



**Estimating the Cost of Scaling-up Maternal
and Newborn Health Interventions to
Reach Universal Coverage:
methodology and assumptions**
Technical Working Paper

Department of Making Pregnancy Safer (FCH/MPS) and
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Acronyms and Abbreviations.

CAH	(Department of) Child and Adolescent Health and Development
CMH	Commission of Macroeconomics and Health
DHS	Demographic and Health Survey
EHTP	Essential Health Technology Package
EIP	Evidence and Information for Policy
FP	Family Planning
GAVI	Global Alliance for Vaccines and Immunization
GBD	Global Burden of Disease
HRH	Human Resources for Health
HSC	Health System Constraints
IMPAC	Integrated Management of Pregnancy and Childbirth
IUD	Intrauterine device
MCH	Mother and Child Health
MDG	Millennium Development Goals
M&E	Monitoring and evaluation
MNH	Maternal and Newborn Health
MMR	Maternal Mortality Ratio
MPS	(Department of) Making Pregnancy Safer
OB/GYN	Obstetrics/Gynaecology
PMTCT	Prevention of mother-to-child transmission
PPC	Post-partum care
PPP	Purchasing Power Parity
RBM	Roll Back Malaria Global Partnership
SBA	Skilled Birth Attendant
STI	Sexually Transmitted Infection
UN Pop	UN Population Division
UNFPA	United Nations Population Fund
UNICEF	United Nations Childrens Fund
VCT	Voluntary counselling and testing
WHO	World Health Organization
WHR	World Health Report

Executive Summary.

This document provides information on the methods, key parameters and underlying assumptions used to estimate the costs of expanding the coverage of skilled maternal and newborn health (MNH) care at facilities towards universal access, which is defined here as 95% coverage. The costs include activities assessed to be crucial in strengthening maternal and newborn health care services to improve health and reduce morbidity and mortality in 75 key countries. The selected countries account for the majority of the maternal and newborn ill-health and mortality burden in low and middle-income countries.

Costs were calculated annually, from 2006 to 2015, and per country based on a bottom-up ingredients approach in order to estimate the additional resources needed to provide 67 key MNH interventions and services.

The total incremental costs for the entire period were estimated at US\$ 39 billion, in addition to current expenditure, increasing from US\$ 1 billion in 2006, as coverage expands, to US\$ 6.1 billion in 2015. This would mean an additional US\$ 0.22 per inhabitant per year initially, expanding to US\$ 1.18 in 2015.

If this scale-up scenario is implemented, significant steps will have been taken in every country in reducing maternal mortality and at a global level the Millennium Development Goal 5 for improving maternal health could potentially be achieved.

1. Introduction.

Although effective maternal and newborn health interventions are known, the challenge is to effectively scale them up to universal coverage, defined here as 95% coverage, in low- and middle-income countries.¹ At present, some 43% of births in developing countries² take place in health facilities with skilled attendants. However, the level of skill is highly variable, and only a fraction of these mothers and their babies have access to the full range of maternal and newborn health interventions. In 2015, following a proposed scale-up plan, on average 73% of mothers and newborn babies would be getting skilled maternal and newborn health (MNH) care.

This document provides information on the methods, key parameters, underlying assumptions and results of estimating the costs, up to 2015, of expanding the coverage of skilled maternal and newborn health (MNH) care at facilities towards universal coverage.

The objective of the costing activity is to estimate the additional financial requirements necessary to scale-up selected interventions towards universal coverage, on top of current finances available for maternal and newborn health. The cost estimates are built up annually, from 2006 to 2015, and country by country for 75 countries, with the intent to provide an aggregated 'Global Price Tag' of the additional financial resources needed to scale-up MNH services to reach universal coverage. The view point of the analysis is that this price tag will provide a concrete starting point to assist in advocating for more or sufficient resources to the health sector, and MNH in particular.

The data collection needs for this costing activity is limited to services provided during pregnancy, labour, childbirth, the post-partum and postnatal period, which includes the first 7 days after birth. A total of 67 evidence-based clinical interventions are included in the cost estimate. Most of them are based on the WHO IMPAC clinical guidelines which identifies interventions considered

¹ Based on World Bank classifications, [World Bank Group - Data and Statistics](#).

² This applies only to the 75 countries used in the costing exercise.

essential for improving maternal and newborn health and feasible to scale-up in low-income settings with limited resources.

To assure universal coverage to a continuum of care it is assumed necessary to extend and strengthen not only programmes, but health systems themselves. Thus, in addition to clinical interventions, a total of 8 programmatic and health system level interventions, identified as necessary to provide these services, are also included in the scaling-up and costing activity.

Costs are based on a bottom-up ingredients approach, using country specific prices and quantities of goods or services needed based on best-practice care models and expert opinion.

2. Methodology.

The costing exercise is based on the technical strategies for improving MNH that are delineated and recommended in the World Health Report 2005. It is assumed that these strategies can only be put into place effectively if they are implemented within a continuum of care, spanning pregnancy, over childbirth into the postnatal period - from the household to the first level of care with recourse to back-up care if necessary.

The costing activity builds on a primary health care approach that integrates maternal and newborn services into existing public health care programmes and strives for universal access, defined here as 95% coverage.

2.1. Guiding parameters.

The objective of the costing was to estimate the additional financial resources required, on top of current financial resources already available for MNH. For that purpose, projected national finances for MNH for the years ahead were assumed to sustain current coverage levels.

Time period and target coverage.

The target coverage rates are set as high as deemed realistically possible by experts, with the aim of reaching universal coverage according to a proposed scale-up plan (see Chapter 2.4).

List of countries.

The cost estimates are built up separately, based on country-specific data for 75 selected countries from different regions of the world where the bulk of maternal, fetoneonatal and child mortality (and morbidity) burden is concentrated. Together, these countries account for more than 75% of the world's population, almost 90% of all births worldwide, and approximately 95% of all maternal and neonatal deaths and under-five deaths (or 94.2% of all U5 deaths, 93.1% of fetoneonatal deaths and 97.5% of maternal deaths). The list of the 75 countries is provided in Annex 1. The criteria used to choose these countries, which were selected in conjunction with a child health costing exercise, are provided in Box 1.

BOX 1. Criteria for selecting countries included in the costing.

1. Countries ranked according to the highest numbers of under-five deaths, or until 90% of the total global deaths reached.
2. Countries whose under-five mortality rates (U5MR) are greater than or equal to 100.
3. Countries with the highest numbers of maternal deaths, or until 95% of total global deaths reached.
4. Countries whose maternal mortality ratios (MMR) are greater than or equal to 200.
5. Countries with the highest numbers of fetoneonatal mortality based on the top numbers of deaths in each country until 93% of total global deaths reached.
6. Countries whose fetoneonatal mortality rates (FNMR) are 30 and above/1000 births.
7. In addition, to balance regional representation of WHO regions, countries with the highest mortality (top three), based on mortality rates (both MMR and U5MR), for the WHO European (EURO), Americas (AMRO) and Eastern Mediterranean (EMRO) region were added to the list.

What costs were considered.

The data collection needs for this costing activity is limited to services provided during pregnancy, childbirth and the period following birth, including the first seven days after birth.,¹

Key health and systems interventions that are considered necessary to effectively scale-up MNH services to improve maternal and newborn health outcomes from 2006 to 2015 were selected for this costing activity. The selection of the MNH clinical interventions as well as the technologies required to provide these services are drawn from the following WHO evidence-based clinical guidelines:

- ≡ *Pregnancy, Childbirth, Postpartum and Newborn Care: A guide for essential practice.* Geneva, World Health Organization, 2003. (<http://www.who.int/reproductive-health/publications/pcpnc/index.html>)
- ≡ *Managing Complications in Pregnancy and Childbirth: A guide for midwives and doctors.* Geneva, World Health Organization, 2000. (<http://www.who.int/reproductive-health/impac/index.html>)
- ≡ *Managing Newborn Problems: A guide for doctors, nurses, and midwives.* Geneva, World Health Organization, 2003 (<http://www.who.int/reproductive-health/publications/mnp/index.html>)
- ≡ *Standards for Maternal and Neonatal Care.* Geneva, World Health Organization, forthcoming.

The rationale for the inclusion of these 67 clinical interventions for MNH is described in Chapter 2.2 as well as in Annex 2.

The calculations for the additional direct services costs for each of the interventions are detailed according to a set of required technologies (e.g. human resources, equipment, supplies, medicines, etc.). The related expenditure categories for the entire package are delineated in Chapter 2.3.

For maternal newborn health it is important to build health systems rather than establishing and costing a stand-alone vertical MNH care programme. Integration of services with other public health care programmes, as well as the substantial investments that are needed to build and strengthen each country's infrastructure and human capacity - of the existing health systems - to ensure quality of care, accessibility to and demand for maternal and newborn health care services has been factored in and is included in the cost estimates.

¹ Costs of interventions delivered to the baby after the first week of life were assigned to the Department of Child and Adolescent Health.

Numerous programmatic measures are critical for the planning and management of MNH care. To address these, the following programme intervention and activities have been costed:

- a) programme planning and management;
- b) supervision of service and staff;
- c) health education;
- d) advocacy, and
- e) monitoring and evaluation.

In an effort to address the strengthening of the health systems, considered to be the key to scaling-up coverage, the following elements were costed:

- e) infrastructure upgrading and maintenance;
- f) acquisition of means of transport and communication, and
- g) human resource development (training of new health professionals, as well as upgrading of skills).

These are detailed further in Chapter 2.3. and Annex 3.

The costing methodology involved scale-up scenarios that are based on current service coverage, as well as on an assessment of the health systems capacity of countries, which have been grouped into four main categories according to the strength of the system in each country as it relates to MNH (see Chapter 2.4).

What is not costed – limitations of the costing methodology.

The estimates of the additional resources required to scale-up existing programmes in low-income countries are only indicative, as many factors may influence the expansion of coverage and the actual costs of services. Lack of data on current coverage and accurate measures of the incidence/prevalence of conditions made it necessary to develop and use assumptions based estimates. The cost estimates are also based on projections on the available infrastructure and health care personnel available to provide MNH services. Furthermore, due to lack of available evidence, it was necessary to limit, e.g., human resource costs, to

current levels of remuneration, which are unlikely to be sufficient to recruit, retain and deploy health workers to the areas where they are most needed. It is therefore assumed that the projections are a low-end estimate as it does not account for increased spending on salaries and other benefits that in many countries are necessary to redeploy and motivate staff and to discourage migration.

The costing exercise was limited to a ten year period, as the uncertainty margin for costing beyond this period is too large.

Although included in the recommended list of MNH interventions, certain interventions were not allocated to MNH services, prevention (VCT) and treatment of HIV and AIDS (e.g. PMTCT) being the most significant. Instead costs of interventions delivered to both the mother and the newborn baby were assigned to child health services.¹

Furthermore, this costing exercise does not include additional factors that might contribute to improved maternal and newborn health and reduce mortality, such as; improved nutrition, access to secondary education, gender equality, water and sanitation, slum upgrading, increased rural income and food intake, access to energy services, and improved transportation infrastructure. It also does not account for costs born by the community or households, as the incremental costs provided relate only to the service provider, whether through public sector delivery or through private or civil society service delivery mechanisms.

2.2. Key clinical interventions.

The services allocated for in the costing include MNH interventions to be provided during pregnancy, labour, childbirth, the post-partum and postnatal period, which includes the first seven days after birth.² The 67 clinical

¹ The interventions allocated to HIV/AIDS are all part of prevention of mother to child transmission of HIV and AIDS (PMTCT), which covers testing and counselling. Since majority of the costs are for replacement feeding which the child continues to receive after the first seven days, the costs were attributed to the child health services.

² Costs of interventions and services that are necessary for all newborn infants in the first week of life are costed. Costs of interventions delivered to the baby after the first week of life were assigned to the child health services. See further *Methodology and assumptions used to estimate*

interventions were selected based on their ability to improve health outcomes of pregnant women, mothers and newborns, and are not limited to interventions that save lives. The interventions are evidence-based and most of them are recommended in WHO guidelines for Integrated Management of Pregnancy and Childbirth (IMPAC). These interventions are largely proven to be cost-effective and feasible to implement in resource poor settings.

Services are delivered at the first level MNH care and the referral hospital that provides back-up care and services. The first level of care includes routine care such as preventive and diagnostic assessment of and treatment for all women during pregnancy and childbirth and newborns in the postnatal period provided by a skilled birth attendant. Secondary (1st referral) level of care includes back-up services for management of maternal and newborn complications, ideally provided in a hospital by a team of doctors, and midwives with laboratory, surgical and blood transfusion facilities. See Annex 2 for a full list of interventions and the underlying assumptions for each service.

2.3. Cost components.

Objective of the costing activity is to estimate the additional financial requirements needed on top of current finances available for MNH. For that purpose, projected national finances for MNH for the years ahead were assumed to sustain current coverage levels. Costs were divided into 'direct service costs', 'programme costs' and 'investments in health system'. Costs are presented in (2004) US dollars, including 3% inflation, and estimated by cost category, country and year from 2006 to 2015.

