

Constraints to Scaling Up the Health Millennium Development Goals: Costing and Financial Gap Analysis

**Background Document for the Taskforce on
Innovative International Financing for
Health Systems**

Working Group 1: Constraints to Scaling Up and Costs



The Taskforce on Innovative
International Financing
for Health Systems



World Health
Organization

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Executive summary

WHO¹ has estimated the cost of strengthening health systems in 49 low-income countries in order to scale up service provision to move more rapidly towards the health Millennium Development Goals (MDGs). The costing uses a normative approach, specifying the activities and levels of coverage, and through them, the

inputs required to scale up the systems and services using technical guidance from WHO, UNAIDS, UNFPA and partners. Country prices were then used to estimate costs.

These are the results:

In US\$ billions	2009	2010	2011	2012	2013	2014	2015	Total	%
Management of childhood illness*	0.14	0.16	0.24	0.35	0.45	0.53	0.66	2.53	1%
Immunization	0.66	0.67	1.04	0.91	1.10	0.91	0.97	6.27	2%
Maternal health	0.70	0.91	1.21	1.50	2.03	2.51	2.97	11.82	5%
Family planning	1.00	1.22	1.46	1.39	1.32	1.16	0.88	8.43	3%
Tuberculosis	0.61	0.67	0.67	0.69	0.70	0.71	0.73	4.78	2%
Malaria	1.04	1.05	0.94	1.17	0.95	0.96	1.14	7.25	3%
HIV / AIDS	0.56	1.12	1.65	2.17	2.69	3.23	3.73	15.13	6%
Essential drugs **	0.53	0.63	0.83	1.10	1.36	1.84	3.17	9.48	4%
Subtotal	5.23	6.43	8.03	9.29	10.62	11.85	14.25	65.70	26%
Governance (including drug regulation)	0.62	0.60	0.83	0.84	0.85	0.92	0.90	5.56	2%
Infrastructure, equipment and vehicles	8.34	12.84	17.33	18.45	13.09	11.42	9.75	91.23	36%
Human resources for health	3.28	5.31	7.24	9.30	10.61	12.33	14.20	62.28	25%
Supply chain / logistics	1.18	0.86	1.41	2.08	2.14	2.63	2.51	12.82	5%
Health information system	0.37	0.94	0.44	0.70	0.69	0.69	0.69	4.52	2%
Health financing	0.32	0.49	0.73	1.13	1.55	2.26	2.85	9.34	4%
Subtotal	14.11	21.04	27.98	32.50	28.94	30.26	30.90	185.73	74%
Total (US\$ billions)	19.34	27.47	36.01	41.79	39.56	42.11	45.16	251.44	100%
Total per capita (US\$)	14.20	19.75	25.35	28.82	26.72	27.87	29.30	172.01	

* Prevention of mother-to-child transmission of HIV and management of malaria in children are grouped under the HIV and malaria costs respectively.

** Essential medicines for noncommunicable diseases, mental health, and parasitic diseases.

The total additional cost is US\$251 billion over 7 years, with \$151 billion of the total for sub-Saharan Africa. The additional per capita costs start at \$14.2 in 2009 and end at \$29.3 in 2015.

Making these additional resources available would significantly reduce mortality in the 49 countries, averting 23 million deaths from 2009–2015, and up to 4 million child deaths annually. At this rate of scale up, 39 out of the 49 countries would reach their MDG 4 target for child survival, and at least 22 countries would achieve their 2015 target for maternal mortality. Significant progress would be made to expand access to health services for HIV/AIDS, tuberculosis and chronic diseases, and global targets to reduce malaria mortality would be achieved.

The realization of these outcomes, however, depends on the availability of increased resources for health in low-income countries. A financing gap analysis of a no-change scenario—where the available funds increase only at recently observed rates—indicates a gap of \$37 billion in 2015 and a gap of \$224 billion for the full period, compared with the estimated need. The gap is

considerably smaller if donor and recipient countries meet their internationally stated pledges to increase their financial flows to health. Under this more optimistic scenario funding in the year 2015 will be just about enough to meet the additional needs, though there will still be a funding gap in earlier years, totalling about \$100 billion for the whole period.

If all the required funds identified in this costing exercise were made available by 2015, total health expenditure for the group of 49 low-income countries as a whole would on average be \$54 per capita, there would be a total of 21 hospital beds per 10,000 population and 1.9 nurses and midwives per 1,000 population. Even then, these ratios would barely approach the rates observed in 2006 in lower middle income countries despite more than 50% of the global disease burden for 2009–2015 being found in the 49 low-income countries. Accordingly, the health system scale up that has been costed in this exercise is not aimed at producing an “ideal” health system but is one that aspires for a reasonable level of functionality to address a formidable burden of disease.



1. Introduction

The *Taskforce on Innovative International Financing for Health Systems* (the Taskforce) was announced at the United Nations in New York on 25 September 2008.² Its objectives are to contribute to filling national financing gaps to reach the health Millennium Development Goals (MDGs) through mobilizing additional resources, increasing the financial efficiency of health financing, and enhancing the effective use of funds. Two technical working groups were established to present analyses and recommendations to the Taskforce: Working Group 1 on Constraints to Scaling up and Costs and Working Group 2 on Raising and Channeling Funds.

The informal UN interagency working group on costing and health economics was asked to provide inputs to Working Group 1 on the incremental costs and financing gaps associated with strengthening health systems in order to scale up service provision and reach the health MDGs in low-income countries.³ The Taskforce requested that the costing focus on 49 low-income countries with a gross national income per capita of US\$935 or less in 2007 (annex 1 provides a list of countries).⁴ The objectives of the costing were to increase coverage of key services and activities to levels defined by the relevant technical programmes and experts as being essential to achieving the targets set for the health MDGs and to scale up the components of the broader health system that would allow these services to function efficiently, effectively and equitably.

The interventions considered focused on MDG 1 (reducing undernutrition), MDG 4 (maternal health), MDG 5 (child health) and MDG 6 (HIV, tuberculosis and malaria). Activities related to target MDG 8e, which aims to increase access to affordable essential medicines, were also included. For this exercise, access to essential medicines was not interpreted narrowly to include only medicines for the conditions mentioned above. It is neither possible nor desirable to link the supply of essential medicines to diseases that are responsible for only approximately 50% of the total burden of disease in low-income countries. Therefore, access was also scaled up for treatment of chronic diseases

(including cardiovascular disease, diabetes, chronic obstructive pulmonary disease and asthma), some cancers, neglected tropical diseases (schistosomiasis, for example), general care including common antibiotics and morphine for palliative care.

Two parallel streams of work were initiated. One was led by WHO and partners on a normative scale-up to reach the health MDGs consistent with previously published cost estimates and inclusive of a broad health system approach. The other was led by the World Bank together with other agencies, building on the marginal budgeting for bottlenecks (MBB) costing that had been done in previous years and the recent work on investment cases in Asia and Africa. Work commenced in late January 2009. This paper presents the core analytical work carried out by WHO and partners to support Working Group 1's recommendations to the Taskforce.

Provisional results are made available with the objective of providing an order-of-magnitude estimate of the costs of scale-up required to strengthen health systems and accelerate progress towards the health MDGs. The costing is based on the normative requirements for moving towards universal coverage of key interventions, as identified by technical programmes in WHO, UNAIDS and UNFPA. We also modelled the expected health outcomes of increasing coverage of these interventions, based on existing epidemiological models and efficacy available in the literature.

The funds that are anticipated to be available to meet these costs are based on two scenarios. The first, or no-change scenario, projects that the available funding for health will increase at the rate observed in the recent past. The second, more optimistic approach assumes that donors will meet their pledges, detailed subsequently in Box B, while the 49 low-income countries included in the analysis will also increase their shares of government expenditure allocated to health. For the sub-Saharan Africa countries this means meeting the Abuja Declaration goal of 15%;⁵ in the

absence of agreed targets for the other countries, 12% is used. This is called the commitments-met scenario. For both scenarios the financing gap is calculated as the difference between the estimated additional costs

and the likely additional available resources. At the same time, the estimated impact of these investments in terms of lives saved and other health outcomes is presented.



2. Ways of working

The Department of Health Systems Financing in the cluster of Health Systems and Services (HSS) coordinated the WHO work. The health system inputs required to support the scale up of the necessary health services were obtained from the following departments within HSS:

- Essential Health Technologies
- Essential Medicines and Pharmaceutical Policies
- Health Policy, Development and Services
- Human Resources for Health (for the health workforce).

Other health system inputs were obtained from the Optimize Project of the Immunization, Vaccines and Biological Department and from the Health Action in Crisis cluster. Partners in the costing of health information

systems and the supply chain were the Health Metrics Network and the USAID Deliver Project respectively.⁶

Inputs on the disease- and programme-specific requirements for scaling up were obtained from relevant departments within WHO (Child and Adolescent Health and Development; Making Pregnancy Safer; Immunization, Vaccines and Biological Department; Global Malaria Programme; Department of Essential Medicines and Pharmaceutical Policies, and the Stop TB Partnership), and from UNFPA and UNAIDS. Estimates of deaths averted were provided from these same sources as well as from the Futures Institute.

There were regular coordinating teleconferences with the World Bank and other agencies to discuss approaches, progress and results.





3. Description of countries

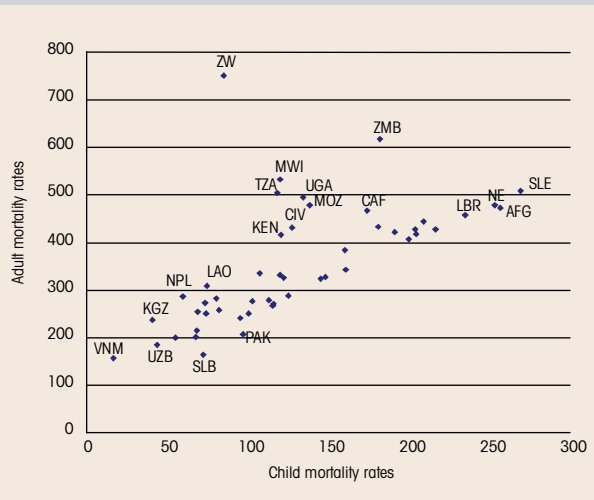
The 49 low-income countries with a gross national income per capita of \$935 or less in 2007 are listed in annex 1. The average total health expenditure per capita in 2006 was \$22, ranging from \$5 to \$58 (excluding Somalia and Democratic People’s Republic of Korea where accurate data on current health expenditures are difficult to obtain). On average 17% (range of 2% to 66%) of funds came from external resources, that is, from sources outside the country such as bilateral donors.⁷

Of the 49 low-income countries, 33 are in sub-Saharan Africa and 29 are described as fragile states by the Organisation for Economic Cooperation and Development.⁸ Adult and child mortality patterns are portrayed in Figure 1. Fourteen countries have high HIV prevalence and most of them, e.g. Zimbabwe and Zambia, have higher than expected levels of adult mortality for the observed levels of child mortality.

Progress towards MDGs 4 and 5 has been very slow. According to Working Group 1’s report *Constraints to Scaling Up and Costs*.⁹

- As many as 22 of 43 low-income countries for which data are available (51%) have made insufficient progress in reducing child mortality, and 16 (37%) have made no progress at all. In 5 countries the average annual rate of reduction in

Figure 1: Child and adult mortality rates in 49 low-income countries, 2006



under-five mortality since 1990 has been negative (Central African Republic, Chad, Kenya, Zambia, Zimbabwe), indicating that child mortality has increased.

- Of the 43 low-income countries with data, 42 have either high or very high maternal mortality rates. Only one country (Tajikistan) has a moderate maternal mortality rate.





4. Principles of costing adopted

The approach utilized in the costing took a normative perspective, responding to the question of how much it would take to expand coverage of essential services with the aim of reaching the health MDGs between now and 2015, including the health system components required to support the increased service delivery.

The aim was to provide order-of-magnitude estimates of the incremental costs by year from 2009 to 2015, using the following classifications:

- by capital and recurrent cost;
- by upfront (i.e. capital plus time-limited recurrent) and continuing costs;
- by input (traded and non-traded goods);
- by disease (HIV, TB, malaria, maternal, child and neonatal, and chronic disease) and health system building block (service delivery composed of infrastructure, equipment and consumables, human resources, logistics and supplies, excluding drugs, health information systems, governance including administration and regulation, and financing);
- by level of care (not allocating those inputs that are costed at the health system level except health system inputs directly associated with service delivery);
- by geographic areas (World Bank geographic regions).

4.1. Scope of costs included and not included

The costing was done in two phases: interventions/diseases and health systems. Most of the disease-specific costing relevant to the health MDGs, including those for expanding access to the management of chronic diseases, mental health and neglected parasitic diseases, had been done earlier by the WHO technical departments (UNAIDS for HIV/AIDS and UNFPA for family planning) in partnership (or with inputs as in the case with UNFPA) with the WHO Health Systems Financing department. They were based on the disease control programmes' assessments of the interventions that

would be needed in each country to reach the relevant MDG and the level of coverage required. This information was then translated into the physical inputs (e.g. people, vehicles, medicines, buildings, etc.) required to achieve the desired levels of coverage.

Interactions between interventions within each disease were modelled and incorporated into the cost (and impact) estimates when possible.¹⁰ Most of these estimates have been published in the peer-reviewed literature (annex 2a). The HIV/AIDS resource estimates and the final paper summarizing the results have been completed and are soon to be submitted for publication.¹¹ For this exercise, measures were taken to exclude double counting (e.g. costs related to managing malaria in children with artemisinin-based combination therapy were omitted from the child health but included in the malaria estimates),¹² and incorporate any synergies (often called "economies of scope", such as combined outpatient consultations across the diseases).

Working Group 1 argues that all citizens should have access to guaranteed health benefits and that the exact nature of the benefits should be determined by individual countries. For the purpose of the costing, a minimum package of services was defined including universal coverage of interventions proven to reduce mortality among mothers, newborns and children under five; childbirth care; reproductive health services; prevention and treatment of the main infectious diseases; diagnosis, information, referral and relief of symptoms for those presenting at the primary care level; and health promotion. In addition to health promotion for MDGs 4, 5 and 6, two public health interventions were costed specifically to address chronic diseases: tobacco control and decreasing salt in processed foods.

Furthermore, and in line with target MDG 8e,¹³ costs were estimated for increasing access to affordable essential medicines for the treatment of chronic diseases (including cardiovascular disease, diabetes, chronic obstructive pulmonary disease and asthma), some cancers, neglected tropical diseases

(schistosomiasis, for example), general care including common antibiotics and morphine for palliative care. The costing assumes that coverage of these essential medicines is increased from their current low levels to 50% by 2015. This costing was based on the published papers on cardiovascular disease and mental health and was augmented using inputs from the relevant technical departments in WHO. The full list of interventions costed and their delivery levels are shown in annex 3.

The disease-specific costing also includes programme costs necessary to ensure that disease control activities are able to function well. This includes the personnel required to manage the disease control programme and the activities they undertake (e.g. additional malaria control programme staff at the province or district level who do supervision, training, monitoring and evaluation, plan bednet distribution campaigns, etc, and the sprayers), their capital costs including the vehicles used only by the programme and their operating costs.¹⁴

Only those items that are specific to the disease are included in the programme/disease-specific price tags. The systems-wide investments required to support these services are estimated and presented separately. Intervention-specific costs include the medicines, diagnostic tests and other consumables that are specific to the disease/condition (e.g. CD4 counts for HIV but not complete blood counts which are costed as a systems-wide investment).

The costing for individual programmes takes into account specific investments that may be needed to overcome programme-specific barriers that impede the scale up of coverage. An example is maternal health, which is one of the greatest development challenges facing the world and the health MDG where least progress has been made. Taking into account the specific constraints facing maternal health, the costs for this area include investments that have been shown to be effective in increasing access to skilled care for pregnant women, such as the construction of maternity waiting homes for pregnant women, and the use of demand-side incentives in the form of payments to women delivering in health facilities. Without these additional facilities, the Making Pregnancy Safer Programme of WHO believes it will not be possible to achieve the desired reductions in maternal mortality.

Costed of the more generic health system components needed to support service delivery are those activities or inputs that need to be scaled up and are shared across programmes. This includes the building of general health facilities (see annex 5) and their associated ambulances/drivers, equipment, consumables and running costs.¹⁵ At the same time, it also includes costs for administration and management of public health functions and general support to the health system infrastructure (e.g. the salaries of clinical engineers and other prevention and maintenance staff, management staff needed for the national human resource planning, etc) and the service vehicles or computers that they use. The six health systems building blocks included in the WHO framework on health systems¹⁶ were used to facilitate this work: health workforce (human resources), logistics and supply chain, health information system, health systems financing, leadership and governance. (Service delivery is costed as part of the disease and programme-specific costs).

Resource estimates presented here on human resources for health include the costs for the additional front-line workers who actually have contact with patients. Costs include pre-service education of these personnel and costs of their employment upon graduation.¹⁷ The costing builds on the methods used in the *World Health Report 2006*,¹⁸ which costed doctors,¹⁹ nurses and midwives. This exercise includes the costs of additional cadres of specialized health personnel including pharmacists, laboratory technologists, pharmacy aides, laboratory technicians, radiology technicians and dental technicians. The costs of training and employing community health workers are also included. All the costs of service delivery, including human resources are calculated to achieve set targets.²⁰ For example, community health workers are recruited to fulfil a target of one community health worker per 1,000 population in rural areas and one community health worker per 1,500 population in urban areas. The community workers are paid a living wage (lowest scale level of the WHO CHOICE salary database). Salaries for all workers are based on current levels, with an extra 50% to capture the costs of retention/relocation incentives (e.g. incentives can be provided only to those going to rural areas), performance bonuses, salary top-ups, etc. In addition, the human resource cost estimates include the costs of the human resource managers who prepare



strategic plans, write job descriptions, and determine feasibility of implementing performance bonuses or retention/relocation incentives.

