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Adding It Up: The Need for and Cost of Maternal and Newborn Care—Estimates for 2012

Susheela Singh, Jacqueline E. Darroch and Lori S. Ashford

HIGHLIGHTS

- In 2012, there were an estimated 122 million births in the developing world. All of these women and newborns needed antenatal, delivery and postnatal care.
- Only 55% of developing-country women who gave birth in 2012 made four or more antenatal visits. Many who received antenatal care did not receive screenings and other necessary services they needed to ensure a healthy pregnancy.
- Sixty-four percent of women who gave birth delivered in a health facility. This proportion varied from 51% in the poorest countries to 94% in higher-income developing countries.
- Between 2008 and 2012, the proportion of women receiving adequate antenatal care increased by a modest one percentage point per year. The proportion delivering in health facilities increased faster, by 2.3 percentage points per year, markedly reducing the numbers of women and newborns with unmet need for facility-based delivery care.
- An estimated 55 million women giving birth in 2012 had an unmet need for adequate antenatal care (four or more visits), and 44 million women had an unmet need for delivery care in a health facility. Two regions, Sub-Saharan Africa and South Asia, accounted for about 80% of the total unmet need for each of these types of care.
- Although only a minority of women and newborns experienced medical complications at the time of delivery in 2012, most of them did not receive the recommended care.
- Unmet need for maternal and neonatal care reflects a number of barriers that need to be overcome, such as weak health infrastructure, lack of trained professionals, distance to care, and issues related to knowledge and attitudes about the need for care.
- The total cost of providing the recommended levels of maternal and neonatal care to all women giving birth and their newborns is an estimated \$24.1 billion annually, of which \$8.5 billion is for direct costs and \$15.6 billion is for program and systems costs. This is more than double the cost of current care in 2012, estimated at \$11 billion.
- These additional investments would provide immediate returns in terms of saving lives and reducing disabilities among women and newborns, and would bring long-term benefits as human and physical capacity in the health sector is improved.



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Context and Purpose of the Report

Worldwide, extensive efforts have been made over the last decade to improve reproductive health services and reduce maternal and child mortality, and impressive gains have resulted. Still, far more women and their babies in developing countries could be spared needless suffering and death, especially during the risky period during and after a birth. Maternal deaths, estimated at 284,000 in developing countries in 2010,¹ are largely due to treatable complications at or around the time of delivery. Greater attention must also be paid to newborn survival, as about three million babies die annually during the first 28 days of life—43% of all deaths under age five.²

The vast majority of these maternal and newborn deaths occur in Sub-Saharan Africa and South Asia. Only a handful of countries in the poorest regions of the world are on track to meet both Millennium Development Goals (MDGs) 4 and 5, which call for reducing child mortality by two-thirds and maternal mortality by three-quarters, respectively, over the period 1990–2015.³ Progress is slowest and inequities in coverage are widest for services, such as life-saving interventions for complications among pregnant women and their newborns, that rely on a well-functioning health system.

In 2010, the United Nations (UN) Secretary-General launched the Global Strategy for Women’s and Children’s Health to mobilize government and donor-agency commitments to achieve MDGs 4 and 5.⁴ The strategy calls on governments to ensure that maternal, newborn and child health care are included in the package of essential health services that is available to everyone. It is being implemented under the umbrella effort, Every Woman Every Child, which includes more than 200 national and international partners and aims to save the lives of more than 16 million women and children over five years.⁵

The health of a mother and that of her newborn are closely linked. Most maternal and newborn deaths are caused by the poor health of the mother before or during pregnancy, or by poor-quality care in the critical hours and days before and after a birth.⁶ Infant mortality among infants whose mothers died is nine times the rate among those whose mothers survived.⁷ Also, a mother’s health has major ramifications for her family’s well-being.

Because of these linkages, there is a strong consensus among policymakers, researchers and health profession-

als that improving maternal and newborn health can be achieved most effectively through a “continuum of care” approach. To accelerate progress toward MDGs 4 and 5, the World Health Organization (WHO) has identified packages of interventions that have proven to be effective for women of reproductive age and their children, including family planning, safe abortion care, and maternal, newborn and child health care.⁸ Programs that integrate women’s and children’s health care from before pregnancy through early childhood can save money, increase efficiency and maximize the health benefits to mothers and their children.

A study published in 2009 by the Guttmacher Institute, *Adding It Up: The Costs and Benefits of Investing in Family Planning and Maternal and Newborn Health*, identified and quantified the unmet need for maternal and newborn health services in 2008.⁹ The study estimated that in the developing world in 2008, roughly half of pregnant women did not receive adequate antenatal care, and a similar proportion did not deliver their babies in a health facility. It estimated that three-quarters of women needing care for obstetric complications, such as obstructed labor or hemorrhage, did not receive it. The study also calculated costs and benefits of closing these health care gaps.

This report gives new estimates for 2012, incorporating recent information on maternal and newborn service needs, use and costs. More comprehensive estimates, including impacts of meeting these health care needs, will be published in 2014. The estimates presented here draw from the most recent survey data on the use of and need for maternal and newborn health care, and from updated estimates of the direct costs of providing these services in 2012. The report presents results for major regions and key subregions and for higher- and lower-income countries of the developing world.

The goal of this report is to inform donors, governments and advocates about the need to improve and expand maternal and newborn health services in developing countries. The benefits of meeting the need for these services would be dramatic, as shown by earlier reports.^{9,10} For example, the 2009 Guttmacher study showed that if all pregnant women and their newborns received adequate services before and at the time of birth—whether deliveries are routine or involve complications—the number of maternal and newborn deaths would be cut substantially.¹⁰

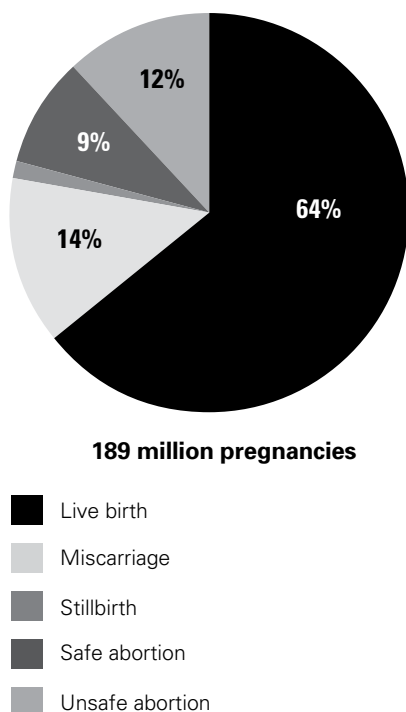
SCOPE OF THIS REPORT

In developing regions in 2012, there were an estimated 189 million pregnancies (Figure 1).¹¹ Of these, 64%, or 122 million, resulted in a live birth, and the services received (or not received) by the women giving birth and their newborns are detailed in this report. For the one-third of pregnancies (67 million) that did not result in live birth, women may have also needed health care, because they experienced either a miscarriage, an induced abortion or a stillbirth. Because data are limited on the services received by women who do not carry their pregnancies to term and they were not included in the 2008 estimates, their needs are not quantified in this report but will be included in a forthcoming report in the *Adding It Up* series.

Services Covered

The maternal and newborn health services analyzed in this report are not meant to be exhaustive but to indicate whether or not women who give birth are receiving the care they need to prevent deaths and disability. The ser-

FIGURE 1. In 2012, 122 million pregnancies resulted in live births in the developing world.



Source: reference 11.

VICES are consistent with those recommended by WHO as essential interventions for pregnant women and their newborns, with some exceptions explained below. Because the health of pregnant mothers and that of their newborns are intertwined, the services must also be linked; they can best be viewed along a continuum of care for women and their infants (Figure 2, page 5). The services for women and their newborns along this timeline and covered in this report include

- antenatal care with a skilled provider (a midwife, nurse or doctor), which should consist of at least four visits during a pregnancy, beginning in the first trimester;
- delivery in a health facility or with a skilled attendant, including routine care for the mother and newborn;
- postnatal care for the mother and newborn shortly after birth, including routine checkups and support for breastfeeding; and
- care for medical complications that arise during pregnancy, childbirth and shortly after birth for the woman and her newborn.

These categories of services are described in the next section and listed in detail in Appendix Table 1, page 30.

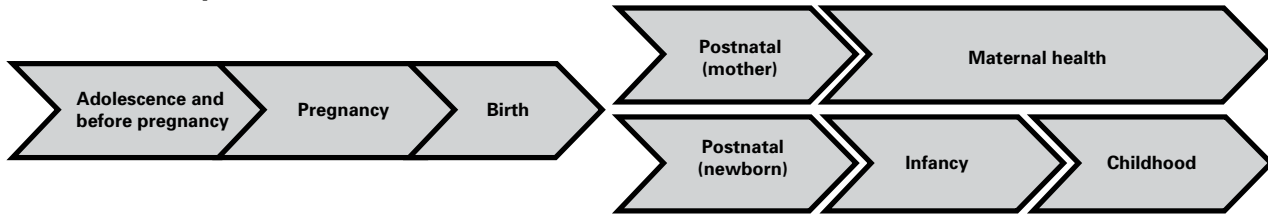
Services Not Covered

Several essential services along the continuum of maternal and newborn care are not included in the estimates in this report. These are care for pregnancies that are not carried to term; contraceptive services to prevent unintended pregnancies, including postpartum family planning; and treatment for HIV among pregnant women and prevention of mother-to-child transmission of HIV. The estimates also exclude care for newborns requiring surgery for congenital abnormalities and neonatal intensive care.

Contraceptive services and the prevention and treatment of HIV should be available as part of an integrated package of reproductive health services for women whether they become mothers or not. These and other reproductive health services will be reviewed in a forthcoming *Adding It Up* report.

Caring for women with miscarriages, stillbirths and abortions. In any given year, some pregnancies (about one-third in 2012) are not carried to term. The pregnant women may choose not to have a child, or a pregnancy they intend to carry to term may not end successfully in

FIGURE 2. A continuum of care helps to ensure the health and safety of women and babies before, during and after delivery.



Note: Adapted from the World Health Organization. Source: reference 8.

a live birth. This report excludes these cases so that we could make direct comparisons with 2008 data. Yet, these women have health care needs that existing services could address more effectively.

In 2012, the 67 million pregnancies in developing regions that did not end in a live birth can be broken down as follows:

- 25.6 million miscarriages—women having miscarriages (fetal deaths before 28 weeks’ gestation) need health services up to the time of pregnancy loss and, in some cases, afterward.
- 2.6 million stillbirths—women who have stillbirths (fetal deaths at or after 28 weeks’ gestation) need antenatal and facility-based care.
- 39 million induced abortions—about 43% of these abortions took place in countries where abortion is legally available under broad criteria, while 57% were unsafe and took place in countries with highly restrictive laws.

In our forthcoming report, the analysis will be extended to include antenatal care for women with miscarriages up until the time of pregnancy loss; antenatal, delivery and postpartum care for women with stillbirths; and abortion services. Estimates of the number of women treated for postabortion complications are available based on health facility surveys in a number of countries.¹² In the section titled “Costs and Benefits of Meeting the Need for Maternal and Newborn Care” (page 20) we include the cost of care for these women in 2012, because the complications of unsafe abortions are a major direct cause of maternal death.

Preventing unintended pregnancies. Any strategy to reduce maternal deaths and illnesses must include providing women and couples with modern contraceptives to prevent unintended pregnancies. Contraceptive services are highly effective and low cost, as shown in prior

Adding It Up reports.⁹ And, while contraception has numerous benefits for women and couples on its own, it also dramatically reduces the number of women and newborns who need health services. A recent study published by the Guttmacher Institute found that based on data for 2012, more than half of women of reproductive age in the developing world (867 million) need contraception to prevent an unintended pregnancy, because they want to delay a birth or stop childbearing.¹³ Of these women, a majority (645 million) are using modern contraceptives, but a significant minority—222 million women—are not. If all of these women, who are referred to as having unmet need for modern methods, received modern contraceptive services, 55 million unintended pregnancies could be averted. Some 21 million unplanned births—about one-sixth of the births covered in this report—could therefore be prevented. A forthcoming report in 2014 will show how providing both contraceptive services and maternal health services to all women who need them is cost-effective in saving lives and improving health.

Preventing and treating HIV and AIDS. HIV infection is one of the major indirect causes of maternal death, accounting for a significant share of maternal deaths, particularly in high-prevalence countries.¹ A review of studies conducted in developing countries found that women with HIV infection have eight times the risk of a pregnancy-related death compared with uninfected women.¹⁴ Therefore, HIV prevention and treatment are critical components of care for pregnant women—both to protect the women’s health and to prevent transmission of the infection from mother to child. The discussion of antenatal care in the next section describes the recommended screening and care. This report excludes the need for and cost of HIV treatment, however.

Essential Health Services for Pregnant Women And Newborns

All pregnancies and births pose some health risks to the mother and child that cannot necessarily be predicted in advance. Therefore, a minimum level of care must be given to all pregnant women to ensure safe and healthy outcomes. The World Health Organization (WHO) has established standards of care for reproductive-age women and their infants—before and during pregnancy, during childbirth and after birth—to be delivered along a continuum of care (Figure 2). The packages of essential services have been continuously refined in recent years as evidence has become available on the effectiveness of specific interventions.^{15–17}

In this section, we present estimates of antenatal, delivery and newborn care needed and used by women who gave birth in 2012. We used data from nationally representative surveys, such as Demographic and Health Surveys, to estimate the proportions of women receiving services, along with some of the specific services they received. These estimates are shown for the developing world as a whole, three major regions—Africa, Asia, and Latin America and the Caribbean—and 14 subregions, grouped according to United Nations definitions. Data are also shown separately for the 69 poorest countries (those with per capita incomes at or below \$2,500 per year) because they are the focus of major health initiatives, and for the remaining, higher-income countries in developing regions (see Appendix Table 2, page 31, for a list of countries and their income categories). The Appendix, page 27, gives an overview of the data sources and methodology used in the analysis.