The following inputs were identified as being needed to provide the recommended MNH services and interventions and were the basis of the cost estimates:

2.3.1. Direct service inputs.

The population in need of direct services were calculated using the UN Population Division (UN Pop) 2002 medium projections. The UN Pop crude birth rate projections were used to determine the number of births, adjusted for maternal mortality and stillbirths to estimate the number of pregnant women and newborn per year.

In addition, two pre-existing models were used for specific sections of these cost projections:

- a) Costs for tetanus toxoid immunizations were estimated using the WHO/IVB costing model. This utilizes country-specific parameters to estimate the likely production function for scaling-up coverage. Costs per contact in this model are based on estimates of the unit cost per contact at primary facilities, estimated at different population coverage levels using an econometric model. The incremental costs of scaling-up immunization to 95% for included vaccines was estimated by running a rapid 95% coverage scenario (including costs for campaigns) and from this subtracting the estimated costs for a "constant routine" scenario (i.e. current coverage as baseline, assume no campaigns). The model includes only 74 countries that are eligible for support from the GAVI initiative, and it was adapted to include only the CAH/MPS selected list of countries and vaccines.^{1,2}
- b) Costs for Intermittent Preventive Treatment and Insecticide Treated Nets were based on a malaria costing tool as developed by WHO/RBM. No specific estimates for malaria-specific programme costs were included in the cost estimate for this exercise, as it was assumed these costs are shouldered by the malaria control programme. The model includes only countries that have reported malaria cases of over 1 per 1000 population.³

¹ Immunization costs are thus not calculated for Brazil, Guatemala, Kazakhstan, Namibia, Peru and South Africa.

² For more detailed information on the costing methodology used for vaccines, see IFFIm Proposal Annex 3: Costing methods and estimation of mortality impact in Proposal for an International Financing Facility for Immunization. GAVI Partners, 2004.

³ Malaria costs thus not calculated for 21 countries: Afghanistan, Azerbaijan, Bolivia, Brazil, China, Egypt, Guatemala, Iraq, Kazakhstan, India, Kyrgyzstan, Lesotho, Mexico, Morocco, Nepal, Nicaragua, Philippines, South Africa, Tajikistan, Timor-Leste, and Turkey.

The need for the other interventions was derived either from treatment protocols (e.g., 100% of women in all countries need routine care) or from the specific incidence of conditions and complications (e.g., treatment of anaemia). Estimates of population in need for specific conditions and complications were derived using Global Burden of Disease regional estimates or expert opinion from within WHO/FCH/MPS. Additionally, the impact of implementing some interventions on the need for other interventions was considered (see Annex 7).

1) Remuneration of service providers.

This category encompasses the estimated average time spent and the skill mix of health providers per intervention at the point of delivery (salary of clinical personnel, in-hospital bed days, outpatient visits). Inputs were identified and based on the IMPAC guidelines and estimates by WHO/MPS technical experts in accordance with current standards of treatment. In order to estimate recurrent cost of service delivery¹, current public provider prices were used.² It is important to note that this may either underestimate costs due to the need for higher salaries/incentives to recruit and keep health workers or place them in needed locations, or overestimate costs due to the fact that current staff can absorb some of the workload without any additional pay (i.e., there currently is excess capacity), depending on the particular context. This category also accounts for overhead costs for electricity and running water but the cost estimates do not account for storage, loss or wastage of drugs and supplies when calculating costs for these inputs, which will underestimate costs.

2) Essential medicines and commodities.

This category includes medicine costs, and commodities that are mostly disposable items. The required technologies, medicines, medical and non-medical equipment and supplies, including lab tests for each intervention, are in

¹ Includes remuneration at current salary levels as well as overhead costs for electricity, running water etc.

² Prices derive from Mulligan, J, Fox-Rushby JA, Adam T, Johns B, Mills A. *Unit Costs of Health Care Inputs in Low and Middle Income Regions*. DCPD Working Paper. No.9. Available at: <http://www.fic.nih.gov/dcpp/wps/wp9.pdf>. For salaries, other than those that went into unit costs for outpatient visits/in-hospital days, please see WHO-CHOICE database (which has assembled regional databases on costs using a standardized methodology): www.who.int/evidence/cea

accordance with current standards of treatment as detailed in the IMPAC clinical guidelines and WHO/UNFPA *Commodities lists for reproductive health*.

The main source on the prices of drugs is the median prices reported in the International Drug Price Indicator Guide, database published by Management Sciences for Health (MSH).¹

Laboratory tests at first level of care are assumed to take place on-site and give same-day results. At the secondary health care level, it is assumed that a laboratory is available, with qualified lab technicians, and the equipment and supplies to do the necessary tests.

Capital cost items such as upgrading necessary medical equipment and other recurrent costs of relevant supplies, are included in the infrastructure costs (see Annex 3).

2.3.2. Programme and health system inputs.

All prices in this section are based on programme cost regression models. Local inflation rates were applied to local or mixed goods (including media, buildings etc) to bring all prices to year 2004 USD levels (inflation rates were taken from countries' central bank web sites or, when not available there, from IMF data). Observed per diems were used when available, otherwise derived from a regression model.²

Table 1 describes the seven activities included under programme (costs incurred at the administrative levels of the district, provincial or central-levels) and health system inputs. Annex 3 gives further details on the assumptions used to cost these activities.

¹ The Management Sciences for Health (MSH) publishes the International Drug Price Indicator Guide which provides a spectrum of prices from drug suppliers and procurement agencies, based on their current catalogues or price lists:
http://erc.msh.org/dmpguide/index.cfm?search_cat=yes&display=yes&module=dmp&language=English&year=2003

² Johns,B, Baltussen R, Hutubessy R. Programme costs in the economic evaluation of health interventions. *Cost Effectiveness and Resource Allocation*, 2003, 1:1. Prices derive from the WHO-CHOICE database: www.who.int/evidence/cea

Table 1. Programme and Health System Strengthening Activities.

Systemic cost categories	Description
1. Programme management	Development and assessment of policy, regulations and strategic and operational plans for MNH programmes
2. Supervision	Supervision of MNH related staff, services and programmes.
3. Health education	Community mobilization to raise awareness on MNH related issues through media (radio and TV time) and printed material (posters, fliers).
4. Advocacy	Development of advocacy strategy, advocacy materials and implementation of advocacy activities.
5. Monitoring and evaluation	Establishing or integrating MNH into monitoring and evaluation frameworks and designs; conducting community surveys (e.g. DHS, etc.,) and conducting facility based surveys.
6. Infrastructure upgrading and maintenance	Upgrading and maintenance of existing hospitals; health centres to birthing centres; as well as building maternity waiting homes.
7. Transport and telecommunication	Acquisition, running and maintenance of vehicle and telecommunications for patient transport, staff supervision, training and outreach services.
8. Human resource development	Increasing training capacity and numbers of new skilled birth attendants (mostly midwives) needed to scale-up to target coverage levels, accounting for attrition (estimated at 5% annually); upgrading of pre-service training for midwifery, obstetric, and neonatal care; review of training materials; establishment of refresher training courses; and establishment of in-service training programmes.

2.4. Scaling-up maternal and newborn health care.

All systems have constraining factors that limit growth and performance. The manner, speed, and costs of scaling-up health services depend very much on the specific circumstances each country is facing. Extending coverage of the 67 MNH interventions will not only require significant increase in expenditures, but an ambitious and realistic scale-up strategy that takes into account the present levels of coverage, and the relative strengths and capacity of the health systems in each of the 75 countries.

2.4.1. Health system constraints categories.

The first step in developing an appropriate scale-up scenario was to establish a Health System Constraint (HSC) Index that would adequately reflect the strength of country health systems as necessary to address key MNH services requirements.

The constraints index used by the Commission on Macroeconomics and Health¹ was assessed but found not to include indicators that would take account of both facility and human resource needs and capacity for MNH. It was agreed that the indicator on *percentage of births attended by skilled health personnel in a health facility* would be suitable as the baseline indicator for scaling-up as it captures the current capacity of a country's health system to provide quality maternal and newborn care and its potential to scale-up access to skilled care. It is expected that scaling-up the coverage of births attended by skilled health personnel at or from a health facility will enable the provision of all the 67 recommended clinical interventions.

Looking at current coverage levels for each country, the 75 countries were grouped into four Health System Constraint (HSC) categories, from the most to the least constrained (see Table 2). It is assumed that each HSC category has different levels and types of constraints, based on current coverage of births attended by skilled health personnel in health facilities.

Table 2. Criteria and assumptions related to the four MNH Health Systems Constraint (HSC) Categories²

<i>Health System Constraint Category</i> <i>based on the proportion of births attended by skilled health personnel in health facilities</i>	<i>Criteria</i>	<i>Assumptions</i>
Health System Constraint Category 1	Coverage < 25%	20 countries facing the greatest constraints and challenges; with high mortality levels, low coverage, poorly developed and fragile health systems
Health System Constraint Category 2	Coverage: 25% - 45%	25 countries with similar constraints as HSC 1 but with a higher coverage
Health System Constraint Category 3	Coverage > 46%	18 countries facing less constraints that already have high coverage; health systems strong enough to make the required progress quickly
Health System Constraint Category 4	Based on same parameters as countries assessed as CMH Constraints Index 4	12 countries where full coverage can be reached rapidly; coverage high and health systems functioning

Note: When scaling-up coverage of antenatal care services, countries were grouped following the same coverage criteria.

¹ Ranson, M.K, K. Hanson, V. Oliveira-Cruz and A.Mills. Constraints to expanding access to health interventions: an empirical analysis and country typology. *Journal of International Development*, 2003, 15: 15-39. John Wiley & Sons, Ltd. See Annex 4 for further information on the index.

² See Annex 1 for list of countries and current coverage of maternity care.

2.4.2. Developing a realistic scale-up scenario.

Many of the 75 countries are already facing enormous constraints in improving maternal and newborn health outcomes. Countries themselves as well as donors need to address this reality and to make sure that increasing coverage of MNH services is effectively planned. For this planning, realistic scale-up assumptions are necessary.

Based on the four HSC categories, an ambitious but realistic growth rates, scale-up patterns and targets for 2015 were determined, taking into consideration the fastest possible scale-up pace for each country and HSC group. That scale-up trajectory/scenario was based on the levels of health systems capacities and baseline coverage.

Taking into consideration the current health systems constraints of the four groups it is estimated that with a scale-up target of 50% for HSC1, 65% for HSC2 and 95% for HSC3 and HSC4 by 2015, meaning an average scale-up to 73% of coverage (with a full package of care) from the current 43% (with limited package of care) would achieve a significant reduction in maternal mortality ratio (MMR) by 2015. This scenario accounts for increasing the number and coverage of births in health facilities, which will require substantial annual programme and health system expansion.

However, if all countries had strong health systems, with a high level of existing coverage, then it would be possible to scale-up towards universal coverage rapidly. An alternative scaling-up scenario was therefore developed and costed that delineated the achievement of 95% coverage from 2006 to 2015 (see Annex 4 for details). However, rapid scale up is not possible in at least half of the 75 countries because of the human resource impediments to rapid expansion from a low base. In these cases a long lag time is needed even if political commitment to MNH is high. Planning and implementing the required upgrading of infrastructure and training of skilled health personnel takes time - there are currently not enough births in many clinical training sites on which to meet the requirements of the curricula needed for the full range of MNH interventions. Given that 95% coverage is congruent with a low MMR of around 25 per 100,000

live births, this alternative scenario would far exceed the MDG target, as well as being historically unprecedented - bringing MMR down by over 90% in 10 years. This scenario does, however provide us with an incremental cost that is needed in order to sustain 95% coverage after it has been reached.

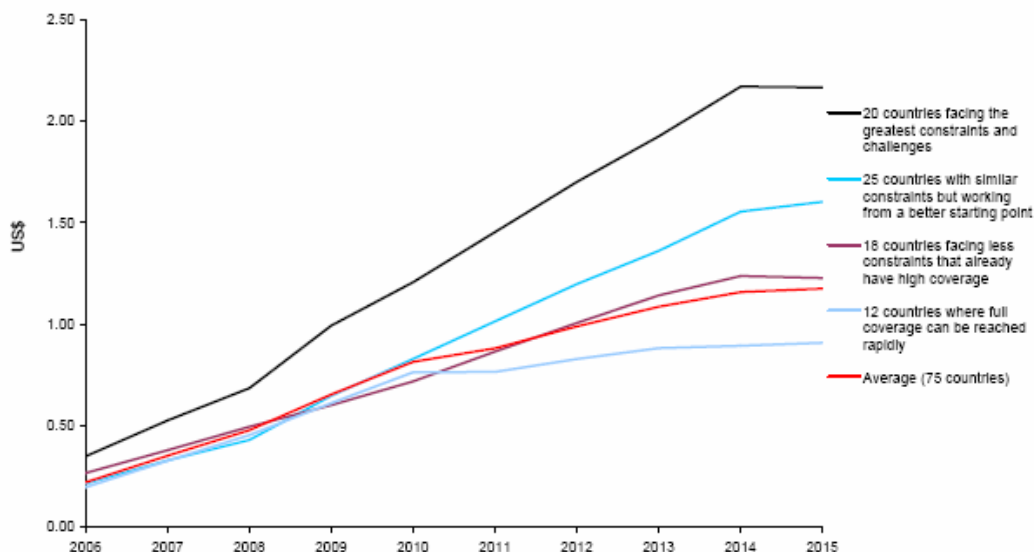
3. The Cost of Scaling-Up Maternal and Newborn Health Care.

