Maternal Health
White Paper

World **Youth** Alliance

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I. Introduction

The death of a mother devastates her family and the broader community. Mothers, as caretakers, educators, and providers, are often at the center of their communities. When a mother dies in childbirth, it puts the baby at risk of morbidity and mortality.[1] Motherless children are at a much greater risk of death than those with living parents[2] due to loss of income and care.[3] Motherless children are also much less likely to receive complete schooling and adequate nutrition; losing a mother is more likely to result in these negative outcomes than is losing a father.[4] When a mother dies, children are more likely to enter the work force at a premature age, leading to health and social problems.[5] Maternal death also has an immediate, direct economic impact on families.[6] In 2010, 287,000 women died of pregnancy-related causes.[7] The number of maternal deaths ranges from an average of 16 per 100,000 live births in the world's most developed countries to over 1,000 per 100,000 live births in the world's least developed countries.[8] Efforts to lower these numbers have been prioritized in the global health policy arena, evidenced by major international political commitments to reducing maternal mortality on the part of United Nations Member States, such as the Millennium Development Goals. Strategies of lower income countries that have successfully reduced their maternal mortality ratios drastically should be instructive for developing countries that are facing the death of mothers in nearly one percent of live births today.

In 2010, 287,000 women died of pregnancy-related causes.

This paper first outlines the international focus on maternal health. The paper next details the current maternal mortality statistics and describes the primary causes of maternal deaths. It then presents several historical models of maternal mortality reduction, focusing largely on Sweden's efforts starting in the mid-1700s to reduce the number of women who die in pregnancy. The paper identifies how Sweden's strong public commitment to training midwives to assist all births reduced the number of maternal deaths to a level much lower than its more developed counterparts, including the United States and Britain; the number fell further with the later introduction of medical technology. The paper then identifies the key interventions necessary to reduce maternal mortality: prenatal care, skilled birth attendants, adequately equipped birthing facilities, and health care delivery system infrastructure, namely education and transportation. Finally, in discussing how to address maternal mortality today, the paper details how the provision of abortion services and contraception has not historically been a component of and is not necessary for reducing maternal mortality.

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[1] *See* Jo Borghi et al., *Mobilising financial resources for maternal health*, 368 LANCET 1457, 1457 (2006).
[2] *See id.*
[3] M. KAMRUL ISLAM & ULF-G. GERDTHAM, WHO, THE COSTS OF MATERNAL-NEWBORN ILLNESS AND MORTALITY 13 (2006), *available at* http://whqlibdoc.who.int/publications/2006/9241594497_eng.pdf.
[4] *Id.* at 14.
[5] *Id.*
[6] *See, e.g.*, Fang Ye et al., *The Immediate Economic Impact of Maternal Deaths on Rural Chinese Households*, 7 PLOS ONE 1 (2012).
[7] WHO ET AL., TRENDS IN MATERNAL MORTALITY: 1990 TO 2010 1 (2012) [hereinafter WHO, TRENDS 2010], *available at* http://whqlibdoc.who.int/publications/2012/9789241503631_eng.pdf.
[8] *Id.*

II. Background

A. International focus on maternal health

In 1987, the Safe Motherhood Conference, which was hosted by the World Health Organization (WHO), United Nations Population Fund (UNFPA), and World Bank, took place in Nairobi, Kenya, and paved the way for the Safe Motherhood Initiative.[9] The conference called for a reduction in the maternal mortality ratio (MMR) by fifty percent by 2000.[10] To tackle the problem of maternal mortality, the Inter-Agency Group (IAG) for Safe Motherhood was formed, with such UN agencies as United Nations Children's Fund (UNICEF), UNFPA, WHO, and World Bank as members, in addition to non-governmental organizations (NGOs) like International Planned Parenthood Federation (IPPF), the Population Council, and Family Care International, which served as the secretariat.[11]

In 1994, delegates from 179 Member States of the United Nations gathered in Cairo, Egypt for the International Conference on Population and Development (ICPD).[12] At the end of the conference, the Member States produced a consensus document called the Programme of Action, which sets forth goals to be achieved over a period of twenty years (1994–2014). Although the Programme of Action is an expression of political will and does not constitute international law,[13] it outlines the priorities of the States Parties and indicates commitment on their part to work toward achieving them. The Programme of Action focuses on maternal mortality as one component of population and development issues and identifies maternal mortality as "among the leading causes of mortality for women of reproductive age in many parts of the developing world."[14] Recognizing the "very serious consequences within the family" of the death of mothers, countries at the ICPD committed to reducing the maternal mortality ratio of 1990 by half in 2000, and then further by half in 2015.[15] Countries also committed to "expand[ing] the provision of maternal health services in the context of primary health care."[16] Among the services needed are "education on safe motherhood, prenatal care that is focused and effective, maternal nutrition programmes, adequate delivery assistance that avoids excessive recourse to caesarean sections and provides for obstetric emergencies; referral services for pregnancy, childbirth and abortion complications; post-natal care and family planning."[17] Countries agreed that skilled birth attendants, such as nurses and midwives, are critical.[18]

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[9] Ann M. Starrs, *Safe Motherhood Initiative: 20 years and counting*, 368 LANCET 1130, 1130 (2006).
[10] *Id.* at 1131.
[11] Women Deliver, Safe Motherhood Initiative, http://www.womendeliver.org/about/the-initiative/safe-motherhood-initiative/ (last visited Nov. 29, 2012).
[12] LARA KNUDSEN, REPRODUCTIVE RIGHTS IN A GLOBAL CONTEXT 6 (2006).
[13] CTR. FOR REPRODUCTIVE RTS., LEGAL STANDARDS, ROMA REPRODUCTIVE FREEDOM IN SLOVAKIA 97, *available at* http://reproductiverights.org/sites/default/files/documents/bo_slov_part4.pdf .
[14] International Conference on Population and Development, Sept. 5–13, 1994, *Report of the International Conference on Population and Development*, Ch. I, Res. 1, Annex, ¶ 8.19, U.N. Doc. A/CONF.171/13/Rev.1 (Oct. 18, 1994).
[15] *Id.* Ch. I, Res. 1, Annex, ¶ 8.21.
[16] *Id.* Ch. I, Res. 1, Annex, ¶ 8.22.
[17] *Id.*
[18] *Id.*

Countries reiterated their concern for high rates of maternal mortality at the Fourth World Conference on Women in Beijing in 1995. Through the consensus Platform for Action, another non-binding document, they committed to "giving particular attention to maternal and emergency obstetric care."[19] They recommitted to the goal set at the ICPD for reducing maternal mortality.[20]

B. Millennium Development Goals

In 2000, UN Member States created and agreed to eight Millennium Development Goals, which expire in 2015.[21] Because they have been agreed to by UN Member States, States are encouraged to work to achieve those goals and must report on progress or decline in each area. Millennium Development Goal 5 (MDG 5) focuses on improvements in maternal health[22]; target 5A is to "reduce by three quarters, between 1990 and 2015, the maternal mortality ratio."[23] Target 5B is to "achieve, by 2015, universal access to reproductive health."[24] MDG 5 is the least-achieved MDG.[25]

"Reduce by three-quarters the maternal mortality ratio." –MDG 5 Target 5A

C. Shift to a focus broader than maternal health

The Safe Motherhood Initiative and the IAG began to merge with other global health efforts between 2002 and 2005 in order to satisfy donors who wanted to fund broader strategies.[26] The combined focus on the health of mothers, newborns, and children made sense because of the inherent relationship among the three.[27] Yet this broader focus caused dispute because child health advocates were concerned about political debate on the subject of unsafe abortion.[28] Furthermore, members of the partnership disagreed about how to prevent maternal deaths, in part with respect to "the relation of the initiative to other health concerns, including family planning, the broader reproductive health agenda and health systems development."[29] Many in the safe motherhood movement were concerned that this partnership would detract from the issue of

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[19] Fourth World Conference on Women, Sept. 4–15, 1995, *Report of the Fourth World Conference on Women*, Ch. I, Res. 1, Annex II, ¶ 106(e), U.N. Doc. A/CONF.177/20/Rev.1 (1996).
[20] *Id.* Ch. I, Res. 1, Annex II, ¶ 106(i).
[21] *See* UNITED NATIONS, THE MILLENNIUM DEVELOPMENT GOALS REPORT 2012 (2012), *available at* http://mdgs.un.org/unsd/mdg/Resources/Static/Products/Progress2012/English2012.pdf [hereinafter MDG REPORT 2012].
[22] *Id.* at 30.
[23] *Id.*
[24] *Id.* For an introduction to reproductive health in the global health policy context, *see* MEGHAN GRIZZLE, REPRODUCTIVE HEALTH WHITE PAPER (2012), *available at* http://www.wya.net/advocacy/research/WYA%20Reproductive%20Health%20White%20Paper.pdf.
[25] WORLD BANK, REDUCING MATERNAL MORTALITY: STRENGTHENING THE WORLD BANK RESPONSE 1 (2009), *available at* http://siteresources.worldbank.org/INTPRH/Resources/376374-1278599377733/MaternalHealth62910PRINT.pdf.
[26] Jeremy Shiffman & Stephanie Smith, *Generation of political priority for global health initiatives: a framework and case study of maternal mortality*, 370 LANCET 1370, 1374 (2007).
[27] *Id.*
[28] *Id.*
[29] *Id.* at 1376.

maternal survival and whether the safe motherhood movement even existed anymore.[30]

On the twentieth anniversary of the creation of the Safe Motherhood Initiative, Women Deliver, a triennial conference promoting solutions to maternal mortality, was launched.[31] Women Deliver signified a shift in the goal of MDG 5 away from decreasing maternal mortality to increasing access to broader reproductive health. MDG 5 at first focused entirely on maternal health, but in 2006 the UN General Assembly added Target 5B on reproductive health at the recommendation of the Secretary General.[32] The WHO issued a report on reproductive health as a means to achieving MDG 5 and identified the progress made through "a holistic approach, i.e, expanding beyond a focus only on maternal health (increasing attention to family planning, sexual health, prevention of unsafe abortion)."[33] Women Deliver has focused largely on access to family planning and access to safe abortion services to improve maternal and newborn health, in addition to access to care during pregnancy and childbirth.[34] The focus on abortion does not address women who are pregnant and desire to carry out their pregnancies, indicating that maternal health strategies no longer focus solely on healthy pregnancies and safe deliveries.