Current Levels of Antenatal Care

Good quality antenatal care offers women the information, counseling and services they need to have a healthy pregnancy, including screening, preventive care and treatment for a range of conditions that could jeopardize the health of the woman or her baby. Also, because pregnancy complications are a key cause of death and illness for both pregnant women and their infants, women should be encouraged and assisted to deliver their babies in a health facility or with a skilled attendant. WHO recommends a minimum of four antenatal visits with a skilled professional—a midwife, nurse or doctor—beginning during the

first trimester and continuing throughout the pregnancy.¹⁵ Women with health complications generally need more than four visits (see Appendix Table 1, page 30, for a list of the conditions and associated care covered in this report).

Number and timing of visits. In 2012, 81% of women giving birth in developing regions received some antenatal care (at least one visit with a skilled provider; Table 1, page 7), representing only a small increase from 78% in 2008 (not shown). Yet, many of these women made only one or two visits during their pregnancies.

The proportion of women making four or more antenatal care visits is a useful proxy for gauging the adequacy of antenatal care: In 2012, 55% of women giving birth in the developing world made the recommended number of antenatal visits, compared with 51% in 2008—an average increase of 1.0 percentage point each year (Figure 3, page 8). While some regions, such as Northern Africa, Southern Africa, Eastern Asia, Central Asia and Central America, have seen greater increases (2.8 percentage points annually or more), others have seen much less or no change (1.5 percentage points or less).

Progress among countries varies. For example, among countries with recent data Rwanda has seen the most rapid gains in antenatal care, and Bangladesh and Ethiopia have made marked progress. Gains were relatively small in India, and almost no improvement has occurred in Uganda (Figure 4, page 9).¹⁸ In all of these countries, fewer than half of women make the recommended four or more visits, which is true for the poorest 69 countries as a whole. Among higher-income developing countries, Colombia and the Dominican Republic, which already had high levels of coverage in 1990, have continued to make steady progress.

When women make antenatal care visits, what services do they receive? The content and quality of care can vary, and surveys may not capture all of the services that women receive. The data that are available, however, show that making visits to a skilled provider does not guarantee that pregnant women will receive the essential tests and treatments they need.

To illustrate the level of care received, we estimated for 2012 the proportion of women receiving blood or urine

TABLE 1. Number of women in developing countries who gave birth and the proportion receiving antenatal care, 2008 and 2012, and the annual percentage point change in the proportion making four or more antenatal visits in 2008–2012, by region, subregion and income group

Region, subregion and income group	Number of women giving birth (000s)		% of women giving birth receiving antenatal care*, †				Annual percentage point change in % with 4+ visits
	2008	2012	2008	2012			
			4+ visits	No visits	1–3 visits	4+ visits	
Developing world	122,710	121,560	51	19	26	55	1.0
Africa	35,490	36,890	45	22	31	47	0.5
Sub-Saharan Africa‡	31,790	33,360	44	22	32	46	0.5
Eastern Africa	12,330	12,710	42	20	41	39	-0.7
Middle Africa	5,240	5,410	45	18	37	45	0.0
Southern Africa	1,280	1,250	74	3	11	85	2.8
Western Africa	11,640	12,510	45	26	25	49	1.0
Northern Africa	5,000	5,010	46	25	14	60	3.5
Asia§	76,430	73,870	49	19	27	54	1.3
Eastern Asia	19,090	17,320	68	6	9	85	4.3
Central Asia	1,290	1,370	71	4	6	90	4.8
South Asia	39,370	38,510	34	29	37	34	0.0
Southeast Asia	11,090	10,850	68	8	20	72	1.0
Western Asia	5,320	5,550	51	17	26	57	1.5
Latin America and the Caribbean	10,790	10,800	79	4	9	87	2.0
Caribbean	780	740	75	4	17	80	1.3
Central America	3,110	3,260	71	6	8	86	3.8
South America	6,910	6,800	83	4	9	87	1.0
69 poorest countries**	83,490	84,530	42	24	32	44	0.5
Higher-income countries††	39,220	37,030	69	6	13	81	3.0

*Based on women's care during pregnancy for their most recent birth in the last three years. †Women with antenatal care are those having at least one visit to a skilled health provider (doctor, midwife or nurse); the data for other visits do not specify the provider. ‡Sub-Saharan Africa includes Sudan and South Sudan, both of which are located in Northern Africa. §Includes Oceania. **Countries with a per capita gross national income of \$2,500 or less in 2010. ††Countries in developing regions with per capita gross national income of more than \$2,500 in 2010. Source: reference 11.

tests as part of their antenatal care.* In the developing world as a whole, among women who made at least one antenatal care visit to a skilled provider in 2012, 66% and 69% reported receiving at least one urine test and one blood test, respectively (Table 2, page 10). However, there were large variations among subregions in the proportions receiving these tests. Pregnant women in lower-income countries receive less comprehensive care than those in higher-income developing countries: In the 69 poorest countries, about 60% of women received each of these tests during their antenatal visits, while in higher-income countries, 80% or more did.

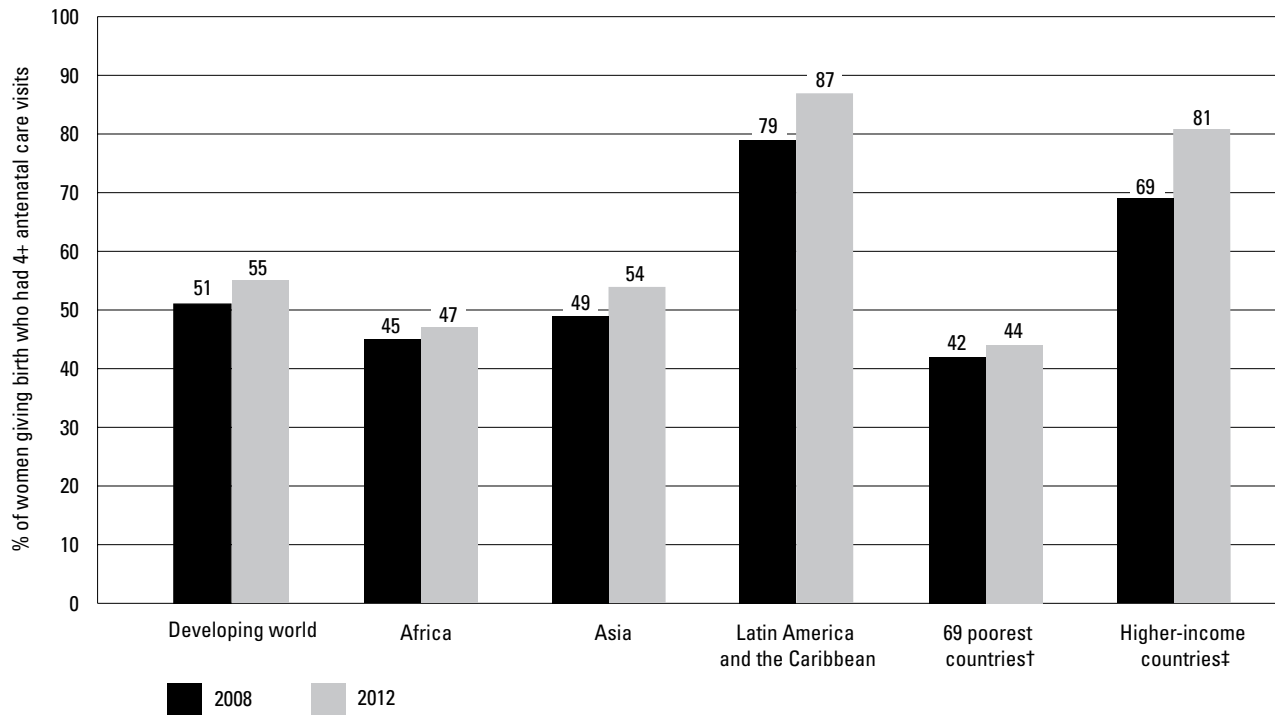
The timing of a woman's first antenatal care visit is also an important indicator of the adequacy of care she receives. As noted above, WHO recommends that women make their first visit during the first trimester of pregnancy. The data available for a limited number of countries suggest that only a minority of women in Sub-Saharan

Africa meet this standard. In most of this region, women are not seen until well into the fifth month of pregnancy. Several countries, such as Ethiopia, Ghana, Rwanda and Uganda, have seen small improvements, while others, including Kenya and Nigeria, have seen little change; the situation has worsened in recent years in Zimbabwe (data not shown).¹⁸ Timing of the first antenatal visit is somewhat better in some Asian and Latin American countries, where the first visit typically occurs during months three or four and months two and three, respectively.

Care for specific health conditions. Table 2 also shows the level of need for certain treatments among women giving birth. For example, WHO recommends that all women receive iron supplementation during pregnancy.

*WHO recommendations call for a urine test at each visit, but the available data do not specify the timing and frequency of testing.

FIGURE 3. In Africa and the poorest countries, fewer than half of women giving birth make the recommended number of antenatal care visits.*



*Four or more antenatal care visits, of which at least one was to a skilled provider. †Countries with a per capita gross national income of \$2,500 or less in 2010. ‡Countries in developing regions with per capita gross national income of more than \$2,500 in 2010. *Source:* reference 11.

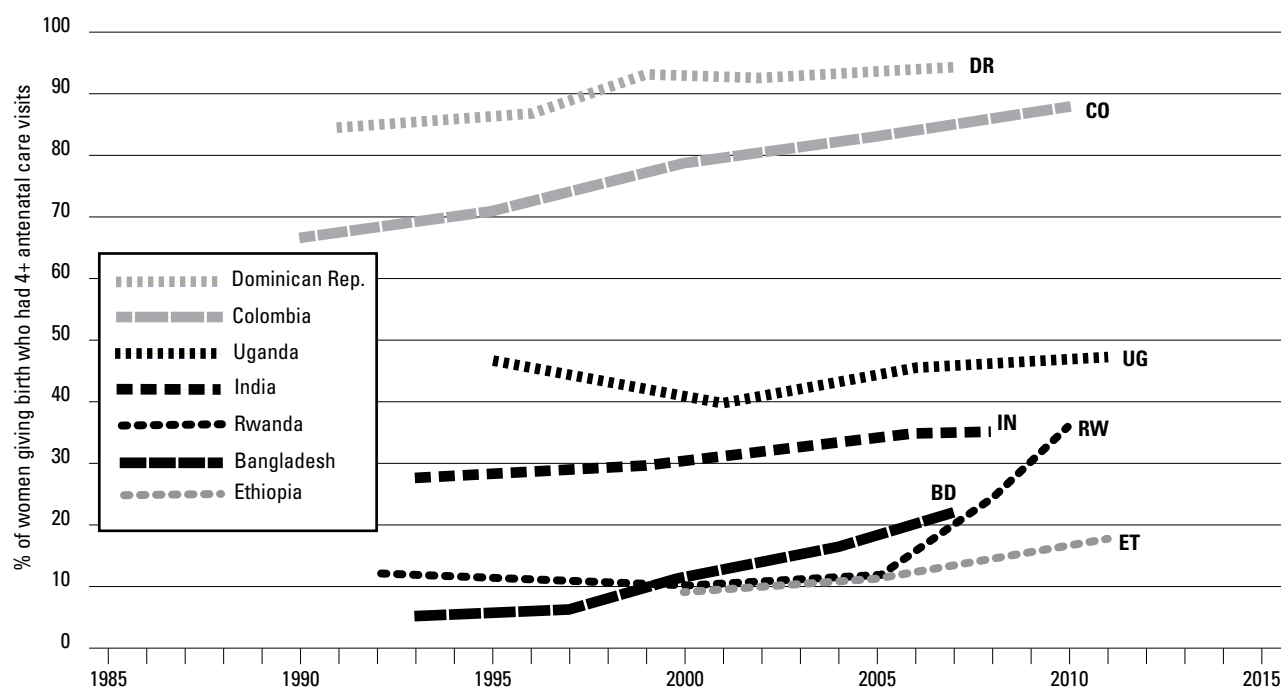
Survey data show that two-thirds of women giving birth in developing regions report taking iron supplements during pregnancy. Because it is likely that not all these women take the recommended amount, a minimum of 33% of pregnant women in developing countries have an unmet need for iron supplements. Further, blood tests done in conjunction with household surveys indicate that an estimated 56% of pregnant women have some degree of anemia (hemoglobin levels below 11 g/dl) and need more than the basic level of iron supplementation. Though the proportion of women taking supplements (67%) is higher than the proportion with blood tests confirming anemia, it is possible that many of the women taking supplements are not taking them at the dosage and frequency needed to treat anemia. Unlike other indicators in this report, the levels of anemia and need for supplementation are higher in Latin America and the Caribbean (58%) and Asia (60%) than in Africa (47%).

