Center for Global Development

MEASURING COMMITMENT TO HEALTH

GLOBAL HEALTH INDICATORS WORKING GROUP REPORT

LOREN BECKER, JESSICA PICKETT & RUTH LEVINE
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Abstract

Many funders of international development programs use indicators as proxies for good public policies and the ability of countries to use aid well. As an input to these efforts, the Global Health Indicators Working Group examined potential measures of a government's commitment to health, with the goal of identifying and recommending a set of indicators for consideration by the Millennium Challenge Corporation and other donors as they assess country eligibility for investment.

Note: Members of the Working Group participated in a personal capacity and on a voluntary basis. The report of the Working Group reflects a consensus among the members listed above, but does not necessarily represent the views of the organizations with which the Working Group members are affiliated, the Center for Global Development's funders, or its Board of Directors.

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Contents

List of Acronyms

CGD	Center for Global Development
DFID	UK Department for International Development
DHS	Demographic and Health Surveys
DTP3	Third dose of diphtheria-tetanus-pertussis vaccine
EPI	Expanded Program on Immunization
GAVI	Global Alliance for Vaccines and Immunization
GDP	Gross domestic product
HMN	Health Metrics Network
ICPD	International Conference on Population and Development
IDA	International Development Association of the World Bank
IMF	International Monetary Fund
LIC	Low income countries
LMIC	Lower-middle-income countries
MCA	Millennium Challenge Account
MCC	Millennium Challenge Corporation
MDGs	Millennium Development Goals
MICS	Multiple Indicators Cluster Surveys
NCHS	National Center for Health Statistics
PSA	DFID Public Service Agreement
UNICEF	United Nations Children's Fund
USAID	U.S. Agency for International Development
WDI	World Development Indicators database
WHO	World Health Organization

Measuring Commitment to Health

Global Health Indicators Working Group Report

I. Introduction

To target development assistance to countries where it will be used most productively, donor agencies use statistical evidence to identify key characteristics of countries whose aid programs are considered effective. Influential research by Craig Burnside, David Dollar, and others[1] has suggested that aid is more effective in good policy environments than in those characterized by high levels of corruption, weak administration of public services, and other features of 'poor governance.' This research has lent momentum to calls for greater selectivity in the provision of development assistance, and both public and private donors have sought ways to measure such features as the quality of public administration, business friendliness, and efficient allocation of public resources toward poverty reduction.[2]

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At the forefront of the movement to link aid allocation to evidence of good governance is the Millennium Challenge Account (MCA), a bilateral U.S. development assistance program intended to promote poverty reduction and growth in countries with good governance and development policies. The MCA, managed by the Millennium Challenge Corporation (MCC), uses a set of 16 indicators to measure various aspects of governance and commitment to sound policies in low- and lower-middle-income countries. Countries that perform well relative to their peers on indicators in three categories — labeled 'ruling justly,' 'economic freedom' and 'investing in people' — are rewarded with access to the agency's nearly $5 billion pool of aid money.[a] For countries that do not pass this eligibility filter, the agency anticipates that the promise of aid in exchange for results will serve as an incentive to improve their performance, and recent research has supported this hypothesis.[3]

Given the design of the MCA, the specifications of the indicators and the thresholds used for this eligibility process are important determinants of which countries may apply for funds, and appropriate choice of indicators is fundamental to the eventual success of the program.[4] During its past two years of operation, the MCC has occasionally modified the eligibility indicators for technical reasons. Currently, it includes two health indicators in the 'investing in people' category: immunization rate[b] as a measurement of health outcomes,

a. The MCA has yet to reach its originally proposed $5 billion annual budget due to lower than expected Presidential requests and Congressional allocations.

b. Average of the DTP3 and measles coverage rates, as reported by the World Health Organization.

and public expenditure on health[c] to measure government inputs. MCC management has expressed interest in exploring the utility of other health indicators — particularly (but not necessarily limited to) input measures — to use in place of, or in addition to, these existing indicators.

To examine and contribute a new perspective to this effort, the Center for Global Development (CGD) convened the *ad hoc* Global Health Indicators Working Group. The Working Group brought together technical experts to identify and recommend ideal health indicators based on the MCC's criteria and other technical considerations. While the MCC expressed interest in benefiting from the group's expertise, the Working Group's recommendations were generated by independent analysis and thus are only advisory in nature. The results of this project may also inform the decisions of other donor and technical organizations attempting to measure a government's commitment to health. Importantly, the Working Group's assessment of potential indicators also suggests priorities for new and improved primary data collection and expanded access to secondary sources.

The Working Group encountered tradeoffs between an indicator's conceptual value and data quality. The original indicators chosen by the MCC are reasonable. Some improvements are possible and desirable, however.

As the Working Group sought to identify indicators that are robust in both theory and practice, they encountered inevitable tradeoffs between an indicator's **conceptual value** as a proxy measure of policy intent or impact, and **data quality**. The overall observation of the Working Group was that the original indicators chosen by the MCC are reasonable ones, given data limitations, and few improvements are feasible at this time. Those indicators are: 1) total expenditures by government at all levels on health divided by GDP, as reported by national governments; and 2) the average of DTP3 and measles immunization rates for the most recent year available from the World Health Organization.

Some improvements are possible and desirable, however. Of the indicators for which data are now available at an acceptable level of quality, comprehensiveness and comparability, the Working Group found that the following is the best measure of government's commitment to health:

- **Percentage of 1-year-olds immunized with the third dose of diphtheria-tetanus-pertussis vaccine,** which proxies the strength of the public health system in providing essential services. [This removes the measles component from the current indicator.]

The Working Group noted that the current health expenditure indicator is relatively weak in its ability to proxy a government's commitment to health. Thus, the Working Group determined that the top priority for additional investment in data quality and analysis is an input indicator that measures national expenditures on health. Despite the weaknesses of the current data, we found that the following indicator has the potential to fill a key gap in measuring commitment to health and should therefore be improved accordingly:

- **Share of government health expenditures on public health functions and services,** which proxies the priority that the government places on health as a core public function.

c. Self-reported by government embassies as a proportion of gross domestic product.

In addition to the top choices above, the Working Group also identified several 'runners up' that are at least as satisfactory from a conceptual perspective and would benefit from improvements in data quality (listed in no particular order):

- Under-five mortality: indicative of government commitment to perinatal, infant and child health
- Percentage of children under five with low height for age (stunting): indicator of chronic malnourishment, reflecting the government's attention to a fundamental risk factor for poor health and cognitive development
- Births attended by skilled health personnel: indicative of effective policies in human health resources and access to obstetric care
- Contraceptive prevalence rate: indicator of a range of appropriate policies that contribute to better pre-conceptional planning, pregnancy and infant health
- Unmet need for family planning: indicator of access to family planning, a service that is directly related to the health and welfare of women and children
- Sustainable access to an improved water source: indicator of government's attention to development of essential public infrastructure necessary for major health improvements

The costs and benefits of these indicators are discussed in more detail in Section III of this report, preceded by an in-depth analysis of the key issues that pertain to measuring effective or 'good' government behavior. The report concludes by considering applications of this work beyond the MCA.

II. Key Considerations in Measuring Good Governance in Health

Defining Good Governance

An ideal suite of indicators would reflect all four elements of a government's health policies.

The most critical consideration in the search for a proxy for good governance in the health sector is the definition of good government behavior. For the purposes of this analysis, the Working Group posed four questions related to a government's commitment to the health of its citizens:

- Is the government placing appropriate priority on health, relative to its means?
- Is the government focusing its resources on public goods and essential public health functions?
- Is the government employing cost-effective health interventions, so that limited health resources go furthest toward improved health outcomes?
- Is the government protecting the poor and other vulnerable populations from catastrophic losses?

Conceptually, then, an ideal suite of indicators would reflect all four elements of a government's health policies. Of these, questions (ii) and (iii) are easiest to measure objectively and are the focus of the Working Group's efforts.

Indicator Evaluation Criteria

The Working Group developed eight criteria to assess prospective indicators

Building upon the MCC's established criteria (see Appendix C), the Working Group developed eight criteria to assess prospective indicators:

- *Developed or validated by an independent third party and utilizes objective and high-quality data.* Only preexisting indicators will be considered; these should measure features that do not rely solely on expert judgment, and the available data should be accurate, complete, and consistent.
- *Analytically rigorous and publicly available.* The indicators should be grounded in data that are accessible to interested parties regardless of location or position.
- *Broad country-coverage and comparability across countries.* Indicators for which many potential grantee countries do not have data or for which the methodology for assessing the indicator varies widely are unacceptable because there is no ability to compare the countries.
- *Direct relationship to government policy.* To proxy government commitment, an indicator should change when relevant government policy changes. This criterion also ensures that the indicators have the potential to provide an incentive for governments that do not yet perform well to alter their policies accordingly.
- *Equates failing with bad outcomes.* To the extent that cross-country comparisons are designed to reward countries for their performance relative to one another, the indicators need to reflect a clear normative judgment. If it is not clear that high (or low) rates of something is good (or bad), cross-country comparison would present serious concerns.
- *Can change over the short term.* To provide adequate incentive for governments to take policy action, the indicators should be able to reflect policy changes over two to three years, and should be measured frequently enough to observe that change.
- *Directly or indirectly reflects attention to equity.* Recognizing that policy choices determine whether the benefits of public spending are distributed in a progressive or regressive fashion, indicators should reflect the desire for governments to adopt health policies that contribute to poverty reduction and the reduction of health and income inequities.
- *Measures performance against ability.* When comparing countries of differing income levels, it is important to look for indicators that are not biased against countries with a lower per capita income.

Many of these criteria address the issue of 'measurability' of a given indicator and the question of whether it is adequately supported by good data. Others evaluate its conceptual value in measuring whether a government 'has its head and its heart in the right place.'

The Working Group identified several additional factors to bear in mind when comparing various indicators. For example, no matter how comprehensive and high-quality an indicator may be, it is important that it is also 'comprehensible' so that government officials can interpret which policies are driving their score, and it has to be 'actionable' in the sense that concrete policy measures

can improve it — both features that are key to creating a strong incentive effect on low-performing countries — without being easily manipulated in a superficial way. Factors such as the relative ease or difficulty of related policy actions should be taken into account, as should sensitivity to external variables and consistency from year to year. Similarly, indicators can be recognized as measuring either effort (as demonstrated by policies and actions) or results. Both are important.

Big-picture relationships to economic growth, poverty reduction, and inequality figure importantly into the conceptual value of any indicator, and should be analyzed, with particular attention to any income bias or gender differences. And finally, there should be some effort to be consistent with existing international efforts and priority targets (such as the Millennium Development Goals). All that said, there is general acknowledgement that almost every indicator is imperfect in some way; tradeoffs are required to arrive at any viable recommendation.

Big-picture relationships to economic growth, poverty reduction, and inequality figure importantly into the conceptual value of any indicator

Measurement Challenges

Health System Inputs

When measuring inputs to the health system, it is not always obvious what a given metric actually signifies. Certain input indicators are less a manifestation of government action than of existing donor priorities and activities. In other cases, there can be definitional inconsistencies across countries. Finally, financing data can be particularly challenging if it comes from the national budgets, which reflect plans or intentions regarding a level of health commitment, rather than the hard reality. Expenditure data are, by definition, retrospective and may imply a time lag of several years before accounts are reconciled and reported, for example through National Health Accounts exercises.

Health System Characteristics, Outputs and Impacts

A different set of measurement issues arises in the context of health system characteristics, outputs and impacts. At the conceptual level, the first and most critical challenge for the Working Group was to establish whether there was a clear relationship to government policies and behaviors, particularly over the short term. Then, even if the outcome itself was variable over a set period, it was necessary to determine whether data are collected frequently enough to reflect that. Infrequent data collection or complex validation processes often lead to a long time lag. This is particularly true (and particularly problematic) because most of these indicators are based on Demographic and Health Surveys or similar collection methods.

III. Characteristics of a Limited Set of Health Indicators

Outcomes Matrix

The following table shows how each indicator performs against the set of criteria laid out in the methodology section, based on the above analysis and listed in no particular order.