The shift is also demonstrated through the statement by the Global Campaign for the Health Millennium Goals, a consortium of groups focusing on MDGs 4 (child health), 5, and 6 (HIV/AIDS), that MDG 5 is focused on "improving women's health,"[35] even though MDG 5 is specifically "to improve maternal health."[36] The history of international awareness of and support for safe motherhood and maternal health has been eclipsed by a shift in emphasis toward access to abortion and contraception; unfortunately, this shift in focus distracts efforts and funding from the strategies that actually work to get women safely through pregnancy and delivery, as discussed below.

D. Maternal mortality statistics

Given international commitments to improving maternal health, global health efforts have focused on reducing both the number of maternal deaths and the maternal mortality ratio. According to the WHO, "A maternal death is the death of a woman while pregnant or

"A maternal death is the death of a woman while pregnant or within 42 days of termination of pregnancy . . . from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes." -WHO

[30] *Id.* at 1375.
[31] *See, e.g.*, Women Deliver, *supra* note 11.
[32] WHO, NATIONAL-LEVEL MONITORING OF THE ACHIEVEMENT OF UNIVERSAL ACCESS TO REPRODUCTIVE HEALTH 1 (2008), *available at* http://whqlibdoc.who.int/publications/2008/9789241596831_eng.pdf.
[33] WHO, UNIVERSAL ACCESS TO REPRODUCTIVE HEALTH: ACCELERATED ACTIONS TO ENHANCE PROGRESS ON MILLENNIUM DEVELOPMENT GOAL 5 THROUGH ADVANCING TARGET 5B 9 (2011), *available at* http://whqlibdoc.who.int/hq/2011/WHO_RHR_HRP_11.02_eng.pdf.
[34] *See* Women Deliver, Three Core Strategies to Save Lives, http://www.womendeliver.org/about/the-issue/three-core-strategies-to-save-lives/ (last visited Nov. 29, 2012).
[35] THE GLOBAL CAMPAIGN FOR THE HEALTH MILLENNIUM GOALS, REPORT 3 (2007), *available at* http://www.who.int/pmnch/topics/mdgs/norad_progress_report.pdf.
[36] MDG REPORT 2012, *supra* note 21, at 30.

within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes."[37] According to the World Bank, "Maternal mortality ratio is the number of women who die during pregnancy and childbirth, per 100,000 live births."[38] The natural MMR, that is, the ratio when "nothing effective is done to avert death," is approximately 1,500.[39]

The WHO and independent researchers state that to reduce the MMR by 75 percent between 1990 and 2015, every year there must be a 5.5 percent reduction in the MMR.[40] From 1990 to 2010 the number of maternal deaths fell by 47 percent.[41] According to the WHO, there were 287,000 maternal deaths in 2010,[42] down from 358,000 in 2008.[43] 99 percent of those deaths occurred in developing countries, with 85 percent occurring in sub-Saharan Africa and South Asia.[44] The only region to have achieved the average yearly 5.5 percent reduction rate was Eastern Asia, with Northern Africa at 5.3 percent.[45] In 2010, the MMR was 240 in developing regions, down from 260 in 2008,[46] as compared to 16 in developed regions.[47] "The adult lifetime risk of maternal death (the probability that a 15-year-old female will die eventually from a maternal cause)" is 1 in 32 in Afghanistan[48] and 1 in 39 in sub-Saharan Africa, as measured in 2010.[49] Meanwhile, in developed regions, the adult lifetime risk of maternal death is 1 in 3,800.[50]

III. Causes of maternal mortality

Four major complications account for a majority of deaths during pregnancy and childbirth[51]: hemorrhage (severe bleeding, generally after childbirth), sepsis (infections, generally after childbirth), hypertensive disorders (problems related to high blood pressure, such as eclampsia

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[37] WHO, INTERNATIONAL STATISTICAL CLASSIFICATION OF DISEASES AND RELATED HEALTH PROBLEMS, TENTH REVISION 156 (2010) [hereinafter WHO, CLASSIFICATION], *available at* http://www.who.int/classifications/icd/ICD10Volume2_en_2010.pdf.

[38] World Bank, Maternal mortality ratio (modeled estimate, per 100,000 live births), http://data.worldbank.org/indicator/SH.STA.MMRT (last visited Nov. 29, 2012).

[39] Wim Van Lerberghe & Vincent De Brouwere, *Of blind alleys and things that have worked: History's lessons on reducing maternal mortality*, *in* SAFE MOTHERHOOD STRATEGIES: A REVIEW OF THE EVIDENCE 7, 8 (Wim Van Lerberghe & Vincent De Brouwere eds., 2001).

[40] WHO, TRENDS 2010, *supra* note 7, at 2; Margaret C. Hogan et al., *Maternal mortality for 181 countries, 1980–2008: a systematic analysis of progress towards Millennium Development Goal 5*, 375 LANCET 1609, 1614 (2010).

[41] WHO, TRENDS 2010, *supra* note 7, at 22.

[42] *Id.*

[43] WHO ET AL., TRENDS IN MATERNAL MORTALITY: 1990 TO 2008 1 (2010), *available at* http://whqlibdoc.who.int/publications/2010/9789241500265_eng.pdf [hereinafter WHO, TRENDS 2008]. An independent analysis of WHO data had similar findings. *See* Hogan et al., *supra* note 40, at 1609.

[44] WHO, TRENDS 2010, *supra* note 7, at 22.

[45] *Id.* at 27.

[46] WHO, TRENDS 2008, *supra* note 43, at 1.

[47] WHO, TRENDS 2010, *supra* note 7, at 22.

[48] *Id.* at 32.

[49] *Id.* at 19.

[50] *Id.*

[51] WHO, Maternal health, http://www.who.int/topics/maternal_health/en/ (last visited Nov. 29, 2012). The source lists another cause, abortion, which is addressed in section III.E *infra*.

and pre-eclampsia), and obstructed labor.

A. Postpartum hemorrhage

Postpartum hemorrhage (PPH) is blood loss of 500 milliliters or more within the first 24 hours after childbirth, and severe PPH is blood loss of 1000 milliliters or more.[52] According to the WHO, PPH "may result from failure of the uterus to contract adequately (atony), genital tract trauma (i.e. vaginal or cervical lacerations), uterine rupture, retained placental tissue, or maternal bleeding disorders."[53] Uterine atony, or poor muscle tone of the uterus,[54] is the most common cause of PPH,[55] and is often the result of a tired uterus due to prolonged labor.[56] During PPH, the placenta, which connects the fetus and the wall of the mother's uterus, is separated by contraction and retraction of the uterus.[57] Every minute, 500 to 800 milliliters of blood flow through the placental site, and when the mother's uterus contracts after pushing out the baby, the blood vessels close and bleeding stops.[58] If the mother's uterus does not contract, then the blood vessels remain open, and the mother can hemorrhage to death in minutes.[59] The best treatments for hemorrhage are prevention of the situations that cause hemorrhage and prompt skilled management immediately available at the time of hemorrhage.[60]

B. Sepsis

In pregnancy, a woman's immune system is less able to fight off infection.[61] If a woman is malnourished or anemic, she is even less able to fight infections during pregnancy.[62] During the time of delivery, the woman may be exposed to infectious agents that can grow in the fluids within the birth canal.[63] During delivery, well-meaning untrained birth attendants may insert contaminated objects into the birth canal, greatly increasing the woman's risk of infection.[64] An infection in the mother's uterus can lead to infection of the newborn,[65] with a high number of newborn infections resulting in death.[66] The treatment for infection is antibiotics[67] and, because

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[52] WHO, MANAGING POSTPARTUM HEMORRHAGE 1 (2008), *available at* http://whqlibdoc.who.int/publications/2008/9789241546669_5_eng.pdf.
[53] *Id.*
[54] *Id.* at 195.
[55] *Id.* at 1.
[56] *See id.* at 60.
[57] *Id.* at 26.
[58] *Id.* at 26, 214.
[59] *Id.* at 26.
[60] *See id.* at 5–6.
[61] *See* S. Chhabra, A. Kaipa, & A. Kakani, *Reduction in maternal mortality due to sepsis*, 25 J. OBSTET. & GYNAECOL. 140, 141 (2005).
[62] *See* WHO, MANAGING PUERPERAL SEPSIS 19 (2008), *available at* http://whqlibdoc.who.int/publications/2008/9789241546669_6_eng.pdf.
[63] See WHO, MANAGING POSTPARTUM HEMORRHAGE, *supra* note 52, at 41.
[64] *See* WHO, MANAGING PUERPERAL SEPSIS, *supra* note 62, at 30.
[65] *See* WHO, MANAGING NEWBORN PROBLEMS F-38 (2003), *available at* http://apps.who.int/iris/bitstream/10665/42753/1/9241546220.pdf .
[66] WHO, Neonatal sepsis – a major killer to be tackled in communities, http://www.who.int/maternal_child_adolescent/news_events/news/2009/19_01/en/index.html (last visited Nov. 29, 2012).