Some treatments are recommended for pregnant women based on the prevalence of certain diseases where they live. Hookworm, for instance, is a soil-transmitted parasite that is endemic in rural areas of the tropics and afflicts the poorest people.¹⁹ The infestation

occurs in the intestines, causing slow blood loss that contributes to anemia and malnutrition—a health threat to both the mother and her newborn. Because individual testing is generally not carried out and there are no obvious symptoms, health experts recommend that all pregnant women living in countries where hookworm is endemic take anti-parasite medication.²⁰ The estimated proportion of pregnant women needing treatment in the developing world as a whole is 79%, ranging from 90% in Africa and 80% in Asia to 40% in Latin America and the Caribbean. The need among pregnant women is much higher in the 69 poorest countries (86%) than in the rest of the developing world (64%).

Treatment for malaria is also location-specific. In areas where any type of malaria is endemic, pregnant women need to sleep under insecticide-treated bed nets. In addition, in Africa where there is moderate to high transmission of a certain type of malaria (*P. falciparum*), pregnant women should be given antimalarial drugs, ideally under supervision—referred to as intermittent preventive treatment of malaria in pregnancy—as part of antenatal services.²¹ In developing countries, 60% of pregnant women need preventive care for malaria; regional figures range

FIGURE 4. Progress in antenatal care between 1990 and 2012 varied greatly among countries.



Source: reference 18.

from 83% in Africa (92% in Sub-Saharan Africa) to 55% in Asia and 19% in Latin America and the Caribbean. (A low proportion in need of malaria prevention indicates that malaria has been eradicated or controlled in much of that region). The need for malaria prevention among pregnant women is much higher in the 69 poorest developing countries (79%) than in the rest of the developing world (19%).

Survey data on whether pregnant women receive antimalarial drugs are fairly comprehensive for Africa but minimal for the rest of the developing world. In Africa, only 40% of pregnant women in countries with malaria reported sleeping under insecticide-treated bed nets the night before being surveyed (not shown). Moreover, only 20% of the pregnant women living in countries in this region who needed intermittent preventive treatment of malaria reported receiving it.¹¹

Antenatal care should also offer pregnant women screening and treatment for sexually transmitted infections (STIs), including HIV, both to protect the women's health and to prevent transmission from mother to child. Syphilis, for example, is linked to a high incidence of stillbirth and low birth weight.¹⁵ HIV infection, in particular, is one of the major indirect causes of maternal death, accounting for a significant share of maternal deaths,

particularly in high-prevalence countries.¹ Thus, pregnant women need

- testing and treatment for STIs;
- testing for HIV infection during antenatal care;
- for women with HIV, providing the appropriate antiretroviral regimens during pregnancy, after delivery and during breast-feeding; and
- screening and treatment for tuberculosis, because pregnant women living with HIV have an elevated risk of developing this disease, which can be fatal to mother and fetus and increases the risk of mother-to-child HIV transmission.^{22,23}

Testing and treatment for syphilis and for HIV testing are included in the cost estimates in this report, but tuberculosis testing and treatment for HIV and tuberculosis are not. We know from other recent reports that the need for treatment has not fully been met. For example, according to the Joint UN Programme on HIV and AIDS, in Sub-Saharan Africa in 2011, 41% of pregnant women living with HIV did not receive antiretroviral treatment for preventing mother-to-child transmission.²² Coverage is believed to be substantially lower in South and Southeast Asia and in the Middle East and Northern Africa, where the AIDS epidemic is concentrated in certain populations.

Current Levels of Care at Delivery and After Birth

Because the vast majority of maternal and newborn deaths occur around the time of delivery, the place of delivery and type of provider assisting births are crucial. With regard to maternal deaths, there is a longstanding consensus among health experts that skilled care at birth and access to emergency obstetric care can save women's lives.^{24,25} Skilled care is also essential to ensure that newborns receive the basic care that they need, including adequate warmth to prevent hypothermia, support for breast-feeding in the first hour after birth, and hygienic care of the umbilical cord and skin.¹⁷ MDG 5, which calls for reducing maternal deaths by three-quarters from 1990

to 2015, uses "proportions of births attended by skilled personnel" as an indicator to monitor progress.

International health organizations define a "skilled attendant" as an accredited health professional—such as a midwife, doctor or nurse—who has been educated and trained to proficiency in the skills needed to manage normal (uncomplicated) pregnancies, childbirth and the immediate postnatal period, and in the identification, management and referral of complications in women and newborns.²⁵ A range of health professionals could meet these criteria, depending on the country context. However, the trained professionals must also have the necessary equipment and support of a functioning health system, including transport and referral facilities for emergency obstetric care.

TABLE 2. Proportions of women receiving specific components of antenatal care and proportions with selected health care needs, by region, subregion and income group in the developing world, in 2012,*

Region, subregion and income group	% of women with antenatal care from a skilled provider who received at least one:		% of women giving birth who took any iron supplements in pregnancy	% of women giving birth with selected health care needs:		
	Urine test	Blood test		Additional iron supplementation for anemia [†]	Treatment for hookworm [‡]	Malaria prevention [§]
Developing world	66	69	67	56	79	60
Africa	59	69	58	47	90	83
Sub-Saharan Africa**	58	68	59	46	100	92
Eastern Africa	39	70	57	38	100	88
Middle Africa	57	62	58	58	100	98
Southern Africa	95	95	64	74	100	34
Western Africa	74	67	63	47	99	99
Northern Africa	68	70	45	52	29	29
Asia^{††}	65	65	69	60	80	55
Eastern Asia	86	87	83	69	94	17
Central Asia	97	97	48	58	0	3
South Asia	57	55	61	57	84	77
Southeast Asia	47	45	82	56	92	63
Western Asia	69	74	62	54	0	18
Latin America and the Caribbean	87	90	83	58	40	19
Caribbean	72	82	77	49	22	58
Central America	87	88	91	61	23	13
South America	88	91	80	58	50	18
69 poorest countries^{††}	58	60	63	53	86	79
Higher-income countries^{§§}	80	84	77	63	64	19

*Based on women's care during pregnancy for their most recent birth in the last three years. [†]Hemoglobin <11g/dL. [‡]Women in countries with endemic (≥10 prevalence) soil-transmitted helminthiasis. [§]Women in areas with endemic malaria transmission (*P. falciparum* or *P. vivax*; unstable or stable). **Includes Sudan and South Sudan, both of which are located in Northern Africa. ^{††}Includes Oceania. ^{‡‡}Countries with a per capita gross national income of \$2,500 or less in 2010. ^{§§}Countries in developing regions with per capita gross national income of more than \$2,500 in 2010. *Source:* reference 11.

TABLE 3. Receipt of delivery care in the developing world,* among all women giving birth, by region, subregion and income group, 2008 and 2012

Region, subregion and income group	% delivered in health facility			% with a skilled attendant at birth			% with cesarean section delivery		
	2008	2012	Annual % point change	2008	2012	Annual % point change	2008	2012	Annual % point change
Developing world	55	64	2.3	61	68	1.8	11	14	0.8
Africa	45	51	1.5	50	55	1.3	5	7	0.5
Sub-Saharan Africa†	42	49	1.8	46	52	1.5	3	5	0.5
Eastern Africa	36	44	2.0	37	46	2.3	3	4	0.3
Middle Africa	61	63	0.5	64	64	0.0	3	6	0.8
Southern Africa	82	87	1.3	85	89	1.0	15	19	1.0
Western Africa	39	47	2.0	43	50	1.8	2	4	0.5
Northern Africa	59	60	0.3	71	73	0.5	13	17	1.0
Asia‡	55	66	2.8	62	72	2.5	11	15	1.0
Eastern Asia	84	99	3.8	83	99	4.0	19	27	2.0
Central Asia	92	95	0.7	97	98	0.3	5	8	0.8
South Asia	39	51	3.0	45	55	2.5	9	11	0.5
Southeast Asia	51	61	2.5	71	77	1.5	7	11	1.0
Western Asia	72	75	0.8	82	83	0.3	12	21	2.3
Latin America and the Caribbean	87	90	0.8	89	91	0.5	31	35	1.0
Caribbean	73	76	0.8	74	77	0.8	23	20	-0.8
Central America	81	85	1.0	82	87	1.3	32	35	0.7
South America	91	94	0.7	93	95	0.5	32	37	1.3
69 poorest countries§	41	51	2.5	48	57	2.3	7	8	0.3
Higher-income countries**	85	94	2.3	87	95	2.0	20	28	2.0

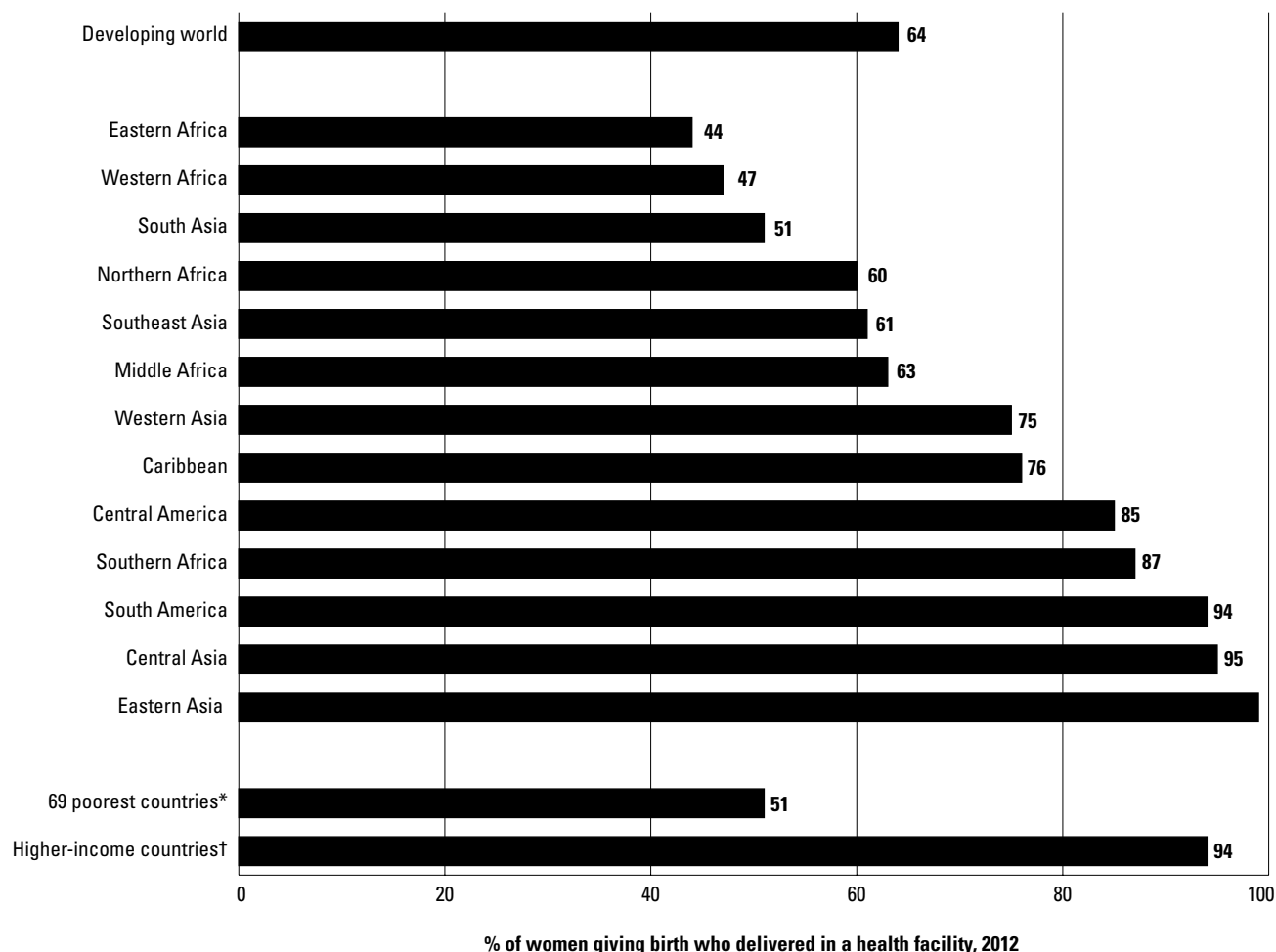
*Based on women's care during pregnancy for their most recent birth in the last three years. †Includes Sudan and South Sudan, both of which are located in Northern Africa. ‡Includes Oceania. §Countries with a per capita gross national income of \$2,500 or less in 2010. **Countries in developing regions with per capita gross national income of more than \$2,500 in 2010. *Source:* reference 11.

Delivery care and postnatal care for mothers and newborns. To give a fuller picture of whether women and their newborns receive adequate delivery and postnatal care, we present both the proportion of women delivering with skilled attendants and the proportion delivering in health facilities. While women and their babies benefit from having skilled assistance at home, they need access to treatment for delivery complications when they arise, and they need postnatal care in the critical hours and days after birth. Access to emergency obstetric care, whether onsite or at a referral location, is crucial because major complications such as hemorrhage, hypertensive disease (which can lead to preeclampsia and eclampsia) and obstructed labor must be addressed without delay. But ensuring access requires strong referral and transportation systems, which can pose a major challenge in some countries. Thus, the proportion of women delivering in health facilities is also important to monitor. The facilities providing delivery care may range from small health centers to national hospitals, and the capacity to provide quality

care can vary enormously across facilities and within and among countries. Not all facilities can manage all obstetric complications (in fact, studies show that very few can²⁶), nor do all provide the necessary quality of care to women and newborns. Nevertheless, facilities are more likely than private homes to have the specialized staff and equipment to treat life-threatening conditions immediately, or to stabilize women for transfer to another facility with this capability.