	Criteria									
Indicators	*Developed/ validated by an independent third party*	*Utilizes objective and high-quality data*	*Analytically rigorous and publicly available*	*Broad country-coverage and comparability across countries*	*Direct relationship to government policy*	*Equates failing with bad outcomes*	*Can change over the short term*	*Measured regularly and frequently*	*Contains some measure of equity and distribution*	*Measures performance against ability*
DTP3 immunization rate	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Government public health expenditure	Yes	Maybe	No	No	Yes	Yes	Yes	No	Yes	Yes
Under-five mortality rate	Yes	Yes	No	Yes	Yes	Yes	No	No	Yes	Maybe
Stunting	Yes	Yes	Yes	No	Yes	Yes	Maybe	No	Yes	Maybe
Skilled birth attendance	Yes	Yes	No	No	Yes	Yes	Yes	No	Yes	Maybe
Contraceptive prevalence rate	Yes	Yes	Yes	Yes	Maybe	Yes	Yes	Yes	Yes	Yes
Unmet need for family planning	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes
Access to water	Yes	Yes	Yes	Yes	Yes	Maybe	No	No	Yes	No

Percentage of 1-year-olds immunized with three doses of diphtheria, tetanus toxoid and pertussis vaccine (DTP3)

Definition

DTP3 immunization coverage is the percentage of one-year-olds who have received three doses of the combined diphtheria, tetanus toxoid and pertussis vaccine in a given year. Immunization coverage estimates are used to monitor immunization services andto guide disease eradication and elimination efforts, and are a good indicator of health system performance.[5]

d. Throughout this report, indicators are listed in the order they are discussed; this should not be construed as a preferential ranking.

Indicator one: DTP3 immunization rate

Source	WHO/UNICEF
Website	http://www.who.int/entity/immunization_monitoring/data/coverage_estimates_series.xls
Primary Sources	Administrative data and household surveys (DHS, MICS, EPI cluster surveys)
Country Coverage	113/113 MCC income-eligible countries
Periodicity	Collected annually; start date varies from 1980
Latest available year	Full coverage: 2004
Variants	WHO/UNICEF adjusted vs. government reported; gender; location (urban/rural, major regions/provinces); and socio-economic characteristics (e.g. mother's education level, wealth quintile)
Other Uses	GAVI milestone, part of the existing MCC immunization indicator. The MDGs use measles immunization.
Income Bias	There is wide variation in this indicator across all MCC income-eligible countries.

Immunization programs are seen as one of the most cost-effective approaches to reducing child mortality.

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Immunization programs are seen as one of the most cost-effective approaches to reducing child mortality.[6] The Global Alliance for Vaccines and Immunization (GAVI) estimates that providing vaccines to all of the unvaccinated children in developing countries would reduce child mortality in those countries by 20 percent, or 2 million children.[7] In 2002, the three diseases covered by the DTP vaccine — diphtheria, tetanus, and pertussis — accounted for 35 percent of all vaccine-preventable deaths.[8]

More important from the perspective of the MCC, however, is the role of the DTP3 immunization rate as a proxy indicator for overall health system strength. In its final report, the UN Millennium Project Task Force on Child Health and Maternal Health expressed concern that there is not currently a good indicator of success in strengthening health systems.[9] In the absence of this indicator, a country's DTP3 immunization rate is seen as a good proxy measure because it requires repeated contact with the same cohort of patients. In addition, immunization programs also are thought to contribute to health sector reform efforts, as investments in immunization services often help build human resources and infrastructure for the health systems as a whole.[10]

Data Issues and Conceptual Concerns

In many developing countries, particularly the poorest, donors pay for a large portion of immunization program costs, e.g. for vaccines and supplies. This is true more for immunization programs than for any other type except HIV/AIDS programs.[11] As a result, there is some concern that immunization rates are a truer reflection of donor priorities than government priorities. Historical trends in immunization coverage provide substantiating evidence that international policy and funding priorities have a significant impact on immunization rates in developing countries. Additionally, studies have found that contact with donors increases coverage for vaccines covered in the WHO Expanded Program on

Immunization (EPI), including DTP3.[12]

Despite this, a review of data reported in the WHO Vaccine Preventable Diseases Monitoring System shows that a significant portion of immunization costs in many MCC income-eligible countries are in fact covered by government financing, and most have a line item in their national budgets for the national immunization program.[13] This indicates that although the development of immunization programs often may be spurred by donor involvement, they are becoming institutionalized within government priorities.

The Working Group suggests DTP3 alone rather than a combination of DTP3 and measles immunization rate

It is due to precisely this concern about the influence of donor priorities that the Working Group suggests DTP3 alone rather than a combination of DTP3 and measles immunization rate, the current MCA eligibility indicator. Measles immunization has a much higher ratio of donor to domestic funding and is less representative of an overall health system because measles vaccines are often administered through donor-funded mass campaigns. Measles, commonly seen as a target for global control and under debate for an eradication campaign, has drawn significant international donor resources for immunization and control campaigns. A coordinated donor program known as the Measles Initiative has pumped more than $150 million into measles immunization campaigns in developing countries since 2001.[14] As a result of this coordinated effort, the donor community has a particularly strong hand in influencing measles immunization rates, which drives up the current MCA indicator while obscuring government investment in health systems that is reflected by the DTP3 rate.

Immunization rates for any vaccine are quite dependent on the accuracy of both the numerator and denominator. While GAVI's data quality audits[15] address the accuracy of the former to a certain extent, all estimates are constrained by frequently out-of-date denominators, with cohorts based on projections from the last census. Hence, projections from a decade-old census (common in many low income countries) that are off by even one percentage point in terms of the population growth rate can distort the actual coverage rates by nearly 15 percent. For these reasons, GAVI uses changes in the total number of children fully immunized for its performance-based payments, rather than coverage rates. This should be taken into account in the supplementary information that may be presented when countries are applying for MCC support.

Relationship to Poverty

Following the general pattern of access to health resources, immunization programs disproportionately reach wealthier populations; however, studies have shown that changes in DTP3 immunization rates among the poorest quintiles mirror those among the population as a whole.[16] The studies also revealed a narrowing in the gap between immunization rates among the wealthiest and poorest quintiles in 21 countries during the 1990s. Nevertheless, the authors conclude that to ensure equity in immunization programs, monitoring should include an examination of disaggregated data on coverage rates among different socio-economic groups based on a variety of social stratifiers including

ethnicity, region, geographic density, and maternal education as well as wealth, all of which have been correlated with immunization disparities in some countries.[17]

The relationship between increasing immunization rates and poverty reduction stems in part from the more general relationship between health and poverty. Generally speaking, health problems contribute to short-term household poverty through the application of financial resources to paying for health care, lost productivity when workers or their dependents fall ill, and the death of income earners. Since DTP immunization could help prevent a significant number of illnesses, it follows that households would incur considerably fewer of these costs.

In the longer term, childhood diseases also stunt growth, which limits ability to perform manual labor later in life, and can impair cognitive abilities and reduce school attendance. All of these factors may limit earning potential later in life. Calculations indicate significant increases in income generation for vaccinated children when they reach adulthood, as well as increased cognitive abilities among children who receive a six-vaccine cohort.[18] Another potential impact is that workers who expect to live longer are more likely to save and invest, increasing both their own overall wealth and national wealth.

Calculations indicate significant increases in income generation for vaccinated children when they reach adulthood.

Government Public Health Spending

Definition

This indicator is defined as central government expenditures on public health services divided by total central government expenditures on health. Central government expenditures on public health services include: administration, inspection, operation, or support of public health services such as blood-bank operation, disease detection, prevention, monitoring, epidemiological data collection, family planning services and so forth; preparation and dissemination of information on public health matters. (These public health services are counted when they are delivered by special teams to groups of clients, most of whom are in good health, at workplaces, schools or other non-medical settings; are not connected with a hospital, clinic or practitioner; and are not delivered by medically qualified doctors. Public health service laboratories are also included in this indicator, but medical analysis laboratories or laboratories engaged in determining the causes of disease are not.)

Central government expenditures on public health services are then taken as a share of all central government outlays on health. This denominator includes expenditures on services provided to individual persons as well as those provided on a collective basis. (Individual services include public health services; medical products, appliances, and equipment; outpatient services; and hospital services. Collective health services are concerned with matters such as formulation and administration of government policy; setting and enforcement of standards for medical and paramedical personnel and for hospitals, clinics, surgeries, etc.; regulation and licensing of providers of health services; and applied research and experimental development into medical and health-related matters.)[19]

Indicator two: Government public health spending

Source	IMF Government Finance Statistics Yearbook, 2004
Website	N/A (yearbook data available for purchase only)
Primary Sources	Government reported
Country Coverage	10/113 MCC income-eligible countries
Periodicity	Collected annually, start date varies from 1995; collection inconsistent in income-eligible countries
Latest available year	No full-coverage year (1 country available for 2005, 4 available for 2004, 1 available for 2003, 3 available for 2002, and 1 available for 2000)
Variants	Local currency unit; inclusion of local government spending
Income Bias	There is wide variation in this indicator across all 10 countries. However, the sample size is much too small for a conclusive answer to this question.

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The Working Group considered the correlation of different types of spending with better or worse health outcomes overall, and for poor and vulnerable populations in particular. This excludes indicators that use overall level of health spending; performance relative to a country's peers cannot be evaluated without corresponding evidence of health outcomes to ascertain whether such spending is efficient and effective. Additionally, different health financing schemes lend themselves to different levels of public and private spending; this makes it difficult to judge whether a given government share of a specific type of expenditure represents good or bad policy.

The best measure of government's resource allocation decisions is its spending on essential public health functions as a share of total health spending.

Based on these assumptions, the best measure of government's resource allocation decisions is its spending on essential public health functions as a share of total health spending. This captures the extent to which governments are focusing their limited resources on overcoming market failures associated with pure or partial public goods which would be unavailable without government provision. In addition, given the disproportionate benefits for the poor of control of infectious disease (and many other essential public health functions), allocation of government spending toward these services and activities is often progressive in nature.

Data Issues and Conceptual Concerns

Definitional inconsistencies around 'public health services' could be contentious and are likely to vary across or even within countries. Also, in countries that have traditionally attracted many donors (such as Ghana, Uganda and Cambodia), donors are more likely to pay for items in the 'public health services' category than they are in less favored countries, which could lead to misleading values for this indicator.

Currently, however, the biggest issue is consistent measurability. While the IMF data are the most objective and consistent, they are so infrequent as to be impractical. Other measures exist, but are inconsistent in terms of their treat-

ment of central government spending versus total government spending. This is a huge source of variance depending on a country's level of decentralization. The value of this indicator hinges on the ability to bring the numerator and denominator into line to include both central and local expenditures.

Relationship to Poverty

Compared to other areas of health spending, the poor are proportionally higher consumers of public health goods and services (depending on the location of service delivery and other factors affecting access). This directly contributes to poverty reduction through improved health status and protection from catastrophic losses due to treatment costs.

Under-five mortality rate

Definition

Childhood mortality rate is defined as the probability of a child born in a specific year or period dying before reaching the age of five, if subject to age-specific mortality rates of that period. Strictly speaking this indicator is not a rate (i.e. the number of deaths divided by the number of population at risk during a certain period of time) but a probability of death derived from a life table and expressed as rate per 1,000 live births. Under-five mortality rate is a leading indicator of the level of child health and overall development in countries.[20]

Nearly three-quarters of the 10.6 million deaths of children under five years old are attributable to six causes, all of which are treatable and/or preventable.