The cost estimates reflect the additional financial requirements needed to reach universal coverage for MNH care in addition to current finances available.

The estimates of the additional resources required presented in this report are only indicative, as many factors may influence the expansion of coverage and the actual costs of services. Integration of services with other public health care programmes (notably family planning, child health, malaria and HIV programmes) has been factored in conjunction with assumptions on the need for the building and strengthening of existing health systems.

The total 10-year cost of implementing the scenario outlined in chapter 2.4 is estimated at US\$39 billion, additional to current level of expenditure, increasing from US\$ 1 billion in 2006 to US\$ 6.1 billion in 2015. This corresponds to approximately US\$ 0.22 per capita per year initially, expanding to US\$ 1.18 in 2015. Figure 1 shows the estimated additional expenditure per inhabitant per year required, classified into the four HSC categories.

Figure 1. Estimated Incremental Cost of Scaling-Up Maternal and Newborn Health Care, per Inhabitant per Year.



BOX 2. Scaling-up to reach 95% coverage by 2015.

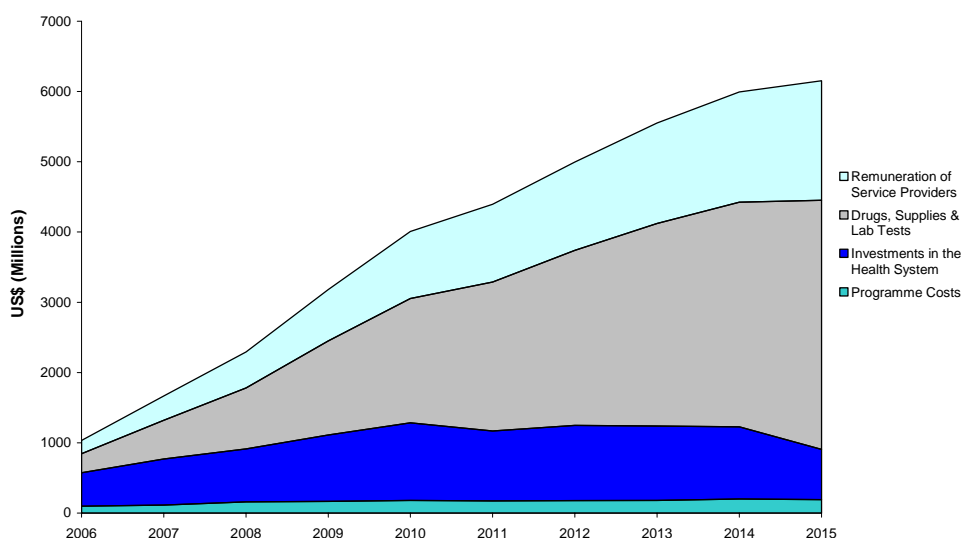
In comparison, to scale up the health system to reach 95% (universal) coverage of all interventions by 2015, then the incremental cost would be US\$ 1.2 billion in 2006 and US\$ 9.5 billion in 2015 or estimated at US\$ 55 billion during 2006 to 2015, additional to current level of expenditure. See table 6.5 in Annex 6 for breakdown of the total incremental costs per HSC category and per inhabitant.

The need for additional resource mobilization will differ for each country depending on their current level of coverage, volume of services, and the need to strengthen their health systems. Countries which are projected to rapidly reach full coverage (HSC 4), but where service provision is, generally, more expensive due to higher salary level and costs, account for 56% of the total global price tag, corresponding to US\$ 0.61 per inhabitant per year, while countries classified as HSC 3 account for 9% of the total global price tag, and comprise only 9% of the total population, corresponding to US\$ 0.74 per inhabitant per year. The countries facing the greatest constraints (HSC 1) account for 18% of costs and 10% of the population, corresponding to US\$ 1.25 per inhabitant per year, and constrained

countries working from a better starting point account (HSC 2) for 17% of costs and 14% of the population, corresponding to US\$ 0.87 per inhabitant per year. Thus, the countries with the most constraints and the lowest current coverage are projected to have the most additional need per capita.

Approximately \$13.6 billion will be required in countries classified as HSC 1 and 2, low income countries with high mortality levels, low coverage and weak health systems. Countries like Afghanistan, Angola, Ethiopia, Haiti, and Pakistan (categorized as HSC 1), are projected to need US\$ 0.35 per inhabitant of additional resources in 2006. As these countries increase coverage of MNH services, this amount is estimated to increase to US\$ 2.17 per inhabitant in 2015. Annex 7 further presents breakdown of the total incremental costs of scaling-up. Figure 2 presents the projected costs by expenditure category for the years 2006 to 2015.

Figure 2. Estimated Incremental Cost of Scaling-Up Maternal and Newborn Health Care, by Expenditure Category.



The vast majority of the additional costs is for the expanded direct service delivery: US\$ 460 million out of the US\$ 1 billion in 2006, rising to US\$ 5.2 billion of the US\$ 6.1 billion in 2015 (56% for first-level and 44% for back-up care). During this period 48% of all additional costs are accounted for by essential medicines and commodities, and 25% by the salaries of the extra workforce and other non-traded goods (overhead costs for e.g. electricity, running

water etc.). Thus, salaries, medicines and commodities account for 73% of total additional costs; of this, 59% relate to maternal interventions and 15% to newborn interventions. The remaining 27% is needed to cover programme development and investments in strengthening the health system. Programme and health system costs increase over time, but less than the other costs. For example, the yearly health system investment costs doubles between 2006 and 2015, but their share of the total drops from 46% to 12%. The increasing number of women and newborn babies reached with increasing coverage mean costs for personnel, drugs, equipment and supplies increase more rapidly than programme and health system strengthening costs. For example, the projections assume roughly an eleven-fold increase in resource requirements for salaries, drugs and commodities, and a double-fold in programme and health system strengthening costs.

The costing shows that approximately 18% of the direct service expenditures will be needed in 2006 for remuneration of service providers, and 26% for drugs, lab tests and other supplies. The proportion of these expenditures will increase from 45% of total incremental costs in 2006 to 85% in 2015.

Figure 3. Breakdown of Estimated Incremental Cost, by Intervention or Point of Delivery.

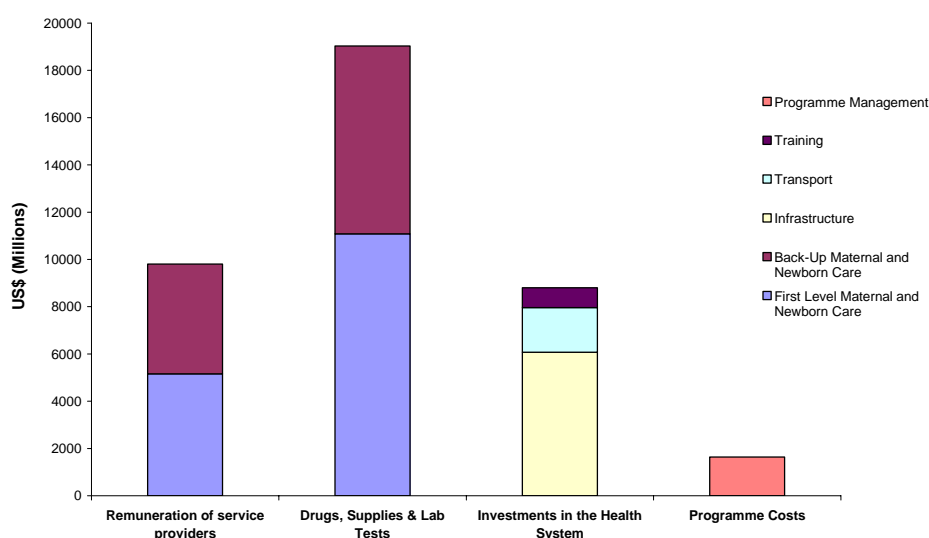
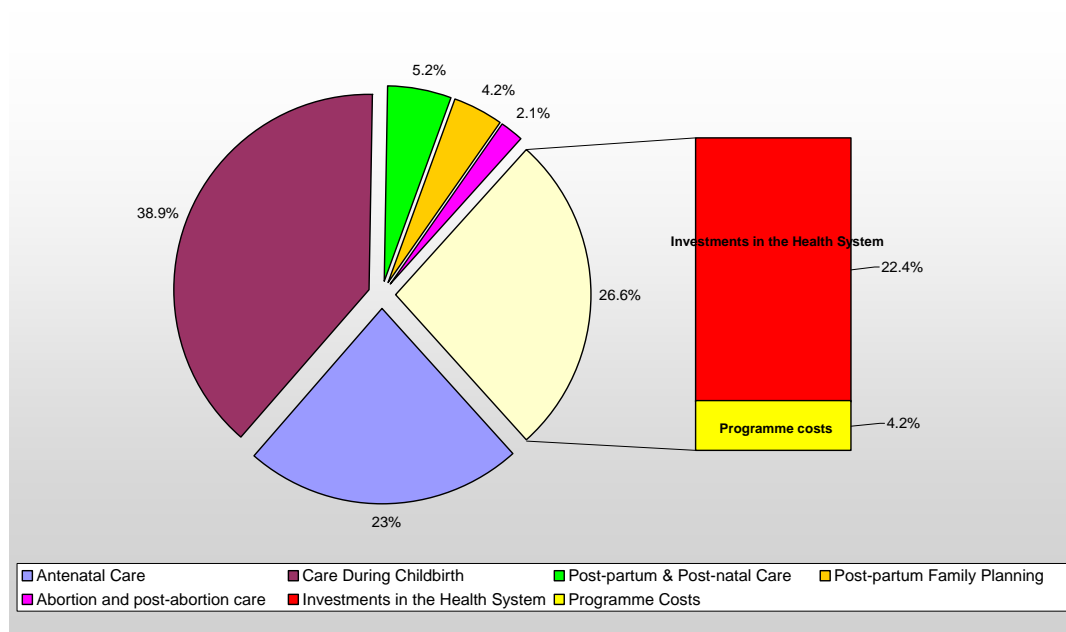


Figure 3 shows a breakdown of the cost categories by intervention or point of delivery. The programme costs will require an incremental increase per annum from US\$ 98 million in 2006 to US\$ 192 million in 2015. Similarly, health

system investments will require an incremental increase per annum of US\$ 475 million in 2006 to US\$ 715 million in 2015. Interventions that are delivered at first level of care account on average for approximately 56% of total incremental recurrent expenditure, whereas interventions at secondary health care level (back-up services) accounts for 44%.

Figure 4 shows the breakdown of costs by broad intervention type. Care during labour and childbirth¹ is the largest expenditure category, accounting for almost 40% of total costs; antenatal care and investment in health systems represent nearly equal expenditure (at 23% and 22% of total costs, respectively). The other broad intervention types represent 5% or less of the total estimated cost.

Figure 4. Estimated Incremental Costs per Intervention, as a Percentage of Total Costs.



In the first year of scale-up, 50% of the additional resources required for direct service delivery are allocated to antenatal care and 38% to care during birth; by year 10, antenatal care decreases to 30% of the recurrent budget, while care during birth increases to 54%. The increase is mainly due to the cost of back-up services during birth and the relating costs from increased commodity and drug use.

¹ Care during birth includes care provided during labour, childbirth and the immediate post-partum/post-natal period (1-2 hours after birth) includes interventions and care of the mother and the newborn baby.

More than half of the total programme costs of US\$ 10.4 billion are due to infrastructure expenditure. Another 18% is spent on improving the referral system (setting up communication system via mobile phones and purchasing ambulances and other forms of emergency transport). Expenditure for the development of human resources for health accounts for 8% of programme and health systems costs.

4. Discussions of results.

The focus of this document has been on providing all the relevant background information on the methodology, key parameters and assumptions that was used to estimate the costs of expanding the coverage of skilled maternal and newborn health (MNH) care at facilities towards universal access, which has been defined here as 95% coverage.

The cost estimates presented in this report are only indicative, as many factors may influence the expansion of coverage and the actual costs of services. They give an estimate of the additional financial requirements and other resources needed to be put in place between 2006 and 2015, if to provide universal coverage, in addition to current expenditure. This global price tag does not attempt to identify the needs of each of the 75 countries included in the costing for meeting universal coverage.

The costing exercise has identified that although effective maternal and newborn health interventions are known, countries with low coverage of skilled attendance at childbirth and limited capacity for emergency obstetric care will experience difficulties in effectively scale-up MNH care. The impediments in hiring and training the necessary human resources and in establishing and maintaining an enabling environment and infrastructure needed to provide universal coverage of MNH services in the short term are challenging. In some cases, maintaining the same level of human resources, given low pay and often frustrating settings, presents a considerable challenge. To meaningfully increase coverage in the medium to long term requires new commitments to training and retaining staff and improving the supportive health system.

