
WOMEN DELIVER

■ ■ ■ **Women Deliver for Development**

BY KIRRIN GILL, ROHINI PANDE, AND ANJU MALHOTRA

BACKGROUND PAPER FOR
THE WOMEN DELIVER CONFERENCE, 18-20 OCTOBER 2007

The WOMEN DELIVER Planning Group

Department for International Development, UK ■ Dutch Ministry of Foreign Affairs ■ Family Care International (Organizing Partner) ■ International Planned Parenthood Federation ■ Norwegian Agency for Development Cooperation ■ Partnership for Maternal, Newborn & Child Health ■ Save the Children/Saving Newborn Lives ■ Sida, Swedish International Development Cooperation Agency ■ UNICEF, United Nations Children's Fund ■ UNFPA, United Nations Population Fund ■ The World Bank ■ The World Health Organization

▾ ACKNOWLEDGEMENTS

We are immensely grateful to Michelle Lee, our research assistant, who identified, reviewed, and managed all the literature for us, developed charts and graphics, and provided useful input. Her exacting custodianship of the literature, attention to detail, and unflagging good spirits made this a pleasant effort. Special thanks to Ann Starrs at Family Care International, who collaborated closely with us on planning this publication and provided insightful editing and comments on numerous versions. Thanks also to Laurie Calhoun for Librarian assistance and Eve Goldstein-Segal for her help in developing tables and graphics for the paper. We received valuable contributions from many people during the process of this paper. Particular thanks are due to Ann Blanc, Flavia Bustreo, Naomi Cassirer, Meg Greene, Geeta Rao Gupta, Kenneth Hill, Tom Merrick, Cindy Stanton, and Anne Tinker.

Design by Green Communication inc.

© Family Care International and International Center For Research On Women, 2007

Not-for-profit organizations may use any of the material in this publication freely as long as it is not used for commercial purposes. FCI would appreciate acknowledgements and copies when possible.

▾ TABLE OF CONTENTS

EXECUTIVE SUMMARY	5
1. INTRODUCTION	7
1.1 Purpose of the paper	7
1.2 Conceptual framework and structure of the paper	8
1.3 Methodology	9
2. WOMEN DELIVER AS MOTHERS: Progress in maternal health over the last 20 years	10
2.1 Progress on key maternal health indicators	10
3. WOMEN DELIVER AS INDIVIDUALS: Maternal health and women’s status and empowerment	21
3.1 Women’s Education	22
3.2 Women’s Economic Opportunity	23
3.3 Household Decision-making and Intimate Partner Violence	24
3.3.1 Household decision-making	24
3.3.2 Intimate partner violence	25
3.4 Reproductive Health: Contraception, Abortion, and HIV and AIDS	27
3.4.1 Contraceptive Use	27
3.4.2 Unsafe Abortion	28
3.4.3 HIV and AID	29
4. WOMEN DELIVER AS FAMILY MEMBERS: Widespread effects of maternal health on children and families	31
4.1 Effects on Children	31
4.2 Household finances and well-being	33
5. WOMEN DELIVER AS CITIZENS: Maternal health benefits for national productivity and health service delivery	35
5.1 Productivity	35
5.2 Burden of Disease	36
5.3 Health service delivery	36
5.4 Cost-effectiveness	37
6. INVESTMENTS IN MATERNAL HEALTH: Shortfalls & Potentials	38
7. CONCLUSIONS	40
REFERENCES	42

List of Figures

Figure 1: Women's Roles and Development: Key Linkages	8
Figure 2: Regional Distributions of Causes of Maternal Deaths	16
Figure 3: Antenatal Care Visits to a Medically Trained Person	19
Figure 4: Attended Delivery by a Medically Trained Person	20

List of Tables

Table 1: Maternal Mortality Ratios (MMR) ^a : 1983–2005	11
Table 2: Lifetime Risk of Maternal Death ^a : 1983-2000	11
Table 3: Maternal Mortality Ratios* (2005): Country-Level Examples	12
Table 4: Complications of Pregnancy and Childbirth: Estimates for Select Less Developed Countries	15
Table 5: Antenatal Care Use, 1990-2000*	17
Table 6: Proportion of deliveries attended by skilled birth attendants, 1990 and 2005	18
Table 7: Potential Effects on Children, Families and Households, and Society Due to Maternal Morbidity and Mortality	32
Table 8: Estimated costs of scaling up services to reduce maternal and antenatal mortality	39

List of Case Studies

Case Study 1: Reducing Maternal Mortality in Sri Lanka	13
Case Study 2: Prioritizing Maternal Health in Honduras	14
Case Study 3: The Costs of Maternal Death in Afghanistan	33

Appendix

Appendix 1: Basic Terminology Defined	41
---------------------------------------	----

▾ EXECUTIVE SUMMARY

This paper argues that maternal health is central to the multiple aspects of many women's lives, and is critically important for development goals more broadly. As such, maternal health is connected with women's lives and options as individuals, the well-being of their children and families, and the economic productivity of their countries. The evidence reviewed indicates that a woman's ability to survive pregnancy and childbirth is closely related to how effectively societies invest in and realize the potential of women—one half of their populations—not only as mothers, but as critical contributors to sustaining families and transforming nations. When investments in women—as mothers, as individuals, as family members, and as citizens—lag, the economic cost of maternal death and illness is enormous. So is the opportunity cost for nations in terms of lost possibilities for broader social and economic development.

Yet **progress and investment in maternal health have lagged** far behind estimates of what is needed to achieve Millennium Development Goal 5, Improve Maternal Health.

- Progress in the last twenty years on key maternal health indicators varies by outcome and region, but has been uneven, inequitable, and inadequate overall.
- The two regions of the world with the worst maternal health status – South Asia and sub-Saharan Africa – show minimal signs of improvement.
- The successful experiences of several countries show, however, that rapid improvements are possible.

Poor maternal health is of serious concern because **women's health as mothers is intricately linked with other aspects of women's lives.**

- The continuing poverty, disempowerment, and overall poor health status of women in much of the developing world contribute to continuing poor maternal health.
- Where women have low status and are disempowered, maternal health is likely to be poor.
- Conversely, where women have power in the household, and access to resources such as education and economic opportunity, they are better able to access and use services during pregnancy and childbirth or otherwise maintain good maternal health.
- Other aspects of women's reproductive health, especially their ability to control their fertility and avoid HIV infection, are also closely associated with their health as mothers.

Maternal health has widespread effects on children and families.

- A mother's death has profound repercussions for newborn and child health and survival.
- It also has grave implications for the long-term well-being of children – particularly girls – through its impact on their education, growth, and care, as well as intergenerational effects.
- Maternal death and illness is costly for families due to high direct health costs, loss of income, and loss of other economic contributions, as well as disturbed family relationships and social stresses.

At the national and global level, **investing in maternal health makes economic sense.**

- Maternal ill health and related newborn mortality have a substantial impact on economic productivity, with estimated global costs of over US\$15 billion per year.
- Yet the total cost of preventing most of these maternal and newborn deaths ranges from only an estimated US\$4.1 - \$6.1 billion per year.
- While maternal death and disability represent a high burden of disease in the developing world, interventions to improve maternal health are available and cost-effective.
- Maternal health interventions benefit overall health service delivery as well.

Investments in maternal health continue to fall far below what the development community knows is necessary to realize the benefits of maternal health and achieve the MDG goal for safer maternity. Yet the gap in the investment needed for maternal health represents a small fraction of global GNP and total development aid, comprising less than 0.016% of global GNP and 2% of aid.

This review highlights some key limitations in the current literature where additional research is needed. Concerted efforts also are needed to change public perceptions about the severity of the problem and the solutions that are available, and to galvanize a coalition of stakeholders committed to improving maternal health. Core elements include:

- Providing access to comprehensive reproductive health services;
- Imparting education that gives women and girls options in life beyond childbearing;
- Ensuring skilled care by nurses, midwives or doctors during pregnancy and childbirth, including emergency services, and care for mothers and newborn babies after delivery.

Full implementation of effective strategies must be linked to a full understanding and acknowledgement of the linkages between maternal health, women's status, and broader development. Adequate investment in maternal health and in women will enable women to fulfil their potential to 'deliver' as mothers, as individuals, as members of families, and as citizens.

1. INTRODUCTION

1.1 Purpose of the paper

Women have a fundamental right to be healthy and fulfil their potential in the various arenas of life. The health and well-being of women is also critical to ensuring healthy children, strong and healthy families and communities, and prosperous nations, especially as they aim to make progress on social and economic development. In their prime reproductive years in particular, women contribute to their societies in multiple ways. Not only do they bear and raise the next generation, they are critical actors for progress, as workers, leaders, and change agents. Thus, in these years women have the greatest potential to “deliver” not only as mothers, but as individuals in their own right, as family members shouldering responsibilities, and as citizens moving their nations towards new horizons.

MILLENNIUM DEVELOPMENT GOAL 5: IMPROVE MATERNAL HEALTH

Target: Reduce by three quarters, between 1990 and 2015, the maternal mortality ratio

Indicators for monitoring progress:

- Maternal mortality ratio (MMR)
- Proportion of births attended by skilled health personnel

Source: United Nations (2007)

The recognition by the world community of these multiple levels of contributions by women has been reflected in the Millennium Development Goals (MDGs), which give a central place to both maternal health and to gender equality. Despite this recognition, however, it is sobering to consider the poor progress that is evident on achieving MDG 5, which aims to reduce maternal mortality by three quarters between 1990 and 2015 (Ronsmans and Graham 2006; Filippi, Ronsmans et al. 2006; UN Millennium Project 2005b). The failure to progress on this core indicator is of particular concern because it limits women’s potential to deliver for development in many other ways.

This paper explores this hypothesis and documents not only the lack of progress on maternal health outcomes over the last 20 years, but also the connection between maternal health, gender equality, and development outcomes. While much public health research has examined maternal health per se, there has been less focus on evaluating the evidence on how maternal health may interact with economic and social development at micro and macro levels. Therefore, this paper presents a comprehensive view of maternal health through a broader perspective, bringing together the evidence from different bodies of research, including the state of maternal health, links between maternal health and other gender and development indicators, and investment in maternal health.

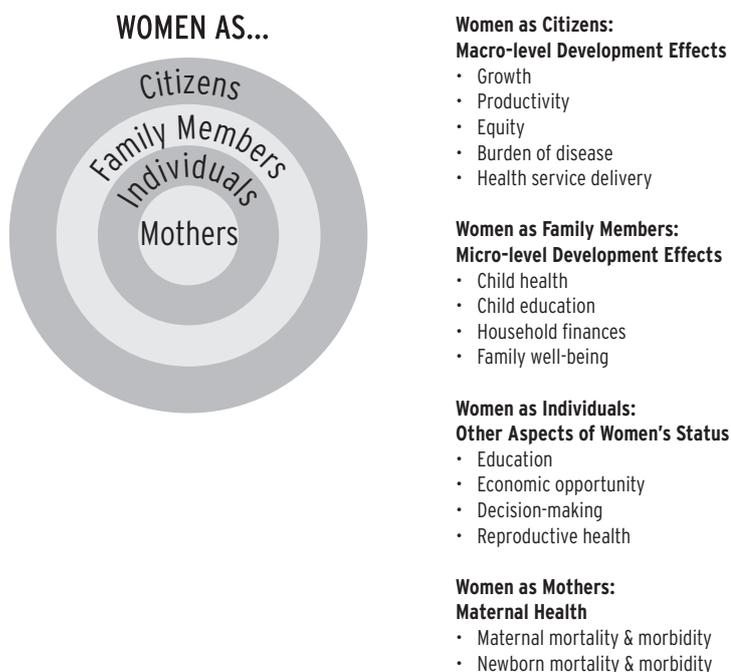
We conducted an extensive review of the literature over the last 20 years to examine the current situation of maternal health in the developing world, how has it changed since the start of the Safe Motherhood Initiative 20 years ago, and where and how the progress has lagged. We argue that maternal health is intricately linked to women’s roles in other spheres of their lives, whether as individuals with their own rights, members of families, or citizens contributing to economic and social development. By presenting evidence on the links between maternal health and other development issues, this paper contributes to the existing literature by examining the evidence to-date on the linkages between maternal health and three important aspects of development: women’s own status and empowerment; economic and social development at the micro, family level; and economic and social development at a macro, national level. Studies have tended to focus on one or the other aspects of development, and few studies, if any, have specifically examined the links between maternal health and a range of women’s status and empowerment outcomes. Our paper addresses these gaps and examines multiple aspects of

development together for a more holistic analysis. Lastly, we assess the extent to which governments and donors have invested in maternal health, and present some examples of successful national efforts to reduce maternal mortality and morbidity.

■ 1.2 Conceptual framework and structure of the paper

Women’s adolescent and adult years are the time when women strive to fulfil their potential, for their lives, their families and communities, and their societies. Since childbearing is a key part of these years for most women in developing countries, maternal health has an important impact on their ability to “deliver”, in every way. Maternal health most directly affects a woman’s own health and survival and that of her newborn. However, maternal health is linked to women’s lives not simply as a health issue. As an individual in her own right, woman’s status and empowerment as an individual and her ability to be a healthy mother strongly impact each other. As a member of a family, the health and well-being of a mother shape the health and education of her children and the finances and welfare of her household. Finally, at a macro level, poor maternal health strongly affects a nation’s economic development. Figure 1 below illustrates this conceptualization. The concentric circles in Figure 1 illustrate how women’s roles as mothers affect other aspects of their lives and their families and societies in ways that have implications beyond health, to their effect as citizens on larger development outcomes. The rest of this paper examines the empirical evidence for this conceptualization.

Figure 1: Women’s Roles and Development: Key Linkages



The next section describes the state of women as mothers, focusing on key indicators related to maternal and newborn mortality and morbidity and the progress made during the last 20 years of the safe motherhood movement. Section 3 looks at maternal health and women as individuals, and examines the relationships between maternal health and other key aspects of women's health and status: education, economic empowerment, decision-making power, intimate partner violence, and reproductive health. Sections 4 and 5 look at the relationship between maternal health and women's roles as family members and as citizens. Section 4 examines the influence of maternal health on child health and education, household finances, and family well-being. Section 5 examines the influence of maternal health on macro-level development outcomes, such as growth, productivity, and equity; the burden of disease due to maternal health; and the benefits to health systems as a whole from investments in maternal health. Section 6 examines the future outlook for mothers in terms of investments in maternal health in relation to what is needed to achieve Millennium Development Goal 5. The concluding section of the paper discusses some policy and research implications of the key findings of the paper.

■ 1.3 Methodology

Sources of the literature

The paper draws on literature from the fields of medicine, public health, sociology, economics, demography, health policy, epidemiology, community health, the biosocial sciences, anthropology, psychology and social psychiatry. We include articles from peer-reviewed journals, as well as materials from major international organizations such as the UN and World Bank.

Searches

Searches on 'maternal health' included the following key terms: maternal mortality, maternal morbidity, obstetric morbidity, and maternal health services utilization (antenatal, delivery, and postnatal care). Individual sections guided further primary keyword searches. For example, key terms used for investments in maternal health included: investments, (donor) funding, and millennium development goals. To fully capture the relationships of economic opportunities to maternal health, we added such search terms as: employment, wages, enterprise, savings, assets, economic opportunity, occupation, and microcredit. Searches on decision-making included key words to reflect different aspects of decision-making, such as household decision-making and health decision-making. The key terms of autonomy and empowerment allowed for a broader examination of decision-making as a part of women's status and health. Searches for links of maternal health with various development outcomes at both micro- and macro- levels used key search terms such as: disability-adjusted life years (DALYs), burden of disease, cost-effectiveness, child education, household finances, family, individual effects, household-level effects, and adult mortality consequences.

All searches were conducted using literature databases such as POPLINE, PubMed, Proquest, Social Science Citation Index, and the websites of international bilateral and multilateral organizations such as the World Health Organization, the World Bank, UNICEF, the United Nations, UNFPA, and the United States Agency for International Development. We also accessed websites of other key players in global health and maternal health such as the Population Reference Bureau, the Global Health Council, the London School of Economics, the London School of Hygiene and Tropical Medicine, Oxfam International, and the Impact Initiative. Through these searches, we accessed a total of 264 articles from which the evidence for this paper is drawn.

2. WOMEN DELIVER AS MOTHERS: Progress in maternal health over the last 20 years

SUMMARY OF FINDINGS: PROGRESS IN MATERNAL HEALTH OVER THE LAST 20 YEARS

- Progress in the last 20 years on key indicators varies by outcome and region, but has been uneven, inequitable and inadequate overall.
- The two regions with the worst maternal health status—South Asia and sub-Saharan Africa—show minimal signs of improvement.
- The successful experiences of several countries demonstrate that rapid improvements are possible.

Every year, over half a million women die in pregnancy and childbirth around the world.¹ This figure has altered little in the last 30 years. Equally distressing is the fact that worldwide, the ratio of maternal deaths to live births (the maternal mortality ratio) has remained essentially static during this period. Moreover, the regions with the poorest maternal health 30 years ago—sub-Saharan Africa and South-Central Asia—have progressed the least (United Nations 2002). Nonetheless, there are success stories where poor maternal health has been turned around. Egypt, Honduras, Malaysia, Sri Lanka, Thailand, and parts of Bangladesh all halved their maternal mortality ratios over the last several decades (Ronsmans and Graham 2006), suggesting that MDG 5, which targets a 75% reduction in maternal mortality, is achievable, provided there is political will and financial investment (Ronsmans and Graham 2006; Abouzahr and Wardlaw 2001; UN Millennium Project 2005b; Freedman, Waldman et al. 2005).

2.1 Progress on key maternal health indicators

Maternal Mortality

Tables 1 and 2 show estimates of maternal mortality across the world between 1983 and 2005. Methodological and measurement issues make specific cross-country and cross-time comparisons tenuous, except for estimates for 1990 and 2005 which have been calculated with the same methodology by Hill and colleagues. Still, the data overall do reveal some broad patterns. The first is that maternal mortality varies tremendously between regions in the world. In 2005, the maternal mortality ratio² (maternal deaths per 100,000 live births) ranged from 9 in Developed Regions to 900 in Sub-Saharan Africa (Table 1). Table 2 shows that in 2000, although the world-wide average lifetime risk of dying from causes related to pregnancy and childbirth was 1 in 74, a woman in Sweden had only a 1 in 29,800 risk of death related to pregnancy and childbirth in her lifetime,³ while the risk for a woman in Sierra Leone or Afghanistan was 1 in 6 (WHO 2004b).

¹ See Appendix 1 for a definition of maternal death.

² See Appendix 1 for a complete definition of maternal mortality ratio.

³ See Appendix 1 for a definition of lifetime risk of maternal death.

Table 1: Maternal Mortality Ratios (MMR)^a: 1983-2005

Region	1983 ^b	1990 ^d	1995 ²	2000 ³	2005 ⁴
World	390	425	400	400	403
Developed Regions^c	NA*	11	21	20	9
Countries of the CIS	NA*	58	NA*	NA*	51
Africa	640	829	1,000	830	820
Northern ^d	NA*	246	200	130	160
Sub-Saharan	NA*	920	1,100	920	900
Asia	420	410	280	330	330
Eastern ^e	55	95	55	55	50
South	650	922	410	520	490
South-Eastern	420	453	300	210	310
Western	340	194	230	190	170
Latin America & Caribbean	270	179	190	190	130
Oceania^e	NA*	548	260	240	430

^a Maternal deaths per 100,000 live births.