placental fragments can cause sepsis, ensuring that all of the placenta has been removed from the uterus.[68]

C. Hypertension

For reasons as yet unknown,[69] pregnant women, especially in their first pregnancies,[70] can develop pre-eclampsia, a disorder characterized by extremely high blood pressure, leading to strokes and damage to internal organs.[71] If the pre-eclampsia is not recognized and treated promptly, the woman can get eclampsia and have seizures.[72] Eclampsia poses a severe risk of death to the mother and baby, with 1 in 50 women with eclampsia in the United Kingdom dying, although it is less frequent than pre-eclampsia.[73] Fortunately, the treatment, intravenous magnesium sulfate, is inexpensive,[74] but it needs to be administered by trained personnel who understand how to administer without great risk to the mother.[75] The other essential component of treatment for pre-eclampsia is timely delivery of the fetus[76]—the "ultimate cure"[77]—and this requires skilled personnel trained in labor induction and often includes management of premature newborns.[78]

D. Obstructed labor

Obstructed labor results when, "in spite of strong contractions of the uterus, the fetus cannot descend through the pelvis because there is an insurmountable barrier preventing its descent."[79] This occurs when the pelvis is small or the fetus is large, or if there are abnormalities present.[80] Prolonged or obstructed labor can lead to infection and can harm or kill the fetus.[81] Preventable

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[67] *See, e.g.*, WHO, MANAGING COMPLICATIONS IN PREGNANCY AND CHILDBIRTH: A GUIDE FOR MIDWIVES AND DOCTORS C-35–C-36 (2007), *available at* http://whqlibdoc.who.int/publications/2007/9241545879_eng.pdf [hereinafter WHO, MANAGING COMPLICATIONS].
[68] *See* WHO, MANAGING PUERPERAL SEPSIS , *supra* note 62, at 19, 30, 65.
[69] Lelia Duley, *Pre-eclampsia and the hypertensive disorders of pregnancy*, 67 BRIT. MED. BULL. 161, 161 (2003).
[70] WHO, MANAGING ECLAMPSIA 25 (2008), *available at* http://whqlibdoc.who.int/publications/2008/9789241546669_2_eng.pdf.
[71] Cheryl Bushnell & Monique Chireau, *Preeclampsia and Stroke: Risks during and after Pregnancy*, 2011 STROKE RES. & TREATMENT (2011).
[72] *See* Duley, *supra* note 69, at 171.
[73] *Id.* at 162.
[74] Pisake Lumbiganon et al., *Magnesium sulfate is not used for pre-eclampsia and eclampsia in Mexico and Thailand as much as it should be*, BULL. WORLD HEALTH ORG. 763, 765 (2007).
[75] For examples of problems associated with lack of knowledge about magnesium sulfate use, see A. Barua et al., *Facility and personnel factors influencing magnesium sulfate use for eclampsia and pre-eclampsia in 3 Indian hospitals*, 115 INT'L J. GYNAECOL. & OBSTET. 231 (2011).
[76] WHO, RECOMMENDATIONS FOR PREVENTION AND TREATMENT OF PRE-ECLAMPSIA AND ECLAMPSIA 4, 26–27 (2011), *available at* http://whqlibdoc.who.int/publications/2011/9789241548335_eng.pdf [hereinafter WHO, PRE-ECLAMPSIA RECOMMENDATIONS].
[77] Gus Dekker & Baha Sabai, *Primary, secondary, and tertiary prevention of pre-eclampsia*, 357 LANCET 209, 214 (2001).
[78] *See, e.g.*, *id.* at 211; Duley, *supra* note 69, at 161–62.
[79] WHO, MANAGING PROLONGED AND OBSTRUCTED LABOUR 17 (2008), *available at* http://whqlibdoc.who.int/publications/2008/9789241546669_4_eng.pdf.
[80] *Id.* at 18–19.
[81] *Id.* at 29.

risk factors include malnutrition, short stature of mother, young age of mother, long-distance travel to skilled health workers, lack of transportation, and delay in referral to special care, among others.[82] Treatment can include use of vacuum extraction by skilled professionals[83] and caesarean section if labor is sufficiently prolonged.[84]

E. Abortion

A fifth complication during pregnancy that is included in calculating the MMR is elective termination of pregnancy, or abortion.[85] Despite being an elective procedure and not a natural occurrence, abortion is included in the MMR because maternal death is defined as death during pregnancy or within 42 days of *termination of pregnancy*.[86] Although abortion can kill women, it is not the reason that women die in childbirth, and thus distracts from the issue of preventing the vast majority of maternal deaths, which occur from late in the third trimester to shortly after childbirth.[87]

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F. Distribution of maternal mortality causes

Direct causes together account for approximately eighty percent of maternal deaths, with hemorrhage contributing as the single greatest cause.[88] According to the WHO, in Africa, 33.9 percent of maternal deaths are caused by hemorrhage, 9.1 percent by hypertensive disorders, 9.7 percent by sepsis, 3.9 percent by abortion, and 4.1 percent by obstructed labor.[89] In Asia, 30.8 percent of maternal deaths are caused by hemorrhage, 9.1 percent by hypertensive disorders,

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[82] *Id.* at 44.
[83] *Id.* at 161.
[84] *Id.* at 85.
[85] WHO, Maternal health, *supra* note 51.
[86] WHO, CLASSIFICATION, *supra* note 37.
[87] *See, e.g.*, UNICEF, THE STATE OF THE WORLD'S CHILDREN 2009: MATERNAL AND NEWBORN HEALTH: WHERE WE STAND 9 (2009), *available at* http://www.unicef.org/sowc09/docs/SOWC09-FullReport-EN.pdf; WORLD BANK, *supra* note 25, at 37; X.F. Li et al., *The postpartum period: the key to maternal mortality*, 54 INT'L J. GYNECOL. & OBSTET. 1, 1 (1996).
[88] WHO ET AL., REDUCTION OF MATERNAL MORTALITY 11 (1999), *available at* http://whqlibdoc.who.int/publications/1999/9241561955_eng.pdf [hereinafter WHO, REDUCTION OF MATERNAL MORTALITY]. Furthermore, abortion in non-septic environments and in countries without good primary care systems only leads to greater risks of hemorrhage. *See* section V.E. *infra*. An explanation of the distinction between direct and indirect causes of maternal death is helpful: "Direct maternal deaths are those resulting from obstetric complications of the pregnant state (pregnancy, delivery and postpartum), interventions, omissions, incorrect treatment, or a chain of events resulting from any of the above. [. . .] Indirect maternal deaths are those resulting from previously existing diseases, or from diseases that developed during pregnancy and that were not due to direct obstetric causes but aggravated by physiological effects of pregnancy." WHO, TRENDS 2010, *supra* note 7, at 4. An example of an indirect maternal death is death from HIV/AIDS during pregnancy. *Id.* at 14. HIV is a continuing challenge to reducing maternal mortality, particularly in East and sub-Saharan Africa, and the MMR would be lower if not for high HIV prevalence in these regions. Hogan et al., *supra* note 40, at 1619.
[89] Khalid S. Khan et al., *WHO analysis of causes of maternal death: a systematic review*, 367 LANCET 1066, 1068 (2006).

11.6 percent by sepsis, 5.7 percent by abortion, and 9.4 percent by obstructed labor.[90] In Latin America and the Caribbean, 20.8 percent of maternal deaths are caused by hemorrhage, 25.7 percent by hypertensive disorders, 7.7 percent by sepsis, 12 percent by abortion, and 13.4 percent by obstructed labor.[91] In the developed world, maternal deaths are largely caused by "other direct causes," such as caesarean section- and anesthesia-related deaths.[92]

Measuring maternal mortality statistics is difficult, however, particularly in developing countries.[93] Civil registration systems do not necessarily record all deaths routinely.[94] Additionally, pregnancy status is not always known.[95] Where cause of death is not determined or is not certified, a death due to pregnancy-related issues can go unnoticed.[96] Misclassification may also occur in developed countries.[97] Underreporting is a further challenge to data accuracy.[98] Statistics collection on abortion is further complicated in countries where it is illegal or not reported, and thus the WHO figures are estimates.[99] Only 65 of 180 countries have a complete civil registration system with good attribution of cause of death, 88 have lacking civil registrations but maternal mortality data from other sources, and 27 have no maternal mortality data at all.[100]

IV. Historical models

A historical investigation is helpful in determining how to address maternal mortality today. This is because the evidence is clear that a substantial reduction in the number of maternal deaths is possible without significant modern technology and procedures, such as surgery, and also because the causes of maternal mortality in the developing world today are similar to those of more developed countries in the late 1800s that introduced successful measures to decrease maternal mortality.[101] Although these models do not provide direct solutions to maternal mortality today, given that historical evidence is only instructive,[102] they suggest what is possible when countries prioritize the health of mothers.