Logistics and supply chain costs include the purchase or construction of warehouses, forklifts and other equipment, and delivery vehicles and their operating costs. The quantities required were provided by the technical experts mentioned earlier consulted for this exercise, and costs include getting equipment to the necessary location in the country. These costs also include the salaries of personnel like logisticians and drivers.²¹

Health information system costs include the specialist staff that collate and report on health statistics, their capital costs including data warehouses and computers, and meetings, training and advocacy events to improve the reliability of the data and its use.

Health financing includes the administrative costs of scaling up risk/fund pooling mechanisms including social health insurance or nationwide community-based health insurance systems as in Rwanda. These include the recurrent costs (mostly administrative expenses) associated with increasing membership in eight countries that already have started social health insurance and the start-up and recurrent costs in another five countries that have declared a serious intent to pursue risk/fund pooling mechanisms.²²

Governance has been defined as “the set of traditions and institutions by which authority in a country is exercised, and includes a) the process by which governments are selected, monitored and replaced, b) the capacity of the government to effectively formulate and implement sound policies, and c) the respect of citizens and the state for the institutions that govern economic and social interactions among them”.²³

It includes the costs of improving the performance of the Ministry of Health in several domains associated with governance, including strategic vision, accountability and transparency (including regulation) and participation and consensus orientation. Costs consist mostly of the salary of a strategic policy unit in the Ministry of Health and at subnational levels, consultation and consensus meetings and activities associated with accreditation, licensing and certification of health facilities, equipment, drugs and human resources.

Also included under governance are the costs associated with better administration and performance of bureaucratic functions. However, due to the lack of information on the number of accountants, auditors or lawyers required to scrutinize accounts and bids, issue contracts and monitor their completion, a blanket 10% increase in the administration costs reported currently in the national health accounts data from the 49 low-income countries was used. This 10% increase could cover the hiring of personnel or the computerization of the health information system.

Further details of the costing assumptions are found in the publications listed in annex 2.

Costs not included

The costing does not include costs associated with other MDGs that could potentially contribute to an improvement in health: i.e. interventions to improve water and sanitation or indoor air pollution, nutritional interventions associated with agriculture and other sectors (except for breastfeeding, health education for complementary feeding, and treatment of severely malnourished children, which are included) or general education of women. These costs also exclude costs that would fall in other sectors, such as the care of HIV orphans, school or prison or work-based/out-of-school youth interventions, the prevention of violence against women,²⁴ the improvement of vital registration or censuses for health information systems. In human resource costs, the costs of building schools to produce the needed health workers are not included in the costing.²⁵ Estimates for governance exclude whole-of-government approaches e.g. improving public finance management.

4.2 Costing methods

Cost estimates were made country by country, and then aggregated. Country estimates were based on an assessment of current levels of coverage of the interventions being costed and the current status of the health system infrastructure and personnel (see annex 1).²⁶ When there was no country-specific data available, regional averages were imputed or in some cases the known value of a country similar in GDP, epidemiology or health system development

was applied. Population figures are from the UN Population Division World Population Prospects, medium variant.²⁷ The inputs needed are costed using an ingredients approach (quantity times price). The way the quantities were obtained has been described above. Prices were obtained from the CHOICE database updated to 2005. The methods used to collect and estimate costs for the database have been published in the peer-reviewed literature (annex 2b). Prices of traded goods are manufacturers' prices (in the case of medicines, median prices and generic versions if available). All costs are expressed in terms of 2005 constant US dollars, rather than current US dollars. They therefore do not try to project rates of inflation, but reflect real costs. Results are rounded to billions or millions, as appropriate. In the tables, totals might not add up exactly as expected because of small rounding errors.

Benchmarking was done qualitatively. Interventions being costed were reviewed against their effectiveness in resolving bottlenecks as described in the draft report of Working Group 1. Additionally, key publications

on bottleneck analysis at the health system level (see example in Box A) and at the disease control programme level were reviewed. At the same time, a non-systematic search for reviews of health system interventions or other relevant papers in the specific areas being costed was done and the papers analysed in terms of the effectiveness of interventions and their costs, when available. National health plans or strategies and human resource scale-up plans of selected countries were also reviewed to scope the range of interventions being planned by countries.

4.3. Assessment of available funds and estimation of the financing gap

Two scenarios were chosen for projecting the likely availability of funding for health during the period until 2015: a no-change scenario in which public, private and external sources of funds would evolve in line with countries' GDPs, and a more optimistic scenario, in which countries would abide by the different pledges they have made (Box B).

Box A. Typical health-system constraints and possible disease-specific and health-system responses

Constraint	Disease-specific response	Health-system response
Financial inaccessibility	Allowing exemptions or reducing prices for focal diseases	Developing risk-pooling strategies
Physical inaccessibility	Providing outreach for focal diseases	Reconsidering long-term plans for capital investment and citing of facilities
Inappropriately skilled staff	Organizing in-service training workshops to develop skills in focal diseases	Reviewing basic medical and nursing curricula to ensure that basic training includes appropriate skills
Poorly motivated staff	Offering financial incentives for the delivery of particular priority services	Instituting performance review systems, creating greater clarity about roles and expectations, reviewing salary structures and promotion procedures
Weak planning and management	Providing ongoing education and training workshops to develop planning and management skills	Restructuring ministries of health, recruiting and developing a cadre of dedicated managers
Lack of intersectoral action and partnership	Creating disease-focused, cross-sectoral committees and task forces at the national level	Building systems of local government that incorporate representatives from health, education, and agriculture and promoting the accountability of local governance structures to the people
Poor quality care among private sector providers	Offering training for private sector providers	Developing accreditation and regulation systems

Adapted from Travis P. et al. Overcoming health-systems constraints to achieve the Millennium Development Goals. *Lancet*, 2004, 364:900–906.



Box B. Scenarios on additional financing

	Scenario 1: No change	Scenario 2: Commitments met
GDP, 2008	WEO, IMF April 2009 update (1)	WEO, IMF April 2009 update (1)
Annual GDP growth	WEO, IMF April 2009 update (1)	WEO, IMF April 2009 update (1)
Health as % of total government expenditure (GGHE/GGE)	Domestically funded health expenditure as a % of GDP remains at observed 2008 levels – e.g. domestic health spending increases if GDP increases.	GGHE/GGE reaches 15% in 2015 for sub-Saharan African (SSA) countries (2), and 12% for others.
Official Development Assistance (ODA) for health (multilateral, bilateral and general budget support; does not include debt relief)	ODA remains at the 2007 observed proportion of donor country GDP; constant patterns of allocation to countries and sectors based on 2007 OECD-CRS data.	ODA target as % of GNI from OECD DAC (3); 50% of additional EU resources up to 2010 allocated to SSA Doubling of Japan's ODA to Africa by 2012 (4) US\$63 billion from the USA by 2014 (5)
Private expenditure for health	Privately funded health expenditure from domestic sources as a % of GDP remains at observed 2008 levels – e.g. private health spending increases if GDP increases. Of the increase, only 50% is assumed to be additional funding for the essential health package costed in this exercise; the other 50% is assumed to be spent on other types of health services.	Private funds were projected using elasticity to GDP (for every 1% GDP increase, private expenditure on health increases by 1.033%). Of the increase, only 50% is assumed to be additional funding for this package of services.

(1) WEO: World Economic Outlook

(2) General government expenditure based on Abuja Declaration of African Union http://www.un.org/ga/aids/pdf/abuja_declaration.pdf

(3) Table 4 in www.oecd.org/dataoecd/47/56/42458719.pdf

(4) <http://www.ticad.net/presskit2008/Japan-initiatives-TICAD-IV.pdf>

(5) http://www.whitehouse.gov/the_press_office/Statement-by-the-President-on-Global-Health-Initiative/2

No-change scenario

The no-change scenario is the sum of projections of resources by domestically funded government spending on health, external resources and domestic private funds. Government and private resources are projected using the 2008 baseline ratio to GDP, and projected the ratios to projected GDPs. External funds (bilateral, multilateral and general budget support) were projected based on the 2007 observed ratios of ODA to GDP in the donor countries and the observed distributions of ODA to recipient countries and to health. GDP projections were estimated using 2008 GDP and countries' GDP growth rates from the IMF World Economic Outlook April 2009 database.

Commitments-met scenario

The more optimistic scenario projected that sub-Saharan African countries would increase the proportion of domestically generated general government expenditure allocated to health to 15% by 2015 in line with the Abuja declaration. For other countries, it is projected

that they would reach 12% by 2015. Private domestic resources were projected to grow at an elastic growth rate of 1.033% for every 1% increase in GDP. This number was derived from a regression of GDP and private health expenditures across low-income countries between 1995 and 2007. External funds were projected based on existing donor country pledges or promises:

- OECD DAC web site;²⁸
- the White House press release requesting approval by Congress to allocate \$63 billion over 6 years to global health initiatives;
- European Union allocation of 50% of the increase in ODA to sub-Saharan Africa;
- Yokohama action plan 2008, which pledged to double ODA to Africa by 2012.

4.4 Calculation of impact

One part of this exercise was to estimate the marginal impact of scaling up coverage of proven interventions. Because much of the work had already been published a

considerable body of literature could be drawn on for the calculations, updating the parameters only where new data had become available. At the time of conducting this work no integrated model was available that would allow for modelling the joint benefits of scaling up the entire package of health interventions together. It was necessary, therefore, to conduct the modelling separately for the different disease areas, taking into account synergies when possible. For example, the effect of scaling up family planning was incorporated into the calculations for maternal mortality.

The health outcomes presented here follow the MDG indicator framework and refer to additional lives saved by scaling up coverage above the currently observed levels. The methods comply with approaches supported by the internationally acknowledged epidemiology reference groups for the different disease areas. Most models use country-level modelling scenarios, taking into account the local epidemiology and context (the exception is TB which was modelled at the regional level). Lives saved are estimated based on the scaled up coverage levels between 2009 and 2015 compared with the mortality that would have been observed if 2008 coverage had been maintained until 2015.

The impact of scaling up the package of essential newborn and child survival interventions was calculated using the Lives Saved Tool (LiST) developed by the Futures Group in collaboration with the Child Health Epidemiology Reference Group (CHERG). In addition to estimating the number of newborn and child lives saved, this approach also estimated the reduction in the percentage of children stunted. The under-five mortality ratio achieved in every country in year 2015 is also reported. The child survival estimates include the impact of scaling up malaria interventions on children.

The total number of maternal deaths averted includes those averted from access to skilled care as well as those indirectly prevented from scaling up access to family planning. A model was developed to take into account synergies acting in both directions—the reduction in births reduces the number of maternal deaths on which skilled birth attendance (SBA) will act, and the scale-up of SBA in turn reduces the indirect mortality prevented by scaling up family planning. UNFPA provided estimates of the expected reduction in unintended births that would be averted each year if

contraceptive prevalence increases sufficiently to satisfy the unmet need for family planning in the 49 countries.²⁹ The number of maternal deaths averted from family planning in year 2015 was estimated based on the maternal mortality rate achieved in year 2015 by country as SBA is successively scaled up.

A new model was developed by WHO to estimate the impact of increasing access to maternal health services in the 49 low-income countries. The starting point is the current profile of maternal mortality (only available by region) upon which was applied the cause-specific efficacy estimates for a broad set of interventions (annex 4). A region-specific efficacy estimate could thus be calculated for the entire package of care (including antenatal care). In recognition of the wide variation in maternal mortality across countries with similar SBA coverage rates we interpret this as a difference in the quality of SBA interventions provided in different countries. A function was therefore calculated to estimate SBA quality and from there the current level of effectiveness in a country. The model allows for effectiveness to improve over time as health systems are strengthened, to reach 90% in 2015. This is a reasonable assumption given that in this exercise we assume that significant efforts are undertaken to strengthen the health system. Using SBA coverage as a proxy indicator for access to maternal care, we applied the estimated year- and country-specific effectiveness to the country-specific mortality rate and to the increasing number of births covered as access is expanded.³⁰

The intervention efficacy and effectiveness parameters applied to the child and maternal health interventions are summarized in annex 4, tables A4A–A4G.

Health outcomes for HIV/AIDS are provided by UNAIDS based on country-specific targets set for reaching universal access to essential interventions including antiretroviral therapy (ART).³¹ The scenario presented here implies that 5.2 million persons receive first-line and second-line ART in year 2015 in the 49 countries, which is a 257% increase from the estimated 2.0 million people on ART in 2008. A constant rate of scale up from 2008 to 2015 is assumed.

The impact of scaling up TB control activities is based on calculations undertaken for the Global Plan to Stop TB 2006–2015.³² The Plan estimates the impact that would



be achieved at the regional level in terms of reducing TB incidence in line with the MDGs, and reaching the Stop TB Partnership's 2015 targets of halving TB prevalence and deaths compared with 1990 levels. For the Taskforce we derived the additional lives saved by country based on the distribution of TB cases within each region.

In addition to MDGs 4, 5 and 6, we estimated the number of chronic disease deaths that could be averted

in high-burden developing countries through scaling up of population-based strategies such as salt reduction and tobacco control interventions and combination drug treatment for individuals at high-risk of a cardiovascular event, based on previous publications (Asaria et al, 2006; Lim et al, 2006). Results available from seven of the 49 low-income countries were extrapolated to the remaining 42 countries in order to provide an indicative estimate of the health gain for scaling up such interventions.





5. Results³³

5.1 Costs

Table 1A provides an overview of the estimated additional costs required. Results are shown in 2005 US\$. A total of \$251 billion would be needed from 2009–2015, with an additional \$45 billion in 2015 alone. This represents an additional \$14.2 per capita to

be spent on health in 2009, with slightly more each year reaching an additional \$29.3 per capita in 2015.

Of the \$66 billion (26%) required to scale up specific programmes and diseases, almost a quarter of the resources is needed to provide essential HIV/AIDS interventions (\$15 billion) while \$12 billion is needed

Table 1A. Incremental costs by year, by disease and health system building block

In US\$ billions	2009	2010	2011	2012	2013	2014	2015	Total	%
Programme and disease									
Management of childhood illness*	0.14	0.16	0.24	0.35	0.45	0.53	0.66	2.53	1%
Immunization	0.66	0.67	1.04	0.91	1.10	0.91	0.97	6.27	2%
Maternal health	0.70	0.91	1.21	1.50	2.03	2.51	2.97	11.82	5%
Family planning	1.00	1.22	1.46	1.39	1.32	1.16	0.88	8.43	3%
Tuberculosis	0.61	0.67	0.67	0.69	0.70	0.71	0.73	4.78	2%
Malaria	1.04	1.05	0.94	1.17	0.95	0.96	1.14	7.25	3%
HIV / AIDS	0.56	1.12	1.65	2.17	2.69	3.23	3.73	15.13	6%
Essential drugs **	0.53	0.63	0.83	1.10	1.36	1.84	3.17	9.48	4%
Subtotal	5.23	6.43	8.03	9.29	10.62	11.85	14.25	65.70	26%
Health system building block									
Governance (including drug regulation)	0.62	0.60	0.83	0.84	0.85	0.92	0.90	5.56	2%
Infrastructure, equipment and vehicles	8.34	12.84	17.33	18.45	13.09	11.42	9.75	91.23	36%
Human resources for health	3.28	5.31	7.24	9.30	10.61	12.33	14.20	62.28	25%
Supply chain / logistics	1.18	0.86	1.41	2.08	2.14	2.63	2.51	12.82	5%
Health information system	0.37	0.94	0.44	0.70	0.69	0.69	0.69	4.52	2%
Health financing	0.32	0.49	0.73	1.13	1.55	2.26	2.85	9.34	4%
Subtotal	14.11	21.04	27.98	32.50	28.94	30.26	30.90	185.73	74%
Total (US\$ billions)	19.34	27.47	36.01	41.79	39.56	42.11	45.16	251.44	100%
Total per capita (US\$)	14.20	19.75	25.35	28.82	26.72	27.87	29.30	172.01	

* Prevention of mother-to-child transmission of HIV and management of malaria in children are grouped under the HIV and malaria costs respectively.

** Essential medicines for noncommunicable diseases, mental health, and parasitic diseases.

to scale up maternal health care. Strengthening malaria control and immunizations would require an extra \$7 billion each, tuberculosis \$5 billion, and remaining child health interventions another \$3 billion. Responding to the large unmet need for family planning would require an additional \$8 billion, while the remaining \$9 billion is the cost of preventing and treating chronic diseases and neglected parasitic diseases.

Of the \$186 billion for health systems strengthening, more than a third (\$91 billion) is for infrastructure, equipment and vehicles and another third (\$62 billion) is for front-line health workers. Supply chain and logistics would require an additional \$15 billion; equitable health financing (social health insurance) \$9

billion; strengthening governance of the health system \$6 billion; and health information systems an estimated \$3 billion.

Figure 2 further illustrates the requirements over time, by disease and health system building block. Table 1B reproduces the breakdown of costs per capita.

Tables 1C, 1D and 1E indicate the resource requirement by programme, disease and health system components, providing additional detail on the breakdown within each programmatic area using the following cost categories: human resource costs; medicines and commodities; infrastructure, equipment and vehicles; and other costs. An explanation of these categories is provided below.