^b 1983 estimates result from a UN regional classification of countries as opposed to UN MDG regional groupings for 1990-2005.

^c Includes North America, Europe, Japan, Australia, and New Zealand which are excluded from regional averages.

^d Excludes Sudan which is included in sub-Saharan Africa.

^e The countries included in Oceania MMR for 1995 and 2000 differ from those included in 1990 and 2005 and thus the changes in estimates across these two sets of time periods should be interpreted with caution.

* NA denotes the lack of available data, or the lack of data according to the regional breakdown used here.

Sources: ¹ Royston and Armstrong (1989); ² WHO (2001); ³ WHO (2004b); ⁴ Hill, Thomas et al. (Under review).

Table 2: Lifetime Risk of Maternal Death^a: 1983-2000

Region	1983 ¹	1990 ²	1995 ³	2000 ⁴
	1 in:			
World	58	60	75	74
Europe	NA*	1,400	2,000	2,400
Africa	21	16	16	20
Northern ^b	NA*	NA*	NA*	210
Sub-Saharan	NA*	NA*	NA*	16
Asia^c	54	65	110	94
Eastern	722	410	840	840
South-Central	26	35	55	46
South-Eastern	44	55	95	140
Western	34	55	95	120
Latin America & Caribbean	NA*	130	160	160
Oceania^c	NA*	26	260	83

^a Lifetime risk is the chance that a woman will die in pregnancy or childbirth at some point in her life rather than during a single pregnancy. For example, a woman in sub-Saharan Africa has a 1 in 16 chance of dying in childbirth, whereas, a woman in Europe has a 1 in 2,400 chance.

^b For 1995 and 2000 excludes Sudan which is included in sub-Saharan Africa.

^c For 1990 Japan and Australia/ New Zealand have been excluded from the regional averages and totals but are included in the average and total for more developed countries.

* NA denotes the lack of available data, or the lack of data according to the regional breakdown used here.

Sources: ¹ Royston and Armstrong (1989); ² Murray and Lopez (1998); ³ WHO (2001); ⁴ WHO (2004b).

Tables 1 and 2 also show that Africa continues to be the region with the highest MMR. In fact, recent data reveal that 51% of all maternal deaths occur in sub-Saharan Africa alone (Hill, Thomas et al., under review). One contributing factor is HIV, which currently accounts for 6.2% of maternal deaths in Africa (Khan, Wojdyla et al. 2006) and has reversed the progress made in maternal health in some countries (Bicego, Boerma et al. 2002; Fawcus, van Coeverden de Groot et al. 2005; UN Millennium Project 2005b). Finally, revised estimates for 1990 and new estimates for 2005 suggest that in those parts of the world where maternal mortality was high in 1990 we still have a long way to go to reach acceptable MMR levels. Levels in sub-Saharan Africa are virtually unchanged between these two time periods. In South Asia, between 1990 and 2005 maternal mortality more than halved, but is still the highest MMR outside of Africa. MMRs at the country level reinforce this poor performance (Table 3). Countries in sub-Saharan Africa and South-central Asia, such as Sierra Leone, Afghanistan, and Niger, have the highest maternal mortality in the world. Of the 13 countries currently estimated to account for two-thirds of all maternal deaths each year, the majority are in sub-Saharan Africa and southern Asia (UN Millennium Project 2005b).

Some countries and regions have, however, made progress. Sweden's MMR is at an incredible 2/100,000 (Table 3). Countries in North Africa, Southeast and Southwest Asia and in Latin America experienced considerable declines in maternal mortality ratios between 1980 and 1997 (AbouZahr and Wardlaw 2001), and between 1990 and 2005 (see Table 1). For example, Malaysia, Egypt, and Thailand were able to decrease maternal mortality ratios by more than 50% within periods of time ranging from 7 to 40 years (Ronsmans and Graham 2006).

Table 3: Maternal Mortality Ratios* (2005): Country-Level Examples

Country	MMR*
Sierra Leone	2127
Niger	1835
Afghanistan	1805
Haiti	665
Bangladesh	614
Kenya	563
India	452
Honduras	283
Philippines	226
Vietnam	153
Egypt	126
Sri Lanka	40
China	45
Romania	24
United States	11
Sweden	4

Source: Hill, Thomas et al. (In review)

These patterns point to a link with development. A glance at Table 3 shows that the countries with lowest MMRs in 2005 (such as Sweden, China, and Egypt) and regions with most progress in MMR are also the more economically developed areas in the world, while the countries with the highest MMRs (such as Sierra Leone and Afghanistan) and the regions with least improvement are among the poorest in the world. Thus maternal mortality is clearly enmeshed with poverty. It is also no coincidence that countries the highest maternal mortality are conflict-ridden countries, which face continuing disruption in access to maternal health services and structural weaknesses in the health infrastructure (Wali, Gould et al. 1999; WHO 2000).

At the same time, cross-national evidence from some countries – such as Sri Lanka, Honduras, Vietnam, and Bangladesh – indicates that lower maternal mortality can be achieved despite the economic constraints that poor countries face. Sri Lanka and Vietnam have achieved declines in maternal mortality ratios, despite the fact they have the same level of per capita gross national income as Yemen and Cote d'Ivoire, which have far higher maternal mortality ratios (Ronsmans and Graham 2006). A closer look at the experiences of some of these countries (Case Studies 1 and 2) strongly illustrates that, with political will and financial commitment, countries can address maternal mortality even in the face of low levels of economic development (AbouZahr and Wardlaw 2001; Ronsmans and Graham 2006).

Case Study 1: Reducing Maternal Mortality in Sri Lanka

Context: The maternal mortality ratio (MMR) in Sri Lanka in the 1940s was over 1600 per 100,000 live births. As of 2000, this number has been reduced to 92.

Interventions/programmes: Key actions contributing to the country's success included strong public investments in the overall health system, while taking special care to include critical elements of maternal health care. Fundamental to their progress was sustained commitment for maternal health care priorities with financial, managerial, and political support. Additionally, special attention was given to specific, sustained strategies in health, education, and nutrition, including equitable access to these services early on. Specific steps taken by the country on the maternal health care front included:

- Ensuring access through the expansion and provision of a free synergistic package of basic comprehensive health and social services, including maternal health care that reached the poor, even in rural areas.
- Employing a judicious mix of health personnel to deliver services. Midwives were professionalized and provided an integral link between women and health units.
- Effectively managing and using health information to serve as a foundation, guiding decision-making and identifying problems.
- Utilizing information for quality improvements, particularly among identified vulnerable groups.
- Empowering clients to provide information and to utilize services effectively.

Cost and cost-effectiveness: In the late 1950s, Sri Lanka's GNP per capita was US\$270 (1995 US equivalent), and about half the households were below the poverty line. The country was able to reduce maternal mortality despite a decreasing budget. Between 1950 and 1999, expenditures on maternal health services declined from an average of 0.28% of GDP in the 1950s to 0.16% in the 1990s, with an average of 0.23% over the five decades from 1950-99.

Impact: The country has shown the capacity to reduce MMR by 50% every 6-12 years.

Source: Pathmanathan, Liljestrand et al. (2003)

Case Study 2: Prioritizing Maternal Health in Honduras

Context: The maternal mortality ratio in Honduras in 1990 was reduced from 182 per 100,000 in 1990 to 108 per 100,000 live births by 1997.

Interventions/programmes:

- Resources were directed towards the reduction of maternal mortality, and it was made a national priority.
- The availability of emergency obstetric care services (EOC) was improved, and new EOC services focused on areas of higher mortality ratios.
- For women experiencing complications, referrals were improved both by traditional as well as skilled birth assistants, thus providing a valuable link between the health system and clients.
- The number of deliveries made with skill attendants was increased, reflecting both an increase in access and demand.

Cost and cost-effectiveness: Though government prioritization and commitment played a large part, much was made possible through the support of various donors. Ministry of Health resources and foreign aid were redistributed towards resolving the problem. The country spends about 7.2% of its GDP on health and social services.

Impact: Despite being one of the poorest countries in the Western Hemisphere, Honduras challenged the problem of maternal mortality and has reduced maternal mortality by 38% over seven years.

Sources: Danel (2000); Danel and Rivera (2003)

Maternal morbidity⁴

Maternal morbidity also remains abysmally high in the developing world. It is estimated that approximately 40% of all women who give birth annually develop complications, and 15% of pregnant women worldwide develop serious complications that could be potentially fatal (UNFPA 2007; Population Resource Center 2001; Koblinsky, Timyan et al. 1993). One in four pregnant women in the developing world experience acute or chronic symptoms related to pregnancy (World Bank 1999). An even larger 58-80% of pregnant women in Bangladesh, Egypt, India, and Indonesia were found to suffer acute morbidity, while 8-29% experienced chronic morbidities related to maternity (Fortney and Smith 1996). Thus, acute or chronic morbidity related to pregnancy is common among women in developing countries. As shown in Table 4, complications of pregnancy and delivery can lead to a broad range of acute or long-term disabilities, including chronic pelvic pain, damage to reproductive organs, kidney failure, uterine rupture, and infertility. Documentation of morbidity is particularly poor where services and conditions are the worst, but estimates indicate that anywhere from 10 to 20 million women suffer from physical or mental disabilities each year as a result of such complications of birth or their management (Ashford 2002; Murray and Lopez 1998).

⁴See Appendix 1 for a definition of maternal morbidity.

Morbidity specifically during delivery is also high. A systematic review of all available data found that 4-8% of pregnant women who deliver in hospitals in developing countries are estimated to experience severe acute maternal morbidity or a “near miss”⁵ (Say, Pattinson et al. 2004). However, this number includes only women delivering in hospitals who generally receive better care than those delivering at home. The morbidity associated with births without a skilled attendant, which comprise almost 50% of births in developing countries, can be expected to be considerably higher (Lawn, Tinker et al. 2006). Estimates for maternal morbidity from earlier periods are not available, so it is not possible to estimate recent progress (Say, Pattinson et al. 2004; Hall 2001; Dias de Souza, Duarte et al. 2002; Filippi, Alihonou et al. 1998). More research is needed to better understand the nature, extent, and consequences of maternal morbidity in various regions of the developing world.

Causes of maternal mortality and morbidity

The main physiological causes of this high maternal mortality and morbidity are conditions for which solutions exist if care were to be made more accessible and available to pregnant women worldwide, providing further evidence that maternal health can be improved if strategic and adequate investments are made. Specific causes of maternal mortality and morbidity vary somewhat across regions (see Figure 2), but haemorrhage is the major cause of death in many parts of the developing world – though not in the developed world. Other major causes across regions include sepsis, hypertensive disorders, unsafe abortion, anaemia and obstructed labour.

In Africa, HIV now accounts for 6.2% of maternal deaths (Khan, Wojdyla et al. 2006). It is the leading cause of maternal deaths in some hospitals in Africa and has reversed the progress made in maternal health in countries with particularly high rates of HIV, such as Malawi and Zimbabwe (Bicego, Boerma et al. 2002; Fawcus, van Coeverden de Groot et al. 2005).

Young mothers are more likely to develop obstructed labour and eclampsia; the risk of death in pregnancy and delivery is for girls under the age of 15 is five times higher than for women in their twenties (UNICEF 2007).

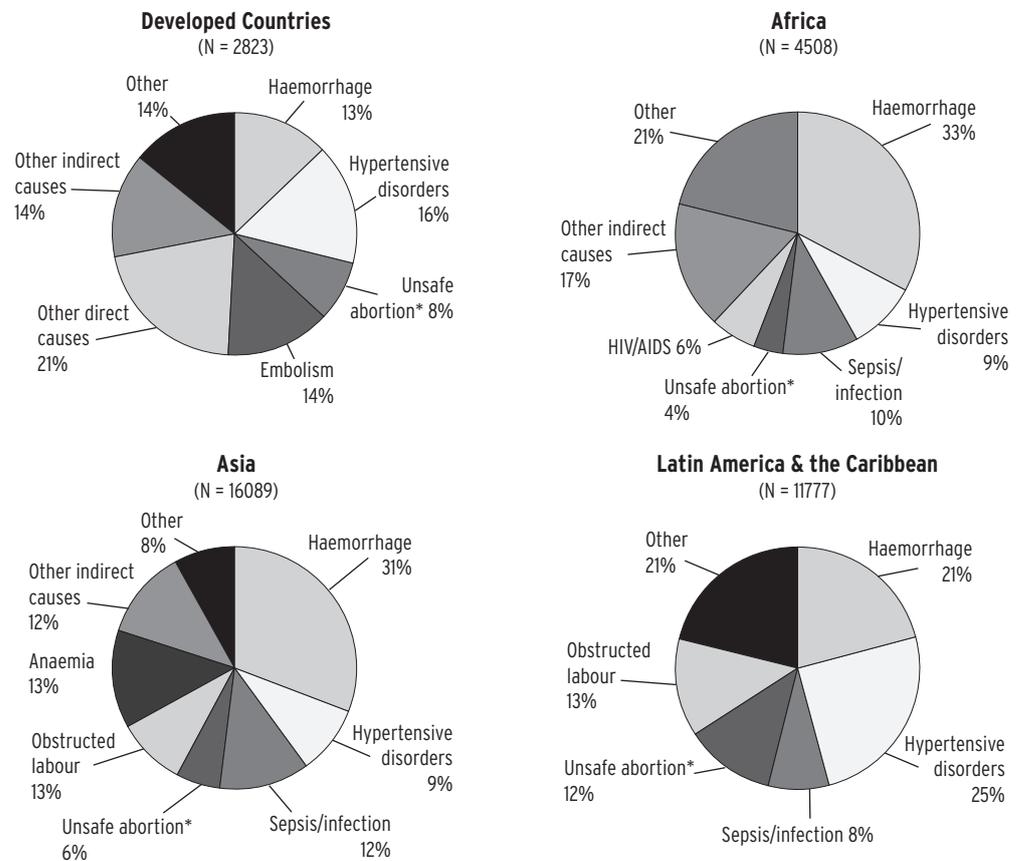
⁵See Appendix 1 for a definition of “near miss”.

Table 4: Complications of Pregnancy and Childbirth: Estimates for Select Less Developed Countries

Complication	Incidence* (%)	Maternal Disabilities That May Result
Severe bleeding (haemorrhage)	11	<ul style="list-style-type: none"> • Severe anaemia • Pituitary gland failure and other hormonal imbalances • Infertility
Infection during or after labour (sepsis)	10	<ul style="list-style-type: none"> • Pelvic inflammatory disease • Chronic pelvic pain • Damage to reproductive organs • Infertility
Obstructed or prolonged labour	6	<ul style="list-style-type: none"> • Incontinence • Fistula • Genital prolapse • Uterine rupture, vaginal tears • Nerve damage
Pregnancy-induced hypertension (preeclampsia and eclampsia)	6	<ul style="list-style-type: none"> • Chronic hypertension • Kidney failure • Nervous system disorder
Unsafe abortion	16	<ul style="list-style-type: none"> • Reproductive tract infection • Damage to uterus • Infertility • Pelvic inflammatory disease • Chronic pelvic pain

*Incidence is taken as a percent of live births
Source: Murray and Lopez (1998)

Figure 2: Regional Distributions of Causes of Maternal Deaths



* Almost all abortion-related deaths are due to unsafe illegal abortions, while legal abortion is associated with little risk (WHO 2004c). Also note that low rate of deaths due to unsafe abortion in some regions, such as Africa, is likely to be due to under-reporting. Source: Khan, Wojdyla et al. (2006)

Newborn mortality, infant mortality, and stillbirths

The conditions that cause deaths and illness in newborns are the same as those that result in maternal mortality and morbidity (Save the Children 2006; AbouZahr 1998), and the countries that experience the highest numbers of newborn deaths are in the regions that have the highest rates of maternal death, namely, sub-Saharan Africa and South-Central Asia (Save the Children 2006; WHO 2006a).

Global estimates show that between 1995 and 2000, the neonatal mortality rate decreased from 36 to 23 (WHO 1996; WHO 2006a). However, it accounts for an increasing proportion of all childhood deaths (UN Millennium Project 2005b). Between 1980 and 2000, while child mortality after the first month of life fell by a third, neonatal mortality rates fell only by about a quarter. Thus, while in 1980, 23% of child deaths occurred in the first week of life, by 2000 this figure had risen to an estimated 28% (Lawn, Cousens et al. 2005). Despite limited historical data and some methodological concerns in making such comparisons, these estimates indicate that neonatal mortality remains an important problem.

The estimated 3.4 million newborn deaths that occur annually in the first week of life are largely due to inadequate care during pregnancy, delivery or in the immediate postpartum period⁶ (WHO 1999). Obstetric complications are responsible for the majority of early newborn deaths and the 3.2 million stillbirths that occur every year (Stanton, Lawn et al. 2006; Filippi, Ronsmans et al. 2006; Weiner, Ronsmans et al. 2003; Kusiako, Ronsmans et al. 2000). Almost two-thirds of the 8 million infant deaths that occur each year are due primarily to poor maternal health and hygiene and deficiencies in maternal and newborn health services, including inefficient management of delivery and lack of essential care of the newborn (WHO 1999). As with maternal mortality, the vast majority of stillbirths and deaths to newborns and infants are preventable (Filippi, Ronsmans et al. 2006; Weiner, Ronsmans et al. 2003; Kusiako, Ronsmans et al. 2000; Lawn, Shibuya et al. 2005; WHO 1999).

Utilization of maternal health services - uneven progress

Although use of some maternal health services, particularly antenatal care, has increased over the last two decades, these increases have not always led to reductions in maternal mortality. Women are more likely to die during or after childbirth than during pregnancy – but use of delivery and postpartum care have increased the least. In addition, improvements in the use of maternal health services have been uneven, in part due to the continuing low status and empowerment of women, which affects their access to and use of these services.

Antenatal care: The largest increase in the utilization of maternal health services between 1990 and 2000 has been in antenatal care (Table 5), over 20%, on average, across all regions of the world. Antenatal care use has increased from 53% to 64% throughout the developing world (WHO and UNICEF 2003). The increase was particularly large in Asia, where utilization jumped by 31%, from 45 to 59%, but women in Asia continue to have the lowest levels of antenatal care use in the developing world. In contrast, in sub-Saharan Africa, while the increase was small (a four percent increase from 68% to 71%), nonetheless, almost three-quarters of pregnant women used antenatal care in 2000. Finally, while utilization of ANC was already relatively high at 77% in Latin America and the Caribbean in 1990, by 2000 it increased further to 88% (WHO and UNICEF 2003).

Skilled attendance at birth:

In the developing world as a whole, the percent of births attended by skilled birth attendants⁷ increased from 43% to 57% between 1990 and 2005 (United Nations 2007). This increase is evident in all regions of the developing world but the degree of improvement varies by region, following a pattern similar to that described above for maternal mortality and morbidity (Table 6).