Also, women delivering in health facilities are more likely than women who deliver at home to receive postnatal care,²⁷ which is also essential for addressing both the routine and emergency health needs of mothers and their newborns. Postnatal care, especially within the first 48 hours after birth, is critical for managing postpartum hemorrhage, one of the major causes of maternal deaths in developing countries, and for ensuring the health of the newborn. Results from Demographic and Health Surveys show that in most countries, the majority of women who deliver in facilities report receiving a health checkup within

FIGURE 5. Delivery in health facilities varies widely across subregions of the developing world.



*Countries with a per capita gross national income of \$2,500 or less in 2010. †Countries in developing regions with per capita gross national income of more than \$2,500 in 2010. *Source:* reference 11.

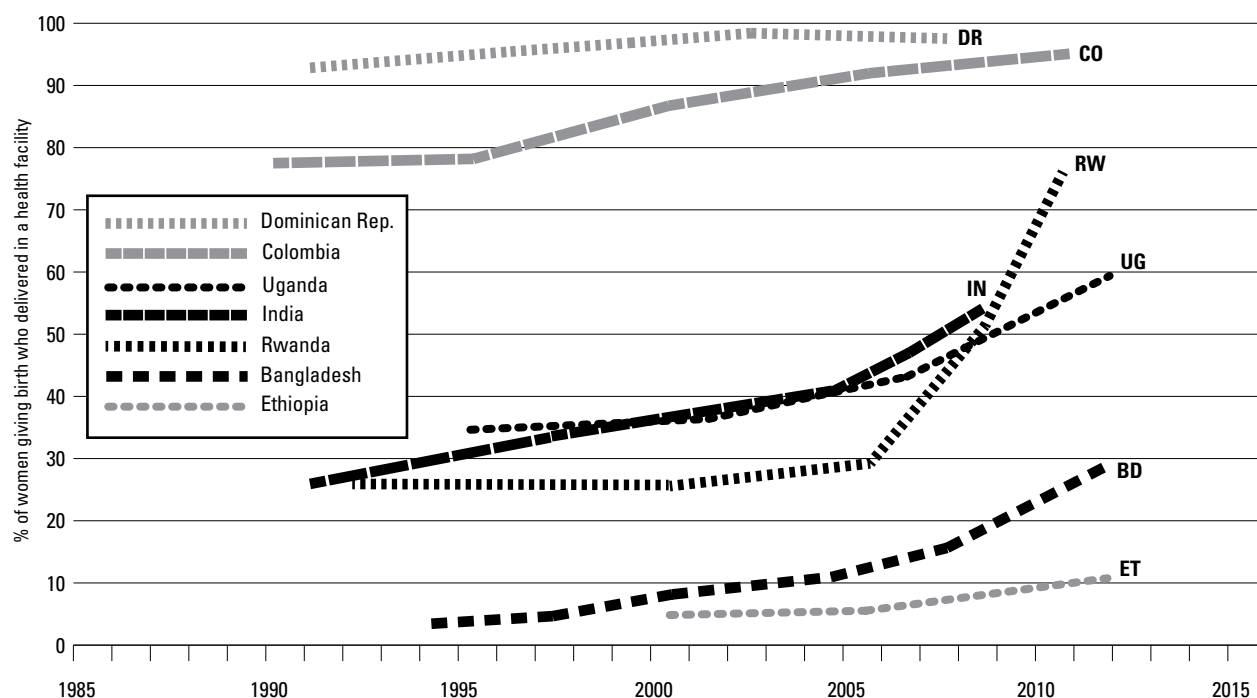
two days after delivery.²⁷ Getting a postnatal checkup is much lower among women who do not deliver in a health facility: Fewer than 30% reported such a checkup in 10 of the 18 countries for which this information was available. Among women who had a postnatal checkup, almost all received this care from a skilled health provider.²⁷

The proportion of women delivering in health facilities follows roughly the same pattern across regions and over time as the proportion with skilled attendance during delivery (Table 3, page 11). Skilled attendance at birth is slightly higher than delivery in facilities because some women who deliver at home may be attended by a midwife, nurse or doctor. (The available evidence suggests that women delivering in a facility are usually attended by a skilled attendant.) The proportion of women receiving skilled attendance at birth is substantially higher than delivery in a health facility in Northern Africa, Southeast Asia and

Western Asia.

Between 2008 and 2012, both measures (delivery in a health facility and delivery with a skilled attendant) increased by a larger margin than did antenatal care—about two percentage points per year, compared with one percentage point for antenatal care—in the developing world as a whole. Increases were greater for delivery in a health facility (2.3 percentage points annually) than for delivery with a skilled attendant (1.8 percentage points). The greatest increase in skilled care at birth occurred in Eastern Asia (predominantly China), where nearly all births now occur in facilities. Substantial increases also occurred in South and Southeast Asia. In Sub-Saharan Africa, skilled care at birth increased by fewer percentage points than the developing-world average, but the change actually reflects substantial gains in expanding services because births in that region increased between 2008 and 2012.

FIGURE 6. Some countries have made impressive progress in expanding the share of women delivering in health facilities.



Sources: reference 18; India—references 18 and 28.

In the developing world as a whole in 2012, 64% of women who gave birth delivered in a health facility (Figure 5, page 12). The proportions were lowest in Eastern and Western Africa (44% and 47% respectively). In the 69 poorest countries, 51% of women gave birth in a health facility, compared with 94% in higher-income developing countries, reflecting wide variations in the adequacy of health systems.

Between 2008 and 2012, the proportion of women delivering in health facilities increased from 55% to 64% (Table 3). Increases were seen in almost all subregions, including Sub-Saharan Africa. In the 69 poorest countries, the proportion of women delivering in facilities increased from 41% in 2008 to 51% in 2012. Improvements were much smaller than average in Middle Africa, Northern Africa, Southern Africa, Western Asia, Central Asia and all subregions of Latin America and the Caribbean. (Some of these regions already had high proportions of women delivering in facilities in 2008.)

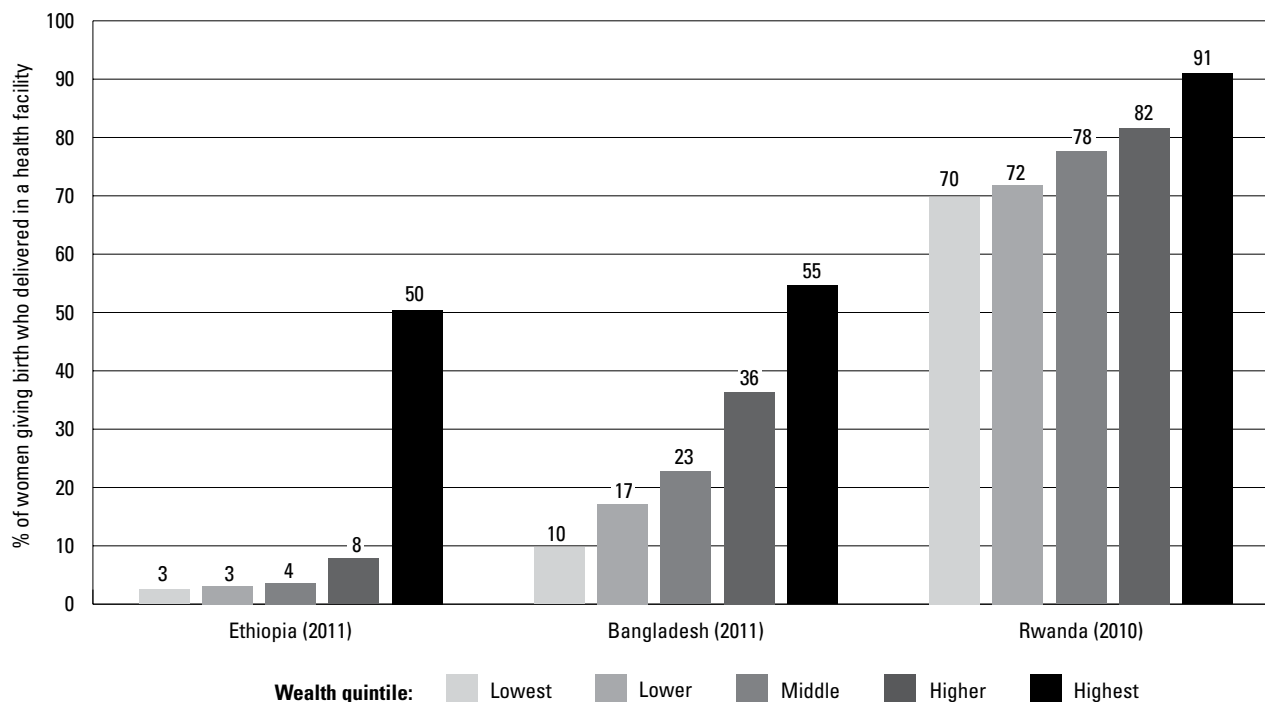
Trends among countries have varied widely. For example, Ethiopia and Bangladesh both showed improvements since the mid-1990s, but even by 2011, the proportions of women delivering in health facilities were still very low, at 11% and 29%, respectively (Figure 6). Rwanda has made

rapid gains in institutional deliveries in recent years, as it has with antenatal care, and Uganda has made significant progress. Colombia and the Dominican Republic have made consistent progress to the point where nearly all women deliver in health facilities.

In India, the proportion of births delivered in health facilities increased substantially from 2005 to 2008, largely because of a program offering cash incentives to women and health providers. In 2005, with the goal of reducing maternal and newborn deaths, the Government of India launched Janani Suraksha Yojana (JSY), a program that offers cash benefits to the women delivering in health facilities and to the community health workers helping to bring them into care. An evaluation using data from district-level surveys showed that the proportion of births delivered in health facilities rose from 41% in 2003 to 54% in 2008, and that the cash benefits played a significant role in the increase.²⁸

Throughout the developing world, survey data consistently show that women with more education and household wealth are more likely than poorer, less educated women to deliver their babies in health facilities.²⁷ Ethiopia, Bangladesh and Rwanda, for instance, illustrate this pattern (Figure 7).¹⁸ In Ethiopia, institutional deliver-

FIGURE 7. The poorest women are least likely to deliver their babies in a health facility.



Source: reference 18.

ies are rare except among women in the highest wealth quintile (those living in the wealthiest 20% of households). Bangladesh and Rwanda have both seen steady increases in institutional deliveries among women in all wealth quintiles, yet disparities remain. In Rwanda, despite an overall high proportion of women delivering in health facilities (77% nationally), substantial variation still exists, from 70% among the poorest women to 91% among the wealthiest. In all three countries, these patterns are nearly identical for delivery with a skilled attendant.

Cesarean sections. A delivery by cesarean section is a lifesaving procedure for pregnant women and their newborns who experience certain complications. It should be available everywhere as part of emergency obstetric care. However, while increased use of cesarean sections is associated with lower maternal and neonatal mortality, cesarean section rates above a certain level do not appear to have any benefit, and may in fact be dangerous for the mother and child.²⁹ According to WHO, no more than 10–15% of births should be delivered by cesarean section,³⁰ rates that are either much lower or much higher can be cause for concern. As with many advanced medical procedures, cesarean sections tend to be underused in poor countries and overused in better-off countries.²⁹ A recent study in developed countries found that both women’s

and obstetricians’ choices influence levels of delivery by cesarean section, and that health system financing is the single most important factor driving these levels.³¹

Between 2008 and 2012, increases in the proportion of deliveries that were by cesarean section were greatest (from 20% to 28% of births) in higher-income developing countries, where they already exceeded the recommended levels (Table 3). Increases were much smaller, less than one percentage point per year, in the poorest countries where too few women have access to cesarean sections. Cesarean section deliveries are most prevalent (and well beyond recommended levels) in Latin America and the Caribbean, Eastern Asia and Western Asia, and they are least prevalent in Eastern, Middle and Western Africa and Central, South and Southeast Asia.

Unmet Need for Maternal and Newborn Health Care

While steady gains have been made in increasing women's access to professional care during pregnancy and delivery, tens of millions of women and newborns in the developing world remain without adequate care. This section summarizes unmet need for the key components of antenatal, delivery and postnatal care described in the previous sections, presenting absolute numbers of women giving birth who did not receive the recommended level of care in 2008 and 2012. The numbers of women with unmet need are calculated using the proportions who did not make four or more antenatal care visits or did not deliver in health facilities (from Tables 1 and 3), multiplied by the estimated number of births for each year (from Table 1).

Estimates are also presented for the number of women and newborns with unmet need for routine delivery care and those needing care for health complications in 2012. Because different costs are associated with routine care and care for health complications, the numbers can help guide where additional resources will be needed.

Antenatal Care and Delivery in Health Facilities

In 2012, 55 million women giving birth in developing regions had an unmet need for adequate antenatal care (four or more visits), and 44 million had an unmet need for delivery care in a facility (Table 4, page 16). Two regions, Sub-Saharan Africa and South Asia, accounted for 44 million out of the 55 million women with unmet need for antenatal care, and 36 million out of 44 million with unmet need for delivery care (Figure 8, page 17)—in other words, about four-fifths of the unmet need.