Figure 2: Incremental costs by year, by disease and health system building block

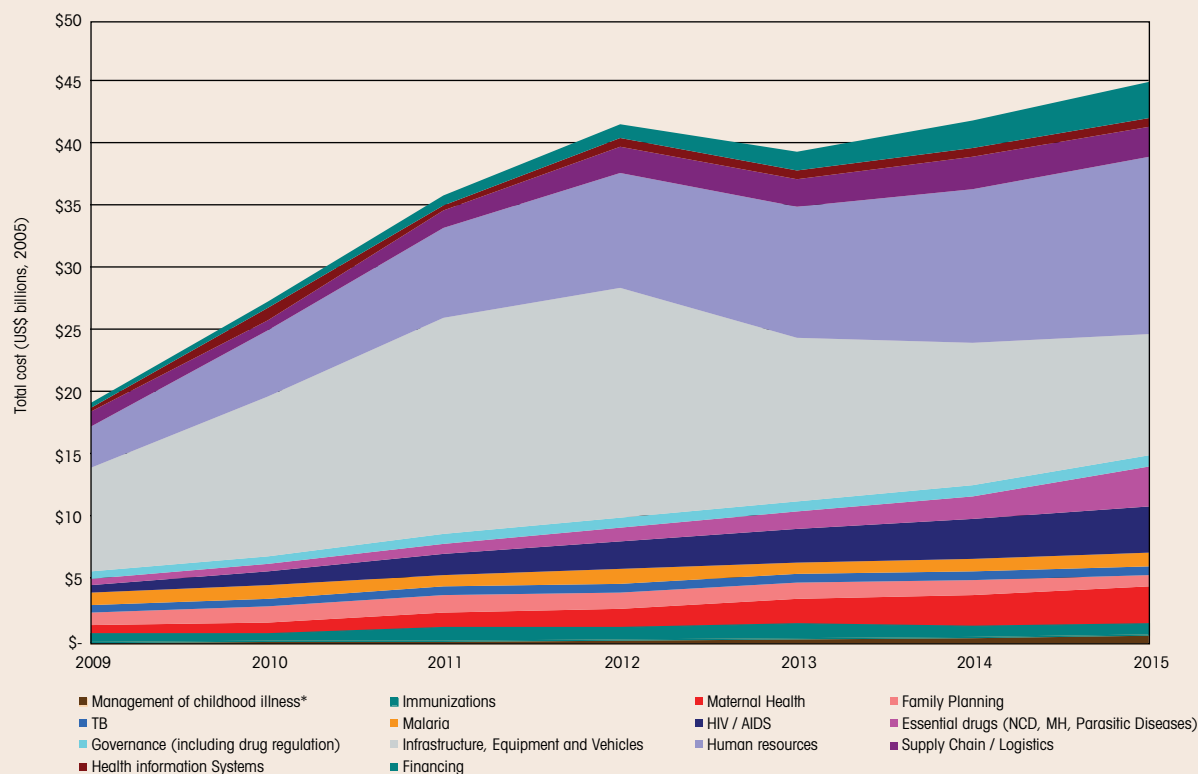




Table 1B. Per capita incremental costs by year, by disease and health system building block

Per Capita								
In US\$	2009	2010	2011	2012	2013	2014	2015	Total
Programme and disease								
Management of childhood illness*	0.10	0.11	0.17	0.24	0.31	0.35	0.43	1.71
Immunization	0.48	0.48	0.73	0.63	0.75	0.60	0.63	4.31
Maternal health	0.51	0.65	0.85	1.04	1.37	1.66	1.93	8.01
Family planning	0.73	0.88	1.03	0.96	0.89	0.77	0.57	5.83
Tuberculosis	0.45	0.48	0.47	0.47	0.47	0.47	0.48	3.29
Malaria	0.80	0.79	0.69	0.85	0.68	0.67	0.78	5.25
HIV / AIDS	0.41	0.81	1.16	1.50	1.82	2.14	2.42	10.24
Essential drugs (NCD, MH, parasitic diseases)	0.39	0.45	0.59	0.76	0.92	1.22	2.06	6.39
Subtotal	3.84	4.62	5.66	6.40	7.17	7.85	9.25	44.79
Health system building block								
Governance (including drug regulation)	0.46	0.43	0.58	0.58	0.58	0.61	0.58	3.82
Infrastructure, equipment and vehicles	6.13	9.23	12.20	12.72	8.84	7.56	6.33	63.01
Human resources for health	2.41	3.82	5.10	6.42	7.17	8.16	9.21	42.28
Supply chain / logistics	0.86	0.62	0.99	1.44	1.45	1.74	1.63	8.73
Health information system	0.27	0.68	0.31	0.48	0.47	0.46	0.45	3.11
Health financing	0.24	0.35	0.51	0.78	1.05	1.50	1.85	6.28
Subtotal	10.36	15.13	19.70	22.41	19.55	20.03	20.05	127.23
Total per capita	14.20	19.75	25.35	28.82	26.72	27.87	29.30	172.01

* Prevention of mother-to-child transmission of HIV and management of malaria in children are grouped under the HIV and malaria costs respectively.

** Essential medicines for noncommunicable diseases, mental health, and parasitic diseases.

Table 1C. Estimated resource requirement by programme, disease and health system component (in billion US\$)

	2009	2010	2011	2012	2013	2014	2015	Total
Programme and disease	5.23	6.43	8.03	9.29	10.62	11.85	14.25	65.70
Management of childhood illness	0.14	0.16	0.24	0.35	0.45	0.53	0.66	2.53
<i>HR costs (salaries)</i>	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.12
<i>Drugs and commodities</i>	0.03	0.06	0.12	0.19	0.29	0.40	0.50	1.59
<i>Infrastructure, equipment and vehicles</i>	0.02	0.03	0.05	0.05	0.06	0.04	0.04	0.28
<i>Other</i>	0.09	0.06	0.06	0.09	0.07	0.07	0.10	0.54
Immunization	0.66	0.67	1.04	0.91	1.10	0.91	0.97	6.27
<i>HR costs (salaries)</i>	0.04	0.05	0.04	0.05	0.04	0.04	0.04	0.28
<i>Drugs and commodities</i>	0.41	0.40	0.53	0.60	0.72	0.59	0.63	3.88
<i>Infrastructure, equipment and vehicles</i>	0.03	0.04	0.25	0.04	0.11	0.05	0.07	0.61
<i>Other</i>	0.18	0.18	0.22	0.23	0.23	0.23	0.24	1.51
Maternal health	0.70	0.91	1.21	1.50	2.03	2.51	2.97	11.82
<i>HR costs (salaries)</i>	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.11
<i>Drugs and commodities</i>	0.07	0.15	0.28	0.47	0.72	0.99	1.30	2.48
<i>Infrastructure, equipment and vehicles</i>	0.14	0.21	0.29	0.29	0.43	0.48	0.48	4.70
<i>Other</i>	0.48	0.53	0.62	0.72	0.87	1.02	1.17	4.53
Family planning	1.00	1.22	1.46	1.39	1.32	1.16	0.88	8.43
<i>HR costs (salaries)</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Drugs and commodities</i>	0.03	0.06	0.09	0.13	0.16	0.20	0.22	0.89
<i>Infrastructure, equipment and vehicles</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Other</i>	0.97	1.16	1.36	1.26	1.16	0.96	0.66	7.54
HIV/AIDS	0.56	1.12	1.65	2.17	2.69	3.23	3.73	15.13
<i>HR costs (salaries)</i>	0.04	0.08	0.13	0.18	0.24	0.29	0.33	1.29
<i>Drugs and commodities</i>	0.27	0.53	0.77	1.01	1.24	1.48	1.70	7.00
<i>Infrastructure, equipment and vehicles</i>	0.01	0.03	0.04	0.06	0.08	0.12	0.19	0.54
<i>Other</i>	0.24	0.48	0.70	0.92	1.13	1.33	1.50	6.31
Tuberculosis	0.61	0.67	0.67	0.69	0.70	0.71	0.73	4.78
<i>HR costs (salaries)</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Drugs and commodities</i>	0.12	0.13	0.13	0.13	0.14	0.14	0.14	0.93
<i>Infrastructure, equipment and vehicles</i>	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.26
<i>Other</i>	0.46	0.50	0.51	0.52	0.52	0.53	0.55	3.59
Malaria	1.04	1.05	0.94	1.17	0.95	0.96	1.14	7.25
<i>HR costs (salaries)</i>	0.01	0.03	0.01	0.01	0.01	0.01	0.03	0.13
<i>Drugs and commodities</i>	0.77	0.65	0.52	0.79	0.58	0.59	0.82	4.72
<i>Infrastructure, equipment and vehicles</i>	0.16	0.25	0.28	0.27	0.25	0.26	0.21	1.68
<i>Other</i>	0.10	0.11	0.11	0.10	0.11	0.10	0.09	0.73

Continued on next page



Table 1C (continued)

	2009	2010	2011	2012	2013	2014	2015	Total
Non-MDGs basic services	0.53	0.63	0.83	1.10	1.36	1.84	3.17	9.48
<i>HR costs (salaries)</i>	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.50
<i>Drugs and commodities</i>	0.17	0.35	0.55	0.80	1.08	1.51	2.87	7.33
<i>Infrastructure, equipment and vehicles</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Other</i>	0.29	0.21	0.21	0.23	0.21	0.26	0.23	1.64
Health system component	14.11	20.94	28.08	32.50	28.94	30.26	30.90	185.73
Human resources for health	3.28	5.31	7.24	9.30	10.61	12.33	14.20	62.28
<i>Pre-service training</i>	2.59	3.64	4.55	4.83	3.31	1.97	0.00	20.88
<i>Salaries and incentives</i>	0.69	1.68	2.69	4.48	7.3	10.36	14.2	41.4
<i>Infrastructure, equipment and transport</i>	8.34	12.84	17.33	18.45	13.09	11.42	9.75	91.23
<i>HR costs (salaries)</i>	0.02	0.03	0.05	0.05	0.05	0.05	0.05	0.28
<i>Drugs and commodities</i>	0.03	0.06	0.10	0.13	0.17	0.21	0.25	0.94
<i>Infrastructure, equipment and vehicles</i>	8.30	12.74	17.19	18.27	12.88	11.17	9.46	90.01
Logistics	1.18	0.86	1.41	2.08	2.14	2.63	2.51	12.82
<i>HR costs (salaries)</i>	0.53	0.60	0.95	1.45	1.47	1.79	1.64	8.44
<i>Warehousing</i>	0.41	0.01	0.07	0.04	0.06	0.10	0.18	0.87
<i>Vehicles</i>	0.02	0.00	0.01	0.00	0.01	0.01	0.01	0.06
<i>Equipment, fuel and others</i>	0.22	0.25	0.39	0.59	0.60	0.73	0.67	3.45
Health information system	0.37	0.84	0.54	0.70	0.69	0.69	0.69	4.52
<i>HR costs (salaries)</i>	0.10	0.21	0.09	0.10	0.09	0.09	0.09	0.77
<i>Infrastructure, equipment and vehicles</i>	0.01	0.02	0.12	0.02	0.02	0.02	0.02	0.23
<i>Other</i>	0.26	0.61	0.33	0.58	0.58	0.58	0.58	3.51
Governance, accreditation and regulation	0.62	0.60	0.83	0.84	0.85	0.92	0.90	5.56
<i>HR costs (salaries)</i>	0.26	0.26	0.30	0.31	0.32	0.34	0.35	2.14
<i>Drugs and commodities</i>	0.04	0.04	0.05	0.05	0.05	0.06	0.06	0.36
<i>Infrastructure, equipment and vehicles</i>	0.03	0.00	0.01	0.01	0.01	0.04	0.01	0.10
<i>Other</i>	0.29	0.29	0.47	0.47	0.47	0.48	0.49	2.96
Health financing	0.32	0.49	0.73	1.13	1.55	2.26	2.85	9.34
Total	19.34	27.36	36.11	41.79	39.56	42.11	45.16	251.44

Human resource costs (salaries): costs presented as human resources here by programme area do not refer to service delivery but rather to the management of the programme (i.e., staff costs incurred at national, regional and district level for employing staff for administration, data management and monitoring). Note that only salaries are presented under this category, as other expenses incurred for personnel training, per diems

and incentives, etc., are classified as other costs. The costs of the front-line health workers are included in the health system component for human resources because most would service multiple disease interventions.

Drugs (medicines) and commodities: this category includes costs for drugs, vaccines and other consumables incurred as interventions are scaled up.

Infrastructure, equipment and vehicles: this category includes costs for purchasing and maintaining capital investments such as buildings, equipment and infrastructure. Costs presented here under each programmatic area are those costs which would be specific to the programme and not counted under the systems-wide construction costs. For example, the construction of maternity waiting homes is included here for maternal and newborn health, and the purchase of

equipment specifically for ensuring a functioning cold chain for vaccines is presented here under costs for immunizations.

Other costs: costs presented here include those resources not included in the above three categories, such as: per diems and other costs for conducting meetings, workshops and training courses; costs for disease-specific surveys; information campaigns; and advocacy events.

Table 1D. Estimated resource requirement by programme, disease and health system component (distribution in %)

	2009	2010	2011	2012	2013	2014	2015	Total
Programme and disease	27.0%	23.5%	22.2%	22.2%	26.8%	28.1%	31.6%	26.1%
Management of childhood illness	2.7%	2.5%	3.0%	3.8%	4.3%	4.5%	4.6%	3.9%
<i>HR costs (salaries)</i>	5.0%	6.1%	5.8%	5.2%	5.0%	4.2%	3.4%	4.6%
<i>Drugs and commodities</i>	18.6%	39.9%	49.1%	54.4%	65.1%	75.3%	75.2%	62.7%
<i>Infrastructure, equipment and vehicles</i>	12.0%	17.6%	20.1%	15.5%	14.0%	6.8%	5.6%	11.2%
<i>Other</i>	64.4%	36.5%	24.9%	24.9%	15.9%	13.6%	15.8%	21.5%
Immunization	12.6%	10.5%	12.9%	9.8%	10.4%	7.7%	6.8%	9.6%
<i>HR costs (salaries)</i>	5.7%	7.1%	3.5%	4.9%	3.5%	3.8%	4.0%	4.4%
<i>Drugs and commodities</i>	61.8%	59.2%	51.3%	65.8%	65.3%	64.9%	64.5%	61.9%
<i>Infrastructure, equipment and vehicles</i>	4.7%	6.6%	24.3%	4.5%	10.3%	5.7%	7.3%	9.6%
<i>Other</i>	27.8%	27.1%	20.8%	24.8%	20.9%	25.5%	24.3%	24.0%
Maternal health	13.4%	14.1%	15.0%	16.2%	19.2%	21.1%	20.8%	18.0%
<i>HR costs (salaries)</i>	0.8%	1.3%	1.6%	1.3%	0.9%	0.8%	0.6%	1.0%
<i>Drugs and commodities</i>	9.4%	16.7%	23.5%	31.2%	35.4%	39.6%	43.8%	21.0%
<i>Infrastructure, equipment and vehicles</i>	20.7%	23.6%	23.8%	19.4%	20.9%	19.0%	16.2%	39.8%
<i>Other</i>	69.2%	58.4%	51.2%	48.1%	42.8%	40.7%	39.4%	38.3%
Family planning	19.1%	19.1%	18.2%	15.0%	12.4%	9.8%	6.1%	12.8%
<i>HR costs (salaries)</i>	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
<i>Drugs and commodities</i>	3.0%	5.0%	6.4%	9.2%	12.3%	17.1%	24.7%	10.6%
<i>Infrastructure, equipment and vehicles</i>	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
<i>Other</i>	97.0%	95.0%	93.6%	90.8%	87.7%	82.9%	75.3%	89.4%
HIV/AIDS	10.7%	17.5%	20.5%	23.3%	25.3%	27.2%	26.1%	23.0%
<i>HR costs (salaries)</i>	6.4%	7.1%	7.8%	8.3%	8.8%	9.1%	9.0%	8.5%
<i>Drugs and commodities</i>	47.8%	47.5%	46.9%	46.5%	46.2%	45.9%	45.5%	46.3%
<i>Infrastructure, equipment and vehicles</i>	2.0%	2.5%	2.5%	2.9%	3.0%	3.8%	5.1%	3.5%
<i>Other</i>	43.8%	43.0%	42.8%	42.3%	42.0%	41.2%	40.4%	41.7%
Tuberculosis	11.6%	10.4%	8.4%	7.4%	6.6%	6.0%	5.1%	7.3%
<i>HR costs (salaries)</i>	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

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Table 1D (continued)