Table 5: Antenatal Care Use, 1990-2000*

Region	1990	2000	% increase
Sub-Saharan Africa	68	71	4
Middle East/ North Africa	52	57	10
Latin America/Caribbean	77	88	14
Asia**	45	59	31
Developing Countries**	53	64	21

* Information on trends in antenatal care use over the past decade is limited to countries where more than one household survey has been carried out. At the end of 2001, a total of 49 countries had trend data. These 49 countries account for 70% of births in the developing world excluding China. They represent 46% of births in the Middle East and North Africa, 60% of births in sub-Saharan Africa and in Latin America and the Caribbean, and 85% of births in Asia and the Pacific (excluding China).

** Excluding China
Source: WHO and UNICEF (2003)

⁶ See Appendix 1 for a definition of postpartum period.

⁷ See Appendix 1 for a definition of skilled birth attendant.

Improvement was greatest in South-Eastern Asia and Northern Africa where the proportion increased from 38% to 68% and 40% to 75%, respectively. In contrast, skilled attendance of births increased by only seven percent in sub-Saharan Africa and 27% in South Asia. Given low initial levels, more than half the women in sub-Saharan Africa and two-thirds of the women in South Asia still continue to deliver their children without the help of a skilled attendant.

In some countries the situation is particularly dire. Afghanistan, Bangladesh, and Chad all have less than 15% of births attended by skilled attendants, while the percentage of births with skilled attendance in Ethiopia is estimated to be only 5.6% (WHO 2006b). Since almost half the world's maternal deaths occur in sub-Saharan Africa and South Asia, the low rates of skilled attendance—and the minimal improvements over the last decade—have particularly significant negative implications for global maternal health (United Nations 2006).

Projections of the percentage of deliveries covered by skilled attendants for the year 2015 based on trends in 1989-1999 raise further concern about Asia and sub-Saharan Africa (AbouZahr and Wardlaw 2001). The projections estimate that only countries in Latin America and the Caribbean, the Middle East, and North Africa will be able to ensure that 80% of deliveries are assisted by skilled attendants by 2015. Countries in Asia will provide skilled coverage for only about 60% of deliveries by 2015, while countries in sub-Saharan Africa are projected to stagnate at under-50 percent coverage (AbouZahr and Wardlaw 2001).

Table 6: Proportion of deliveries attended by skilled birth attendants, 1990 and 2005

Region	1990 (%)	2005 (%)	% increase
Developing regions	43	57	33
Sub-Saharan Africa	42	45	7
Northern Africa	40	75	88
Southern Asia	30	38	27
South-Eastern Asia	38	68	79
Western Asia	60	66	10
Eastern Asia	51	83	63
Latin America & the Caribbean	72	89	24

Source: United Nations (2007)

Where skilled attendance has notably increased, most of the progress is due to greater utilization of higher-level care, in particular by greater use of doctors rather than other health professionals such as nurses or midwives. In addition, two-thirds of attended births occur in hospitals rather than mid-level facilities (WHO 2005; Stanton, Blanc et al. 2007). The use of higher-level care rather than basic care facilities may be a result of what is available rather than what women would prefer (Stanton, Blanc et al. 2007). For instance, a considerable number of countries continue to face severe shortages in the availability of basic⁸ essential obstetric care facilities, while higher level care in the form of

comprehensive⁹ essential obstetric care facilities is more readily available (AMDD Working Group on Indicators 2002a, 2002b, 2003a, 2003b, 2004).

Postpartum care: More than 60% of maternal deaths occur in the postpartum period. Of these, 45% occur within one day of delivery and more than 80% within two weeks (Li, Fortney et al. 1996; Lawn, Tinker et al. 2006). In addition, an estimated 25-45% of newborn deaths occur in first 24 hours after birth, and three quarters by the end of the first week of life (Lawn, Tinker et al. 2006). The most common causes of maternal deaths in the postpartum period in developing countries are haemorrhage, hypertensive disorders, and infection (Li, Fortney et al. 1996), all of which are technically treatable.

⁸ See Appendix 1 for a definition of basic essential obstetric care.

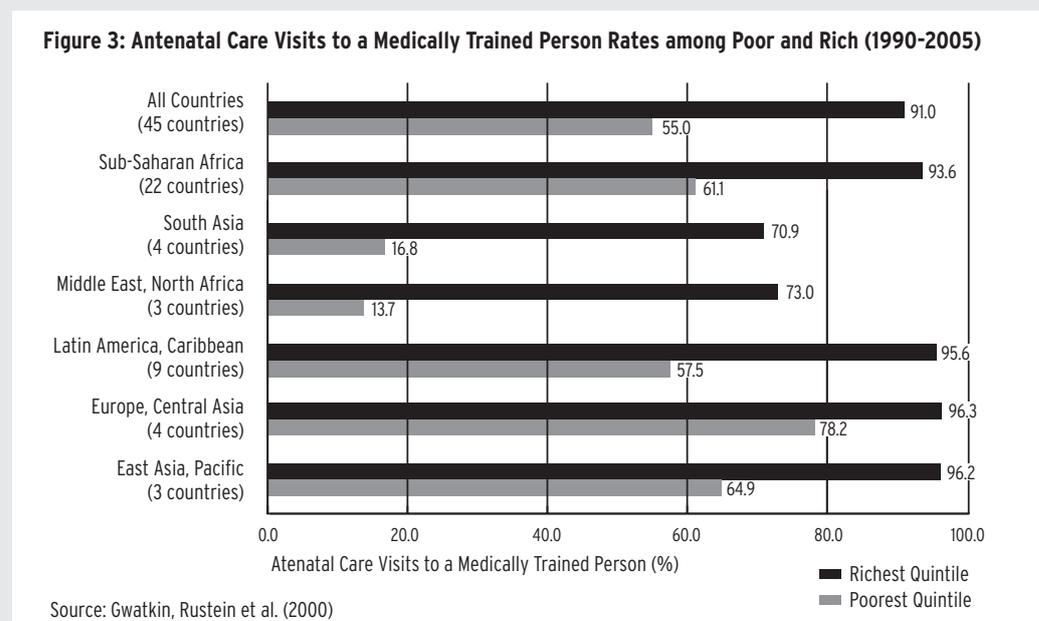
⁹ See Appendix 1 for a definition of comprehensive essential obstetric care.

Despite the importance of postpartum care, coverage for postpartum care remains even lower than skilled care¹⁰ at birth (Lawn, Tinker et al. 2006). Using data from Demographic and Health Surveys conducted between 1999 and 2004, a recent study of 30 countries showed that four in ten women with a live birth in the five years preceding the survey did not receive any postpartum care. For those who did receive postpartum care, the first postpartum care visit was sought on average two days after birth (Fort, Korthari et al. 2006). Given that a substantial number of both maternal and newborn deaths occur within the 24-48 hours after delivery, a critical period for both mother and child, the delay in seeking postpartum care is troubling.

Utilization of maternal health services - inequities in access

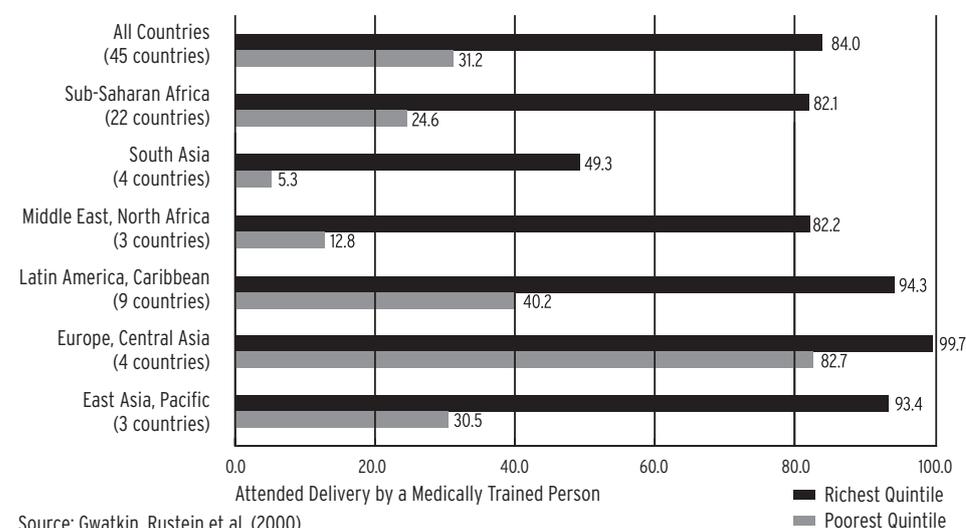
Improvements in maternal health also may be lagging due to strong inequalities in distribution of maternal health services: the poorest women and the regions with the worst maternal outcomes still have the lowest service coverage. There is increasing and strong evidence that the use of maternal care services is closely tied to economic status (UN Millennium Project 2005b). In countries for which data exists, analyses show that the wealthy have far greater access to maternal health services than the poor (Gwatkin, Wagstaff et al. 2005; Ronsman and Graham 2006; Stanton, Blanc et al. 2007). A study in over 50 countries found that, on average across the range of countries, in the richest households, over 90% of pregnant women used ANC, as compared to 60% of pregnant women in the poorest.

Attended delivery showed an even greater wealth gap (see Figures 3 and 4). Over 80% of births were attended among the richest, compared to only 34% among the poorest (Gwatkin, Wagstaff et al. 2005). This gap is particularly wide in South Asia, which is also a region with particularly poor maternal health status. In South Asian countries, antenatal care coverage is 17% among the poorest and 71% among the richest, while skilled attendance at birth is only 5% among the poorest and 49% among the richest (Gwatkin, Rustein et al. 2000). Data on inequalities is not available for earlier periods, so it is difficult to analyze change over time.



¹⁰ See Appendix 1 for a definition of skilled care, also referred to as skilled attendance at birth.

Figure 4: Attended Delivery by a Medically Trained Person Rates among Poor and Rich (1990-2005)



There are also large differentials in postpartum care between rich and poor. Women from wealthier households who had received antenatal care for their last pregnancy were more likely to have received postpartum care, particularly from a health professional, than women from poor households who had received antenatal care. In fact, women in the wealthiest one-quarter of households were four times more likely to receive postpartum care than the poorest one-quarter (Fort, Korthari et al., 2006).

The World Bank estimates that if all women had access to interventions for addressing complications of pregnancy and childbirth, particularly emergency obstetric care, 74% of maternal deaths could be averted (Wagstaff and Claeson 2004). As such, the importance of explicitly recognizing and promoting an equity-sensitive approach is reflected in recent proposals to modify the targets for MDGs 4 and 5 to promote faster progress among the poor and other marginalized groups (UN Millennium Project 2005b).

Despite this grim situation, there are success stories where poor maternal health has been turned around. These successes underscore the importance of effective health inputs to improving maternal health (DFID 2007) and suggest that MDG 5 is achievable with adequate financial and political commitment (Ronsmans and Graham 2006; AbouZahr and Wardlaw 2001).

Summary

Overall, the evidence suggests that progress in efforts to reduce maternal mortality and morbidity since 1987 has been poor and uneven (Starrs 2006; Lawn, Tinker et al. 2006; Freedman, Wirth et al 2003; WHO 2005). As summarized by WHO, “Although an increasing number of countries have succeeded in improving the health and well-being of mothers, babies and children in recent years, the countries that started off with the highest burdens of mortality and ill-health made least progress during the 1990s. In some countries the situation has actually worsened, and worrying reversals in newborn, child and maternal mortality have taken place. Progress has slowed down and is increasingly uneven, leaving large disparities between countries as well as between the poor and the rich within countries” (WHO 2005).

The uneven and inequitable improvements in the availability and use of maternal health services point to serious institutional and infrastructural deficits. Health care systems, as well as social security systems for the poor, are inadequate to provide the care that women need to be healthy. This means families may have to pay out of pocket, in which case many poor families may decline care services altogether. This, in turn, exacerbates the problem of poor maternal health. Clearly then, to improve maternal health, investments in improving the availability, quality, and affordability of health services are essential, particularly to improve maternal health for the poorest and in the worst-affected regions of the developing world.

Poor maternal health is of serious concern beyond its importance as a health issue because women's health as mothers is intricately linked with other aspects of women's lives and development more broadly. The following sections assess the evidence to support these links.

3. WOMEN DELIVER AS INDIVIDUALS: Maternal Health and Women's Status and Empowerment

SUMMARY OF FINDINGS: MATERNAL HEALTH CLOSELY TIED TO WOMEN'S STATUS AND EMPOWERMENT

- Higher rates of female education are consistently associated with increased use of maternal health services.
- Gainful employment of women and other economic opportunities afforded to them have a significantly positive effect on reducing maternal mortality and morbidity, and increasing maternal health service utilization.
- Women's involvement in decision-making on key aspects of life is positively associated with the utilization of maternal health services, while the high prevalence of intimate partner violence is extremely detrimental to maternal and newborn health.
- Reproductive health is intricately linked to maternal health. Contraceptive use has a positive relationship with maternal health, whereas unsafe abortion and HIV are associated with numerous negative outcomes ranging from maternal mortality to various obstetric complications.

Poor maternal health is not just a problem of women's health but also a problem of persistent poverty and gender inequality (Grown, Gupta et al. 2005; Murphy 2003). As WHO noted, "Maternal mortality is an indicator of disparity and inequity between men and women and its extent a sign of women's place in society and their access to social, health and nutrition services and to economic opportunities" (WHO 1999). The research examined above showed how poor progress in reducing maternal mortality and morbidity is related to poverty and economic inequality; section 4 pursues this theme further. The research reviewed in this section focuses on gender inequality, and provides evidence that where women have low status and are disempowered, maternal health is likely to be poor. Conversely, where women have power in the household, and access to resources such as education and economic opportunity, they are better able to access and use services during pregnancy and childbirth or otherwise maintain good maternal health. Education and employment are "enabling" factors in that they can be instrumental in enabling women to gain the knowledge, confidence, skills, and opportunities they need to increase their social and economic status and power in the household and in society. Finally, women's health in other reproductive domains is closely associated with their health as mothers.

■ 3.1 Women's Education¹¹

Perhaps the clearest and best documented example of the linkage between women's status and maternal health is the impact of women's education on maternal health. Education can affect maternal health by improving women's access to information and their ability to make choices about their bodies. Education also can enable women to gain the skills and confidence to demand access to better maternal health services.

The extensive literature on this linkage shows that women's education increases the use of maternal health services, independent of related factors such as urban/rural residence or socioeconomic status and across the range of services and stages of maternal care. Studies found a significant positive relationship between education and use of antenatal care, delivery care, and postnatal care. Several authors find that educated women are more likely than uneducated women to use antenatal care¹², to use it early and frequently, and to use trained providers and medical institutions (LeVine, LeVine et al. 1991; Obermeyer and Potter 1991; Elo 1992; Bhatia and Cleland 1995; Govindasamy 2000; Beegle, Frankenberg et al. 2001; Bloom, Wypij et al. 2001). Similarly, education was associated with a safe delivery¹³ in many studies (Obermeyer and Potter 1991; Elo 1992; Govindasamy 2000; Beegle, Frankenberg et al. 2001; Bloom, Wypij et al. 2001). One study reviewed also found a positive relationship between education and utilization of postnatal care (Bhatia and Cleland 1995). Additionally, female education, along with trained delivery assistance, is a strong predictor of maternal mortality, independent of per capita income (Shiffman 2000).

Evidence indicates that the level of education is also important, such that higher levels of education—at least six years or more—have a larger positive effect on women's use of antenatal, delivery, and postnatal services than does primary schooling alone (Elo 1992; Bhatia and Cleland 1995; Govindasamy 2000). The research suggests that this may be because it is at secondary or higher levels of schooling that women gain the confidence and independence to demand services. For women with lower levels of education, the positive effect of education varies depending on the outcome. For example, primary education seems to have greater influence on the use of antenatal services than it does on use of delivery or postnatal care (Elo 1992; Bhatia and Cleland 1995).

Several studies suggest that education matters only when there is at least a minimal level of health services available for women to access. Elo (1992) found that uneducated women in Lima, Peru are more likely to have professional assistance for antenatal and delivery care than even the most educated women in the rural Sierra. The study suggests that this is a result of the poor availability of services in the rural area and finds that equalizing education between the two areas would not, by itself, eliminate the estimated differences in use of services. In contexts of very low use of maternal care, pre-existing norms regarding what is acceptable care, or norms restricting women's mobility, may be an additional factor inhibiting both educated and uneducated women from using the limited services that are available (Govindasamy 2000; Bloom, Wypij et al. 2001).

¹¹ In the literature on maternal health and education, education is measured primarily by years of schooling as a continuous variable, with three studies looking specifically at levels of education. The study examining early pregnancy and education, used school exit, defined as any school departure prior to secondary school completion, as the measure of educational attainment. One study looks at a maternal health outcome—early pregnancy and childbirth—as one of its primary measures of maternal health. The other research studies generally use maternal health service utilization as a proxy indicator of maternal health. To a more limited extent, women's nutrition and more general non-reproductive health outcomes are also examined.

¹² Studies measured antenatal care in terms of whether any care was sought, in which trimester of pregnancy it was sought, and frequency of antenatal care visits.

¹³ Safe delivery is typically defined in these studies by whether or not a delivery was conducted by a trained attendant such as a physician or trained midwife.

■ 3.2 Women's Economic Opportunity¹⁴

Women's economic opportunity is a key aspect of women's economic empowerment more broadly. As such, economic opportunities for women have a strong potential to positively impact maternal health, although this link has not been as extensively examined as has the link with education. To the extent that employment as an indicator of women's empowerment may pose physical burdens, hazards, or stress on women, it could lead to negative maternal health outcomes. Conversely, experiences and roles as economic actors may empower women through greater control over income which, in turn, may increase their power in decision-making about health care and their ability to access and pay for the services they need when pregnant. The evidence overwhelmingly bears out the latter connection: women's employment is beneficial for maternal health. In addition, employment can benefit health also because in many countries rights to social security and benefits like maternity leave are linked to paid employment. Paid work also can increase women's access to representation and social dialogue, improving their ability to voice their concerns, including for better maternal health services. Social dialogue between workers, employers, and governments can enable these concerns to be parlayed into actions and measures that improve women's health and lives.

Extensive research on women's employment indicates that income from employment acts as an enabling factor for the use of maternal health services (Chakraborty, Islam et al. 2003). Employment is associated with lower maternal mortality and morbidity and higher utilization of maternal health services, even after controlling for other key factors (Anson 2004; Kuate Defo 1997; Miles-Doan and Brewster 1998; Taguchi, Kawabata et al. 2003). Economic opportunity in terms of participation in credit programmes is also beneficial: a study in Bangladesh found that women who participated in credit programmes were more likely to use health care, controlling for other factors (Nanda 1999).

