture the generation of data, the quality of the data produced, the creation of information, and the application and synthesis of information into knowledge for decisionmaking that improves health systems operations (Alliance for Health Policy and Systems Research, 2008). Each of these elements can be assessed as part of information performance monitoring. Much emphasis has been placed on information systems that produce data, while, more recently, monitoring and evaluation (M&E) groups and academics have examined the application of information in decisionmaking, as well as the financial and human resources allocated to information systems and application (Hanney, et al., 2003; Islam, 2007; Stansfield, et al., 2006).

A good information system has four main functions – namely, to generate, compile, analyze and synthesize, and communicate and use health data – to help in the decisionmaking process (WHO, 2008). Publicly funded health programs are increasingly being asked to account for their performance, and information systems provide a means of operationalizing this quest for accountability (Perrin, et al., 1999) Their main objective is to produce information for improved health services and evidence-based policy decisions that will lead to improvements in the health status of the population. Although they do not directly improve or reduce health status, reliable and timely health information is an essential foundation of public health action and health systems strengthening, both nationally and internationally. Information is therefore used as a management and oversight tool to improve outcomes through the analysis of changes in outcomes, as well as the processes and capacity being applied to achieve the outcomes (Perrin, et al., 1999).

According to WHO, the key components of the information building block include the generation and use of information; development of health information and surveillance systems; development of standardized tools and instruments; and collation and publication of international health statistics (WHO, 2007). These components should deliver timely and accurate reporting of population- and facility-based data that support decisionmaking and, where relevant, be utilized at the point of collection. The information system should also be able to detect events that threaten public health security so that authorities can investigate and contain the threats. The data provided by information systems also can draw attention to systems that are performing well or populations that are achieving better health as well as to areas in need.

Information systems include **health information systems**, which provide data on health status and integrate data collection processing, reporting, and use of the information necessary for improving health service delivery through better management, and **health management information systems** (HMIS), which are specially designed to assist in the management and planning of health programs, as opposed to the delivery of care. According to the WHO *Toolkit*, indicators of country HIS performance can be grouped into two broad types, namely:

- Indicators related to data generation using core sources and methods (health surveys, civil registration, census, facility reporting, health system resource tracking). These indicators reflect country capacity to collect relevant data at appropriate intervals.
- Indicators related to country capacities for synthesis, analysis, and validation of data. These indicators measure key dimensions of the institutional frameworks needed to ensure data quality, including independence, transparency, and access.

Core sources of information include:

- Population-based data relating to the whole population, not only to groups using health facilities. Such data can be gathered continuously from administrative records, such as census or birth registries, or, periodically, through cross-sectional household surveys (HMN, 2008).
- Institution-based data that produce data from administrative and operational activities. These include patient records, which contain clinical information obtained in the course of providing health care, and administrative data collected as part of the operation of a program, such as billing information or number of patients served.

Different data are needed at different levels of the health system. At a lower level, data regarding a patient, often presented in patient charts, are needed for patient management. At the facility and district levels,

summary indicators are needed for management, planning, and procurement purposes. Indicators also are needed at the district level for planning and reporting to the national level. The national summary indicators are then used for the governance of the health system and regional or global reporting (Islam, 2007). The guiding principles of information systems are that no health data should be requested from a service level to be reported to higher levels that do not have an actionable use at the recording level; health data should be used to analyze and solve important health and service problems; and priority attention should be given to improving data generation and use at the local level, to support the enhancement of service performance at that level (WHO, 2000).

***Recommended Indicator Sources***

The WHO ***Toolkit*** identifies 29 indicators across six categories: country health surveys, birth and death registration, census, health facility reporting, health system resource tracking, and capacity for analysis, synthesis, and validation of health data. These core indicators assess the strength of the system based on the presence and quality of the data generated using core sources and methods (health surveys, civil registration, census, facility reporting, and databases), the reporting of data, and the country's capacity for analysis, use, and dissemination of health data. The *Toolkit* also proposes an overall health information system performance index (HISPIX), a summary measure based on the 29 indicators that captures overall data quality and overall health information system performance. The sources of the data for the indicators in the *Toolkit* and for HISPIX are, for the most part, available within WHO databases and from other international agencies. However, the draft *Toolkit* has not yet identified sources for all proposed indicators.

WHO/HMN and its partners have developed the **Health Information System Assessment Tool**, a self-assessment tool that has been completed by 68 countries to date, with several more awaiting validation (HMN, 2008a). HMN states that the self-assessment approach appears to have worked well, although it will lead to comparability issues. The tool contains more than 125 indicators, also grouped in six areas similar to the WHO draft *Toolkit*: health information system resources (policies, human resources, financing, and infrastructure); indicators; data sources; data management; information products; and dissemination and use. Scenarios are provided that allow for objective rating of the system. From these ratings, an overall measure is calculated.

In its *Framework and Standards for Country Health Information Systems*, HMN describes a minimum set of core health indicators that all national health information systems should be able to report (HMN, 2008). The *Framework* points to the indicators used for World Health Statistics 2005, which were developed in part to use to monitor WHO's efforts to strengthen health information systems. WHO aims for all countries to have systems in place to be able to report on these core indicators, and the extent to

which a national health information system can do so is a measure of the system's quality. The 39 core indicators reflect determinants of health, health status, and health systems, and were selected based on the availability and quality of data. They include a number of indicators to measure progress toward the MDGs.

**The Working Group on Health System Metrics**, which involves HMN, WHO, The World Bank, The Global Fund, and the GAVI Alliance, has chosen one indicator for information systems: the percent of births and deaths registered.

WHO also has a manual titled ***Developing Health Management Information Systems: A Practical Guide for Developing Countries*** to help program managers monitor the establishment and functioning of HMIS. It contains questions and indicators designed to assess data collection processes and identify issues with the current information system, including issues with the use of information. It also demonstrates how to identify indicators that the HIS should collect based on the national health strategy for a given area, such as child health or HIV/AIDS (WHO/WPRO, 2004).

The Global Fund's ***Monitoring and Evaluation Toolkit*** (second edition) provides four examples of information system indicators. Two indicators relate directly to The Global Fund goals: 1) staff and civil society training in M&E and 2) the presence of a nationally coordinated multiyear plan, with a schedule for survey implementation and data analysis prepared (The Global Fund, 2006).

***Health Systems Assessment Approach: A How-To Manual***, developed by the USAID-funded Health Systems 20/20, Partners for Health Reform Plus (PHRplus), RPM Plus, and QAP projects, classifies 26 HIS indicators in seven topical areas: health status indicators for both mortality and morbidity*;* health system indicators; resources, policies, and regulations; data collection and quality; data analysis; and use of information for management policymaking, governance, and accountability. It provides the definition and rationale for each indicator, as well as the sources and caveats. The first seven indicators cover health status and systems (different from the WHO *Toolkit*). These represent data collection for commonly agreed upon indicators of health status and systems. For example, unlike other HIS assessments, it does not measure the existence of survey or vital registry to measure mortality or HIV prevalence but rather uses the indicator itself (under-5 mortality). Whether a given country's HIS has collected and reported these agreed-upon indicators of health indicators is a basic level of function and capacity, and a lack of current data for these critical indicators would also imply serious weaknesses in the information system. The next 19 indicators are concerned with resources and policies (5); regulation of information systems (6); data analysis (6); and use of information for management, policymaking, governance, and accountability (2) (Islam, 2007).

USAID indicators for its ***Strategic Framework for Foreign Assistance Operational Plan*** (Department of State [DOS], 2006) include several indicators that are designed to measure progress in capacity building of information systems within each element. However, they capture only activities conducted by the U.S. Government and do not measure the strength of national information systems. They measure such things as individuals trained in strategic information activities, including M&E; surveillance; the number of host-country institutions with improved management information systems; the number of monitoring plans or number of sector assessments conducted by the U.S. Government.

Other relevant indicators include The World Bank's **Statistical Capacity Indicator**, which is a summary measure that provides an overview of the statistical capacity of developing countries. It was developed to assess the capacity of statistical systems using metadata generally available for most countries. The quality of the statistical system is also important (de Vries, 1998). The **Performance of Routine Information System Management** (**PRISM**) framework developed by MEASURE/Evaluation and John Snow, Inc. (JSI) helps managers assess the performance of HIS in terms of data quality and continuous information use.

No information indicators are explicitly mentioned by the SWEF Research Network, The World Bank's results-based financing in health project, which plans to link funding to performance on five standard indicators, or the CGD Global Health Indicators Working Group. Countries also use a number of measures to monitor performance-based funding schemes, such as the percent of districts with disease surveillance reports, the proportion of districts submitting monthly reports to MOH on time, or the proportion of research findings translated into policy and practice. However, these are extensive, vary widely, and are country specific.

***Most Recommended Information Indicators***

Based on this review, several indicators are recommended by multiple organizations. It is important, however, that indicators be chosen according to their purpose.

- **HISPIX.** The WHO *Toolkit* proposes a health HISPIX, a summary measure based on a set of 29 standardized indicators for assessing data quality and the overall performance of the health information system. The score is calculated from information available from WHO databases and other international agencies. Information on inputs and resources is available from country health

statistics reports and from the self-assessments conducted through HMN. The indicators below are part of the 29 standard indicators.

- **Existence of demographic or household surveys – two or more data points available for child mortality in the past five years.** This indicator measures the existence of demographic or household surveys and is relevant only to countries without complete civil registration systems (less than 90 percent coverage of births and deaths), based on whether the country has had more than one demographic or health survey. Data quality and comparability may be an issue. Because the indicator captures the existence of the survey and not the survey quality, it cannot be used to compare issues across countries. The indicator has a threshold of two or more surveys within the past five years.

- **Percent of births and deaths registered in the country.** This indicator measures the functioning of the vital registration system and the availability of key indicators at the national level. The numerator is civil registration records and the denominator is the census.

- **Percentage of districts that submit timely, complete, accurate reports to national level.** A variation of this is "health facilities or districts reporting all indicators according to national guidelines." This is a measurement of the comprehensiveness of health information management and capacity at the lower levels to provide the data. It also demonstrates the extent to which information is available on a specific disease or service statistic. Sources are administrative records aggregated at the national level.

- **Completion of at least one NHA in last five years.** The existence of an NHA demonstrates (to varying degrees) health systems resource tracking, health systems governance, and decisionmaking. NHAs provide managers with reliable national information on the sources and uses of funds for health. Governments in countries with NHAs can use them to understand how resources are mobilized and managed for the health system; who pays and how much is paid for health care; who provides goods and services; and how health care funds are distributed across the different services.

- **The existence of designated mechanisms charged with analysis of health statistics, synthesis of data from different sources, and validation of data from population and facility sources.** The definition of this concept varies. The HSAA describes it as "the presence of mechanisms to review the utility of current information system indicators for the planning, management, and evaluation process, and to adapt and modify accordingly" (Islam, 2007). The Global Fund describes it as "a

nationally coordinated multiyear plan with a schedule for survey implementation and data analysis prepared" (The Global Fund, 2008). The underlying rationales are similar: to provide some indication of the use of data in program planning.