	2009	2010	2011	2012	2013	2014	2015	Total
<i>Drugs and commodities</i>	19.4%	19.2%	19.5%	19.6%	19.6%	19.5%	19.3%	19.4%
<i>Infrastructure, equipment and vehicles</i>	5.5%	5.3%	5.2%	5.2%	5.2%	5.4%	5.8%	5.4%
<i>Other</i>	75.1%	75.6%	75.3%	75.3%	75.2%	75.1%	74.8%	75.2%
Malaria	19.8%	16.3%	11.6%	12.6%	9.0%	8.1%	8.0%	11.0%
<i>HR costs (salaries)</i>	1.3%	3.3%	1.5%	1.2%	1.4%	1.4%	2.3%	1.8%
<i>Drugs and commodities</i>	74.1%	62.4%	56.1%	67.0%	61.0%	60.9%	71.8%	65.1%
<i>Infrastructure, equipment and vehicles</i>	15.3%	23.8%	30.4%	23.2%	25.9%	26.8%	18.0%	23.1%
<i>Other</i>	9.3%	10.5%	11.9%	8.6%	11.6%	10.9%	8.0%	10.0%
Non-MDGs basic services	10.2%	9.8%	10.4%	11.9%	12.9%	15.5%	22.3%	14.4%
<i>HR costs (salaries)</i>	13.6%	11.5%	8.6%	6.5%	5.3%	3.9%	2.3%	5.3%
<i>Drugs and commodities</i>	32.5%	55.2%	66.0%	72.3%	79.3%	82.0%	90.4%	77.3%
<i>Infrastructure, equipment and vehicles</i>	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
<i>Other</i>	53.9%	33.4%	25.3%	21.1%	15.4%	14.1%	7.3%	17.3%
Health system component	73.0%	76.5%	77.8%	77.8%	73.2%	71.9%	68.4%	73.9%
Human resources for health	23.2%	25.4%	25.8%	28.6%	36.7%	40.8%	45.9%	33.5%
<i>Pre-service training</i>	79.0%	68.5%	62.9%	51.9%	31.2%	16.0%	0.0%	33.5%
<i>Salaries and incentives</i>	21.0%	31.5%	37.2%	48.1%	68.8%	84.0%	100%	66.5%
Infrastructure, equipment and transport	59.1%	61.3%	61.7%	56.8%	45.2%	37.7%	31.6%	49.1%
<i>HR costs (salaries)</i>	0.2%	0.2%	0.3%	0.3%	0.4%	0.4%	0.5%	0.3%
<i>Drugs and commodities</i>	0.4%	0.5%	0.6%	0.7%	1.3%	1.8%	2.5%	1.0%
<i>Infrastructure, Equipment and vehicles</i>	99.4%	99.3%	99.2%	99.0%	98.4%	97.8%	97.0%	98.7%
Logistics	8.3%	4.1%	5.0%	6.4%	7.4%	8.7%	8.1%	6.9%
<i>HR costs (salaries)</i>	45.2%	70.0%	67.4%	69.6%	68.7%	68.0%	65.6%	65.9%
<i>Warehousing</i>	34.9%	1.0%	4.7%	1.7%	3.0%	3.8%	7.2%	6.8%
<i>Vehicles</i>	1.4%	0.4%	0.4%	0.2%	0.3%	0.3%	0.4%	0.4%
Equipment, fuel and others	18.5%	28.6%	27.5%	28.4%	28.1%	27.8%	26.8%	26.9%
<i>Health information system</i>	2.6%	4.0%	1.9%	2.1%	2.4%	2.3%	2.2%	2.4%
<i>HR costs (salaries)</i>	27.0%	25.4%	17.0%	14.1%	13.1%	13.1%	13.1%	17.1%
<i>Infrastructure, equipment and vehicles</i>	3.0%	2.4%	22.1%	2.9%	2.9%	2.9%	2.9%	5.1%
<i>Other</i>	69.9%	72.2%	61.0%	83.0%	83.9%	83.9%	83.9%	77.7%
Governance, accreditation and regulation	4.4%	2.9%	3.0%	2.6%	3.0%	3.0%	2.9%	3.0%
<i>HR costs (salaries)</i>	41.1%	43.6%	36.5%	37.2%	37.7%	36.8%	38.9%	38.5%
<i>Drugs and commodities</i>	6.9%	7.1%	6.6%	6.5%	6.4%	6.2%	6.4%	6.5%
<i>Infrastructure, equipment and vehicles</i>	5.2%	0.8%	0.7%	0.7%	0.6%	4.5%	0.6%	1.8%
<i>Other</i>	46.9%	48.5%	56.3%	55.7%	55.2%	52.5%	54.1%	53.2%
Health financing	2.3%	2.3%	2.6%	3.5%	5.4%	7.5%	9.2%	5.0%
Total	100%	100%	100%	100%	100%	100%	100%	100%

Table 1E. Estimated resource requirement by programme, disease and health system component (in per capita US\$)

	2009	2010	2011	2012	2013	2014	2015	Total
Programme and disease	3.84	4.62	5.66	6.40	7.17	7.85	9.25	44.79
Management of childhood illness	0.10	0.11	0.17	0.24	0.31	0.35	0.43	1.71
<i>HR costs (salaries)</i>	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.08
<i>Drugs and commodities</i>	0.02	0.05	0.08	0.13	0.20	0.27	0.32	1.06
<i>Infrastructure, equipment and vehicles</i>	0.01	0.02	0.03	0.04	0.04	0.02	0.02	0.19
<i>Other</i>	0.07	0.04	0.04	0.06	0.05	0.05	0.07	0.37
Immunization	0.48	0.48	0.73	0.63	0.75	0.60	0.63	4.31
<i>HR costs (salaries)</i>	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.19
<i>Drugs and commodities</i>	0.30	0.29	0.38	0.41	0.49	0.39	0.41	2.66
<i>Infrastructure, equipment and vehicles</i>	0.02	0.03	0.18	0.03	0.08	0.03	0.05	0.42
<i>Other</i>	0.13	0.13	0.15	0.16	0.16	0.15	0.15	1.04
Maternal health	0.51	0.65	0.85	1.04	1.37	1.66	1.93	8.01
<i>HR costs (salaries)</i>	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.08
<i>Drugs and commodities</i>	0.05	0.11	0.20	0.32	0.49	0.66	0.84	2.67
<i>Infrastructure, equipment and vehicles</i>	0.11	0.15	0.20	0.20	0.29	0.32	0.31	1.58
<i>Other</i>	0.35	0.38	0.44	0.50	0.59	0.68	0.76	3.69
Family planning	0.73	0.88	1.03	0.96	0.89	0.77	0.57	5.83
<i>HR costs (salaries)</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Drugs and commodities</i>	0.02	0.04	0.07	0.09	0.11	0.13	0.14	0.60
<i>Infrastructure, equipment and vehicles</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Other</i>	0.71	0.84	0.96	0.87	0.78	0.64	0.43	5.23
HIV/AIDS	0.41	0.81	1.16	1.50	1.82	2.14	2.42	10.24
<i>HR costs (salaries)</i>	0.03	0.06	0.09	0.12	0.16	0.19	0.22	0.87
<i>Drugs and commodities</i>	0.20	0.38	0.54	0.70	0.84	0.98	1.10	4.74
<i>Infrastructure, equipment and vehicles</i>	0.01	0.02	0.03	0.04	0.05	0.08	0.12	0.36
<i>Other</i>	0.18	0.35	0.50	0.63	0.76	0.88	0.98	4.27
Tuberculosis	0.45	0.48	0.47	0.47	0.47	0.47	0.48	3.29
<i>HR costs (salaries)</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Drugs and commodities</i>	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.64
<i>Infrastructure, equipment and vehicles</i>	0.02	0.03	0.02	0.02	0.02	0.03	0.03	0.18
<i>Other</i>	0.33	0.36	0.36	0.36	0.35	0.35	0.36	2.47

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Table 1E (continued)

	2009	2010	2011	2012	2013	2014	2015	Total
Malaria	0.76	0.75	0.66	0.81	0.65	0.64	0.74	5.01
<i>HR costs (salaries)</i>	0.01	0.02	0.01	0.01	0.01	0.01	0.02	0.09
<i>Drugs and commodities</i>	0.56	0.47	0.37	0.54	0.39	0.39	0.53	3.26
<i>Infrastructure, equipment and vehicles</i>	0.12	0.18	0.20	0.19	0.17	0.17	0.13	1.16
<i>Other</i>	0.07	0.08	0.08	0.07	0.07	0.07	0.06	0.50
Non-MDGs basic services	0.39	0.45	0.59	0.76	0.92	1.22	2.06	6.39
<i>HR costs (salaries)</i>	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.35
<i>Drugs and commodities</i>	0.13	0.25	0.39	0.55	0.73	1.00	1.86	4.91
<i>Infrastructure, equipment and vehicles</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Other</i>	0.21	0.15	0.15	0.16	0.14	0.17	0.15	1.14
Health system component	10.36	15.05	19.77	22.41	19.55	20.03	20.05	127.23
Human resources for health	2.41	3.82	5.10	6.42	7.17	8.16	9.21	42.28
<i>Pre-service training</i>	1.90	2.61	3.20	3.33	2.23	1.31	0.00	14.59
<i>Salaries and incentives</i>	0.51	1.2	1.89	3.09	4.93	6.86	9.21	27.69
Infrastructure, equipment and vehicles	6.13	9.23	12.20	12.72	8.84	7.56	6.33	63.01
<i>HR costs (salaries)</i>	0.01	0.02	0.03	0.03	0.03	0.03	0.03	0.19
<i>Drugs and commodities</i>	0.02	0.05	0.07	0.09	0.11	0.14	0.16	0.64
<i>Infrastructure, equipment and vehicles</i>	6.09	9.16	12.10	12.60	8.70	7.39	6.14	62.19
Logistics	0.86	0.62	0.99	1.44	1.45	1.74	1.63	8.73
<i>HR costs (salaries)</i>	0.39	0.43	0.67	1.00	1.00	1.19	1.07	5.74
<i>Warehousing</i>	0.30	0.01	0.05	0.02	0.04	0.07	0.12	0.61
<i>Vehicles</i>	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.04
<i>Equipment, fuel and others</i>	0.16	0.18	0.27	0.41	0.41	0.48	0.44	2.34
Health information system	0.27	0.60	0.38	0.48	0.47	0.46	0.45	3.11
<i>HR costs (salaries)</i>	0.07	0.15	0.06	0.07	0.06	0.06	0.06	0.54
<i>Infrastructure, equipment and vehicles</i>	0.01	0.01	0.08	0.01	0.01	0.01	0.01	0.16
<i>Other</i>	0.19	0.44	0.23	0.40	0.39	0.38	0.38	2.41
Governance, accreditation and regulation	0.46	0.43	0.58	0.58	0.58	0.61	0.58	3.82
<i>HR costs (salaries)</i>	0.19	0.19	0.21	0.22	0.22	0.22	0.23	1.47
<i>Drugs and commodities</i>	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.25
<i>Infrastructure, equipment and vehicles</i>	0.02	0.00	0.00	0.00	0.00	0.03	0.00	0.07
<i>Other</i>	0.21	0.21	0.33	0.32	0.32	0.32	0.32	2.03
Health financing	0.24	0.35	0.51	0.78	1.05	1.50	1.85	6.28
Total	14.20	19.67	25.42	28.82	26.72	27.87	29.30	172.01

Table 2. Incremental costs by year, by capital and recurrent expenditure

In US\$ billions	2009	2010	2011	2012	2013	2014	2015	%
Capital	12.80	17.58	22.88	23.34	13.60	8.28	2.25	40%
Recurrent	6.54	9.88	13.12	18.45	25.96	33.84	42.91	60%

Table 3. Incremental costs by year, by traded and non-traded goods

In US\$ billions	2009	2010	2011	2012	2013	2014	2015	%
Traded	7.74	11.31	15.01	16.71	14.86	14.73	15.55	38%
Non-traded	11.28	16.15	21.00	25.08	24.71	27.39	29.60	62%

In terms of the breakdown between recurrent and capital costs over the 7 years, 60% of the \$251 billion required is for the recurrent component with the remaining 40% for capital costs (\$151 billion and \$101 billion respectively). Table 2 illustrates that the investments in capital goods are frontloaded and peak in 2012, thereafter decreasing as the majority of health facilities have been built and vehicles and other equipment purchased. In defining capital goods, the standard approach of including all investments that last more than one year has been used.

Almost 38% of all inputs are traded internationally and are purchased at international market prices, while 62% are non-traded and prices depend on domestic markets. Table 3 presents the details of the estimated additional resource requirement according to this economic classification, with the traded goods estimate providing an indication of the need for foreign exchange to purchase imported goods.

Table 4 shows that 28% of all costs are incurred by investments at the national programme level, 38% at the hospital level, 26% at the primary health centre level and 9% at the community level.

Table 4. Incremental costs by year, by level of care

In US\$ billions	2009	2010	2011	2012	2013	2014	2015	%
Community	1.64	2.42	3.39	3.42	3.28	3.78	4.29	9%
Management of childhood illness	0.01	0.03	0.05	0.08	0.13	0.18	0.22	
Family planning	0.19	0.22	0.25	0.29	0.29	0.25	0.19	
Malaria	0.72	0.46	0.50	0.99	0.58	0.59	1.04	
HIV/AIDS*	0.09	0.19	0.29	0.39	0.50	0.61	0.72	
HR costs (salaries)	0.63	1.52	2.30	1.66	1.78	2.16	2.12	
Health centre	5.76	6.73	7.88	10.72	9.17	10.97	13.62	26%
Child health	0.01	0.02	0.03	0.05	0.08	0.11	0.14	
Immunizations	0.47	0.47	0.61	0.69	0.81	0.69	0.73	

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Table 4 (continued)

In US\$ billions	2009	2010	2011	2012	2013	2014	2015	%
Maternal and newborn health	0.39	0.51	0.68	0.91	1.23	1.57	1.93	
Family planning	0.26	0.32	0.37	0.39	0.42	0.40	0.32	
TB	0.12	0.13	0.13	0.13	0.14	0.14	0.14	
Malaria	0.00	0.01	0.01	0.01	0.01	0.01	0.01	
HIV/AIDS*	0.33	0.65	0.94	1.23	1.50	1.79	2.04	
Essential drugs (NCD, MH, parasitic diseases)	0.14	0.28	0.44	0.64	0.87	1.21	2.30	
HR costs (salaries)	—	—	—	1.69	2.85	3.77	4.71	
Consumables and other recurrent	0.02	0.33	0.64	0.96	1.27	1.29	1.31	
Construction	2.47	2.47	2.47	2.47	—	—	—	
Equipment and other capital	1.55	1.55	1.55	1.55	—	—	—	
Hospital	5.19	9.63	14.08	15.83	15.94	16.20	17.81	38%
Management of childhood illness	0.01	0.02	0.03	0.05	0.08	0.10	0.13	
Maternal and newborn health	0.12	0.15	0.21	0.28	0.37	0.46	0.54	
Family planning	0.22	0.26	0.29	0.32	0.31	0.26	0.19	
Tuberculosis	0.03	0.03	0.03	0.03	0.03	0.03	0.03	
Malaria	0.33	0.31	0.15	0.14	0.14	0.14	0.14	
HIV/AIDS*	0.08	0.15	0.22	0.28	0.34	0.40	0.47	
Essential drugs (NCD, MH, parasitic diseases)	0.03	0.07	0.11	0.16	0.22	0.30	0.57	
HR costs (salaries)	0.06	0.15	0.38	1.10	2.63	4.37	7.29	
Consumables and other recurrent	0.02	0.03	0.05	0.89	3.35	5.80	8.26	
Construction	2.45	4.90	7.36	7.36	4.90	2.45	—	
Equipment and other capital	1.84	3.55	5.26	5.22	3.56	1.87	0.18	
Other (national programme)	6.75	8.69	10.66	11.82	11.17	11.16	9.44	28%
Management of childhood illness	0.11	0.10	0.12	0.16	0.16	0.13	0.16	
Immunizations	0.19	0.20	0.43	0.23	0.29	0.22	0.24	
Maternal and newborn health	0.19	0.25	0.32	0.32	0.44	0.48	0.49	
Family planning	0.33	0.43	0.55	0.39	0.30	0.25	0.17	
Tuberculosis	0.45	0.50	0.51	0.52	0.53	0.54	0.56	
Malaria	0.28	0.41	0.42	0.40	0.38	0.39	0.33	
HIV/AIDS*	0.06	0.12	0.19	0.27	0.34	0.42	0.50	
Essential drugs (NCD, MH, parasitic diseases)	0.36	0.28	0.28	0.30	0.28	0.33	0.31	
Health system investments	4.78	6.40	7.84	9.24	8.45	8.40	6.68	

The analysis also takes into account the need for investment by region. The list of 49 countries includes 33 countries from sub-Saharan Africa, and 60% (\$151 billion) of the total resource needs over the seven years are for sub-Saharan Africa. In terms of investment needs per capita, as shown in Table 5B the average by region ranges between \$20 and \$28 for the seven-year period.

5.2. Available additional funding and the financing gap

Table 6 shows the additional financing that would be available over time under the two scenarios: no-change and commitments-met. In the first, donor funds are assumed to decline between 2009 and

2011 because of the current economic crisis. This is driven by the assumption that the current ratio of ODA to donor GDP remains constant: if GDP is expected to fall, ODA would also be expected to fall. Government and private sector domestic contributions continue to increase because IMF projections suggest that one low-income country will still grow over the next few years. The funding gap, however, is very large, totalling more than \$224 billion over the period, and more than \$37 billion in 2015.