Between 2008 and 2012, the total number of women with unmet need for these services in developing regions declined slightly because of increases in the use of services. During this period, the number of women of reproductive age increased (due to population growth), but overall fertility rates declined, resulting in nearly the same number of births in 2012 as in 2008. Reductions in fertility in the developing world, consistent with women's own fertility desires, make it easier for countries to improve and expand existing care for mothers and newborns. However, trends in total births mask important regional differences: From 2008 to 2012, the number of births showed a mod-

erate 9% decline in Eastern Asia (mainly in China), but births increased slightly (by 5%) in Sub-Saharan Africa.

Between 2008 and 2012, the number of women with unmet need for adequate antenatal care declined in the developing world by 2.4 percent per year. Declines in unmet need for antenatal care were greatest in Southern Africa, Eastern Asia (China), Central Asia and Central America (Table 4). There was no progress in Sub-Saharan Africa in reducing the number of women with unmet need for adequate antenatal care. In Eastern and Middle Africa, the numbers of women with unmet need for antenatal care increased because the rising levels of service use did not keep pace with rising numbers of women giving birth each year. Progress was negligible in South Asia and in the 69 poorest countries (where the number with unmet need declined by only 0.4% annually).

Between 2008 and 2012, the decline in the number of women with unmet need for delivery care (11 million) was much greater than the decline related to antenatal care (six million). Percentage improvements were greatest in Asia and Latin America and the higher-income developing countries. By comparison, Sub-Saharan Africa saw much less progress in reducing the number of women with unmet need for facility-based delivery. Still, the region experienced a decline of 1.8% per year, and an absolute drop of 1.3 million women with unmet need. In South Asia, the number of women with unmet need for delivery care declined substantially between 2008 and 2012, dropping by five million, in large part because of progress in India, discussed on page 13. Bangladesh has also made gains in expanding antenatal and delivery care.

Care for Maternal and Newborn Health Complications

Maternal health complications. The major complications of pregnancy and delivery are similar around the world. They include hemorrhage (severe bleeding), sepsis (infection), preeclampsia and eclampsia, obstructed or prolonged labor, and complications of unsafe abortion.³² If left untreated, they can lead to serious illness, injury and even death.

Women who have normal deliveries may also suffer postpartum illnesses. In Matlab, Bangladesh, for example,

TABLE 4. Unmet need for antenatal and delivery care in the developing world, among all women giving birth, by region, subregion and income group, 2008 and 2012

Region, subregion and income group	Number (000s) with unmet need for adequate antenatal care (made <4 antenatal visits)*			Number (000s) with unmet need for delivery care (did not deliver in a health facility)†		
	2008	2012	Annual % change	2008	2012	Annual % change
Developing world	60,420	54,580	-2.4	55,070	43,990	-5.0
Africa	19,520	19,390	-0.2	19,420	17,930	-1.9
Sub-Saharan Africa‡	17,720	18,110	0.6	18,410	17,120	-1.8
Eastern Africa	7,210	7,820	2.1	7,950	7,170	-2.5
Middle Africa	2,860	2,970	1.0	2,060	1,990	-0.8
Southern Africa	340	180	-11.8	230	170	-6.5
Western Africa	6,420	6,430	0.0	7,130	6,590	-1.9
Northern Africa	2,690	2,000	-6.4	2,070	2,020	-0.6
Asia§	38,650	33,730	-3.2	34,240	24,940	-6.8
Eastern Asia	6,110	2,590	-14.4	3,110	240	-23.1
Central Asia	370	130	-16.2	100	70	-7.5
South Asia	25,890	25,500	-0.4	23,880	18,920	-5.2
Southeast Asia	3,590	3,040	-3.8	5,480	4,180	-5.9
Western Asia	2,620	2,360	-2.5	1,510	1,410	-1.7
Latin America and the Caribbean	2,250	1,450	-8.9	1,410	1,110	-5.3
Caribbean	200	150	-6.3	210	180	-3.6
Central America	900	440	-12.8	600	500	-4.2
South America	1,160	860	-6.5	600	430	-7.1
69 poorest countries**	48,190	47,390	-0.4	49,320	41,600	-3.9
Higher-income countries††	12,230	7,190	-10.3	5,760	2,390	-14.6

*No visits to a skilled provider and <4 visits to any provider. †Includes unmet need for care for both the mother and the newborn. ‡Includes Sudan and South Sudan, both of which are located in Northern Africa. §Includes Oceania. **Countries with a per capita gross national income of \$2,500 or less in 2010. ††Countries in developing regions with per capita gross national income of more than \$2,500 in 2010. Source: reference 11.

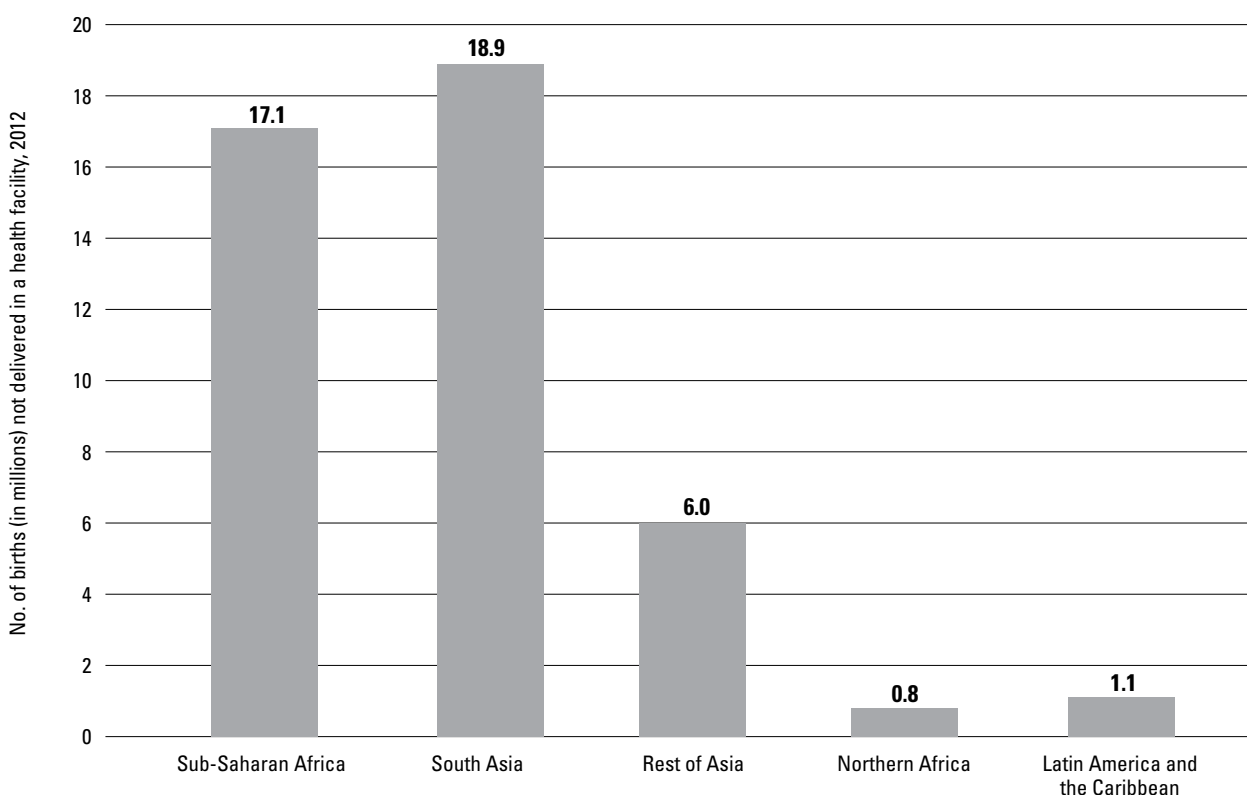
where detailed records are available on women's reproductive health and a special study was undertaken on maternal disability, researchers found that nearly half of all women who gave birth were diagnosed with a postnatal illness or disability 6–9 weeks after delivery.³³ Some of the chronic and debilitating postnatal conditions include damage to the reproductive organs (such as a ruptured uterus or obstetric fistula—a hole that causes constant leakage of urine or feces), hypertension, depression and severe anemia.⁷ Though the exact numbers of maternal disabilities worldwide are not known, researchers believe that they are vastly undercounted, and existing evidence shows that they can compromise women's productivity or lead to social isolation (including through abandonment or domestic violence), making it all the more critical that women receive adequate obstetric care.³²

As noted earlier, women who deliver in a health facility have the best chance of receiving care for obstetric complications, should they arise, and adequate care for their newborns. However, women who deliver in facilities do

not necessarily receive all of the care they need, because the facilities may lack the needed equipment, supplies or skilled professionals for treating certain complications. The available studies on facilities offering emergency obstetric care in developing countries suggest that most can only offer some of the needed care, making it paramount to upgrade facilities and strengthen systems for referral and rapid transportation.^{26,34–36} The proportion offering emergency obstetric care is highest among large hospitals and reaches quite low levels among smaller health facilities and clinics where many deliveries occur.^{37–41}

Although only a minority of women experience obstetric complications, large proportions of these women do not receive the care they need. Of the 122 million women giving birth in 2012, an estimated 30 million, or approximately 24%, experienced major obstetric complications—hemorrhage (the most frequent complication), sepsis, preeclampsia or eclampsia, or obstructed labor (Table 5, page 18). The majority of these women did not receive needed care: Unmet need for care for these

FIGURE 8. Unmet need for delivery in health facilities is concentrated in Sub-Saharan Africa and South Asia.



Source: reference 11.

complications ranged from 68–70% for conditions that are easy to diagnose to 84% for preeclampsia and eclampsia, which are often not diagnosed until their most extreme. Some of these women did not receive care because they did not deliver in a health facility; still others delivered in a facility that did not provide the necessary care. Adequate antenatal and delivery care would help to reduce and manage complications. For example, adequate monitoring and treatment of hypertension during pregnancy would help to reduce progression to preeclampsia and eclampsia. Also, regions with very low levels of cesarean sections are likely to have inadequate treatment for major complications such as obstructed labor.

Newborn health complications. The vast majority of newborn deaths can be attributed to three major causes: sepsis, prematurity and low birth-weight, and birth asphyxia (breathing difficulties).⁴² Three-quarters of newborn deaths occur in the first week of life, and 25–45% of these occur in the first 24 hours.⁴³ Basic interventions to prevent newborn deaths are relatively inexpensive and are best integrated with maternal health care throughout the

health system.⁴² Many interventions to save newborn lives are simple to perform and low-cost and do not require emergency care, such as

- clean delivery and hygienic cord care;
- drying the baby and keeping it warm;
- antibiotic treatment of local infections;
- care for low-birth-weight and preterm babies, including kangaroo mother care (skin-to-skin contact for warmth), initiation of early breast-feeding and extra support for feeding; and
- resuscitation with a bag and mask for babies who are unable to breathe.¹⁷

Immediate interventions such as these are included in our estimates, but more complex, long-term care, such as neonatal intensive care and surgery for congenital abnormalities, is not included.

In 2012, 46 million newborns (38%) needed care for major complications at the time of delivery, including sepsis, low birth weight and asphyxia. We estimate that slightly more than half of these did not receive adequate care (56%). The largest group of newborns with unmet

need for major complications—24 million—suffered infections or sepsis. Prematurity and low birth weight also accounted for a large share of newborn complications, 18.5 million.

The newborns who did not experience major complications needed routine or other minor care, and they were assumed to receive it if the mother delivered in a health facility. (In other words, the proportion of newborns with unmet need for routine care is the same as the proportion of pregnant women with unmet need for routine care—i.e., those not delivering in health facilities.)

Although a higher proportion of newborns than women giving birth needed care for major complications, a higher proportion of newborns received the necessary care—44% of newborns versus 28% of women. This is because the types of care usually given to newborns are less costly and simpler to deliver than the complex interventions for managing labor and delivery.

Reasons for Unmet Need

Much of the unmet need described in this section reflects a lack of access to and poor quality of maternal and newborn health care. These can be seen as “supply-side” problems that must be overcome to close health care gaps. In addition, survey data suggest that some unmet need is explained by “demand-side” (social and cultural)

factors—attitudes and beliefs that prevent women from using modern health care for pregnancy and delivery.

Data from 22 recent Demographic and Health Surveys are available on the reasons that women give for not delivering in a health facility.¹¹ On the supply-side, the two most important reasons women mentioned were cost and distance or lack of transport to a health facility. Other less commonly cited supply-side reasons include the facility was not open and women lack trust in the quality of care provided.

On the demand side, the two most common reasons were that it is not customary and it is not necessary to deliver in a facility. The latter was particularly prevalent in some countries where very high proportions of women do not deliver in facilities: Almost three-quarters of women in India who did not deliver in a facility said that it was not necessary, and more than half gave this reason in Egypt, Ethiopia, Nepal, Nigeria and Pakistan. In many other countries, a smaller but significant percentage gave this reason or said that it was not customary. Other demand-side reasons, such as that the facility did not have a female provider or that the husband or family did not allow this, were cited much less often.