Maternal mortality was high in the late nineteenth century and early twentieth century in areas where doctors performed deliveries, particularly in the hospital, and where surgery was advocated for even normal labor.[103] On the other hand, skilled birth attendants performing

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[90] *Id.*
[91] *Id.*
[92] WHO, Maternal and perinatal health, http://www.who.int/reproductivehealth/topics/maternal_perinatal/epidemiology/en/index.html (last visited Nov. 29, 2012).
[93] WHO, TRENDS 2010, *supra* note 7, at 7. For a survey of the various sources of maternal mortality data, see *id.* at 9–10.
[94] *Id.* at 7.
[95] *Id.*
[96] *Id.*
[97] *Id.*
[98] *Id.*
[99] *Id.*
[100] *Id.* at 12.
[101] Irvine Loudon, *Maternal mortality in the past and its relevance to developing countries today*, 72 AM. J. CLINICAL NUTRITION 241S, 243S (2000).
[102] *See id.* at 241S.
[103] *Id.* at 242S.

deliveries at home contributed to a much lower MMR.[104] A decline in maternal mortality in northwestern Europe from 1890 to 1900 was due to "home deliveries by well-trained and well-supervised midwives who conscientiously used antiseptic techniques from the time they were introduced."[105]

A. Sweden

Sweden is an excellent model of a poor country's ability to decrease maternal mortality without use of modern technology. Although Sweden had a relatively low gross domestic product in the early twentieth century, it had a lower MMR than those of the United States and Britain[106]: from 1900 to 1904, the MMR was 230, while in England and Wales it was 440 and in the United States it was 520 to 850 in 1900.[107] In 1751, when the first Swedish national maternal mortality statistics were available, the MMR was almost 900.[108] That same year, the Commission on Health recognized that increased provision of midwives would have saved at least 400 of the 651 women who had died in childbirth.[109] Identification of the problem of maternal mortality and mobilization of the government to combat the problem were the first critical steps.[110] The use of trained, educated midwives supervised by public health officials was extremely common in Sweden: by the late nineteenth century, 78 percent of women were attended by a licensed midwife at home, and only two to five percent gave birth at a hospital.[111] Midwifery reduced nonseptic maternal mortality by 46 percent, and not necessarily because of their skill, given that they only used forceps in fewer than one percent of cases.[112] Instead, their success was due to "continuous support during labor."[113] The introduction of midwives alone greatly reduced the MMR, even before the use of antibiotics.[114] The introduction of antiseptic techniques was a second important step in further lowering the number of maternal deaths,[115] as it reduced mortality by puerperal sepsis, a kind of infection, by 49 percent.[116] Other countries, such as the Netherlands, Denmark, and Norway,

The introduction of midwives alone greatly reduced the MMR in Sweden, even before the use of antibiotics. The introduction of antiseptic techniques was a second important step in further lowering the number of maternal deaths.

[104] *Id.* at 242S–43S.
[105] *Id.* at 242S.
[106] Ulf Högberg, *The Decline in Maternal Mortality in Sweden: The Role of Community Midwifery*, 94 AM. J. PUB. HEALTH 1312, 1319 (2004).
[107] *Id.* at 1312.
[108] *Id.* at 1314.
[109] *Id.*
[110] Vincent De Brouwere, René Tonglet, & Wim Van Lerberghe, *Strategies for reducing maternal mortality in developing countries: what can we learn from the history of the industrialized West?*, 3 TROPICAL MED. & INT'L HEALTH 771, 773 (1998).
[111] *Id.* at 772.
[112] Högberg, *supra* note 106, at 1317.
[113] *Id.* at 1318.
[114] J. Chamberlain et al., *The role of professional associations in reducing maternal mortality worldwide*, 83 INT'L J. GYNECOL. & OBSTET. 94, 95 (2003).
[115] De Brouwere et al., *supra* note 110, at 773.
[116] Högberg, *supra* note 106, at 1318.

implemented policies that reflected the success of Sweden's—"political commitment, availability of effective techniques, and assistance to most deliveries provided by trained health professionals able to 'culturally' integrate such a technology"—and reduced their MMRs significantly.[117]

B. Industrialized countries

In the industrialized world, MMRs did not begin to decline until the government and the public committed to tackling the problem. In England and Wales, traditional birth attendants, who were unskilled, were replaced by trained midwives, thanks to the Midwives Act of 1902.[118] Provision of licensed midwives improved the MMR, but general practitioners, who were not necessarily better skilled than midwives at obstetrics, intervened too often with forceps and chloroform, offsetting the gains made by the increased number of midwives.[119] MMRs eventually fell by 1935 in England and Wales, primarily due to the decrease in puerperal infections.[120] In the United States, where maternal mortality information was only available after 1900, maternal mortality was much higher than in Sweden because there was very little provision of midwives.[121] Delivery by a doctor was actually more dangerous than delivery at home by a professional midwife.[122] Doctors often interfered unnecessarily, by, for example, using forceps or chloroform in delivery.[123]

C. Developing countries

Other countries have been successful in reducing their MMRs without a lot of financial resources. In Sri Lanka, a relatively poor country,[124] the MMR was 1,500 up to 1947, but the creation of health care facilities and an investigatory committee on maternal deaths, in addition to professional training organizations, lowered the ratio to between 80 and 100 in 1975.[125] In Malaysia, due to the combination of public commitment, the creation of centers for low-risk deliveries, quality assurance, and confidential enquiries, the MMR decreased from between 120 and 200 in the 1970s, the ratio of the United States and the United Kingdom after World War II, to between 60 and 80 in 1990 and to 20 in 1995.[126] In both countries, the "comprehensive strengthening of human development programs (i.e., infrastructure, education, sanitation and health systems) – specifically in poor and underserved areas" contributed to the decrease in the MMR.[127]

In Thailand, the MMR was above 400 up to the 1960s, the same ratio as the United Kingdom in

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[117] De Brouwere et al., *supra* note 110, at 773.
[118] *Id.*
[119] *Id.*
[120] *Id.*
[121] Van Lerberghe & De Brouwere, *supra* note 39, at 13–14.
[122] *Id.* at 17.
[123] Loudon, *supra* note 101, at 242S–43S.
[124] Van Lerberghe & De Brouwere, *supra* note 39, at 7.
[125] *Id.* at 20–21.
[126] *Id.* at 21.
[127] Ndola Prata et al., *Maternal mortality in developing countries: challenges in scaling-up priority interventions*, 6 WOMEN'S HEALTH 311, 316 (2010).

1900 and the United States in 1939.[128] Thailand then committed to training paramedical personnel and new certified midwives replaced traditional birth attendants in villages.[129] By 1970, the MMR was 200 to 250, and as the number of midwives increased in the 1970s, the MMR dropped to 98 by 1980.[130] Then, as hospitals were equipped, the MMR reached 42 in 1985, 25 in 1990, and 11 in 1995.[131] In Honduras, recognition by the government of the problem of maternal mortality led to the formation of a working group to develop and implement solutions.[132] The subsequent professional training of traditional birth attendants led to a reduction in the MMR from 182 in 1990 to 108 in 1997.[133]

V. Addressing the causes of maternal mortality

The vast majority of maternal deaths are preventable.[134] The Swedish model demonstrates that it is possible and "perfectly realistic" to reduce the MMR by "over 50% in well less than ten years."[135] It is also possible to do so without access to modern technology and major financial resources, although education of midwives requires financial investment on the part of the government.[136] In fact, lack of financial resources for technology does not explain the high MMRs in poor and developing countries, given that "three out of four poor countries today have MMRs that are higher than those of Sweden a century earlier, i.e. before caesarean section, blood transfusion or antibiotics, and at a time when nearly all deliveries took place at home."[137]

The vast majority of maternal deaths are preventable.

Preventing and treating the complications that can arise during childbirth are the necessary components of any coherent plan to decrease maternal mortality. The systematic implementation of the necessary interventions proven to decrease maternal mortality has resulted in decreased maternal mortality worldwide. These interventions are prenatal care, skilled birth attendants, adequately equipped birthing facilities, and health care delivery system infrastructure, such as education and transportation. Any one of these interventions leads to a decrease in maternal mortality, and while countries should commit to providing all of them, they should not view reducing maternal mortality as insurmountable given the resource investments they require. For

[128] Van Lerberghe & De Brouwere, *supra* note 39, at 22.
[129] *Id.*
[130] *Id.*
[131] *Id.*
[132] *See* Prata et al., *supra* note 127, at 317.
[133] *Id.*
[134] WHO, REDUCTION OF MATERNAL MORTALITY, *supra* note 88, at 1.
[135] Van Lerberghe & De Brouwere, *supra* note 39, at 28.
[136] The cost of educating midwives varies from country to country and depends on how much education covers, such as tuition or tuition, room, and board, and how long the education lasts. Tuition is less than $2,000 per year in several countries. Howard Friedman, UNFPA, How much does it cost to educate midwives?, http://www.unfpa.org/sowmy/resources/docs/background_papers/21_FriedmanH_EducationCosts.PDF. Capital costs include construction of facilities and purchase of equipment, while recurrent costs include facility costs, student costs, and staff costs. *Id.* Start-up costs for a school for nurses and midwives range from $300,000 to $2 million. *Id.*
[137] Van Lerberghe & De Brouwere, *supra* note 39, at 8. *See also id.* at 10–11 ("The North European success story is all the more impressive since it was achieved before modern hospital technology, transfusions, caesarean sections, or antibiotics became available, and, in the case of Sweden, in a poor rural country with a dispersed population.").

example, the provision of prenatal care services and skilled birth attendants, which are relatively inexpensive, can do a lot to reduce the MMR. A country can provide these services while it does not have a full medical infrastructure in place, and when it is able to create a full medical infrastructure, then technology can reduce the MMR even further.