The second scenario illustrates that if donors and recipient countries fulfil their commitments, the level of funding available in 2015 would just about be sufficient to meet the required costs of scaling up. However, even if donors meet their current commitments, there will still

Table 5A. Total incremental costs by World Bank region (US\$ 2005, billion)

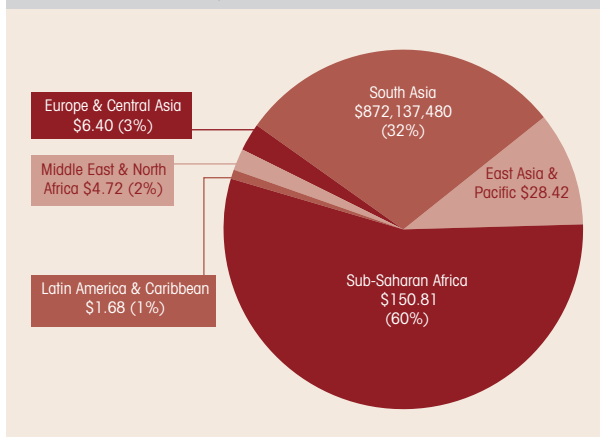
	Number of countries	2009	2010	2011	2012	2013	2014	2015	Total 2009–2015	%
Sub-Saharan Africa	33	11.14	16.05	21.01	24.72	24.11	25.82	27.96	150.81	60%
Latin America and the Caribbean	1	0.14	0.18	0.23	0.27	0.26	0.28	0.33	1.68	1%
Middle East and North Africa	1	0.27	0.42	0.63	0.74	0.80	0.88	0.99	4.72	2%
Europe and Central Asia	3	0.60	0.83	1.06	1.16	0.97	0.98	0.80	6.40	3%
South Asia	4	4.85	6.61	8.66	9.91	9.01	9.71	10.65	59.40	24%
East Asia and the Pacific	7	2.35	3.38	4.43	4.98	4.40	4.45	4.42	28.42	11%
Non sub-Saharan Africa	16	8.20	11.42	15.00	17.07	15.45	16.30	17.19	100.62	40%
Total	49	19.34	27.47	36.01	41.79	39.56	42.11	45.16	251.44	100%

Table 5B. Incremental costs by World Bank region, per capita (US\$ 2005)

	2009	2010	2011	2012	2013	2014	2015	Average 2009–2015
Sub-Saharan Africa	15.84	22.25	28.41	32.61	31.05	32.45	34.32	28.40
Latin America and the Caribbean	13.63	17.83	22.18	25.87	24.55	26.62	30.57	23.19
Middle East and North Africa	11.16	17.15	24.89	28.67	30.04	31.92	34.91	25.97
Europe and Central Asia	14.82	20.26	25.40	27.36	22.56	22.48	18.04	21.58
South Asia	12.34	16.50	21.23	23.85	21.28	22.50	24.26	20.41
East Asia and the Pacific	12.28	17.46	22.62	25.20	22.03	22.02	21.68	20.53



Figure 3: Estimated cost to scale up essential interventions linked to the health MDGs in 49 low-income countries 2009–2015 (US\$ 2005, billion), by World Bank region



be insufficient funding over the entire period to enable the 49 low-income countries to scale up investments in the initial years to the desired extent—the total financing gap would be \$100 billion for the entire seven-year period. Additional funds will certainly be required in the initial years to enable countries to engage in health system infrastructure and human capital investment.

5.3. Impact on the availability and use of services

Assuming the required funding is found, Tables 7 and 8 describe in turn the increases in physical infrastructure and health workers that would be made available.

In addition, considerable improvements in governance and health financing mechanisms could be expected. They include strengthened governance capacity brought about by the establishment or strengthening of the following units within ministries of health, at both national/central and sub-national levels:

- strategic direction/coordination (CEO unit);
- strategic planning, monitoring and reporting (strategic planning and policy unit);
- liaison, advocacy and external relations (external relations team);
- licensing and quality assurance of facilities (licensing unit, including inspection services);
- licensing and market authorization of drugs (drug regulation unit);
- contracting with non-state service providers (contracting unit);
- operations and performance evaluation (internal audit unit—national/central unit only).

Table 6. Available incremental funding and funding gap (48 countries), million constant US\$ (2005)

	2009	2010	2011	2012	2013	2014	2015	Total
Incremental cost	19,337	27,466	36,008	41,793	39,561	42,112	45,159	251,435
No-change scenario	441	1,142	2,266	3,556	4,953	6,453	8,039	26,850
government	303	643	1,114	1,651	2,237	2,873	3,546	12,368
external	-186	-193	-74	74	219	351	496	688
private	324	692	1,226	1,832	2,496	3,228	3,998	13,795
Financing gap	18,896	26,324	33,742	38,236	34,609	35,659	37,119	224,585
Commitments-met scenario	5,076	9,084	13,595	19,137	25,930	34,008	44,366	151,196
government	1,574	3,577	6,311	9,923	14,698	21,105	29,686	86,875
external	2,876	4,176	5,031	5,905	6,741	7,084	7,411	39,224
private	625	1,330	2,254	3,309	4,491	5,820	7,268	25,097
Financing gap	14,261	18,382	22,413	22,656	13,631	8,104	793	100,239

Table 7. Cumulative number of newly built health facilities by level, by year

	2009	2010	2011	2012	2013	2014	2015
Health centres construction started	22,240	22,240	22,240	22,240			
Health centres operating		22,240	44,480	66,720	88,960	88,960	88,960
District hospitals construction started	1603	1603	1603	1603			
District hospitals operating				1603	3205	4808	6410
Provincial hospitals construction started	364	364	364				
Provincial hospitals operating					364	729	1093

Table 8. Estimated additional health workers by professional category, by year

	2009	2010	2011	2012	2013	2014	2015	Total
Physicians	—	—	—	—	—	—	349,953	349,953
Nursing personnel	—	—	—	231,944	463,889	463,889	463,889	1,623,611
Midwifery personnel	—	—	—	10,785	21,570	21,570	21,570	75,495
Medical officers	—	—	—	58,325	58,325	58,325	58,325	233,302
Radiology technicians	—	3,019	6,299	9,254	9,527	9,799	9,799	47,697
Lab technicians	—	2,384	4,973	7,306	7,521	7,736	7,736	37,656
Pharmacy aides	—	1,271	2,652	3,896	4,011	4,126	4,126	20,083
Orderlies	—	4,767	9,945	14,611	15,042	15,473	15,473	75,311
Pharmacists	—	1,033	2,155	3,166	3,259	3,352	3,352	16,317
Laboratory technologists	—	1,033	2,155	3,166	3,259	3,352	3,352	16,317
Imaging technicians	—	—	—	—	—	—	—	—
Dentists	—	1,907	3,978	5,845	6,017	6,189	6,189	30,125
Community health workers	—	158,450	158,450	158,450	158,450	158,450	158,450	950,701
Total	—	173,864	190,607	506,749	750,871	752,263	1,102,216	3,476,569

The following market-enhancing mechanisms would be established and/or gradually strengthened, operated by NGOs:

- regulatory bodies for health-related professions, including registration, representation and investigation services;
- accreditation agencies for health service facilities, including quality standards and inspection services.

These actions would complement the activities that were costed to strengthen the management of disease control programmes for each of the health MDGs, as well as the overall operation of the health information system.

Finally, risk/fund pooling mechanisms would be expanded in eight countries and started in five more countries, as described earlier.



Table 9. Additional health service outcomes in 2015 compared with baseline coverage (millions)

Health service outcome	SSA	Non-SSA	Total
Additional women obtaining access to skilled birth attendance and antenatal care	14.95	7.10	22.05
Additional newborns getting quality of care at birth and neonatal care	14.95	7.10	22.05
Number of new users (both women and men) receiving contraceptive services	26.10	16.53	42.63
Additional number of children with pneumonia managed according to standard guidelines	24.32	15.78	40.09
Number of lives prolonged due to antiretroviral therapy (= total number of persons on antiretroviral therapy in 2015)	5.02	0.18	5.20

This strengthening of infrastructure, health workers and governance would enable more patient contacts and better health. Table 9 shows some of the additional health services that would be provided with increased access. Twenty-two million more women in the 49 countries would obtain access to skilled care at birth and antenatal care services, including 15 million women in sub-Saharan Africa. With strengthened health service provision, an additional 40 million children with pneumonia would receive care, and in total 5 million people would have access to antiretroviral therapy.

5.4. Impact on lives saved and additional health outcomes

The health outcomes presented here follow the MDG indicator framework (illustrated in Table 10) and refer to the additional lives saved by scaling up coverage above the currently observed levels. It should be noted that while this modelling mainly takes into account mortality reduction, the scale-up of interventions as planned would significantly reduce morbidity and improve overall population health in the 49 low-income countries.³⁵

As shown in Table 11, the planned investment would significantly reduce mortality in the 49 countries. Almost 23 million lives would be saved between 2009 and 2015. This consists of almost 17 million child deaths averted, including 3.7 million newborns (rows e and f).³⁶ Further information on the breakdown of the 17 million child and newborn deaths averted is provided in rows a to d, showing that a scaled-up

package of skilled birth attendance and immediate newborn care at delivery would avert an additional 2.4 million neonatal deaths (row a), for example, while the scale-up of immunizations would prevent just over to 3.3 million deaths (row c). Increasing coverage of malaria interventions would prevent more than 5 million malaria-related child deaths (row d), the vast majority in sub-Saharan Africa, while increased emphasis on the management of childhood illness would avert 8.6 million deaths in under fives.³⁷ The results indicate that 39 out of the 49 countries would reach MDG 4, with another four countries within 10% of their MDG 4 target for under-five mortality.

The maximum impact on maternal deaths is achieved when family planning is scaled up jointly with skilled attendance at birth. The scale-up of service provision as costed in this exercise would avert up to a million maternal deaths during the seven years from 2009 to 2015, the majority of which result from the scaled up package of skilled care at birth and during antenatal care in combination with a strengthened health system. On this basis, at least 22 countries—14 in sub-Saharan Africa—will reach the MDG 5a target, reducing the national maternal mortality ratio by three quarters by 2015.³⁸ Target 5b, addressing access to family planning services, will be achieved in every country.

MDG 6 refers to halting and reversing the spread of malaria, TB, HIV/AIDS and other major diseases. With regards to malaria, 85% of all malaria deaths occur in children.³⁹ The impact estimates presented in this report do not consider deaths in adults or children over five years old (mainly due to the technical parameters of the

Table 10. MDG-related health outcomes considered in the analysis

Millennium Development Goal	Target *	Health outcomes considered in the analysis
MDG 1: Eradicate extreme poverty and hunger	Target 1c: Reduce by half the proportion of people who suffer from hunger	<ul style="list-style-type: none"> Reduction in stunting (low height for age) in children under five
MDG 4: Reduce child mortality	Target 4a: Reduce by two thirds the mortality rate among children under five	<ul style="list-style-type: none"> Number of under-five deaths averted by country and year Number of countries achieving a two-third reduction in the under-five mortality ratio by 2015 (from 1990 baseline) Number of newborn deaths averted by country and year
MDG 5: Improve maternal health	Target 5a: Reduce by three quarters, between 1990 and 2015, the maternal mortality ratio	<ul style="list-style-type: none"> Number of maternal deaths averted by country and year Number of countries achieving the three-quarter reduction in the maternal mortality ratio by 2015 (from 1990 baseline)
	Target 5b: Achieve, by 2015, universal access to reproductive health	<ul style="list-style-type: none"> Pregnancies and unplanned births averted, and maternal lives saved by scaling up access to family planning
MDG 6: Combat HIV/AIDS, malaria and other diseases	Target 6a: Halt and begin to reverse the spread of HIV/AIDS	<ul style="list-style-type: none"> Number of HIV/AIDS-related deaths averted by country and year
	Target 6b: Achieve, by 2010, universal access to treatment for HIV/AIDS for all those who need it	
	Target 6c: Halt and begin to reverse the incidence of malaria and other major diseases	<ul style="list-style-type: none"> Number of tuberculosis-related deaths averted by country and year Number of malaria-related deaths in children averted by country and year
MDG 8: Develop a global partnership for development	Target 8e: In cooperation with pharmaceutical companies, provide access to affordable essential drugs in developing countries	Number of deaths averted due to expanding tobacco control and salt reduction strategies,** and providing preventive drug treatment for high-risk individuals

* MDG targets (<http://www.undp.org/mdg/>).

** Prevention of chronic diseases through scaling up of salt reduction and tobacco control interventions is included here as it will reduce the need for essential drugs to manage cardiovascular disease.

Table 11. Health outcomes achieved by scaling up, by programme (millions)

	Additional outcomes achieved in year 2015 (millions)			Total additional outcomes 2009–2015 (millions)		
	SSA	Non-SSA	Total	SSA	Non-SSA	Total
Deaths averted						
Child and newborn mortality						
Child and newborn deaths averted by independently implemented programmes*						
(a) Package of skilled birth attendance and immediate newborn care ¹	0.47	0.21	0.67	1.66	0.69	2.35
(b) Management of childhood illness and nutrition ¹	1.89	0.67	2.56	6.22	2.37	8.59
of which are neonatal deaths ¹	0.41	0.22	0.63	1.39	0.82	2.21
(c) Immunizations ²	0.62	0.17	0.80	2.60	0.71	3.31
(d) Malaria interventions ¹	0.80	0.03	0.83	4.96	0.18	5.15

Continued on next page



Table 11 (continued)

Deaths averted	Additional outcomes achieved in year 2015 (millions)			Total additional outcomes 2009–2015 (millions)		
	SSA	Non-SSA	Total	SSA	Non-SSA	Total
Total deaths prevented by a combined programme including birth attendance and newborn interventions, management of childhood illnesses, immunizations and malaria interventions**	3.11	0.83	3.94	13.59	3.24	16.84
(e) Total number of newborn deaths averted (0–28 days)	0.68	0.33	1.01	2.50	1.21	3.72
(f) Total number of post-neonatal deaths averted (>28 days)	2.42	0.51	2.93	11.06	2.03	13.08
Countries reaching MDG5 target by 2015 (two-thirds reduction in under-5 mortality rate)				27	12	39
Maternal mortality***						
(g) Total number of maternal deaths averted (family planning + skilled birth attendance) ³	0.25	0.07	0.32	0.79	0.21	1.00
Countries reaching MDG 5 (three-quarters reduction in maternal mortality rate)				14	8	22
Mortality due to HIV, tuberculosis, malaria and chronic diseases						
(h) Malaria (children under five) ¹ – same as above in (d)	0.8	0.03	0.83	4.96	0.18	5.15
(i) Tuberculosis ⁴	0.22	0.04	0.26	1.28	0.22	1.49
(j) HIV/AIDS ⁵	0.18	0.01	0.19	0.54	0.03	0.58
(k) Chronic diseases ⁶	n/a by year	n/a by year	n/a by year	n/a	n/a	2.9
Total number of deaths averted						
Minimum number of deaths averted ((e) + (f) + (g) + (i) + (j) + (k))	3.75	0.96	4.71	16.21	3.7	22.8
Other health outcomes (millions)						
Additional unplanned pregnancies averted if unmet need for family planning is satisfied ⁷	10.45	7.16	17.61	39.39	26.82	66.20
Additional unplanned births averted if unmet need for family planning is satisfied ⁷	6.92	3.95	10.86	25.37	13.87	39.24
Percent reduction in stunting in children 12–23 months (by 2015) ¹	32.52	36.18	33.71			
Percent reduction in stunting in children 24–59 months (by 2015) ¹	23.61	25.37	24.18			
Reduction in number of children stunted 12–23 months ¹	3.78	2.68	6.46	11.00	8.67	19.67
Reduction in number of children stunted 24–59 months ¹	13.48	10.13	23.61	37.46	30.77	68.22

Sources for numbers:

¹ Simulation using Lives Saved Tool (version 1 March 2009)

² Simulation using Lives Saved Tool (version 1 March 2009) + WHO/IVB projections for selected vaccines

³ WHO projections for access to skilled care combined with estimates from UNFPA for family planning. The numbers reported here refer to a scenario with increasing family planning and thus fewer births over time.

⁴ Estimates from the Stop TB Global action plan.

⁵ UNAIDS estimates.

⁶ Results extrapolated from the following sources: Asaria P, Chisholm D, Mathers C, et al. Chronic disease prevention: health effects and financial costs of strategies to reduce salt intake and control tobacco use. *Lancet*, 2007, 370:1944–1953; Lim SS, Gaziano TA, Gakidou E, et al. Prevention of cardiovascular disease in high-risk individuals in low-income and middle-income countries: health effects and costs. *Lancet*, 2007, 370:1954–1962.

⁷ Estimates provided by UNFPA.

* The interventions in the separate packages often act on the same cause of death. Numbers presented here for each package refer to the scale-up of these interventions in the absence of the scale-up of other child health interventions.

** The total deaths averted is less than the sum of the programmes because of overlapping mortality impact across the independently implemented programmes.

*** The estimates for maternal deaths averted as presented in this table will be updated in 2010 taking into account new UN maternal mortality estimates expected to be made available mid-2010.

model used) and so the impact described here can be considered a conservative estimate. With the estimated modelling, in total, 5.15 million deaths in children under five would be averted in seven years, and 0.83 million in 2015 alone (rows d and i in Table 11). The global targets to reduce malaria mortality by at least 50% by 2010 and by 75% by 2015 will be achieved.⁴⁰

Implementation of the StopTB strategy averts 1.5 million deaths (row j), and the increased availability of antiretroviral therapy and other HIV/AIDS interventions save a further 0.6 million lives, the majority in sub-Saharan Africa (row k). Scaling up preventive interventions and access to essential medicines for chronic diseases would prevent another 2.9 million adult deaths (row l).

Finally, the last six rows of Table 11 report selected other health outcomes associated with the scale-up of activities costed in the earlier sections. The first two deal with the impact of family planning programmes, while the second two report the percentage declines in the proportion of children that are stunted. Sixty-six million unplanned pregnancies would be averted through family planning, indirectly contributing to averting 39 million unintended births. The scale-up of preventive care including promotion for improved nutrition practices would contribute to a 34% reduction in stunting in children 24–59 months, and a 24% reduction for children aged 12–23 months.



6. Points for consideration

6.1. Calculation of needs with particular consideration of the current status of fragile states included in the costing

As stated previously, these estimates present, for the first time, a detailed assessment of the health system strengthening inputs and activities required to support the scale-up of service delivery to provide universal coverage and accelerate progress towards the health MDGs. The approach is normative, as indeed was the approach taken to set the health MDG targets. The activities and the inputs that the technical programmes and experts consider to be required in order to facilitate the achievement of the MDGs were costed. The approach builds on previously published price tags for various components of the costing, as well as for the health impacts.