- **Availability of a national summary report that contains HIS information, analysis, and interpretation (most recent year).** This is an indicator of the capacity for analysis, synthesis, and validation of health data. It also provides a proxy for the national commitment to transparency and data dissemination, and provides stakeholders the opportunity to engage and take action together.

The main difference between the HISPIX and the HMN self-assessment score is that the HISPIX indicators can be assessed externally on the basis of information largely available in the public domain, while the HMN is a self-assessment. However, indicators of health systems resources are not widely available and used by most agencies. The HMN assessments are one of the few sources available that capture the details of health information system resources and data management and quality. The WHO *Toolkit*, HSAA, and HMN all recommend indicators for data use and analysis. The extent to which "use" is measured varies widely. The *Toolkit* includes the indicator mentioned above ("the existence of designated mechanisms charged with analysis of health statistics, synthesis of data from different sources …"), as well an indicator on immunization data validation that does not actually measure data use but rather the establishment of mechanisms to do so. The HMN assessment includes 10 indicators to measure use of data for planning and resource allocation, but countries will vary in their assessment of demonstrated use of data.

Other relevant indicators not widely included for monitoring information system performance are indicators of health systems resource tracking. These indicators, where available, indicate the level of support the government provides to the HIS. Another area that varies includes indicators concerning data quality assessments. WHO is one of the few sources to establish a target for this, specifying that data quality assessments should be carried out and published within the last three years and that assessment should cover all routine data sources.

One indicator that may overlap with the medicines building block of the framework is the existence of information on the availability of tracer medicines and commodities in facilities. Similarly, the indicator of the existence of a national database for human resources may overlap with the human resources building block.

### *Issues and Concerns*

The lack of data availability or an information system itself is an indication of a country's HIS situation and may be useful in determining system needs and where capacity building should occur. Furthermore, several HIS indicators, such as the existence of two or more data points on child mortality, are not a continuous measurement, as in health status, but rather categorically defined as yes or no.

Information systems also are difficult to compare across countries, as rarely has the same assessment tool been applied to all countries, and even when assessed on the same indicator, data quality may be an issue. Often HIS indicators are suited to the local context; data needs will vary according to the epidemiological profile and development (HMN, 2008a). HIS indicators also are difficult to include in progress monitoring, as they lack a proximity to better health outcomes, and progress in information systems is difficult to associate with progress toward better health or reaching MDGs (Walford, 2007).

Differences in health systems, the level of decentralization, and the various economic and social and political contexts also affect the nature and effectiveness of the information system. The World Bank attempts to compare the quality of national information systems through its Statistical Capacity Index. However, the Index does not include health facility reporting and data utilization.

## Medical Products, Vaccines, and Technologies

A well-functioning health system ensures equitable access to medical products, vaccines, and technologies of assured quality, safety, efficacy and cost, and their sound and cost-effective use (WHO, 2007). The lack of affordable access to lifesaving medicines contributes to enormous inequities in health between developed and developing countries and leads to preventable mortality and morbidity, episodes of catastrophic illness that cause further impoverishment, low quality of life, and large-scale economic and health system losses. Economic factors are frequently the most important barriers to access. Measuring and understanding the reasons for prices of medicines and how the price affects consumption of health care are important in helping countries develop and establish policies that ensure the affordability of medicines. Yet cost is only part of measuring access to medicines.

According to WHO, access to and appropriate use of effective medicines require a complex and coordinated system that has five components. It must encompass:

- National policies, standards, guidelines, and regulations that support policy and evidence-based selection of medicines, vaccines, and technologies according to international standards
- Information on prices, international trade agreements, and capacity to set and negotiate prices
- Reliable manufacturing practices and quality assessment of priority products
- Procurement, supply, and storage and distribution systems that minimize leakage and other waste
- Support for rational use of essential medicines, commodities, and equipment through guidelines and strategies that ensure adherence, reduce resistance, and maximize patient safety and training

Monitoring of this building block is closely intertwined with at least two other building blocks – leadership and governance, and information – and, where rational use is concerned, the service delivery building block.

***Recommended Indicator Sources***

The indicators that measure access to medicines in the WHO indicator ***Toolkit*** are constructed around the MDG 8 indicator "Proportion of population with access to affordable essential drugs on a sustainable basis." This was created to monitor the goal of providing access to affordable essential drugs in developing countries, in cooperation with pharmaceutical companies (United Nations, 2008). The target is formulated to capture the extent to which the pharmaceutical sector is contributing to providing access. The contribution of the pharmaceutical sector to access, affordability, and sustainability components of

the indicator depends on both domestic and international factors. However, the data needed to form the MDG indicator has not been collected regularly, and the lack of comparable data is a significant problem.

Given the limitations of the MDG indicator, WHO has broken it down to two components, namely the structure component (policy and legal provisions) and the process component (cost, supply, and use), which contain nine indicators. The nine indicators include measures of national legislation and policies, insurance coverage, cost, and availability of medicines. The *Toolkit* does not include indicators on rational use of medicines. The *Toolkit* itself specifies two indicators. The first is the percent of facilities with tracer medicines and commodities in stock on the day of visit and in the last three months. A supplemental indicator is the median proportion of tracer medicines and commodities in stock on the day of visit and in the last three months. Data for this indicator come primarily from facility visits. However, comparisons across countries may vary based on the epidemiology. The second indicator compares the median local medicine price to the international reference price for a core list of drugs, which also requires the availability of facility data.

The only indicator included in the 2007 draft monitoring plan of the **Working Group on Health System Metrics** is the availability of lifesaving medicines, including those for TB, antiretroviral HIV/AIDS treatment, and malaria (Walford, 2007).

The **SWEF Research Network** included in its list two frequently cited indicators – facilities without stockouts and price paid compared with the international price – but also includes the percent of facilities with expired items, an indicator of quality (SWEF Research Network, 2003). The set included an indicator on affordability (average drug cost per encounter), which would require including a comparison to wages or purchasing power.

USAID's ***Health Systems Assessment Approach: A How-To Manual*** contains 39 indicators related to pharmaceutical management, including national policies regarding medicines, indicators of availability, and procurement and financing (cost) arrangements (Islam, 2007). However, it provides more detailed indicators of procurement, pharmaceutical registration, mechanisms for licensing providers, appropriate use, and quality than the WHO *Toolkit*. It also includes indicators of private and public expenditures per capita on pharmaceuticals and total expenditures on medicines as a percentage of total health expenditures (THE), the latter being a measure of the significance of pharmaceutical spending relative to other spending on health and of financial and institutional sustainability.

In 1999, the WHO Action Program on Essential Drugs, now the Essential Medicines and Pharmaceutical Policies Department, issued ***Indicators for Monitoring National Drug Policies: A Practical Manual*** which proposes a set of 31 background indicators, 50 structural indicators, 38 process indicators, and 10 outcome indicators (WHO, 1999). These indicators are intended for self-use by developing countries to monitor their pharmaceutical systems. The manual allows a country to evaluate the performance of the pharmaceutical sector, monitor progress in the implementation of national drug policies, and assess the effects of changes on drug policy objectives.

The draft ***WHO Medicines Strategy (2008–2013)*** aims to improve medicine-related progress in three areas: policy and access, quality safety and efficacy, and cost-effective use (WHO, 2008a). It measures country progress on four indicators that are assessed from eight specific expected results. The four country progress indicators are access to essential medical products and technologies; availability of and median consumer price ratio for 30 selected generic essential medicines in the public, private, and nongovernmental sectors; national regulatory capacity; and percentage of prescriptions in accordance with current national or institutional clinical guidelines.

To monitor the progress of efforts to improve the global medicines situation and measure important aspects of country pharmaceutical situations, WHO has developed ***Using Indicators to Measure Country Pharmaceutical Situations: Fact Book on WHO Level I and Level II Monitoring Indicators*** (WHO, 2006). Level I indicators measure the existence and performance of key national pharmaceutical structures and processes. Level II indicators measure key outcomes of these structures and processes in the areas of access, product quality, and rational use. These indicators can be used to assess progress over time, compare situations across countries, and reassess and prioritize efforts based on the results.

The Level I and Level II data are gathered through surveys. Level I is a questionnaire completed by health officials, which leads to several data limitations. The interpretation of questions and validation of data are issues, and respondents may not have the resources to provide accurate responses (Carandang & Pierre-Jacques, 2005). Level II indicators are completed through facility and household surveys and have been completed on a smaller sample of countries. It contains 13 questions on pharmaceutical-seeking behavior and affordability. WHO conducted a survey of Level I indicators in 2003 and Level II indicator surveys between 2002 and 2004. A key finding was that most countries have a national medicines policy, but few monitor the policy with indicators. It also was found that many basic policies fundamental to promoting rational use of medicines are not being implemented.

WHO's Action Program on Essential Drugs conducted a global survey (***Public Education in Rational Drug Use: A Global Survey),*** on public education interventions in rational drug use (Fresle & Wolfheim, 1997). The rationale for these indicators is the need to evaluate such interventions by measuring consumer's information and education on medicines and appropriate treatment-seeking strategies.

***Rapid Pharmaceutical Management Assessment: An Indicator-based Approach*** is a manual that presents an indicator-based approach for rapidly assessing pharmaceutical management systems and programs, and contains indicators similar to the WHO Level I and II indicators, although it covers a broader range of topics (MSH/URC, 1995). It presents a set of 46 indicators of performance, grouped under eight topics of pharmaceutical management (policy, legislation, and regulation; essential drug lists; health budget and finance; pharmaceutical procurement; pharmaceutical logistics; patient access and drug utilization; product quality assurance; and private sector pharmaceutical activity).

**The ECHIM Project comprehensive indicator list** (ECHIM, 2008a) and the European Observatory (EO) ***Health Systems in Transition: Template for Analysis*** (Mossialos, et al., 2007) also contain indicators that intend to provide a detailed description of a health system. Both of these sources are geared toward evaluating more developed-country health systems and are mainly concerned with expenditures for pharmaceutical products and the appropriateness of prescribing practices in developed countries. The EO asks about the government's ability to regulate providers. It includes regulatory indicators that could be applied for more developed systems, including regulations on alternative complementary medicines and malpractice. The EO template is one of the only sources to include indicators of patient education.

Other sources containing information on medicines include JSI's ***Logistics System Assessment Tool (LSAT)*** (DELIVER, 2009), which is a qualitative data collection instrument that provides a comprehensive system-level assessment of logistics system performance for any program that manages a health commodity. The indicators can be used to diagnose problems in drug supply systems, management, or procurement. USAID's **Strategic Framework for Foreign Assistance Operational Plan** (DOS, 2006) contains several indicators regarding medicines, particularly on the availability of drugs at U.S. Government-supported locations and the value of drugs purchased by the U.S. Government.

Data on indicators of access to and use of medicines can be obtained from a range of surveys, including **WHS** (health expenditures and insurance, conducted in 2001 and 2007); **NHAs** (cost and expenditure data); WHO/Health Action International (HAI) **national medicine pricing surveys** (prices, availability, affordability, and components of medicine prices in low- and middle-income countries, conducted in 45 countries in 1999, 2003, and 2007); The World Bank **Living Standards Measurement Study (LSMS)**

**surveys** (level and distribution of out-of-pocket payments for health care and extent to which such payments act as barriers to health care access); and USAID-funded **SPA facility surveys** (availability of essential medicines/first-line medicines, indicators for monitoring vaccine storage conditions, adherence to standard treatment guidelines, and quality assurance activities).