A. Prenatal care

It is most important that a pregnant woman and her family understand the physical needs she will have for adequate nutrition and rest during pregnancy,[138] as well as learn the danger signs that require her to seek care.[139] Prenatal care for the woman and her family provides an opportunity to educate them about the importance of adequate food intake, adequate relief from heavy work, and adequate emotional support that the family will need to provide.[140] Prenatal care provides an opportunity to monitor and intervene in situations of anemia, malnutrition, infection, premature labor, pre-eclampsia, and other conditions that threaten the life of the mother and her unborn child.[141] Prenatal care also provides the critically important function of educating the mother and family about how to access the health care system at the time of delivery, so that plans can be made for the mother to avail herself of skilled birth attendants and adequate delivery facilities when she needs them.[142] Women are more likely to use a skilled birth attendant during childbirth if they have had had at least one prenatal care visit.[143]

Prenatal care for the woman and her family provides an opportunity to educate them about the importance of adequate food intake, adequate relief from heavy work, and adequate emotional support that the family will need to provide.

B. Skilled birth attendants

A pregnant woman in labor needs to be in a situation where the progress of her labor can be monitored by someone capable of intervening in a timely fashion. This is the role of the skilled birth attendant. According to UNFPA, "[s]killed birth attendants are trained to recognize problems early, when the situation can still be controlled, to intervene and manage the complication, or to stabilize the condition and refer the patient to a higher level of care, if needed."[144] A minimally equipped skilled birth attendant can do a lot to prevent death in

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[138] *See* Ornella Lincetto et al., *Antenatal Care*, *in* THE PARTNERSHIP FOR MATERNAL, NEWBORN AND CHILD HEALTH, OPPORTUNITIES FOR AFRICA'S NEWBORNS 57 (2006), *available at* http://www.who.int/pmnch/media/publications/aonsectionIII_2.pdf.

[139] *See id.* at 53; WHO, BIRTH AND EMERGENCY PREPAREDNESS IN ANTENATAL CARE 2 (2006), *available at* http://www.who.int/reproductivehealth/publications/maternal_perinatal_health/emergency_preparedness_antenatal_care.pdf.

[140] *See* Lincetto et al., *supra* note 138, at 53.

[141] *See id.* at 51, 53, 56.

[142] *See id.* at 57. *See also* Mesay Hailu et al., *Birth Preparedness and Complication Readiness among Pregnant Women in Southern Ethiopia*, 6 PLOS ONE 1 (2011); Allisyn C. Moran et al., *Birth-Preparedness for Maternal Health: Findings from Koupéla District, Burkina Faso*, 24 J. HEALTH POP. NUTR. 489 (2006).

[143] *See* Lincetto et al., *supra* note 138, at 53.

[144] UNFPA, Skilled attendance at birth, http://www.unfpa.org/public/mothers/pid/4383 (last visited Nov. 29, 2012).

childbirth, even without medical technology.[145] The skilled birth attendant can track the progress of the labor and know how to intervene to increase the strength of contractions in a manner safe for the mother and the baby.[146] She can provide labor support, including the encouragement of rest and rehydration, possible positional changes, and possible drainage of the bladder.[147] She also provides management of the placenta, assuring its removal, and massages the uterus, all of which aid in reduction of blood loss.[148] Adequately trained skilled birth attendants can also recognize when to call for help and get the mother to help in a timely fashion.[149] The skilled birth attendant is trained to avoid the situations which lead to hemorrhage, infection, and obstructed labor, and can intervene to facilitate delivery as needed. Skilled birth attendants are distinct from traditional birth attendants; skilled birth attendants have certain competencies: a "combination of knowledge, skills, attitude, and professional behavior."[150]

Although figures differ, there is clear consensus that skilled birth attendants are a critical component of decreasing the MMR.[151] According to UNFPA, for every 1,000 births in a year, six midwives are needed to achieve 95 percent coverage.[152] UNFPA estimates that providing skilled birth attendants to all women, with back-up emergency obstetric care, could reduce maternal mortality by 75 percent.[153] Another source states that the provision of just one additional midwife could save the lives of 219 women.[154] Skilled attendance at birth has been shown to correlate to lower MMRs,[155] and a 2010 *Lancet* study attributes the decline in the MMR in part to an increase in attendance by skilled personnel at birth.[156] For example, in Indonesia, the government introduced a "midwife in every village" program, and the percentage of births attended by trained personnel doubled to 73 percent from the 1994 rate and the MMR has been reduced by half since 1989.[157] In Egypt, the

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[145] Wendy J. Graham, Jacqueline S. Bell, & Colin H.W. Bullough, *Can skilled attendance at delivery reduce maternal mortality in developing countries ?*, Box 2, *in* SAFE MOTHERHOOD STRATEGIES: A REVIEW OF THE EVIDENCE 7, 8 (Wim Van Lerberghe & Vincent De Brouwere eds., 2001).
[146] *Id.*
[147] *Id.*
[148] *Id.*
[149] *Id.*
[150] UNFPA, THE STATE OF THE WORLD'S MIDWIFERY 2011: DELIVERING HEALTH, SAVING LIVES 4 (2011), *available at* http://www.unfpa.org/sowmy/resources/docs/main_report/en_SOWMR_Full.pdf [hereinafter UNFPA, MIDWIFERY 2011].
[151] *See, e.g., id.* at 27 ("Professionalisation of delivery care is the key."); UNFPA, Skilled attendance at birth, *supra* note 144.
[152] UNFPA, MIDWIFERY 2011, *supra* note 150, at 17.
[153] UNFPA, NO WOMAN SHOULD DIE GIVING LIFE, FACTS AND FIGURES 3, *available at* http://www.unfpa.org/webdav/site/global/shared/safemotherhood/factsheet3_eng.pdf.
[154] Open Ideo, How might we improve maternal health with mobile technologies for low-income countries?, http://www.openideo.com/open/maternal-health/brief.html (last visited Nov. 29, 2012).
[155] *See, e.g.*, UN WOMEN, 2011-12 PROGRESS OF THE WORLD'S WOMEN: IN PURSUIT OF JUSTICE, *available at* http://progress.unwomen.org/pdfs/EN-Report-Progress.pdf.
[156] Hogan et al., *supra* note 40, at 1619.
[157] *Id.* at 113.

MMR was reduced by 52 percent between 1992-93 and 2000, and during the same time frame the number of births attended by skilled birth attendants increased by 50 percent.[158] A survey of 58 countries where 91 percent of maternal deaths occur shows that less than 17 percent of the world's midwives are available in those countries.[159]

C. Medical technology and adequately equipped birthing facilities

Medical technology and specialized medical services are also critical because the provision of skilled birth attendants can only work to a certain extent to reduce maternal mortality. For example, in Chile, once the MMR decreased to between 40 and 50 referral to specialized medical services was necessary to reduce the MMR further.[160] The availability of modern medical technology also works in conjunction with the availability of skilled birth attendants to reduce the MMR. In the United States, for example, the introduction in the 1930s of sulfa drugs in the hospital delivery room prevented the spread of infection; the delivery room had been a dangerous place to give birth.[161]

Adequately equipped birthing facilities must be available but need not be extravagant; they must include at the very minimum the essential medications needed to treat the four major lethal complications. For hemorrhage, the facility must have available oxytocin by intravenous (IV) or intramuscular (IM) administration, and also IV fluid for resuscitation of the hemorrhaging woman.[162] For infection, the facility must have an appropriate range of antibiotics to treat the most common causes of obstetrical infection.[163] For pre-eclampsia, the facility must have IV magnesium sulfate, and oxytocin for induction of labor.[164] For obstructed labor, the facility must have vacuum, forceps, and capacity for Caesarean section.[165]

Adequately equipped birthing facilities must be available but need not be extravagant; they must include at the very minimum the essential medications needed to treat the four major lethal complications.

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[158] Oona Campbell et al., *National maternal mortality ratio in Egypt halved between 1992-93 and 2000*, 83 BULL. WORLD HEALTH ORG. 462, 467 (2005). The improvement in the MMR was also due to higher standards of care, the strengthening of health facilities, better prenatal care, and increased education and socioeconomic status. *Id.* at 467–68.

[159] UNFPA, MIDWIFERY 2011, *supra* note 150, at x.

[160] Elard Koch et al., *Women's Education Level, Maternal Health Facilities, Abortion Legislation and Maternal Deaths: A Natural Experiment in Chile from 1957 to 2007*, 7 PLOS ONE 1 (May 2012), *available at* http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0036613.

[161] Melissa A. Thomasson & Jaret Treber, *From Home to Hospital: The Evolution of Childbirth in the United States, 1927-1940*, NBER Working Paper Series 1, 4 (2004).