On the other hand, lack of employment is associated with a greater likelihood of maternal mortality. Taguchi, Kawabata et al. (2003) examined 59 cases of maternal death and 177 control cases in Indonesia, and found that, controlling for other factors, women who were unemployed had over four times the chance of maternal death than employed women (OR=4.4) (Taguchi, Kawabata et al. 2003). Evidence indicates that unemployment is also associated with a greater chance of maternal health complications such as illness following childbirth. Kuate Defo (1997) found that in Cameroon, women who did not work experienced a significantly higher likelihood of episodes of illness in the two years following childbirth. The effects of employment were robust and statistically significant, regardless of what other variables were included in the analyses.

Authors found that, in addition to influencing maternal health status, employment and participation in credit programmes were positively correlated with seeking some maternal health services. Women in white-collar professions and agriculture in China and the Philippines were found more likely to use antenatal care services (Anson 2004; Miles-Doan and Brewster 1998), and more likely to access postnatal care (Anson 2004). Chakraborty, Islam et al. (2003) found that Bangladeshi women who were gainfully employed had a significantly greater

¹⁴ Economic opportunity was measured in terms of key aspects of employment, such as involvement in gainful or paid employment, wages, type of occupation, status at work, sector of activity, work effort, and potential wage rate. Maternal health was measured primarily in terms of maternal health care utilization, although two studies measured maternal health in terms of maternal morbidity (Islam, Chowdhury et al. 2004; Kuate Defo 1997) and one study in terms of maternal deaths (Taguchi, Kawabata et al. 2003). The study on microcredit programs examined health more generally, using measures such as who was consulted in the case of illness (Nanda 1999).

likelihood of seeking modern health services to treat complications during pregnancy than women who were not employed. This effect was not statistically significant after controlling for other variables, suggesting that in at least some cases employment may have an indirect effect through other factors rather than directly itself influencing maternal health.

These studies, while not specifically examining women's control over the income they gain from employment, nonetheless suggest that women's employment may be more important to improving maternal health than household socio-economic status per se, perhaps because the former increases women's ability to control and access the economic resources they need during pregnancy. At the same time, other research highlights how economic disadvantage more generally influences maternal health negatively through factors such as residence in a poor neighbourhood, and lack of toilet facility and potable water (Kuate Defo 1997; Taguchi, Kawabata et al. 2003). To the extent that women's economic contributions raise the standard of living of their households, they may contribute to improved maternal health through this additional route as well.

■ 3.3 Household Decision-making¹⁵ and Intimate Partner Violence

A growing literature enables us to examine the linkage between maternal health and indicators of women's empowerment such as decision-making in the household and experience of intimate partner violence. This literature suggests that while education and employment may be enabling factors, decision-making and violence are more direct measures of women's agency, or their ability to make critical life choices. As such, they reflect the power dynamics women face vis-à-vis other family members in their efforts to secure their own welfare and frequently that of their children. They also reflect women's value in the household and the effort and resources that are likely to be spent in preserving their well-being. While the research on these links is more scant than is the case for education and employment, it does establish some consistent findings.

■ ■ 3.3.1 Household decision-making

Studies typically measure women's household decision-making power through questions on "how much say" they have compared to other household members on matters like finances, purchases, children, contraception, mobility, leisure, work, etc. Research shows that, by various measures, women's involvement in household decision-making on key aspects of life is positively associated with utilization of maternal health services, independent of other factors such as education, income, and employment (Allendorf 2007; Becker, Fonseca-Becker et al. 2006; Furuta and Salway 2006; Govindasamy 2000; Matsumura and Gubhaju 2001; Matthews, Brookes et al. 2005).

Several studies demonstrate that women's involvement in decision-making is linked to an increased likelihood of receiving antenatal care (Allendorf 2007; Furuta and Salway 2006; Matthews, Brookes et al. 2005). Aspects of women's decision-making positively associated with antenatal care include spousal discussion of family planning (Furuta and Salway 2006), household purchases (Matthews, Brookes et al. 2005; Allendorf 2007), and health care

¹⁵ Decision-making generally was measured using two or more different aspects of women's involvement in decisions, such as health-related issues, family planning, household purchases, and visits to family members. Rather than compiling these aspects into one index, most studies look at the links between maternal health and each aspect of decision-making separately. Decision-making was often considered as part of an investigation of women's autonomy. Two studies examined joint decision-making among couples rather than focusing solely on women's involvement in decision-making. Maternal health is primarily measured by utilization of maternal health services.

(Allendorf 2007). Studies also find that women's input into decision-making is positively associated with delivery in an institution (Govindasamy 2000; Matsumura and Gubhaju 2001; Matthews, Brookes et al. 2005), though others find that, after controlling for confounders, there is no significant association between women's involvement in decision-making (measured in terms of health care and large purchases) and skilled delivery care (Furuta and Salway 2006).

The degree and type of participation in decision-making matter. In one study women with strong decision-making power were more than twice as likely to deliver at a health facility compared to women with more limited decision-making power (Matsumura and Gubhaju 2001). Similarly, when women *alone* have the final say on decisions, there is a significant and positive association with their health service use (Allendorf 2007). Further, women from female-headed households, who have a high degree of autonomy, were found to be substantially more likely to deliver at a health facility than women with a spouse (Matsumura and Gubhaju 2001).

The degree of agreement between spouses about the women's power to be involved in decision-making can further influence the relationship between decision-making and maternal health. The association between women's decision-making and health service use becomes two to three times larger when both the husband and wife agree that the wife has power in decision-making. In Nepal, for example, if both the wife and the husband say the wife has autonomous decision-making power, the odds of the wife's receiving antenatal care are almost three times greater, while they are 95% higher if she alone says she makes the decision autonomously (Allendorf 2007).

Women's ability to participate in decision-making *and* their utilization of maternal health services are both influenced by other decision-makers in their households. In Nepal and India, mothers-in-law and other key household decision-makers had an important effect on women's use of antenatal care services (Chapagain, 2006; Allendorf, 2007; Barua, Walia et al., unpublished). In both countries, young wives are expected to show deference to the older members of their families and to respect their decisions. This significantly affected their ability to participate in decision-making on antenatal care. Findings from these studies highlight the importance of intra-household power dynamics and suggest that perceptions of what are socially preferred roles for women as individuals and as members of society can limit their ability to exercise their right to health care.

■ ■ 3.3.2 Intimate partner violence

Evidence on intimate partner violence from around the world demonstrates that violence during pregnancy is not rare (Ellsberg and Heise 2005). Estimates range from 0.9% to 20.1% (Gazmararian, Lazorick et al. 1996), but may underestimate the extent of the problem. There is a tendency to under-report as many women are reluctant to admit to having experienced violence (Bacchus, Mezey et al. 2004). In addition, deaths from domestic violence are often not collected in the statistics gathered on maternal health and are not included in definitions of "pregnancy-related death" (Ganatra, Coyaji et al. 1996).

The specific relationship of violence with pregnancy varies by location. Some studies find that pregnant women are more likely to experience violence than women who are not pregnant (McFarlane, Parker et al. 1996; Ganatra, Coyaji et al. 1998). Multi-country surveys find that intimate partner violence during pregnancy in developing countries ranges from 1.3% of pregnant women in Cambodia (Kishor and Johnson 2004) to 27.6% in Peru province (Garcia-Moreno, Jansen et al. 2005; Garcia-Moreno, Jansen et al. 2006). These studies also find, however, that there is no consistent pattern of change in violence during pregnancy: while in some countries the level of violence is higher during pregnancy, in other areas the reverse may be true.

While the extent of violence during pregnancy varies, studies consistently show that violence is associated with numerous negative outcomes for maternal and fetal health. Intimate partner violence can compromise both maternal and fetal health through a number of mechanisms including physical trauma or homicide, stress-related behavioural and physiological responses (such as cigarette smoking and alcohol abuse), and inadequate maternal nutrition. Through its control over women's lives and access to resources, violence can also indirectly contribute to women's isolation during pregnancy and hamper access to health care (Kaye, Mirembe et al. 2006; Pallitto 2004).

Analyses across multiple developing country sites find that women who experienced violence were significantly more likely to have a terminated pregnancy or non-live birth than women who did not experience violence (Kishor and Johnson 2004; Garcia-Moreno, Jansen et al. 2005; Kishor and Johnson 2003). Women who experienced violence are also likely to have poorer maternal health because they are less likely to access antenatal, delivery and postnatal care (Kishor and Johnson 2004; Garcia-Moreno, Jansen et al. 2005). They are twice as likely as other women to delay antenatal care until the third trimester (McFarlane, Parker et al. 1996) and have a 37% increased risk of obstetric complications requiring hospitalization before delivery. A recent study in Uganda showed that violence during pregnancy was associated with delivery of low birth weight babies and antepartum hospitalization, even after controlling for maternal age and parity (Kaye, Mirembe et al. 2006). Complications included hypertension, antepartum haemorrhage, premature rupture of membranes, and anaemia (Kaye, Mirembe et al. 2006).

El Kady, Gilbert et al. (2005) found that women who were hospitalized for assault during pregnancy in California had a greater likelihood of immediate complications such as uterine rupture and increased maternal mortality, even after adjusting for demographic factors and other potential confounders. Outcomes among women who delivered during the assault hospitalization were particularly poor: they had over 45 times the risk of uterine rupture and a 20 times higher risk of maternal death than other women. In addition, only 58% of the women delivering at the assault hospital had started antenatal care in the first trimester, compared with 82% among women in the comparison group (El Kady, Gilbert et al. 2005). Bacchus, Mezey et al. (2004) found that women in an inner-city London hospital who had experienced domestic violence had a significantly higher risk of antenatal admission for obstetric complications and depressive symptomatology, independent of the effects of other risk factors such as smoking, alcohol use, age, and socio-economic and civil status.

Intimate partner violence also affects well-being of the fetus. The U.S. study of McFarlane et al. (1996) found that experience of abuse during pregnancy was a significant risk factor for low birth weight as well as low maternal weight gain, infections, anaemia, smoking, and use of alcohol and drugs. In addition, more severe abuse was significantly associated with lower infant birth weight for all three ethnic groups, blacks, Hispanics and whites, taking part in the study (McFarlane et al. 1996). Violence during pregnancy was found to be associated with delivery of low birth weight babies and a greater likelihood of fetal mortality (Kaye, Mirembe et al. 2006; El Kady, Gilbert et al. 2005).

A study in the United States found that 1 in 6 adult women screened during antenatal visits reported physical abuse during pregnancy (McFarlane, Parker et al. 1996). Abuse was also likely to be recurrent: 60% of pregnant women reported repeated episodes of violence (McFarlane, Parker et al. 1996). A study in rural west Gujarat in India showed that domestic violence was the second highest cause of pregnancy-related mortality, accounting for 15.7% of maternal deaths (Ganatra, Coyaji et al. 1998).

■ 3.4 Reproductive Health: Contraception, Abortion, and HIV and AIDS

It is important to recognize that maternal health is one aspect of women's overall reproductive health. There are good reasons to believe that options and constraints that women face on other reproductive health issues such as contraception, abortion, and risks of HIV have considerable implications for their health as mothers. Because of gender-based power dynamics with regard to sexuality in many cultures, women often do not have the power to negotiate safe sex or to prevent or safely abort unwanted pregnancy. Consequently women are vulnerable to greater risks of maternal morbidity and mortality, particularly in the context of HIV, because of risky sexual experiences *and* pregnancies that occur under less than ideal circumstances.

In this section we focus specifically on these links between women's maternal health and their health and well-being in the realms of contraceptive use, abortion, HIV and AIDS. Since many of the links between maternal health and reproductive health are two-way, we examine the existing evidence for both directions of these linkages.

■ ■ 3.4.1 Contraceptive Use¹⁶

Contraceptive use affects maternal health and mortality in several ways. It results in fewer births overall, fewer unwanted pregnancies, and a lower proportion of births that are high risk (Fortney 1987). It changes the composition of childbearing through its effects on age, parity and, to some degree, spacing. While the magnitude of the effect depends on the structure of a particular population, evidence generally indicates that changes in the composition of childbearing would decrease overall maternal mortality (Marston and Cleland 2004).

Due to the high unmet need for family planning in many developing countries, contraceptive use has the potential to prevent numerous unwanted and high-risk pregnancies and the mortality and morbidity associated with pregnancy and childbirth. Research indicates that between one-fifth and a quarter of maternal deaths could be eliminated if unplanned and unwanted pregnancies were prevented (Campbell and Graham 2006).

Contraceptive use can also help women space pregnancies to avoid the higher risk associated with too short or too long an interval between pregnancies (UN Millennium Project 2006). There is a U-shaped relationship between the length of interpregnancy interval and adverse maternal health outcomes, with higher risks of adverse outcomes at short and long interbirth intervals. Davanzo, Razzaque et al. (2004) found that women with preceding interpregnancy intervals of less than six months (compared with 27-50 months) had a significantly higher likelihood of pre-eclampsia, high blood pressure, and premature rupture of the membranes. Women with long pregnancy intervals of 75+ months (compared with 27-50 months) had a significantly higher risk of pre-eclampsia, proteinuria, high blood pressure, edema, and maternal mortality. Short intervals also showed a higher maternal mortality, but these were not statistically significant (Davanzo, Razzaque et al. 2004).

Theoretically, maternal health has the potential to influence women's contraceptive use via the utilization of maternal health services. Women who use maternal health services have been found to be more likely to use other reproductive health services, such as family planning

¹⁶ The literature on the influence of contraceptive use on maternal health is extensive. Therefore, this review focuses on a few of the most comprehensive, significant or recent studies.

(Ahmed and Mosely 1997). However, there is little existing research that examines this relationship. This review found only two studies that support this linkage (Ahmed and Mosely 1997; Hotchkiss, Rous et al. 2005).

Better utilization of maternal health services has been shown to be associated with greater contraceptive use. Greater intensity¹⁷ of MCH service use, including antenatal, delivery care and child vaccinations, were positively associated with subsequent contraceptive use in three of the five countries surveyed in a recent study, even after controlling for individual and community level confounding effects (Hotchkiss, Rous et al. 2005). Ahmed and Mosely (1997) examined the simultaneity of the relationship between MCH utilization and contraceptive use, and showed that contraceptive use and MCH care utilization were directly and significantly related in all of the six countries in their study (Zimbabwe, Thailand, Egypt, Tunisia, Guatemala and Colombia), even after controlling for other key factors.

■ ■ 3.4.2 Unsafe Abortion

Unsafe abortion has a clear and well-established link to maternal morbidity and mortality: the consequences of unsafe abortion can include severe maternal health complications, such as haemorrhage and infection, severe pain, and secondary infertility, as well as death (Ahman, Dolea et al. 2003). In fact, extensive evidence documents that unsafe abortion is one of the major direct causes of maternal mortality and morbidity, and WHO (2004c) estimates that unsafe abortion accounts for 13% of maternal deaths worldwide.

An estimated 19 million unsafe abortions take place every year, and one in every ten pregnancies is terminated through unsafe abortion (WHO 2004c). About 68,000 maternal deaths, mostly in developing countries, are estimated to be due to unsafe abortion every year although this number is likely to be a considerable underestimate due to the secrecy surrounding abortion and the difficulty of getting information about maternal deaths (WHO 2004c). Estimates of maternal deaths related to abortion vary widely by region and country, and range between 1.4 - 48.6% of all maternal deaths (WHO 2004c). The proportion of maternal deaths due to abortion is highest in the Latin America and Caribbean region (WHO 2004c), where abortion is largely illegal. Abortion-related deaths may be higher than 30% of all maternal deaths in some countries of Latin America, as well as in parts of Eastern Europe (Khan, Wojdyla et al. 2006). Deaths due to complications of unsafe abortion may also be considerably higher than official estimates in many parts of the world, particularly where abortion is illegal or highly restricted.

The consequences of unsafe abortion extend beyond maternal deaths to severe complications that can have lifelong implications for women's health. Complications of unsafe abortion include haemorrhage and infection. Infection can cause pain and damage fallopian tubes and ovaries, leading to secondary fertility (Ahman, Dolea et al. 2003). Global Burden of Disease estimates suggest that 20-30% of unsafe abortion cases result in reproductive tract infections, and secondary infertility is a result of 20-40% of the reproductive tract infections caused by abortion (Ahman, Dolea et al. 2003).

While unsafe illegal abortion has severe consequences for maternal health, legal abortion poses little risk to women. Legal abortion is associated with less risk of a maternal death than even

¹⁷ Intensity was indexed by computing an average score based upon answers to questions regarding: 1) receipt of antenatal care by a trained provider; 2) timing of 1st antenatal check; 3) receipt of tetanus injection; 4) delivery at a health facility; 5) presence of a trained practitioner during delivery; 6) possession of a vaccination card; 7) average number of vaccinations.

female sterilization: women who undergo female sterilization in the USA have four times the risk of death than women who undergo a legal abortion (WHO 2004c). The risk is substantially higher in developing countries: the mortality risk of legal abortion is only 4-6 per 100,000 cases, but is 100-1000 per 100,000 cases for illegal abortions (WHO 2004c). Thus women's options for safe abortion services are an important determinant of maternal health outcomes.

Maternal and reproductive health policies and programmes can have a dramatic effect on unsafe abortion rates. Favourable changes in reproductive health laws and policies, as well as improved access to contraceptive and abortion services, outreach, and counselling, can substantially reduce unsafe abortion rates and maternal deaths and morbidity related to abortion (UN Millenium Project 2006; Royston and Armstrong 1989; Baiden, Amponsa-Achiano et al. 2006; Okonofua 2006; Mesce and Sines 2006). South Africa provides a recent example where the implementation of the 1996 Choice on Termination of Pregnancy (CTOP) Act greatly liberalized abortion in the country and subsequently impacted maternal mortality. Comparison of mortality estimates from 1994 prior to the Act and 1998-2001 data following the legal reform indicates a 91% reduction in deaths from unsafe abortion (Jewkes, Rees et al. 2005).

On the other hand, restrictive abortion laws are associated with a high incidence of unsafe abortion and maternal deaths. Romania provides a clear case study of the effect of laws criminalizing abortion. The number of abortion-related maternal deaths rose by a factor of five, from 20 per 100,000 live births in 1965 to nearly 100 per 100,000 in 1974 after abortion laws were made more restrictive (Royston and Armstrong 1989). However, upon the relaxation of abortion laws at the end of 1989, notable improvements in women's health were observed as maternal mortality dropped by nearly 50% from 159 deaths per 100,000 live births in 1989, with an estimated 87% of these deaths due to unsafe abortion, to 83 deaths per 100,000 live births in 1990, with 69% of the deaths were due to unsafe abortion (Hord, David et al. 1991).

■ ■ 3.4.3 HIV and AIDS

HIV affects maternal health in several ways: as an underlying factor in direct maternal deaths by increasing pregnancy-related complications such as anaemia, haemorrhage, and sepsis; as an indirect cause of maternal death by increasing susceptibility to opportunistic infections such as pneumonia, tuberculosis, and malaria; and as a contributory factor in indirect deaths from other causes (Berer 1999; McIntyre 2003). There is a significant body of evidence to indicate that HIV increases the risk of complications of pregnancy, delivery and induced abortion, thereby causing a greater number of maternal deaths and complications (Berer 1999; McIntyre 2003; Collin, Chisenga et al. 2006).

