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Postpartum Hemorrhage Today: Living in the Shadow of the Taj Mahal

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‘Women are not dying because of a disease we cannot treat. They are dying because societies have yet to make the decision that their lives are worth saving.’

Mahmoud F. Fathalla, *President of the International Federation of Gynecology and Obstetrics (FIGO), World Congress, Copenhagen, 1997*

INTRODUCTION

The wife of the Shah Jahan of India, the Empress Mumtaz, had 14 children and died after her last childbirth of a postpartum hemorrhage (PPH) in 1630. So great was the Shah Jahan’s love for his wife that he built the world’s most beautiful tomb in her memory – the Taj Mahal¹. Far away to the north another country was taking a different approach: in 1663, the Swedish Collegium Medicum was established. The Swedish clergy created an information system that by 1749 provided the first national vital statistics registry in Europe; by 1757, a national training was approved by Queen Eleonora of Sweden for midwives in all parishes. In the 1860s, parliament legislated that all Swedish parishes must have a midwife, and in the next three decades, maternal mortality fell abruptly. The resulting infrastructure – a comprehensive community midwifery system, with physician back-up expertise and an outcome reporting system – is today considered responsible for reducing the maternal mortality rate (MMR) in Sweden from 900 to 230 per 100,000 livebirths in the years between 1751 and 1900². It is noteworthy that an MMR of 230 per 100,000 livebirths was thus reached in an era before cesarean sections, blood transfusions and antibiotics existed. To this day, Sweden enjoys the lowest maternal mortalities in the world, and midwifery remains strong even though birthing care has long since moved to hospitals².

In 2012, each nation must decide whether it is going to build monuments to hardship and suffering or take the steps to avoid it. Three years remain until the target date of 2015, and it is already predicted that the Millennium Development Goal (MDG) number 5 to reduce maternal mortality by 75% will only be reached by few low resource countries. Maternal mortality is currently estimated, in three different studies^{3–5}, to be between 291,000 and 340,000 deaths per year, a number that translates into a global ratio of 200–250 maternal deaths per 100,000. Another way to characterize these deaths is to say that one woman dies every minute of every hour of every day. There needs to be a

5.5% decline in MMR to reach MDG 5, 2.6% for sub-Saharan Africa; however, the overall decline has been 3.1%. Only 13 developing countries will reach MDG 5 by 2015, nine countries of these will achieve both MDG 4 and 5³.

Most of the deaths and disabilities attributed to childbirth are avoidable, because the medical solutions are well known. Indeed, 99% of maternal deaths occur in developing countries that have an inadequate transport system, limited access to skilled care-givers and poor emergency obstetric services⁶. It is axiomatic that each and every mother and newborn require care that is close to where they live, respectful of their culture and provided by persons with enough skill to act immediately should an unpredictable complication occur. The challenges that remain internationally are not technological but strategic and organizational⁶.

PPH is the most common cause of maternal mortality and accounts for 35% of the maternal deaths worldwide. In some countries, it can be up to 55%. The optimal solution for the vast majority, if not all, of these tragedies is prevention, before the birth, by ensuring that women are sufficiently healthy to withstand PPH should it occur and by prevention and treatment of anemia. At the time of the birth, the systematic use of active management of the third stage of labor is promoted, a management strategy that unfortunately is dependent on circumstances and the availability of oxytocics. To their credit, the International Confederation of Midwives (ICM) as well as the International Federation of Gynecology and Obstetrics (FIGO) have engaged their membership in a worldwide campaign since 2003 to address this travesty.

POSTPARTUM HEMORRHAGE: WHEN, WHY AND WHERE

Postpartum hemorrhage definition

PPH has been defined as blood loss in excess of 500 ml in a vaginal birth and in excess of 1000 ml in a cesarean

delivery. For clinical purposes, any blood loss that has the potential to produce hemodynamic instability should be considered a PPH. Clinical estimates of blood loss are often inaccurate (see Chapter 9).

Primary postpartum hemorrhage

Primary (immediate) PPH occurs within the first 24 hours after delivery. Approximately 70% of immediate PPH cases are due to uterine atony. Atony of the uterus is defined as the failure of the uterus to contract adequately after the child is born.

Secondary postpartum hemorrhage

Secondary (late) PPH occurs between 24 hours after delivery of the infant and 6 weeks postpartum. Most late PPH is due to retained products of conception, infection, or both.