Indicator three: Under-five mortality rate

Source	UNICEF/WHO/World Bank
Website	http://www.who.int/statistics
Primary Sources	Vital registration, census, and surveys (DHS, MICS)
Country Coverage	113/113 MCC income-eligible countries
Periodicity	Widely available every decade starting in 1960; also available for 1995 & 2003. Some countries report more frequently
Latest available year	Full coverage: 2003
Variants	Gender; location (urban/rural, major regions/provinces); socio-economic characteristics (mother's education, wealth quintile)
Other Uses	MDG Indicator #13; IDA14 Country Outcome Indicator #2; DFID PSA list
Income Bias	Poor countries tend to perform worse on this indicator than their better off counterparts. However, within the MCC income categories there is a good deal of variation along the GDP spectrum.
New Data Sources	There currently are ongoing discussions with UNICEF about more intensive monitoring of this indicator, which may eliminate some of the concerns about lag time. As an MDG and IDA indicator, it seems likely that, moving forward, there will be increasing focus on monitoring.

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Nearly three-quarters of the 10.6 million deaths of children under five years old are attributable to six causes, all of which are treatable and/or preventable.[21] This suggests that governments should be able to implement policies that would lead to direct improvement in performance on this indicator. Because the entire cohort measured turns over every five years, the right policy actions also should show results in the short term.

The variety of causes also gives governments the flexibility to choose the interventions they feel best suit the circumstances in their countries. For example, widespread immunization campaigns and access to water initiatives (both under consideration for separate MCC indicators) are cost-effective child survival interventions; governments could have the choice to select which interventions they think would have the most positive impact.

A final comment that arose in Working Group discussions is the intuitive appeal and wide recognition of this indicator. Because of the attention it receives, it may be better measured than many other indicators.

Data Issues and Conceptual Concerns

Questions have been raised about whether this indicator is slow to respond to policy changes; this may be the result of infrequent measurement rather than lack of actual response.

Beyond measurement concerns, however, there also is a concern that the flexibility discussed above as one of the indicator's strengths also may have a downside. As the WHO says in its report on the health-related Millennium Development Goals, 'Statistics alone do not tell us why mortality or coverage rates are rising or falling, nor suggest which policy responses are appropriate.'[22] Although governments can adopt a number of policies to improve their countries' performance on this indicator, it may not be clear to governments how they should choose to focus their limited resources. Moreover, many of the long-term structural, environmental, trade, and conflict factors that contribute to child mortality fall outside of the national government's control.

A final concern, voiced in our Working Group discussions, is that the indicator may track closely with other indicators under consideration, such as immunization and access to water measures.

In all nine developing countries studied, the poorest quintile experienced the highest under-five mortality rates.

Relationship to Poverty

Health outcomes generally correlate with household income, with per capita GDP — a proxy for household income — explaining 75 to 80 percent of inter-country variation in health outcomes. With specific regard to mortality measures, it is commonly estimated that the income elasticity of mortality figures is -0.6, indicating a six percent decrease in mortality for every 10 percent increase in income.[23] One study of inequalities in child mortality found that in all nine developing countries studied, the poorest quintile experienced the highest under-five mortality rates, and in many cases, the gap between the poorest and the rest was quite large.[24] According to another study, children born into families in the poorest quintile of the wealth distribution in 24 developing countries are three times more likely to die before the age of five than children from the wealthiest quintile.[25]

In addition, both that study and another published in 2003 found that, despite international efforts to push pro-poor health initiatives, the gap in under-five mortality rates between the poorest quintile and the rest of the population is widening in many developing countries.[26] Other social stratifiers, including maternal education, region and population density have also been linked to higher child mortality rates.[27]

The Working Group was unable to find literature making the reverse causal link: that reductions in child mortality lead to reductions in poverty, which seems to be of greater interest to the MCC. However, there is an indirect connection, because in the long term, lower child mortality rates lead to a reduction in fertility rates[28] that ultimately might contribute to poverty reduction.[29] Additionally, lower child mortality tends to lead to increased investment in education because people expect more return on that investment, as it increases earning potential and labor productivity among surviving children.[30]

Stunting typically is seen as a reflection of chronic malnutrition and, thus, can be used as a proxy for the presence and effectiveness of food and nutrition-related programs and policies.

Percentage of children under age 5 under height for age (Stunting)

Definition

This indicator is defined as the percentage of children under five whose height-for-age is more than two standard deviations below the National Center for Health Statistics (NCHS)/WHO reference median. It includes both moderate and severe stunting (defined as more than three standard deviations below median height-for-age of NCHS/WHO reference population). This indicator measures growth in young children, which is internationally recognized as an important public health indicator for monitoring nutritional status and health in populations. In addition, children who suffer from growth retardation as a result of poor diets and/or recurrent infections tend to have greater risks of illness and death.

Indicator four: Stunting

Source	WHO
Website	http://www.who.int/statistics
Primary Sources	National household surveys; sub-national nutritional surveys; national nutrition surveillance systems
Country Coverage	106/113 MCC income-eligible countries
Periodicity	Collected inconsistently across countries beginning in 1975
Latest available year	No full coverage year, most recent updates 2003
Variants	Gender; age; location (urban/rural, major regions/provinces)
Other Uses	None. The MDGs use the percentage of children underweight for age.
Income Bias	Poor countries tend to perform worse on this indicator than their better off counterparts. However, within the MCC income categories there is a good deal of variation along the GDP spectrum.

Content and Policy Link

Stunting typically is seen as a reflection of chronic malnutrition and, thus, can be used as a proxy for the presence and effectiveness of food and nutrition-related programs and policies. Although malnutrition often is classified as a non-health indicator,[e] its links to maternal and neonatal health services and childhood illness make it an important component of health status.[32]

Interventions addressing aspects of maternal and child health, nutrition, and education have played an important role in the reduction of stunting rates.

A government can take several policy actions to affect performance on this indicator. These include both macro- and micro-nutrient interventions that increase both food consumption and vitamin and mineral consumption. Additionally, there is significant evidence on the impact of most of these interventions on disease morbidity, mortality, and other health conditions.[33]

Beyond nutrition interventions, a 2005 study that looked at several specific interventions, and controlled for long-term growth and development, found that interventions addressing aspects of maternal and child health, nutrition, and education have played an important role in the reduction of stunting rates among children under age five in developing countries. For example, both increased immunization rates and female literacy have a strong, significant correlation with reduced stunting prevalence.[34]

Stunting, then, might be a good summary measure of overall investment in people over the medium-term, because it reflects health, nutrition, women's education, discrimination against female children, and family planning. That is, stunting can be the result of inadequate health services, because frequent diarrhea goes untreated; bouts with preventable malaria and vaccine-preventable diseases like measles all can contribute to stunting. Poor nutrition — resulting from weak investment in agriculture, uneven distribution of income, and mothers' lack of knowledge of good nutritional practices — also contributes, as does short birth intervals due to lack of access to, and information about, contraception, and low female educational attainment. Finally, stunting results from discrimination against girls when they are fed less than boys. Hence, a stunting indicator can capture investment in people in a number of different ways, including combinations of investments, such as female education and preventive health services. It thus avoids (to a certain extent) focusing on a single indicator that could have a high (or low) value that is an outlier from the broader picture of investment in people.[f]

A stunting indicator can capture investment in people in a number of different ways.

Data Issues and Conceptual Concerns

The lack of regular data collection presents a problem for the use of this indicator, as current collection practices do not meet MCC requirements for timely reporting and comparable measurements. However, the methods for undertaking this measurement are well known and potentially could be used in a variety of settings at relatively low cost.

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e. The MDGs identify stunting as a hunger and poverty target rather than a health target.

f. Paragraph text provided by Marty Makinen.

Relationship to Poverty

The relationship between decreasing the incidence of stunting in children under age five and reduction of poverty is a subset of the more general relationship between health and poverty. Health problems contribute to short-term household poverty through the application of financial resources to paying for health care, lost productivity when workers or their dependents fall ill, and the death of income earners. Malnutrition makes children more susceptible to disease, and increases the likelihood that those who fall ill will die. Although it is rarely the direct cause of death, malnutrition was associated with 54 percent of the 10.8 million child deaths reported by the WHO in developing countries in 2001.[35]

Malnutrition makes children more susceptible to disease, and increases the likelihood that those who fall ill will die.

Improving nutrition also has a long-term effect on household poverty, as properly nourished children are likely to earn more when they reach adulthood.[36] This is mainly a result of the education effects of improved nutrition, which improves developmental levels in infancy, leads to more and earlier school enrollment, improves cognitive function, and can decrease absenteeism due to illness. A 10 percent increase in stunting in the average Ghanaian child correlates with a 3.5 percent increase in the age of school enrollment, while a small improvement in height-for-age in Pakistani children is correlated with a two percent increase in school enrollment rates for boys and a 10 percent increase for girls. Ultimately, this improved education can significantly increase earning potential and bring people out of poverty.[37]

In addition to delaying school entry, stunting can also hinder cognitive development, which further hurts education prospects. A 1999 study of Filipino children found that both moderate and severe stunting in the first two years of life had a significant negative effect on cognitive test scores in late childhood, even when researchers controlled for the amount of schooling received.[38] Malnutrition also can significantly hinder motor skills development in young children,[39] which may limit their ability to perform physically demanding tasks in the future.

Births attended by skilled health personnel

Definition

This is defined as the percentage of live births attended by skilled health personnel in a given period of time. A skilled birth attendant is an accredited health professional — such as a midwife, doctor or nurse — who has been educated and trained to proficiency in the skills needed to manage normal (uncomplicated) pregnancies, childbirth and the immediate postnatal period, and in the identification, management and referral of complications in women and newborns. Traditional birth attendants, trained or not, are excluded from the category of skilled attendant at delivery. In developed countries and in many urban areas in developing countries, skilled care at delivery is usually provided in a health facility. However, birth can take place in a range of appropriate places, from home to tertiary referral centre, depending on availability and need; WHO does not recommend any particular setting. Home delivery

may be appropriate for a normal delivery, provided that the person attending the delivery is suitably trained and equipped and that referral to a higher level of care is an option.[40]

Indicator five: Skilled birth attendants

Source	WHO
Website	http://www.who.int/statistics
Primary Sources	Household survey data and health service statistics
Country Coverage	111/113 MCC income-eligible countries
Periodicity	Irregular
Latest available year	Inconsistent; 11 countries have data for 2005
Variants	Place of delivery; type of skilled health personnel; location (urban/rural, major regions/provinces); and socio-economic characteristics (e.g. education level, ethnicity, wealth quintile)
Other Uses	MDG Indicator #17; IDA14 Country Outcome Indicator #4; DFID PSA list; ICPD goal
Income Bias	Poor countries tend to perform worse on this indicator than their better off counterparts. However, within the MCC income categories there is a good deal of variation along the GDP spectrum.

The presence of a skilled attendant at birth could prevent a substantial percentage of the four major types of delivery complications.

Content and Policy Link

A study of the determinants of maternal mortality in sub-Saharan Africa found that the presence of a skilled attendant at birth is a significant predictor of maternal mortality, prompting the authors to conclude that reducing the number of maternal deaths requires increasing the rate of skilled birth attendance.[41] Another study focusing on West Africa also found a strong correlation; however, since the vast majority of births attended also took place in a health facility, the authors were unable to rule out the possibility that the causal relationship was facility-based rather than personnel-based.[42]

Estimates suggest that the presence of a skilled attendant at birth could prevent a substantial percentage of the incidence of the four major types of delivery complications, including 70 to 85 percent of obstructed labor complications, 20 to 40 percent of eclampsia cases, 50 to 70 percent of cases of puerperal sepsis, and 30 to 50 percent of obstetric hemorrhages.[43] Maternal health and lack of obstetric care, including the absence of a skilled attendant at birth, also are linked with increased stillbirth rates and perinatal mortality.[44]

Proven models exist to provide access to skilled birth attendants in resource-poor settings, and doing so is a low-cost intervention for reducing maternal mortality and morbidity, as well as preventing subsequent infant deaths. The cost of a skilled attendant ranges from $2 to $100, depending on the level of complication involved, and the estimated cost of each maternal and perinatal

death averted is $1,000 to $3,000. Some experience supports the feasibility of training and deploying skilled midwives in both urban and rural settings.[45]

Data Issues and Conceptual Concerns

The lack of regular data collection presents a problem for the use of this indicator. The irregular periodicity of collection at this point seriously hinders the ability of this indicator to show change in the short term. However, it is both an IDA14 and an MDG indicator, which means that there should be more attention to regular collection than in the past. Should the measurement problems be resolved, this indicator could change in the relatively short term because it reflects outcomes that are directly tied to inputs at the time of delivery. This means that only implementation time will control how long it takes for a policy change to appear in the data on this indicator. However, given the education deficits and human resource shortages in many developing countries, it may take a significant amount of time to overcome these hurdles.