The analysis indicates that the planned investment would significantly reduce mortality in the 49 countries. It should be noted, however, that the results indicate that not all countries would achieve all of the health MDG goals by 2015, even with the rate of scale up implied by the costing reported in this document. The modelling of impact is conservative in nature as it is based on published estimates of efficacy which may underestimate the impact of key services (such as skilled birth attendance).⁴¹ Even then, there may be questions raised about the feasibility of scaling up so rapidly, particularly in several of the fragile states that have been included. These issues are not addressed here, but it may well be that for these countries it would not be possible to scale up the health system as rapidly as we assume. The extension of the scaling up horizon in these particular countries, if it is done, would be consistent with best practice recommendations to adopt a strategic approach to institution building, coupled with humanitarian approaches in fragile states.⁴²

6.2. Institution or systems building approach versus quick-fixes/short-cuts to reach the targets

For this exercise, an institution building approach has been adopted as the predominant strategy. This can

be clearly seen in terms of the infrastructure built and the human resources that have been produced and employed across the health system, without assigning them specifically to different disease-specific activities or health programmes. This avoids some of the problems associated with scaling up particular programmes that might reduce the effectiveness of others in the absence of overall health system strengthening. While we followed the advice of experts on what types of activities and inputs are required to scale up health systems and services, it is possible that this approach provides some type of idealized, best case, vision. It is possible that in several of the 49 low-income countries, the targets might be achieved even if some parts of the health systems scale-up is not done in its entirety or completed in time. We have no way of judging this, although the experience of recent years is that strengthening some programmes independently from the system as a whole stretches the capacity of the system to deliver in other areas.

6.3. Comparison of available resources and financing gap

The no-change scenario paints a bleak picture in the future in terms of reaching the health MDGs by 2015. It has a sound theoretical basis showing that across countries, there is a very strong relationship between total health expenditures (from all sources, including external assistance) and GDP.^{43,44,45} In our model domestic health expenditures are assumed to increase at a slightly more rapid rate than GDP, based on the empirical estimate of the elasticity of overall health spending to GDP in these countries, without explicit consideration of the source of the increased health expenditures. In fact, the implication of the available empirical work is that in the past, donor resources have not increased over time more rapidly than would be expected from the observed rates of growth in GDP in the recipient countries. The spirit behind the MDGs is that advanced economies and developing countries will work together to scale up health spending more rapidly, so the amount that could be available at the country level might turn out to be higher if national governments and donors give a higher priority to health.

However, even under the more optimistic “commitments met” scenario where donors and national governments fulfil their publicly voiced commitments there are still funding gaps that will need to be met over the coming years. This requires not only that donor and recipient countries work towards meeting their commitments, but also that new sources of funding are actively explored. At the same time, ensuring more efficient and effective use of the existing resources for health could also make important contributions.

Reprogramming current spending might have some potential to release some funds. It has been shown that a high proportion of official development assistance in health is going to technical cooperation, over 40% in 2006. While technical cooperation is valuable, there is the question of whether there might be scope for more efficiencies in this particular area, allowing more money to be spent on actually improving health in the low-income countries.⁴⁶

6.4. The need for more research, data and evidence to enhance health systems functioning

This exercise has highlighted the need to collect on a systematic basis data on variables that will reflect the current status of health systems and to pull together the evidence on what intervention or approach has worked to improve the delivery of health services or to scale up health systems. In much of the costing we had to rely on the grey literature and expert advice on the status of the health systems in these low-income countries and on what to include under health systems scale-up. There are many reported success stories and promising case studies that are now at the stage that they can be programmed to be brought to scale with careful evaluation. Such investments deserve to be prioritized in funding.

Some action research on improving governance and management in particular might have multiplier effects. Improved governance has been shown to be associated with better outcomes and the World Bank IDA,⁴⁷ and the United States government’s Millennium Challenge Account have made this one of their criteria for countries to qualify for grants.⁴⁸ However, the challenge has

been to find effective governance interventions that can be implemented in the health sector without requiring whole-of-government approaches. If this is not possible, a tactical approach to benefit from early gains would be to designate the health sector as a “leading edge” of whole-of-government approaches that might take time to implement in the public bureaucracy.

Gaining efficiencies at the health service delivery level also deserves attention. Vexing questions still remain on how to improve the management of health facilities and human resources, and the integration and extension of services in the spirit of primary health care.

6.5. “Sticker shock” and then an explicit recognition of the dismal state of health systems that the price tag implies

Sticker shock has been defined as the feeling of surprise experienced by consumers upon finding unexpectedly high prices on the price tags (stickers) of products they are considering purchasing. The high price tag associated with scaling up health systems and achieving most or all of the health MDGs by 2015 is, however, not unexpected. The dismal state of health systems in low-income countries still persists despite the additional significant funding that has flowed in recent years from disease-specific global health initiatives like the Global Fund to Fight AIDS, TB and Malaria, the US President’s Emergency Plan for AIDS Relief, the President’s Malaria Initiative and the GAVI Alliance. This suggests that a health system scale-up will not occur as a by-product or as a marginal benefit from investment by the disease-specific global health initiatives. What has been overlooked is the need for a catch-up first before even thinking about a scale-up of health systems in low-income countries.

Table 12 illustrates selected benchmark indicators for the health systems in place to address the existing disease burden, by country income group. It is clear that low-income countries have over half the global burden of disease, yet very low levels of resource availability, despite the rapid scale-up of development assistance for health which has taken place since 2000. This is reflected in the low availability of hospital beds and nurses/midwives.



Table 12. Comparison of selected health system indicators, by country income category (benchmarks)

Countries	% burden of disease (DALYs, 2004)	Total health expenditure per capita (US\$, 2005)	Hospital beds per 10,000 population (latest year available)	Nurses/midwives per 1,000 population (latest year available)
High income	8%	4012	49	8.8
High middle income	8%	412	42	3.9
Low middle income	30%	72	24	2.5
Low income	54%	22	13	1.1
Expected achievements in 49 countries with scale-up as modelled		54	22	2.3

Source: WHO data

If investments in health systems were made as modelled in this exercise, the 49 low-income countries would on average spend \$54 per capita on health and there would by 2015 be 22 hospital beds per 10,000 population and 2.3 nurses/midwives per 1,000 population. Even then, these ratios would barely approach the rates observed in 2006 in the group of lower middle-income

countries. No-one would say that the low-income countries have ideal, or even well functioning health systems today. Table 12 clarifies that our costing exercise is not based on an ideal situation, but that it really describes a very modest scale up that should be achievable if the global commitment to the MDGs is taken seriously.





The Taskforce on Innovative
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for Health Systems

ANNEXES

Annex 1. List of countries and classifications

Country	WHO epidemiological region (1)	World Bank region code (2)	CMH index (3)	HSC index (4)	Fragile state (5)	Governance score (6)	Logistics score (7)
Afghanistan	EMRD	SA	1	1	1	3.0	1
Bangladesh	SEARD	SA	2	1	0	4.0	4
Benin	AFRD	SSA	2	3	0	3.5	4
Burkina Faso	AFRD	SSA	2	2	0	3.5	3
Burundi	AFRE	SSA	1	1	1	3.0	2
Cambodia	WPRB	EAP	3	1	1	3.5	4
Central African Republic	AFRE	SSA	1	2	1	2.0	1
Chad	AFRD	SSA	1	1	1	2.5	2
Comoros	AFRD	SSA	2	3	1	3.0	3
Côte d'Ivoire	AFRE	SSA	1	2	1	2.5	3
Democratic People's Republic of Korea	SEARD	EAP	2	2	0	2.5	1
Democratic Republic of the Congo	AFRE	SSA	1	2	1	3.0	1
Eritrea	AFRE	SSA	1	1	1	3.5	3
Ethiopia	AFRE	SSA	1	1	0	4.0	2
Gambia	AFRD	SSA	4	4	1	3.5	4
Ghana	AFRD	SSA	3	3	0	4.5	4
Guinea	AFRD	SSA	3	2	1	3.0	3
Guinea-Bissau	AFRD	SSA	1	1	1	2.5	2
Haiti	AMRD	LAC	1	1	1	2.5	2
Kenya	AFRE	SSA	2	2	0	3.5	4
Kyrgyzstan	EURB	ECA	3	3	0	3.5	4
Lao People's Democratic Republic	WPRB	EAP	2	1	1	3.0	3
Liberia	AFRD	SSA	1	2	1	2.0	2
Madagascar	AFRD	SSA	2	2	0	3.5	3
Malawi	AFRE	SSA	3	3	0	3.0	3
Mali	AFRD	SSA	1	1	0	3.5	3
Mauritania	AFRD	SSA	1	2	1	3.5	4
Mozambique	AFRE	SSA	2	2	0	3.5	3
Myanmar	SEARD	EAP	2	2	1	2.5	1
Nepal	SEARD	SA	2	1	0	4.0	3
Niger	AFRD	SSA	1	1	1	3.0	2
Nigeria	AFRD	SSA	1	2	1	3.0	4
Pakistan	EMRD	SA	2	1	0	3.5	4

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Country	WHO epidemiological region (1)	World Bank region code (2)	CMH index (3)	HSC index (4)	Fragile state (5)	Governance score (6)	Logistics score (7)
Papua New Guinea	WPRB	EAP	3	3	1	2.5	3
Rwanda	AFRE	SSA	3	2	0	4.5	3
Sao Tome and Principe	AFRD	SSA	2	2	1	3.0	3
Senegal	AFRD	SSA	2	2	0	3.5	4
Sierra Leone	AFRD	SSA	1	2	1	3.5	2
Solomon Islands	WPRB	EAP	2	2	1	3.0	2
Somalia	EMRD	SSA	1	1	1	1.0	1
Tajikistan	EURB	ECA	3	3	1	3.0	2
Togo	AFRD	SSA	2	2	1	3.0	3
Uganda	AFRE	SSA	2	2	0	4.0	4
United Republic of Tanzania	AFRE	SSA	3	2	0	4.0	3
Uzbekistan	EURB	ECA	2	2	1	4.0	4
Viet Nam	WPRB	EAP	4	4	0	4.0	4
Yemen	EMRD	MENA	1	1	1	3.0	4
Zambia	AFRE	SSA	3	3	0	3.5	4
Zimbabwe	AFRE	SSA	3	3	1	1.5	2

- (1) To aid in cause of death analyses, burden of disease analyses, and comparative risk assessment, the 191 Member States of WHO have been divided into five mortality strata on the basis of their levels of child mortality under five years of age (5q0) and 15–59 year-old male mortality (45q15). The classification of Member States into the mortality strata was carried out using population estimates for 1999 (UN Population Division 1998) and estimates of 5q0 and 45q15 based on WHO analyses of mortality rates for 1999. Quintiles of the distribution of 5q0 (both sexes combined) were used to define a *very low child mortality* group (1st quintile), a *low child mortality* group (2nd and 3rd quintiles) and a *high child mortality* group (4th and 5th quintiles). Adult mortality 45q15 was regressed on 5q0 and the regression line used to divide countries with high child mortality into *high adult mortality* (stratum D) and *very high adult mortality* (stratum E). Stratum E includes the countries in sub-Saharan Africa where HIV/AIDS has had a very substantial impact. <http://www.who.int/whr/2002/MembersETC.pdf>
- (2) World Bank region codes as follows (<http://go.worldbank.org/K2CKM78CC0>)
 SSA: Sub-Saharan Africa
 LAC: Latin America and the Caribbean
 MENA: Middle East and North Africa
 ECA: Europe and Central Asia
 SA: South Asia
 EAP: East Asia and Pacific
- (3) The CMH index arranges 84 developing countries into four quartiles, from the most to the least constrained quartile. Classification is based on constraints other than lack of finance, such as those related to the demand for health services, weak health systems and broader economic, social and political factors. The constraint index is a measure of the average level of constraint that operated in a country over the time period 1985–1999. For further information see Ranson M, Hanson K, Oliveira-Cruz V, Mills A. Constraints to expanding access to health interventions: an empirical analysis and country typology. *Journal of International Development* 2003; 15:15–39. (See http://www.who.int/whr/2005/td_one_en.pdf for more detail on how the CMH index was used to classify countries and determine their scale-up patterns.)
- (4) The Health Systems Constraint (HSC) Index is a variation on the CMH index, further adjusted to take into account specific constraints related to maternal health, specifically current coverage of births attended by professional health personnel. (See http://www.who.int/whr/2005/td_two_en.pdf for more details on how this was used to classify countries and determine their scale-up patterns.)
- (5) The list of fragile states used for this exercise (not an official DAC list or definition) comprises the 31 countries in the bottom two quintiles of the 2006 Country Policy and Institutional Assessment (CPIA) list, 4 countries just above the cut-off point that have been moving in and out of the bottom two quintiles since 2003 (Mauritania, Niger, Tajikistan, and Yemen), plus 3 non-rated countries (Liberia, Myanmar and Somalia). <http://www.oecd.org/dataoecd/34/24/40090369.pdf>
- (6) The Country Policy and Institutional Assessment (CPIA) assesses the quality of a country's present policy and institutional framework. "Quality" refers to how conducive that framework is to fostering poverty reduction, sustainable growth and the effective use of development assistance. CPIA domain 9 on building human resources; scale from 1–6 <http://siteresources.worldbank.org/IDA/Resources/CPIA2007Questionnaire.pdf>
- (7) Indicator calculated by the USAID Deliver Project to reflect the level of economic and infrastructure development, geography and the effectiveness of public sector and health sectors. The score is computed using the population density of the country, the Logistics Performance Indicator provided by the World Bank, an index of GNI PPP per capita and a governance index.

Annex 2a. Publications on Global Price Tags for programme areas and diseases

Financial resources required for tuberculosis control to achieve global targets set for 2015. Floyd K, Pantoja A. *Bulletin of the World Health Organization*, 2008, 86:568–576.

Estimated global resources needed to attain international malaria control goals. Kiszewski A, Johns B, Schapira A, Delacollette C, Crowell V, Tan-Torres T, Ameneshewa B, Teklehaimanot A, Nafo-Traore F. *Bulletin of the World Health Organization*, 2007, 85:623–630.

A financial road map to scaling up essential child health interventions in 75 countries. Stenberg K, Johns B, Scherpbier RW, Tan Torres Edejer T. *Bulletin of the World Health Organization*, 2007, 85:305–314.

Estimating the costs of achieving the WHO–UNICEF Global Immunization Vision and Strategy, 2006–2015. Wolfson LJ, Gasse F, Lee-Martin S-P, Lydon P, Magan A, Tibouti A, Johns B, Hutubessy R, Salama P, Okwo-Bele J-M. *Bulletin of the World Health Organization*, 2008, 86:27–39.

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Chronic disease prevention: health effects and financial costs of strategies to reduce salt intake and control tobacco use. Asaria P, Chisholm D, Mathers C, Ezzati M, Beaglehole R. *Lancet*, 2007, 370:1944–1953.

Prevention of cardiovascular disease in high-risk individuals in low-income and middle-income countries: health effects and costs. Lim SS, Gaziano TA, Gakidou E, Reddy KS, Farzadfar F, Lozano R, Rodgers A. *Lancet*, 2007, 370:1954–1962.

Cost of scaling up mental healthcare in low- and middle-income countries. Chisholm D, Lund C, Saxena S. *British Journal of Psychiatry*, 2007, 191:528–35.

What countries need: Investments needed for 2010. UNAIDS (2009).

Annex 2b. Publications on the derivation of values in the CHOICE database

Programme costs in the economic evaluation of health interventions. Johns B, Baltussen R, Hutubessy R. *Cost-effectiveness and Resource Allocation*, 2003, 1:1.

Econometric estimation of country-specific hospital costs. Adam T, Evans DB, Murray CJL. *Cost-effectiveness and Resource Allocation*, 2003, 1:3.

Determinants of variation in the cost of inpatient stays versus outpatient visits in hospitals: a multi-country analysis. Adam T, Evans DB. *Social Science and Medicine*, 2006, 63:1700–1710.

Capacity utilization and the cost of primary care visits: implications for the costs of scaling up health interventions. Adam T, Ebener S, Johns B, Evans DB. *Cost-Effectiveness and Resource Allocation*, 2008, 6:22.