Etiology

It may be helpful to think of the causes of PPH in terms of the four 'T's:

- Tone: uterine atony, distended bladder
- Trauma: uterine, cervical, or vaginal injury
- Tissue: retained placenta or clots
- Thrombin: pre-existing or acquired coagulopathy.

The World Health Organization (WHO) has examined studies on PPH published between 1997 and 2002 in order to arrive at more precise definitions of PPH and its incidence⁷. Available resources – data from 50 countries, 116 studies and 155 unique data sets – were reported to be poor in quality. Definitions of PPH were lacking in 58% of the published studies and, in the population-based surveys of medium quality, the prevalence ranged from a low of 0.55% of deliveries in Qatar to a high of 17.5% in Honduras.

A systematic review of 120 data sets on the prevalence of PPH published in *Best Practice and Research* reported approximately 6.6% incidence of PPH and 1.86% of severe PPH⁸.

A recent nationwide study in the USA reported 2.9% of all deliveries to be complicated by PPH⁹. Very severe PPH was recently reported in a study covering all hospital births in the UK to be at 2.2/10,000 births⁷; it can be expected to be at least four times this level in low income countries.

One of the major problems plaguing the field is how to measure PPH with accuracy. Published data are scant, and an adequate and accurate gold-standard method is lacking. Clinical visual estimation of blood loss is not reliable¹⁰. As is often the case, necessity becomes the mother of invention. In the rural areas of Tanzania, the use of a 'kanga' has been adopted as a valid measurement tool¹¹. Convenient because it is produced and sold locally, the pre-cut kanga is a standard-sized rectangle (100 cm × 155 cm) of local cotton fabric. When three to four soaked kangas are

observed at a delivery, the trained traditional birth attendant (TBA) is entrusted to transfer patients to a health center.

Even when a good measurement methodology is in place, there is still difficulty in defining PPH simply as blood loss greater than 500 ml because it fails to take into account predisposing health factors that are reflected in such a definition. Since the quantity of blood loss is less often important than the actual effect that it has on the laboring woman, it has been suggested that the definition take into account any blood loss that causes a major physiological change, such as low blood pressure, which threatens the woman's life. These issues are discussed in greater detail in Chapter 11.

About 87% of maternal deaths in 2011 were equally distributed between Asia and sub-Saharan Africa⁵ but the risks are higher in Africa because it has a smaller population than Asia. For decades, sub-Saharan Africa has been the region with the highest MMR in the world, at over 500/100,000 livebirths. In this region, the numbers of births attended by skilled health personnel and life expectancy at birth strongly correlate with maternal mortality. As an example, the increased ability to measure maternal mortality in Afghanistan has revealed a heretofore suspected but unconfirmed reality. The Center for Disease Control and Prevention's retrospective cohort study of women of reproductive age in four selected districts in four provinces reported an astounding maternal mortality of 1900 per 100,000 live births¹². Another group of authors, working in the same country, described the reasons for such a high MMR ratio in the Province of Herat:

'. . . conditions for individual and community health often depend on the protection and promotion of human rights. The findings of this study identify a number of human rights factors that contribute to preventable maternal deaths in Herat Province. These include access to and quality of health services, adequate food, shelter, and clean water, and denial of individual freedoms such as freely entering into marriage, access to birth control methods and possibly control over the number and spacing of one's children.'¹³

Sixty per cent of all pregnancy-related maternal deaths occur during the postpartum period and one source suggests 45% of them occur in the first 24 h after delivery¹⁴.

Compared with the other four main causes of direct maternal deaths – hypertensive disease, obstructed or prolonged labor, unsafe abortion and severe infection – PPH is very swift to kill. It is also mostly unexpected and sudden. This means that in a setting where skilled birth attendance is increasing, and many births take place in health centers, the other causes can be effectively dealt with while PPH soon will stand out as a predominant cause of maternal death. Other deaths are easier to prevent through an effective referral system. In low resource settings, PPH needs extra attention in order to reduce MMR. The introduction of appropriate measures to manage PPH at non-hospital level (see Chapter 67) should be seen in this light.