Over 17 million women are living with HIV and every year two million pregnancies occur among HIV positive women (UNAIDS 2006; McIntyre 2005). AIDS has become the leading cause of maternal deaths in some areas of Africa (McIntyre 2005). It is one of the five major causes of maternal deaths in South Africa (National Committee on Confidential Enquiries into Maternal Deaths 2000), and was the fourth largest cause of maternal deaths in Bukoba district in Tanzania in 1993 (MacLeod and Rhode 1998). HIV also increases maternal morbidity. In Lusaka, Zambia, for example, Collin, Chisenga et al. (2006) found that during the postpartum period, HIV positive women were more likely to experience two or more episodes of moderate to severe morbidity than women who were HIV negative.

In addition, studies indicate that HIV increases the chance of a maternal death by increasing susceptibility to opportunistic infections such as pneumonia, tuberculosis, and malaria. For

example, *pneumocystis carinii* pneumonia has demonstrated a more aggressive course during pregnancy, resulting in an increase in both morbidity and mortality (Ahmad, Mehta et al. 2001). Studies in Zambia and South Africa show that tuberculosis, the most common opportunistic infection associated with HIV in resource-poor settings, continues to be a major cause of maternal mortality (Ahmed, Mwaba et al. 1999; Khan, Pillay et al. 2001). In South Africa alone, 54% of maternal tuberculosis deaths were caused by HIV (Khan, Pillay et al. 2001). Increasing evidence suggests that HIV may increase the spread of malaria in pregnant women (Berer 1999; ter Kuile, Parise et al. 2004; van Eijk, Ayisi et al. 2003).

Maternal health is also theorized to affect HIV because the state of pregnancy may accelerate disease progression among HIV positive women. The evidence on the influence of pregnancy on HIV is limited and less clear. Studies in France, Scotland, and Italy found that pregnant women did not experience a more rapid progression of HIV (Saada, Le Chenadec et al. 2000; Alliegro, Dorrucchi et al. 1997), or adverse effects on immunological markers of HIV (Brettle, Raab et al. 1995), when compared with non-pregnant women.

However, evidence from developing countries, where HIV is accompanied by a greater degree of symptomatology, suggests there may be a link between pregnancy and HIV. A recent study in Uganda found that risk of HIV acquisition significantly increased during pregnancy, even after adjusting for sociodemographic and behavioural factors (Gray, Li et al. 2005). The adjusted incidence rate for HIV was 2.16 during pregnancy and 1.16 during breastfeeding. Pregnant women were compared with breastfeeding women and women who were neither pregnant nor breastfeeding. This study is supported by studies conducted in Malawi and Rwanda, which reported higher rates of incidence during pregnancy and the early postpartum period, but which did not adjust findings for sexual risk factors (Taha, Dallabetta et al. 1998; Leroy, Van de Perre et al. 1994).

A meta-analysis of data from seven prospective cohort studies, six in developed countries and one in a developing country, support the differences in findings between these two types of countries (French and Brocklehurst 1998). The analysis found that HIV progression was significantly more likely to be related to pregnancy in the developing country setting. The authors concluded that there appears to be an association between HIV progression and pregnancy, but the association was not strong. Further studies of greater size in developing countries are needed to make a more definite assessment of this relationship (French and Brocklehurst 1998).

Summary

The literature shows that indicators of women's status, empowerment, and health—such as education, employment, decision-making, violence, contraception, unsafe abortion, and HIV—can have a strong impact on maternal health. Thus, women with education, access to economic opportunities, access to reproductive health options, and women who are empowered in the home are all more likely to have better maternal health than those who are un-educated, unemployed, and disempowered. Clearly then, maternal health is linked to broader social investment in improving women's education and employment, and gender equality.

However, maternal health does not have an impact on women alone. Rather, it has a broader impact on the demographics, economics, health, and psychological and social development of children, families, and societies more broadly (Table 6). The death or extreme morbidity of a mother can lead to higher morbidity and mortality for children, disruption or dissolution of families, and – at a societal level – a greater likelihood of more single-parent households.

Economic consequences of poor maternal health can include reduced productivity and greater poverty at household and societal levels, while social and psychological consequences include undesirable changes in child-care, depression, and related problems. Sections 4 and 5 below examine the evidence for some of these links and point to the serious global ramifications of poor maternal health.

▾ 4. WOMEN DELIVER AS FAMILY MEMBERS: Widespread Effects of Maternal Health on Children and Families

SUMMARY OF FINDINGS: WIDESPREAD EFFECTS OF MATERNAL HEALTH ON CHILDREN AND FAMILIES

- Poor maternal health, specifically maternal mortality, has profound effects on newborn and child health and survival.
- Maternal mortality also has grave implications for the long-term well-being of children - particularly girls - through its impact on their education, growth, and care, as well as intergenerational effects.
- Maternal death and illness is costly for families due to high direct health costs, loss of income, and loss of other economic contributions, as well as disturbed family relationships and social stresses.

Poor maternal health can have enormous costs for families, in emotional, health, and economic terms. That maternal health and mortality are of fundamental importance to the survival and well-being of children is well-documented in the literature. There is increasing evidence that maternal death and illness are also costly for families due to high direct health costs, loss of income and other economic contributions, and disturbed family relationships and social stresses. These costs may be particularly acute for the poorest, and exacerbated by poor-quality institutional and infrastructural environments, as discussed in Section 2.

Where social security and health care systems are inadequate to provide the care that women (and men and children) need to be healthy, pregnant or not, families may have to pay out of pocket or miss out on care altogether. Thus, while poor maternal health drains family resources, poverty itself can also lead to financial barriers to maternal health. This section of the paper elaborates on the evidence for these family-wide consequences of poor maternal health.

■ 4.1 Effects on Children

Numerous studies have showed that a child's chances of dying increase dramatically after a mother's death (Roy, Kane et al. 2001; Strong 1992; Chen, Gesche et al. 1974; Koenig, Fauveau et al 1988; Gertler, Martinez et al. 2003; Greenwood, Greenwood et al. 1987). One study in the Gambia found that when mothers died after giving birth, every one of their newborn infants died within one year (Greenwood, Greenwood et al 1987). Chen, Gesche et al. (1974) found only 5% of infants survived one year after the death of a mother. Koenig, Fauveau et al. (1988) found a child whose mother had died was four times more likely to die than children who had not lost a mother.

Maternal death seems to be one mechanism for perpetuating gender inequality in the next generation: after a mother's death, the risk of child mortality is greater for girls than for boys, particularly among older children (Roy, Kane et al. 2001; Strong 1992). Strong (1992) followed children of up to age 10 for two years after a mother's death and found that younger children

Table 7: Potential Effects on Children, Families and Households, and Society Due to Maternal Morbidity and Mortality

Potential Effects	On Children	On Families and Households	On Society
Demographic	Death	Loss of deceased Dissolution of family/household	Loss of deceased Increased number of one-parent households Increased number of orphans
Health	Illness Injury Malnutrition Poor hygiene	Reduced allocation of labour to health maintaining activities Poor health for surviving household members	Reduction in the allocation of labour to health-maintaining activities
Economic	Increased child labour	Reduced productivity of ill adult Lost output of deceased adult Reallocation of land and labour Medical costs of treatment Loss of savings Changes in consumption and investment Funeral costs, legal fees Transfers Changes in household management	Reduced productivity of ill adult Lost output of deceased adult Reallocation of land and labour Loss of savings Changes in consumption and investment Transfers Economic burden of one-parent family
Psychological	Depression Other psychological problems	Depression Other psychological problems Grief of loved ones	Grief Loss of community cohesion
Social	Social isolation Reduced education Reduced parental supervision and care	Social isolation Changes in care for children, elderly, and disabled	Changes in responsibility for care of children, elderly, and disabled Loss of community/societal leaders Changes in women's rights, health policy, other public policy

Source: Reed, Koblinsky et al. 2000

were more likely to die after the death of a mother, and, among older children, girls were more likely to die than boys. For children less than one month of age at the time of their mother's death, over two-thirds died within 24 months, with almost no difference among boys and girls. Among children aged 1-11 months, however, girls were 40% more likely to die than boys, while among children 1-5 years old girls were twice as likely to die (Strong 1992).

A mother's death also has harmful repercussions for the growth, care, and education of her children. Children whose mothers die are more likely to be stunted (Ainsworth and Semali 2000). When a mother dies or is severely ill, children are more likely to be sent to foster care. Bledsoe, Ewbank et al. (1988) found a higher likelihood of death and disability among foster children in Sierra Leone. Foster children were more likely to be nutritionally disadvantaged and receive less schooling and health care. After a mother's death, children have less chance of schooling (Ainsworth and Semali 1998; Gertler, Martinez et al. 2003). In Indonesia, the death of a mother was found to lower the probability of school enrolment and increase the probability of child death and malnourishment (Gerter, Martinez et al. 2003). A growing literature on orphanhood is exploring these negative effects, as well as potential benefits, of foster care (Gilborn 2002; Guarcello, Lyon et al. 2004; Nyamukapa and Gregson 2005; Oleke, Blystad et al. 2007).

The effects of poor maternal health can last for generations. Women who do not gain enough weight during pregnancy increase the chances that their newborns have low birthweight. Girls who were born underweight are more likely to be stunted, grow as underweight adults, and experience obstructed labour. This endangers their own lives and that of their newborns, with complications like birth asphyxia, which causes brain damage and may impede cognitive

development (Save the Children 2006; AbouZahr 1998). Evidence also indicates that poor health at birth may result in adverse consequences for adult well-being such as increased chance of death from cardiovascular and cerebrovascular diseases (AbouZahr 1998).

■ 4.2 Household finances and well-being

In addition to health costs, numerous studies highlight the potentially catastrophic financial costs to a household of a maternal death or illness (Singh, Darroch et al. 2003; Filippi, Ronsmans et al. 2006; PRB and Immpact 2007; Tinker and Koblinsky 1993; Tinker, Daly et al. 1994).

Case Study 3: The Costs of Maternal Death in Afghanistan

Every year, 23,000 Afghan women die from maternal causes.¹ In certain areas of the country, the number of deaths from maternal causes exceeds those from all other causes of death among women, with antenatal or postpartum haemorrhage and obstructed labour being the most common causes. Almost all of these deaths occur within 42 days after birth, with over half of these deaths taking place within the first 24 hours.² One study conducted in 2002 in four districts of Afghanistan estimated the national maternal mortality ratio at an outrageous 1,600 to 2,200 deaths per 100,000 live births with maternal mortality increasing with greater remoteness. Numbers of deaths from maternal complications exceeded those from all other causes among women of reproductive age, particularly in the rural areas.² Nationally, one in six women is projected to be at risk for maternal death in her lifetime, compared to neighbouring Pakistan's 1 in 31 lifetime risk or the 1 in 2,500 lifetime risk in the United States.³ As such, Afghanistan's estimated risk is one of the highest in the world.

These deaths leave a great impact on the children, families, and communities of Afghanistan, and further contribute to a cycle of poverty.¹

- 75% of infants surviving a maternal death die within the first year of life.²
- Children lose the opportunity of education as they take on more responsibilities.
- Families accrue medical and funeral expenses they cannot afford. They also lose the domestic, agricultural, business, and other skills contributed by the woman in the family.
- Communities take on the burden of trying to support a larger number of dependent and impoverished neighbours.
- Government is forced to manage the widespread effects of the cycle of poverty.

¹ Inter-Agency Reproductive Health Task Force, Ministry of Health, Afghanistan.

² Bartlett, Mawji et al. (2005)

³ WHO (2004b)

Direct health costs: The direct costs of treatment and care related to a maternal illness can reduce savings and investments and change patterns of household consumption (Reed, Koblinsky et al. 2000). A study in Indonesia found that the costs of a hospital delivery with complications were about US\$255, or approximately 14% of average annual income. A normal delivery attended by a trained midwife cost US\$51, a comparatively small amount, yet 20% of the poorest women were compelled to borrow money to pay for it (PRB and Immpect 2007). In Ghana and Benin, some families spend up to US\$115 or US\$256, respectively, to treat near-miss complications. In 2000, these costs represented 8% of the average annual household cash expenditures for Ghanaian families and as much as 34% in Benin (Borghi, Hanson et al. 2003).

Lost work and income: Mothers' income is particularly valuable to families; research shows that women are more likely than men to spend their earnings on things that benefit the household, such as food, education, and medicine (Jowett 2000; Tinker 1997). Research on microcredit shows that women's borrowing increases household consumption about twice as much as men's borrowing. Women's borrowing also has greater benefits for children in terms of improved nutrition and school enrolment (World Bank 1998). Thus, to the extent that households rely on women's income for consumption, maternal illness and death can have a severe economic impact on families.

A study in Ghana found that pregnant women lost an average of 26 days of work due to reduced productivity, and postpartum women who continued to work regardless of ill-health lost an average of 23 days, a considerable loss even though household coping strategies were able to recover some proportion of it (PRB and Immpect 2007). A review of studies in the U.S. showed that poor health of mothers is associated with reduced labour market participation, decreased wage rates, and increased welfare dependency (Hutton 2006).

The loss of a mother's income due to maternal death or illness can be particularly devastating for female-headed households. Women are estimated to be the sole income earners for 25-33% of households in the world (Tinker and Koblinsky 1993). Such families are likely to be already struggling with poverty. In a study of ten developing countries, poverty measures were higher for female-headed households in one-fifth to one-third of households (Quisumbing, Haddad et al. 2001).

Other economic contributions: Women account for the brunt of non-paid work throughout the world. This unpaid work has economic value because it saves expenditures and replaces income in times of economic crisis (UN Millennium Project 2005a). By one account, if given economic value the total contribution of women's unpaid work in the household globally would add the equivalent of one third to the world's gross national product (Sivard 1995). This is not surprising given women's non-paid contributions to vital activities such as food production and caregiving. For example, rural women are responsible for the production of half of the world's food. In developing countries, and Africa especially, they produce 60-80% of the food (UN Millennium Project 2005a). Women also provide 70-80% of the health care in developing countries (Tinker, Daly et al. 1994). Thus, poor maternal health can significantly diminish women's ability to provide essential economic contributions to the household, including food production, water collection, and caring for children, the sick, and the elderly (Tinker and Koblinsky 1993).

Family well-being: The psychological and social consequences of poor maternal health and mortality are less extensively documented, but are significant nevertheless (Table 7). In many societies, men are not socialized to manage household affairs and are poorly equipped to care for children and families due to maternal death. Thus, after a mother's death, a father may have difficulty managing household affairs in a one-parent household, leading to deterioration of social cohesion and increasing depression and psychological problems in the family. Further,

children may be forced to drop out of school to help earn income, exposing them to illness, injury and poor hygiene (Islam and Gerdtham 2006).

Several studies also have cited the high rate of depression during postpartum and pregnancy and the their negative effects on families, which include disturbed relationships with children, marital discord, and poor performance of household tasks (Rahman, Iqbal et al. 2003; Rodrigues, Patel et al. 2003; Stuchbery, Matthey et al. 1998). One study in Pakistan found that about 1 in four women experienced antenatal or postpartum depression (Rahman, Iqbal et al. 2003). Good maternal health care services can reduce postpartum depression and puerperal psychosis (Singh, Darroch et al. 2003).

Despite these negative consequences of maternal morbidity and mortality, women's low status in a household typically means that women's health care needs may be ignored and given low priority. Further, childbearing is considered a 'normal' part of a woman's role. Thus, families may be reluctant to invest in maternal care, women may be unable to negotiate better care and, consequently, the risks and costs of maternal morbidity and mortality persist (Barua and Kurz 2001).

Given the costs and other negative consequences associated with poor maternal health for women, and their children and families, it is logical that the cumulative impact of maternal mortality and morbidity is reflected in national and global development outcomes. We next turn to examine the evidence on the impact of poor maternal health on development.

➤ 5. WOMEN DELIVER AS CITIZENS: Maternal Health Benefits for National Productivity and Health Service Delivery

SUMMARY OF FINDINGS: MATERNAL HEALTH BENEFITS FOR NATIONAL PRODUCTIVITY AND HEALTH SERVICE DELIVERY

- Maternal health has a substantial impact on economic productivity.
- Maternal morbidity and mortality represent a significant proportion of the burden of disease in the developing world, but interventions are available and cost-effective.
- Investing in maternal health benefits equity and overall health service delivery.

Maternal mortality and morbidity are associated with a very high burden of disease. At the same time, evidence also points to the fact that maternal health interventions can be highly cost-effective, and have important benefits for overall health service delivery.

■ 5.1 Productivity

Cost estimates in recent years have tried to quantify the effects of maternal deaths and illnesses on national budgets and productivity, based on a variety of assumptions. USAID estimated the economic impact of maternal and newborn mortality to be a global loss of over US\$15 billion annually due to diminished potential productivity, of which about half was associated with women and half with newborns (USAID 2001). Estimates for four countries indicate that costs of total productivity losses per year associated with poor maternal, newborn and infant health range from US\$8 million in Mauritania to US\$85 million in Uganda, and US\$95 million in Ethiopia, based on 2001 figures (Burkhalter 2000; Sommerfelt 2003). Per capita annual productivity

losses range from US\$1.5 in Ethiopia to over US\$3 in Uganda and Mauritania, and almost US\$5 in Senegal (Islam and Gerdtham 2006). Using somewhat different assumptions, and adding household and health center costs to such estimates, the annual cost for lost productivity in Uganda is closer to US\$102 million or US\$4.25 per capita per year (Islam and Gerdtham 2006).

While research has not explicitly explored the impact of poor maternal health on economic growth, a growing literature illustrates a positive relationship between health overall and economic growth (Lopez-Casnovas, Rivera et al. 2005; Bloom and Canning 2000; Bloom, Canning et al. 2001). Since burden of disease estimates show that maternal mortality and morbidity is one of the largest single causes of the ill-health of adult women, it can reasonably be assumed to account for an important portion of the effect of overall adult ill-health on economic growth. The literature on the economic impact of AIDS supports such an assumption. By striking individuals in the prime of their productive lives, AIDS substantially affects economic growth, productivity, investment, domestic savings, poverty, and inequity (Haacker 2004; Greener 2004; Ainsworth and Over 1994). Like AIDS, maternal morbidity and mortality affects women at the prime of their lives when they have the greatest ability to contribute to society and the economy, has severe economic repercussions for families, and represents a large burden of disease. Thus it is likely to have a similar effect on macro economic outcomes. More research is needed specifically on the consequences of maternal death and disability, however, to provide the empirical evidence to support these theoretical links.

A recent review of the literature concluded that much more research needs to be done on the impact of maternal and newborn health on economic growth. Many studies used measures like infant mortality, life expectancy, and adult survival, rather than maternal and newborn health indicators, making the effect of maternal-newborn health on economic growth difficult to estimate (Wilhelmson and Gerdtham 2006). Models also need to estimate the potential for increase in growth rates if maternal mortality and morbidity were reduced.