Annex 3. List of health interventions included in the costing

Preventive interventions	Model	Service delivery level	Coverage target in 2015
Communication and behaviour change	Malaria	National	Universal
Condom promotion and distribution	HIV	National	Country-specific
Control of tobacco use	Chronic diseases	National	Universal exposure in selected countries
Counselling for improved complementary feeding	Children under 5 (included in other interventions in maternal health)	Community, primary	95% coverage
Counselling for promotion of exclusive and continued breastfeeding	Children under 5	Community, primary, hospital	95% coverage
Family planning interventions: oral contraceptives (pill), injectables, condoms - male and female, intrauterine devices (IUD), implants, sterilization - female and male	Family planning	Community, primary, hospital	Universal: corresponding to fully eliminating unmet need
Harm reduction among intravenous drug users	HIV	Community, primary	Country-specific
HIV prevention among female sex workers	HIV	Community	Country-specific
HIV prevention among male sex workers	HIV	Community	Country-specific
HIV prevention among men who have sex with men	HIV	Community	Country-specific
HIV prevention: mass media	HIV	National	Country-specific
Immunizations (all routine immunizations including BCG, DPT, OPV, Hib, pneumococcus, 2-dose measles, hepatitis B, yellow fever, rubella, rotavirus and meningitis A, and Japanese encephalitis for populations at risk)	Immunizations	Community, primary	90% coverage for routine vaccines, and introduction of new vaccines
Implementation of the international code of marketing of breast-milk substitutes	Children under 5	National	Universal
Long-lasting insecticide-treated mosquito nets, or other malaria vector control intervention	Malaria, children under 5, maternal health (people living in endemic areas)	Community, primary	97% coverage
Intermittent preventive therapy for malaria	Malaria, maternal health	Primary	95% coverage
Male circumcision	HIV	Primary, hospital	Country-specific
Newborn care, routine (immediate postnatal care, breastfeeding support, resuscitation, small baby care and kangaroo mother care, care for minor problems, presumptive sepsis care, eye prophylaxis, presumptive treatment for syphilis, pre-referral care for seriously ill neonate)	Neonatal health	Primary (hospital if after birth complication)	95% coverage
Post-exposure prophylaxis	HIV	Primary, hospital	Country-specific
Postnatal care	Neonatal health	Primary	95% coverage
Postpartum administration of anti-D immunoglobulin to rhesus-negative women with a rhesus positive foetus	Maternal health	Primary, hospital	95% coverage
Postpartum care in the maternity ward, routine (examination of the mother, information and counselling, recording and reporting, administration of iron and folate supplements, administration of vitamin A supplements)	Maternal health	Primary (hospital if after birth complication)	95% coverage

Continued on next page

Annex 3 (continued)

Preventive interventions	Model	Service delivery level	Coverage target in 2015
Postpartum care, follow-up visit (postpartum examination of the mother, information and counselling on home care, care seeking, counselling on family planning methods)	Maternal health	Primary	95% coverage
Postpartum counselling on family planning (counselling on family planning methods, voluntary tubal ligation (female sterilization), intrauterine device, combined oral contraceptives, combined injectables)	Maternal health	Primary, hospital	95% coverage
Prevention and control of malaria epidemics	Malaria	National	Universal
Prevention of mother-to-child transmission of HIV by antiretroviral prophylaxis and infant feeding counselling	Children under 5, maternal health, HIV	Primary, hospital	Country-specific
Salt reduction in processed foods	Chronic diseases	National	Universal exposure in selected countries
Screening all pregnant women for blood group isoimmunization	Maternal health	Primary, hospital	95% coverage
Social marketing	HIV	Community	Country-specific
STI management	HIV	Primary	Country-specific
Universal salt iodization	Children under 5	National	Universal
Vitamin A supplementation to children under five, routine	Children under 5	Community, primary	95% coverage
Voluntary counselling and testing	HIV	Community, primary, hospital	Country-specific
Treatment interventions	Model	Service delivery level	Coverage target in 2015
Antibiotic treatment for dysentery	Children under 5	Primary	95% coverage
Antiretroviral therapy	HIV	Primary, hospital	Country-specific
Antiretroviral therapy and co-trimoxazole preventive therapy for HIV+ TB patients	TB/HIV	Primary, hospital	Global target (*)
Basic care package for HIV+ people	HIV	Primary, hospital	Country-specific
Case management of diarrhoea	Children under 5	Community, primary, hospital	95% coverage
Case management of malaria (artemisinin-based combination therapies and rapid diagnostic tests)	Malaria, children under 5	Community, primary	80% coverage
Case management of pneumonia	Children under 5	Community, primary, hospital	95% coverage
Case management of severe malnutrition	Children under 5	Community, hospital	95% coverage
Case management of neonatal infections	Children Under 5	Community	95% coverage
Co-trimoxazole preventive therapy for HIV+ TB patients	TB/HIV	Primary, hospital	Global target (*)
Diagnostic testing (HIV)	HIV	Primary, hospital	Country-specific
HIV care and support in TB patients	TB/HIV	Primary, hospital	Global target (*)
HIV surveillance in TB patients tested	TB/HIV	Primary, hospital	Global target (*)
HIV testing and counselling of TB patients	TB/HIV	Primary, hospital	Global target (*)
Home-based care for people living with HIV/AIDS	HIV	Primary, hospital	Country-specific
Isoniazid preventive therapy, following tuberculin skin test	TB/HIV	Primary, hospital	Global target (*)

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Preventive interventions	Model	Service delivery level	Coverage target in 2015
Isoniazid preventive therapy, no tuberculin skin test	TB/HIV	Primary, hospital	Global target (*)
Management of breathing difficulty	Neonatal health	Hospital	95% coverage
Management of congenital syphilis	Neonatal health	Hospital	95% coverage
Management of convulsions	Neonatal health	Hospital	95% coverage
Management of mastitis	Maternal health	Primary	95% coverage
Management of neonatal tetanus	Neonatal health	Hospital	95% coverage
Management of postpartum depression	Maternal health	Primary	95% coverage
Management of severe hypothermia	Neonatal health	Hospital	95% coverage
Management of severe jaundice	Neonatal health	Hospital	95% coverage
Multidrug-resistant tuberculosis patients treated	TB	Primary (hospital)	Global target (*)
Nutritional support	HIV	Primary, hospital	Country-specific
Palliative care for people living with HIV/AIDS	HIV	Primary, hospital	Country-specific
Prophylaxis for opportunistic infections	HIV	Primary, hospital	Country-specific
Regular deworming	Children under 5	Community, primary	95% coverage
Routine offer of counselling and testing	HIV	Primary, hospital	Country-specific
Safe abortions/management of abortion complications	Maternal health	Primary, hospital	95% coverage
Sepsis management	Neonatal health	Hospital	95% coverage
Severe and complicated malaria, case management	Malaria	Hospital	100% coverage
Special general care for seriously ill neonate	Neonatal health	Hospital	95% coverage
Supporting breastfeeding (maternal stay for baby care)	Neonatal health	Hospital	95% coverage
TB smear positive/ negative/ extrapulmonary treatment	TB	Primary (hospital)	Global target (*)
TB screening among people living with HIV/AIDS	TB/HIV	Primary, hospital	Global target (*)
Treatment of bacterial vaginosis or trichomoniasis infection in pregnancy	Maternal health	Primary	95% coverage
Treatment of chlamydia in pregnancy	Maternal health	Primary	95% coverage
Treatment of chronic diseases including asthma, cardiovascular disease, mental illness and neglected tropical diseases and symptomatic treatment	Chronic disease	Primary, hospital	Range 20–50% coverage
Treatment of complications during childbirth (ultrasound, promote foetal maturation before preterm delivery, management of pre-labour rupture of membranes or infection, management of antepartum haemorrhage, management of puerperal sepsis, management of obstructed labour, management of prolonged labour, management of foetal distress, episiotomy, avoid breech presentation at birth (with external cephalic version), vaginal breech delivery, craniotomy or embryotomy, management of postpartum haemorrhage, management of perineal infection, repair of vaginal or perineal tear, repair of cervical tear, symphysiotomy)	Maternal health	Primary, hospital	95% coverage
Treatment of eclampsia	Maternal health	Hospital	95% coverage
Treatment of gonorrhoea in pregnancy	Maternal health	Primary	95% coverage
Treatment of hookworm infection (antenatal care)	Maternal health	Primary	95% coverage

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Annex 3 (continued)

Preventive interventions	Model	Service delivery level	Coverage target in 2015
Treatment of lower urinary tract infection in pregnancy	Maternal health	Primary	95% coverage
Treatment of measles and measles complications	Children under 5	Primary, hospital	95% coverage
Treatment of moderate anaemia in pregnancy	Maternal health	Primary	95% coverage
Treatment of opportunistic infections	HIV	Primary, hospital	Country-specific
Treatment of severe anaemia	Maternal health	Hospital	95% coverage
Treatment of severe hypertension in pregnancy	Maternal health	Primary	95% coverage
Treatment of severe pre-eclampsia	Maternal health	Hospital	95% coverage
Treatment of syphilis in pregnancy	Maternal health	Primary	95% coverage
Treatment of upper urinary tract infection	Maternal health	Hospital	95% coverage
Treatment of upper urinary tract infection in pregnancy	Maternal health	Primary	95% coverage
Treatment of vaginal candida infection in pregnancy	Maternal health	Primary	95% coverage
Very small baby care and kangaroo mother care	Neonatal health	Hospital	95% coverage
Complicated interventions	Model	Service delivery level	Coverage target in 2015
Antenatal care, routine (assessment of maternal and foetal well-being, information and counselling, recording and reporting, screening for hypertensive disorders of pregnancy (pre-eclampsia), screening for anaemia, prevention of anaemia, specialist care for pregnant women with diabetes, syphilis testing, tetanus toxoid immunization)	Maternal health (immunizations for tetanus toxoid)	Primary	95% coverage
Childbirth care, routine (initial assessment and recognition of delivery complications, surveillance and regular monitoring of labour and delivery, social support throughout labour and delivery, prevention and control of infections, assistance during childbirth, active management of the third stage of labour, care and support for the mother)	Maternal health	Primary, hospital	95% coverage

(* Global target as specified in *The Global Plan to Stop TB, 2006–2015*. Stop TB Partnership and WHO. Geneva, World Health Organization, 2006. (WHO/HTM/STB/2006.35)



Annex 4. Estimates of efficacy and effectiveness

This Annex provides an overview of the efficacy estimates applied to child and maternal health interventions in this exercise. Effectiveness assumptions for other interventions and programmes are documented elsewhere.⁴⁹ Additional details are available from WHO upon request.

Table A4A. Efficacy of interventions acting on newborn and child mortality											
(EFF = efficacy; AF= affected fraction)											
Cause of death	Intervention	Age									
		0–1 months		1–6 months		6–12 months		12–23 months		24–59 months	
		EFF	AF	EFF	AF	EFF	AF	EFF	AF	EFF	AF
Diarrhoea											
	Rotavirus vaccine			0		0.95	0.27	same as 6–12 months			
	Vitamin A for prevention – one dose			0		0.16	1 ^a	same as 6–12 months		same as 6–12 months	
	Vitamin A for prevention – two doses			0		0.32	1	same as 6–12 months		same as 6–12 months	
	Zinc for prevention			0		0.21	1	same as 6–12 months		same as 6–12 months	
	Oral rehydration solution			0.75	0.95	0.75	0.95	same as 6–12 months		same as 6–12 months	
	Antibiotics for dysentery			0.98	0.05	0.98	0.05	same as 6–12 months		same as 6–12 months	
	Zinc for treatment			0.2	1	0.2	1	same as 6–12 months		same as 6–12 months	
Pneumonia											
	Zinc for prevention			0.00		0.18	1	same as 6–12 months		same as 6–12 months	
	Hib vaccine			0.20	1	0.20	1	same as 6–12 months		same as 6–12 months	
	Pneumococcal vaccine			0.37	1	0.37	1	same as 6–12 months		same as 6–12 months	
	Case management of pneumonia (oral antibiotics)			0.80	1	0.80	1	same as 6–12 months		same as 6–12 months	
	DPT3 vaccine			0.10	1	0.10		same as 6–12 months			
Measles											
	Measles vaccine			0.00		0.85	1	same as 6–12 months		same as 6–12 months	
	Vitamin A for prevention – one dose					1.13	1	same as 6–12 months		same as 6–12 months	
	Vitamin A for prevention – two doses										
	Vitamin A for treatment			0.46	1	0.46	1	same as 6–12 months		same as 6–12 months	

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Table A4A.(continued)

Cause of death	Intervention	Age									
		0–1 months		1–6 months		6–12 months		12–23 months		24–59 months	
		EFF	AF	EFF	AF	EFF	AF	EFF	AF	EFF	AF
Malaria											
	Insecticide spraying or use of treated bednets			0.70	1	0.70	1	same as 6–12 months		same as 6–12 months	
	Zinc for prevention			0.18	1	0.48	1	same as 6–12 months		same as 6–12 months	
	Antimalarials			0.84	1	0.84	1	same as 6–12 months		same as 6–12 months	
Neonatal diarrhoea											
	Oral rehydration solution	0.75	1								
Neonatal asphyxia											
	Newborn resuscitation (facility based)	0.30	1								
	Newborn resuscitation (home based)	0.30	1								
	Clean delivery including labour monitoring and emergency obstetric care	0.50	1								
	Case management of serious neonatal illness	0.05	1								
	Case management of pregnancy	0.15	1								
Neonatal prematurity											
	Newborn resuscitation	0.075	1								
	Antenatal corticosteroids	0.30	1								
	Kangaroo mother care	0.17	1								
	Routine postnatal care	0.35	1								
	Case management of serious neonatal illness	0.28	1								
	Antibiotics for premature rupture of membrane	0.09	1								
	Clean delivery including labour monitoring and emergency obstetric care	0.075	1								
	Case management of pregnancy	0.03	1								
	Bacteriuria treatment	0.02	1								

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Table A4A.(continued)

Cause of death	Intervention	Age									
		0–1 months		1–6 months		6–12 months		12–23 months		24–59 months	
		EFF	AF	EFF	AF	EFF	AF	EFF	AF	EFF	AF
Neonatal sepsis pneumonia											
	Clean delivery only	0.22	1								
	Antibiotics for premature rupture of membrane	0.075	1								
	Case management of pneumonia (oral antibiotics)	0.42	1								
	Clean delivery including labour monitoring and emergency obstetric care	0.22	1								
	Case management of serious neonatal illness	0.70	1								
	Routine postnatal care	0.31	1								
	Syphilis detection and treatment	0.025	1								
	Case management of pregnancy	0.03	1								
Neonatal tetanus											
	Tetanus toxoid	0.88	1								
	Clean delivery only	0.23	1								
	Clean delivery including labour monitoring and emergency obstetric care	0.60	1								
Neonatal congenital anomalies											
	Periconceptual folic acid	0.075	1								
Neonatal other											
	Case management of serious neonatal illness	0.03	1								

^a Affected fraction for vitamin A and zinc is 1.00 in countries where the population is vitamin A or zinc deficient. In other countries the affected fraction is 0.00.

Table A4B. Relative risk of child mortality among children who are stunted

Age of child	1–6 months		6–12 months		12–23 months		24–59 months	
	RR	AF	RR	AF	RR	AF	RR	AF
Diarrhoea mortality								
Child is:								
Greater than 1 std dev less than median norm	1.00	1.0	1.00	1.0	1.00	1.0	1.00	1.0
B/W 1 and 2 std dev less than median norm	1.20		1.20		1.20		1.20	
B/W 2 and 3 std dev less than median norm	1.60		1.60		1.60		1.60	
More than 3 std dev less than median norm	4.60		4.60		4.60		4.60	
Pneumonia mortality								
Child is:								
Greater than 1 std dev less than median norm	1.00	1.0	1.00	1.0	1.00	1.0	1.00	1.0
B/W 1 and 2 std dev less than median norm	1.00		1.00		1.00		1.00	
B/W 2 and 3 std dev less than median norm	1.30		1.30		1.30		1.30	
More than 3 std dev less than median norm	3.20		3.20		3.20		3.20	
Measles mortality								
Child is:								
Greater than 1 std dev less than median norm	1.00	1.0	1.00	1.0	1.00	1.0	1.00	1.0
B/W 1 and 2 std dev less than median norm	1.00		1.00		1.00		1.00	
B/W 2 and 3 std dev less than median norm	1.70		1.70		1.70		1.70	
More than 3 std dev less than median norm	2.80		2.80		2.80		2.80	
Malaria mortality								
Child is:								
Greater than 1 std dev less than median norm	1.00	1.0	1.00	1.0	1.00	1.0	1.00	1.0
B/W 1 and 2 std dev less than median norm	1.00		1.00		1.00		1.00	
B/W 2 and 3 std dev less than median norm	1.00		1.00		1.00		1.00	
More than 3 std dev less than median norm	2.10		2.10		2.10		2.10	

RR: relative risk of mortality; AF: affected fraction; std dev: standard deviation; B/W: birth weight



Table A4C. Impact of nutrition on stunting (odds ratio for stunting among children 1 to 59 months)

Age of child	1–6 months		6–12 months		12–23 months		24–59 months	
	Odds ratio for stunting	AF	Odds ratio for stunting	AF	Odds ratio for stunting	AF	Odds ratio for stunting	AF
Impact of previous stunting on stunting								
Not stunted at previous age cohort	1	1	1	1	1	1	1	1
Stunted at previous age cohort	12.4	1	21.4	1	30.3	1	46.2	1
Impact of complementary feeding on stunting								
Food secure with promotion	1	1	1	1	1	1	1	1
Food secure without promotion	1	1	1.43	1	1.43	1	1	1
Food insecure with promotion and supplementation	1	1	1.6	1	1.6	1	1	1
Food insecure with neither promotion nor supplementation	1	1	2.39	1	2.39	1	1	1
Impact of zinc supplementation on stunting								
Zinc supplemented	1	1	1	1	1	1	1	1
Not zinc supplemented	1	1	1.18	1	1.18	1	1.18	1

AF: affected fraction

Table A4D. Relative risk of child mortality based on breastfeeding status

Age of child	< 1 month		1–6 months		6–12 months		12–23 months	
	RR	AF	RR	AF	RR	AF	RR	AF
Diarrhoea								
Exclusive breastfeeding	1.00	1.0	1.00	1.0	1.00	1.0	1.00	1.0
Predominant breastfeeding	2.28		2.28		1.00		1.00	
Partial breastfeeding	4.62		4.62		1.00		1.00	
Not breastfeeding	10.53		10.53		2.83		2.83	
Pneumonia								
Exclusive breastfeeding	1.00	1.0	1.00	1.0	1.00	1.0	1.00	1.0
Predominant breastfeeding	1.75		1.75		1.00		1.00	
Partial breastfeeding	2.49		2.49		1.00		1.00	
Not breastfeeding	15.13		15.13		1.52		1.52	

RR: relative risk of mortality; AF: affected fraction

Table A4E. Impact of breastfeeding promotion on age appropriate breastfeeding (odds ratio of age appropriate breastfeeding)

Age of child	< 1 month		1–6 months		6–12 months	
	Odds ratio	AF	Odds ratio	AF	Odds ratio	AF
Optimal breastfeeding						
Impact of promotion on age appropriate breastfeeding	4	1	3.5	1	1.6	1.0

Reference for Tables A4A–A4E: Futures Institute, Lives Saved Tool (LiST) version available 1 March 2009. Please note that the LiST model has since undergone review and that efficacy estimates may have been updated.