The risk of dying from PPH depends not only on the amount and rate of blood loss, but also the health status of the woman¹⁵. Poverty, lifestyle, malnutrition and women's lack of decision-making power to control their own reproductive health are some of the broad issues that have unfortunately come to be accepted as inevitable and unchangeable. Despite policy statements by FIGO on task shifting^{16,17}, there are still many areas of the world where midwives, nurses and other trained health workers cannot use medications on their own volition to prevent and/or treat PPH. The insidious reality about having a PPH is that two-thirds of the women who experience it have no identifiable clinical risk factors such as multiple births or fibroids. In this regard PPH is a veritable equal-opportunity occurrence. However, it is not an equal-opportunity killer because it is the poor, malnourished, unhealthy woman who delivers away from medical care who will die from it, whereas those who are fortunate enough to deliver in a well-supplied and staffed medical facility most likely will survive three delays at the actual time of birth: delay in the decision to recognize a complication and seek help; delay in accessing transportation to reach a medical facility; and, finally, delay in receiving adequate and comprehensive care upon arrival.

Maternal death is closely linked to the access to family planning. A woman who has gone through many births is older, and in many countries often poor. She may also be living in a remote or under-served area. Since the uterus in a grand multiparous woman (usually defined as having gone through six births or more) is thinner and weaker, and this often is combined with anemia and malnutrition, a grand multiparous woman runs much higher risk of PPH, and thereby risk of maternal death in a low resource setting.

In many other countries, hemorrhage accounts for more than half of the maternal deaths, rather than the 33% of maternal mortality usually cited worldwide. For example, in Indonesia it has been reported at 43%, in the Philippines at 53% and in Guatemala at 53%⁶.

Within given countries, certain populations are also at increased risk. In Latin America, for example, the Pan American Health Organization (PAHO) has identified reasons why maternal mortality is higher among the indigenous populations:

- (1) The professional teams in charge of maternity care underrate or are ignorant of traditional cultural practices;
- (2) The health team and pregnant women often communicate poorly, a principal factor behind the low maternity coverage;
- (3) Public policies for consensus building and intercultural dialogue on maternal health are in conflict over objectives and goals and the allocation of resources¹⁸.

EXISTING EVIDENCE FOR PREVENTION OF HEMORRHAGE

See the FIGO guidelines on the prevention and treatment of PPH in low resource countries Appendix.

Active management of the third stage of labor¹⁹

Data support the routine use of active management of the third stage of labor (AMTSL) by all skilled birth attendants, regardless of where they practice; AMTSL reduces the incidence of PPH, the quantity of blood loss and the need for blood transfusion, and thus should be included in any program of intervention aimed at reducing death from PPH (see Chapters 14 and 15).

The usual components of AMTSL include¹⁹:

- (1) Administration of oxytocin (the preferred storage of oxytocin is refrigeration but it may be stored at temperatures up to 30°C for up to 3 months without significant loss of potency) or another uterotonic drug within 1 minute after birth of the infant. Alternatively, a combination of oxytocin 5 IU and ergometrine 0.5 mg per ampoule IM, or misoprostol 600 µg orally. Uterotonics require proper storage:
 - (a) Ergometrine or methylergometrine: 2–8°C and protect from light and from freezing;
 - (b) Misoprostol: in aluminum blister pack, room temperature, in a closed container;
 - (c) Oxytocin: 15–30°C, protect from freezing.
- (2) Controlled cord traction.
- (3) Uterine massage after delivery of the placenta.
- (4) Counseling on the adverse effects and contraindications of these drugs should be given.

Warning! Do not give ergometrine, methylergometrine, or syntometrine (because they contain ergot alkaloids) to women with heart disease, pre-eclampsia, eclampsia, or high blood pressure.

Misoprostol and the prevention of postpartum hemorrhage

The 18th Expert Committee on the Selection and Use of Essential Medicines met in March 2011, and approved the addition of misoprostol for the prevention of PPH to the WHO model list of essential medicines²⁰. It reported that misoprostol 600 µg orally can be used for the prevention of PPH where oxytocin is not available or cannot be safely used. Misoprostol should be administered by health care workers trained in its use during the third stage of labor, soon after birth of the infant, to reduce the occurrence of PPH²¹. The most common adverse effects are transient shivering and pyrexia. Education of women and birth attendants in the proper use of misoprostol is essential. Recent studies in Afghanistan and Nepal demonstrate that community-based distribution of misoprostol can

be successfully implemented under government health services in a low-resource setting, and, accompanied by education can be a safe, acceptable, feasible and effective way to prevent PPH^{22,23}.