***Most Recommended Medical Products, Vaccines, and Technologies Indicators***

From the above sources, the indicators most frequently cited are components of the MDG indicator that collectively try to measure the proportions of national populations that have access to affordable essential drugs on a sustainable basis. Four dimensions are largely captured by the indicators: drug prices, drug availability, affordability (financial burden of drug costs felt by consumers and governments), and quality.

- **Proportion of population with access to affordable essential drugs on a sustainable basis (MDG indicator on health service delivery).** This has not been monitored regularly, and WHO now recommends nine indicators that are components of access to essential drugs.

- **Availability and price of essential medicines.** The average availability of 30 selected essential medicines in public and private health facilities indicates the frequency of stockouts in facilities and the degree of system function in financing, procurement, logistics, and distribution. This is a common measure but detailed definitions vary by country as medicines vary by epidemiological profiles and health goals. Although the WHO global target is 80 percent availability, country-specific targets are required. Furthermore, data may not include all private sector facilities. The median consumer price ratio of essential medicines also has a target set by WHO of not more than four times the world market price. This is an indicator of cost, as well as of procurement efficiency, governance, and corruption. The core list of medicines tends to vary among countries, and therefore, results are often not comparable. The number of facilities (including pharmacies) is sometimes small, leading to large sampling error. Data need to be presented by type of facility and by public and private sectors. To evaluate affordability, several studies have compared medicine treatment costs to a day's wages of the lowest-paid unskilled government worker (WHO, 2008; WHO/AusAID, 2006). This is a useful complement to the actual cost of the drug compared with international prices. Drug availability and price make a composite indicator that includes the following three subindicators:

  - **Percent of facilities that have all tracer medicines and commodities in stock**. The availability of critical supplies and frequency of stockouts in facilities are common measures of how well a

system is functioning in financing, procurement, logistics, and distribution. Alternatively, some surveys may collect data on the percent of facilities that have all tracer medicines and commodities in stock on the day of the visit. Data on medicine availability can be used with data on other components of service capacity to assess the ability of facilities to provide specific services.

- **Median proportion of tracer drugs that are in stock on the day of visit and in the last three months.**
- **Ratio of median local medicine price to international reference price (median price ratio) for core list of drugs.**

- **The existence and year of last update of a published national medicines policy.** The existence of such a policy indicates a commitment to improving pharmaceutical management in the public and private sectors. Data can be found at WHO and MOH Web sites, and in country studies. The WHO target is the existence of a policy updated within the last 10 years.

- **The existence and year of last update of a published national list of essential medicines.** This indicator measures a country's commitment to rational resource allocation and containing pharmaceutical costs. Information can be found in National Essential Medicines Program and WHO reports. The WHO target is the existence of a list updated within the last two years.

- **Standard treatment guidelines.** These indicate the capacity to provide consistent treatment for common health problems. If guidelines exist, evidence-based best practices for treatments of common conditions are reviewed and codified. Data comparability is an issue with this indicator, as guidelines may vary by country. The WHO target is the existence of a policy updated within the last five years.

- **Percent of drugs purchased through competitive bidding of total pharmaceutical expenditures.** A well-organized procurement unit should have this information readily available. This indicator has a WHO target of 80 percent. An estimate of the value would be acceptable in most cases if the question is also asked about the percentage of suppliers that are international versus national or local. However, not all items are best procured through competitive tenders, and country or donor policies may affect purchasing arrangements. In some cases, such as vaccines, there are few reliable suppliers, so these products are usually procured through direct purchase.

- **Appropriate prescription practices and rational drug use.** Several publications provide indicators that assess the quality of drug prescribing and use, which is important for monitoring the impact of essential drugs programs on hospitals, providers, and consumers. Monitoring pharmaceutical use is a timely issue in developed countries, but resources for this are lacking in developing countries. As Laing and his co-authors noted in 2001, policies that affect the health system structure and financing may have negative impacts on individuals' use of pharmaceuticals, with outcomes such as reductions in access or overconsumption. Policymakers should monitor the effects of implementing heath system reforms through key patient use indicators that have already been developed and tested (Laing, et al., 2001).

The WHO Level I and II *Fact Book* includes indicators on policies for rational use, prescribing practices, public education campaigns, and the provision of independent information for providers and consumers (WHO, 2006). The WHO *Toolkit* does not include indicators of use. In general, indicators of use, the presence of a national strategy to contain antimicrobial resistance, and public education on medicines are less frequently mentioned by agencies or countries. Other less frequently mentioned indicators are standards and regulation of traditional medicines, and legal provisions for generic substitutions.

There are several international targets for access to medicines, such as the WHO and Joint United Nations Program on HIV/AIDS (UNAIDS) '3 by 5' indicators for access to HIV/AIDS treatment, the Amsterdam targets for TB treatment, and the Abuja targets for malaria. These are targets for access and end goals; they are less useful for monitoring progress toward improved access and cost.

Another issue is government expenditures on medicines as a percent of the health budget. In 1999, WHO established a target of 20 percent to be sustained over a three-year period. This indicator is not included in the WHO draft *Toolkit*, nor is it widely used by other agencies. The HSAA includes a measurement of government expenditures on drugs but does not set a target. Also, less frequently mentioned is the existence of quality assessment systems for products prior to procurement, such as a drug prequalification process. WHO does not include prequalification as an indicator in the *Toolkit*, although it encourages the use of the WHO/United Nations prequalification program. Regarding traditional medicines, while WHO has put forth guidelines for the registration of herbal medicines and technical guidelines related to safety, efficacy, and quality, most agencies do not assess progress in the use and regulation of traditional medicines as part of HSS activities. However, as of 2007, about 50 countries had a national policy on traditional medicines, and more than 110 had various mechanisms in place to regulate these medicines.

Researchers recently were able to use data from the WHO/HAI surveys to determine drug prices, availability, and affordability in 36 low- and middle-income countries (Cameron, et al., 2008), and other researchers have used 2002 WHS to examine health expenditures and medicine access among respondents in eight countries (Wagner, et al., 2008). The WHS indicators were used to assess out-of-pocket expenditures on medicines and barriers to access to medicines. The second phase of this research is now under way and will involve analytic work to assess the key determinants of medicine access and affordability, and the extent to which health insurance protects households from catastrophic health expenditures, as well as the impact of insurance on cost-related barriers to medicine access (WHO/ PAHO Collaborating Center in Pharmaceutical Policy).

***Issues and Concerns***

Despite the existence of several global and regional price information services, including the WHO/HAI database, data availability on access to and use of medicines is a critical issue. SPAs capture many of the facility-based aspects of medicine availability and prescribing but only have been conducted in a few countries. WHS capture expenditure and insurance information, but the same questions may not be asked in all countries. Product quality is also difficult to assess (other than by expiration date), as are appropriate prescription practices, rational drug use, and user compliance. WHO is working to improve the accessibility of unique drug information at the country level and create one central Web site with links to all medicine-related country information relevant for planning and measuring progress (WHO, 2008).

## Financing

According to WHO, the purpose of health financing is to "make funding available, as well as to set the right financial incentives to providers, to ensure that all individuals have access to effective public health and personal health care" (WHO, 2000). This building block is essential for the operation of a national health system – if financing were to fail, no health promotion or disease prevention would be able to take place.

Health financing refers not only to funds coming from the government but also to funds spent by individuals on their health care (out-of-pocket expenditures) and funds coming from and managed by the private sector, such as employers and insurers. In developing countries, additional funds come from donors and are either administered by donors themselves or given to the government or a private institution to be administered as they do their own funds. Donor funding is not a sustainable source of funding in the long term, so health system plans should include increasing domestic spending on health to eventually bridge the gap currently covered by donor funds. In the short term, increasing the diversity of international donors is important to protect against unexpected discontinuation of funds (WHO, 2007).

As mentioned above, the health financing system also will set financial incentives for providers. These incentives can have positive and negative effects on how health service workers provide care (Christianson, et al., 2007). Ideally, health systems should reward providers who give better care and serve more patients with greater payment, but in practice these "pay for performance" schemes can result in the creation of unintended ("perverse") incentives. Health system planners need to take into account what incentives they are creating when they decide on provider payment methods. These payment design questions have been covered extensively in the health economics literature for more developed countries, as well as for India, China, Russia, and some Latin American countries, but for less-developed countries there has been less study of incentives and payment methods because of the general simplicity of their health finance systems (Schneider & Hanson, 2007).

Ensuring all individuals have access to care requires that financing be available universally, whether through public or private funding. This funding needs to be available in sufficient amounts to cover basic care and prevent financial disaster due to a catastrophic illness (WHO, 2007). The definition of catastrophic health costs is still under debate, but a 2003 WHO-supported study found that three key preconditions for incurring catastrophic health costs were the availability of health services requiring payment, low capacity to pay, and the lack of prepayment or health insurance (Xu, et al., 2003). The

importance of pooling financial risk through prepayment is reiterated in WHO's 2007 *Framework for Action* report (WHO, 2007) and USAID's HSAA manual (Islam, 2007). For poor and vulnerable populations with a low capacity to pay, prepayment may not provide full protection from financial hardship, and WHO encourages taking additional steps to cover their health care costs.

Finally, the supply and demand of health care is dynamic, and thus health financing needs to be able to flow efficiently, effectively, and equitably to the facilities and individuals who need them.

In order to measure whether these aspects of health financing are being met, indicators should cover whether adequate funds are available in ways that ensure access to health care, if the system protects from financial catastrophe, and if there are incentives for providers and users to be efficient with funds (WHO, 2007). In general, the indicators in the sources below fall neatly into these categories. Financing indicators are generally quantifiable, making measurement less difficult. The indicators are also largely at the national level. Other building blocks such as service delivery and information systems will have more district- and facility-level indicators.

***Recommended Indicator Sources***

For finance, the WHO indicator ***Toolkit*** has just two recommended core indicators and one subindicator, reflecting the dearth of reliable financial information (WHO, 2008). It does, however, cover both national expenditures and personal expenditures, and there are also three optional indicators being considered to gather greater information on resource utilization and household impoverishment due to health expenditures.

There is significant overlap in indicators between WHO's *Toolkit* and USAID's **HSAA**, but the latter has more indicators and information on the rationale behind the choice of each. It includes nearly all of the indicators given in the *Toolkit*.

USAID's **graduation report on increased health promotion and access to quality health care** (USAID Program Objective Team 3.2, 2001) includes many of the recommended indicators described below and an indicator for effective payment systems for primary and secondary health care providers. This type of indicator relates to provider incentives and is one of the few sources that touch on this topic. In order to operationalize such a measure, greater detail needs to be given on what counts as an effective payment system.

The **SWEF Research Network** takes a slightly different approach to categorizing indicators but still uses several of the same measures as the WHO *Toolkit*. It also includes measures relating to financial system sustainability, the pace of disbursement of donor and MOH funds, and the verticality of the system. The majority of these additional indicators seem to be of more relevance to funders rather than to the broader health systems community. This is in part because The Global Fund is a disease-specific funding organization and also because the stated purpose of the indicator list is to monitor how The Global Fund's financial support is being used (SWEF Research Network, 2003).