[162] *See, e.g.*, WHO, RECOMMENDATIONS FOR THE PREVENTION OF POSTPARTUM HAEMORRHAGE (2007), *available at* http://whqlibdoc.who.int/hq/2007/WHO_MPS_07.06_eng.pdf; V.D. Tsu & P.S. Coffey, *New and underutilised technologies to reduce maternal mortality and morbidity: what progress have we made since Bellagio 2003?*, 116 BJOG 247, 248–49 (2008).

[163] *See, e.g.*, WHO, MANAGING COMPLICATIONS, *supra* note 67, at S-25, S-32, S-33, S-64, S-95, S-101, S-110. *See also* J. Hussein & J. A. Fortney, *Puerperal sepsis and maternal mortality: what role can new technologies play?*, 85 INT'L J. GYNECOL. & OBSTET. S52 (2004).

[164] *See, e.g.*, WHO, PRE-ECLAMPSIA RECOMMENDATIONS, *supra* note 76, at 2, 20; Tsu & Coffey, *supra* note 162, at 249–50.

[165] *See, e.g.*, WHO, MANAGING COMPLICATIONS, *supra* note 67, at P-27–P-52; Tsu & Coffey, *supra* note 162, at 250–51.

D. Health care delivery system infrastructure

1. Education

Any coherent program designed to address maternal mortality must be able to interface the patient with the health care delivery system. In order for this interface to function, the woman and her family must have the educational level to understand the need and benefit of prenatal care, and to understand how to access the health care delivery system. Women's educational level is highly correlated with the MMR.[166] An increase in maternal educational attainment contributed to the global decline in maternal mortality, according to a 2010 *Lancet* study.[167] One study found that "women with no education had 2.7 times and those with between one and six years of education had twice the risk of maternal mortality of women with more than 12 years of education."[168]

An increase in maternal educational attainment contributed to the global decline in maternal mortality, according to a 2010 *Lancet* study.

The education a woman has represents both the opportunities she has had and the opportunities she will have in the future; it also "promotes increasing autonomy, awareness, responsibility and knowledge for self-care, healthy lifestyles and behaviours."[169] An educated woman therefore will have the ability to access the appropriate maternal and reproductive health services and understand the information provided to her, thereby reducing her likelihood of maternal death.[170] More educated women are more likely to ask questions about their health care and be listened to by health workers.[171] Educated women also are likely to have more self-esteem and thus are more empowered to make appropriate health decisions.[172] This affirms the central role of education in combating maternal mortality.[173] For example, in South and West Asia, only ten percent of women with a secondary education gave birth without having received prenatal care, while approximately half of women with no education did so.[174] In Burkina Faso, women with no education are half as likely as women with a primary education and a quarter as likely as women with a secondary education to have the assistance of a skilled birth attendant during childbirth.[175]

Another important aspect of education in combating maternal mortality is that more educated

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[166] Koch et al., *supra* note 160, at 12.
[167] Hogan et al., *supra* note 40, at 1619.
[168] *See* Saffron Karlsen et al., *The relationship between maternal education and mortality among women giving birth in health care institutions: Analysis of the cross sectional WHO Global Survey on Maternal and Perinatal Health*, 11 BMC PUB. HEALTH 606 (2011).
[169] Koch et al., *supra* note 160, at 13.
[170] *Id.*; Karlsen et al., *supra* note 168.
[171] Karlsen et al., *supra* note 168.
[172] *Id.*
[173] *See, e.g.*, Chryssa McAlister & Thomas F. Baskett, *Female education and maternal mortality: a worldwide survey*, 28 J. OBSTETR. GYNAECOL. CAN. 983 (2006).
[174] EDUC. FOR ALL, GLOBAL MONITORING REPORT 2010: REACHING THE MARGINALIZED 47 (2010).
[175] *Id.*

women delay and space their pregnancies, which allows them to maintain their health.[176] Paradoxically, however, the more education a woman has, the likelier she is to delay marriage and childbearing for work opportunities, which in turn may "increase complications and maternal deaths for pre-existing chronic conditions or problems such as gestational diabetes or hypertension."[177] This "fertility paradox" highlights the dangers of childbearing at an advanced age.[178]

2. Transportation

Transportation issues also affect the ability of the woman to access health care facilities in a timely fashion.[179] These include lack of money to pay for transportation to an obstetric specialist hospital, roads that are unpaved or are made unpredictable by weather, the absence of roads, and public transportation that does not operate at all hours.[180] Women will often travel by bicycle or on foot for an hour to reach the closest health clinic.[181] In one region in Uganda, most maternal deaths occur because women cannot afford transportation to the health center; the Gates Foundation had phased out a transportation project in 2010.[182] Meanwhile, transportation barriers in the mountainous regions of Peru have been successfully overcome by provision of housing near birth facilities that can be utilized by the woman and her family near the woman's due date; both the housing and the birth facilities are designed to mimic the typical indigenous home so that women will choose to utilize the birth services.[183] As of 2008, no maternal deaths had occurred in the region since 2005 due to the birth facilities and the increased rate of skilled attendance at birth.[184]

Women will often travel by bicycle or on foot for an hour to reach the closest health clinic.

[176] *See, e.g.*, UNFPA, Empowering Women Through Education, http://www.unfpa.org/gender/empowerment2.htm (last visited Nov. 29, 2012); EDUC. FOR ALL, *supra* note 174, at 47.
[177] Koch et al., *supra* note 160, at 10.
[178] *See* Karlsen et al., *supra* note 168.
[179] *See, e.g.*, Justine I. Blanford et al., *It's a long, long walk: accessibility to hospitals, maternity and integrated health centers in Niger*, 11 INT'L J. HEALTH GEOGRAPHICS 24 (2012); Michael Poku-Boansi, Ellis Ekekpe, & Agatha Akua Bonney, *Combating Maternal Mortality in the Gushegu District of Ghana: The Role of Rural Transportation*, 12 J. SUSTAINABLE DEV. AFR. 274 (2010), Hildah Essendi, Samuel Mills, & Jean-Christophe Fotso, *Barriers to Formal Emergency Obstetric Care Services' Utilization*, 88 J. URBAN HEALTH S356 (2010); Thomas Schmid et al., *Transportation for Maternal Emergencies in Tanzania: Empowering Communities Through Participatory Problem Solving*, 91 AM. J. PUB. HEALTH 1589 (2001); Chris Saunders, TransAid, *Transport and Maternal Health in Rural Africa*, *available at* http://www.ifrtd.org/new/issues/22may08_transaid.pdf.
[180] Essendi et al., *supra* note 179, at S362.
[181] *See* Poku-Boansi et al., *supra* note 179, at 278.
[182] Tom Gwebayanga, *Mother delivers triplets by her own*, ALLAFRICA.COM, Oct. 18, 2011, *available at* http://allafrica.com/stories/201210181476.html?viewall=1.
[183] Barbara Fraser, *Peru makes progress on maternal health*, 371 LANCET 1233, 1233 (2008).
[184] *Id.*

E. Abortion and contraception

1. Misguided emphases in efforts to decrease maternal mortality

Calls for countries to implement measures to reduce maternal mortality are vigorous.[185] The Committee on Economic, Social, and Cultural Rights, the treaty-monitoring body charged with monitoring implementation of the International Covenant on Economic, Social, and Cultural Rights[186] and issuing non-binding recommendations to States,[187] has found that "the failure to reduce infant and maternal mortality rates" violates a country's "obligation to fulfil,"[188] which "requires States to adopt appropriate legislative, administrative, budgetary, judicial, promotional and other measures towards the full realization of the right to health."[189] Many international agencies,[190] NGOs,[191] and treaty-monitoring bodies (TMBs), such as the CEDAW Committee,[192]

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[185] *See, e.g.*, CEDAW Committee, *Concluding Observations: Liberia*, U.N. Doc. CEDAW/C/LBR/CO/6, ¶ 37 (Aug. 7, 2009) ("[The Committee] urges the State party to make every effort to raise awareness of and increase women's access to health-care facilities, medical assistance by trained personnel, particularly in the areas of birth attendance and post-natal care, especially in rural areas. The Committee recommends that the State party step up its efforts to reduce the incidence of maternal mortality [. . .]."); CEDAW Committee, *Report of the Committee on the Elimination of Discrimination against Women, Concluding Observations: Burundi*, ¶¶ 61–62, U.N. Doc. A/56/38 (2001) ("The Committee recommends that the State party make every effort to increase access to health-care facilities and medical assistance by trained personnel in all areas, including rural areas, so as to increase, in particular, the number of births assisted by qualified personnel.").

[186] International Covenant on Economic, Social and Cultural Rights, *opened for signature* Dec. 19, 1966, 993 U.N.T.S. 3.

[187] CTR. FOR REPROD. RTS., GAINING GROUND: A TOOL FOR ADVANCING REPRODUCTIVE RIGHTS LAW REFORM 17 (2007), *available at* http://reproductiverights.org/sites/default/files/documents/pub_bo_GG_advocacy.pdf; OFFICE OF THE U.N. HIGH COMM'R FOR HUM. RTS., THE UNITED NATIONS HUMAN RIGHTS TREATY SYSTEM: AN INTRODUCTION TO THE CORE HUMAN RIGHTS TREATIES AND THE TREATY BODIES, *available at* http://www.ohchr.org/Documents/Publications/FactSheet30en.pdf.