The usual components of management of the third stage of labor with misoprostol include²¹:

- A single dose of 600 µg administered orally (data from two trials comparing misoprostol with placebo show that misoprostol 600 µg given orally reduces PPH with or without controlled cord traction or use of uterine massage)
- Controlled cord traction **only** when a skilled attendant is present at the birth
- Uterine massage after delivery of the placenta, as appropriate.

An even more promising alternative method to deal with PPH was undertaken in Indonesia, where 1811 women were offered counseling about the prevention of PPH and use of misoprostol by trained and supervised volunteers. This study demonstrated that misoprostol was safely used in a self-directed manner among study participants who had home deliveries in the intervention area.²⁴

A recent study, not yet published, has questioned the need for massage and control cord traction. It would appear that the oxytocic is the most important factor in AMTSL. However, teaching staff and patients about uterine massage has huge benefits in preventing unsuspected PPH especially in delivery units with inadequate staff.

Misoprostol is available in many countries (see Addendum A). There are, however, restrictions to its use in many countries resulting from the fear that it will be used as an abortifacient. Given the potential benefits of misoprostol to the major goal of the MDG 5 (maternal mortality), and the fact that WHO has added it to its list of 'essential medicines' there appears to be a role for FIGO, ICM and the research community in closing the gaps on research as well as the barriers to availability of this medication.

ONGOING INITIATIVES TO PREVENT POSTPARTUM HEMORRHAGE

Every childbearing woman is potentially at risk for PPH, but biological/physiological considerations are only a part of the picture. Broader issues suggest that health care workers should assume more of an attitude of service and responsibility in the larger public health issues, empowering women to seek help because the health care culture is acceptable to them. With respect to indigenous populations and minority groups forgotten or subjugated by a dominant culture, more sensitive approaches that respect pregnancy and birth as a social and cultural rather than a medical act and incorporating traditional practitioners, e.g. the 'partera' in Central America, into the health care team, are an important step forward. It is crucial that physicians,

midwives, and nurses work with communities and women's groups to bridge existing gaps in care.

An international group including the ICM, FIGO members, researchers and experts met in Ottawa, Canada, in August 2003 to craft the Ottawa Statement on prevention of PPH²⁵ and offer new options for its treatment. At the World Congress of FIGO in Chile in 2003, President Arnaldo Acosta announced that FIGO, in partnership with ICM, would launch an initiative that would promote AMTSL to prevent PPH and increase the knowledge of nurses, midwives and physicians in the medical and surgical treatment of PPH. Both FIGO and ICM collaborated with the Program for Appropriate Technology for Health (PATH) to conduct a project: Prevention of PPH Initiative (POPPHI), 2005–2010²⁶. The program has created tool kits and educational modules for implementation of the AMTSL. POPPHI provided small grants to countries for FIGO and ICM members to collaborate on scaling up the use of AMTSL. The results of this initiative are discussed in more detail in Chapter 15. These initiatives have been prompted in large part by the fact that past efforts have not decreased maternal mortality and morbidity substantially. PPH prevention and treatment procedures are well known and are proven to be scientifically beneficial but not readily available to health workers and pregnant women.

FIGO 2012 postpartum hemorrhage guideline for low resource countries²⁷ (see Appendix on PPH Guidelines)

Management of third-stage labor should be offered to women since it reduces the incidence of PPH due to uterine atony.

Protocols on management of PPH in general and the use of medications for prevention and treatment are provided in the FIGO guideline. New therapies such as balloon tamponade (see Chapters 47 and 48) and conservative surgical therapies are now the mainstay of severe PPH treatment²⁸ (see Chapters 51 and 52).

THE ROLE OF NATIONAL PROFESSIONAL ORGANIZATIONS

Key actions to reduce postpartum hemorrhage

- (1) Disseminate the FIGO 2012 clinical guideline on prevention and management of PPH in low resource countries to all national associations of midwives, nurses, medical officers and obstetrician–gynecologists, and ask them to implement the guideline at the national, district and community level.
- (2) Obtain support for this statement from agencies in the field of maternal and neonatal health care, such as UN agencies, donors, governments and others.

- (3) Recommend that this guideline become a Global Initiative to be adopted by health policy makers and politicians in all countries.
- (4) Recommend that this Global Initiative on the prevention of PPH be integrated into the curricula of midwifery, medical and nursing schools.
- (5) Advocacy for public education about the right of every woman to have skilled attendants at birth and the need for early prevention and treatment of PPH.