Scaling-up the 67 MNH interventions will not only require significant increase in expenditures, but an ambitious and realistic scale-up plan and strategy that takes into account the present levels of coverage, and the relative strengths and capacity of the health systems (including human resource needs) in each country. It will take considerable efforts for countries with very weak health systems to build up their capacity to reach the desired and needed coverage levels. This reality will

have to be translated into severe efforts, both from the countries themselves as well as donors, to make sure that increasing coverage of MNH services is based on situational and realistic assumptions.

In all countries included in this costing activity, but especially those with a low HSC rating, the challenges that impede increasing coverage must be identified and targeted, particularly accessibility, human resource inputs, and the supply of commodities and drugs. Reaching rural, underserved and poor populations requires particular attention and participatory demand creation may be necessary. Short to long term strategies will need to be developed and implemented in parallel to ensure the attainment of universal coverage of skilled care is sustained.

Real progress in improving MNH can only be achieved through providing universal coverage and access to care during pregnancy, childbirth, the post-partum and post-natal period. That is also important to address and improve equity in health. Political will is essential to ensure universal coverage and financial protection.¹ The largest effort is needed in the poorest and most aid-dependent countries. National authorities and the international community have to be aware that the results obtained will be slowest in the countries where the largest effort is made – that is necessary in order to reduce the growing gap between countries and to move towards achieving the MDGs in all countries of the world.

¹ For further policy and strategic discussions, see the *World Health Report 2005: make every mother and child count*, and WHR Policy Brief Four on 'Access to Care and Financial Protection for All'.

ANNEX 1. List of countries included in the costing.

Table 1.1. List of countries and coverage of maternity care.

Country	Deliveries attended by skilled attendant (%) ¹	Deliveries in health facilities (%) ²	Antenatal care visits (4 or more) (%) ³	Feto-neonatal mortality rate ⁴	Maternal mortality ratio ⁵
Afghanistan	14	14	19	88	1,900
Angola	45	38	41	93	1,700
Azerbaijan	88	81	43	47	94
Bangladesh	12	6	11	60	380
Benin	60	60	61	69	850
Bhutan	15	15	36	52	420
Bolivia	65	56	48	41	420
Brazil	88	88	77	24	260
Burkina Faso	31	31	23	66	1,000
Burundi	25	19	51	68	1,000
Cambodia	32	10	9	76	450
Cameroon	56	54	52	67	730
Central African Republic	44	44	40	85	1,100
Chad	14	11	15	71	1,100
China	89	70	59	38	56
Comoros	62	43	52	51	480
Congo	43	41	42	55	510
Côte d'Ivoire	45	45	35	97	690
Dem. Rep. of the Congo	43	41	42	83	990
Dem. Rep. of Timor-Leste	38	32	23	75	660
Djibouti	27	30	36	57	730
Egypt	61	52	41	29	84
Equatorial Guinea	5	5	19	70	880
Eritrea	28	17	27	51	630
Ethiopia	10	5	10	72	850
Gabon	86	84	63	58	420
Gambia	51	38	60	83	540
Ghana	44	44	62	48	540
Guatemala	41	41	68	30	240

¹ [Global monitoring and evaluation](#). Geneva, World Health Organization, 2004.

² [STATcompiler -DHS](#). Last accessed, 23 September 2004.

³ [STATcompiler -DHS](#). Last accessed, 23 September 2004.

⁴ Neonatal and Perinatal Mortality. Country, Regional and Global Estimates. Geneva, World Health Organization, 2005 (in preparation).

⁵ [Maternal mortality in 2000 - Estimates developed by WHO, UNICEF and UNFPA](#). Geneva, World Health Organization, 2004.

Guinea	35	29	48	79	740
Guinea-Bissau	35	35	38	84	1,100
Guyana	86	86	52	41	170
Haiti	24	18	42	55	680
India	43	34	30	71	540
Indonesia	56	40	71	36	230
Iraq	72	30	50	89	250
Kazakhstan	99	98	71	30	210
Kenya	42	42	61	50	1,000
Kyrgyzstan	98	96	81	55	110
Lao People's Dem. Republic	19	19	12	81	650
Lesotho	60	41	57	68	550
Liberia	47	38	54	113	760
Madagascar	47	34	40	58	550
Malawi	54	54	55	55	1,800
Mali	41	24	30	69	1,200
Mauritania	40	40	16	115	1,000
Mexico	86	86	56	24	83
Morocco	40	30	8	30	220
Mozambique	44	44	37	96	1,000
Myanmar	56	29	48	65	360
Namibia	76	76	55	57	300
Nepal	11	9	15	63	740
Nicaragua	67	66	62	25	230
Niger	18	18	11	65	1,600
Nigeria	42	37	47	83	800
Pakistan	20	14	14	81	500
Papua New Guinea	53	32	50	63	300
Peru	59	57	69	24	410
Philippines	58	36	61	26	200
Rwanda	31	26	10	71	1,400
Senegal	51	45	17	52	690
Sierra Leone	42	38	42	103	2,000
Somalia	34	25	15	72	1,100
South Africa	85	85	72	41	230
Sudan	86	20	47	48	590
Swaziland	70	41	57	64	370
Tajikistan	77	77	45	47	100
Togo	49	49	46	72	570
Turkey	81	75	44	38	70
Uganda	39	37	40	48	880

United Rep. of Tanzania	36	36	69	71	1,500
Viet Nam	85	62	15	52	130
Yemen	22	16	12	51	570
Zambia	47	43	71	67	750
Zimbabwe	73	65	64	46	1,100

ANNEX 2. Clinical interventions included in the costing.

A total of 67 evidence-based clinical interventions are included in the cost estimates. They are mainly based on the WHO evidence-based IMPAC clinical guidelines and are comprised of interventions that are considered essential for improving maternal and newborn health and appropriate to scale up in low-income countries. In addition, certain interventions - best practices that have proved to be effective - were added with the view that countries that have already established basic care could begin to implement these interventions at secondary level of care.¹

The provision of these interventions is at the first level of care and second (back-up) level of care. Table 2.1 shows the interventions grouped according to level of care. Routine care at first level MNH care (represented in green column in table below) should focus on a package of preventive and diagnostic assessment of and treatment for all women during pregnancy, labour and childbirth and the post-partum period and to all and newborn babies in the post-natal period provided by a skilled birth attendant (best by midwives) in midwifery-led facilities.² At this level, in endemic areas, appropriate situational care for certain diseases and conditions is added to services. Furthermore, complications care at first level includes initial management of maternal and newborn complications, as pre-referral care and then referral when needed. It is essential that a system of referral links the first level and the health personnel working there to higher levels of care. Back-up care at secondary health care level (listed in the pink column) includes management of complications, which is provided by a team of doctors (gynaecologists-obstetricians and paediatricians), midwives, nurse-midwives with laboratory, surgical and blood transfusion facilities.

¹ For instance "*screening all pregnant women for blood group isoimmunization*", and "*postpartum administration of anti-D immunoglobulin*" are recommended for countries classified as HSC category 4. High-technology interventions (for instance assisted ventilation for the newborn) and services that requires tertiary health care level are not included as they are not outlined in the WHO normative tools underpinning the costing exercise.

² Skilled attendant is a health professional – such as a midwife, doctor or nurse – who has been educated and trained to proficiency in the skills needed to manage normal (uncomplicated) pregnancies, birth and the immediate postnatal period, and in the identification, management and referral of complications in women and newborns. Making pregnancy safer: the critical role of the skilled attendant: a joint statement by WHO, ICM and FIGO. Geneva, World Health Organization, 2004.

Table 2.1. List of MNH interventions.

	First level maternal and newborn care		BACK-UP care at secondary health care level
	Routine care (offered to all women and newborn babies)	Complications care at first level (includes initial management of complication and referral if necessary).	Complications care at back-up level (includes care provided to women and newborns with complications or at risk conditions not manageable at lower level)
Care during pregnancy	Assessment of mother and fetal well being, information and counseling on care and self care, including birth and emergency plan, breastfeeding and education on danger signs; family planning counseling and advice, recording and reporting Screening of hypertensive disorders of pregnancy Prevention (iron supplementation) and screening for anemia Diagnosis of bleeding during pregnancy Screening for maternal syphilis STI/RTI diagnosis (candida vaginitis, gonorrhoea, chlamydia, bacterial vaginosis and trichomoniasis) Tetanus toxoid immunization ¹ Screening for urinary tract infection Voluntarily Counseling and Testing (VCT) for HIV ²	Initial management of pre-eclampsia and eclampsia Treatment of mild to moderate anemia Presumptive treatment of syphilis (1-10% of all pregnant women) STI/RTI management (candida vaginitis, gonorrhoea, chlamydia, bacterial vaginosis and trichomoniasis), (5-10% of all pregnant women) Antibiotic treatment for lower urinary tract infection (4-7% of all pregnant women) Counseling, support and treatment of opportunistic infections among HIV-positive pregnant women with ARV	Treatment of severe pre-eclampsia, eclampsia (3% of all women during pregnancy, birth and postpartum period). Treatment of severe anemia (3-5% of all women during pregnancy, birth, postpartum) Treatment of bleeding in pregnancy (treatment of post abortion complications 0.05%) External Cephalic Version (ECV), (4% of all pregnant women) Treatment of opportunistic infections in HIV-positive women with ARV and provision of ARV for PMTCT
Endemic areas	Antimalarial Intermittent preventive treatment (IPT) and insecticide treated nets (ITNs) Systematic treatment of hookworm infestation	Treatment of uncomplicated malaria (5-10% of all pregnant, birthing and postpartum women)	
Situational	Abortion care (where abortion is unrestricted under law) & post-abortion and counselling (1-10%)	Post-abortion care (not complicated cases): MVA for threatened or incomplete abortion (10-15%)	Post-abortion care complicated cases
Care of mother and the newborn-baby during childbirth & the first 1-2 hours after birth	Routine care during labour, birth and the immediate post-partum period, which includes: care and social support during childbirth; regular monitoring for detection of complication and recording (including use of partograph); prevention and control of infection; and active management of third stage of labour. Detection of prolonged and obstructed labour Diagnosis of pre-labour rupture of membrane (PROM) Essential Newborn Care which includes: dry the baby, assess breathing, clamp and cut the cord, place baby in skin-to-skin contact with the mother, identify, exclude major risk factors and encourage	Episiotomy (10-15% of all birthing women), Repair of vaginal / perineal tears (10% of all birthing women). Diagnosis, initial management and referral of rupture of uterus Initial management and referral of prolonged and obstructed labour and fetal distress (10-15%), Vacuum extraction (3% of all birthing women) Initial management and referral of pre-labour rupture of membranes (PROM) Initial management of bleeding Resuscitation of babies not breathing or gasping at birth, monitoring of breathing and pre-referral treatment of severe cases (4%) Re-warm baby and pre-referral care of severe cases	Management of rupture of uterus Breech delivery; Vacuum extraction; forceps; c-section (10-15% of all birthing women) Management of pre-labour rupture of membranes (PROM) (5-7%) Management of severe bleeding (5%) Management of respiratory distress (2-4%) Management of severe hypothermia (2%)

¹ Note that this intervention applies to women not already immunized.