A CGD review of indicators for **MCC** resulted in only one finance-related input indicator on the final MCC list – the portion of total general government expenditure (GGE) that is used for general government health expenditure (GGHE) – but the earlier list included many other financial indicators that were disqualified due to data availability concerns (Becker, Pickett & Levine, 2006). These may become usable later, if data become available. It is notable that The **World Bank Country Policy and Institutional Assessment (CPIA) Index** also relies solely on the GGHE/GGE ration for measuring health financial systems (World Bank, 2007 and 2008).

**MDG** indicators are largely involved in measuring health outputs and outcomes, but two would collect information on how much donor funding is going to health. The **ECHIM Project** includes one indicator on health financing (ECHIM, 2008).

Data availability is possibly the most important criterion for judging health systems indicators. The main data sources for the indicators mentioned in this section are NHAs, household surveys such as DHS and LSMS, and SPA exit interviews. As pointed out earlier by the 2000 *World Health Report*, NHAs are subject to the same quality, validity, and reliability issues as other data sources from less-developed countries but are nonetheless an important part of estimating the efficiency of national health systems (WHO, 2002). WHO worked from the data available in full NHAs from 67 countries to choose its financial indicators. In some cases, additional disaggregated data can be taken from The World Bank's public expenditure reviews.

***Most Recommended Financial Indicators***

From these sources, we found a collection of indicators recommended by multiple organizations.

- **THE per capita** is one of the financial indictors most often cited, as it is a commonly collected indicator that measures the availability of resources for health. While there is not a direct linear

relationship between expenditures and health at all expenditure levels, a 2001 study found that at low expenditure levels, health system efficiency is positively related to health expenditure per capita (Evans, et al., 2001). Performance sharply increases with expenditure up to about $80 per capita per year. According to the WHO's Commission on Macroeconomics and Health, basic essential health care services would have required expenditures in 2007 of at least US$34 [US$30–40] per capita per year in low-income countries (WHO, 2001). Countries spending below this threshold are likely to have poor access, a low quality of health care, or both (Kruk & Freedman, 2008).

- **THE as a percent of gross domestic product (GDP)** is cited as often as THE per capita. Some would argue that this measure is not as easily interpretable, and HMN has noted that a target specifying a minimum threshold for this indicator is not very useful on scientific grounds (HMN, 2006). For the purposes of determining graduation countries in its E&E region, USAID also has set a minimum threshold for this indicator (USAID, 2001).

- As mentioned earlier, another often-cited indicator is **GGHE/GGE**. This indicator illustrates the level of government financial support to the health sector relative to other financial commitments. This is one way to quantify the political support for health within a country. According to the Abuja Declaration, 15 percent or greater GGHE/GGE would reflect that health is a high priority in that country. However, as with THE per capita, when GGHE/GGE is already high, increasing it will not necessarily be a positive movement. This indicator will have to be gauged using country context.

Two other notable indicators are the **amount of total donor spending on health as a percent of THE** and the **percent of government health spending that reaches the poorest income quintile:**

- The first is an indicator that measures how sustainable health funding is in a country. If donor contributions to a country's total health spending are above 10 percent, a significant burden would be placed on private spending if donor contributions are withdrawn (Islam, 2007).

- The second of these indicators deals with equity in resource allocation and risk protection, which is very important, but there is no easily applicable threshold that would be appropriate in every situation, and data collection for this would be difficult (Walford, 2007). Whether or not this particular indicator is used, there is a need for some type of measure dealing with the equity of health care finance in order to describe a population's exposure to catastrophic health

expenditures. Several similar indicators deal with the financial risk households are exposed to by health expenditure, but there is a lack of consensus on how best to measure this. The WHO *Toolkit* suggests using a **ratio of out-of-pocket expenditures to total health expenditures**, but it also considers the percent of the population incurring catastrophic health expenditures, which is a measure also suggested by DfID. Other sources approach this question by measuring not the exposure to risk but the extent of protection against such risk. ECHIM includes a measure related to the percent of the population covered by prepaid care/health insurance, as does an academic literature review (Kruk & Freedman, 2008). Risk pooling through insurance and prepayment are acknowledged to be the best ways to increase financial protection against health expenses and equity of health financing (Gottret & Schieber, 2006). While insurance and prepayment schemes may not be widely used currently, including an indicator to measure insurance/prepayment could encourage the creation of such programs. Clearly, there is still considerable discussion on how to capture these data and what types of thresholds would be appropriate. The World Bank's work on the idea of affordability, notably by Wagstaff and van Doorslaer, has contributed to a better description of the difficulties of measuring this indicator (Wagstaff, 2002; Wagstaff & van Doorslaer, 2004).

- **Indicators to monitor country actions for strengthening health financing.** The WHO *Toolkit* gives additional "output" indicators related to the above input indicators. These measure the government outputs that would produce measures of resources. Some of these indicators are collected under information systems in other sources, while others, such as government expenditures on salaries and number of people covered by health insurance, are mentioned as stand-alone indicators in other sources under finance.

In an extensive literature review, THE per capita and donor spending on health as a percent of THE were found to be among the most often used in evaluations of health systems. The authors discuss the data availability for these indicators, as well as perhaps a stronger link to health outputs and outcomes (Kruk & Freedman, 2008).

### *Issues and Concerns*

To have cross-country comparability, it is important that the classification of health expenditures be standardized in NHAs. Particularly in the first round of NHAs, it was not possible to disaggregate total expenditures by function due to country-by-country variations in classifying funds (Nandakumar, et al., 2004). Until this standardization occurs, any indicator based on this data will have to be used with caution

across countries. The OECD has published a very complete guide to data collection for its own work on its System of Health Accounts, which may be a good basis for standardization (OECD, 2000). Expenditure data in household and facility surveys also will be of concern due to the lack of monetization of markets in many countries, so dollar amounts may not always capture the total cost of a transaction (Kahn & Hotchkiss, 2006). It is important, however, to collect whatever information is available on the personal cost of health care to measure household hardship due to health care.

## Leadership and Governance

Governance in health systems is about establishing effective rules in the institutional arenas for policies, programs, and activities related to public health functions in order to achieve health sector objectives (USAID, 2008). These rules determine the roles and responsibilities for three sets of actors: state actors (who include policymakers and other government officials), health service providers, and service users. Determining the roles and responsibilities among these three sets of actors can reduce the hierarchical or authoritarian nature of public sector bureaucracy, often a core obstacle to the practice of good governance within health systems (Doherty & Gilson, 2006). According to WHO, this building block (also referred to as stewardship) is the most complex but critical building block of any health system (WHO, 2007). There is no clear blueprint for effective health leadership and governance. Although governance is ultimately the responsibility of the government, leadership and governance functions are carried out at lower levels, as well. Furthermore, as the concept of governance/stewardship in the health sector is relatively new, there is little guidance for the collection or standardization of information on this aspect of the health system (Islam, 2007).

The rationale for governance and accountability is that health systems are responsible for the improvement of population health in an equitable manner, and those affected by decisions and policies that affect well-being must have an understanding of and ultimate control over that system. Such control requires reasonable accountability from the government (Daniels, et al., 2000). Good governance has been shown to correlate with property rights, civil liberties, greater foreign investment, and increased aid effectiveness. These clearly have relevance to health care (Lewis, 2006). Good governance also includes evidence-informed policymaking and knowledge generation and dissemination.

Governance has been the subject of multiple definitions and interpretations that derive from different purposes (USAID, 2008). Some definitions concentrate on technical government functions and how they are administered. The World Bank views governance as economic policymaking and implementation, service delivery, and accountable use of public resources and regulatory power. It divides governance into six dimensions: voice and accountability, political stability, government effectiveness, regulatory quality, rule of law, and control of corruption. Other definitions address how government connects with other sectors and with citizens. For example, USAID considers health governance as the process of "competently directing health system resources, performance, and stakeholder participation toward the goal of saving lives and doing so in ways that are open, transparent, accountable, equitable, and responsive to the needs of the people" (Brinkerhoff, 2007). Different United Nations agencies have

various descriptions of governance, while WHO prefers the concept of governance as stewardship, "the careful and responsible management of the well-being of the population" (WHO, 2000).

Better governance influences health in various ways. For example, it can:

- Improve the policy process in the health sector by greater use of data, evidence, and policy research, and increase the extent to which policy processes are informed by independent, valid research and analysis, and are open and accessible to citizens
- Improve accountability and transparency, and reduce corruption, informal payments, fraudulent billing, and employee theft by installing fee collection systems or facility-level accounting and reporting systems and by monitoring the sale of publicly funded drugs in the public and private sectors
- Enhance participation at local levels by providing information to the public on citizens' rights and duties in health sector activities and increase participation by civil society and community groups

To achieve better governance, WHO helps governments develop health sector policies and frameworks, design regulatory frameworks, support greater accountability, generate and interpret intelligence and research on policy options, build coalitions, and work with other partners (WHO, 2007).

According to USAID's Health Systems 20/20 project, governance indicators are of two types:

1. Rules-based indicators, which measure whether the government has established key rules or policies in the health sector, such as a national essential medicines list or a national policy on malaria control. These indicators cannot be measured along a continuum and are discrete achievements.
2. Outcome-based indicators, which measure whether rules and procedures are being effectively implemented or enforced based on the experience of relevant stakeholders. These include integration and responsiveness indicators that measure aspects of hospital or facility organizational structure and functioning, such as information use and technology, coordination among staff, and use of standardized protocols.

***Recommended Indicator Sources***

**The WHO draft *Toolkit on Monitoring Health Systems Strengthening*** classifies indicators into the rules-based and outcome-based categories. There are 10 rules-based indicators that result in a Policy

Index for assessing overall policies, regulations, and strategies in relation to the health sector. The *Toolkit* also has six select markers of governance: health worker absenteeism, government funding reaching the district level, stockouts, informal payments, pharmaceutical regulation, and the existence of civil society organizations. The *Toolkit* also uses The World Bank's CPIA Index to provide a composite measure of governance. Again, the indicators overlap with the medicines and HIS sectors.

The WHO Regional Office for the Eastern Mediterranean (EMRO) has developed an analytical framework that intends to measure the governance function of the health system at the national and subnational levels (WHO/EMRO, 2007; Siddiqi, 2008). It assesses nine principles of governance: strategic vision; participation and consensus orientation; rule of law; transparency; responsiveness; equity and inclusiveness; effectiveness and efficiency; accountability; and intelligence, information, and ethics. These nine principles are divided into 100 broad and specific questions that use data from both publicly available information and key informant interviews. The framework includes interviews with private sector NGOs but does not include interviews with civil society organizations (CSOs) or measures of clinical governance from interviews with health system users. While the results help identify strengths and weaknesses, they are qualitative and not comparable between countries. The framework has been applied in nine countries, including Afghanistan, Egypt, Pakistan, and Sudan. The questionnaire is available, but we have not been able to find results of the country assessments.