■ 5.2 Burden of Disease

Maternal morbidity and mortality represent a significant proportion of the burden of disease for the developing world. Maternal causes are one of the leading single causes of mortality and disability among women of reproductive age in developing countries (World Bank 1993; Setel, Saker et al. 2004; WHO 1999; Murray and Lopez 1997). Among this 15-49 age group, maternal ill health accounts for 13% of deaths and 13% of Disability-Adjusted Life Years (DALYs)¹⁸ lost (WHO 2002a; WHO 2002b). In addition, maternal health and the quality of obstetric and newborn care is directly associated with perinatal conditions (birth asphyxia, trauma, and low birth weight). These perinatal conditions are the second leading cause of premature death and disability among children under-five, which account for about 20% of the burden of disease in that age group (World Bank 1999).

■ 5.3 Health service delivery

Evidence suggests that investing resources in maternal health not only improves maternal and neonatal outcomes, but has important benefits for overall health service delivery and use as well (Borghini, Ensor et al. 2006; Fraser, Kamal-Smith et al. 2004; Goodburn and Campbell 2001; Graham 2002; Parkhurst, Danischevski et al. 2005; Tinker 1997; Singh, Darroch et al. 2003). These benefits are manifested in several different ways. First, investments in key maternal health facilities can carry over to other types of services. For example, when facilities are upgraded to provide essential obstetric care, they gain the capacity to perform operations and

¹⁸ See Appendix 1 for definition of Disability Adjusted Life Year (DALY).

blood transfusions needed for accidents and other emergencies (Jowett 2000; Tinker 1997), and equipment used for maternity care (blood pressure gauges, IV kits) are used for many other clinical interventions as well. In addition, prevention can avoid the exorbitant costs of treating maternal health complications of various types (Singh, Darroch et al. 2003). For example, an estimated 20-50% of hospital beds are filled by women with complications of unsafe abortion (Jowett 2000; Tinker 1997). Maternal health interventions, such as family planning and safe abortion, could prevent these costs to the health system.

There are other synergies associated with women's use of maternal health care services. Women who use maternal health services are more likely to use other reproductive health services (Ahmed and Mosely 1997). Improvements in quality, availability, and affordability of basic maternal health services would also address the inequities in the use of maternal care discussed earlier in this paper by increasing access for poor women, and, in fact, well-functioning health systems are essential to the sustainable and equitable delivery of technical maternal health interventions (UN Millennium Project 2005b). Finally, maternal health indicators are closely associated with key service delivery issues such as equity and efficiency, and they have been used to assess the functioning of health systems (Borghi, Ensor et al. 2006; World Bank 1999).

■ 5.4 Cost-effectiveness

Existing evidence suggests that maternal health interventions are highly cost effective, making them particularly good value for limited health care resources. A recent study has brought together additional data on the cost-effectiveness of maternal and newborn strategies using standardized methods and different settings to compare results (Adam, Lim et al. 2005). It found that primary care interventions for mothers and newborns and preventive community-level interventions for newborns were highly cost effective in both sub-Saharan Africa and South East Asia, the two settings with high adult and child mortality conditions. While hospital-based interventions were found to be considerably more expensive, the study concluded that they were also highly cost-effective, as well as essential for efforts to substantially reduce maternal and newborn mortality. Achieving the Millennium Development Goals, however, would require additional integrated efforts in coordination with reproductive health and non-health sectors, such as poverty reduction and education (Adam, Lim et al. 2005).

These findings support an extensive World Bank study on health which found that antenatal and delivery care and family planning were two of the six most cost-effective interventions selected for the essential package of clinical services for low and middle income countries (World Bank 1993). The World Bank also found maternal health interventions were among the most cost-effective interventions for women of reproductive age. In addition, prevention and management of perinatal conditions, which are closely tied to maternal well-being and health care, was found to be one of the most cost-effective interventions for children under five (Tinker, Daly et al. 1994).

Summary

The review of the literature in sections 2 to 5 above establishes the importance of maternal health as a women's health and rights issue and also as a development issue. However, despite the strong body of evidence presented above, investments in maternal health continue to fall short of what the development community knows is necessary to achieve the acknowledged benefits of maternal health and the MDG goals for safer maternity. At the same time, although the increase in funding needed to reach desired levels is large, the increase represents a very small percent of donor country GNP and so is well within reach. The next section explores the level of investment needed and available to reach MDG 5.

6. INVESTMENTS IN MATERNAL HEALTH: Shortfalls & Potentials

Investments in maternal health continue to fall below what the development community knows is necessary to achieve the benefits of maternal health and the Millennium Development Goal for safer maternity. Adequate investment in maternal health is an essential first step to addressing all the major barriers to improving maternal health, including access, quality, and cost. MDG 5 is both ambitious and essential. Achieving the goal requires adequate investment of resources. Estimates of costs to implement the kinds of services that are required to achieve it have been developed by the World Health Organization, the Lancet Neonatal Survival Series, and the Commission for Macroeconomics and Health (see Table 7).

According to WHO, a package of 67 maternal and neonatal health interventions covering pregnancy, childbirth and up to 42 days postpartum would need to be implemented in order to significantly lower maternal and newborn mortality. The cost of scaling up maternal and newborn services to the level required to reduce maternal and perinatal mortality to levels approaching MDG goals was estimated at US\$1 billion additional expenditure in 2006, increasing each year as coverage expands to US\$6.1 billion per year in 2015. This would correspond to a total of US\$39 billion for the period 2006-2015 (WHO 2005). The cost per person of implementing this package was estimated to be US\$0.22-\$1.18 per year (WHO 2005).

The Lancet Neonatal Survival Series estimated the costs of a somewhat different package of 16 proven neonatal and maternal health interventions covering the preconception, antenatal, intrapartum, and postnatal periods. The costing exercise aimed at a target coverage of 90% for 75 countries included in the analysis. The annual running cost at current degrees of coverage was estimated to be US\$1.97 billion, while the additional costs for expansion of coverage from current levels to the targeted 90% coverage was calculated to be US\$4.1 billion per year. Per capita costs of implementing this package were just under one dollar (Darmstadt, Bhutta et al. 2005).

The Commission for Macroeconomics and Health also developed estimates for another package of services. The Commission estimated that the per capita incremental cost for antenatal care, treatment of complications during pregnancy, skilled birth attendance, emergency obstetric care, and postpartum care (including family planning) would range between US\$0.36-0.58 to US\$0.89-1.40 per person over the years 2007 to 2015. The overall incremental cost per year was projected to be US\$2.1 billion in 2007, increasing each year to US\$5.5 billion per year in 2015 (Kumaranayake, Kurowski et al. 2001).

The bottom line of these estimates is strikingly consistent: the money needed to implement key improvements is less than US\$1.5 per capita per year—a very small proportion of the world's resources (Table 8). While these global estimates make different assumptions and are not strictly comparable, they provide a broad indication of what will be needed for significant improvements in maternal health. More accurate estimates incorporating local resource needs will require the development of budgets at the national level, and will need to include the costs of raising demand for maternal health services (Borghi, Ensor et al. 2006).

Given this range of estimates of what is likely to be needed, what is the current and expected scenario of investment in maternal health? All the available evidence suggests there is a wide gap between what is available and what is needed to move the agenda forward and meet MDG 5 (Borghi, Ensor et al. 2006; Powell-Jackson, Borghi et al. 2006; AbouZahr 2003). While disaggregated data on investment in maternal health alone are difficult to obtain (Howard 1990; Potts, Walsh et al. 1999), international development assistance for both maternal and

Table 8: Estimated costs of scaling up services to reduce maternal and antenatal mortality

Source	Intervention	Additional costs for expansion of coverage (\$US)	Annual per capita cost (\$US)	Scenario
The Lancet Neonatal Survival Series (2005)	Package of 16 proven interventions spanning the preconception, antenatal, intrapartum, and postnatal periods for a target coverage of 90%	\$4.1 billion annually	\$0.96	75 countries that have a high burden of child deaths and maternal mortality
WHO (2005)	Package of 67 interventions during pregnancy, birth and the postpartum and postnatal periods for a target coverage of 73%	\$1 billion (2006) increasing to \$6.1 billion (2015)	\$0.22 - 1.18	75 countries that together account for almost 95% of child maternal and neonatal deaths globally
Commission for Macroeconomics and Health (2001)	Antenatal care, treatment of complications during pregnancy, skilled birth attendance, emergency obstetric care, postpartum care including family planning for a target coverage of 90%	\$2.1 billion (2007) increasing to \$5.5 billion (2015)	\$0.36-0.58 (2007) to \$0.89 -1.40 (2015)	83 epidemiologically appropriate countries consisting largely of sub-Saharan Africa and South and East Asia

Sources: Darmstadt, Bhutta et al. (2005); WHO (2005); Kumaranayake, Kurowski et al. (2001)

neonatal health was estimated to be US\$659 million in 2003 and US\$537 million in 2004 (Powell-Jackson, Borghi et al. 2006). Donor funding would have needed to double between 2004 and 2006 to get to the WHO estimates of US\$1 billion level for 2006 required to meet the US\$ 5. To get to the US\$5.5 billion level estimated for 2015, donor funding will need to increase over ten times its 2004 level. Projections suggest that such funding requirements could be met if countries invested 15% of their national budgets in health, the Abuja target set by and for Africa, and if official development assistance climbed further towards 0.7% of Gross National Income in the OECD countries (Freedman, Graham et al., under review).

Current US funding levels for both maternal and child health suggest that U.S. investment in global maternal health is lagging far behind estimated needs. Despite greater funding for HIV and malaria, US government appropriations for child survival and maternal health programmes stayed at the same level of US\$356.4 million in FY2006 and FY2007. In fact, according to Global Health Council estimates, after accounting for inflation, U.S. investment in maternal and child health has actually declined 18% between 1997 and 2007 (Global Health Council 2007a). A further decrease is planned for FY2008, for which the allocation to child and maternal health is slated to be US\$345.6 million (Global Health Council 2007b). In comparison, as the only bilateral donor to have a strategy specific to improving maternal health, DFID's expenditure in maternal and newborn health has progressively increased throughout the years from US\$1.8 million in 2001-2002 to US\$32.6 million in 2005-2006 in current dollars (DFID 2007).

While the gap in the investment needed for maternal health may seem large, it represents a very small fraction of global GNP and total development aid. Even the considerably larger US\$5 billion shortfall in estimated funds required by 2015 to meet both maternal health and

child health MDGs comprises only 0.016% of global GNP and 2% of aid (Costello and Osrin 2005). Providing this small proportion of their GNP needed to achieve MDG 5 is well within the grasp of donor countries of the world. For example, military spending was US\$626.1 billion in the US alone this year (Hellman 2006)—more than 125 times the entire global shortfall needed to meet maternal and child health MDGs at the 2015 level.

7. CONCLUSIONS

Given the longstanding research that argues for investing in maternal health, and the relatively small proportion of global resources needed to make a difference, the significant shortfall in resources invested and the continued lack of progress in maternal health over the last two or more decades is both disturbing and puzzling. In particular, there has been inadequate investment in ensuring that improved services are accessible, affordable and available on an equitable basis. The lack of resource commitment is especially baffling given the evidence on the high cost associated with the large burden of disease of maternal health, and the research showing that maternal health interventions are cost-effective and thus particularly good value for limited health care resources. While the global costs of maternal ill health and subsequent newborn mortality are estimated to be over US\$15 billion per year, the total cost of preventing maternal and newborn deaths is only between US\$4.1 and US\$6.1 billion per year.

The lack of progress is especially of concern for south Asia and sub-Saharan Africa, which have consistently experienced the worst maternal health in the world. Our review suggests that it is no coincidence that these regions also lag in progress on a range of broader development outcomes, including poverty reduction and the status of women. The evidence reviewed here indicates that maternal health outcomes are intimately related to how effectively societies invest in and realize the potential of women—one half of their populations—as not only mothers, but as critical contributors to sustaining families and transforming nations. When societies cannot deliver for women, women's ability to deliver for themselves, their children, families and societies is hampered. When investments in women lag—as mothers, as individuals, as family members, and as citizens—not only is the economic cost of maternal death and illness large, so is the opportunity cost for nations in terms of lost possibilities of significant progress in achieving social and economic development more broadly.

The evidence shows the vicious cycle of poor maternal health, inadequate investments, and lower levels of development. Both continued low status of women and poor investment in services, institutions, and infrastructure to care for women have led to poor maternal health. Poor maternal health has a negative effect on development outcomes, such as household savings and economic productivity; poor economic outcomes, in turn, weaken investments in services, institutions and infrastructure, which, in turn, make it more difficult to improve maternal health.

This review highlights some key limitations in the current literature. Most notably, additional research is needed on how poor maternal health influences women's status; the multiple ways in which it impacts women's productivity, household well-being, and national economic growth; and on how women's status and broader development, in turn, impact the patterns and extent of improvements in maternal health. However, additional evidence alone will not be enough to ensure greater progress. Concerted efforts also are needed to change public perceptions about the severity of the problem and the solutions that are available, and to galvanize a coalition of

stakeholders committed to improving maternal health (Shiffman, Beer et al. 2002). Full implementation of effective strategies must be linked to a full understanding and acknowledgment of the linkages between maternal health, women's status, and broader development. Adequate investment in maternal health and in women will enable women to fulfil their potential to 'deliver' as mothers, as individuals, as members of families, and as citizens.

Appendix 1: Basic Terminology Defined

Term	Definition	Source
Basic essential obstetric care	Essential obstetric care is the term used to describe the elements of obstetric care needed for the management of normal and complicated pregnancy, delivery and the postpartum period. Basic essential obstetric care services at the health centre level should include at least the following: parenteral antibiotics, parenteral oxytocic drugs, parenteral sedatives for eclampsia, manual removal of placenta, manual removal of retained products.	WHO
Comprehensive essential obstetric care	Comprehensive essential obstetric care services at the district hospital level (first referral level) should include all basic essential care services plus surgery, anaesthesia, and blood transfusion.	WHO
DALY	The Disability Adjusted Life Year (DALY) is a health gap measure that extends the concept of potential years of life lost due to premature death (PYLL) to include equivalent years of 'healthy' life lost by virtue of being in states of poor health or disability. The DALY combines in one measure the time lived with disability and the time lost due to premature mortality. One DALY can be thought of as one lost year of 'healthy' life and the burden of disease as a measurement of the gap between current health status and an ideal situation where everyone lives into old age free of disease and disability.	WHO
Lifetime risk of maternal death	Probability of maternal death during a woman's reproductive life, usually expressed in terms of odds	WHO
Maternal death	The death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes (ICD-10).	WHO
Maternal morbidity	Refers to serious disease, disability or physical damage such as fistula and uterine prolapse, caused by pregnancy-related complications. Direct causes of maternal morbidity are obstetric complications during pregnancy, labour, or the postpartum period due to interventions, omissions, or incorrect treatment. Indirect maternal morbidity results from previously existing conditions or disease, aggravated by pregnancy; this type of disability may occur at any time and continue throughout a woman's life. Maternal morbidity can also be psychological, most often manifested by depression, which can result from obstetric complications, interventions, cultural practices, or coercion.	UNFPA
Maternal mortality ratio	Number of maternal deaths during given time period per 100,000 live births during same time period	WHO
Near miss	Also known as "severe acute maternal morbidity." A near miss is a very ill pregnant or recently delivered woman who would have died had it not been that luck and good care was on her side.	Mantel et al. (1998); Prual et al. (2000)
Postpartum period	Although not officially sanctioned, traditionally the postpartum period is supposed to end 6 weeks (42 days) after birth. The period of 6 weeks fits very well into cultural traditions in many countries, where often the first 40 days after birth are considered a time of convalescence for the mother and her newborn infant.	WHO
Skilled care / Skilled attendance at birth	The care provided to a mother and her newborn during pregnancy, childbirth, and immediately after birth by an accredited and competent health care provider who has at her/his disposal the necessary equipment and the support of a functioning health system, including transport and referral facilities for emergency obstetric care.	WHO (2004a)
Skilled birth attendant	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 immediate postnatal period, and in the identification, management and referral of complications in women and newborns.	WHO (2004a)