² All HIV/AIDS interventions/treatment protocols are included here only for informational purposes, as they are seen as essential parts of MNH care but have been costed under one PMTCT cost as they are all considered to be part of the prevention of mother to child transmission of HIV and AIDS (including VCT of the pregnant woman). Since majority of the costs are for replacement feeding, which the child continues to receive after the first week of life, the costs were attributed to child health services.

	breast feeding. Identification of newborn hypothermia		
Endemic areas	Prevent mother to child transmission of HIV (PMTCT) - guidance and support with replacement feeding.	Administering of ARV	PMTCT including administering of ARV
Care of the mother from 1-2 hours after birth until discharge (24-48 hours at least)	Examination of the mother, info & counselling, recording & reporting; prevention (iron and folate supplementation) and detection of anaemia Prevention and control of infections Identification of hypertensive disorders Family Planning counselling and decision-making on birth spacing Vitamin A supplementation	Initial management of anaemia (40% of all women during pregnancy, birth and postpartum) Initial management of sepsis (mastitis (5%), perineal (1%), lower urinary tract infection (4%) Initial management of pre-eclampsia / eclampsia and pre-referral care (<1%) IUD insertion (3% of all birthing women)	Management of severe anaemia (including blood transfusion). (3-5%) Management of puerperal sepsis (5%) Management of severe pre-eclampsia / eclampsia (<0.5%) Female sterilization (5-15%)
Newborn care from 1-2 hours after birth until discharge (24-48 hours at least)	Routine care of the newborn: Assessment of wellbeing and weight, detection of complications, cord care, eye prophylaxis; advising mother on breastfeeding and newborn care, post-natal care visits, and danger signs. Breastfeeding support and guidance Preventions and control of infections Screening for jaundice, birth trauma and malformations Verification of RPR status	Additional care if preterm, or birth weight less than 2500 or twin (additional care can include: special support for breastfeeding, additional warmth, ensure hygiene, monitor more often). Kangaroo Mother Care (5-10%) Additional assistance to mother to express breast milk or provide/advice on alternative feeding methods in case of feeding problems (1-40%) Treatment of local infections (cord, skin, eye, thrush) and pre-referral care of severe infections (4%) Pre-referral care for severe jaundice Presumptive single dose of penicillin treatment in asymptomatic baby of RPR positive mother Pre-referral treatment with antibiotics (5-10%) Management of mild birth trauma and pre-referral care for severe trauma. Pre-referral care for severe malformation and provide advice to parents on mild malformations.	Care of babies with birth weight less than 1500 gr or very preterm (2-3%) Alternative feeding methods if baby is unable to feed (5-10%) or if HIV positive mother decided to not breastfeed the baby Management of neonatal sepsis and other severe infections (4% all baby) Management of neonatal tetanus (0.1%) Management of severe jaundice (4%) Treatment of congenital syphilis, 10 days (1%) Presumptive treatment of infection (4%) Management of severe birth trauma
Post-partum care (mother) - discharge to 6 weeks after birth	Routine postpartum care, which includes general assessment of mother's wellbeing, information and counselling on nutrition, care and self care; detection of any danger signs; monitoring and recording; prevention (iron and folate supplementation for 3 months after birth) and detection of anaemia; family planning and decision-making on birth spacing ¹	Treatment of moderate infections, and anaemia, postpartum depression, and treatment of mastitis	Management of postpartum depression (2%) to be checked Management of severe anaemia, including blood transfusion (4%) Management of severe puerperal sepsis 3% Female sterilization (5-15%)
Post natal care (baby), discharge to 4 weeks after birth	Routine care of the newborn: assessment of wellbeing and breastfeeding, detection of complications, advising mother on breastfeeding, newborn care and danger signs.	Additional follow-up for low birth weight and high risk babies.	Management of neonatal sepsis and other infections, detection and management of not lethal malformations, care of very low birth weight infants; care of newborns with failure to thrive (5-10%)

¹ Acceptance rate for contraceptives and the use of different contraceptive methods are based on the current prevalence rates in countries.

Key assumptions underlying interventions.

The scope of this costing exercise is limited to interventions and services provided to all women during pregnancy, labour, childbirth, the post-partum period, and to all newborn babies in the first seven days after birth.¹

Antenatal care.

All women should receive basic care during pregnancy comprised of preventive measures essential for an optimal pregnancy outcome, preferably provided in four or more visits. The number and timing of visits ensures the most efficient delivery of interventions.

All women will attend at least one antenatal care visit: 1st visit: 30-40 minutes < 4 months 2nd visit: 20 minutes 6-7 months 3rd visit: 20 minutes 8 month 4th visit: 15 minutes 9 month

According to specific epidemiology and prevalence, care should be provided to all pregnant women in an area for all relevant conditions (e.g. malaria, hookworm prevention). All additional care needed is provided at the first level through follow-up visits, when required. Pre-referral care, including first steps of complication care management, is provided at this level before a woman is (urgently) referred to back-up care for management of complications (see box 2.1 *Referral Care*).

All antenatal care visits can be provided on an outpatient basis in first level facilities or as an outreach service by a midwife in the community. For this costing exercise, all women will incur, as a minimum, the costs for the basic antenatal care services delivered at outpatient basis, and women who develop complications, and need appropriate care, will then incur additional costs.

¹ Costs of interventions and services that are necessary for all infants in the first week of life are included; for infants with complications originating in the perinatal period, the costing covers the costs resulting from the treatment of those conditions (e.g. preterm baby that needs hospital care for more than one week). Costs of interventions delivered to the newborn baby after the first week of life were assigned to child health services. See further *Methodology and assumptions used to estimate the cost of scaling up selected child health interventions*. Geneva, World Health Organization, 2005. Available at the World Health Report website: [WHO | The world health report](http://www.who.int/world-health-report)

Care during labour and childbirth

Every woman, without exception, needs professional skilled care at birth. For the purpose of this costing exercise, normal care during labour and childbirth is costed at the first level of care, including one bed day in a birthing centre¹ with skilled attendants/midwife, for an average (minimum) around 7hrs. Midwives are assumed to be available for around the clock service.² A woman who lives far away from a facility waits for birth in a maternity waiting home. The home is connected to the birthing centre on around the clock basis.

The skilled attendant/midwife provides basic care during labour and birth for all women and newborn babies. She also provides additional interventions when required to manage moderate complications or when referral is not safe due to the advanced state of the delivery. Midwives also provide pre-referral treatment for severe complications. The pregnant woman is accompanied by a skilled health worker to the hospital upon referral. Care for complications continues in the hospital. If the birthing centre is in the referral hospital, the same principles apply; expect that pre-referral care is part of complications treatment.

BOX 3. Referral care for women and babies

Referral for women and newborn babies implies transfer from home or a small hospital to a better equipped and staffed referral hospital or, for births at large hospitals, in-hospital referral (to another ward). Long distance transfer requires a vehicle, equipment and supplies needed for continuing treatment, and a trained health care provider to accompany the woman/newborn to the referral site. Both women and infants referred to another institution receive pre-referral treatment at first level of care. When a preterm/sick baby is referred, the mother is referred with the baby. When the mother is referred, the health baby is referred with the mother. Babies who develop complications incur additional costs.

All women will incur, as minimum, the cost of normal care during birth. Around 7% of women will experience potential complications and will need referral to back-up care at a 1st referral hospital. Those women will then incur additional costs, depending on the complication. Caesarean delivery is only done at the 1st referral level and implies a 4 day stay at the hospital.

¹ Birthing centre deals with antenatal care, labour, childbirth and the postpartum/postnatal period for mothers and newborns. It can be a part of a health facility or a hospital or a stand alone unit.

² Services open and available 24 hours a day, 7 days a week.

Immediate postnatal care

Care during childbirth¹ and the first 12-24 hours, or until mother has been examined and shows no danger signs and baby² is feeding well, body temperature is stable and there are no other danger signs, is costed as part of care during childbirth at the first health care level. Care is provided by a skilled birth attendant and assumed to start at birth and end 12-24 hours after birth (longer after caesarean section). Skilled health personnel attends every birth and provides care for the mother and the baby after birth and during the postnatal period, and cares for normal babies and babies at risk, at the institution or at home. Home birth and essential newborn care by a skilled attendant are not significantly different from the institutional birth, however, this costing exercise only allocates for care provided at the facility. For institutional births, a skilled attendant stays with the mother and the baby for the first hour after birth, monitors intensively for 2 more hours, then occasionally examines and assesses the health status of the mother and baby, and does a final examination before discharge. The same provider is also available if the mother reports problems or they are identified during monitoring. For home birth, the skilled attendant stays with the baby (and the mother) for about 3 hours after birth and pays an additional home visit within 24 hours of birth. That time by a midwife is not costed in this costing exercise.

Care for the healthy newborn baby in the first week of life consists of basic newborn care, breastfeeding support and immunization. According to prevailing disease patterns or maternal illness, they receive eye prophylaxis, PMTCT and malaria prevention. This part of newborn care after birth is the same for every baby, whether the baby develops complication or not. For babies with no complications and no risk, this care covers the management from the moment of birth to about 12-24 hours after birth, including instructions for home care. The baby is roomed with the mother until they are both fit go home. Babies are monitored for wellbeing, with special emphasis on supporting breastfeeding. Mothers receive information and counselling for home care. Although a baby with complications will not receive complete basic newborn care, the remaining

¹ A birth could be a liveborn baby, single or multiple infants that survive or die or a baby a lethal malformation that will die or a stillborn baby. Multiple births: 1.2 - 2% is multiple pregnancies. Triplets and higher order births are much rarer; however, all are preterm births and result in very small babies. Costing for higher order births is not done separately.

Stillbirth: No newborn care is provided. Although time is needed for counselling bereaved parents and recording/reporting, it is not costed separately.

² In this report the newborn will be referred evenly to as the newborn, newborn baby or a baby.

time is assumed to be used as time for the pre-referral care. Thus, all babies will incur, as a minimum, these costs.

Professional health personnel visit babies born at home without skilled birth attendant the next day to provide interventions for postpartum/postnatal care. A midwife at the first health care level performs a follow up visits for babies treated for complications.

In case of complications, both mother and baby are referred to the hospital. When management of severe maternal complications is needed, including caesarean section, the hospital stay is also longer for the healthy newborn infants. Basic care costs are used for this period until discharge. Moderate problems are treated at the birthing centre, as pre-referral care. In case a back-up care is needed, babies who are very small, ill, or have complications are referred for special neonatal care. In cases of need of special care for the newborn with complications, the mother also needs to be present and needs hospitalization (bed, infrastructure, food etc), which is costed as 4 bed days at a first level facility. The same applies to the newborn, in case of complications of the mother. A full team of health personnel care for infants with early onset problems at the referral hospital. Mothers stay with babies to ensure breastfeeding or breast milk.

Special care of small babies or at risk infants

For special care of very small babies (duration of care was based on duration of treatment, assuming no complications) or infants <1500 g who are born 8-12 weeks before the estimated date of delivery or 5-9 weeks (35-63 days) before term. Care is needed until 37 weeks of gestational age. However, early mortality in this group is high despite treatments and some babies will die near the start of treatment; therefore we counted the cost for only 30 days of special care. Incidence of some interventions such as trauma, convulsions, hypothermia, severe maternal infections, and neonatal tetanus are estimated low since we are assuming that care during labour and birth is good. In absence of such care (home birth without skilled attendant) these problems will be much more frequent. Their incidence thus should be increased if high proportions of births are happening without skilled attendance.

At risk infants are born preterm, have difficulty feeding the first few days of life, have minor birth trauma that may require care, or are otherwise healthy but need

treatment because of maternal illness. They need additional care to prevent serious illness, need replacement feeding because of HIV, require additional thermal protection, and more frequent monitoring for danger signs. The assumption used is that the condition of an infant at risk will improve.

All infants at risk receive basic newborn care for every day of their stay at the facility. A midwife with special skills provides this additional care. Institutional stays are longer for at risk babies. If it is a home birth, daily follow-up visits are required. Costing is done for hospital stays only. Maternal stay at the facility for the needs of at risk infants is calculated as follows: No costing for the first 3 days since many mothers will have complications that already require a longer stay and treatment for their own health, or will have had caesarean section. To avoid double costing maternal stay, the duration of maternal stay is 3 days less than baby stay. Maternal costing after 3 days is done as it where at the maternity waiting home.

Early post-partum visit (1 week) for the mother and baby

Early postpartum visits are provided on an outpatient basis at a health centre or as an outreach service by a midwife. Women with health complaints receive postpartum care; women with postpartum complications (e.g. signs of anaemia, mastitis, postpartum depression symptoms) receive additional care, pre-referral care and/or are referred to a hospital.

Late post-partum visit (latest at 6 wks) – family planning

Family planning (FP) services are assumed to be in place in the community and that they cover the largest part of the FP costs/services. A postpartum care visit at 6 weeks is costed for all women, mainly involving family planning counselling. Initially, women receive counselling on birth spacing and family planning during antenatal care visits and then again in this postpartum visit. Services costed in this visit include information and counselling session on four types of contraceptive methods – female sterilization, IUD insertion, and pill or injectables contraceptives combined with condoms (for dual protection).

This visit is provided on an outpatient basis at the health centre or as an outreach service by a midwife. For this costing exercise, the target population for family planning services are all postpartum women, not all women of childbearing ages.

Abortion care

For the purpose of this costing, abortion and post-abortion care includes treatment of post-abortion complications, provided at the first health care level by skilled attendant or doctor. Safe abortion care is included only in countries where it is currently unrestricted under law. If in need for surgery, the woman is stabilized at the first level of care by a skilled attendant and then referred urgently to back-up care at a first level referral hospital where she will receive appropriate treatment.

Outreach services

The interventions focus on individual-oriented clinical services. Community and family-oriented support for self care is organized via these individual services. Outreach activities, such as health education, are costed under the supervision and health education components of the programme cost. They are costed as time spent by a midwife and/or health education specialist, the use and costs of transportation (fuel, mobile phone, maintenance etc.) to visit communities and establish links with traditional birth attendants (TBAs), traditional healers and other relevant community groups.

ANNEX 3. Programme and health system inputs and underlying assumptions

Programme inputs.

1. Programme management.

At national and provincial levels, programme management includes costs for general programme co-ordination such as the development and assessment of policy, strategic and operational plans for programmes related to MNH, management of staffing and salaries for work on planning (strategic, annual work plans, interagency coordination meetings, micro plans for districts, and situational assessments) and implementation of maternal and newborn/child health activities.