FIGO will work toward ensuring that:

- (1) Every mother giving birth anywhere in the world will be offered AMTSL for the prevention of PPH.
- (2) Every skilled attendant will have training in AMTSL and in techniques for the treatment of PPH.
- (3) Every health facility where births take place will have adequate supplies of uterotonic drugs, equipment and protocols for both the prevention and the treatment of PPH.
- (4) PPH emergency trays and wall mounted protocols will be available in all birthing units.
- (5) Blood transfusion facilities are available in centers that provide comprehensive health care (secondary and tertiary levels of care). Primary level centers need access to blood supplies quickly or be prepared for quick effective transfers when basic treatment appears to be unsuccessful (see Chapter 67).
- (6) Physicians and midwives are trained in simple conservative techniques such as intravenous infusions, aortic compression, bimanual massage of the uterus, removal of retained placenta and uterine tamponade.
- (7) Every doctor who can perform a laparotomy and basic clinical officers who are responsible for the surgical management at the peripheral hospital level are provided with surgical training to perform 'simple conservative surgery', including compression sutures and sequential devascularization as well as repairs of cervical lacerations, deep vaginal lacerations and subtotal hysterectomy.
- (8) The study of promising new drugs and technologies to prevent and treat PPH is supported by donors and governments.
- (9) Member countries are surveyed regularly to evaluate the uptake of these recommendations.

Key steps for success in reducing maternal mortality and morbidity due to PPH

- (1) Ensure pre- and in-service training to health care providers in early diagnosis, prevention and treatment of PPH. Promote and reinforce the value

and effectiveness of AMTSL as a best practice standard.

- (2) All health care providers/professionals and/or birth attendants need to continue advocating at community, district and regional and national health facilities for a secure continuous supply of oxytocics, basic equipment for diagnosis and treatment of PPH.
- (3) Health care professionals need to be knowledgeable about physiologic management because they may practice in an environment where AMTSL may not be feasible. Training of all health care providers/professionals and/or birth attendants in the practice of physiologic management, AMTSL, diagnosis and management of PPH.
- (4) Prepare and disseminate PPH prevention and treatment protocols.
- (5) Monitor the incidence of PPH and ensure quality assurance of treatment at local, regional and national levels.

CONCLUSION

Tourists flock to the Taj Mahal, largely unaware how often around the world the event symbolized by this monument still occurs in the shadows of a woman's blood-soaked dirt floor, or when a desperate husband's rough cart is dragged over poor roads and fails to arrive in time, or in the sad eyes of a basic health-unit nurse. Governments have been slow to prioritize women's health and donor countries have not shown sufficient commitment to dealing with maternal mortality.

The recent Muskoka initiative in Canada by the G-8-G-20 countries in 2010-2011 has shown tremendous leadership in addressing this issue as part of MDG 4 and 5²⁹. The secretary general of the UN, Ban Ki-Moon, further launched a funding commitment of all UN countries. This is in a context in which there is supposed recognition that poverty reduction and education are the keys to good health – that there is no health without education and no education without health³⁰.

To address the issue of PPH, ICM and FIGO have launched a worldwide initiative to promote the offer of active management to all women. Recent advances in the past 20 years have produced new techniques such as balloon tamponade, shock garment (refer to Chapters 38, 39, 47, 48 and 58) and other non-invasive techniques to treat PPH. Both organizations need the support of governments, donors and the public to support the campaign that will lead to addressing MDG 5.

We respectfully request that professional associations implement FIGO guidelines to prevent and treat PPH, and work with government leaders and civil society on the broader issues of poverty, nutrition, status of women and access to health and education for all girls in the country. Health care professionals can be part of the solution to attain MDG 5. The time is right