[188] Committee on Economic, Social and Cultural Rights, *General comment No. 14: The right to the highest attainable standard of health (art. 12)*, ¶ 52, *in Compilation of General Comments and General Recommendations Adopted by Human Rights Treaty Bodies*, at 91, U.N. Doc. HRI/GEN/1/Rev.9 (Vol. II) (May 27, 2008). The Committee also states that a "major goal" of States in eliminating discrimination against women "should be reducing women's health risks, particularly lowering rates of maternal mortality." *Id.* at ¶ 21.

[189] *Id.* at ¶ 33.

[190] *See, e.g.*, WHO, Maternal Mortality, Fact Sheet No. 348, May 2012, http://www.who.int/mediacentre/factsheets/fs348/en/index.html (last visited Nov. 29, 2012); UNFPA, Safe Motherhood: Stepping Up Efforts to Save Mothers' Lives, http://www.unfpa.org/public/mothers (last visited Nov. 29, 2012); UNFPA, Facts about Safe Motherhood, http://web.unfpa.org/mothers/facts.htm (last visited Nov. 29, 2012).

[191] *See, e.g.*, BARBARA B. CRANE & CHARLOTTE E. HORD SMITH, IPAS, ACCESS TO SAFE ABORTION: AN ESSENTIAL STRATEGY FOR ACHIEVING THE MILLENNIUM DEVELOPMENT GOALS TO IMPROVE MATERNAL HEALTH, PROMOTE GENDER EQUALITY, AND REDUCE POVERTY, *available at* http://www.unmillenniumproject.org/documents/Crane_and_Hord-Smith-final.pdf. *See also* notes 198–200 *infra*.

[192] CEDAW Committee, *Concluding Observations: Zambia*, U.N. Doc. CEDAW/C/ZMB/CO/5-6, ¶ 33 (Sept. 19, 2011) ("The Committee is especially concerned about the high rates of maternal mortality and morbidity, related in particular to maternal deaths and disabilities resulting from unsafe abortions, in spite of abortion laws that do not prohibit women from seeking safe abortions at health centres[.]"); CEDAW Committee, *Concluding Observations: Nepal*, U.N. Doc. CEDAW/C/NPL/CO/4-5, ¶ 31 (Aug. 11, 2011) ("The Committee welcomes the Aama programme for free delivery services and the decrease in the maternal mortality rate. However, it is deeply concerned about [. . .] the high rate of unsafe abortion, in particular for women living in poverty, women from rural villages and women from marginalized communities within urban areas, in spite of the legalization of abortion in 2002; [and] the lack of access to family planning and the unmet need for contraception, in particular among rural women, adolescents, poor women and women with disabilities[.]"); CEDAW Committee, *Concluding Observations:*

which monitors implementation of the Convention on the Elimination of All Forms of Discrimination against Women,[193] and the Human Rights Committee,[194] which monitors implementation of the International Covenant on Civil and Political Rights,[195] argue that contraception and safe abortion services are necessary to decrease the number of maternal deaths. The Safe Motherhood Initiative, which brought the issue of maternal mortality to the forefront of global health policy discussions, was closely tied to a call for safe, legal abortion services as a component of reducing maternal mortality.[196] The Women Deliver conference promotes abortion as one solution to maternal mortality.[197] The NGOs involved in the IAG for Safe Motherhood—IPPF,[198] the Population Council,[199] and Family Care International[200]—have

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Rwanda, U.N. Doc. CEDAW/C/RWA/CO/6, ¶ 35 (Feb. 10, 2009) ("Taking account of the fact that illegal and unsafe abortions are a cause of maternal mortality, the Committee is concerned that abortion is a punishable offence under Rwandan law."); CEDAW Committee, *Concluding Observations: Honduras*, U.N. Doc. CEDAW/C/HON/CO/6, ¶ 24 (Aug. 10, 2007) ("The Committee also urges the State party to provide women with access to quality services for the management of complications arising from unsafe abortions and to reduce women's maternal mortality rates."); CEDAW Committee, *Concluding Observations: Pakistan*, U.N. Doc. CEDAW/C/PAK/CO/3, ¶ 41 (June 11, 2007) ("Clandestine abortions being a major cause of maternal mortality, the Committee is deeply concerned that abortion is a punishable offence under Pakistani law, which may lead women to seek unsafe, illegal abortions, with consequent risks to their life and health."); CEDAW Committee, *Concluding Observations: Chile*, U.N. Doc. CEDAW/C/CHI/CO/4, ¶ 19 (Aug. 25, 2006) ("The Committee expresses its concern about the inadequate recognition and protection of the reproductive health and rights of women in Chile. It remains concerned that abortion under all circumstances is a punishable offence under Chilean law, which may lead women to seek unsafe, illegal abortions, with consequent risks to their life and health, and that clandestine abortions are a major cause of maternal mortality."); CEDAW Committee, *Concluding Observations: Mali*, U.N. Doc. CEDAW/C/MLI/CO/5, ¶ 34 (Feb. 3, 2006) ("[T]he Committee is concerned about the high maternal and infant mortality and morbidity, resulting from, inter alia, [. . .] unsafe abortions."); CEDAW Committee, *Report of the Committee on the Elimination of Discrimination against Women*, *Concluding Observations: Colombia*, ¶ 393, U.N. Doc. A/54/38 (May 4, 1999) ("The Committee notes with great concern that abortion, which is the second cause of maternal deaths in Colombia, is punishable as an illegal act. No exceptions are made to that prohibition, including where the mother's life is in danger or to safeguard her physical or mental health or in cases where the mother has been raped. [. . .] The Committee believes that legal provisions on abortion constitute a violation of the rights of women to health and life and of article 12 of the Convention."). The CEDAW Committee also found Brazil in violation of CEDAW due to the death of a woman who experienced complications in pregnancy. *See* CEDAW Committee, Communication No. 17/2008, U.N. Doc. CEDAW/C/49/D/17/2008 (Aug. 10, 2011).

[193] Convention on the Elimination of All Forms of Discrimination against Women, *opened for signature* Dec. 18. 1979, 1249 U.N.T.S. 13.

[194] *See, e.g.*, Human Rights Committee, *Concluding Observations: Paraguay*, U.N. Doc. CCPR/C/PRY/CO/2, ¶ 10 (Apr. 24, 2006) ("The State party should take effective action to reduce infant and maternal mortality by [. . .] ensuring that contraceptives are available to the general public, especially in rural areas."); Human Rights Committee, *Concluding Observations: Hungary*, U.N. Doc. CCPR/CO/74/HUN, ¶ 11 (Apr. 19, 2002) ("The State party should take steps to protect women's life and health, through more effective family planning and contraception (art. 6)."); Human Rights Committee, *Concluding Observations: Colombia*, U.N. Doc. CCPR/C/79/Add.75, ¶ 37 (May 5, 1997) ("In this regard, priority should be given to protecting women's right to life by effective measures against violence and by access to safe contraception.").

[195] International Covenant on Civil and Political Rights, *opened for signature* Dec. 19, 1966, 999 U.N.T.S. 171.

[196] *See, e.g.*, T.K. Sundari Ravindran & Marge Berer, *Preventing Maternal Mortality: Evidence, Resources, Leadership, Action*, *in* SAFE MOTHERHOOD INITIATIVE: CRITICAL ISSUES 5 (Marge Berer & T.K. Sundari Ravindran eds., 2000), *available at* http://www.rhmjournal.org.uk/publications/SafeMotherhood.pdf.

[197] *See* Women Deliver, *supra* note 34.

[198] *See* Int'l Planned Parenthood Fed'n, What We Do: Abortion, http://www.ippf.org/en/What-we-do/Abortion/ (last visited Nov. 29, 2012).

[199] *See* Population Council, Safe abortion and postabortion care, http://www.popcouncil.org/topics/safeaborpac.asp (last visited Nov. 29, 2012).

[200] *See* Fam. Care Int'l, Maternal Health, http://www.familycareintl.org/en/issues/26 (last visited Nov. 29, 2012).

promoted the provision of abortion services as a solution to maternal mortality. The WHO, in its periodic report on the incidence of unsafe abortion, calls for "safe abortion" and contraception as a component of reducing maternal mortality.[201]

The call for abortion in countries with high MMRs does not address the reality that the high MMR is due in large part to the poor medical infrastructures in those countries, which are not capable of providing safe abortion services. The WHO has explained that "[u]nsafe abortions are characterized by the lack or inadequacy of skills of the provider, hazardous techniques and unsanitary facilities."[202] 98 percent of unsafe abortions occur in developing countries and 56 percent of abortions in developing countries are unsafe.[203] Likewise, the MMR in the developing world was 240 in 2010, while it was only 16 in the developed world.[204] In the developing world, basic medical infrastructure is lacking: only 35 percent of rural women in Africa and Asia and 60 percent of rural women in Latin America have access to health care facilities.[205] Countries with high MMRs do not have the medical capacity to deal with complications from bleeding and infection, two causes of maternal mortality, and there is a lack of trained medical professionals to provide basic health care services.[206] Further, countries that cannot even provide an antiseptic environment for basic health care cannot provide safe abortion services. Abortion is often performed surgically,[207] and in countries where surgery is already poorly performed, abortion procedures will result in complications.[208] Childbirth, on

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[201] WHO, UNSAFE ABORTION: GLOBAL AND REGIONAL ESTIMATES OF THE INCIDENCE OF UNSAFE ABORTION AND ASSOCIATED MORTALITY IN 2008 31 (6th ed. 2011), *available at* http://whqlibdoc.who.int/publications/2011/9789241501118_eng.pdf [hereinafter WHO, UNSAFE ABORTION].