Key assumptions:

This cost category is partly shared with child health programmes as it is assumed that joint Mother and Child Health (MCH) programmes are functioning at national and district levels. Percentages of the total costs for activities at this level are attributed to MNH services, since it is assumed MNH includes only a small part of the entire national health strategy/plan. For district planning however, MNH is takes on 30% of the total costs. Situational assessments are included and costed for every 5 years where MNH services are billed 100% of the costs, except for site visits, where MNH incurs 10% of total costs. Costs of writing and distributing policy and regulations are included every 10 years. Recurrent costs include costs for per diems and travel for attendees, meeting rooms and other support services, some consumable goods and capital goods.

Staff

Staffing and salaries at the national and provincial/district levels are assumed to be shared with child health services (in a MCH programme). At the national level, MNH covers all of costs but is allocated 50% of total programme management costs at the district level. Countries categorized as HSC 4 are not allocated staffing at national level; it is assumed that they already have these programmes in place.

Note: No programme costs are allocated to MNH programmes for malaria interventions, as these costs were assumed to be covered by the Roll Back Malaria

programmes. The same assumption applies for the programme costs for tetanus toxoid immunization where it is assumed that other programmes (such as child health in partnership with vaccines) would cover the overhead costs.

2. Supervision.

Supervision and administration is costed at four levels; supervision trips at the district level, supervision of first level health centres and first referral hospitals, and as part of outreach services and health education visits to the community. Cost for support staff and drivers are included for each supervision visit.

Key assumptions:

This cost category is partly shared with child health programmes as it is assumed that joint Mother and Child Health (MCH) programmes are functioning at national and district levels.

Costs of supervision and support visits to communities from staff at health facilities is calculated in terms of time spent and number of visits done, and all of that costs is attributable to MNH services.

From the national/provincial level to referral facilities, MNH services are billed 15% of total costs; from national to district supervision, staffing, offices, transport 10% of total costs attributable to MNH services as it is assumed that only a small part of the supervision visits are related to MNH services. From district level to health facilities: assumed that MNH services are a greater part of the primary health care supervision visits and thus 25% is attributable to MNH.

3. Health education.

Several types of interventions have been assumed under this broad title intended to indicate activities held outside the facility to increase public awareness and support for MNH issues, including awareness of MNH needs, danger signs, and the importance of a skilled birth attendant at birth. It also includes under this title activities designed to increase linkages between health services and communities

Costs include activities to raise awareness in communities and among women and their families through media (radio and TV time), printed material (posters, fliers) on care during pregnancy and childbirth, on birth planning, and on emergency preparedness.

Key assumptions:

Costs include materials for outreach for health education. The outreach visit itself is costed under supervision (as the time spent on outreach visits, by a health promotion specialist (2 hours a week) and a midwife/skilled attendant (2 days a month), both based at a facility), and transport costs for those visits are included under the transport category. However, the production cost material used in these visits, both for giving away and education/reference material for medical/health providers' staff, is included (production).

Outreach materials include the production and printing of booklets, posters and brochures (treated as 3 different materials and campaigns on TV and radio spots (the number of spots, frequency and duration). Formative research/pre-intervention assessment is allocated for as initial research in terms of personnel time (incl. salary), operative/admin costs (offices, materials needed etc) and ongoing monitoring.

4. Monitoring and evaluation.

This category includes costs for establishing monitoring and evaluation (M&E) programmes (development of strategy, hiring staff, establishing infrastructure (computers, e-mail) and integrating and upgrading maternal health into existing monitoring frameworks and designs (training and retaining staff, facilitation of strategic reviews every 3 years, and coordination).

Key assumptions:

This cost category is partly shared with child health programmes as it is assumed that joint MCH programmes are functioning at national and district levels. Costs are allocated for putting M&E systems in place for countries classified as HSC category 1 and 2 countries where it is assumed that there is none or not properly functioning M&E systems in place.

Staff costs

Main cost items include those of data entry personnel and of an epidemiologist at the national level to consolidate and analyse information collected at various levels (health facilities, district and national level).

IT infrastructure

Include costs for installing and maintaining IT infrastructure.

Community and facility-based surveys

1) Community-based surveys are costed every 5 years (e.g. DHS) for countries that presently do not do DHS surveys, with 25% of the total cost attributed to MNH services/programmes (costs shared with child health and other programmes).

2) Activities for the review of maternal and perinatal deaths and complications to improve quality of MNH care at health institutions, a process of death reviews and maternal and perinatal death reviews/audits, are included. Total costs are attributed to MNH services.

For the facility birth: at first level of care, the review is done by a midwife/equivalent and at secondary health care level by a doctor and a midwife. Patient records are included in individual care.

For a home birth: costed as home visit by a midwife (from first level facility).

5. Advocacy.

Costs include the development of an advocacy strategy; planning, activities, and production of advocacy material. The formulation and review of the advocacy strategy (strategic review every 3 years), including external consultancy for writing materials and communication strategy, and support to the advocacy base is shared with a MCH programme and MNH is attributed 15% of the total costs. The MNH programme then takes on the full costs of general advocacy activities to strengthen advocacy based activities (incl. office space, personnel, travel, per diems etc.) and maintain momentum (meetings in countries with stakeholders, advocacy activities and other relevant meeting with teaching institutions, and ministries of Transport, Finance etc. Advocacy material (videos/documentaries, information kits, leaflets, CD-ROMs etc) to support these activities is produced every 5 years.

Investments in the health system.

6. Infrastructure.

Existing facilities (first and back-up level of care hospitals/health centres as well as maternity waiting homes) are to be upgraded and maintained as midwifery-led birthing centres in terms of infrastructure, equipment, supplies, drugs and transportation.

Key assumptions:

It is assumed that all hospitals in countries in HSC category 1 and 2 (in total 11,473 hospitals) and half of all HSC category 3 hospitals (1,500) will require upgrading of facilities, equipment and supplies to enable health care professionals to provide around the clock quality back-up MNH services. In order to ensure two midwifery-led birthing centres per district of 120 000 population, approximately 12,000 health centres will need to be upgraded (to birthing centres). These two midwifery-led birthing centres will need to be staffed by 10 midwives (or equivalent) to provide 24hrs service to 3,600 births per year.¹

Existing hospitals and health facilities at the district level are upgraded and maintained for countries in HSC categories 1 and 2 (100%) and 3 (50%) to provide quality of midwifery and essential obstetric care services. First referral units are upgraded (with necessary equipment and supplies according to WHO's IMPAC guidelines for the hospital and care-givers to treat) to provide around the clock obstetric care and services. No new hospitals are assumed to be built. It is further assessed that maternity waiting homes next to facilities must be established to ensure that women in remote areas can reduce the risk of delays by being closer to back-up facilities.

Table 3.1. Benchmarks for infrastructure.

<p>A district of 120 000 with 3600 births per year has (at least) 20 midwives w/ each midwife delivering 175 births each per year on average</p> <p><i>First level of care: midwifery-led birthing centres per 120 000 with 3600 births per year</i> Services 24/7 with surgical facilities only for minor outpatient procedures such as IUD insertion or minor suturing, and small basic laboratory</p> <p><i>Back-up level (1st referral level): 1 district hospital per 120 000 people with 3600 birth per year</i> At least 1 hospital w/ 10 midwives and a team of 4 medical doctors who have OB/GYN and pediatric skills in addition to auxiliaries and other support workers (incl. lab technicians) Services 24/7 at a district hospital capable of performing surgery such as caesarean delivery and other obstetric emergency procedures Equipped with anaesthesia equipment and a laboratory Blood transfusion available Care of sick newborns/LBW/ and pre-term newborns</p>
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¹ World Health Report 2005: make every mother and child count. Geneva, World Health Organization, 2005.

It is assumed that there is reasonable technical efficiency, the primary health care level is working properly, and access to first referral level is available.

7. Transport.

Cost includes acquisition, operational cost, and maintenance of vehicles and telecommunications for patient transport, staff supervision, training and outreach services. In order to improve/strengthen referral to services it is assumed that each hospital and health centre needs one ambulance/emergency vehicle and that all facilities are equipped with mobile phones.

Key assumptions:

To strengthen referral, each secondary health care facility/hospital has 1 ambulance (per 450 000 population) and mobile phones and MNH services are billed 10-15% of the total costs for running it. At the district level, 1 vehicle is needed per 120 000 population and mobile phones for every health facility. Vehicles for outreach services and supervision are costed as 1 vehicle for every 220 supervision/training/outreach days in rural areas. It is assumed that 25% of outreach services/supervision visits in a health centre (PHC level) are MNH-related, the rest is assumed to be divided among other programmes. Purchasing and operating costs of mobile phones to strengthen referral system between facilities is also included.

8. Human resources for health.

This category includes expenditure needed to strengthen midwifery capacities. Performance of health care services depends ultimately on a motivated, competent health workforce, and the major MNH interventions and services cannot be scaled up without an effective workforce. Strengthening human resources will be critical to ensure the necessary numbers and relevant competencies are available to provide skilled care.

Key assumptions:

- a) Upgrading of training curricula for midwifery and medical/obstetric/neonatal care: curricula will be updated and the teaching facilities upgraded to be able to produce more graduates.
- b) Initial training of skilled birth attendants, overhead training costs and training of midwifery teachers: the calculations present a rough estimate of

the needed human resources and midwifery skills to move towards universal coverage of MNH services. It is estimated that to reach a scale up of 95% coverage there will be a need for an additional of 330,000 midwives at 175 births per midwife, of which 186 thousands will need to be trained by 2015 (see the stock of health professionals needed for first-level and back-up maternal and newborn care to scale up to universal coverage in table 3.2 below). In addition, an estimated 146,300 midwives will be needed to be trained in order to make up for loss due to attrition (5% annual attrition ratio)¹ by 2015 and an additional 223,700 by 2030 when coverage is expected to reach 95% coverage.

The number of midwifery teachers is derived on the assumption that 15 midwifery students can be trained by each teacher. Training costs are based on observed costs from operating programmes, adjusted to individual country prices based on PPP exchange rates.

c) Upgrading and refresher courses/training for current skilled birth attendants (SBAs), and upgrading auxiliary midwives and medical doctors with obstetric and paediatric skills: As a means to improve skills and quality of care in line with evidence-based treatment guidelines, it is assessed to be necessary to upgrade at minimum half of all the current stock of midwives (or equivalent) with 3 months training and approximately 20,000 health professionals who provide obstetric care and/or special newborn care with 12 months training. Refresher training is also included to ensure care is in-line with high standards and the latest evidence. The cost of this training is set based on observed costs from operating programmes, adjusted to individual country prices based on PPP exchange rates. This is a one time investment in upgrading present skills.

For medical doctors with OB/GYN and paediatric skills, curricula for their training are assumed to need revision and they will need special training for working in rural areas. A proportion of practicing doctors/medical officers will need upgrading (on special care/complications; several weeks course), and occasional short upgrades.

No cost is allocated to educating/upgrading traditional birth attendants (TBAs) or other traditional healers/practitioners to improve treatment or referral. No other

¹ Estimates by WHO/EIP/HRH experts.

investment in human resources in the health facility, e.g. for lab technicians and admin staff is included in the costing exercise.

Scaling-up first level MNH care and back-up care (from the current 43% to 73% coverage by 2015) in the 75 countries will require filling the supply gap. In table 3.2 the projections present a rough estimate of the number of human resources and skills needed, and do not take into account the current intake and production in midwifery. Thus, the calculations implicitly assume that currently there is a stable dynamic (i.e. producing as many as leave in a given year) as the best compromise across many countries.

Table 3.2. Filling the supply gap in human resources.

Targets	Strategies
First-level maternal and newborn care for all mothers and newborns: 1 birthing centre per 1750 births, 1 midwife or other professional with midwifery skills per 175 births	Upgrading and redeployment of 140 000 of the estimated 265 000 professionals currently attending to 43% of births at first level MNH care
	Production of midwives or professionals with midwifery skills: 700 000 by 2030 (330 000 to increase the stock and 370 000 to make up for attrition), 334 000 being produced within the first ten years
	Upgrading and creation of 37 000 birthing units, 24 000 within the first ten years
Back-up maternal and newborn care for at least 7% of mothers and 10–15% of newborns: 1 hospital per 120 000 inhabitants	Upgrading of 47 000 doctors and technicians providing back-up services, 27 000 within the first ten years
	Upgrading of 18 000 maternity units in hospitals, 11 000 within the first ten years

ANNEX 4. Data requirements.

1. Demographic and epidemiological data.

To assess the estimated country-specific target population - pregnant women and newborns - the proxy *live births per year* was used together with the crude birth rate, adjusted for maternal mortality and stillbirths, to estimate the number of pregnant women and newborns per year. Medium projections on the total population from the UN Population Division 2002 are the main source.

The estimated country-specific target population in need (PIN), or the women/babies who will require the different interventions, was estimated using the above parameters and the incidence/ prevalence¹ of the conditions/risks associated with pregnancy, including the interactions of scale up upon epidemiology (see Annex 7).