REFERENCES

- AbouZahr, C. 1998. "Maternal Mortality Overview." In *Health Dimensions of Sex and Reproduction*. Murray, CJ and AD Lopez, eds. Boston: Harvard University Press. Vol. 2.
- AbouZahr, C. 2003. "Safe motherhood: a brief history of the global movement 1947-2002." *Br Med Bull* 67: 13-25.
- AbouZahr, C. and T. Wardlaw. 2001. "Maternal mortality at the end of a decade: signs of progress?" *Bull World Health Organ* 79(6): 561-8.
- Adam, T., S. S. Lim, S. Mehta, Z. A. Bhutta, H. Fogstad, M. Mathai, J. Zupan and G. L. Darmstadt. 2005. "Cost effectiveness analysis of strategies for maternal and neonatal health in developing countries." *BMJ* 331(7525): 1107.
- Ahmad, H., N. J. Mehta, V. M. Manikal, T. J. Lamoste, E. K. Chapnick, L. I. Lutwick and D. V. Sepkowitz. 2001. "Pneumocystis carinii pneumonia in pregnancy." *Chest* 120(2): 666-71.
- Ahman, E., C. Dolea and I. Shah. 2003. *The global burden of unsafe abortions in the year 2000*. Geneva: Department of Reproductive Health and Research, WHO.
- Ahmed, S. and W. H. Mosley. 1997. Simultaneity in maternal-child health care utilization and contraceptive use: Evidence from developing countries. *Hopkins Population Center Papers on Population*. Baltimore: Johns Hopkins University, Department of Population Dynamics, School of Hygiene and Public Health.
- Ahmed, Y., P. Mwaba, C. Chintu, J. M. Grange, A. Ustianowski and A. Zumla. 1999. "A study of maternal mortality at the University Teaching Hospital, Lusaka, Zambia: the emergence of tuberculosis as a major non-obstetric cause of maternal death." *Int J Tuberc Lung Dis* 3(8): 675-80.
- Ainsworth, M. and I. Semali. 1998. "The impact of adult deaths on the nutritional status of children." *Coping with AIDS: the economic impact of adult mortality on the African household* ed. Washington, DC: The World Bank: Chapter 9.
- Ainsworth, M. and I. Semali. 2000. *The Impact of Adult Deaths on Children's Health in Northwestern Tanzania*. Washington, DC: Development Research Group, World Bank. 1-35.
- Ainsworth, M. and M. Over. 1994. "AIDS and African Development." *World Bank Research Observer* 9(2): 203-40.
- Allendorf, K. 2007. "Couples' reports of women's autonomy and health-care use in Nepal." *Stud Fam Plann* 38(1): 35-46.
- Alliegro, M. B., M. Dorrucchi, A. N. Phillips, P. Pezzotti, S. Boros, M. Zaccarelli, R. Pristera and G. Rezza. 1997. "Incidence and consequences of pregnancy in women with known duration of HIV infection. Italian Seroconversion Study Group." *Arch Intern Med* 157(22): 2585-90.
- AMDD Working Group on Indicators. 2002a. "Program note. Using UN process indicators to assess needs in emergency obstetric services: Bhutan, Cameroon and Rajasthan, India." *Int J Gynaecol Obstet* 77(3): 277-84.
- AMDD Working Group on Indicators. 2002b. "Averting maternal death and disability. Program note. Using UN process indicators to assess needs in emergency obstetric services: Pakistan, Peru and Vietnam." *Int J Gynaecol Obstet* 78(3): 275-82.
- AMDD Working Group on Indicators. 2003a. "Program note: using UN process indicators to assess needs in emergency obstetric services: Morocco, Nicaragua and Sri Lanka." *Int J Gynaecol Obstet* 80(2): 222-30.
- AMDD Working Group on Indicators. 2003b. "Program note. Using UN process indicators to assess needs in emergency obstetric services: Niger, Rwanda and Tanzania." *Int J Gynaecol Obstet* 83(1): 112-20.
- AMDD Working Group on Indicators. 2004. "Program note: using UN process indicators to assess needs in emergency obstetric services: Benin and Chad." *Int J Gynaecol Obstet* 86(1): 110-20; discussion 109.
- Anson, O. 2004. "Utilization of maternal care in rural HeBei Province, the People's Republic of China: individual and structural characteristics." *Health Policy* 70(2): 197-206.
- Ashford, L. 2002. *Hidden Suffering: Disabilities From Pregnancy and Childbirth in Less Developed Countries*. Washington, DC: Population Reference Bureau.
- Bacchus, L., G. Mezey and S. Bewley. 2004. "Domestic violence: prevalence in pregnant women and associations with physical and psychological health." *Eur J Obstet Gynecol Reprod Biol* 113(1): 6-11.
- Baiden, F., K. Amponsa-Achiano, A. R. Oduro, T. A. Mensah, R. Baiden and A. Hodgson. 2006. "Unmet need for essential obstetric services in a rural district in northern Ghana: complications of unsafe abortions remain a major cause of mortality." *Public Health* 120(5): 421-6.
- Bartlett, L. A., S. Mawji et al. 2005. "Where Giving Birth Is a Forecast of Death: Maternal Mortality in Four Districts of Afghanistan, 1999-2002." *The Lancet* 365(9462): 864-70.
- Barua, A. and K. Kurz. 2001. "Reproductive health-seeking by married adolescent girls in Maharashtra, India." *Reproductive Health Matters* 9(17): 53-62.
- Barua, A., S. Walia, K. MacQuarrie et al. Unpublished. "Supportive Mothers-in-Law: Key to Young Married Women's Reproductive Health in India."
- Becker, S., F. Fonseca-Becker and C. Schenck-Yglesias. 2006. "Husbands' and wives' reports of women's decision-making power in Western Guatemala and their effects on preventive health behaviors." *Soc Sci Med* 62(9): 2313-26.
- Beegle, K., E. Frankenberger and D. Thomas. 2001. "Bargaining power within couples and use of prenatal and delivery care in Indonesia." *Stud Fam Plann* 32(2): 130-46.
- Behrman, J. R. and B. L. Wolfe. 1989. "Does more schooling make women better nourished and healthier?: Adult sibling random and fixed effects estimates for Nicaragua." *The Journal of Human Resources* 24(4): 644-663.
- Berer, M. 1999. "HIV/AIDS, Pregnancy and Maternal Mortality and Morbidity: Implications for Care." *Safe Motherhood Initiatives: Critical Issues*. Berer, M and S Ravindran, ed. Oxford: Reproductive Health Matters: 198-210.
- Bhatia, J. C. and J. Cleland. 1995. "Determinants of maternal care in a region of South India." *Health Transition Review* 5: 127-142.
- Bicego, G., J. T. Boerma and C. Ronsmans. 2002. "The effect of AIDS on maternal mortality in Malawi and Zimbabwe." *Aids* 16(7): 1078-81.
- Bledsoe, C. H., D. C. Ewbank and U. C. Isiugo-Abanihe. 1988. "The effect of child fostering on feeding practices and access to health services in rural Sierra Leone." *Soc Sci Med* 27(6): 627-36.
- Bloom, D. E. and D. Canning. 2000. "Policy forum: public health. The health and wealth of nations." *Science* 287(5456): 1207, 1209.
- Bloom, D. E., D. Canning and J. Sevilla. 2001. *The Effect of Health on Economic Growth: Theory and Evidence. NBER Working Paper No. 8587*. Cambridge: National Bureau of Economic Research.

- Bloom, S. S., D. Wypij and M. Das Gupta. 2001. "Dimensions of women's autonomy and the influence on maternal health care utilization in a north Indian city." *Demography* 38(1): 67-78.
- Borghji, J. 2001. "What is the cost of maternal health care and how can it be financed?" *Studies in Health Services Organization and Policy* (17): 245-269.
- Borghji, J., T. Ensor, A. Somanathan, C. Lissner and A. Mills. 2006. "Mobilising financial resources for maternal health." *The Lancet* 368(9545): 1457-65.
- Borghji, J., K. Hanson et al. 2003. "Costs of near-miss obstetric complications for women and their families in Benin and Ghana." *Health Policy Plan* 18(4): 383-90.
- Brettell, R. P., G. M. Raab, A. Ross, K. L. Fielding, S. M. Gore and A. G. Bird. 1995. "HIV infection in women: immunological markers and the influence of pregnancy." *AIDS* 9(10): 1177-84.
- Burkhalter, B. R. 2000. *Assumptions and Estimates for the Application of the REDUCE Safe Motherhood Model in Uganda (unpublished)*. Bethesda, MD: Center for Human Services.
- Campbell, O. M. and W. J. Graham. 2006. "Strategies for reducing maternal mortality: getting on with what works." *The Lancet* 368(9543): 1284-99.
- Chakraborty, N., M. A. Islam, R. I. Chowdhury, W. Bari and H. H. Akhter. 2003. "Determinants of the use of maternal health services in rural Bangladesh." *Health Promot Int* 18(4): 327-37.
- Chapagain, M. 2006. "Conjugal Power Relations and Couples' Participation in Reproductive Health Decision-Making: Exploring the Links in Nepal." *Gender Technology and Development* 10(2): 159-189.
- Chen, L. C., M. C. Gesche, S. Ahmed, A. I. Chowdhury and W. H. Mosley. 1974. "Maternal mortality in rural Bangladesh." *Stud Fam Plann* 5(11): 334-41.
- Collin, S. M., M. M. Chisenga, L. Kasonka, A. Haworth, C. Young, S. Filteau and S. F. Murray. 2006. "Factors associated with postpartum physical and mental morbidity among women with known HIV status in Lusaka, Zambia." *AIDS Care* 18(7): 812-20.
- Costello, A. and D. Osrin. 2005. "The case for a new Global Fund for maternal, neonatal, and child survival." *The Lancet* 366(9485): 603-5.
- Danel, I. 2000. *Maternal Mortality Reduction, Honduras, 1990-1997: A Case Study*. Washington, DC: The World Bank.
- Danel, I. and A. Rivera. 2003. "Honduras, 1990-1997." *Reducing Maternal Mortality: Learning from Bolivia, China, Egypt, Honduras, Indonesia, Jamaica, and Zimbabwe*. Koblinksky, MA, ed. Washington, DC: The World Bank: 51-62.
- Darmstadt, G. L., Z. A. Bhutta et al. 2005. "Evidence-Based, Cost-Effective Interventions: How Many Newborn Babies Can We Save?" *The Lancet* 365(9463): 977-88.
- Davanzo, J., A. Razzaque, M. Rahman and L. Hale. 2004. *The Effects of Birth Spacing on Infant and Child Mortality, Pregnancy Outcomes, and Maternal Morbidity and Mortality in Matlab, Bangladesh*. *RAND Labor and Population Working Paper Series*: RAND.
- Department for International Development. 2007. *DFID's Maternal Health Strategy, Reducing maternal deaths: evidence and action*. London: DFID.
- Dias de Souza, J. P., G. Duarte and A. Basile-Filho. 2002. "Near-miss maternal mortality in developing countries." *Eur J Obstet Gynecol Reprod Biol* 104(1): 80.
- El Kady, D., W. M. Gilbert, G. Xing and L. H. Smith. 2005. "Maternal and neonatal outcomes of assaults during pregnancy." *Obstet Gynecol* 105(2): 357-63.
- Ellsberg, M. and L. Heise. 2005. *Researching violence against women: A practical guide for researchers and activists*. Washington, DC: WHO and PATH.
- Elo, I. T. 1992. "Utilization of maternal health-care services in Peru: the role of women's education." *Health Transit Rev* 2(1): 49-69.
- Fawcus, S. R., H. A. van Coeverden de Groot and S. Isaacs. 2005. "A 50-year audit of maternal mortality in the Peninsula Maternal and Neonatal Service, Cape Town (1953-2002)." *BJOG* 112(9): 1257-63.
- Filippi, V., E. Alihonou, S. Mukantaganda, W. J. Graham and C. Ronsmans. 1998. "Near misses: maternal morbidity and mortality." *The Lancet* 351(9096): 145-6.
- Filippi, V., C. Ronsmans, O. M. Campbell, W. J. Graham, A. Mills, J. Borghi, M. Koblinksky and D. Osrin. 2006. "Maternal health in poor countries: the broader context and a call for action." *The Lancet* 368(9546): 1535-41.
- Fort, A. L., M. T. Kothari and N. Abderrahim. 2006. *Postpartum Care: Levels and Determinants in Developing Countries*. Calverton, MD: Macro International, Inc.
- Fortney, J. A. 1987. "The Importance of Family Planning in Reducing Maternal Mortality." *Studies in Family Planning* 18(2): 109-114.
- Fortney, J. A. and J. B. Smith, Eds. 1996. *The Base of the Iceberg: Prevalence and Perceptions of Maternal Morbidity in Four Developing Countries*. Research Triangle Park, NC: Family Health International.
- Fox-Rushby, J. A. and F. Foord. 1996. "Costs, effects and cost-effectiveness analysis of a mobile maternal health care service in West Kiang, The Gambia." *Health Policy* 35(2): 123-43.
- Fraser, A., M. Kamal-Smith and K. Watkins. 2004. *The cost of childbirth: how women are paying the price for broken promises on aid*. *Oxfam Briefing Paper* 52. Oxford: Oxfam.
- Freedman, L., M. Wirth, R. Waldman, M. Chowdhury and A. Rosenfield. 2003. *Background Paper of the Task Force on Child Health and Maternal Health: Millennium Project*. Commissioned by the UN Secretary General and supported by the UN Development Group.
- Freedman, L. P., R. J. Waldman et al. 2005. "Transforming health systems to improve the lives of women and children." *The Lancet* 365(9463): 997-1000.
- Freedman, L., W. Graham, E. Brazier, J.M. Smith. Under review by *The Lancet*. "Practical lessons from global safe motherhood initiatives: Time for a new focus on implementation."
- French, R. and P. Brocklehurst. 1998. "The effect of pregnancy on survival in women infected with HIV: a systematic review of the literature and meta-analysis." *BJOG: An International Journal of Obstetrics and Gynaecology* 105(8): 827-835.
- Furuta, M. and S. Salway. 2006. "Women's position within the household as a determinant of maternal health care use in Nepal." *International Family Planning Perspectives* 32(1): 17-27.
- Ganatra, B. R., K. J. Coyaji and V. N. Rao. 1998. "Too far, too little, too late: a community-based case-control study of maternal mortality in rural west Maharashtra, India." *Bull World Health Organ* 76(6): 591-8.
- Garcia-Moreno, C., H. A. F. M. Jansen, M. Ellsberg et al. 2005. *WHO Multi-country Study on Women's Health and Domestic Violence against Women: initial results on prevalence, health outcomes and women's responses*. Geneva: World Health Organization.
- Garcia-Moreno, C., H. A. Jansen, M. Ellsberg et al. 2006. "Prevalence of intimate partner violence: findings from the WHO multi-country study on women's health and domestic violence." *The Lancet* 368(9543): 1260-9.

- Gazmararian, J. A., S. Lazorick, A. M. Spitz, T. J. Ballard, L. E. Saltzman and J. S. Marks. 1996. "Prevalence of violence against pregnant women." *JAMA* 275(24): 1915-20.
- Gertler, P., S. Martinez, D. Levine and S. Bertozzi. 2003. *Losing the presence and presents of parents: how parental death affects children*. Berkeley, CA: Haas School of Business.
- Gilborn, L. Z. 2002. "Beyond our Borders: The effects of HIV infection and AIDS on children in Africa." *Western Journal of Medicine* 176(1): 12-14.
- Global Health Council. 2007a. U.S. House Numbers for FY07 Budget Increase Investments in HIV/AIDS and Malaria, Underfund Child and Maternal Health. http://www.globalhealth.org/assets/press/pr_house_fy07.pdf. Accessed on April 12, 2007. Last updated January 31, 2007.
- Global Health Council. 2007b. Global Health Funding. http://www.globalhealth.org/view_top.php?id=172. Accessed on May 1, 2007. Last updated.
- Goodburn, E. and O. Campbell. 2001. "Reducing maternal mortality in the developing world: sector-wide approaches may be the key." *BMJ* 322(7291): 917-20.
- Govindasamy, P. 2000. "Poverty, women's status, and utilization of health services in Egypt." *Women, Poverty, and Demographic Change*. Garcia, B, ed. Oxford: Oxford University Press: 263-285.
- Graham, W. J. 2002. "The global problem of maternal mortality: inequalities and inequities." *Maternal morbidity and Mortality*. MacLean, A and J Neilson, ed. London: Royal College of Obstetricians and Gynaecologists: 3-20.
- Gray, R. H., X. Li, G. Kigozi, D. Serwadda, H. Brahmbhatt, F. Wabwire-Mangen, F. Nalugoda, M. Kiddugavu, N. Sewankambo, T. C. Quinn, S. J. Reynolds and M. J. Wawer. 2005. "Increased risk of incident HIV during pregnancy in Rakai, Uganda: a prospective study." *The Lancet* 366(9492): 1182-8.
- Greene, M. E. and T. Merrick. 2005. *Poverty Reduction: Does Reproductive Health Matter?* Health, Nutrition and Population (HNP) Discussion Paper. Washington, DC: The World Bank.
- Greener, R. 2004. "The Impact of HIV/AIDS on Poverty and Inequality." *The Macroeconomics of HIV/AIDS*. Haacker, M, ed. Washington, DC: International Monetary Fund.
- Greenwood, A. M., B. M. Greenwood, A. K. Bradley, K. Williams, F. C. Shenton, S. Tulloch, P. Bypass and F. S. Oldfield. 1987. "A prospective survey of the outcome of pregnancy in a rural area of the Gambia." *Bull World Health Organ* 65(5): 635-43.
- Grown, C., G. R. Gupta et al. 2005. "Taking action to improve women's health through gender equality and women's empowerment." *The Lancet* 365(9458): 541-3.
- Guarcello, L., S. Lyon, F. C. Rosati et al. 2004. The influence of orphanhood on children's schooling and labour: evidence from sub-Saharan Africa. *Understanding Children's Work Project Working Paper Series*. Rome: UCW, ILO, UNICEF, World Bank.
- Gupta, I. and A. Mitra. 2004. "Economic Growth, Health and Poverty: An Exploratory Study for India." *Development Policy Review* 22(2): 193-206.
- Gwatkin, D., S. Rustein, K. Johnson, R. Pande and A. Wagstaff. 2000. Socioeconomic Differences in Health, Nutrition, and Population - 45 countries. <http://go.worldbank.org/YP7EAOVF50>. Accessed on April 30, 2007. Last updated.
- Gwatkin, D., A. Wagstaff and A. Yazbeck, Eds. 2005. *Reaching the Poor with Health, Nutrition, and Population Services: What Works, What Doesn't, and Why*. Washington, DC: The World Bank.
- Haacker, M. 2004. "HIV/AIDS: The impact on the social fabric and the economy." *The Macroeconomics of HIV/AIDS*. Haacker, M, ed. Washington, DC: International Monetary Fund.
- Hall, M. H. 2001. "Near misses and severe maternal morbidity." *Why mothers die 1997-1999: The confidential enquiries into maternal deaths in the United Kingdom* ed. London: RCOG Press: Department of Health, Welsh Office, Scottish Home and Health Department, Department of Health and Social Sciences, Northern Ireland: 323-325.
- Hellman, C. 2006. Highlights of the Fiscal Year 2007 Pentagon Spending Request. Washington, DC: Center for Arms Control and Non-Proliferation. 2007.
- Hill, K., K. Thomas, C. AbouZahr et al. Under review by *The Lancet*. "Levels and trends in global and regional maternal mortality 1990 to 2005"
- Hord, C., H. P. David et al. 1991. "Reproductive health in Romania: reversing the Ceausescu legacy." *Stud Fam Plann* 22(4): 231-40.
- Hotchkiss, D., J. Rous, E. Seiber and A. Berruti. 2005. "Is Maternal and Child Health Service use a Causal Gateway to Subsequent Contraceptive use?: A Multi-Country Study." *Population Research and Policy Review* 24(6): 543-571.
- Howard, L. M. 1990. Supporting Safe Motherhood: A Review of Financial Trends. *PRE Working Paper Series*. Washington, DC: The World Bank.
- Hutton, G. 2006. The effect of maternal-newborn ill-health on households: economic vulnerability and social implications. *Moving towards universal coverage: Issues in maternal-newborn health and poverty*. WHO. Geneva: WHO.
- Inter-Agency Reproductive Health Task Force, Ministry of Health, Afghanistan. *Reconstructing Afghanistan: Saving Mothers' Lives*.
- Islam, M. A., R. I. Chowdhury, N. Chakraborty, W. Bari and H. H. Akhter. 2004. "Factors associated with delivery complications in rural Bangladesh." *Eur J Contracept Reprod Health Care* 9(4): 203-13.
- Islam, M. K. and U. G. Gerdtham. 2006. The costs of maternal-newborn illness and mortality. *Moving towards universal coverage: Issues in maternal-newborn health and poverty*. Geneva: WHO.
- Jewkes, R., H. Rees et al. 2005. "The impact of age on the epidemiology of incomplete abortions in South Africa after legislative change." *BJOG* 112(3): 355-9.
- Jowett, M. 2000. "Safe Motherhood interventions in low-income countries: an economic justification and evidence of cost effectiveness." *Health Policy* 53(3): 201-28.
- Kaye, D. K., F. M. Mirembe, G. Bantebya, A. Johansson and A. M. Ekstrom. 2006. "Domestic violence during pregnancy and risk of low birthweight and maternal complications: a prospective cohort study at Mulago Hospital, Uganda." *Trop Med Int Health* 11(10): 1576-84.
- Khan, M., T. Pillay, J. M. Moodley and C. A. Connolly. 2001. "Maternal mortality associated with tuberculosis-HIV-1 co-infection in Durban, South Africa." *Aids* 15(14): 1857-63.
- Khan, K. S., D. Wojdyla, L. Say, A. M. Gulmezoglu and P. F. Van Look. 2006. "WHO analysis of causes of maternal death: a systematic review." *The Lancet* 367(9516): 1066-74.
- Kishor, S. and K. Johnson. 2003. *Women's health at the nexus of poverty and domestic violence: Evidence from the developing world. Paper presented at the 2003 Annual Meeting fo the Population Association of America, Minneapolis, Minnesota*.
- Kishor, S. and K. Johnson. 2004. *Profiling Domestic Violence: A Multi-Country Study*. Calverton, Maryland: ORC Macro.