Like all survey-based indicators, there are concerns about the lack of consistency regarding the definition of 'skilled birth attendant' among the various collection tools, limiting the comparability of data between countries. WHO also has expressed concerns that although it has developed a standardized definition of skilled attendance, no one has attempted to verify that those who claim to be skilled birth attendants meet the standards set forth by WHO for that category of medical personnel.[46]

It is far more cost-effective to increase birth attendance in areas with low current rates.

Relationship to Poverty

Little or no conclusive evidence exists on differences between the maternal mortality and morbidity of the rich and those of the poor. There is, however, clear evidence on the difference in the use of obstetric care based on socio-economic class. In a study of 45 developing countries and transition economies, World Bank researchers found that in every country, both the wealthiest quintile and the population as a whole were significantly more likely than the poorest quintile to have medically-trained personnel present at birth.[47] In many countries, the direct correlation between wealth and use of obstetric care is consistent across all five wealth quintiles.[48] And in some countries, such as Kenya, there are dramatic inequities associated with low maternal education, regional variations, and rural residency even among the non-poor.[49]

It is far more cost-effective to increase birth attendance in areas with low current rates than to do so in areas with relatively high rates.[50] As a result, cost-conscious policies likely will have some measure of pro-poor focus built into them. Given this fact and the much lower rates of skilled birth attendance among the poor, it seems likely that any increased focus on increasing skilled birth attendance would have some impact on reducing the gap between the rich and poor in terms of obstetric care and, by extension, maternal mortality.

Although the academic literature does not appear to have addressed this issue, efforts to increase the prevalence of skilled attendance at birth also should contribute to poverty reduction because of the significant burden that maternal mortality and morbidity can impose on families in the developing

countries. Women of child-bearing age contribute to the household financially through their labor productivity and by caring for the entire family. The loss of this resource due to death or morbidity-related disability contributes to household poverty and reduces child survival rates. Conversely, actions that prevent maternal mortality and morbidity should decrease financial risks for poor households.

Contraceptive prevalence rate

The availability of family planning information and services plays a significant role in increased contraceptive prevalence.

Definition

Contraceptive prevalence rate is the percentage of women between 15–49 years who are practicing, or whose sexual partners are practicing, any form of contraception. Contraceptive methods include condoms, female and male sterilization, injectable and oral hormones, intrauterine devices, diaphragms, spermicides and natural family planning, as well as lactational amenorrhea (lack of menstruation during breastfeeding) where it is cited as a method.

Indicator six: Contraceptive prevalence rate

Source	UN Population Division
Website	http://www.unfpa.org/swp/2005/images/e_indicator1.pdf
Primary Sources	Household surveys; Demographic and Health Surveys (DHS); Multiple Indicators Cluster Surveys (MICS); contraceptive prevalence surveys; and health service statistics
Country Coverage	98/113 MCC income-eligible countries
Periodicity	Measured every 3 to 5 years
Latest available year	Inconsistent, ranging from 1980–2002
Variants	Modern methods; age (adolescence);. marital status; method of contraception; location (urban/rural, major regions/provinces); and socio-economic characteristics (e.g. education level, wealth quintile)
Other Uses	MDG Indicator #19c, ICPD goal
Income Bias	Poor countries tend to perform worse on this indicator than their better off counterparts. However, within the MCC income categories there is a good deal of variation along the GDP spectrum.

Content and Policy Link

The availability of family planning information and services plays a significant role in increased contraceptive prevalence. A study of the determinants of increased contraceptive prevalence in 26 developing countries found that satisfaction of existing demand for family planning services accounted for at least 70 percent of the increase in 24 countries and more than 80 percent in two-thirds of the countries studied.[51] These numbers indicate that by implementing family planning programs that meet the needs of their populations, govern-

ments should be able to have a direct impact on their performance on the contraceptive prevalence rate indicator.

The impacts of increased contraceptive prevalence include lower total fertility rates[52] and reduced maternal and child mortality,[53] making it a strong overall measure of maternal and child health. It measures voluntary use of contraception to space pregnancies or avoid additional ones after the desired family size has been reached, and is regarded by many as the highest quality reproductive health indicator. The behavioral motivation behind it is unambiguous, unlike either unwanted fertility or unmet need, which require cognitive changes in women's perception of their ability to manage their fertility. Increased contraceptive prevalence also can indicate awareness among women that an infant's health can be compromised by an ensuing closely spaced pregnancy.

From a policy and growth perspective, a high correlation is observed between economic development and contraceptive prevalence.This is usually tied to government-sponsored access to contraception among the rural and urban and poor-wealthy populations. That said, nearly all developing country governments officially sponsor contraceptive access and several low-income countries have moderate to high prevalence rates, including Zimbabwe, Bangladesh, Bolivia, and India. It has also been shown to rise steadily over the short-term as a result of government activity in countries such as Sri Lanka, Thailand, Indonesia, Zimbabwe, and China. The contraceptive prevalence rate should be seen as a preconceptional health measure that is informative of women's, maternal and infant health.

Contraceptive prevalence is the single most important proximate determinant of total fertility, a fact that can be demonstrated using empirical evidence.

Data Issues and Conceptual Concerns

The above strengths notwithstanding, the international community has historically refrained from setting specific goals for national contraceptive prevalence rates because the prevailing view is that family planning should be a personal choice left to individuals and couples. Setting specific goals in this arena may cause governments to aggressively push family planning programs in violation of the rights and preferences of their citizens. Instead, the international community has focused on the efforts of governments to meet the needs of their people in terms of providing family planning information and services.[54]

Data availability and comparability may be a barrier to the adoption of this indicator. In addition to the fact that a number of MCC countries lack data on contraceptive prevalence, there can be differences in definitions employed by various survey instruments in measuring this practice.

Relationship to Poverty

A study of public family planning service usage found that users from the wealthiest quintile outnumbered those from the poorest quintile in 13 of the 20 developing countries examined, and that the contraceptive prevalence rate is significantly higher amongst the wealthiest quintile in all 20 countries. In addition to wealth, there is also evidence of inequitable distribution due to other socio-economic factors, including education, region, population density, and

ethnicity.[55] However, the study also found that countries with a higher contraceptive prevalence rate had less disparity than those in which a smaller percentage used contraceptives, indicating that increasing the contraceptive prevalence rate could contribute to reducing inequity.[56]

The existing literature on the subject makes it clear that contraceptive prevalence is the single most important proximate determinant of total fertility, a fact that can be demonstrated using empirical evidence.[57] Eastwood and Lipton have demonstrated a causal link between lower fertility rates and overall poverty rates at the macro-level,[58] and it is not unreasonable to hypothesize that increases in contraceptive prevalence will contribute to poverty reduction in the long term. Other poverty-reduction effects may occur because some forms of contraception also prevent HIV/AIDS and other sexually-transmitted disease that help contribute to poverty incidence in developing countries.

Unmet need for family planning

Definition

Unwanted pregnancies can pose significant health risks to women and their families.

This is defined as the number of women of child-bearing age who are married or in consensual union and who desire either to terminate childbearing or to postpone their next birth for a specified length of time (usually 2 years or longer); and who are not using a contraceptive method or who are pregnant and whose pregnancies were unwanted or mistimed; or amenorrhoeic women who gave birth recently whose last birth was unintended; divided by the total number of women who are married or in consensual union.

Indicator seven: Unmet need for family planning

Source	U.N. Population Division
Website	http://www.un.org/esa/population/publications/contraceptive2003/wcu2003.htm
Primary Sources	Household DHS surveys
Country Coverage	63/113 MCC income-eligible countries
Periodicity	Irregular (generally collected every 3–5 years)
Latest available year	Inconsistent, starting from 1985
Variants	Location (urban/rural); socio-economic characteristics (e.g. education level); and age
Other Uses	ICPD goal
Income Bias	Poor countries tend to perform worse on this indicator than their better off counterparts. However, within the MCC income categories there is a good deal of variation along the GDP spectrum.

Content and Policy Link

The adequate availability of family planning information and services plays a significant role in decreasing unwanted fertility rates. Unwanted pregnancies can pose significant health risks to women and their families, particularly since

unwanted pregnancies often are associated with high risk of maternal death and injury.[60]

High levels of unmet need indicate that family planning programs and policies either do not exist or are inadequate. This can mean that programs are failing to fully inform women of the options available to them, or that the mechanisms for delivering those options are inadequate for the demand in a country. Governments can respond to these failings by adopting policies aimed at strengthening and expanding family planning programs with their health systems.

From a conceptual standpoint, this measure also is useful in measuring the overall responsiveness of the health system to women's needs and gender equity issues.

Data Issues and Conceptual Concerns

The lack of regular data collection presents a problem for the use of this indicator. The irregular periodicity of collection at this point seriously hinders the ability of this indicator to show change in the short term. Should the measurement problems be resolved, this indicator should be able to reflect recent policies and practices, because it is directly linked to an input measure that is reflected at the time of delivery. This means that only implementation time will control how long it takes for a policy change to be reflected in the data on this indicator.

Initial improvements in family planning programs can actually increase demand for contraception, which often causes demand to exceed the existing supply.

One broader conceptual concern about this indicator is that the determinants of the decision not to use contraception are often unclear. A woman who does not wish to become pregnant may have both information about, and access to, modern methods of contraception, but still decide not to employ those methods. Such cases would be classified in the data as unmet need, even though they would not reflect a failure of family planning services.

Another concern about this indicator is that it does not decrease linearly when family planning programs improve and desired fertility decreases; initial improvements in family planning programs can actually increase demand for contraception, which often causes demand to exceed the existing supply. As a result, unmet need will rise until supply shifts in response to demand.[61] This curvilinear relationship between unmet need and program strength (as proxied by contraceptive prevalence rate), which has been noted in the literature from early in the formulation of the 'unmet need' concept, renders it necessary to use unmet need and contraceptive prevalence measures jointly to effectively capture the intersection of family planning policies and practices.[62] In the longer term, unmet need declines and this progressive satisfaction of need through, for instance, better access to services of higher quality, remains the main driving force behind increasing contraceptive prevalence (and both falling fertility and reduced recourse to abortion).

The underlying dynamics are explained by an analytic model of changing demand and access to family planning, and varying degrees of contraceptive efficacy and other proximate determinants of fertility, during the fertility transition.[63] Cross-sectional data indicate that after contraceptive prevalence reaches roughly 30 percent, the relationship becomes linear.[64] Analysis of

changes in contraceptive prevalence over time further indicates that conversion of unmet need into family planning use accounts for some 61 to 96 percent of increases in contraceptive prevalence in 26 countries (with changes in fertility preference accounting for much of the balance).[65] Contraceptive prevalence rate and unmet need, taken together, provide a picture of the levels of fertility desires and the effectiveness of programmatic response in helping to realize stated preferences.

Taking the sum of contraceptive prevalence and unmet need as a measure of total demand for family planning, the proportion of family planning demand being satisfied is routinely calculated in Demographic and Health Survey reports (i.e., contraceptive prevalence divided by total demand). This measure is interpretable at all levels of demand, but taken alone does not indicate the volume of demand and, therefore, changes in the strength of the health system response. However, analyses show progressive improvement in the proportion of demand satisfied over the past decades in surveyed countries and significant differentials between rural and urban areas and across income groups.[66] As any two of three measures largely fix the value of the third, using the more extensively analyzed measures of contraceptive prevalence and unmet need is recommended. The calculated ratio could be used as part of the elaborated documentation for proposal review.[g]

The poorest quintile experiences a higher unwanted fertility rate than the wealthiest. In many cases, the difference between the two is substantial.