Every year over 200 million women in the world become pregnant and 136 of them give births. It is estimated that around 7% of them develop pregnancy-related complications, which require medical attention at a referral hospital. For close to 530 000 women, pregnancy-related complications are fatal each year. The complications that cause morbidities and deaths of mothers also affect the infant they are carrying. WHO estimates 3.3 million stillborn babies and over 4 million neonatal deaths each year - around 97% of those maternal deaths and 93% of the neonatal deaths take place in the 75 countries included in this costing.²

For the simplicity of calculations, it was assumed that the number of deliveries equals the number of births (stillborn and liveborn babies).

2. Coverage of maternity services.

To estimate the current coverage rate, the following baseline indicators, with national level data, were used to reflect coverage and baseline for scaling-up MNH services.

¹ Most of the incidence and prevalence estimates and effectiveness data used in the costing are based on WHO/MPS expert opinion, based on historical data and [Global Burden of Disease 2002 Estimates](#).

² World Health Report 2005: make every mother and child count. Geneva, World Health Organization, 2005.

A. Antenatal care (ANC).

Care during pregnancy¹ is currently being provided to 42% of pregnant women, on average. It ranges from coverage of 8% to 81% between the 75 countries. Survey data show reasonable coverage with ANC coverage, even with 4 visits, but the quality is not always adequate and fail to meet the standards recommended by WHO. This indicator does not provide information on the content or quality of the services provided.

Key assumptions:

Coverage was estimated for the number of women that currently receive 1, 2, 3, and 4 ANC visits:

1. Data missing from the ANC 4 visits data set were predicted using simple, linear regression using data on percentage that come in for at least one ANC visit as the independent variable. This simple regression shows an r-squared of .80, and standard regression diagnostics do not indicate any threats to the validity of the model. Due the high explanatory power of the simple regression, further models were not pursued.

2. Extrapolate coverage for ANC visit 2 and 3: Assumed that 50% of women that come for one ANC visit but not 4 times will come twice, while 25% will come 3 times.

For the rate of scaling up, the following assumptions were used:

3. Determine the proportion of women coming in for X number of visits over time: Scaling up involves two related aspects: scaling up overall coverage, and scaling up the proportion of women that come in for all 4 visits. Women that currently come in once were counted at 25% of the costs for all 4 visits, 50% for those who come twice, etc. Even though a larger portion of ANC costs are accrued in the first two ANC visits (when screening/treatment of diseases happen), this counting reflects the fact that currently many of the ANC visits in many countries do not cover everything in the costing package. Dividing the cost of current attendance evenly in the scale-up scenario helps account for current low quality service.

B. Skilled attendant at delivery.

The quality of the coverage data available, for instance the coverage of the skilled birth attendant and percentage of deliveries in health facilities, is not clear, in terms of which indicator gives the more correct picture of the quality maternal and

¹ Percentages of women aged 15-49 who had four or more visits of care during pregnancy. Source: [STATcompiler -DHS](#). Last accessed, 23 September 2004.

newborn care. One of the problems concerning quality of data lies in definitional problems, e.g. of the skilled birth attendant.

C. Percentages of births in health facilities (FD).¹

This indicator best captures the current health system capacity of a country to provide quality MNH care and its potential to scale-up access to skilled birth attendants. Scaling-up the coverage of births attended by skilled health personnel at or from a health facility is expected to enable the provision of all the recommended clinical interventions. This proxy indicator therefore serves as the backbone indicator for this costing activity. It is used as a baseline indicator for all care provided by the skilled birth attendant and complications care and all care at the back-up health care level/1st referral sites.²

Key assumptions:

To estimate care during childbirth and immediate postpartum (for the mother) and post-natal (for the newborn) care, the indicator that reflects the presence of a continuum of care at birth is "*the percentage of deliveries in health facilities*" as it most accurately captures the current health system capacity of a country to provide quality MNH care and its potential to scale up access to skilled birth attendants (as recommended by WHO).

D. Post-partum care (PPC).

There is no reliable data available on the coverage of post-partum care services. Estimates based on the limited data available indicate coverage of post-partum care below 30% for developing countries.

Key assumption:

The indicator "health facility births" is used to capture the number of women receiving care after delivery as it was assumed that women who give birth in a health facility are likely to receive PPC.

E. Post-partum family planning (PP FP).

¹ Percent distribution of live births in the last three years preceding the survey, by place of delivery. Source: DHS - Statcompiler.

b) For countries where data was missing, imputation of regional weighted averages was used.

² For short referred to as "*health facility births*". By using this indicator does not translate into any recommendation of setting of birth; birth can take place in a range of appropriate places, depending of availability and need, but should have a skilled attendant present.

No good national data is available on the coverage of family planning services. The contraceptive prevalence rate of several modern methods was used to reflect the percentage of women who are currently using those contraceptive methods.¹

Key assumptions: Projected acceptance rates for contraception and the use of different contraceptive methods are based on the current contraceptive prevalence rate (CPR/any modern method) in countries and are the best proxy for uptake of FP. Countries for which data were not available were assumed to have similar rates to neighbouring countries. For this costing exercise, the target population for family planning services are all postpartum women, not all women of childbearing ages. For the purpose of this costing and to scale-up FP services, it was assumed that women who give birth in a health facility, captured by "percentages of deliveries in a health facility", are more likely to receive post-partum care. It was assumed, for the purpose of the costing exercise, to apply equally to access to FP counselling and services as it does for deliveries.

F. Abortion care.

Data on incidence of induced abortion and abortion care services are frequently incomplete; in countries where abortion is restricted under law, formal reporting is not available at all.

Reliable data are therefore available only from countries where abortion is quite unrestricted under law.

Key assumptions:

In countries where abortion is quite unrestricted under law, the incidence of abortion is derived from Global Burden of Disease (GBD) regional estimates (percentages) of live births to estimate the number of abortions for all countries. In countries where abortion is highly restricted under law, the majority of abortions that take place are unsafe.² The numbers of unsafe abortions that take place have to be estimated indirectly and are mainly based on hospital records of complications from unsafe abortion and on survey data estimating the underreporting, and are therefore imprecise. It is generally accepted that, even so, numbers of abortions are underestimated.

¹ Population Division of the United Nations. Contraceptive Prevalence Wallchart 2003.

² *Unsafe Abortion. Global and regional estimates of the incidence of unsafe abortion and associated mortality in 2000.* Fourth Edition. Geneva, World Health Organization, 2004.

To estimate the per cent of safe abortion that have complications; for abortion performed during the first trimester with vacuum aspiration, reports indicate that less than 0.1% of women experience serious complications requiring hospitalization.¹ For second trimester abortions (or the later the abortion is performed), the risk of complications increases. Based on a study conducted in France, we assume 3% of safe abortions performed in facilities will have complications requiring medical care.² In countries where abortion is restricted under law, the percentage of women estimated to be in need of medical treatment due to the complications of unsafe abortion³ is based on WHO regional estimates of unsafe abortions to live birth. The estimated percentage of unsafe abortions that are assumed to have complications requiring medical treatment varies from 10-50% depending on the region.⁴ This percentage is thus carried forward into future years based on the population to calculate the number in need for services, with treatment for those who experience complications from abortion.

¹ Hakim-Elahi, E., HM. Tovell and MS. Burnhill. *Complications of first trimester abortion: a report of 170,000 cases*. *Obstetrics & Gynecology*, 1990, 76:129-135.

² Thonneau P., B. Fougereyrollas, B. Ducot, D. Boubilley, J. Dif, M. Lalande, and C. Souat. *Complications of abortion performed under local anesthesia*. *European Journal of Obstetrics, Gynecology and Reproductive Biology*, 1998, 81(1):59-63.

³ Defined by WHO as a procedure for terminating an unintended pregnancy carried either by persons lacking the necessary skills or in an environment that does not conform to minimal medical standards, or both.

⁴ In *Unsafe Abortion. Global and regional estimates of the incidence of unsafe abortion and associated mortality in 2000*.

ANNEX 5. Health systems constraints and scale-up scenarios.

In order to prepare scale-up scenarios an assessment of the current capacity and strength of the health systems in extending coverage of MNH services, in addition to taking into account several factors, constraints other than lack of finance, and some broader social and political factors. The section below shows the factors identified and that will contribute to the efforts of scaling-up by influencing the acceleration of extending coverage of MNH services.

1. Commission on Macroeconomics in Health (CMH) Constraints Index:

The health system constraints index used by the Commission on Macroeconomics and Health, as an attempt to classify countries according to the level of health systems constraints they face¹, was assessed but found not to include indicators believed to be very relevant to MNH. An alternative way to classify countries according to health system capacity was found, which takes account of both facility and human resource capacity for MNH (see chapter 2.4).

2. Countries experiencing conflict/post-conflict, civil unrest and/or political instability: scaling-up infrastructure and provision of services is difficult in countries and areas where conflict is ongoing, and where current or recent war, civil unrest and/or political instability have prevailed - in so called fragile states. Regardless of current maternity care coverage, the situation in many of the 75 countries, and in a large group of low-income countries with poor and deteriorating economic and social conditions, weak governance and ineffective government-donor relationships is difficult. In that respect, scaling-up health system capacity and infrastructure will meet considerable barriers even with strong and additional external aid. In addition, a lag time of at least 3 to 4 years after end of conflict can be anticipated for a country to organize and strengthen its infrastructure, including health systems, before meaningful scale-up can occur.

Countries on the *Consolidated Appeals Process (CAP)* list for 2003-2004 (or parts of these countries) declared to have a humanitarian crisis, were assessed

¹ The constraint index is a measure of the average level of constraint that operated in a country over the time period 1985-1999.

against the list of the 75 countries included in the costing; 28 of them are included in the CAP list for 2004, or 37% of the countries. Most of these countries have been classified in HSC category 1.

Scaling-up coverage has to be translated into efforts, both from the countries themselves and donors, and be sensitive to current reality. When taking into consideration and assessing how rapidly the capacity of the health systems, health workers and services in fragile states - conflict-torn, post-conflict situation or politically unstable - can be accelerated, a long term and realistic approach to scaling-up is needed. For the purpose of this costing, it is assumed that fragile states have slower growth rates overall, and no assumption is made on whether the conflict/situation is to end in the future. The HSC categories and the scale-up scenario costed try to capture this but the reality is simplified for the purpose of this costing exercise.

Choosing scale-up scenario.

The HSC index is used to classify countries, based on an indicator that captures important factors that hinder the delivery of adequate MNH services, namely lack of skilled attendants at birth.

For this costing activity, the HSC index was used:

- (i) to assist in determining the pattern and timing of scaling up interventions;
- (ii) to make assumptions on the need for additional system inputs, including capital items such as hospital equipment, capacity development and training.

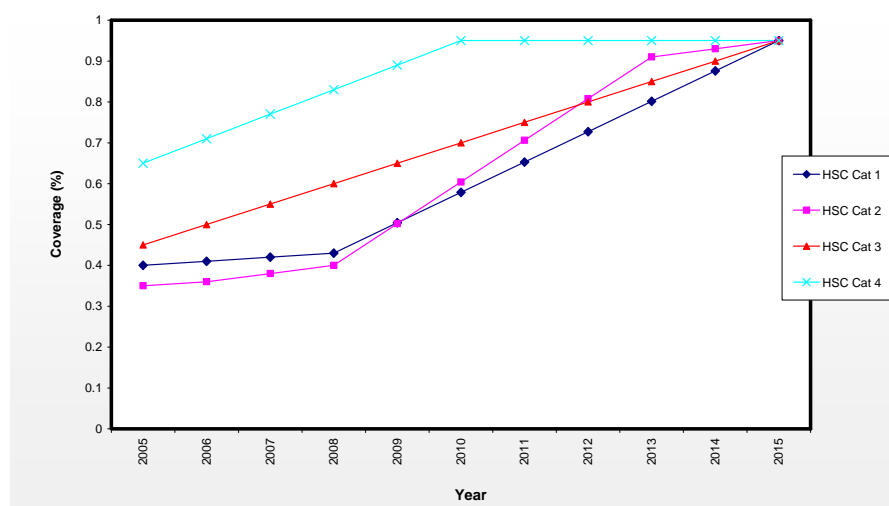
Countries identified with low health system constraints (HSC 1 and 2), i.e. with high systematic constraints, were attributed greater costs in terms of need for incremental investments in the health system. HSC category 4, the least constraint countries in terms of scaling-up skilled care, were based on coverage of deliveries at a health facility and also took into consideration the health system constraints index as assessed by the CMH Constraints Index 4.

Based on the four HSC categories, two scale-up scenarios were explored. The ultimate goal of the scale-up scenarios is to reach 95%, to reflect the imperative for universal coverage, taking into consideration the likely scale-up rates each HSC category would be able to achieve in their efforts towards attaining universal

coverage (see table 2 in chapter 2.4). Ambitious, but realistic scale-up scenarios were developed that were believed will achieve positive and sustainable MNH outcomes. The distinction between the scenarios is reflected in the growth rates, or the possible acceleration of scaling-up, where each scenario was given different assumptions on the strength and capacity of the health systems and infrastructure, and the time-frame given to reach the target coverage.

Figure 5.1 and 5.2 below provide an overview of the two scale-up projections¹ for the period 2006 – 2015.