[202] WHO, THE PREVENTION AND MANAGEMENT OF UNSAFE ABORTION: REPORT OF A TECHNICAL WORKING GROUP 3 (1992), *available at* http://whqlibdoc.who.int/hq/1992/WHO_MSM_92.5.pdf.

[203] Guttmacher Inst., Facts on Induced Abortions Worldwide, Jan. 2012, http://www.guttmacher.org/pubs/fb_IAW.html.

[204] WHO, TRENDS 2010, *supra* note 7, at 22.

[205] *See, e.g.*, WHO, UNSAFE ABORTION, *supra* note 201, at 7.

[206] *See, e.g.*, WHO, Achieving the health-related MDGs, It takes a workforce!, http://www.who.int/hrh/workforce_mdgs/en/index.html (last visited Nov. 29, 2012); Karlsen et al., *supra* note 168, at 607 ("It is maintained that a key stumbling block [to reducing maternal mortality] is the inability to establish and maintain robust health systems with appropriate obstetric facilities where they are most needed .").

[207] *See* S. Balakrishnan, WHO, Surgical methods for first trimester termination of pregnancy, http://apps.who.int/rhl/fertility/abortion/CD002900_Blakrishnans_com/en/index.html (last visited Nov. 29, 2012); L. Cheng, WHO, Surgical versus medical methods for second-trimester induced abortion, http://apps.who.int/rhl/fertility/abortion/CD006714_chengl_com/en/index.html (last visited Nov. 29, 2012) ("[S]pecialized training and consistent practice are needed to perform [dilation and evacuation] safely [. . .]."); WHO, SAFE ABORTION: TECHNICAL AND POLICY GUIDANCE FOR HEALTH SYSTEMS 40–42 (2012), *available at* http://apps.who.int/iris/bitstream/10665/70914/1/9789241548434_eng.pdf.

[208] "Unsafe abortion" occurs when, according to the WHO, "a procedure for terminating an unintended pregnancy [is] carried out either by persons lacking the necessary skills or in an environment that does not conform to minimal medical standards, or both." WHO, UNSAFE ABORTION, *supra* note 201, at 2. Unhygienic conditions cause problems, and "the lack of immediate intervention if severe bleeding or other emergency develops during the procedure" is a further complication. *Id.* Thus, countries that cannot address these occurrences in other settings are unlikely to be able to provide "safe" abortions.

the other hand, does not require surgery for the most part, and thus maternal mortality can be reduced in countries where surgery is dangerous. Even if abortion is legalized, it does not become safe as a result of legalization.[209] Only through provision of conditions for care in childbirth is it possible to provide the more advanced health care structures necessary to ensure that women do not also die from abortion.

Calls for increased access to contraceptives likewise do not address the situations of women who are already pregnant or want to have children and deserve high quality maternal health care. The provision of contraceptives and abortion is appropriate only if the goal is to prevent pregnancy and childbirth, not to protect mother and baby throughout pregnancy and childbirth.

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Significant reductions in the MMR in developed nations took place before the legalization and wide availability of contraception and abortion, indicating that they are not necessary components for MMR reduction. For example, in the United States, the Supreme Court found that the right to privacy included abortion in 1973[210] and possession of contraception for married individuals in 1965[211] and unmarried individuals in 1972.[212] However, the MMR dropped sharply in the United States and the rest of the industrialized world before abortion and contraception were declared constitutional rights and became more available.[213] Despite the wide availability of contraception and abortion in the United States, the MMR has increased recently, rising from 12 in 1980 to 21 in 2010.[214] Chile provides a modern example of a country that has not needed the provision of abortion to reduce its MMR drastically.

2. Chile

The example of Chile demonstrates that abortion services are not necessary either to decrease the MMR or to achieve a low MMR, as Chile reduced its MMR after abortion was illegalized.[215] The MMR in Chile, where abortion continues to be illegal, is the lowest in Latin America,[216] at 18.2[217] to 25.[218] Since 1990, the MMR has decreased by a yearly rate of 4.3 percent, going from

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[209] *See* Susan A. Cohen, *Facts and Consequences: Legality, Incidence and Safety of Abortion Worldwide*, GUTTMACHER POL'Y REV. (2009), *available at* http://www.guttmacher.org/pubs/gpr/12/4/gpr120402.html.
[210] *See* Roe v. Wade, 410 U.S. 113 (1973).
[211] *See* Griswold v. Connecticut, 381 U.S. 479 (1965).
[212] *See* Eisenstadt v. Baird, 405 U.S. 438 (1972).
[213] *See* Van Lerberghe & De Brouwere, *supra* note 39, at 15; Loudon, *supra* note 101, Figures 2 & 4.
[214] *See* WHO, TRENDS 2010, *supra* note 7, at 45.
[215] Koch et al., *supra* note 160. *See also* Elard Koch, *Decriminalization of abortion for medical reasons*, Testimony before the Commission on Health, Senate of Chile (Aug. 16, 2011), *available at* http://www.scribd.com/nlafferriere/d/63446440-Aborto-y-mortalidad-materna-en-Chile-Presentacion-del-Dr-Koch-ante-Senado-2011 [hereinafter Koch, Senate Testimony].
[216] Koch et al, *supra* note 160, at 2.
[217] *Id.* at 3.
[218] WHO, TRENDS 2010, *supra* note 7, at 32.

56 in 1990 to 26 in 2008.[219] There was a therapeutic abortion law in Chile between 1931 and 1989,[220] and a 2012 study shows that there is no correlation between this law and a decrease in maternal mortality.[221] In fact, after the implementation of the therapeutic abortion law, the MMR rose to its highest ever in Chile by 1937, at 989.2, due to sepsis and hemorrhaging.[222] In 1937, a mother-child law that provided for prenatal care was implemented and the MMR decreased 72.6 percent, from 989.2 in 1937 to 270.7 in 1957.[223] The decline from 1957 and onwards was due to compulsory education laws, strengthening of maternal and infant health programs, provision of family planning, and water and sewer improvements.[224] Furthermore, skilled birth attendance increased from 60.8 percent of births in 1957 to more than 90 percent by 1980, and by 1999 over 99 percent of births occurred in hospitals or maternity centers.[225]

From 1990 to 2004, after restrictions on abortion in Chile were tightened, the MMR decreased from 42.1 to 18.5, a 56 percent decline in less than 15 years.[226] The largest proportional decrease in the MMR was in the poorest quintile.[227] During this time, Chile's economy grew and fewer people were living in poverty, leading to decreased maternal mortality.[228] The government also focused intensively on maternal and child health, introducing health measures such as free basic health care, including prenatal health care, social protection for the extreme poor, and reproductive health care, including sex education, family planning, sexually transmitted infection prevention and treatment, and prenatal and obstetric care.[229] All these measures helped to reduce the MMR even further after abortion became illegal again in Chile, indicating that the provision of abortion services is not necessary for MMR reduction.

Maternal mortality in Chile decreased as the economy grew and fewer people were living in poverty. The government also focused intensively on maternal and child health.

VI. Conclusion

The four main causes of death in childbirth are evident: hemorrhage, sepsis, hypertensive disorders, and obstructed labor. To reduce the MMR, certain strategies have proven effective in countries without requiring significant amounts of financial resources. Although historical solutions do not readily apply to medicine given that technology is always improving and new solutions emerge, history has shown what happens when countries prioritize the health of women. The MMR is reduced because resources are directed toward education, both of the general population and of midwives and other skilled birth attendants, as evidenced historically

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[219] Koch, Senate Testimony, *supra* note 215, at 28.
[220] *Id.* at 1.
[221] *See* Koch et al., *supra* note 160.
[222] Koch, Senate Testimony, *supra* note 215, at 3.
[223] *Id.* at 4.
[224] *Id.* at 6.
[225] Koch et al., *supra* note 160, at 12.
[226] Rogelio Gonzalez et al., *Tackling Health Inequities in Chile: Maternal, Newborn, Infant, and Child Mortality Between 1990 and 2004*, 99 AM. J. PUB. HEALTH 1220, 1221 (2009).
[227] *Id.* at 1223.
[228] *Id.*
[229] *Id.* at 1223–24.

in Sweden and currently in Chile. Childbirth can be safe if resources are directed toward educating people about the process and a woman's needs throughout pregnancy and childbirth, and about unsafe practices, such as delivery in a rural village with the presence of a local village woman who has not even washed her hands, as opposed to safe practices, such as delivery with a skilled birth attendant, or, even safer, delivery with a skilled *and* adequately equipped birth attendant. History shows that even in resource-poor areas this can help significantly and then can be further reduced when a full medical infrastructure is in place, with the ability to transfuse blood, give IV antibiotics, and perform a caesarean section.

The goal of providing available contraception and safe abortion should not divert funding from education and the establishment of an intact medical infrastructure. Women will always die from abortion in areas where childbirth is unsafe, and to save a woman from an abortion complication requires the same infrastructure as is required to save her from a childbirth complication. To make childbirth safe, childbirth must come first among global maternal health priorities.