Relationship to Poverty

Despite the nonlinear relationship between reducing unmet need for family planning and increasing the contraceptive prevalence rate, the former is seen as an important strategy for achieving increased contraceptive use and decreasing total fertility. Thus, the relationship between contraceptive prevalence and poverty discussed above also applies to unmet need for family planning.

Also, by decreasing unmet need, governments may reduce unwanted pregnancies, which occur disproportionately among the poor and may have a significant impact on poverty status. An examination of unwanted fertility rates in 41 developing countries found that in more than three-quarters of the countries, the poorest quintile experiences a higher unwanted fertility rate than the wealthiest. In many cases, the difference between the two is substantial.

Unwanted pregnancies often tend to be higher risk, particularly among women at the extremes of the fertile age spectrum, and are strongly associated with maternal mortality through unsafe abortion and pregnancy complications.[67] Some evidence suggests that the children who are the products of unwanted pregnancies experience negative outcomes later in life.[68] In addition to its mortality effects, unintended pregnancy also can limit educational opportunities for the mother, and can strain household finances. All of these factors collectively can impact the poverty status of the whole family in both the short and the long term.[69]

g. Paragraph text provided by Stan Bernstein.

Sustainable access to an improved water source[h]

Definition

This is the percentage of population with access to an improved drinking water source in a given year. Improved drinking water sources are defined in terms of the types of technology and levels of services that are more likely to provide safe water than unimproved technologies. Improved water sources include household connections, public standpipes, boreholes, protected dug wells, protected springs, and rainwater collections. Unimproved water sources are unprotected wells, unprotected springs, vendor-provided water, bottled water and tanker truck-provided water. Reasonable access is broadly defined as the availability of at least 20 liters per person per day from a source within one kilometer of the user's dwelling. Sustainable access has two components with respect to water: one stands for environmental sustainability, the other for functional sustainability. The former insists on environmental protection through limiting extraction of water to a capacity below what is actually available. The latter reflects program sustainability in terms of supply and management. Access to drinking water is a fundamental need and a human right vital for the dignity and health of all people. The health and economic benefits of improved water supply to households and individuals (especially children) are well documented.[70]

The leading cause of death among poor people in developing countries is water-related disease.

Indicator eight: Access to water

Source	WHO/UNICEF
Website	http://devdata.worldbank.org/dataonline/
Primary Sources	National household surveys and assessment questionnaires
Country Coverage	110/113 MCC income-eligible countries
Periodicity	Collected irregularly; only available for 1990 and 2002
Latest available year	Full coverage: 2002
Variants	Location (urban/rural)
Other Uses	MDG Indicator #30; IDA14 Country Outcome Indicator #7
Income Bias	This indicator shows more evidence of income bias than the others. However, there is still some variation from the upward trend along the income spectrum.

h. The MCC is planning to add a natural resource management indicator during the next round, and access to water would fit as well in that category as in health. One of the four indicators currently under consideration is the percentage of the urban and rural population with access to improved sanitation, a metric often used in conjunction with this indicator.

Content and Policy Link

The leading cause of death among poor people in developing countries is water-related disease transmitted through contaminated drinking water, inadequate sanitation, and poor personal hygiene. At any given time, close to half the people in the developing world are suffering from one or more of the main diseases associated with inadequate provision of water and sanitation services.[71] These diseases kill about 2 million children every year, and many more are at risk because more than 1 billion people around the world lack access to safe drinking water.[72]

Improved access to water must be accompanied by sanitation and hygiene efforts.

Water infrastructure projects are capital-intensive and require significant investment by government and/or donors. The attention focused on this issue by international actions like Agenda 21, the MDGs, and the World Summit on Sustainable Development have produced numerous policy recommendations regarding how governments and donors can improve performance on this indicator.

Data Issues and Conceptual Concerns

The lack of regular data collection presents a problem for the use of this indicator, as do definitional inconsistencies across countries and surveys. However, it is both an IDA and an MDG indicator, which means that there should be more incentive for regular collection than in the past. Also, donors may be investing heavily in this currently because it is a popular, effective intervention.

Another concern is that providing access to safe drinking water by itself does not guarantee an improvement in health. According to the WEHAB Working Group, improved access to water must be accompanied by sanitation and hygiene efforts if the full benefits are to be realized.[73] An additional conceptual question about this indicator is whether it penalizes countries that have large rural populations, when compared with largely urban countries. Globally, 94 percent of people living in urban areas have access to an improved water source, while only 71 percent of rural residents do.[74]

More importantly, several fundamental determinants of safe water usage are not addressed by this indicator. For example, households may have access to an improved water source but not use it, or may be burdened by long queuing times even if the water source is nearby; increasing supply alone is not the whole picture. Equally, an 'improved' source may not be working, or may have been inaccurately reported and instead provide contaminated, unreliable water. In fact, 'improved' sources can sometimes provide lower quality water than the original 'unimproved sources,' and in some cases vendors of bottled water may actually be the most cost-effective source.

Relationship to Poverty

As with many other indicators, it is clear that poor access to safe drinking water is part of the vicious circle of poverty and ill health. Unlike many health indicators, however, significant research has focused on the impact of improving access to water on household poverty status. This impact stems in part from reduced health costs, and also from increased worker productivity and the critical role of water in many household microenterprises.[75] A 2004 study

found that an increase in rates of access to an improved water source has had a significant negative impact on income inequality in several Latin American countries.[76]

Lack of direct access to safe, clean drinking water affects household income and consumption in several ways. Developing countries lose millions of working days a year as a result of the time workers spend collecting water and suffering from or caring for relatives suffering from water-borne illnesses.[77] Indian households, for example, lose 73 million working days a year to water-borne diseases, which cost a total of $600 million for medical treatment and lost production. Africans lose 40 billion working hours a year because of time spent carrying water.[79] These impacts also are felt on the macro level: a one percent increase in lack of access to water results in a 0.09–0.13 percent decrease in a country's total factory production.[80]

Additionally, households may spend significant resources purchasing water from vendors who charge drastic mark-ups over tap prices, or treating surface water to make it potable, reducing the amount of money families have to spend on other forms of consumption.[81] In the longer term, water-borne illnesses can delay school entry, cause absenteeism, and impair cognitive function, all of which impact future economic potential.[82]

IV. Discussion and Recommendations

In a perfect world, a vast array of valuable information about health status and health system inputs would be available to inform policymaking and program design, both by decision makers in the developing world and by those in donor agencies. The MCC would have access to a complete and up-to-date set of data and would be able to select indicators based solely on the aspects of 'investing in people' that they measure or represent.

There is much to be gained from moving to an international consensus on the identification, investment, adoption and harmonization of key indicators for health.

The current state of data collection and analysis in the developing world, however, implies many profound limitations in the available indicators. In only one case — DTP3 immunization rate — did an indicator meet all eight of the criteria we examined in this study, and even for that indicator, questions can arise about the influence of donor priorities. As a result, recommendations regarding the remaining seven indicators required consideration of the trade-offs between data quality and availability, and of the value of the indicator in assessing government commitment to health.

That said, there is much to be gained from moving to an international consensus on the identification, investment, adoption and harmonization of key indicators for health, as envisioned in the Paris Declaration on Aid Effectiveness[83] and Marrakech Action Plan for Statistics.[84] Major benefits of coordination of key indicators include clear signals to developing country governments; economies of scale and scope in investments in data collection; and reduced transaction costs for developing country governments. Within that broader context, the Working Group has proposed several policy actions for the MCC and for several other key stakeholders, as summarized in the following chart and outlined in greater detail below.

Summary Recommendations

Key Stakeholder	*Policy Recommendation*
Millennium Challenge Corporation	• Immediately replace the current immunization indicator with DTP3 immunization rate • Prioritize investment in the government public health spending indicator to replace the current expenditure measure in the medium term; in the short-term, consider the World Development Indicators data for the current metric • Also invest in or encourage other agencies' efforts to improve the collection of data on skilled birth attendants and/or contraceptive prevalence rates, and set a target adoption date for those indicators in the long term • Consider under-5 mortality, stunting, unwanted fertility and access to water as supplementary information
International Development Association's Results Measurement System	• Supplement child mortality and skilled birth attendants indicators with immunization rate and public health expenditures, and invest in improved data quality for their existing indicators
Health Metrics Network	• Coordinate with the MCC and IDA to improve indicator measurement and availability • Strengthen country capacity for data collection and vital registration
Bilateral Aid Agencies	• Expand the use of Demographic and Health Surveys • Standardize DHS definitions across countries (with particular attention to the skilled birth attendants indicator)
International Monetary Fund	• Strengthen the public health expenditure data set • Make existing data freely available to the public
National Governments	• Improve data collection and vital registration systems • Adopt and standardize National Health Accounts to better track expenditure indicators

An Easy Yes

The DTP3 immunization rate is the only indicator that meets all eight of the criteria discussed in the methodology section.

At this time, the DTP3 immunization rate is the only indicator that meets all eight of the criteria discussed in the methodology section. As a result, it seems clear that this indicator should be included in the MCC's country selection criteria for health. The argument could be made that the combined DTP3 and measles immunization indicator also meets all of the criteria and should be retained. However, the one caveat in recommending an immunization indicator is the question of whether immunization rates reflect donor priorities more than government priorities.

The Working Group discussed the question of whether the source of funds matters, provided the resources are going into the health system. The major concern that members raised was that donor funding may not be sustainable if international priorities change. With immunization, which is funded almost exclusively through the public sector in developing countries, the withdrawal of donor funds could have a particularly profound impact. Given the increased donor participation in measles immunization, excluding measles immunization from the indicator would help to minimize the risks associated with donor

funding. Additionally, because the health system effects of immunization are best captured by the DTP3 indicator — which requires repeated contact for full immunization — the measles rate seems superfluous.

Two important notes accompany this recommendation. First, seven low-income countries and one lower-middle-income country that pass the existing immunization indicator do not pass based on DTP3 immunization alone. Two of these eight countries, Georgia and Nicaragua, already have signed compacts with the MCC. Since both of these countries currently perform above the median on three of the four 'investing in people' indicators, neither will lose its eligibility based on this change alone. Madagascar and Mali, both of which were declared eligible in fiscal year 2006, also fail on this indicator, and Mali will lose its eligibility if this change is adopted. As a result, the MCC must consider how to handle countries that fall behind due to changes in the indicators, rather than changes in their own policies and investment levels. It may be useful, when changing an indicator, to allow some form of grace period, giving countries that fail based on an indicator change an opportunity to catch up.

An additional concern with both immunization indicators is the question of using a threshold instead of a floating median as the performance goal. With the existing immunization indicator, the median score for the lower-middle-income category already surpasses 90 percent. However, less than one-third of all income-eligible countries have DTP3 immunization rates in excess of 90 percent, and the median score in both income categories also remains below 90 percent. The Working Group believes that the MCC does not need to confront this question at this time, with the caveat that they should look closely at the variance of this indicator to ensure that it remains sensitive to government commitment. In the future, the agency may want to consider adopting a threshold in one or both of the categories in place of the floating median. Similarly, the MCC could consider an alternate variation of DTP3 immunization by using the percentage of districts within a country that have achieved over 80% coverage (also reported by WHO/UNICEF on an annual basis), rather than relying on the aggregate national average. This measure better addresses the inequities across regions and rural areas. It could also be taken into account as supplementary information within the current framework.

The best conceptual measure of a government's commitment to health is spending in public health services and functions.

The Impact of Spending

Because of shortcomings in the underlying data and availability, the Working Group was unable to identify an indicator superior to the current MCC expenditure indicator at this time, and so cannot issue a clear recommendation for immediate application. However, the Working Group agrees with the importance that the MCC places on measures of a government's financial inputs to the health system. With that in mind, we recommend that the top priority for additional investment is in this area. Based on our analysis, we believe that the best conceptual measure of a government's commitment to health is evidenced by the share of government health spending invested in public health services and functions. This is particularly true in the context of creating a comprehensive 'set' of indicators, and this indicator fills a key gap in terms of

assessing rational allocation of funds. Based on the merits of the data quality alone, the government expenditure on public health indicator might have failed to make it to the 'recommended' list; however, the Working Group circled back and instead recommends this as the top priority for data investment based on its conceptual desirability.