Table A4F. Cause of maternal death applied in the main scenario presented here

Cause of maternal death*	Africa	Asia	Latin America
Haemorrhage	37.33%	34.88%	27.19%
of which antepartum	11.20%	10.46%	8.16%
of which postpartum	26.13%	24.42%	19.03%
Hypertension	10.02%	10.31%	33.59%
Sepsis/infection	10.68%	13.14%	10.07%
Abortion**	—	—	—
Obstructed labour	4.52%	10.65%	17.52%
Anaemia	4.07%	14.50%	0.13%
HIV/AIDS	7.00%	0.00%	0.00%
Ectopic pregnancy	0.55%	0.11%	0.65%
Embolism	2.20%	0.45%	0.78%
Other direct causes	5.40%	1.81%	4.97%
Other indirect causes	18.39%	14.16%	5.10%
Total	100.00%	100.00%	100.00%
Total for which cause of death is addressed by the skilled birth attendance package	66.63%	83.47%	88.50%

* Cause of death addressed in the analysis is indicated in bold font.

** Not addressed here since the incidence of abortion and associated mortality is separately calculated by country, based on inputs provided by UNFPA.

Source: WHO analysis of causes of maternal death: a systematic review. Khan KS, Wojdyla D, Say L, et al. *Lancet*, 2006, 367:1066–1074.



Note: Given that the scenario presented here adjusts the number of births to take into account family planning, which is assumed to result in a lower incidence of unsafe abortion, abortion from the cause of death analysis was removed and the cause of death redistributed accordingly in order to achieve an adjusted relative percentage of cause-specific mortality. The percentage of maternal deaths due to unknown causes was redistributed using the relative weight of defined causes (including other direct and indirect causes). The total percentage of causes on which the aggregate efficacy of the skilled birth attendance (SBA) package is

applied consequently ranges from 67–89% by country as shown in Table A4F. Approximately 11–33% of deaths are thus not addressed by the efficacy estimates for the SBA package. The proportion of haemorrhage which is antepartum vs. postpartum was assumed to be 30% and 70% respectively based on studies from the African region. It should be further noted that abortion deaths were addressed in a residual calculation for selected countries where abortion is legal on demand, applying the efficacy of safe abortion on the estimated number of unsafe abortions occurring in absence of access to safe abortion.

Table A4G. Efficacy/effectiveness of interventions included in the skilled birth attendance package

	APH*	PPH*	Unsafe abortion	Obstructed labour	Hypertensive disorders	Infections	Anaemia
To all women							
Iron folate supplementation							0.1
Screening for and management of urinary tract infections						0	
Screening for asymptomatic bacteria and treatment						0.1	
Screening for eclampsia					0.48		
Normal delivery (including active management of 3rd stage of labour to prevent PPH*)		0.62				0.4	
ITN/IPT **							0.2
Only to women in need							
Complicated abortion			0.975				
Management of severe PPH *		0.75					
Basic emergency obstetric care – aggregate estimate							0.4
Basic emergency obstetric care – eclampsia treatment					0.59		
Comprehensive emergency obstetric care (including caesarean section, blood, etc)	0.325	0.75		0.95		0.9	
Total risk reduction by cause	0.33	0.98	0.98	0.95	0.79	0.95	0.57

* APH = Antepartum haemorrhage; PPH = Postpartum haemorrhage

** ITN = insecticide treated nets; IPT = intermittent preventive treatment for malaria

Reference and notes for Table 4G: The assumed efficacy of the SBA+ package was calculated using numbers from Adam et al⁵⁰ as a basis for intervention efficacy acting on specific cause of death. We also added the efficacy for interventions covered in Bhutta et al,⁵¹ but which are not included in the Adam publication. Combining all the intervention-specific efficacies multiplied by the relative cause of death gives an estimated total average regional frontier effectiveness of the SBA+ package ranging from

53.8%–73.9%, depending on the assumed distribution of deaths by country. In recognition of the wide variation in MMR across countries with similar SBA coverage rates we interpret this as a difference in the quality of SBA interventions provided in different countries. A function was calculated to estimate SBA quality and the current level of SBA care effectiveness in a country. The model allows for effectiveness to improve over time to reach 90% in 2015.



Annex 5: Types of facility infrastructure included in the costing

The model for infrastructure, equipment and vehicles is based on a three-way categorization of health facilities, each with its own equipment profile. Profiles were developed with staff working in the Department of Essential Health Technologies and the Unit on Technology and Facilities Planning at the World Health Organization in Geneva based on an informal review of the literature and expert knowledge. Additional system-wide inputs, such as the required human resources and vehicles for maintenance, are also included and costed separately from the facilities. The three facilities are:

1. *Health centre*: A district-level health facility with an average size of 230 built square metres. The land required for the facility is assumed to be 2.5 times the built size, and the purchase price of the land is assumed to be about one fifth (17%) of the total construction costs. In addition, the facility is assumed to have storage facilities that are one fourth the size of the rest of the building; the construction costs of storage are assumed to have a unit price of 50% of other construction costs. This level facility is meant to represent an average profile of small first-level facilities such as health posts as well as larger health centres, some of which may have limited number of in-patient beds. These facilities, as well as all higher-level facilities, are assumed to be supplied with a standard contingent of medical equipment (e.g. for physical plant) and furnishings. The population served is assumed to be 10,000.
2. *District hospital*: A district-level hospital with an average size of 20 times that of the health centre (for

a mean size of 4025 built square metres, or about 40 square metres per bed). The same assumptions for land, storage space, equipment and furnishings apply as for the health centre, but are scaled in proportion to the physical size of the facility in square metres. The capacity of the district hospital facility is assumed to be 100 in-patient beds on average. Additional durable medical equipment that are relevant to the increased level of services offered at this facility are costed (e.g. radiography). The main services offered are assumed to be internal medicine, obstetrics-gynaecology, paediatrics, and general surgery; limited laboratory services are available. The population served is assumed to be 100,000.

3. *Provincial hospital*: A provincial/regional-level hospital with an average size of 8.8 times that of the district hospital (mean size: 35,420 built square metres, or about 70 square metres per bed). The same assumptions for land, storage space, equipment and furnishings apply as for the district hospital, but are scaled in proportion to the physical size of the facility. The provincial hospital is assumed to support about eight clinical specialties offering specialized diagnostic, procedural and treatment services; the average capacity is assumed to be 500 in-patient beds. Additional durable medical equipment are included that are relevant to the increased level of services offered at this facility. A range of specialized laboratory and diagnostic services are assumed to be available. The population served is assumed to be 1,000,000.

These assumptions result in an additional 1.5 hospital beds per 1,000 persons in the 49 countries analysed.

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Endnotes

- ¹ In case of questions, please contact Dr Tessa Tan-Torres Edejer, WHO/HSF/CEP at tantorrest@who.int
- ² <http://www.internationalhealthpartnership.net/taskforce.html>
- ³ For Terms of Reference of Working Group 1 see http://www.internationalhealthpartnership.net/CMS_files/documents/wg1_-_terms_of_reference_EN.pdf
- ⁴ <http://go.worldbank.org/D7SN0B8YU0>
- ⁵ Abuja, African Union, 2001.
- ⁶ Sara Bennett, formerly manager of the Alliance for Health Policy and Systems Research provided advice on the costing work on governance.
- ⁷ WHO database on health expenditures: <http://www.who.int/nha/en/>
- ⁸ OECD/DAC definition of fragile states: "States are fragile when state structures lack political will and/or capacity to provide the basic functions needed for poverty reduction, development and to safeguard the security and human rights of their populations". (OECD/DAC, 2007a)
- ⁹ Report available at: http://www.internationalhealthpartnership.net/CMS_files/documents/working_group_1_-_report_EN.pdf
- ¹⁰ For example, the joint impact on disease burden of scaling up insecticide-treated nets and artemisinin-based combination therapy for malaria is unlikely to be additive, and the model should take into account the reduced need for treatment as prevention is scaled up.
- ¹¹ A general overview of the approach can be found at: http://www.unaids.org/en/KnowledgeCentre/Resources/FeatureStories/archive/2007/20070925_Resource_needs_methodology.asp
- ¹² There is some residual double counting between HIV/AIDS and maternal health for sexually transmitted infections (STI) since maternal health programmes include screening for STI among pregnant women; and between HIV/AIDS and family planning in the costs of condom provision.
- ¹³ MDG 8, Target 8e: In cooperation with pharmaceutical companies, provide access to affordable essential medicines in developing countries. (http://www.un.org/esa/policy/mdggap/mdggap_matrix_drugs.html)
- ¹⁴ It is important to note that there will be differences in the estimates in this report from those that have already been published by WHO and UNAIDS for the costs to achieve the MDGs. This is because the estimates in this exercise are limited to the 49 low-income countries whereas the global price tags included countries covering the large part of the global burden. Also, interventions like artemisinin-based combination therapy for children with malaria or preventing mother-to-child transmission of HIV which were included in the price tags for child health and malaria/HIV are here counted only once and are reported under the specific disease (HIV and malaria and not child health). In addition, the health systems costs (e.g. production and salaries of midwives for maternal health, community health workers for child health, health facilities, universal precautions and safety of blood supply in HIV) that were included in the disease-specific price tags have been extracted and reintegrated in the health system costing for the purposes of this exercise. In addition, the service costs (e.g. cost of outpatient visits and in-patient days) were also extracted as these are being costed as infrastructure, human resources and consumables separately in this exercise.
- ¹⁵ Although only new buildings, equipment and vehicles were costed, some proportion of this can be reallocated to refurbishing buildings or repairing equipment or vehicles.
- ¹⁶ WHO (2007). *Everybody's business: strengthening health systems to improve health outcomes – WHO's framework for action*.
- ¹⁷ Pre-service education costs are included only at the tertiary level for doctors, nurses and other medical staff and laboratory technicians, orderlies etc., as needed. In addition, costs are included for training community health workers prior to their engagement in the field.
- ¹⁸ http://www.who.int/hrh/documents/whr06_background_papers/en/index.html
- ¹⁹ Note that clinical officers or medical assistants with three years of training can substitute for some of the work done by physicians. If the regulatory environment permits, they can be placed in the front lines sooner; however, the total costs of this limited task-shifting do not vary much from the physician approach as they are employed earlier and therefore need to be paid salaries earlier. In this analysis, 40% of the required number of doctors were trained as clinical officers. This is true for the other professions as well but was not done in this exercise.
- ²⁰ These are not to be interpreted as WHO norms or recommendations but are the result of interviews with experts and data search in publications including what countries report as norms in their human resources scale-up plans. The generic norm approach was used merely to facilitate the costing.
- ²¹ This means that the costs of drugs and consumables reflect the manufacturers' cost only and distribution within the country is costed under the logistics and supply chain category.
- ²² It is important to note that countries scaling up coverage using tax-based financing would incur at least some of these costs, but through the tax system. This is not costed here.
- ²³ Kaufmann D, Kraay A and Mastruzzi M. *Governance matters VII: Aggregate and individual governance indicators, 1996–2007* (June 24, 2008). World Bank Policy Research Working Paper No. 4654.

²⁴ This is another reason why the HIV estimates in this exercise would differ from the estimates published by UNAIDS.

²⁵ The capital costs for education are not taken into account. It was not possible to find sufficient good data to make a calculation for these costs. Some gross data are available from the IFC 2007 publication *The Business of Health in Africa: Partnering with the Private Sector to Improve People's Lives*. Start-up costs range from US\$ 0.3 to 2 million for a school of nursing, laboratory technicians, etc and US\$ 2–10 million for a multidisciplinary health university. Distance learning for nurses has start-up costs of US\$ 0.2 to 0.5 million.

²⁶ All costs are incremental. For the disease-specific interventions, WHO databases on coverage were used to determine the current situation. For health facilities and equipment and human resources, WHO databases of country estimates (latest year data available) were used to establish the existing resources. For logistics, health information systems and governance, countries were classified according to a classification system as described in annex 2.

²⁷ <http://esa.un.org/unpp/>

²⁸ Details available at <http://www.oecd.org/dataoecd/47/56/42458719.pdf>

²⁹ Based on a comparison of the number of pregnancies that would occur in a scenario with constant contraceptive prevalence rate (CPR) and a scenario with current unmet need/increasing CPR.

³⁰ Number of births provided by UNFPA, modelled to take into account the increase in family planning coverage.

³¹ UNAIDS (2009). *What countries need: Investments needed for 2010* ([targetshhttp://data.unaids.org/pub/Report/2009/JC1681_what_countries_need_en.pdf](http://data.unaids.org/pub/Report/2009/JC1681_what_countries_need_en.pdf)). The estimates were adjusted to allow for projection of resource needs up until 2015.

³² *The Global Plan to Stop TB, 2006–2015*. Stop TB Partnership and WHO. Geneva, World Health Organization, 2006. (WHO/HTM/STB/2006.35)

³³ The breakdown of costs by upfront or continuing investments is not presented because the majority of costs are incurred from continuing investments. The upfront costs for the establishment of risk/fund pooling mechanisms is less than US\$1 billion.

³⁴ This table presents an indicative allocation by level. Some of the health system costs may be further allocated to specific levels of care.

³⁵ For this exercise we have not modelled the health impact of scaling up essential medicines for diabetes, cancers, mental disorders or parasitic diseases.

³⁶ Note that the estimates presented here for the number of child deaths averted did not take into account reduction in births as a result of family planning as it was not feasible for this exercise to insert the UNFPA estimated births into the Lives Saved (LiST) model. While the outcome would be the same

for the number of countries reducing their under-five mortality ratio to reach the MDG 4 target, the total number of under-five deaths averted would be significantly lower in a scenario where unmet need for family planning is reduced to zero in 2015.

³⁷ Note that the numbers presented here for malaria and immunizations refer to the scale-up of these interventions in the absence of the scale-up of other child health interventions.

³⁸ In our analysis 27 of the 49 countries do not reach the MDG 5a target for a reduction in maternal mortality by year 2015. This is partially due to limitations in the data available on the causes of mortality and the efficacy of interventions. The causes of maternal mortality by region include large proportions (20–30%) of “unspecified” causes for which no evidence-based interventions are considered in our model. Moreover, for some of the causes we could find limited evidence on efficacious interventions to address these specific causes. Thus, a general restriction of our model is that the literature indicates limited efficacy levels for the set of services included in skilled birth attendance, even though historic data indicates high efficacy. Another reason why many countries do not achieve their MDG5a target in our calculations is due to technical aspects of the model, whereby for countries that currently have high skilled birth attendance coverage we are only able to apply the full efficacy of the maternal health package on the marginal coverage increase. In addition, the modelling outcomes by country are dependent on progress made to reduce maternal mortality from 1990–2005. In some countries little or no progress has been made. In some of these cases even when service provision is dramatically scaled up from 2009 onwards in our model, the lack of progress made from 1990–2005 prevents the country reaching the MDG5a target.

³⁹ World Malaria Report 2008.

⁴⁰ Resolution WHA58.2. Malaria control. Geneva, World Health Organization, 2005 (58th World Health Assembly, 23 May 2005 http://www.who.int/gb/ebwha/pdf_files/WHA58/WHA58_2-en.pdf).

⁴¹ Our maternal mortality model is likely to underestimate impact of scale-up for a number of reasons, including: a review of the literature on the efficacy of skilled birth attendance interventions provided a range of 53.8%–73.9% by region (annex 4, reference and notes for Table A4G), even though historic data indicates high efficacy of 95% or more. Moreover the available data on the current mortality indicates that a high percentage of deaths are attributable to unknown causes, thus in our model we have not applied an efficacy on these deaths, which reduces the estimates impact in a conservative fashion.

⁴² OECD 2008. *Service delivery in fragile situations: Key concepts, findings and lessons* <http://www.oecd.org/dataoecd/17/54/40886707.pdf>

⁴³ van der Gaag J. *Health care for the world's poorest: Is voluntary (private) health insurance an option?* http://www.ifpri.org/2020Chinaconference/pdf/beijingbrief_vanderGaag.pdf



⁴⁴ van der Gaag J, Štimac V. *Toward a new paradigm for health sector development*. Results for Development Institute, 2008.

⁴⁵ Hartwig J. What drives health care expenditure?—Baumol's model of "unbalanced growth" revisited. *Journal of Health Economics*, 2008; 603–623.

⁴⁶ http://www.who.int/whr/2008/08_chap5_fig05_en.pdf. Preliminary figures for 2007 suggest the proportion of disbursements devoted to technical support fell dramatically in 2007. It remains to be seen, however, if this really represents an increase in funding available to countries to strengthen their health systems, or it represents a change in classification practices among donors.

⁴⁷ The International Development Association (IDA) of the World Bank provides interest-free credits and grants for

programmes in low-income countries (<http://go.worldbank.org/QAFU9RGOY1>).

⁴⁸ The Country Policy and Institutional Assessment (CPIA) measures the extent to which a country's policy and institutional framework supports sustainable growth and poverty reduction. <http://go.worldbank.org/F5531ZQHT0>

⁴⁹ *The Global Plan to Stop TB, 2006–2015*. Stop TB Partnership and WHO. Geneva, World Health Organization, 2006 (WHO/HTM/STB/2006.35).

⁵⁰ Adam et al. *British Medical Journal* 331:1107.

⁵¹ Bhutta Z et al. Interventions to address maternal, newborn, and child survival: what difference can integrated primary health care strategies make? *Lancet*, 2008, 372:972–989.







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