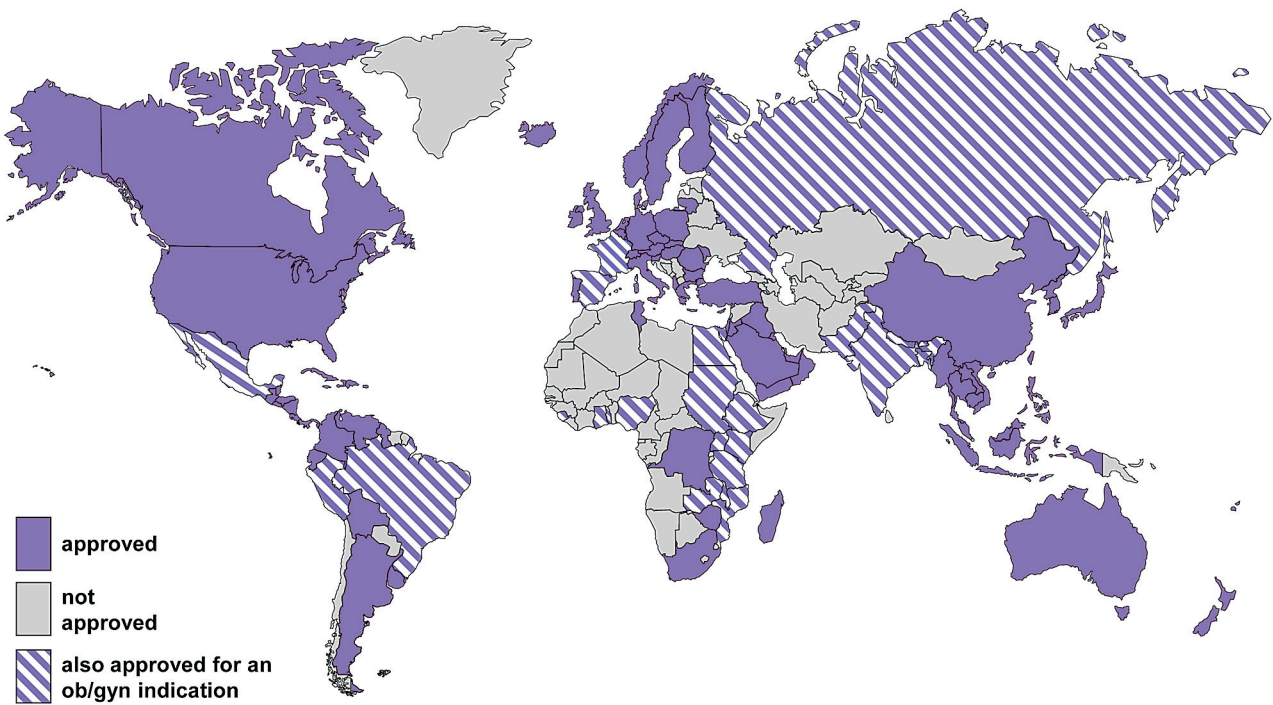
to act upon the answers that have been staring us in the face for some time. The Taj Mahal monument serves as a reminder that all women deserve a safe birth.