- Koblinsky, M. A., J. Timyan and J. Gay. 1993. *The Health of Women: A Global Perspective*. Boulder, San Francisco, and Oxford: Westview Press.
- Koenig, M. A., V. Fauveau, A. I. Chowdhury, J. Chakraborty and M. A. Khan. 1988. "Maternal mortality in Matlab, Bangladesh: 1976-85." *Stud Fam Plann* 19(2): 69-80.
- Kuate Defo, B. 1997. "Effects of socioeconomic disadvantage and women's status on women's health in Cameroon." *Soc Sci Med* 44(7): 1023-42.
- Kumaranyake, L., C. Kurowski and L. Conteh. 2001. *Costs of scaling-up priority interventions in low income countries: methodology and estimates*. Geneva: World Health Organization, Commission on Macroeconomics and Health.
- Kusiako, T., C. Ronsmans et al. 2000. "Perinatal Mortality Attributable to Complications of Childbirth in Matlab, Bangladesh." *Bull World Health Organ* 78(5): 621-7.
- Lawn, J. E., S. Cousens et al. 2005. "4 million neonatal deaths: when? Where? Why?" *The Lancet* 365(9462): 891-900.
- Lawn, J., K. Shibuya et al. 2005. "No Cry at Birth: Global Estimates of Intrapartum Stillbirths and Intrapartum-Related Neonatal Deaths." *Bull World Health Organ* 83(6): 409-17.
- Lawn, J. E., A. Tinker, S. P. Munjanja and S. Cousens. 2006. "Where is maternal and child health now?" *The Lancet* 368(9546): 1474-7.
- Leroy, V., P. Van de Perre, P. Lepage, J. Saba, F. Nsengumuremyi, A. Simonon, E. Karita, P. Msellati, R. Salamon and F. Dabis. 1994. "Seroincidence of HIV-1 infection in African women of reproductive age: a prospective cohort study in Kigali, Rwanda, 1988-1992." *Aids* 8(7): 983-6.
- LeVine, R. A., S. E. LeVine, A. Richman, F. M. T. Uribe, C. S. Correa and P. M. Miller. 1991. "Women's Schooling and Child Care in the Demographic Transition: A Mexican Case Study." *Population and Development Review* 17(3): 459-496.
- Li, X. F., J. A. Fortney, M. Kotelchuck and L. H. Glover. 1996. "The postpartum period: the key to maternal mortality." *Int J Gynaecol Obstet* 54(1): 1-10.
- Lopez, A. D., C. D. Mathers, M. Ezzati et al. 2006. *Global Burden of Disease and Risk Factors*. New York: Oxford University Press and The World Bank.
- López-Casasnovas, G., B. Rivera and L. Currais, Eds. 2005. *Health and Economic Growth: Findings and Policy Implications*. Cambridge: The MIT Press.
- MacLeod, J. and R. Rhode. 1998. "Retrospective follow-up of maternal deaths and their associated risk factors in a rural district of Tanzania." *Trop Med Int Health* 3(2): 130-7.
- Mantel, G. D., E. Buchmann, H. Rees and R. C. Pattinson. 1998. "Severe acute maternal morbidity: a pilot study of a definition for a near-miss." *Br J Obstet Gynaecol* 105(9): 985-90.
- Marston, C. and J. Cleland. 2004. *The effects of contraception on obstetric outcomes*. Geneva: WHO.
- Matsumura, M. and B. Gubhaju. 2001. "Women's Status, Household Structure and the Utilization of Maternal Health Services in Nepal." *Asia-Pacific Population Journal* 16(1): 23-44.
- Matthews, Z., M. Brookes, R. W. Stones and M. B. Hossain. 2005. "Village in the City: Autonomy and Maternal Health-Seeking Among Slum Populations of Mumbai." *A focus on gender: collected papers on gender using DHS data*. Moore, S, ed. Calverton: ORC Macro.
- McFarlane, J., B. Parker and K. Soeken. 1996. "Abuse during pregnancy: associations with maternal health and infant birth weight." *Nurs Res* 45(1): 37-42.
- McIntyre, J. 2003. "Mothers infected with HIV." *Br Med Bull* 67: 127-35.
- McIntyre, J. 2005. "Maternal health and HIV." *Reprod Health Matters* 13(25): 129-35.
- Mesce, D. and E. Sines. 2006. *Unsafe Abortion: Facts and Figures*. Washington, DC: Population Reference Bureau.
- Miles-Doan, R. and K. L. Brewster. 1998. "The impact of type of employment on women's use of prenatal-care services and family planning in urban Cebu, the Philippines." *Stud Fam Plann* 29(1): 69-78.
- Mumford, E. A., V. Dayaratna, W. Winfrey, J. Sine and W. P. McGreevey. 1998. *Reproductive Health Costs: Literature Review*. Washington, DC: POLICY Project.
- Murphy, E. M. 2003. "Being Born Female is Dangerous for your Health: Intersections of Reproductive Health, Gender and Mental Health." *American Psychologist* 58(3): 205-10.
- Murray, C. J. and A. D. Lopez. 1997. "Mortality by cause for eight regions of the world: Global Burden of Disease Study." *The Lancet* 349(9061): 1269-76.
- Murray, C. J. L. and A. D. Lopez, Eds. 1998. *Health Dimensions of Sex and Reproduction: The Global Burden of Sexually Transmitted Diseases, HIV, Maternal Conditions, Perinatal Disorders, and Congenital Anomalies*. Boston: Harvard University Press.
- Nanda, P. 1999. "Women's participation in rural credit programmes in Bangladesh and their demand for formal health care: is there a positive impact?" *Health Econ* 8(5): 415-28.
- National Committee on Confidential Enquiries into Maternal Deaths. 2000. "A review of maternal deaths in South Africa during 1998." National Committee on Confidential Enquiries into Maternal Deaths." *S Afr Med J* 90(4): 367-73.
- Nyamukapa, C. and S. Gregson. 2005. "Extended family's and women's roles in safeguarding orphans' education in AIDS-afflicted rural Zimbabwe." *Soc Sci Med* 60(10): 2155-67.
- Obermeyer, C. M. and J. E. Potter. 1991. "Maternal health care utilization in Jordan: a study of patterns and determinants." *Stud Fam Plann* 22(3): 177-87.
- Okonofua, F. 2006. "Abortion and maternal mortality in the developing world." *J Obstet Gynaecol Can* 28(11): 974-9.
- Oleke, C., A. Blystad, K. Fylkesnes et al. 2007. "Constraints to educational opportunities of orphans: a community-based study from northern Uganda." *AIDS Care* 19(3): 361-8.
- Pallitto, C. C. 2004. *Domestic violence and maternal, infant, and reproductive health: A critical review of the literature*. Washington, DC: Pan American Health Organization.
- Parkhurst, J. O., K. Danishevski and D. Balabanova. 2005. "International maternal health indicators and middle-income countries: Russia." *BMJ* 331(7515): 510-3.
- Paruk, F. and J. Moodley. 2001. "Severe obstetric morbidity." *Current Opinion in Obstetrics & Gynecology* 13(6): 563-568.
- Pathmanathan, I., J. Liljestrand, J. M. Martins, L. C. Rajapaksa, C. Lissner, A. d. Silva, S. Selvaraju and P. J. Singh. 2003. *Investing in Maternal Health: Learning from Malaysia and Sri Lanka*. *Health, Nutrition, and Population Series*. Washington, DC: The World Bank.

- Population Resource Center. 2001. Maternal Mortality and Morbidity. <http://www.prcdc.org/summaries/matmort/matmort.html>. Accessed on August 30, 2007.
- Potts, M., J. Walsh, J. McAninch, N. Mizoguchi and T. J. Wade. 1999. "Paying for Reproductive Health Care: What is Needed, and What is Available?" *International Family Planning Perspectives* 25 (Supplement): S10-16.
- Powell-Jackson, T., J. Borghi, D. H. Mueller, E. Patouillard and A. Mills. 2006. "Countdown to 2015: tracking donor assistance to maternal, newborn, and child health." *The Lancet* 368(9541): 1077-87.
- PRB and Immpact. 2007. Economic and Financial Tools Assess Safe Motherhood Programme Costs and Benefits. <http://www.prb.org/pdf07/CostEffects.pdf>. Accessed on April 13, 2007.
- Pruhal, A., M. H. Bouvier-Colle, L. de Bernis and G. Breart. 2000. "Severe maternal morbidity from direct obstetric causes in West Africa: incidence and case fatality rates." *Bull World Health Organ* 78(5): 593-602.
- Quisumbing, A., L. Haddad and C. Pena. 2001. Are women overrepresented among the poor? An analysis of poverty in ten developing countries. *Food Consumption and Nutrition Division Discussion Paper 115*. Washington, DC: International Food Policy Research Institute.
- Reed, H. E., M. A. Koblinsky and W. H. Mosley, Eds. 2000. *The Consequences of Maternal Morbidity and Maternal Mortality: Report of a Workshop*. Washington, DC: National Academy Press.
- Rahman, A., Z. Iqbal and R. Harrington. 2003. "Life events, social support and depression in childbirth: perspectives from a rural community in the developing world." *Psychol Med* 33(7): 1161-7.
- Rodrigues, M., V. Patel, S. Jaswal and N. de Souza. 2003. "Listening to mothers: qualitative studies on motherhood and depression from Goa, India." *Soc Sci Med* 57(10): 1797-806.
- Ronsmans, C. and W. J. Graham. 2006. "Maternal mortality: who, when, where, and why." *The Lancet* 368(9542): 1189-200.
- Roy, N. C., T. T. Kane and K. Barkat-e. 2001. "Socioeconomic and health implications of adult deaths in families of rural Bangladesh." *J Health Popul Nutr* 19(4): 291-300.
- Royston, E. and S. Armstrong, Eds. 1989. *Preventing Maternal Deaths*. Geneva: World Health Organization.
- Saada, M., J. Le Chenadec, A. Berrebi, A. Bongain, J. F. Delfraissy, M. J. Mayaux and L. Meyer. 2000. "Pregnancy and progression to AIDS: results of the French prospective cohorts. SEROGEST and SEROCO Study Groups." *AIDS* 14(15): 2355-60.
- Save the Children. 2006. State of the World's Mothers 2006: Saving the Lives of Mothers and Newborns. Westport, Connecticut: Save the Children.
- Say, L., R. C. Pattinson and A. M. Gulmezoglu. 2004. "WHO systematic review of maternal morbidity and mortality: the prevalence of severe acute maternal morbidity (near miss)." *Reprod Health* 1(1): 3.
- Setel, P. W., L. Saker, N. C. Unwin, Y. Hemed, D. R. Whiting and H. Kitange. 2004. "Is it time to reassess the categorization of disease burdens in low-income countries?" *Am J Public Health* 94(3): 384-8.
- Shiffman, J. 2000. "Can poor countries surmount high maternal mortality?" *Stud Fam Plann* 31(4): 274-89.
- Shiffman, J., T. Beer and Y. Wu. 2002. "The emergence of global disease control priorities." *Health Policy Plan* 17(3): 225-34.
- Singh, S., J. Darroch, M. Vlassoff and J. Nadeau. 2003. Adding it up: The benefits of investing in sexual and reproductive health care: The Alan Guttmacher Institute and UNFPA.
- Sivard, R. 1995. *Women...a world survey*. Washington, DC: World Priorities.
- Sommerfelt, A. E. 2002. *Assumptions and Estimates for the Application of the REDUCE Safe Motherhood Model for the WHO African Region (Harare, Zimbabwe)*. REDUCE Workshop for WHO African Region. Harare, Zimbabwe.
- Sommerfelt, A. E. 2003. *Assumptions and Estimates for the Application of the REDUCE Safe Motherhood Model for Ethiopia*. REDUCE Workshop. Addis Ababa, Ethiopia.
- Stanton, C., J. E. Lawn et al. 2006. "Stillbirth Rates: Delivering Estimates in 190 Countries." *The Lancet* 367(9521): 1487-94.
- Stanton, C., A. Blanc, T. Croft and Y. Choi. 2007. "Skilled care at births in the developing world: Progress to date and strategies for expanding coverage." *Journal of Biosocial Science* 39: 109-120.
- Starrs, A. M. 2006. "Safe motherhood initiative: 20 years and counting." *The Lancet* 368(9542): 1130-2.
- Strong, M. A. 1992. "The health of adults in the developing world: the view from Bangladesh." *Health Transition Review* 2(2): 215-230.
- Stuchbery, M., S. Matthey and B. Barnett. 1998. "Postnatal depression and social supports in Vietnamese, Arabic and Anglo-Celtic mothers." *Soc Psychiatry Psychiatr Epidemiol* 33(10): 483-90.
- Taguchi, N., M. Kawabata, M. Maekawa, T. Maruo, Aditiawarman and L. Dewata. 2003. "Influence of socio-economic background and antenatal care programmes on maternal mortality in Surabaya, Indonesia." *Trop Med Int Health* 8(9): 847-52.
- Taha, T. E., G. A. Dallabetta, D. R. Hoover, J. D. Chipangwi, L. A. Mtimavalye, G. N. Liomba, N. I. Kumwenda and P. G. Miotti. 1998. "Trends of HIV-1 and sexually transmitted diseases among pregnant and postpartum women in urban Malawi." *Aids* 12(2): 197-203.
- ter Kuile, F. O., M. E. Parise, F. H. Verhoeff, V. Udhayakumar, R. D. Newman, A. M. van Eijk, S. J. Rogerson and R. W. Steketee. 2004. "The burden of co-infection with human immunodeficiency virus type 1 and malaria in pregnant women in sub-saharan Africa." *Am J Trop Med Hyg* 71(2 Suppl): 41-54.
- Tinker, A. 1997. *Safe Motherhood as a Social and Economic Investment*. Technical Consultation on Safe Motherhood. Colombo, Sri Lanka.
- Tinker, A. and M. A. Koblinsky. 1993. *Making Motherhood Safe*. *World Bank Discussion Paper* 202. Washington, DC: The World Bank.
- Tinker, A., P. Daly, C. Green, H. Saxenian, R. Lakshminarayanan and K. Gill. 1994. *Women's Health and Nutrition: Making a Difference*. *World Bank Discussion Paper*. Washington, DC: The World Bank.
- UN Millennium Project. 2005a. *Taking action: Achieving gender equality and empowering women*. Task Force on Education and Gender Equality. London and Sterling, Virginia: Earthscan.
- UN Millennium Project. 2005b. *Who's got the power? Transforming health systems for women and children*. Task Force on Child and Maternal Health. London and Sterling, Virginia: Earthscan.
- UN Millennium Project. 2006. *Public Choices, Private Decisions: Sexual and Reproductive Health and the Millennium Development Goals*.
- UNAIDS. 2006. *AIDS epidemic update 2006*. Geneva: UNAIDS.
- UNICEF. 2007. *State of the World's Children: Women and Children - The Double Dividend of Gender Equality*. New York: UNICEF.
- UNFPA. 2007. *Facts about Safe Motherhood*. <http://www.unfpa.org/mothers/facts.htm>. Accessed on August 30, 2007.

- United Nations. 2002. *Report of the International Conference on Financing for Development*. International Conference on Financing for Development. Monterrey, Mexico, 18-22 March 2002, United Nations.
- United Nations. 2006. *The Millennium Development Goals Report*. New York: United Nations.
- United Nations. 2007. *The Millennium Development Goals Report*. New York: United Nations.
- United Nations. 2007. UN Millennium Development Goals. <http://www.un.org/millenniumgoals/>. Accessed on July 12, 2007.
- USAID. 2001. USAID Congressional Budget Justification FY2002: Program, Performance and Prospects - The Global Health Pillar. http://www.usaid.gov/pubs/cbj2002/prog_pref2002.html. Accessed on April 13, 2007.
- van Eijk, A. M., J. G. Ayisi, F. O. ter Kuile, A. O. Misore, J. A. Otieno, D. H. Rosen, P. A. Kager, R. W. Steketee and B. L. Nahlen. 2003. "HIV increases the risk of malaria in women of all gravidities in Kisumu, Kenya." *AIDS* 17(4): 595-603.
- Wagstaff, A. and M. Claeson. 2004. *The Millennium Development Goals for Health: Rising to the Challenges*. Washington, DC: The World Bank.
- Wali, S., E. Gould and P. Fitzgerald. 1999. "The impact of political conflict on women: The case of Afghanistan." *American Journal of Public Health* 89(10): 1474-1476.
- Weiner, R., C. Ronsmans et al. 2003. "Labour Complications Remain the Most Important Risk Factors for Perinatal Mortality in Rural Kenya." *Bull World Health Organ* 81(8): 561-6.
- WHO. 1996. *Perinatal Mortality: a listing of available information*. Geneva: World Health Organization.
- WHO. 1999. *Reduction of Maternal Mortality: A Joint WHO/UNFPA/UNICEF/World Bank Statement*. Geneva: World Health Organization.
- WHO. 2000. *Reproductive Health During Conflict and Displacement*. Geneva: World Health Organization.
- WHO. 2001. *Maternal Mortality in 1995: Estimates Developed by WHO, UNICEF and UNFPA*. Geneva: WHO.
- WHO. 2002a. *Revised global burden of disease 2002 estimates of numbers of deaths by sex, cause, and WHO region*. Geneva: World Health Organization.
- WHO. 2002b. *Revised global burden of disease 2002 estimates of DALYs by sex, cause, and WHO region*. Geneva: World Health Organization.
- WHO. 2004a. *Making pregnancy safer: the critical role of the skilled attendant: a joint statement by WHO, ICM and FIGO*. Geneva: WHO.
- WHO. 2004b. *Maternal Mortality in 2000: Estimates Developed by WHO, UNICEF and UNFPA*. Geneva: WHO.
- WHO. 2004c. *Unsafe Abortion: Global and Regional Estimates of the Incidence of Unsafe Abortion and Associated Mortality in 2000*. Geneva: WHO.
- WHO. 2005. *The World Health Report 2005: Make every mother and child count*. Geneva: WHO.
- WHO. 2006a. *Neonatal and Perinatal Mortality: country, regional, and global estimates*. Geneva: World Health Organization.
- WHO. 2006b. *Skilled attendant at birth 2006 updates - Factsheet*. Geneva: WHO, Department of Reproductive Health and Research.
- WHO and UNICEF. 2003. *Antenatal care in developing countries: Promises, achievements and missed opportunities*. Geneva: WHO-UNICEF.
- Wilhelmson, K. and U. G. Gerdtham. 2006. *Impact on economic growth of investing in maternal-newborn health. Moving towards universal coverage: Issues in maternal-newborn health and poverty*. Geneva: WHO.
- World Bank. 1993. *World Development Report 1993: Investing in Health*. Washington, DC: The World Bank.
- World Bank. 1998. *Using microcredit to advance women. PREMnotes, Number 8*. Washington, DC: World Bank.
- World Bank. 1999. *Safe Motherhood and The World Bank*. Washington, DC: The World Bank.