Other studies and anecdotal evidence suggest that discriminatory attitudes and abusive behaviors among providers may deter women from seeking maternal and

TABLE 5. Numbers and proportions of women in the developing world giving birth and newborns with selected complications requiring medical care and proportions having unmet need for this care, 2012

Type of complication	Number with complications (000s)*	% with complications	% with unmet need (among those who needed care for complications, % who not receive it)†
Women giving birth			
Total	29,620	24	72
Hemorrhage‡	13,410	11	70
Obstructed labor	7,290	6	68
Sepsis	4,630	4	69
Preeclampsia/eclampsia	4,290	4	84
Newborns§			
Total	46,410	38	56
Infection/sepsis	24,310	20	66
Prematurity and low birth weight	18,450	15	47
Asphyxia/breathing difficulties	3,650	3	36

*Some women and newborns may have more than one complication; on the other hand, some serious complications are not included in these estimates. †Estimates of the proportion of women who get care for complications and the proportion who have unmet need for such care are based on the available evidence on facilities’ capacity to provide emergency obstetric care. Based on this evidence, we assume that among women who have complications and deliver in a facility, half get adequate care. For newborns, we assumed those who were delivered in a facility received basic care for the complications shown here, because the care needed is less complex than that required for treating women’s complications. However, for conditions among newborns that develop after discharge from the facility (such as sepsis), we assumed that 50% of those who were born in a health facility received care. ‡Includes antepartum and postpartum hemorrhage. §Estimates include complications in the immediate postnatal period, including some weeks after birth; however, most conditions that develop after delivery (such as sepsis) occur in the first few weeks after birth. In addition, more complex complications, such as congenital abnormalities, are not included in these estimates. Sources: references 11, 61–69.

newborn health care.⁴⁴ For example, women who go to facilities to give birth may encounter discrimination, verbal or physical abuse or abandonment. Or, they may receive care that lacks dignity, confidentiality or informed consent.⁴⁵ These problems are systemic and persist for many reasons: Societies may tolerate abusive behavior; some providers lack basic awareness about patients' rights; health care workers may be overworked and overstressed; and health care systems may lack accountability and oversight mechanisms.^{45,46}

Apart from improving access, maternal and newborn health programs must include a component that educates women (as well as partners and other family members) about the health benefits of obtaining antenatal and postnatal care and of delivering in a health facility with skilled professionals. Provider training must also emphasize respect for and sensitivity toward patients as a vital component of quality care. Resources, such as adequate beds and supplies, should be available so that quality care can be provided.

Costs and Benefits of Meeting the Need For Maternal and Newborn Care

Improving the amount and quality of maternal and newborn health care available in developing regions will require substantial investments to improve health systems. We estimated the cost of providing maternal and newborn health services to women and infants who currently receive services, as well as the cost of meeting the unmet need for these services. Annual costs are shown based on estimated costs in 2012. Our estimates are comprehensive and include both the direct costs of commodities, supplies and personnel, and the indirect costs of the programs and systems that support services. (For more information on how the estimates were derived, see the Appendix, page 27).

The program and system costs, or indirect costs, include management, supervision, training, health education, monitoring and evaluation, advocacy, information systems and commodity supply systems, as well as the cost of strengthening health care systems to ensure that there is the capacity to serve all pregnant women. Some of these reflect ongoing activities to support services, while others reflect one-time investments to increase system capacity—both are needed to expand and improve services. While indirect costs account for a large share of total costs, by improving systems for maternal and newborn health care, the investment will also help expand the capacity of health systems.

Cost of Providing Current Levels of Maternal and Newborn Care

The direct cost of current levels of maternal and newborn care is an estimated \$5.5 billion, of which supplies account for less than half (\$2.0 billion) and personnel costs are more than half (\$3.5 billion; Table 6, page 21). Given the current proportions of women and infants in the developing world receiving maternal and newborn care in 2012, the direct cost of providing these services per woman giving birth is an estimated \$74—\$28 for supplies and \$46 for personnel. These costs include antenatal care at the levels women currently obtain it; delivery, neonatal and postnatal care in health facilities at current levels; and, among women who experience complications, treatment at estimated current levels.

Average direct costs for delivery are much lower for women having a normal delivery (\$18) than for those having a cesarean section (\$100; not shown).

The total cost of providing the current level of maternal and newborn health services to all women who give birth in facilities (i.e., the direct cost plus program and system costs) is an estimated \$11 billion. In addition to the \$5.5 billion spent on direct costs, program and systems costs total \$5.5 billion for women and newborns currently receiving services (Table 7, page 22).

Who bears these costs? In the developing world, the largest portion is generally paid by individuals themselves. These costs are often in the form of user fees (for public-sector services) and, increasingly, of employer-supported health insurance premiums and private-sector fees. Government health budgets also cover a large proportion of costs. International donor assistance typically accounts for less than one-tenth of government spending on health, except in the poorest countries.⁴⁷

Cost of Providing the Recommended Level of Care

Increasing care for women and infants who currently receive services so that they receive the full set of services recommended by WHO (four antenatal care visits; routine delivery, newborn and postnatal care from trained providers; and care for maternal and newborn health complications) would increase the overall costs from \$11.0 billion to \$17.1 billion annually (Table 7). The average total cost per birth with care would increase from \$146 to approximately \$229 (not shown). Most of this increase is in the program and systems spending needed to build the capacity of health systems to provide a higher level of services, including care for complications related to pregnancy, delivery and newborn health.

Providing the full level of recommended services to women and newborns who are *not* currently receiving any care—that is, serving those with unmet need—would cost an additional \$7.1 billion, of which \$2.1 billion is for direct costs and \$5.0 billion is for program and systems costs. Adding the costs of improving current care and fulfilling unmet need—i.e., providing all women who give birth and their newborns with the full recommended set of ma-

ternal and neonatal services that they need—would cost \$24.1 billion annually (Figure 9, page 23).

Africa, which currently accounts for about one-fifth of the cost of all maternal and newborn care received in the developing world, would account for about half of all funds if the recommended level of care were provided to all women giving birth and their newborns. The reason for this large shift is that this region has the greatest need for

capacity building, including training of health professionals, and it has the highest proportions of women and infants with unmet need for care.

The cost of current care for women and their newborns has increased about 25% in comparison with the estimates for 2008 published in the 2009 *Adding It Up* report—from \$8.7 billion to \$11 billion. Some expected factors include inflation and an increase in the number of

TABLE 6. Current annual direct costs for maternal and newborn care in developing countries and average direct costs per case receiving this care, by cost component and developing region, 2012

Cost component and region*	Total maternal and newborn care	Antenatal care†	Facility-based services for mothers and newborns‡		
			Total	Maternal care	Newborn care
DIRECT COSTS OF CARE (IN MILLIONS OF U.S. DOLLARS)					
All maternal and newborn care					
All developing countries	\$5,520	\$1,280	\$4,240	\$3,630	\$610
Africa	\$1,330	\$400	\$940	\$780	\$160
Asia	\$3,020	\$670	\$2,350	\$2,000	\$350
Latin America and the Caribbean	\$1,160	\$200	\$960	\$850	\$110
Supplies§					
All developing countries	\$2,020	\$690	\$1,330	\$1,190	\$140
Africa	\$520	\$230	\$290	\$250	\$40
Asia	\$1,230	\$390	\$840	\$750	\$90
Latin America and the Caribbean	\$270	\$70	\$200	\$180	\$20
Personnel**					
All developing countries	\$3,490	\$580	\$2,900	\$2,440	\$470
Africa	\$810	\$170	\$650	\$520	\$120
Asia	\$1,790	\$290	\$1,500	\$1,250	\$250
Latin America and the Caribbean	\$890	\$130	\$760	\$670	\$90
AVERAGE DIRECT COSTS OF CARE (IN U.S. DOLLARS)					
All maternal and newborn health care					
All developing countries	\$74	\$19	\$55	\$47	\$8
Africa	\$72	\$23	\$49	\$41	\$8
Asia	\$65	\$17	\$48	\$41	\$7
Latin America and the Caribbean	\$120	\$22	\$99	\$87	\$11
Supplies§					
All developing countries	\$28	\$10	\$17	\$15	\$2
Africa	\$29	\$13	\$15	\$13	\$2
Asia	\$27	\$10	\$17	\$15	\$3
Latin America and the Caribbean	\$28	\$7	\$20	\$19	\$2
Personnel**					
All developing countries	\$46	\$9	\$38	\$31	\$6
Africa	\$44	\$9	\$34	\$28	\$6
Asia	\$38	\$7	\$31	\$26	\$5
Latin America and the Caribbean	\$93	\$14	\$78	\$69	\$10

*Numbers may not add up to totals because of rounding. †Costs include visits women currently make and the package of services they currently receive. ‡Costs include the following services at the level currently received: delivery services, neonatal care and basic services for the newborn and woman in the immediate postnatal period. Delivery services include the basic services for uncomplicated deliveries and treatment of complications for a proportion of women. Costs take into account the fact that not all facilities are able to provide care for maternal and newborn complications. §Includes supplies such as medications, gloves, antiseptic, local anaesthesia, syringes, sutures, dressings and daily hospital food charges. **Includes costs for community health workers, nurses/midwives, general physicians and obstetricians. *Source:* reference 11.

TABLE 7. Current annual costs of providing maternal and newborn care and estimated costs of providing recommended services to all women and newborns in the developing world who need them—all in millions of 2012 U.S. dollars, by cost component and region, 2012

Cost component and region*	Current cost of maternal and newborn care†	Estimated cost of providing recommended maternal and newborn care‡		
		Full care to those currently receiving some care	Full care to those not currently receiving any care	Full care for all in need
Total cost for all developing countries	\$10,970	\$17,060	\$7,060	\$24,120
Direct costs	\$5,520	\$6,420	\$2,100	\$8,510
Supplies	\$2,020	\$2,420	\$950	\$3,370
Labor	\$3,490	\$4,000	\$1,150	\$5,150
Program and systems costs	\$5,450	\$10,640	\$4,970	\$15,600
Total cost by region				
Africa	\$2,220	\$7,100	\$4,750	\$11,850
Asia	\$6,060	\$7,310	\$2,190	\$9,500
Latin America and the Caribbean	\$2,690	\$2,650	\$120	\$2,770
69 poorest countries§	\$4,450	\$9,420	\$6,580	\$16,000

*Numbers may not add up to totals because of rounding. †For current antenatal, delivery, neonatal and postnatal care (see notes to Table 6 for more detail). ‡Includes the recommended package of basic antenatal, delivery, neonatal and postnatal care and care for complications of pregnancy, delivery and the immediate postnatal period for women and newborns (see reference 17). §Countries with a per capita gross national income of \$2,500 or less in 2010. Source: reference 11.

women receiving care between 2012 and 2008. Other factors may also help explain this large increase. First, WHO's most recent estimates of personnel costs in developing regions are somewhat higher than their prior estimates that were used in our 2009 report.⁴⁸ Second, some of the change between the two sets of estimates reflects improved estimations for some components of care. The annual cost of providing recommended care to all women who give birth in the developing world also increased slightly over this period, from \$22.1 billion to \$24.1 billion—an increase of about 9%, or just over 2% per year. This relatively small increase reflects inflation, as well as improved estimation for 2012 cost estimates.

The Cost of Postabortion Care

As noted on page 4, many women who become pregnant but do not give birth have health care needs that can and should be addressed. The costs shown in Tables 6 and 7 are associated with women who give birth; they do not include postabortion care. Yet, the care for women who have had unsafe abortions is critical because the complications associated with unsafe procedures are among the major causes of maternal deaths in developing countries.

Estimates of the number of women who have had an unsafe abortion and who need and receive facility-based care for complications have been updated on the basis of data for the early 2000s.¹² The direct cost of treating postabortion complications (hemorrhage, sepsis, physical

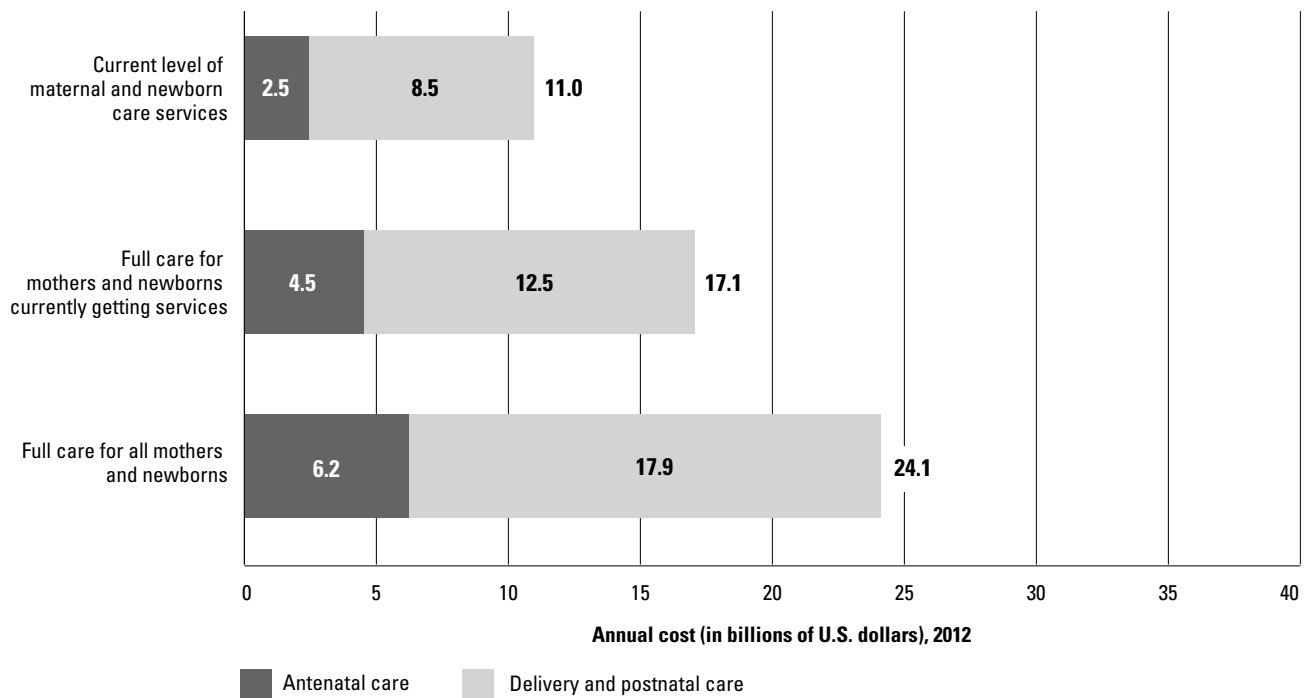
trauma, etc.) is an estimated \$50 per case for the women currently receiving care. The current direct cost of providing postabortion care in the developing world as a whole is estimated at \$300 million, and program and systems costs are an additional \$290 million, for a total cost of \$590 million. Expanding services so that they meet the need for postabortion care among all women in the developing world, including direct and program and systems costs, would cost \$1.35 billion annually. These costs are in addition to those shown in the tables.