PAHO also has developed a tool to assess government stewardship in providing "essential public health functions" (EPHF) (PAHO, 2008). The EPHF are the fundamental set of actions that governments should perform in order to improve the health of populations. PAHO has developed a methodology that allows health ministries to evaluate in a comprehensive manner their public health systems, including health infrastructure, management, and financing, and evaluate their performance in the 11 functions. It has practical use as a framework for understanding the MOH service delivery capacity and role, and can be used as an M&E tool by governments. It was initially conducted in 41 Latin American and Caribbean countries in 2001 and 2002, and since then many countries have continued monitoring the status of EPHF not only at the national level but at the subnational level, as well.

**USAID's HSAA** instructs on how to use indicators to gauge the overall government context and the capacity of the government in five dimensions (Islam, 2007). For the overall governance environment, the HSAA uses the six World Bank indicators of government effectiveness, as well as indicators from five dimensions of governance: information/assessment capacity, policy formulation and planning, social participation and system responsiveness, accountability, and regulation. Several indicators overlap with indicators for information systems, medicines, and financing. There are criteria and guidance given on

how to weigh the information and produce a balanced assessment, although there are few questions that can be answered with quantitative data. The HSAA has far more indicators on regulation and social responsiveness than WHO and other agencies; however, unlike other groups, it does not include indicators of disparity between quintiles or regions.

USAID Missions have included health governance indicators as part of results frameworks under the Democracy and Governance Strategic Objective. USAID/Guinea, for example, in its results framework measured progress toward "improved effectiveness, accountability, and transparency of government institutions in the productive and social sectors," using the indicator "percentage of target CSOs which have formed effective partnerships with local government delivering services." For the objective "Strengthened Civil Society and Advocacy," one indicator used by the Mission was "Percent of CSOs that effectively monitor government public services." These are examples of indicators that could be modified to be potentially collected across countries. The USAID Democracy and Governance Office also developed the ***Handbook of Democracy and Governance Program Indicators*** (Hyman & Silver, 1998). While there are no health sector indicators, it offers insight into the challenges of applying performance measurement indicators for governance.

DfID has adopted the use of "country governance analysis" to help guide aid allocations to countries (DfID, 2008). These analyses examine the capability (stability, regulation, trade/growth, effectiveness, security); accountability (transparency, free media, rule of law, elections); and responsiveness (rights/liberties, pro-poor, equality, regulation, corruption) of the government. Assessments are based on existing national and international data. They are relatively new and have not been completed for many countries.

The **Working Group on Health System Metrics** comprises HMN, WHO, The World Bank, The Global Fund, and the GAVI Alliance uses The World Bank's CPIA Index, which rates countries against a set of 16 criteria grouped in four clusters: (a) economic management; (b) structural policies; (c) policies for social inclusion and equity; and (d) public sector management and institutions. In addition to macroeconomic management, the assessment criteria include trade and financial policies; business regulation; social sector policies; the effectiveness of the public sector; and transparency, accountability, and corruption.

As a response to improve the health indicators of the Millennium Challenge Account (MCA), the CGD Global Health Indicators Working Group reviewed indicators for their overall utility and their relationship to poverty and good governance. Good governance and development policies are key considerations of

aid allocations from the MCA. The Group's report, ***Measuring Commitment to Health***, specifies indicators that reflect a government's commitment and allocation of resources to reach the underserved and its selection of interventions (Becker, Pickett & Levine 2006). It chose eight proxy indicators (complete diphtheria-pertussis-tetanus immunizations [DPT3], government public health expenditure, under-5 mortality rate, contraceptive prevalence rate, unmet need for family planning, stunting, skilled birth assistance, and access to water) to reflect a government's health policies and commitment to health. These are actually output indicators but are included here to demonstrate the different concepts of measuring governance.

The Global Fund's **March 2008 addendum** to its 2006 ***Monitoring and Evaluation Toolkit*** provides guidance on indicators of governance, including six examples (such as number of CSOs partnering with public/private providers to deliver services and frequency of audits or reviews of performance). Rather than specify indicators, it strongly encourages countries to use existing in-country indicators such as those that are part of a program-based approach (including the Sector-Wide Approach) or other national strategic frameworks that meet Global Fund M&E requirements. Governance indicators may be indicators of equity of access and coverage of essential services by regions quintile or vulnerable population groups. Appropriate targets are set using country-specific baselines and resources (The Global Fund, 2008).

The **SWEF Research Network** working group primarily focuses on governance of the policy process, fairness in resource allocation, and donor harmonization. It is one of the only sources to include indicators on the number of public/private partnerships for services and the number of new private providers, which measure private sector involvement in health care, the government's understanding of the role of the private sector, and ease of entry into the market. These are goals of The Global Fund, and private sector involvement may not be a suitable indicator for all countries.

Other sources of governance indicators include **"corruption evaluations"** to help policymakers measure corruption in the health sector and identify possible ways to intervene to increase accountability, transparency, citizen voice, detection, and enforcement; control discretion; and reduce monopoly power (Vian, 2008). Sources of data to identify corruption include corruption perception surveys, expenditure surveys, qualitative data collection, and reviews of control systems. Other indicators that have been identified for capturing poor governance in health service delivery mismanagement include leakage of drugs and supplies, patients providing in-kind supplies and drugs, staff absenteeism, and informal payments (Lewis, 2006). **Benchmarks of Fairness**, a generic matrix for assessing health systems reform in developing countries (Daniels, et al., 2000), includes benchmarks for democracy, accountability, and empowerment. The democracy benchmark has eight field-tested and measureable criteria (indicators),

such as the existence of procedures for evaluating services, resource allocation with transparency, and fair grievance. Because of the adaptive framework, it is a promising tool for cross-country comparability (Alliance for Health Policy and Systems Research, 2008). The USAID **Strategic Framework for Foreign Assistance Governance Indicators** quantify how USAID Missions are improving governance in USAID-assisted areas and at the national level (DOS, 2006). A corruption perceptions index (CPI), public sector opinion surveys, and corruption barometers are available from **Transparency International** (TI); however, they do not cover any health-specific indicators. Among the 11 institutions that provide data for the CPI, none are health institutions or organizations. TI and a partner organization, CIET International, have implemented public opinion surveys, institutional surveys, case studies, and social audits that measure governance of local health institutions or health boards. However, these case studies are typically qualitative assessments for specific purposes and are not comparable across countries.

Another indicator used by Political Risk Services in its ***International Country Risk Guide*** is a measure of institutional/bureaucratic quality (PRS Group, 2009). This indicator captures the result of good governance, although not necessarily in the health sector. It has been used in research to analyze the relationship between governance and health and education. Its role, however, has not been clearly captured in such analyses.

***Most Recommended Leadership and Governance Indicators***

The indicators most frequently cited are measures of accountability and social participation. Government expenditure on health is also frequently used, although this overlaps with financing measures. Sources varied widely in the use of governance indicators, although several include the CPIA in their overall assessment. Often governance indicators must be established within local contexts and aligned with local goals. Some general descriptions include:

- **WHO Policy Index.** WHO proposes universal use of 10 yes/no indicators that assess if a country has adopted WHO-recommended policies, regulations, and strategies in relation to 10 areas of the health sector (WHO, 2008). The 10 policy items are rated as zero (adequate policy does not exist or cannot be assessed) or one (adequate policy is available). The proposed index does not aim to assess enforcement, as this may be captured by other indicators within the health system components. The indicators include the existence of a national health strategy; an essential medicines list and policy on drug procurement; a national policy on child, maternal, and reproductive health; national policies on malaria and TB; and participation in the United Nations General Assembly Special Session (UNGASS) composite policy index questionnaire.

- **Existence of an up-to-date national health strategy linked to national needs and priorities.** The strategy should follow internationally accepted policy standards and guidelines (e.g., the international code of marketing of breast milk substitutes, international standards of care). These measures indicate government stewardship and capacity to develop, implement, and monitor legislation and guidance on public health and health system issues. Comprehensive health policy and planning processes integrate health system information, public input, and evidence-based recommendations for action. The target is for each health goal to conform to standard international policies. Comparability is an issue, as the regulation and enforcement of policies, and the processes by which they are set, vary by country. Data are found within MOH documents or reports. This indicator is also part of the WHO Policy Index.

- **Health worker absenteeism in public health facilities**. This indicator is also an indicator of regulation (see below).

- **Proportion of government funds that reaches district-level facilities**. The rationale for this is that governance in health financing can be assessed by monitoring not only overall levels of health spending but also equity in allocating budgets and efficiency in ensuring that spending reaches health facilities and the poor. Data can be gathered from Public Expenditure Tracking Surveys, NHAs, and/or MOH records.

- **Health service delivery: Stockout rates of essential drugs in health facilities.** This indicator is also part of the medicines component of health systems (see Medical Products, Vaccines, and Technologies section).

- **Pharmaceutical regulation: Proportion of pharmaceutical sales that consist of counterfeit drugs.** This indicator is also part of the medicines component of health systems (see Medical Products, Vaccines, and Technologies section) and one of several often-used indicators of regulation (see below).

- **Accountability indicators.** These measure the government's ability to answer questions, meet reasonable expectations of the system, and address negligent or corrupt actions. There are many measures of this, and researchers approach accountability using different paradigms and measure different outcomes (Alliance for Health Policy and Systems Research, 2008). They include

indicators of civil society participation in decisions, although the range and impact of civil involvement are difficult to compare. Some agencies (USAID among them) include the existence of a free and scientific press, watchdog organizations, and an independent judiciary as a requirement for accountability. Other measures of accountability include the existence of fair grievance procedures, such as dispute resolution, that are available to the public. Data likely come from interviews of stakeholders.

- **Disparity in coverage between lowest- and highest-income groups/regions/rural/urban areas.** Equitable coverage demonstrates rational and transparent resource allocation. However, comparability is an issue, as the size of the different groups or regions affects result and may limit the usefulness of country comparisons of data. Data can be found in household surveys.

- **CPIA Index.** The World Bank's CPIA Index is based on a set of criteria captured in 16 subcomponents grouped in four clusters: (a) economic management; (b) structural policies; (c) policies for social inclusion and equity; and (d) public sector management and institutions (World Bank, 2007 and 2008).

- **Proportion of informal payments within the public health care system.** Informal payments can reduce the utilization of services by patients who cannot pay and reduce the quality of care from loss of revenue at facilities. The frequency of **informal payments** is often used in studies and interventions. Data can be gathered from household surveys, corruption perception surveys, and key informant interviews, although the latter are subjective, subject to measurement error, and can only provide a rough indication of trends.

- **Regulation.** The most frequently cited indicator is pharmaceutical regulation, which itself has many measures, including "the existence of adequate regulation to ensure the safety, efficacy, and quality of medicines" and "the proportion of pharmaceutical sales that consist of counterfeit." Regulation of medicines and procurement overlap with the medicines sector indicators. Indicators also can include absenteeism, accreditation, and licensure of health professionals, although these may overlap with the workforce sector. Data on regulatory and enforcement policies may be available at the MOH; other sources include key informant interviews and facility surveys.