Specifically, the MCC should work closely with the IMF to increase and refine reporting of government health spending on public health services in its Government Finance Statistics Yearbook, to ensure that it accurately represents the share of both central and local total health expenditures, and is measured both more widely and more frequently.[i] There is already an existing methodology for doing so through the National Health Accounts (NHA) — a type of health financing measurement that has greatly benefited from the support of USAID, among other donors — which can serve as a sensible starting point for further investment. Assuming that this could be resolved relatively quickly and easily incorporated into the existing collection process, then the MCC should proceed to adopt this indicator in place of the current measure of total public expenditure on health as a proportion of GDP; in the meantime, the MCC should continue to use their current indicator, for lack of a better alternative, but should rely on the World Development Indicators Database for its source data, rather than its current self-reporting by national embassies (assuming that the time lag inherent in WDI data is preferable to the subjectivity of the current reporting system). The current measure does not adjust for subsistence and debt service, is inconsistent in its treatment of local versus central governments as well as donor contributions, and does not address the critical question of how the government is allocating those funds within the health sector. In contrast, the proportion of government health expenditures devoted to core public health functions directly answers the question of appropriate resource allocation.

The Working Group recommends that the MCC focus its attention on improving the collection of data on skilled attendance at birth and contraceptive prevalence rate.

Trade-Offs and Incentives for New Data

Looking beyond the immunization and expenditure indicators, it becomes much less clear which measures the MCC should use. Selecting another indicator from the other six examined in the Working Group context requires balancing sometimes imperfect information against the desire to use the indicators that best capture government investment in health. Based on the MCC's past reluctance to adopt indicators that do not fully meet the stated data standards, the Working Group cannot at this point recommend full adoption of any of the remaining indicators. However, this is an area in which the MCC can provide significant incentive to governments and international organizations to improve data collection methods and frequency.

Based on the analysis above, the indicators that measure contraceptive prevalence, the presence of a skilled attendance at birth and chronic childhood malnutrition appear to be best from a conceptual standpoint. However,

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i. Unlike outcome indicators, expenditure indicators are largely government reported and so require much lower investments to achieve necessary improvements.

they each raise significant questions regarding the ability to collect and rigorously analyze data on a timely basis. Of these, the contraceptive prevalence rate and skilled birth attendance indicators are more likely candidates for increased monitoring attention because they are aligned with other international priorities, as indicated by their designation as an MDG indicator and IDA outcome measure. As a result, the Working Group recommends that the MCC focus its attention on improving the collection of data on skilled attendance at birth and contraceptive prevalence rate.

The MCC already has signaled on more than one occasion that it would like to adopt skilled birth attendance as a measure of investment in women's and children's health. However, the Working Group recommends that the agency take a more pro-active approach to encourage better collection and analytical rigor. Congress has appropriated $5 million of funding to the MCC for data improvement, some of which should be applied to increasing efforts to collect and verify data on skilled birth attendance and contraceptive prevalence rates, by either expanding the use of DHS surveys or incorporating relevant questions into other routine data collection efforts, in coordination with the United Nations agencies involved in monitoring the MDGs, the World Bank's International Development Association (IDA), and USAID. This should be undertaken with the explicit intention of eventually adopting one or both of these as selection indicators according to a timeline set by the MCC.

We hope that the findings can serve as a broader reference on the benefits and costs related to indicators of a government's investment in, and commitment to, the health of its citizens.

In the meantime, these and the other remaining indicators should be considered — transparently — by the MCC Board as supplementary information about the countries for which they are available and up-to-date.

Applications and Recommendations Beyond the MCA

While the MCA is the immediate target of these recommendations, the recommendations have applications far beyond just this one aid program. As other donors — both public and private — increasingly shift towards performance-based aid and demand greater accountability for results, we hope that the Working Group's findings can serve as a broader reference on the benefits and costs related to indicators of a government's investment in, and commitment to, the health of its citizens. Examples of possible beneficiaries of these findings include IDA, whose Results Measurement System is intended to closely measure countries' progress against agreed development outcomes. Currently, IDA employs child mortality and skilled birth attendance indicators as health metrics for these purposes; the Working Group hopes that IDA would consider supplementing these indicators with immunization rate and public health expenditures, while strengthening the capacity of countries and technical agencies to improve data quality and timeliness for their existing indicators. Should IDA pursue the latter, then MCC might also want to reconsider those indicators at that time.

Similarly, the World Health Organization launched the Health Metrics Network (HMN) in 2005 to 'increase the availability and use of timely and accurate health information in countries and globally through shared agreement on goals and coordinated investments in core health information systems,' which

would align nicely with the need to improve the measurability of the indicator 'runners-up' that are wonderful measures of government behavior in concept, but are not supported by the current state of data. In fact, there may well be room for collaboration with the MCC and IDA, who could contribute to the HMN for such an effort.

Other bilateral donor efforts, such as USAID, could also significantly contribute to the array of prospective indicators for this and other purposes by funding the expansion of Demographic & Health Surveys, and strengthening the consistency of definitions across countries. Finally, national governments themselves have a critical role to play in strengthening their own data collection and vital registration systems, including the adoption of National Health Accounts where they are not yet in place. And across the board, governments, aid agencies and international financial institutions should make a concerted effort to make their data transparent and freely available to the public (specifically including the IMF Government Finance Statistics Yearbook, for example).

Final Thoughts

The ability to count vital events reliably is an indicator of commitment to good governance in general.

In considering key indicators for a health system and for tracking health system performance, one issue that comes up again and again is the weakness of the information system that is so critical to inform decision-making. The ability to count vital events reliably is an indicator of commitment to good governance in general, not just health, which is often forgotten. Thus, the Working Group would also like to propose birth and death registration as ideal information metrics worthy of greater investment by the donor community.

Finally, reliance on any single indicator or set of indicators, no matter how good, is inherently limited in approximating a government's commitment to the health sector as a whole. The selection of a given indicator may well be interpreted as prioritizing it above other health measures, regardless of whether that is actually the case, and could lead to increased focus on that indicator at the expense of the overall health system. Similarly, some indicators, particularly financial ones, implicitly prescribe 'optimal' spending ratios, when in fact, the ideal outcome might vary according to the specific national circumstances. While these may be necessary evils inherent in any quantitative measure of good governance, they should be guarded against wherever possible, and necessitate vigilance by the MCC, including consideration of multiple additional indicators as supplementary information when available.

V. Additional Analysis and Next Steps

The Working Group identified several areas for additional analysis by the Millennium Challenge Corporation and other stakeholders as part of an ongoing assessment of proposed and existing indicators, both for global health in particular and for other metrics of development more broadly. For the array of

conceivable expenditure input indicators, it is worth more in-depth examination of how directly they impact national health outcomes, and how closely they are correlated with the other measures of national, subnational and donor spending patterns. For each individual indicator, there is a clear need to examine the issues related to margin of error. It would also be beneficial to look closely at how the different indicators within a full suite track over time, and to see how they relate to a wide array of social stratifiers such as gender, education, region, population density, ethnicity, and wealth, particularly within vulnerable groups (such as refugees, urban slum dwellers, orphans, and linguistic minorities) that are frequently excluded from survey analyses.

The Working Group urges the MCC and other health stakeholders to regularly survey and reassess the universe of possible indicators.

The Working Group also would like to see these and other indicators considered through the lens of economic incentives and game theory. Recent studies[85] have demonstrated that the MCC indicators create a strong incentive effect for candidate countries to improve their performance. However, that can be taken a step too far in cases where governments might find ways to effectively 'play the system,' and improve on one narrow measure without actually improving their overall commitment to health — or in some cases, even to its detriment. Obviously this would be an undesirable outcome, and should be a key consideration in the adoption of new indicators or continuance of existing ones. To that end, the Working Group suggests that the MCC compare changes in the active indicators to others that were not chosen over time, to see whether any performance improvements are in fact representative of the overall health sector, as intended.

As the MCC continues its work, new questions will arise and need to be addressed to maintain the quality and value of the selection indicators. In non-health sectors, for example, it has been suggested that a hard threshold may have more merit as a qualifying factor for some indicators than a floating median; this may eventually prove true of some health indicators, such as the DTP3 immunization rate. Rigorous thinking is required to assess if and when that will be the case and at what level, and on what grounds to justify that change. Similarly, certain indicators may eventually outlive their usefulness, and so the status quo should be challenged on a regular basis with this in mind along with a process for removing and replacing outdated measures. Eventually, for example, if immunization rates continue to rise, then DTP3 rates may no longer effectively distinguish between weak and strong governance in health — at which point it may be appropriate to replace it with the coverage of a newer vaccine (for example, hepatitis B).

Finally, the Working Group urges the MCC and other health stakeholders to regularly survey and reassess (using a standard approach such as ours, described in Appendix D) the whole universe of possible indicators and the related data sources every three to five years to see if new indicators or methodologies have been developed or if the quality of available data has improved significantly. The Working Group hopes that the measurability of the suggested 'runners-up' increases sufficiently in the near future, and that the MCC will revisit those indicators at that time for consideration and eventual adoption.

Appendices

Appendix A. Working Group Member Biographies

Carla Abou-Zahr has worked at the World Health Organization since 1989, where she is currently serving as the interim Executive Secretary for the Health Metrics Network, a global collaboration for improved health information systems. Prior to joining WHO, she worked for EUROSTAT and the United Kingdom civil service. Abou-Zahr's academic background is in statistics and health systems management, and she specializes in strategy development, monitoring and evaluation, with over 20 years experience in international work, largely in population, health and development. She has worked extensively with international, national, public and non-profit agencies, including national level health service providers and community-based NGOs in Asia, Africa, and the Middle East, and has been responsible for developing strategic frameworks and operational approaches in the area of reproductive health; formulating research protocols, evaluating research results, elaborating program monitoring and evaluation strategies, identifying indicators, and enhancing national capacity to plan, implement, monitor and evaluate programs. Abou-Zahr has authored several original articles on reproductive health, maternal mortality and morbidity and on health information systems.

Roger Bate is a resident fellow at American Enterprise Institute and a Director of the health advocacy group Africa Fighting Malaria. He researches international health aid policy in Africa and the developing world, and evaluates the performance and effectiveness of aid agencies, nongovernmental organizations, and other aid organizations and development policy initiatives. He writes extensively on topics such as health policy and endemic diseases (malaria, HIV/AIDS) in developing countries; water policy and international environmental and health agreements (industrial chemicals, climate change, and water). Bate's writings have appeared in, among others, the *Lancet,* the *Wall Street Journal,* the *Financial Times,* and the *Washington Post,* and he regularly contributes to AEI's *Environmental Policy Outlook and Health Policy Outlook* series. Before joining AEI, Bate founded the environmental unit at the Institute of Economic Affairs in 1993 and co-founded the European Science and Environment Forum; he also founded the Frederic Bastiat International Journalism Prize in 2001.

Stan Bernstein is a Policy Advisor with the United Nations Population Fund, where he is responsible for advising on the follow-up to the 2005 World Summit Outcome, including recommendations on the monitoring framework for the Millennium Development Goals and participation in the Interagency and Expert

Group on MDG Indicators. He spent the past two years as Policy Advisor to the UN Millennium Project under the direction of Jeffrey Sachs, with primary responsibility for facilitating the incorporation of sexual and reproductive health concerns in Task Force analyses and recommendations, providing inputs to pilot country activities and commissioning and producing additional reports. He served as a member of the UN Millennium Project's Health Systems group which developed analyses and recommendations related to the work of the Maternal and Child Health and the HIV/AIDS, TB and Malaria Task Forces. Previously, Bernstein served as a Senior Research Adviser for the UNFPA's *State of World Population* report for 10 years, addressing a variety of thematic concerns about population, health, including reproductive health, and development. He was also involved in strategy formulation and programming processes at country level and served in the Secretariats of the International Conference on Population and Development, the Hague Forum, the General Assembly Special Session (ICPD+5) and the European Population Forum. Prior to his work with the Fund, he was a researcher at the School of Public Health at the University of Michigan from which he worked as a consultant for UNFPA and USAID, and helped run a Population and Development Training Program with financial support from USAID and the ILO. His professional training background was in Social Psychology at the University of Michigan.