Benefits of Investing in Maternal and Newborn Care

Providing all pregnant women with the recommended maternal and newborn health care would significantly reduce death and disability, protecting the future health of women and infants by lowering their risk of complications and providing timely care for complications for those who need it. For example, enabling more women to deliver in sanitary conditions would reduce postpartum infections and sepsis (among both women and newborns), and improving the management of labor and the availability of cesarean sections would help eliminate obstetric fistula.

Estimates for 2008 published in an earlier report showed that providing maternal and newborn care prevents millions of needless deaths and disabilities in developing regions. For example, the level of care provided in 2008 was estimated to prevent 100,000 maternal deaths

FIGURE 9. Providing the recommended care to all mothers and newborns in the developing world will require increased funding.



Notes: Costs include direct costs and the program and systems costs of supporting the services. Services include antenatal and delivery care for women and care for newborns and mothers in the immediate postnatal period. *Source:* reference 11.

and 520,000 newborn deaths per year.^{10,11} If all women had been provided with the recommended maternal and newborn health care, the effects would likely have been more dramatic: The number of maternal deaths could have been reduced by another 200,000 (a decline of 57% from the 2008 level), to an estimated 153,000 per year, and the number of newborn deaths could have been reduced by 1.3 million (a decline of 42% to an estimated 1.8 million).

In a forthcoming report, the estimates of lives saved and disability reduced will be updated, along with the cost-effectiveness and broader health and social benefits of investing in sexual and reproductive health care, in particular, contraceptive, maternal and newborn care.

Conclusions and Implications

Prospects for Meeting the Unmet Need for Care

Much progress has occurred around the world in reducing maternal and infant mortality since 1990, reflecting growing political commitments and resources in the last two decades. Increased political prioritization can be seen in the growing levels of development assistance going to health care, as well as in the introduction of proven interventions to save the lives of pregnant women and their children. These commitments to health generally and to maternal and newborn health in particular are reflected in the improvements shown in this report, and efforts must continue.

Progress between 2008 and 2012. The estimates in this report demonstrate that progress in expanding antenatal and delivery care between 2008 and 2012 was modest but steady. Upticks in service use can be seen in all regions, though progress in individual countries varies, as shown in Figure 3. Disaggregating data among regions and population subgroups is important for identifying the degree of disparity among and within countries, for example, the large differences between better-off and poorer women in the proportion delivering in facilities (Figure 8). In general, services that require a well-functioning health system (such as emergency obstetric care) are less equitable in terms of coverage than services that do not (such as child vaccines).³ Governments must give attention to monitoring maternal and newborn health needs and services, including reducing economic and other inequities, in order to make progress in improving health.

Increases in the use of services have not necessarily been accompanied by improvements in quality. A number of indicators—timing of the first antenatal visit, receipt of screening tests and supplements, and HIV care for pregnant women—give some insights into the quality of antenatal care, and all fall short of recommended levels. Although our earlier *Adding It Up* reports did not measure these indicators, and therefore we have not presented comparisons over time, the current data make clear that service quality is not at the level it should be. Thus, investments must be made to increase both the quantity and quality of services.

Global data also make clear that maternal and newborn deaths are heavily concentrated in Sub-Saharan Africa and South Asia, regions where large proportions of the world's poor live and where health systems and services are especially weak. The majority of women in these regions are not receiving the recommended care during pregnancy and childbirth, and, as a result, most of these countries will not meet the targets set for the MDGs 4 and 5 in 2015.

Progress is also lagging in certain countries and subregions outside of Sub-Saharan Africa and South Asia. For example, in Southeast Asia, fewer than two-thirds of women deliver their babies in health facilities. And while at least two-thirds of women in the subregion make adequate antenatal care visits, about half do not undergo blood or urine tests when they receive care. Also, high proportions of women in Southeast Asia need care for hookworm and malaria (Table 2).

Between 2008 and 2012, the number of women with unmet need has declined for antenatal and delivery care because of increases in the use of services, but, of the 122 million women giving birth in 2012, 45% still lack adequate antenatal care, 36% do not deliver in a health facility and 32% do not have a skilled attendant at delivery. In addition, care for women and newborns with complications still falls far short of need. In 2012, millions of women and newborns had major complications and did not receive care for them. Thus, greater investments are needed to address the time-sensitive and critical health needs that pregnant women and their newborns face at the time of delivery and postpartum, as well as when medical complications arise earlier.

The total cost of providing maternal and newborn care at the recommended levels to all women giving birth is substantial: \$24.1 billion annually, of which \$8.5 billion would go toward direct costs (supplies and personnel) and \$15.6 billion to the programs and systems that support the services. The total is more than double what is currently spent on maternal and newborn care (\$11 billion). As is the case with current spending, most of the total investment would come from domestic sources—government health spending, payments from the users of services and their families—with some assistance from external donors.⁴⁹

Our cost estimates do not include cash transfers, incentives or other approaches and mechanisms that encourage people to use health care, although they could be considered to ensure that care is available and used by those who need it most.

Program and systems costs are much higher than the direct costs of care because expanding and improving services (reaching more women and increasing provision to reach the recommended level of care) will be costly. Human, logistical and physical capacity must improve. To meet existing needs, program and systems cost must rise steeply and will peak in the short term; and as capacity is expanded, those costs will be mainly devoted to maintaining the systems. Thus, we expect the program and systems costs to level off over time.

The funding picture. Total development assistance for maternal, newborn and child health rose steadily from 1990 to 2010—in part because of increases in all health spending (especially related to HIV/AIDS), and in part because of global initiatives focusing specifically on saving women’s and children’s lives. Development assistance from all sources—governments, multilateral agencies and private organizations—for maternal, newborn and child health reached \$5.2 billion in 2010, five times more in constant dollars than assistance in 1990.⁴⁷ The investments appear to have paid off, as maternal and child deaths and illnesses declined as a share of the global disease burden during that time period.⁵⁰ Moreover, the investments did not occur in a vacuum; they were accompanied by (and, in some cases, made possible by) strengthened economies; advances in education, especially for girls; and other socioeconomic changes. The investments in reproductive, maternal and child health likely had positive, synergistic effects with other investments made during that time period.

Recognizing that many of the poorest countries would not achieve MDGs 4 and 5, the UN Secretary-General launched a global effort in 2010, now called Every Woman Every Child, that brings together several initiatives geared toward saving mothers’ and children’s lives. When it launched, the initiative garnered \$40 billion in commitments from sources that included both developing-country governments and donor agencies; it counted 220 partners and \$20 billion in new spending by September 2012.⁵¹ The effort builds on other global initiatives such as the H4+ partnership, which brings together major UN agencies working in health; the 2010 Muskoka Initiative of the G8 (industrialized) countries; and Countdown 2015—all of which promote progress toward MDGs 4 and 5.

Even if all of the funds pledged to Every Woman Every

Child are raised and spent, however, the resources would not be sufficient in every country to expand services to all who need them. National governments and households, not external funders, have been and will continue to be responsible for funding the lion’s share of health care costs. Even at its highest point in 2009, development assistance for health was typically less than 10%, although in some of the poorest countries, the assistance was more than half of government expenditure.⁴⁷ To provide health care to all who need it, middle- and upper-income countries may need to reallocate health expenditures to support the most vulnerable groups of women, while the poorest countries may have to rely on external assistance for some time.

Programs that aim to improve the health of women and children must also provide modern contraception and related reproductive health care—both for the benefits these services bring and because they reduce the cost of maternal health care by preventing unintended pregnancies and births. The cost of this care is not included in the estimates in this report, but the services are complementary and essential. As noted earlier in this report, many pregnancies are unintended, and not all women who need modern contraceptive methods are using them. Fully meeting this need would reduce the number of births covered in this report by one-sixth.¹³

Barriers to Adopting Proven Interventions

Gaps in the coverage and quality of key services prevent the most vulnerable women and children from benefiting from proven interventions. Along the continuum of care from pregnancy through the postnatal period, a large unmet need can be seen particularly in the most risky period: for the mother, at the time of delivery and for the newborn, immediately after birth.

The major impediments to scaling up health interventions in developing countries are well documented: massive shortages of health workers, weaknesses in health system infrastructure, shortages of commodities and poorly functioning supply chains, and weaknesses in management capacity and health information systems.^{17,50} Social and cultural barriers are also impediments to using modern health care for pregnancy and delivery: As discussed in this report, many women do not believe it is necessary to deliver their babies in a health facility. Misinformation and misperceptions play an important role in people’s decisions to use health care; thus, future investments must include an information and communication component (partly included in our estimates) to educate women and families about the importance of using health facilities for delivery.

These supply-side and demand-side barriers may apply to many areas of health. However, maternal and newborn survival did not improve as quickly as child survival between 1990 and 2010,² likely because maternal and newborn care relies more heavily on skilled providers and a functioning health system, and because social and cultural barriers are greater in regard to using modern health care for pregnancy and delivery.

Actions Needed

Clearly, closing funding gaps is of the highest priority, and the price tag is substantial. Yet attention must also be paid to other factors that affect access to and use of maternal and newborn health services. Policymakers should bear in mind that as the proportion of women who are receiving maternal and newborn care rises, the remaining women with unmet need are likely to be harder to reach—they are likely to be disproportionately rural and poor and to perceive facility-based care as unnecessary and undesirable. This implies that greater educational efforts will be needed to overcome the personal and systemic barriers that these women face.

National actions in the following areas will help to address these barriers:

- Build the physical capacity of services to achieve universal access to basic and emergency obstetric care
- Address logistical issues, such as stockouts, and provide reliable supplies of essential commodities
- Ensure that adequate numbers of trained staff are available and that services are high quality
- Increase demand for services and the ability to pay through innovative means such as financial incentives, insurance and private-sector initiatives

In most countries, the use of maternal and newborn care is greater among urban and wealthier communities than among rural and poorer ones. Given that resources for expanding and improving services will be limited, some redistribution of resources may be necessary; for example:

- Shifting tasks so that lower-level health care workers can perform routine functions, freeing up more skilled medical personnel for urgent and complex care
- Where cesarean sections exceed the recommended levels, advocating for reducing medically unnecessary procedures so as to reallocate resources toward medically necessary interventions
- Targeting public resources to the most disadvantaged groups, such as rural, poor and less educated women

- Fully funding services that provide modern contraception to all women and couples who want it, to prevent unintended pregnancies and unwanted births

In communities, programs need to address the social and cultural barriers that prevent women from using modern health care, for example, through public education campaigns. Broader efforts are also needed to improve the status, education and economic power of women and girls. To improve the likelihood that all pregnant women will receive the care they need, programs should take the following steps:

- Counter beliefs that because women historically have not received care for pregnancy or childbirth, antenatal care and delivery in health facilities are not necessary
- Implement changes to health provider training and health facility policies to ensure women are treated with dignity and respect by medical staff
- Ensure that pregnant women start receiving care during the first trimester of pregnancy to reduce the risk of complications for the mother and the newborn
- Address obstacles such as lack of awareness, information and transport that prevent women from getting emergency obstetric care

In the next few years, international agencies, national governments and the private sector must act to expand access to basic and emergency care for all pregnant women and newborns. In addition, the quality of care must improve, both for those who are now receiving services and for those with unmet need. Because of a general increase in the desire for smaller families, the total number of births in the developing world did not increase between 2008 and 2012, making it somewhat easier to meet service needs; it is no longer necessary to increase funding just to keep up with growing numbers. Fully meeting the need for maternal and neonatal health care will not be cheap, however, because health infrastructure must be improved and additional health workers trained in underserved areas. Progress around the world in increasing care for women and their infants demonstrates that it is possible to accomplish this with sufficient funds, innovative initiatives and political commitment.

Appendix: Methodology and Data Sources

This report builds on a previous study that estimated for 2008 the need for maternal and newborn health services for women giving birth, the need for care for complications of induced abortion and the cost of meeting these needs.^{9,52} The current report presents new, comparable estimates for 2012. Most of the data have been updated, and use of a comparable methodology permits comparison of many of the measures between 2008 and 2012. Coverage of services has been expanded somewhat in the new analyses and estimation of some of complications has been improved.