- **Social responsiveness**. One goal of many donor-funded health reforms is to increase the extent to which citizens of a country are able to participate in health policy decisions. These indicators measure the government's ability to facilitate collaboration among government, civil society, and

other stakeholders to participate in the planning, budgeting, and monitoring of activities in the health sector. They include voice and accountability and whether CSOs empower individuals to express their views to government bodies. Indicators frequently relate to the **number of civil society members or civil groups trained**. Indicators for this objective vary depending on the country context and may not be relevant in all situations. Data likely come from interviews of stakeholders.

One measure that overlaps with health service delivery is evaluation of staff performance. Evaluations can improve the accountability of the government in providing appropriate services and monitor the responsiveness of the public health sector. They also can measure staff absenteeism or adherence to regulations and protocols. Indicators on patient expenditure are not included here and would overlap with financing. Both the DHS and WHS can provide data on inequity, and WHS can provide data on expenditure. Neither the WHS or DHS questions distinguish between formal and informal payments.

***Issues and Concerns***

Data availability is a critical concern when selecting indicators. Several indicators have data available for most countries in the public domain, using sources such as household surveys, World Bank indexes, and Transparency International's CPI and Global Corruption Barometer survey. Currently, there is no health-specific policy and institutional assessment tool, but WHO is proposing one based on measures in The World Bank's CPIA (WHO, 2008). The CPIA itself is not yet suitable to be deconstructed into a health-specific index (Bos, 2006). There are five health- and education-related indicators in the CPIA under the "building human resources" dimension. These five indicators are similar to the WHO Policy Index and account for 1.67 percent of the total score, with an overall correlation with the CPIA of .76. Recent discussions and recommendations for revising the CPIA included recommendations for evaluating national poverty reduction policies and social policies but not for increasing the significance of health sector in the score. There are other issues in creating a health-specific CPIA, including the inclusion of the overall country policy framework in any assessment of health governance.

Another general concern is the simplistic nature of some indicators. For instance, the WHO indicator on the existence of a country health strategy is a yes/no indicator that does not capture the breadth of how governance may affect health outcomes. Governance indicators also are not always sector specific. As a result, it is not always possible to disaggregate them to be health sector specific. They often capture a composite picture of a country's governance but not down to the sector level. A good example is the set of governance-related indicators that are part of the MCC category of Ruling Justly.

The comparability of measures of governance is also a challenge, as the definitions and contexts of governance vary across countries and depend on the degree of development. Moreover, in any external assessment, data for many indicators must still be gathered in collaboration with the MOH. Reliable reporting of data is also a concern. There have been no systematic reviews on governance or accountability in health systems, and research analytic frameworks and measurements vary widely (Alliance for Health Policy and Systems Research, 2008). Research responses are often qualitative, which affects their quality. For example, the assessment of data reliability and the quality, timeliness, and extent of data use are graded according to qualitative answers on seven questions. The methodology and issues concerning corruption perception surveys also are currently being debated. The perceptions of the public regarding services will vary according to local circumstances, and perceptions can be different from actual behaviors. The level of decentralization and the development of information systems also affect many aspects of financing and policy measures.

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# Appendix 1: Indicators by Organization

| HS Building Block/ Indicator | Threshold/Benchmark/Target | WHO [a] | USAID HS 20/20 [b] | MCC/MCA (long list) [c] | Literature review [d] | MDG [e] | World Bank [f] | SWEF [g] | ECHIM [h] | DFID [i] | USAID E&E Grad.[j] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Service Delivery | | | | | | | | | | | |
| *Number and Distribution of in-patient beds per 10,000* | No threshold set- A greater number of hospital beds suggests that there is a greater availability of inpatient health services. Conversely, some countries (e.g., members of the Organisation for Economic Cooperation and Development) have witnessed a downward trend in hospital beds per 10,000 population as outpatient surgery increases. | X | Total # of Hospital beds per 10,000 pop. | Hospital bed density | | | | | Total # of Hospital beds per 100,000 pop. | | |
| *Number and distribution of health facilities per 10,000 pop.* | Although few benchmarks are available, a comparison with key neighboring countries may be instructive. | X | # of primary care fac. per 10,000 pop | | Hospitals per 1,000 pop. | | | | | | |
| *Proportion of Health facilities that meet basic service capacity standards - general and specific* | No threshold set - increases are considered positive movement. | X | | | | | | | | | |

| HS Building Block/ Indicator | Threshold/Benchmark/Target | WHO [a] | USAID HS 20/20 [b] | MCC/MCA (long list) [c] | Literature review [d] | MDG [e] | World Bank [f] | SWEF [g] | ECHIM [h] | DFID [i] | USAID E&E Grad.[j] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Number of out-patient dept. (OPD) visits per 10,000 pop per year* | This is related to the number of inpatient visits- in some developed countries outpatient visits increase because in patient visits are decreasing, reflecting the greater use of ambulatory procedures instead of procedures requiring admission. In some instances this reflects overuse, and a decrease in OPD visits would be positive movement. This would also be true in urban areas of developing nations when access to inpatient care is restricted, resulting in overuse of OPD (Holdsworth, Garner and Harpham, 2006). However, In other instances, such as in countries where use is strikingly low (Uganda, Burundi, etc, possibly in the ballpark of 500/10,000 or less), an increase implies increases in primary care use. Therefore, an increase in this number suggests positive movement (Sjonell, 1984). | X | | | | | | | X | X | X |
| *Service Quality/Quality of Care indicators* | Category of indicators; more definition of indicators is needed before a threshold is set. | * | * | | * | | | | | * | * |
| Percentage of people living within X kms of a health facility | No threshold set - No distance set. The values for this indicator will vary by type of geography. | | X | | … within 10km | | | | | | |
| Percentage of primary care facilities that are adequately equipped | No threshold set. | | X | | | | | | | | |
| Number and distribution of health facilities with basic service capacity per 10,000 | No threshold set. | X | | | | | | | | | |
| Basic and comprehensive obstetric care facilities per 500,000 | Minimum of four basic emergency obstetric care facilities and one comprehensive emergency obstetric care facility per 500 000 population (WHO, 2005). | | | | X | | | | | | |

| HS Building Block/ Indicator | Threshold/Benchmark/Target | WHO [a] | USAID HS 20/20 [b] | MCC/MCA (long list) [c] | Literature review [d] | MDG [e] | World Bank [f] | SWEF [g] | ECHIM [h] | DFID [i] | USAID E&E Grad.[j] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of primary care or outpatient visits per person to health facilities per year | In most developing countries, a higher utilization rate of public sector health services (compared to the private sector) may be desirable, because it suggests access to facilities and a degree of trust in the public system. However, to interpret this indicator, a regional average is needed (Islam et al., 2007). | | X | | | | | | | | |
| Availability of updated clinical standards for MOH priority areas, high burden diseases areas, and/or areas responsible for high morbidity and mortality | Yes/No - definition of "updated" not given. | | X | | | | | | | | |
| Number of new services offered by type of facilitiy | No threshold set. | | | | | | | X | | | |
| Average hours that priority services are offered per week | No threshold set. | | | | | | | X | | | |
| The ratio of health care professionals to the population | See workforce section. | | X | | | | | | | | |
| Financial access (select an indicator based on available data) | This is a category of indicators. Indicators need to be defined before a threshold is set. | | * | | | | | | | | |
| User fee exemptions and waivers | No threshold set. | | X | | | | | | | | |
| Private sector service delivery | High private sector use can indicate an unmet demand for health services in the public sector, perhaps due to poor quality issues or access constraints (Islam et al., 2007). | | X | | | | | | | | |
| Existence of corporate social responsibility (CSR) programs that offer health services among the country's largest employers | Yes/No | | X | | | | | | | | |

| HS Building Block/ Indicator | Threshold/Benchmark/Target | WHO [a] | USAID HS 20/20 [b] | MCC/MCA (long list) [c] | Literature review [d] | MDG [e] | World Bank [f] | SWEF [g] | ECHIM [h] | DFID [i] | USAID E&E Grad.[j] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Quality Assurance system that monitors the service quality of health care facilities | No threshold set. | | | | | | | | | | X |
| Public /Private indicators | This is a category of indicators. Indicators need to be defined before a threshold is set. | | | | | | | X | | | |
| Pregnant women who received 1+ antenatal care visits (%) | | | X | | Pregnant women receiving 4 ANC visits | | | | | | |
| Life expectancy at birth, total (years) | | | X | | | | | | | | |
| Mortality rate, infant (per 1,000 live births) | | | X | | | | | | | | |
| Maternal mortality ratio (per 100,000 live births) | | | X | | | | | | | | |
| Prevalence of HIV, total (% of population aged 15–49) | | | X | | | | | | | | |
| Percentage of births attended by skilled health personnel per year | | | X | | | | | | | | |
| DPT3 immunization coverage: one-year-olds immunized with three doses of diphtheria, tetanus toxoid, and pertussis (DPT3) (%) | | | X | | | | | | | | |
| Contraceptive prevalence (% of women aged 15–49) | | | X | | | | | | | | |

| HS Building Block/ Indicator | Threshold/Benchmark/Target | WHO [a] | USAID HS 20/20 [b] | MCC/MCA (long list) [c] | Literature review [d] | MDG [e] | World Bank [f] | SWEF [g] | ECHIM [h] | DFID [i] | USAID E&E Grad.[j] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Health Workforce** | | | | | | | | | | | |
| *Number of health workers per 10,000 pop* | Use the staffing requirement model developed for the WHO to determine thresholds (Hall, 2001), or the WPRO Workforce Projection Tool. The WHO found that a minimum of 2.3 physicians, nurses, and midwives per 1000 population were needed to meet 80% coverage of skilled birth attendance (SBA). Another study found a similar threshold of 2.5 per 1000 to reach 80% coverage for Skilled Birth attendants (SBA) or measles vaccination (WHO, 2006). These numbers have been cited by other sources as a general threshold for all basic health interventions, but perhaps more work is needed to test for other basic output indicators other than SBA and measles. | X | | | | | | X | X | X | X |
| *The ratio of doctors (physicians), nurses, midwives, pharmacists, and laboratory technicians, per 1,000 population* | Use the staffing requirement model developed for the WHO to determine thresholds (Hall, 2001), or the WPRO Workforce Projection Tool. The WHO found that a minimum of 2.3 physicians, nurses, and midwives per 1000 population were needed to meet 80% coverage of skilled birth attendance (SBA). Another study found a similar threshold of 2.5 per 1000 to reach 80% coverage for Skilled Birth attendants (SBA) or measles vaccination (WHO, 2006). These numbers have been cited by other sources as a general threshold for all basic health interventions, but perhaps more work is needed to test for other basic output indicators other than SBA and measles. | | X | Densities | Nurses and MDs per 1,000 pop | | | | X | | |