Caren Grown is a Senior Scholar and Co-director of the Gender Equality and the Economy program at the Levy Economics Institute of Bard College. Her current research focuses on gender equality, public finance, and international trade and investment. Previously, Grown directed the Poverty Reduction and Economic Governance team at the International Center for Research on Women, where she worked on a range of issues related to gender, poverty, and economic policy, and served as Senior Associate of the UN Millennium Project Task Force on gender equality and women's empowerment. From 1992–2001, she was a Senior Program Officer at the John D. and Catherine T. MacArthur Foundation, where she managed research networks and competitions on a wide range of economic, governance, and population issues. Before joining the MacArthur Foundation, Grown was an economist with the Center for Economic Studies at the U.S. Bureau of the Census. She has edited and co-authored several books and numerous articles on gender equality, including: *Trading Women's Health and Rights: The Role of Trade Liberalization and Development* (Zed Books 2006); *Taking Action: Achieving Gender Equality and Empowering Women* (Earthscan Press 2005); and *Development, Crises and Alternative Visions: Third World Women's Perspectives* (Monthly Review Press 1987). She has guest co-edited three special issues of World Development on macroeconomics, international trade, and gender inequality, and has written widely on gender and development issues. She holds a PhD in economics from the New School for Social Research and a BA in Political Science from the University of California at Los Angeles.

Sheila Herrling rejoined the Center for Global Development in October 2005, where she works with Steve Radelet on the MCA Monitor initiative. Before becoming the Senior Policy Analyst, Sheila served as Director of Communications and Policy for the Center. Prior to joining the Center, she served as Deputy Director for the Office of Development Policy at the U.S. Treasury Department, where she provided policy advice on U.S. engagement in the multilateral development banks, strengthening development effectiveness, results measurement and country growth and poverty reduction strategies. Sheila has extensive experience in Africa, where she served as Advisor to the U.S. Executive Director to the African Development Bank in Abidjan, Cote d'Ivoire. Prior to joining the U.S. Treasury, she worked at the Academy for Educational Development on basic education programs in Latin America. Sheila received her M.A. in International Development from American University and a B.A in Economics from William Smith College.

Ruth Levine (Chair, Global Health Indicators Working Group) is a health economist with 15 years of experience working on health and family planning financing issues in Eastern Africa, Latin America, the Middle East, and South Asia; she currently manages the Global Health Policy Research Network at the Center for Global Development. Before joining the Center, Levine designed, supervised, and evaluated health sector loans at the World Bank and the Inter-American Development Bank. She also conducted research on the health sector, and led the World Bank's knowledge management activities in health economics and finance between 1999 and 2002. From 1997 and 1999, she served as the advisor on social sectors in the Office of the Executive Vice President of the Inter-American Development Bank. Levine holds a doctoral degree from Johns Hopkins University, has published on health and family planning finance topics, and is the co-author of *The Health of Women in Latin America and the Caribbean* (World Bank 2001), *Millions Saved: Proven Successes in Global Health* (CGD 2004), and *Making Markets for Vaccines: Ideas to Action* (CGD 2005).

Marty Makinen is a Vice President and Principal Associate in the international health practice at the private consulting company Abt Associates Inc., in Bethesda, Maryland, where he has worked for over 20 years on health-sector financing and economic policy problems with governments and the private sector in more than 40 countries in Africa, Asia, Eastern Europe, Latin America, the Caribbean, and the Middle East. During that time, he has led several USAID-financed projects, including: the worldwide Health Financing and Sustainability Project, the Zdrav*Reform* Program in the former Soviet Union, and the worldwide Partnerships for Health Reform Project and its successor PHR*plus.* He has also served as a member of the Global Alliance on Vaccines and Immunizations' Independent Review Committees for financial sustainability and progress reporting. Before coming to Abt Associates, Makinen previously worked as a research scientist at the University of Michigan's Center for Research on Economic Development, a resident advisor on food and nutrition policy in Madagascar for Associates in International Resources and Development, and an Assistant

Professor of Economics at the University of Delaware. He has taught short courses and given guest lectures at the International Children's Centre in Paris; the National University of Rwanda; Tulane University; the Institute of Health Administration in Kiev, Ukraine; Princeton University; Johns Hopkins University; the World Bank Institute Flagship Course; and Emory University. He received his Ph.D. and Master's Degree in Economics from the University of Michigan and his B.A. in Economics from Kalamazoo College.

Kathryn McDonald is Executive Director and Senior Scholar of the Center for Health Policy and the Center for Primary Care and Outcomes Research (CHP/PCOR) at Stanford University. She is also Associate Director of the Stanford-UCSF Evidence-based Practice Center, and leads CHP/PCOR's Quality and Patient Safety Indicators project. Her work focuses on evidence-based medicine, medical technology assessment, healthcare quality and patient safety. McDonald has served as a project director and investigator on a number of research projects at the Stanford School of Medicine, including the Cardiac Arrhythmia and Risk of Death Patient Outcomes Research Team, the international investigation of Technological Changes in Healthcare, and the development of the Quality and Patient Safety Indicators for the Agency for Healthcare Research and Quality. Previously, she worked as a manager for technology optimization and business development at Stanford Hospital, and as a research and development manager for new product development for a medical device company. She received a master of management degree from Northwestern University's Kellogg School of Management, with an emphasis on the healthcare industry, and holds a BS in chemical engineering from Stanford University.

Catherine Michaud is a Senior Research Associate at the Harvard Center for Population and Development Studies, where she is currently collaborating on the Center's Schistosomiasis Research Program, with a focus on estimating the burden of the disease and reviewing the available empirical evidence regarding schistosomiasis treatment outcomes. Another area of work focuses on the review of trends, and analysis of the impact of, external financial resources on the macrohealth process in selected countries including Ethiopia and Sudan. She recently co-authored the chapter 'Priorities for Global Research and Development of Interventions: Overview and Synthesis' in the second edition of *Disease Control Priorities in Developing Countries.*

Philip Musgrove is Deputy Editor-Global Health for *Health Affairs,* which is published by Project HOPE in Bethesda, Maryland. He previously worked as a principal economist for the World Bank, including two years on secondment to the World Health Organization. He has also served as an adviser in health economics at the Pan American Health Organization, and a research associate at the Brookings Institution and at Resources for the Future. Musgrove has worked on health reform projects in Argentina, Brazil, Chile, and Colombia, and has dealt with a variety of issues in health economics, financing, equity, and nutrition; his publications include more than 50 articles in economics and

health journals and chapters in 20 books, including the second edition of *Disease Control Priorities in Developing Countries.* He is an adjunct professor at the School of Advanced International Studies at Johns Hopkins University and has taught at George Washington University, American University, and the University of Florida. He holds degrees from Haverford College, Princeton University, and Massachusetts Institute of Technology.

Mead Over is a 20-year veteran of the World Bank, where he currently serves as the Lead Economist of the Development Research Group. His work as focused on the economics of HIV/AIDS, including studies of its impact and of the cost-effectiveness of alternative prevention strategies, and he has also explored a variety of topics on the impact of AIDS on health systems, on the evaluation of hospital reform proposals, and on incentives for efficient, high quality service delivery by health care providers at the periphery, as well as earlier work on the U.S. Medicare system.

Michel Thieren is a Belgian physician specializing in humanitarian affairs and human rights. He has spent more than a decade managing emergency operations in non-governmental organizations and the United Nations, and was head of office in northern Bosnia for the World Health Organization in 1995–1996. He works at the World Health Organization in Geneva.

Amy Tsui is the Director of the Bill & Melinda Gates Institute of Population & Reproductive Health at the Johns Hopkins Bloomberg School of Public Health, where her research focuses on the effects of various family planning and health service delivery models on contraceptive, fertility, and sexual health outcomes in Malawi, urban Pakistan, northern India, and Ethiopia. Between 1991 and 1997, Tsui led the USAID-funded Evaluation Project at the University of North Carolina, and has published widely on issues of measurement in the field of reproductive health. Tsui holds a doctoral degree in Sociology from the University of Chicago.

Abdo Yazbeck is a Lead Health Economist at the World Bank Institute's program on health and AIDS, with previous experience in the South Asia Region on health projects, and health sector policy research in Bangladesh, India, Sri Lanka, and the Maldives. Yazbeck also served as a Coordinator of the Health and Poverty Thematic Group of the Human Development Network, working on improving the poverty focus of World Bank financed projects, and on assisting country clients in the development of Poverty Reduction Strategy papers and programs. Prior to joining the Bank, he lectured in economics for five years at Texas A&M University and Rice University. Yazbeck has more than fourteen years experience in health economics and development economics, and has worked in 18 countries in the former Soviet Union, the Middle East, North Africa, South Asia, and Sub-Saharan Africa.

Project Staff

Loren Becker is a program associate with the Health Financing Task Force. She received a Master's Degree in Public Policy in May 2006 from Duke University's Terry Sanford Institute of Public Policy, where she focused her studies on the relationship between health and economic development and the interaction of the public and private sectors in both research and service-delivery. Prior to matriculating at Duke, she worked for four years at the Bureau of National Affairs Inc., a legal and regulatory publishing company in Washington, DC, first as a Web developer and then as a congressional reporter. Becker also holds a BA in Latin American Studies from the George Washington University.

Jessica Pickett works on the Global Health Policy Research Network at the Center for Global Development, where she manages the Global Health Forecasting Working Group, oversees outreach and communications related to the Advance Market Commitment and Global Health Indicators Working Groups, and edits the Global Health Policy blog. She is also responsible for coordinating the Center's foundation relations. Prior to joining CGD, Pickett supported fundraising and communications activities at the GAVI Fund. She holds a degree in public policy from Duke University with a concentration in health.

Appendix B. Full Indicator Index

Health Status Indicators

1. Total fertility rate
2. Life expectancy at birth
3. Healthy life expectancy at birth
4. Under-five mortality rate
5. Infant mortality rate (first year of life)
6. Neo-natal mortality rate (first 28 days of life)
7. Incidence of smear positive tuberculosis
8. Number of wild polio cases reported
9. Maternal mortality ratio
10. Stillbirth rate
11. Life expectancy index
12. Percentage of children under age 5 under weight for age
13. Prevalence of adults who are obese
14. Mean systolic blood pressure among adults
15. Percentage of the population undernourished
16. Percentage of children under age 5 under height for age
17. Percentage of infants with low birthweight
18. HIV prevalence (% ages 15–49)
19. Disability-adjusted life expectancy
20. Equality of child survival

Health Service Coverage Indicators

21. Percentage of newborns immunized with BCG
22. Percentage of 1-year-olds immunized with one dose of DTP
23. Percentage of 1-year-olds immunized with three doses of DTP-3
24. Percentage of immunization coverage with three doses of polio vaccine
25. Percentage 1-year-olds immunized with measles
26. Percentage of 1-year-olds immunized with three doses of hepatitis B
27. Percentage of live births protected through maternal immunization with at least 2 doses of tetanus toxoid
28. Percentage of 1-year-olds immunized with three doses of Hib vaccine
29. Percentage of 1-year-olds immunized with yellow fever vaccine
30. Percentage of districts achieving at least 80% DTP3 coverage
31. Percentage of districts achieving at least 90% measles vaccine coverage
32. Drop-out rate between DTP1 and DTP3 coverage
33. Percentage of districts with DTP3–DTP1 drop-out rates greater than 10 percent
34. Percentage of vaccine spending financed using government funds
35. Tuberculosis cases detected under DOTS
36. Tuberculosis cases successfully treated under DOTS
37. Contraceptive prevalence rate
38. Antenatal care coverage
39. Births attended by skilled health personnel
40. Births in health facilities
41. Births by caesarean section
42. Percentage of children under age 5 with diarrhea receiving oral rehydration and continued feeding
43. People with advanced HIV infection receiving antiretroviral (ARV) combination therapy
44. Percentage of children under age 5 with insecticide-treated bednets
45. Percentage of children under age 5 with fever treated with anti-malarial drugs