While the earlier study also estimated the health impacts of providing these services, this report does not provide updated estimates on health impacts; we plan to update these estimates in a future report. In that report, we will also extend the recent estimates to include needs and care for women with miscarriages, stillbirths and induced abortions.

Data Sources

Our principal sources were Guttmacher Institute tabulations of Demographic and Health Surveys (DHS); other national surveys, including Multiple Indicator Cluster Surveys (MICS) and Centers for Disease Control and Prevention (CDC) Reproductive Health Surveys (RHS); international data compilations;⁵³ and published reports. We used the most recent available data sources, including newly released preliminary DHS survey reports, available as of April 30, 2013. We made estimates for missing data and for countries without survey data in a number of ways, including by using subregional averages, data from similar nearby countries, data from earlier surveys and data from compilations published by international agencies.

Geographic Regions and the 69 Poorest Countries

We use the United Nations Population Division's geographic definition of the developing world, regions and subregions.⁵⁴ The 69 poorest countries in the world are those with a 2010 per capita gross national income less than or equal to US\$2,500.⁵⁵ This group of 69 countries is the focus of Family Planning 2020, an initiative that builds on the 2012 Family Planning Summit.⁵⁶ They are included

here partly to show differences between poorer and better-off developing countries. We will also present the same groups of countries in our upcoming *Adding It Up* analysis of the provision of contraceptive services combined with maternal and newborn health care. Appendix Table 2 provides a list of developing countries by region and subregion and also identifies the 69 poorest countries.

Data Coverage

The most recent survey data on distributions of women aged 15–49 by need for and use of antenatal and delivery health services are incorporated into the updated 2012 estimates.

- For antenatal visits, new survey data were used for 88% of the women giving birth in the developing world, and for 6% of women, the same data source was used as in 2008; estimates (generally based on subregional averages) were made for 6% of women giving birth in 2012, a smaller proportion than in 2008, when estimates were made for 13% of women giving birth.
- For place of delivery, 2012 estimates use new survey data for 97% of women giving birth in the developing world and the same data source as in 2008 for 3% of women.

Key Steps in Estimation

- We estimate total pregnancies in 2012 and their distribution by outcome as follows: Total births were based on UN estimates of the number in each country in 2012;⁵⁷ births were distributed into intended and unintended pregnancies using estimates from the 2008 *Adding It Up* analysis of survey data on birth intention status;⁵² estimates of the number of induced abortions for 2012 (projections based on rates for 2003 and 2008)^{58,59} were used for each subregion, distributed across countries in the subregion according to the percentage distribution of unintended births; the proportion of all abortions that were unsafe in 2008 were assumed to be unchanged and applied to 2012;^{60,61} and miscarriages⁶² and stillbirths⁶³ were estimated based on existing syntheses of clinical studies. A small percentage of women may have more than one pregnancy in a

given year, in particular if their pregnancies end in abortion or miscarriage; this situation is very infrequent among women with live births. We focus on live births in this report and treat the number of live births as equal to the number of women who gave birth in 2012.

- Estimates of receipt of needed health services (“met need”) draw on a wide range of surveys of women who had live births in recent years, principally the DHS, supplemented by the MICS and the RHS, independent national surveys and other national sources of data on health services,²⁸ as well as estimates from published studies and literature reviews. Where available, we took information reported for the most recent birth in the time period covered in the data source, usually the past two years (MICS) or three years (DHS).^{*} These surveys provide information on receipt of antenatal and delivery care and on cesarean sections, as well as on receipt of blood and urine tests, anemia screening, treatment for intestinal parasites and other types of care, although all items are not included in every survey. Estimates of syphilis testing and treatment were based on WHO data compilations and analyses.^{64,65}

Some services recommended during pregnancy are not covered by survey data. We based estimates of receipt of care on the type of care needed; for example, we assumed women were screened for hypertensive disease if they had a urine test during antenatal care and for anemia if they had a blood test. We generally assumed that half of the women needing frequent or complex antenatal care received it if they made at least four antenatal care visits, for example, weekly monitoring or other treatment for hypertensive disease; we assumed women with urinary tract infection received treatment if they had adequate antenatal care (measured as four or more visits, one of which was to a trained provider). We assumed all newborns delivered in facilities to have received basic care, and we assumed 50% of women delivering in facilities and their newborns obtained postnatal services. For receipt of care for complications, on which no relevant

survey data were available, we estimated met need based on the type of treatment required, delivery in a facility and the extent of provision of emergency obstetric services in health facilities. Published studies show a range of proportions of facilities providing emergency obstetrics services and present data based on facilities, not births; lacking definitive information, we assumed that half of the women and newborns delivered in a facility had access to emergency care, whether onsite or through referral and transfer.^{26,37–41}

- The specific services that women and newborns need for basic care and for diagnosis and treatment of conditions or complications are based on recommended standards of care from international agencies (principally the World Health Organization).[†] The list of services included in the report is provided in Appendix Table 1, page 30. All of these services are included in our cost estimates; however, we present selected key indicators of services received in the report.

- The proportions of women giving birth and newborns who are in need of health services related to pregnancy, delivery and the immediate postpartum period are based on published estimates of the incidence or prevalence of three general health conditions (anemia,^{18,66} hookworm¹⁹ and malaria^{67,68}), four pregnancy and delivery complications (hemorrhage,^{69–72} sepsis,⁷³ preeclampsia and eclampsia,^{74,75} and obstructed labor^{76,77}), and three newborn complications (prematurity and low birth weight,⁷⁸ infection and sepsis^{48,79} and asphyxia and breathing difficulties^{78,80}).

- We estimated proportions of births with need, met need and unmet need for basic and specific health care from the most recent available data and applied them to estimates of total live births in 2012 from the United Nations Population Division to estimate total numbers of women and newborns needing and receiving each service.⁵⁷

- For each country in the developing world, we estimated the numbers of women giving birth and newborns in need of health services related to pregnancy, delivery and the immediate postpartum period (generally the first week, although some conditions develop as late as 4–6 weeks after birth); the numbers in need receiving care; and the unmet need for care. These were summed to subregions, regions and to the entire developing world. For countries that did not have survey data on specific measures, we made estimates based on subregional, regional or global averages. The aggregated subregional and regional results presented in the report are robust and reliable best estimates. Country-specific results that are presented in the figures are illustrative examples based on actual survey data.

^{*}An exception was made in the case of India, where rapid change in the proportion delivering in health facilities, resulting from a large-scale intervention (Janani Suraksha Yojana), was better captured by using data for the last full year of data from the most recent national survey, the 2007–2009 District-Level Household Survey (DLHS).²⁸

[†]In general, recommended standards of care have changed little between 2008 and 2012. However, a few recommended services were not costed in 2008, and it is now feasible to include them. These services include treatment of syphilis among pregnant women, antenatal corticosteroids for preterm labor, induction of labor beyond 41 weeks, and counseling and support for appropriate breast-feeding. In these cases, whenever possible, we have updated the 2008 cost estimates in order to have comparable results.

- Unmet need is estimated as the difference between the total number of women who need a particular type of health service (given the recommended standards of care and levels of specific conditions and complications) and the number who are receiving that service.
- Costs are estimated for two scenarios: the current status (reflecting current levels of receipt of care) and a scenario in which all women and newborns receive all of the health services they need, for basic care and care for any conditions or complications.

Additional Indicators Presented in 2012 Estimates

In this report, as in the 2008 report, we present estimates of the numbers and proportions of women and newborns receiving recommended antenatal, delivery and newborn health care services. We also present separate coverage estimates for some interventions for 2012 that were not presented separately for 2008 although they were included in the 2008 cost estimates. These additional indicators are

- receipt of at least one urine test and one blood test as part of antenatal care;
- iron supplementation during pregnancy (this indicator includes women who did not make any antenatal visits but who report taking iron supplements);
- proportions who were anemic (hemoglobin level less than 11g/dl, which includes mild, moderate or severe anemia);
- need for and receipt of treatment for hookworm;
- need for and use of preventive interventions (insecticide-treated bed nets and intermittent preventive treatment for malaria) among pregnant women living in countries where malaria is endemic.

Estimates of Direct and Indirect Costs

Direct costs were estimated for drugs, medical supplies, hospital hotel costs and labor needed for providing maternal and neonatal health services. Program and systems costs (also referred to as indirect costs) were calculated as a proportion of direct costs, based on estimates published by the United Nations Population Fund (UNFPA)⁸¹ using the same approach as was used for the 2008 estimates. Total costs are the sum of direct and indirect costs. These costs are paid for through a number of sources that vary in importance depending on the country: national government budgets, external agencies and donors, employers (through insurance benefits), and women and families themselves, through contributions to insurance coverage and out-of-pocket payments for services and supplies.

Direct costs. A bottom-up, or ingredients-based, costing methodology was employed. For each intervention, a list was compiled of all inputs required to treat an average case. Inputs include all required drugs and supplies, as well as estimates of what type of staff would provide the treatment and how much time (in minutes) each of these staff would spend with the patient. Supplies include gloves, syringes, sutures, dressings and anesthesia. In addition, where relevant, some cost was added to account for the direct cost of hospitalization (principally food) not captured by the program and system cost estimates.

The inputs were then costed using international prices (drug costs were based on the median cost in U.S. dollars cited in the Management Sciences for Health International Drug Price Indicator⁸² and medical supplies in U.S. dollars were based on the United Nation Children's Fund (UNICEF) supply catalogue⁸³). Country-specific data on salaries came from the World Health Organization's CHOICE 2005 Database.^{84,85} Personnel costs were calculated by applying salary estimates to estimates of the type of staff and amount of time needed for each intervention, and these cost estimates were adjusted to 2012 U.S. dollars using the U.S. GDP Price Deflator.⁸⁶

Indirect costs. Indirect costs include program management, supervision, training of personnel, health education, monitoring and evaluation, advocacy, information systems and commodity supply systems, and costs for maintaining and expanding the physical capacity of health facilities.⁸⁷ Updated estimates of indirect costs for sexual and reproductive services in the developing world are not available at this time.

Following prior estimates of contraceptive costs for 2012, we assumed that UNFPA's 2008 program and systems percentage (which is lower than its 2009 percentage) applies to cost estimates for the current year (2012).¹³ The same reasons underlie the choice to use UNFPA's 2009 rates for the near future scenario, in which costs are estimated for providing improved services to all current users and all women with unmet need: Given the inadequate levels of investment in recent years, it is appropriate to apply the higher 2009 indirect rates to the future scenario, to account for the cost of building capacity and improving services necessary to fully meet the needs of all women and newborns who need maternal and newborn care.

APPENDIX TABLE 1. Maternal and neonatal health services included in cost estimates for 2012

Category of care	Intervention
Antenatal care	<p>Screening for blood sugar, Rh factor and HIV infection</p> <p>Pregnancy test</p> <p>Counseling and education on STIs and reproductive tract infections, birth and emergency preparedness and breast-feeding</p> <p>Tetanus vaccine</p> <p>Deworming medications</p> <p>Syphilis detection and treatment</p> <p>Hypertensive disease management</p> <p>Initial urine screening</p> <p>High blood pressure without proteinuria management</p> <p>Management of mild preeclampsia (<37 weeks' gestation)</p> <p>Management of mild preeclampsia (≥37 weeks' gestation)</p> <p>Management of severe preeclampsia</p> <p>Malaria prevention (insecticide-treated bednet and intermittent preventive treatment and treatment)</p> <p>Anemia screening, prevention and treatment</p> <p>Urinary tract infection treatment</p> <p>Antepartum hemorrhage treatment</p>
Care before labor	<p>Antenatal corticosteroids to prevent respiratory distress syndrome in preterm babies</p> <p>Antibiotics for prelabor rupture of membranes (PROM)</p> <p>Induction of labor (beyond 41 weeks)</p>
Delivery care	<p>Routine vaginal delivery</p> <p>Active management of the third stage of labor</p> <p>Cesarean sections</p> <p>Pre-referral management of labor complications</p> <p>Management of prolonged labor (induce labor, assisted vaginal delivery or normal delivery)</p> <p>Management of obstructed labor by assisted vaginal delivery or cesarean section</p> <p>Management of eclampsia</p> <p>Management of maternal sepsis</p> <p>Management of postpartum hemorrhage</p>
Postpartum/postnatal care	<p>Preventive postnatal care in the immediate period following delivery, including iron supplementation</p> <p>Treatment of mastitis</p> <p>Treatment of obstetric fistula</p> <p>Breast-feeding counseling and support</p>
Care for postabortion complications	<p>Postabortion case management</p>
Newborn care	<p>Immediate newborn care, including antibiotic to prevent ophthalmia</p> <p>Neonatal resuscitation</p> <p>Supportive care for prematurity and low birth weight</p> <p>Treatment of local infections</p> <p>Treatment of congenital syphilis</p> <p>Treatment of newborn sepsis (injectable antibiotics or full supportive care)</p> <p>Hepatitis B vaccine</p> <p>Polio vaccine</p> <p>BCG (tuberculosis) vaccine</p>

Note: All services are included in cost estimates, according to women's and newborn's need for care; selected services are presented in the text.

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125 Maiden Lane
New York, NY 10038
(212) 248-1111; fax (212) 248-1951
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1301 Connecticut Avenue NW, Suite 700
Washington, DC 20036
policyinfo@guttmacher.org

www.guttmacher.org