| HS Building Block/ Indicator | Threshold/Benchmark/Target | WHO [a] | USAID HS 20/20 [b] | MCC/MCA (long list) [c] | Literature review [d] | MDG [e] | World Bank [f] | SWEF [g] | ECHIM [h] | DFID [i] | USAID E&E Grad.[j] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Distribution of health workers by profession/ specialization, region, place of work, and sex* | Use the staffing requirement model developed for the WHO to determine thresholds (Hall, 2001), or the WPRO Workforce Projection Tool. | X | | | | | | | Mobility of professional, tbd. | | |
| *Annual number of graduates of health professions educational institutions per 100,000 pop – by cadre* | Use the staffing requirement model developed for the WHO to determine thresholds (Hall, 2001), or the WPRO Workforce Projection Tool. | X | | | | | | | X | | |
| *Indicators for monitoring country actions for strengthening the health workforce* | This is a set of indicators; no threshold set. | X | | | | | | | | | |
| The distribution of health care professionals in urban and rural areas | No threshold set. The goal is to make sure that there are sufficient providers in rural areas. However, what is sufficient will vary by country, based on the labor-capital mix and disease burden. | | X | | | | | X | | | |
| Number of medical schools /nursing schools | No threshold set. | | | X | | | | | | | |
| HR data—Presence of human resources data system | Yes/No | | X | | | | | | | | |
| The existence of a functioning HR planning system | Yes/No | | X | | | | | | | | |
| HR dedicated budget | Yes/No | | X | | | | | | | | |
| Proportion of health workers receiving training during previous year | No threshold set. | | | | | | | X | | | |
| % of health workers in rural areas receiving supervisory visits in last (X) months | No threshold set. | | | | | | | X | | | |
| Number of unfilled positions (rural vs. urban) | No threshold set. | | | | | | | X | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| Proportion of health workers at tertiary, secondary, and primary levels | No threshold set. | | | | | | | X | | | |
| Ratio of GFATM to MOH funds covering per diems and salaries. | No threshold set. | | | | | | | X | | | |
| Information Systems | | | | | | | | | | | |
| *HISPIX* | Scale and scoring of the index are not yet known. | X (Toolkit) | | | | | | | | | |
| *Existence of national set of indicators with targets and annual reporting to inform health sector reviews and planning cycles (ie demographic and household surveys)* | Yes/No | X (Toolkit) | X | | | | | | | | |
| *Percent of births (or deaths) registered in the country* | <50% score 0<br>50–89% score 1<br>>=90% score 2 | X (Toolkit) | | | | | X | | | X | |
| *Percentage of districts that submit timely, complete, accurate reports to national level* | If the percentage is below 95 percent, then data quality is compromised. According to the WHO, "an accurate listing of public and private service delivery points should be available in all countries." | X (Toolkit) | % of districts represented in reported info. | | | | | | | | |
| *Completion of at least one national health account in last 5 years* | At least one national health account completed in last 5 years. | X (Toolkit) | | | | | | | | | |
| *Existence of designated mechanisms charged with analysis of health statistics* | Yes/No | X (HMN), toolkit | X | | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| *Availability of a national summary report which contains HIS information, analysis, and interpretation (most recent year)* | Yes/No | X | X | | | | | | | | |
| The quality of health status Indicators as a proxy for the quality of the HIS (Mortality (Maternal mortality ratio, U5MR) | No threshold set. | X (HMN) | X | | | | X | X | | | |
| World Bank Statistical Capacity Indicator | No threshold set. | X (HMN) | | | | | X | | | | |
| International Health Regulations implemented according to international standards | Yes/No | X (Toolkit) | | | | | | | | | |
| Availability of financial or physical resources (or both) to support the HIS within regional and district budgets | No threshold set. | | X | | | | | | | | |
| Two or more data points available for child mortality in the past 5 years | Threshold of two or more surveys within the past five years. | X (Toolkit) | X | | | | | | | | |
| Health facilities or districts reporting all indicators according to national guidelines | No threshold set. | X | X | | | | | | | | |
| Health information systems that better inform policy-makers and facility managers on health status and trends: government implements a NHA, HMIS, and Clinical IS (EMR, etc.) | No threshold set. | | | | | | | | | | X |
| Sentinel surveillance sites performing according to national standards (number and percentage) | No threshold set. | | X | | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| ICD-10 used in district hospitals and causes of death reported to national level. | WHO targets for ICD-10:<br><50% score 0;<br>50–89% score 1;<br>>=90% score 2 | X | | | | | | | | | |
| Percentage of disease surveillance reports received at the national level from districts compared to the number of reports expected | No threshold set. | | X | | | | | | | | |
| Data quality* (e.g. presence of procedures to verify the quality of data reported, such as data accuracy checklists prior to report acceptance, internal data quality audit visits | WHO is one of the few sources to establish a target for data quality ("data quality assessment carried out and published within last 3 years; assessment should cover all routine data sources). | * | * | | | | | | | | |
| Data analysis (e.g. designated mechanisms charged with analysis, utility, synthesis and validation of data from population and facility sources) | This is a category of indicators. Indicators need to be defined before a threshold is set. | | * | | | | | | | | |
| Data dissemination policy (e.g. there is national commitment to transparency in data dissemination; a regulatory framework for the generation and use of health information | Yes/No | X | X | | | | | | | | |
| Percentage of private health facility data included in reported data | No threshold set. | | X | | | | | | | | |
| PRISM: indicators of the performance of HIS on behavioral, organizational, and technical determinants | This is a category of indicators; qualitative continuum | | X | | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| Medicines | | | | | | | | | | | |
| *Proportion of population with access to affordable essential drugs on a sustainable basis (e.g. availability of life-saving medicines)* | MDG target is not specified, but the target is assumed to be 100%. | X | | | | X | | | | | |
| *Availability and price of essential medicines* | WHO global target: 80% availability; not more than 4 times the world market price. | X | * | | | | | | | X | |
| *Percent of health facilities that have all tracer medicines and commodities in stock the day of visit, last three months (also average availability of 30 selected essential medicines in public and private health facilities; varies time period of measurement).* | WHO target: no stockouts. Global target: 80 percent. Country-specific targets required. | * (Toolkit) | * | | | | | * | | * | |
| *Median proportion of tracer drugs that are in stock on the day of the visit, last three months* | Supplement to above indicator. | X (Toolkit) | | | | | | | | | |
| *Ratio of median local medicine price to international reference price for core list of drugs* | No threshold set - but the mark-up between manufacturers cost and consumer price has a rough target of below 70%. The target needs to be refined and needs to be country specific. | X (Toolkit) | * | | | | | % of average int'l price pd for last regular procurement of indicator drugs | | X | |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| *Existence and year of last update of a published national medicines policy* | WHO target: Policy exists and was updated within the last ten years. | X (Toolkit) | X | | | | | | | | |
| *Existence and year of last update of a published national list of essential medicines* | WHO target: Policy exists and was updated within the last two years. | X (Toolkit) | X | | | | | | | | |
| *Existence of Standard Treatment Guidelines e.g. measures of adherence to STGs.* | WHO target: Policy exists and was updated within the last five years. | * | * | | | | | | | | |
| *Percent of drugs purchased through competitive bidding over of the total pharmaceutical expenditure* | WHO target: 80 percent | X | X | | | | X | | | | |
| *Appropriate prescribing practices and rational drug use* | This is a category of indicators. Indicators need to be defined before a threshold is set. | * | * | | | | | | | | |
| Existence and performance of key national pharmaceutical structures and processes (e.g. mechanisms for the licensing, inspection and control of (1) pharmaceutical personnel, (2) manufacturers, (3) distributors/importers, and (4) pharmacies/drug retail; a system for pharmaceutical registration; a national drug regulatory authority) | This is a category of indicators. Indicators need to be defined before a threshold is set. | * | * | | | | | * | | | |
| Legal provisions to allow generic substitution in the private sector | WHO target: Yes | * (Toolkit) | * | | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| Are there formal standard operational procedures (SOPs) for conducting procurement of pharmaceuticals in the public sector? | Yes/No | X | | | | | | | | | |
| Public and private per capita expenditure on medicine | No threshold set - country specific. | X (Toolkit) | | | | | | | | | |
| Percentage of population covered by health insurance | No threshold set - long term target is 100%. | X | X | | | | | | | | |
| Percent of facilities with expired items | No threshold given; assumed to be 0%. | | X | | | | | X | | | |
| Median consumer price ratio of 30 selected essential medicines in public and private health facilities | WHO target: below 4x world market reference price. | X (Toolkit) | X | | | | | | | | |
| Private expenditure on pharmaceuticals (per capita average exchange rate) | No threshold set - country specific. | | X | | | | | | | | |
| Drug use in health facilities | This is a category of indicators. Indicators need to be defined before a threshold is set. | * | * | | | | | | | | |
| Drug use in communities (e.g., most commonly used drugs, ideas about drug efficacy, drug sources, and treatments) | This is a category of indicators. Indicators need to be defined before a threshold is set. | * | | | | | | | | | |
| Government expenditure on medicines as a percent of the health budget | WHO established a target of 20 percent, to be sustained over a three-year period. | X | | | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| Financing | | | | | | | | | | | |
| *Total Health Expenditure (THE) per capita in international and US dollars* | No clear threshold for this indicator (Carrin and Evans (2004). However, Evans et al., (2001) found that health system performance sharply increases with total health expenditure up to about $80 (£53) per capita a year. Kruk and Freedman (2008) cite the Commission on Macroeconomics and Health (WHO, 2001), that says "providing basic essential health care services would require expenditure in 2007 of at least $34 (30-40) USD per capita per year in low-income countries. Countries with relatively low per capita spending (e.g., below USD 30 per capita) are likely to have poor access, a low quality of health care, or both. | X | Per capita THE, at average exchange rate (USD) | | X | | | | | X | X |
| *THE as % of GDP* | No threshold set - Interpretation of this indicator is a challenge. In high income countries, the concern is overspending on health, while in low income countries, the primary issue is often under-spending on health. A target that specifies a minimum desired proportion of GDP (or of general government expenditure) for health spending is not very useful on scientific grounds (HMN, 2006). | X | X | X | | | | X | X | X | X |
| *General govt. health expenditure as a proportion of total government expenditure (GGHE/GGE)* | Abuja Declaration- 15% of government budget to health. | X | X | X | | | X | X | | X | X |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| *The ratio of HH OOP payments for health to total health expenditures* | Lower figures are generally better. In poor countries, where the level of out of pocket expenditure is high, a decrease is desirable to increase protection for financial catastrophe (HMN, 2006) On the other hand, it is not necessarily true that 0% out of pocket payment is desirable. Most countries impose some form of payment at point of service to discourage "over-use" (Carrin and Evans, 2004). | X | | Private exp. Health as % of THE | | | | | | | |
| *Amount of total donor spending on health as % of THE* | A donor contribution of more than 10 percent of a country's total health spending is a problem for financial and institutional sustainability if the donor contributions are withdrawn (Islam et al., 2007). | | X | External $ for health as % of THE | | ODA as percent of GNI (not related to health) | | X(w and w/o GFATM funds) | | | |
| *% of Government health financing that reaches the poorest income quintile* | No threshold set. This is an indicator of equity, but appropriate allocation varies by country (Walford, 2007) | | | | X | | | | | Share of exp. To poorest 25% districts | X |
| *Selected indicators for monitoring country actions for strengthening health financing* | This is a set of indicators; no threshold set. | X | | | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| % households impoverished annually by Out of Pocket spending/ % of population with catastrophic health expenditure, by expenditure quintile | The WHO defines catastrophic health expenditures as 40% or more of a family's income after basic needs are met (Kruk and Freedman, 2008). The World Bank threshold for this measure is 20% of all expenditures over a set period, a year for example (World Bank, 2003). Others have classified expenditures as catastrophic when they put a family below the poverty line. "While it is acknowledged that the choice of threshold is arbitrary, 10 per cent of total expenditure has been a common choice (Pradhan and Prescott, 2002; Ranson, 2002; Wagstaff and van Doorslaer, 2003); with the rationale that this represents an approximate threshold at which the household is forced to sacrifice other basic needs, sell productive assets, incur debt, or be impoverished (Russell 2004)", cited in van Doorslaer and O'Donnell (2008). However, there is significant disagreement on such an arbitrary distinction, particularly across different income level countries. Other alternatives suggested include % of non-food expenditures, concentration indices, etc. | X | | Fairness of financial contribution to Health system | | | | | | X | X |
| % of population covered by health insurance | | | | Private pre-paid plans as % of PHE | X | | | | X | | |
| Out-of-pocket spending as % of private expenditure on health | No threshold set; lower percentages indicate greater availability of private risk pooling mechanisms. | | X | X | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| Public (government) spending on health as % of total health expenditure | If the percentage is below approximately 40 percent, it can reflect either a low tax capability of the country's government, or a government philosophy of their limited role in health (i.e., that public spending should not play a large role in financing or providing health services for the population), or both. A low value for this indicator also means that the government has limited ability to act to address equity issues. (Islam et al., 2007). | | X | Public HE as % of GDP | | | | | | | |
| Total Public health expenditures disaggregated by source ( by donor) | No threshold set. | | | | | | | X | | | |
| Govt. expenditure on wages and salaries as % of GGHE | No threshold set - but on average a country devotes just over 42% of total general government health expenditure to paying its health workforce (WHO, 2006) Governments in the 14 African countries have devoted a much lower proportion of their total expenditures to the health workforce (29% on average) than those in the other 50 countries (45% on average). | X | | | | | | Ratio of wages paid by Govt: by GFATM | | | |
| Effectiveness of payment systems for primary and secondary health care providers | This is a category of indicators. Indicators need to be defined before a threshold is set. | | | | | | | | | | * |
| Sustainability of funds, Pace of disbursement, and verticality of program indicators | This is a category of indicators. Indicators need to be defined before a threshold is set. | | | | | | | * | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| Governance | | | | | | | | | | | |
| Policy Index (10 components) | | X (Toolkit) | | | | | | | | | |
| *• Existence of an up-to-date national health strategy linked to national needs and priorities* | The target for is the existence of the standard international policy for each health goal. | * (Toolkit) | * | | | | | | | | |
| *• Existence of an essential medicines list updated within the last five years and disseminated* | This is a category of indicators. Indicators need to be defined before a threshold is set. | * (Toolkit) | * | | | | | | | | |
| *• Existence of policies on drug procurement which specify the most cost effective drugs in the right quantities; and open, competitive bidding of suppliers for quality products* | This is a category of indicators. Indicators need to be defined before a threshold is set. | * (Toolkit) | * | | | | | | | | |
| *• Existence of a national strategic plan for TB that reflects the Stop TB Strategy* | Yes/No | X (Toolkit) | | | | | | | | | |
| *• Existence of a national malaria strategy/policy which includes drug efficacy monitoring, vector control, and insecticide resistance monitoring* | Yes/No | X (Toolkit) | | | | | | | | | |
| *• Completion of the UNGASS National Composite Policy Index Questionnaire* | Yes/No | X (Toolkit) | | | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| *• Existence of comprehensive reproductive health policy* | Yes/No (taking into account whether the plan has been systematically developed and costed) (WHO, 2005). | X (Toolkit) | | | | | | | | | |
| *• Existence of an updated comprehensive, multi-year plan for childhood immunization* | Yes/No | X (Toolkit) | | | | | | | | | |
| *• Existence of key health sector documents, which are published and disseminated annually (also: health system goals, objectives, and performance targets clearly communicated to the public by the MOH)* | This is a category of indicators. Indicators need to be defined before a threshold is set. | * (Toolkit) | * | | | | | | | | |
| *• Existence of mechanisms, such as surveys, for obtaining timely client input on the existence of appropriate, timely and effective access to health services.* | Yes/No | X (Toolkit) | X | | | | | | | | |
| *HRH: Health worker absenteeism in public health facilities* | WHO marker indicator (no target given; assumed to be 0%) | X | | | | | | | | | |
| *Health Financing: Proportion of government funds which reach district-level facilities* | WHO marker indicator (no target given; assumed to be 100%) | X | | | | | | | | | |
| *Health Service Delivery: Stock-out rates (absence) of essential drugs in health facilities* | WHO marker indicator (no target given; assumed to be 0%) | X | | | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| *Health Service Delivery: Proportion of informal payments within the public health care system* | WHO marker indicator (no target given; assumed to be 0%) | X | | | | | | | | | |
| *Pharmaceutical Regulation: Proportion of pharmaceutical sales that consist of counterfeit drugs* | WHO marker indicator (no target given; assumed to be 0%); | X | | | | | | | | | |
| *Voice & Accountability: Existence of effective civil society organizations in countries with mechanisms in place for citizens to express views to government bodies* | WHO marker indicator. Yes/No | X | | | | | | | | | |
| *Disparity in coverage between lowest/ highest income groups (for DPT3 or other indicators)* | Difficult to set a global or national threshold- will vary by region/group. | X (HMN) | | | | | | X | | | |
| *World Bank Country Policy and Institutional Assessment (CPIA)* | 0-6 score, 6 is maximum. | X | X | | | | | | | | |
| Worldwide Governance Indicators: Civil Liberties, Political Rights, Voice and Accountability, Government Effectiveness, Rule of Law, Control of Corruption | Measured in units ranging from about -2.5 to 2.5, with higher values corresponding to better governance outcomes. | | X | X | | | X | | | X | X |
| *International Country Risk Guide (Political Risk Services Group)* | 0 to 100, 100 is maximum. | | X | | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| Voice and Accountability: (e.g. rules for public disclosure of information; existence of effective civil society organizations who can express views to government bodies; existence of policies that defines the role and responsibilities of the public health sector) *Also part of World Bank governance indicators.* | This is a category of indicators. Indicators need to be defined before a threshold is set. | * | * | | | | | | | | |
| Strengthening civil society/Social responsiveness (e.g., collaboration between government, civil society and other stakeholders in the planning, budgeting, and monitoring of activities in the health sector; number of civil society members trained; existence of active citizen health boards; MOH outreach with information, education, and communication. | This is a category of indicators. Indicators need to be defined before a threshold is set. | * | * | | | | * | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| **Pharmaceutical regulation** (e.g., proportion of pharmaceutical sales that consist of counterfeit drugs; (USAID= Adequate regulation to ensure the safety, efficacy, and quality of medicines, as well as the appropriateness and accuracy of product information) | This is a category of indicators. Indicators need to be defined before a threshold is set. | * | * | | | | | | | | |
| Percentage of publicly funded supplies and services leaked* (e.g., sale of publicly funded drugs in private markets, fraudulent insurance billing practices) | This is a category of indicators. Indicators need to be defined before a threshold is set. | | * | | | | | | | | |
| Proportion of informal payments within the public health care system | This is a category of indicators. Indicators need to be defined before a threshold is set. | X | | | | | | | | | |
| Percent of government spending devoted to health | This is a category of indicators. Indicators need to be defined before a threshold is set. | X | X | X | | | | X | | | |
| Government budget process (e.g., explicit procedures for resource allocation with transparency and rationales) | This is a category of indicators. Indicators need to be defined before a threshold is set. | * | * | | | | * | | | | |
| Public/private mix (e.g., absolute number of private and public health care providers | This is a category of indicators. Indicators need to be defined before a threshold is set. | | * | | | | | * | | | * |
| Proportion of government funds which reach district-level facilities | No threshold set. | X | | | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| Share of expenditure to poorest 25% of districts | See Finance section. | | | | | | | | | X | |
| Government coordination or harmonization of donor inputs | This is a category of indicators. Indicators need to be defined before a threshold is set. | | * | | | | | * | | | |
| DPT3 immunization (proxy) | | | | X | | X | | | | | |
| Management capacity indicators | This is a category of indicators. Indicators need to be defined before a threshold is set. | | | | | | | | | * | |
| Health worker absenteeism in public health facilities | This is a category of indicators. Indicators need to be defined before a threshold is set. | * | * | | | | | | | | |
| Stock-out rates (absence) of essential drugs in health facilities | No stock-outs (assumed to be 0%). | * | * | | | | | * | | | |
| Provider/institutional report cards* (e.g. human resources management, supervision) | Yes/No | | X | | | | | X | | | |
| Legislative and Policy Reforms are enacted, with increased focus on community-based primary health care | Yes/No | | | | | | | | | | X |