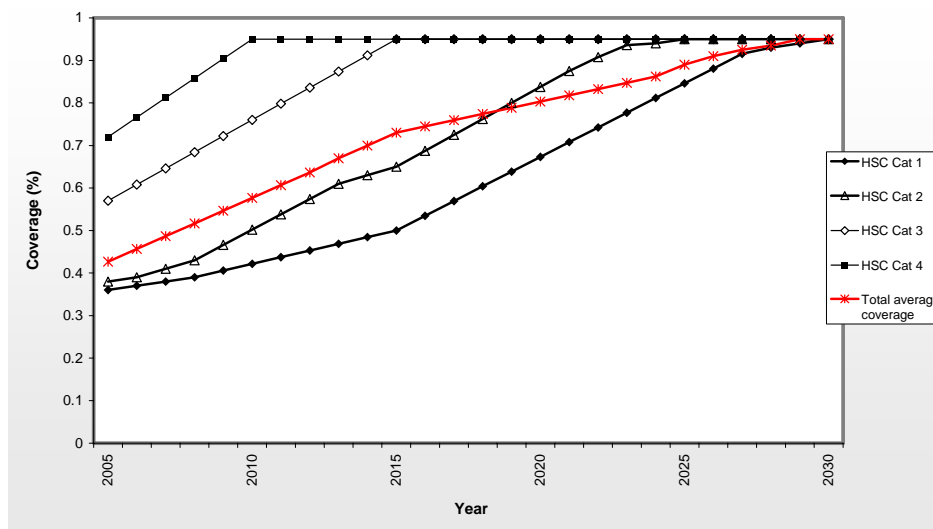
Figure 5.1. Scale-Up Projections to Achieve 95% Coverage of 'births at health facility' in 2015 - SCENARIO 1.



This scenario reflects efforts of rapidly scaling-up programmes assuming substantial investment in existing health systems over 10 years, to reach 95% coverage of births in facilities in and by 2015. The assumption is that all countries, irrespective of their health system capacity (HSC) classification, will reach 95% coverage by 2015 (see cost estimates for that scenario in Annex 6).

¹ Note that the modelling of scale-up curves and coverage targets given are not intended to be prescriptive in terms of what individual countries should reach, but were done to represent likely scenarios for the sake of this global costing.

Figure 5.2. Scale-Up Projections to Achieve 95% Coverage of 'births at health facility' (Average Coverage by Health System Constraints Category) - SCENARIO 2.



Scale-up patterns and targets for this scenario were determined using moderate growth rates, assessed specifically for each health system capacity (HSC) category, and using 2015 to assess where countries are in their efforts to reach universal coverage. This scenario accounts for increasing the number and coverage of skilled birth attendants in health facilities, which will require substantial annual programme and health system expansion (see more in chapter 2.4 and cost estimates for that scenario in chapter 3 and Annex 6).

ANNEX 6. Breakdown of the incremental cost estimates.

BOX 4. Desegregation of cost estimates.

Costs		Total
1. Direct service delivery costs	a = US\$ 9.8 billion (25%) b = US\$ 19 billion (48.5%)	US\$ 28.8 billion (73%)
2. Programme costs	a = US\$ 1.6 billion (4%)	US\$ 10.4 billion (27%)
3. Investments in health systems	a = US\$ 6 billion (15.5%) b = US\$ 1.8 billion (4.8%) c = US\$ 840 (2.1%)	
<i>Remuneration of service providers at facility level</i>	<i>US\$ 9.8 billion</i>	
<i>Human resources for service delivery*</i>	<i>US\$ 10.6 billion (27%)</i>	
<hr/>		
Terminology	Data included	Denominator
1. Direct service delivery costs	a. Remuneration of service providers (facility level) b. Essential medicines and commodities	Per patient
2. Programme costs	a. Investment in programme management and policy (management, advocacy, health education, M&E)	Per population / district
3. Investments in health systems	a. Investment in physical resources/infrastructure b. Transport/telecommunications for referral c. Investment in human resources (training and upgrading)	Per population / district

Remuneration of service providers at facility level (1.a above) Includes staff consultation time, salaries of skilled attendants/health workers, locally procured goods, electricity and maintenance of buildings.

Human resources for MNH service delivery Includes 1.a and 3.c above.*

* Note that 1.a includes not only remuneration at current salary levels but also overhead costs for electricity and water etc. However, human resources are the main cost component, thus this is used as an approximate measure.

Table 6.1. Total incremental costs per Inhabitant.

Health system constraints category	2006		2015		Grand total	Total (average) per capita	% of total
	Total incremental cost	Cost per capita	Total incremental cost	Cost per capita			
<i>HSC category 1</i>	\$ 161,599,957	\$ 0.35	\$1,240,747,302	\$ 2.17	\$ 7,035,252,988	\$ 1.25	18%
<i>HSC category 2</i>	\$ 136,224,565	\$ 0.22	\$1,209,053,063	\$ 1.60	\$ 6,551,760,673	\$ 0.87	17%
<i>HSC category 3</i>	\$ 115,661,579	\$ 0.27	\$596,661,349	\$ 1.23	\$ 3,705,389,721	\$ 0.74	9%
<i>HSC category 4</i>	\$ 620,524,623	\$ 0.20	\$3,108,147,726	\$ 0.91	\$ 21,983,627,505	\$ 0.61	56%

Table 6.2. Total incremental costs by Expenditure Category.

Cost components	2006	% of total	2015	% of total	Total	% of total
<i>Remuneration of service providers</i>	\$ 190,873,037	18%	\$ 1,703,544,317	28%	\$ 9,804,422,758	25%
<i>Drugs, supplies & lab tests</i>	\$ 269,927,348	26%	\$ 3,543,705,254	58%	\$ 19,032,267,477	48%
sub total	\$ 460,800,385	45%	\$ 5,247,249,571	85%	\$ 28,836,690,236	73%
<i>Investments in the Health System</i>	\$ 474,982,750	46%	\$ 715,711,011	12%	\$ 8,802,913,123	22%
<i>Programme Costs</i>	\$ 98,227,590	9%	\$ 191,648,858	3%	\$ 1,636,427,528	4%
sub total	\$ 573,210,340	55%	\$ 907,359,870	15%	\$ 10,439,340,651	27%
Grand total	\$ 1,034,010,725	100%	\$ 6,154,609,441	100%	\$ 39,276,030,887	100%

Cost components	2006	% of total	2015	% of total	Total	% of total
<i>Remuneration of service providers</i>	\$ 190,873,037	18%	\$ 1,703,544,317	28%	\$ 9,804,422,758	25%
<i>Drugs, supplies & lab tests</i>	\$ 269,927,348	26%	\$ 3,543,705,254	58%	\$ 19,032,267,477	48%
<i>Investments in the Health System</i>	\$ 474,982,750	46%	\$ 715,711,011	12%	\$ 8,802,913,123	22%
<i>Programme Costs</i>	\$ 98,227,590	9%	\$ 191,648,858	3%	\$ 1,636,427,528	4%
Grand total	\$ 1,034,010,725	100%	\$ 6,154,609,441	100%	\$ 39,276,030,887	100%

Table 6.3. Total incremental costs by Level of Care.

Service Delivery Costs	2006	% of total	2015	% of total	Total	% of grand total
Total First Level Maternal and Newborn Care	\$ 313,632,374	56%	\$ 2,851,176,767	54%	\$ 16,250,165,824	56%
Total Back Up Maternal and Newborn Care	\$ 241,694,585	44%	\$ 2,396,072,804	46%	\$ 12,586,524,412	44%
Service Delivery Sub-Total	\$ 555,326,959	100%	\$ 5,247,249,571	100%	\$ 28,836,690,236	100%
Grand total	\$ 1,034,010,725		\$ 6,154,609,441		\$ 39,276,030,887	

Service Delivery Costs	2006	% of	2015	% of	Total	% of
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		total		total		grand total
Total First Level Maternal and Newborn Care	\$ 313,632,374	30%	\$ 2,851,176,767	46%	\$ 16,250,165,824	41%
Total Back Up Maternal and Newborn Care	\$ 241,694,585	23%	\$ 2,396,072,804	39%	\$ 12,586,524,412	32%
Grand total	\$1,034,010,725	54%	\$ 6,154,609,441	85%	\$ 39,276,030,887	73%

Table 6.4. Total incremental costs by Intervention.

Intervention	Total costs	% of total
Antenatal Care	\$ 9,045,479,062.56	23%
Care During Birth	\$ 15,264,738,488.62	39%
Post-partum & Post-natal Care	\$ 2,049,539,823.32	5%
Post-partum Family Planning	\$ 1,633,631,444.88	4%
Abortion and post-abortion care	\$ 843,301,416.26	2%
Programme Management	\$ 249,662,590.75	1%
Supervision	\$ 75,172,338.68	0%
Health Education	\$ 756,422,919.13	2%
Advocacy	\$ 286,552,542.26	1%
M&E	\$ 268,617,137.34	1%
Infrastructure	\$ 6,077,503,077.31	15%
Transport	\$ 1,884,992,189.18	5%
Training	\$ 840,417,856.58	2%
	\$ 39,276,030,886.87	100%

Table 6.5. Total incremental costs of Scaling-Up MNH services to 95% coverage by 2015.

Health system constraints category	2006		2015		Grand total	Total (average) per capita
	Total incremental cost	Cost per capita	Total incremental cost	Cost per capita		
<i>HSC category 1</i>	\$176,695,430	\$0.38	\$2,399,005,902	\$4.19	\$11,504,603,334	\$2.05
<i>HSC category 2</i>	\$147,132,897	\$0.23	\$2,202,312,499	\$2.92	\$11,585,301,758	\$1.53
<i>HSC category 3</i>	\$150,810,637	\$0.35	\$924,736,626	\$1.90	\$5,394,097,023	\$1.07
<i>HSC category 4</i>	\$746,883,131	\$0.24	\$4,002,127,460	\$1.17	\$27,174,045,421	\$0.76

ANNEX 7. Interactions of scale-up upon epidemiology.

The impact of scale-up of specific interventions on need for other interventions was calculated using change in coverage and effectiveness of the interventions and baseline epidemiology. Conceptually stated, this means: (increase in coverage x effectiveness) = decrease in % need or incidence.

1. Increase in coverage of syphilis screening and treatment during pregnancy will decrease incidence of newborns requiring treatment for syphilis.

Source of effectiveness: US Preventive Services Task Force on Syphilis Screening (July 2004) in particular: *Antenatal syphilis screening in the UK: A systematic review and national options appraisal with recommendations. PHLs Communicable Disease Surveillance Centre with the PHLs Syphilis Working Group; 1998*
http://www.guideline.gov/summary/summary.aspx?doc_id=5265&nbr=3592&string=syphilis

2. Increase in coverage of maternal TT immunization will decrease the incidence of tetanus infection in the newborn.

Source of effectiveness - on the assumption that at least one dose is given at least 90 days prior to delivery: *Maral I, Cirak M, Aksakal FN, Baykan Z, Kayikcioglu F, Bumin MA. Tetanus immunization in pregnant women. Serum levels of antitetanus antibodies at time of delivery. Eur J Epidemiol. 2001; 17(7):661-5.*

3. Increase in coverage of antibiotics for premature rupture of membrane will decrease
a. % requiring presumptive sepsis care
b. % requiring sepsis management

Source of effectiveness *Kenyon S, Boulvain M, Neilson J. Antibiotics for preterm rupture of membranes. The Cochrane Database of Systematic Reviews 2003, Issue 2. Art. No.: CD001058. DOI: 10.1002/14651858.CD001058.*

4. Increase in coverage of treatment of *bacterial vaginosis / trichomonas infection* will decrease the incidence of PROM and need for antibiotic treatment.

Source of effectiveness: *McDonald H, Brocklehurst P, Parsons J, Vigneswaran R. Antibiotics for treating bacterial vaginosis in pregnancy. The Cochrane Database of Systematic Reviews 2003, Issue 1. Art. No.: CD000262. DOI: 10.1002/14651858.CD000262.*

5. Increase in coverage of active management of labour will decrease incidence of post partum haemorrhage and prolonged labour.

Source of effectiveness: *Prendiville WJ, Elbourne D, McDonald S. Active versus expectant management in the third stage of labour. The Cochrane Database of Systematic Reviews 2000, Issue 3. Art. No.: CD000007. DOI: 10.1002/14651858.CD000007*

6. Increase in coverage of external cephalic version will decrease the need for caesarean sections.

Source of effectiveness: *Hofmeyr GK, Kulier R. External cephalic version for breech presentation at term (Cochrane Review). The Cochrane Library, 1, 2002.*

7. Increase in coverage of caesarean sections will decrease incidence of obstetric fistulae.

Source of effectiveness: *Cottingham J, Royston E. Obstetric Fistulae: A review of available information. WHO/MCH/MSM/91.5*

*NOTE that for the purpose of this analysis, the number of newborns every year is based on estimates by UNPop Division (unchanged even with additional maternal deaths being averted by the scale up of interventions and consequent potential for new pregnancies).

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