References

1. Taj Mahal History and Pictures. http://www.indianchild.com/taj_mahal.htm
2. Hogberg U. The decline in maternal mortality in Sweden: the role of community midwifery. *Am J Pub Health* 2004; 94:1312–9
3. Lozanso R, Wang H, Foreman KJ, et al. Progress towards MDG 4 and 5 on maternal and child mortality: An updated systematic analysis. *Lancet* 2011;378:1139–65
4. Hogan MC, Foreman KJ, Naghavi M, et al. Maternal mortality for 181 countries 1980–2008. A systematic analysis of progress towards Millennium Development Goal 5. *Lancet* 2010;375:1609–23
5. WHO. Trends in Maternal Mortality 1990–2008. Estimates developed by WHO, UNICEF, UNFPA and the World Bank. www.who.int/reproductivehealth/publications/.../en/index.html
6. Abou Zahr C. Antepartum and postpartum haemorrhage. In: Murray CJL, Lopez AD, eds. *Health Dimensions of Sex and Reproduction*. Boston: Harvard University Press, 1998: 172–81
7. Gulmezoglu AM. Postpartum haemorrhage (1997–2002). Monitoring and Evaluation Department of Reproductive Health and Research, 25–26 May 2004. Geneva: WHO, 2004
8. Carroli G, Cuesta C, Abalos E, Gulmezoglu AM. Epidemiology of post partum haemorrhage: a systematic review. *Best Pract Res Clin Obstet Gynaecol* 2008;22:999–1012
9. Bateman BT, Berman MF, Riley LE, Leffert LR. The epidemiology of postpartum hemorrhage in a large, nationwide sample of deliveries. *Anesth Analg* 2010;110:1368–73
10. Razvi K, Chua S, Arulkumaran S, Ratnam SS. A comparison between visual estimation and laboratory determination of blood loss during the 3rd stage of labour. *Aust N Z J Obstet Gynaecol* 1996;36:152–4
11. Prata N, Mbaruku G, Campbell M. Using the kanga to measure postpartum blood loss. *Int J Gynaecol Obstet* 2005;89: 49–50
12. Bartlett LA, Mawji S, Whitehead S, et al. Where giving birth is a forecast of death: maternal mortality in four districts of Afghanistan, 1999–2002. *Lancet* 2005;365:864–70
13. Physicians for Human Rights. Maternal Mortality in Heart Province, Afghanistan, 2002. www.phrusa.org/research/afghanistan/maternal_mortality
14. Li XF, Fortney JA, Kotelchuck M, Glover LH. The postpartum period: the key to maternal mortality. *Int J Gynaecol Obstet* 1996;52:1–10
15. Coombs CA, Murphy EZ, Laros RK. Factors associated with postpartum hemorrhage with vaginal birth. *Obstet Gynecol* 1991;77:69–76
16. Lalonde A, FIGO SMNH Committee. Human resources for health in low resource world: Collaborative practice and task shifting in maternal and neonatal care. *Int J Obstet Gynecol* 2009;105:74–6
17. Gessesew A, Barnabas GA, Prata N, Weidert K. Task shifting and sharing in Tigray, Ethiopia to achieve comprehensive emergency obstetrical care. *Int J Obstet Gynecol* 2011;113: 28–31
18. Maxine S, Rojas R, PAHO/WHO. Maternal and child mortality among the indigenous peoples of the Americas. *Healing our Spirit Worldwide* 2004;2:1–3
19. Prendiville W, Elbourne D, McDonald S. Active versus expectant management in the third stage of labour. *Cochrane Database Syst Rev* 2009;(3):CD000007
20. World Health Organization. Unedited Report of the 18th Committee on the Selection and Use of Essential Medicines. 2011 (cited 9th May 2011). Available at: http://www.who.int/selection_medicines/complete_unedited_TRS_18th.pdf
21. Mobeen N, Durocher J, Zuberi N, et al. Administration of misoprostol by trained traditional birth attendants to prevent postpartum haemorrhage in homebirths in Pakistan: A randomised placebo-controlled trial. *BJOG* 2011;118:353–61
22. Sanghvi H, Ansari N, Prata NJ, Gibson H, Ehsan AT, Smith JM. Prevention of postpartum hemorrhage at home births in Afghanistan. *Int J Gynecol Obstet* 2010;108:276–81
23. Rajbhandari S, Hodgins S, Sanghvi H, McPherson R, Pradhan YV, Baqui AH. Expanding uterotonic protection following childbirth through community-based distribution of misoprostol: Operations research study in Nepal. *Int J Gynecol Obstet* 2010;108:282–8
24. Sanghvi H, Wiknjosastro G, Chanpong G, Fishel J, Ahmed S, Zulkarnain M. Prevention of postpartum hemorrhage in West Java, Indonesia. Baltimore: JHPIEGO Brown's Wharf, 2004
25. Lalonde A, Daviss BA, Acosta A, Herschderfer K. Post partum hemorrhage today: ICM/FIGO initiative 2004–2006. *Int J Obstet Gynecol* 2006;94:243–53
26. Program for Appropriate Technology for Health (PATH). Maternal and child health: Safe birth and newborn care: Preventing postpartum hemorrhage. Available at: www.path.org/projects/preventing_postpartum_hemorrhage.php. Accessed on January 3, 2012
27. Lalonde A, Okong P, Zulfigar Bhutta S, et al. FIGO Guidelines: Prevention and treatment of postpartum hemorrhage in low-resource settings. Submitted for publication in *FIGO Journal*, February 2012
28. Kayem G, Kurinczuk JJ, Alfirevic S, Spark P, Brocklehurst P, Knight M. Specific second-line treatments for postpartum hemorrhage: A national cohort study. *BJOG* 2011;118: 856–64
29. United Nations Development Program (UNDP). The Millennium development goals: Eight goals for 2015. Available at: www.beta.undp.org/content/undp/en/home/mdgoverview.html. Accessed on January 8, 2012
30. Sachs JD. *Macroeconomics and Health: Investing in Health for Economic Development*. Geneva: World Health Organization, 2001

Addendum A: Countries in which misoprostol is approved

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Gynuity Health Projects tracks formal drug registration and government approval of misoprostol throughout the world. This map reflects our latest information. If you become aware of registration or approval in new countries, please write to pubinfo@gynuity.org.