| **Guide to Appendix 1:** | |
|---|---|
| ***Bolded*:** | Indicates these indicators are discussed in greater detail in the text |
| *** :** | Indicates that this source mentions indicators on this topic but presents it in a different form (ie uses multiple indicators, suggests topic area but does not present specific indicator, index vs. indicator, etc.) |
| **Yellow highlighting:** | Indicates that this indicator is a health output indicator |
| **Blue highlighting:** | Indicates the indicator overlaps with a financing, workforce, or medicines indicator |
| **Pink Highlighting :** | Identifies WHO's proposed list of ten rules-based indicators for key aspects of health policy |

Notes:

The Global Fund, referenced in the text of this literature review encourages the use of existing in-country indicators used to monitor health systems performance. For example, the specific indicators that are part of a program-based approach (including SWAp) performance matrix or other national strategic framework (The Global Fund, 2008).

Sources for Indicators:

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# Appendix 2: Health Output Indicators

| Technical Area | Output Indicators |
|---|---|
| Tuberculosis | TB case detection rate (new smear-positive)<br>TB treatment success rate (new smear-positive) |
| Malaria | Insecticide-treated net (ITN) Use<br>Intermittent preventive treatment (IPT)<br>Indoor residual spraying (IRS)<br>Artemisinin-based drug treatment of malaria |
| Maternal and Child Health | Number of antenatal care visits (1 visit)<br>Number of antenatal care visits (4 visits)<br>Births attended by skilled health personnel<br>Delivery at a health facility<br>Proportion of 1-year-old children immunized against measles<br>Percentage of 1-year-olds immunized with the third dose of DPT<br>Percent of children ages 12 to 23 months fully immunized before age 1<br>Pneumonia care-seeking<br>Oral rehydration therapy use<br>Vitamin A supplementation<br>Exclusive breastfeeding |
| Family Planning and Reproductive Health | Modern contraceptive prevalence rate<br>Unmet need for family planning |
| HIV/AIDS | Condom use rate of the contraceptive prevalence rate<br>Condom use at last high-risk sex<br>Percentage of population ages 15 to 24 with comprehensive correct knowledge of HIV/AIDS<br>*Proportion of population with access to affordable, essential drugs on a sustainable basis* |
| Other Public Health Threats | Treatment of neglected tropical diseases in endemic areas<br>Bacterial resistance rates in documented infections<br>Detection and treatment of noncommunicable diseases |