Behavior and Risk Factor Indicators

46. Sustainable access to an improved water source
47. Sustainable access to improved sanitation
48. Proportion of population using solid fuels
49. Prevalence of current tobacco use in adolescents
50. Per capita alcohol consumption among adults

Health System Indicators

51. Public expenditure on health as a percentage of GDP
52. Total expenditure on health as a percentage of GDP
53. General government expenditure on health as a percentage of total expenditure on health
54. Private expenditure on health as a percentage of total expenditure on health

55. General government expenditure on health as a percentage of total government expenditure
56. External resources for health as a percentage of total expenditure on health
57. Social security expenditure on health as a percentage of general government expenditure on health
58. Out-of-pocket expenditure as a percentage of private expenditure on health
59. Private pre-paid plans as a percentage of private expenditure on health
60. Per capita total expenditure on health at average exchange rate ($US)
61. Per capita total expenditure on health at international dollar rate
62. Per capita government expenditure on health at average exchange rate ($US)
63. Per capita government expenditure on health at international dollar rate
64. Physicians' density
65. Nurse density
66. Midwife density
67. Nurse/midwife density
68. Dentist density
69. Pharmacist density
70. Health worker density
71. Nurses and midwives to physicians ratio
72. Hospital bed density
73. Responsiveness of health system
74. Fairness of financial contribution to health system
75. Coverage of vital registration for deaths
76. Number of medical schools
77. Number of nursing schools
78. External resources for human resources for health

Appendix C. About the Millennium Challenge Account

The Millennium Challenge Account (MCA) is a bilateral U.S. development assistance program announced by President Bush in March 2002. Twenty-three countries are currently eligible for the MCA and thirteen are eligible under the MCA's Threshold Program. To date, nine countries have MCA Compacts.

How the MCA is Different

The MCA is intended to be different than other U.S. aid programs in six key ways:

- *Focus:* The objective of the MCA is to help support economic growth and poverty reduction in the poorest countries in the world. The program is not designed for humanitarian assistance, to help in post-conflict situations, to further security interests, or to reward political allies.

- *Administration:* The MCA is administered by the Millennium Challenge Corporation (MCC) which is independent of all other agencies that administer U.S. aid. The MCC is governed by a CEO and a board of directors consisting of the Secretaries of State and Treasury, the Administrator of USAID, the U.S. Trade Representative, the CEO of the MCC and four non-governmental representatives (two of these seats remain vacant).
- *Country selection:* The MCA provides assistance to only a select group of countries that are implementing policies consistent with a strong commitment to economic growth and development.
- *Country ownership:* Because the MCA selects countries with relatively good governance, it can offer them more flexibility over how funds are used. The MCC works a bit like a foundation, asking eligible countries to submit proposals based on national development priorities. When these proposals are approved, the country government enters into a 'compact' with the MCC that includes program details and clear benchmarks for success.
- *Size:* The MCA was intended to provide very large resources to countries that qualify. The originally- proposed $5 billion annual budget would represent a near doubling of the subset of the foreign assistance budget that focuses on development objectives (rather than security, post-conflict or humanitarian goals). The MCA has yet to reach its intended scale, due to lower than expected Presidential requests and Congressional allocations.
- *Focus on results:* The MCC places great emphasis on accountability and measurable results, and thus requires countries to outline clear benchmarks for success in their compacts. These benchmarks, combined with reliable baseline data on planned outcomes, should allow for effective monitoring and evaluation.

The MCA uses a three step process to select eligible countries:

- *Identify candidate countries:* The MCA defines a pool of candidate countries based primarily on their annual per capita income level. FY 2006 marks the first year that the MCA can select eligible countries from two distinct groups: a low-income country group (per capita income below $1,575) and a lower middle-income country group (per capita income between $1,575 and $3,255).
- *Apply selection criteria:* The MCA uses sixteen indicators in three categories — ruling justly, economic freedom, and investing in people — to measure the candidate countries against each other. Countries must be above the median score on half of the indicators in each category, as well as in control of corruption, to be eligible for the MCA. To pass the inflation indicator, a country's inflation rate must be under 15 percent, rather than the median.
- *Board discretion:* The MCA board of directors reserves the right to exercise discretion in the selection process, considering gaps, lags or weaknesses in data; country performance substantially below the median on any indicator; and additional qualitative information.

Countries that do not qualify for the MCA, but are judged by the MCC board to be making progress in the indicators they fail to pass, are included in the Threshold Program.

Current MCA Selection Indicators

Ruling Justly
- Civil Liberties (Freedom House)
- Political Rights (Freedom House)
- Voice and Accountability (World Bank Institute)
- Government Effectiveness (World Bank Institute)
- Rule of Law (World Bank Institute)
- Control of Corruption (World Bank Institute)

Economic Freedom
- Country Credit Rating (Institutional Investor)
- Inflation Rate (IMF IFS, WEO and other sources)
- Days to Start a Business (World Bank)
- Trade Policy (Heritage)
- Regulatory Quality (World Bank Institute)
- Fiscal Policy (IMF WEO and other sources)

Investing in People
- DTP3 & Measles Immunization Rate (World Health Organization)
- Public Expenditure on Health (national sources)
- Girls' Primary Education Completion Rate (World Bank EdStats)
- Public Expenditure on Primary Education (national sources)

Appendix D. Methodology

The research for this report began with a comprehensive review of existing country-level health indicators available through online databases, international organization reports, and other publicly available sources. These sources were identified through online searches and consultations with experts in a variety of areas of global health, to ensure that no major resources were excluded. Based on this review, 78 indicators were identified as possible candidates for recommendation to the MCC and compiled into an initial list as the starting point for a three-phase approach to examining the indicators and making recommendations.

Phase I: Data Assessment

The initial phase of research involved paring this list down to only those indicators that were most likely to qualify for inclusion, based on data quality and availability. To do this, information was collected on a variety of aspects of the indicators, to allow an assessment along the data criteria set forth by the MCC. This first-round review looked at the following four criteria:

- *Developed by an independent third party.* To assess this indicator, information was collected on the source that reported the indicator. Although the MCC currently uses a government-reported indicator, this would not be allowable under the stated criteria.
- *Utilizes objective and high-quality data.* In the initial stage, this criterion was assessed by looking at the primary sources that contribute to the data. Surveys and administrative data received a high ranking in this category, while government-reported figures ranked low on objectivity.
- *Analytically rigorous and publicly available.* Assessment of this criterion was limited to the issue of public availability during the early research phase, and focused on whether any of the primary or secondary data sources were proprietary.
- *Broad country-coverage and comparability across countries.* Assessment of this indicator involved looking at both the number of countries covered and the time periods for which data are available. The latter question was broken down into the periodicity with which data are updated and the most recent year for which data are available. To be considered comparable, data needed to be available for most or all countries in the same year and the definitions associated with the data needed to be standardized across all of the countries.

Based on this phase of research, a consultant produced a matrix that provided information on each indicator to serve as the background document for the Working Group's involvement in Phase II (Appendix B). This matrix also divided the indicators into two categories: those that currently merit further consideration based on data quality and availability and those that may be considered in the future but are not feasible at this time.

Phase II: Working Group Consultations

The second phase of research focused on more qualitative aspects of the indicators, and did not directly take into account the data quality and availability questions. To begin this assessment, the Working Group reviewed a complete list of indicators on various aspects of global health (see Appendix B) for further discussion.

The Working Group helped identify a set of five qualitative criteria regarding desirable aspects of the selected indicators. These criteria are meant to address the question of whether an indicator adequately reflects government commitment to health in terms of financial and intellectual resources. Two of the three remaining MCC criteria also are covered by the Working Group's criteria. The five criteria selected were:

- *Direct relationship to government policy.* In order to test government commitment, an indicator should change when relevant government policy changes. This criterion also ensures that the indicators provide an incentive for governments that do not perform well to alter their policies accordingly. This criterion also is included in the MCC's list.
- *Equates failing with bad outcomes.* Since the cross-country comparison undertaken by the MCC is designed to reward countries for their performance relative to one another, the indicators need to reflect a clear normative

judgment. If it is not clear that a high (or low) rate is a good (or bad) thing, cross-country comparison would present serious concerns.

- *Can change over the short term.* To provide adequate incentive for governments to take policy action and stay the course, there needs to be a reward in the short term for having done so. As a result, the MCC indicators should be able to reflect policy changes over a period of two to three years.
- *Contains some measure of equity and distribution.* One of the goals of the MCC, and international development aid as a whole, is to reduce poverty and inequality in developing countries. Indicators used by the agency, therefore, should reflect the desire for governments to adopt health policies that contribute to poverty reduction and equitable distribution of resources. In assessing this question, each indicator's relationship to poverty reduction was examined, which also is an MCC criterion.
- *Measures performance against ability.* When comparing countries of differing abilities, it is important to consider progress as a product of ability and to look for indicators that are not biased against countries with a lower per capita income level.

Having established these criteria, the Working Group also chose a list of eight new indicators for which it wanted more in-depth research: (1) DTP3 immunization rate; (2) government spending on public health services; (3) under-five mortality rate; (4) stunting rate; (5) skilled birth attendance; (6) contraceptive prevalence rates; (7) unmet need for family planning; and (8) access to an improved water source.

Phase III: Final Assessments

For the final phase of research, a thorough analysis was conducted of each of the indicators identified during phase II, as well as the two existing indicators, based on the criteria laid out by the Working Group and the MCC. This phase relied heavily on examining existing literature in order to build an argument for or against each indicator's performance against the criteria. In addition, the Working Group directly examined the data on the indicators to identify trends and assess availability.

The findings of this research then served as the basis for the comparisons and conclusions included in the discussion section of this report. Based on those discussions, the Working Group made recommendations regarding the MCC's use of health indicators in its country selection criteria.

Appendix E. Statistical Analysis of Indicator Relationships

Statistical correlation tests were run on the relationship between being above the median on DTP3 immunization and passing each of the other indicators we studied within each of the two income groups. Please note that, in some cases, passing requires being above the median, while in others it requires being below the median.

These tests produce correlation coefficients within the range of -1 to 1. A negative coefficient indicates a negative correlation, and a positive coefficient indicates a positive correlation. A coefficient of 0 signals no relationship, while a coefficient of 1 or -1 is a perfectly linear relationship. The easiest way to interpret the correlation coefficient is to square it. The squared value is the percentage of the variance in X that can be explained by variation in Y. Table 1 shows the correlation coefficients and their squared values relating DTP3 to each of the other indicators in each income category.

In most cases, the coefficients are not statistically significant for the lower-middle-income countries (LMIC). This may largely be attributable to the small sample size within this category, which would allow only a very strong relationship to appear statistically (i.e. the relationship with the MCC immunization indicator). The only indicator for which there is not a statistically significant relationship to DTP3 is unwanted fertility. The other relationships all are significant and indicate some level of correlation, although it is often fairly low. Given that DTP3 immunization is part of the calculation for the MCC immunization rate, it is unsurprising that the relationship is strongest between those two indicators.

Table 1. The relationship between DTP3 and other indicators

Indicator	*Income Group*	*Correlation Coefficient (R)*	*R2*
Under-five mortality rate	LIC	0.2674*	0.07150276*
	LMIC	0.2887	0.08334769
Stunting	LIC	0.2182*	0.04761124*
	LMIC	0.1483	0.02199289
Access to water	LIC	0.3440*	0.118336*
	LMIC	0.1723	0.02968729
MCC immunization indicator	LIC	0.7372*	0.54346384*
	LMIC	0.7490*	0.561001*
Skilled birth attendance	LIC	0.2734*	0.07474756*
	LMIC	0.2301	0.05294601
Contraceptive prevalence rate	LIC	0.2308*	0.05326864*
	LMIC	-0.0169	0.00028561
Unwanted fertility rate	LIC	-0.1588	0.02521744
	LMIC	-0.2217	0.04915089

* Signals significance at the 95 percent level

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