



Maternal morbidity: Neglected dimension of safe motherhood in the developing world

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In safe motherhood programming in the developing world, insufficient attention has been given to maternal morbidity, which can extend well beyond childbirth. For every woman who dies of pregnancy-related causes, an estimated 20 women experience acute or chronic morbidity. Maternal morbidity adversely affects families, communities and societies. Maternal morbidity has multiple causes, with duration ranging from acute to chronic, severity ranging from transient to permanent and with a range of diagnosis and treatment options. This article addresses six selected relatively neglected aspects of maternal morbidity to illustrate the range of acute and chronic morbidities that can affect women related to pregnancy and childbearing that are prevalent in developing countries: anaemia, maternal depression, infertility, fistula, uterine rupture and scarring and genital and uterine prolapse. Based on this review, recommendations to reduce maternal morbidity include: expand the focus of safe motherhood to explicitly include morbidity; improve data on incidence and prevalence of maternal morbidity; link mortality and morbidity outcomes and programming; increase access to facility- and community-based maternal health care and reproductive health care; and address the antecedents to poor maternal health through a lifecycle approach.

Keywords: maternal morbidity; uterine rupture; uterine prolapse; fistula; maternal depression; anaemia

Introduction

Recent analyses show that maternal mortality declined by one-third between 1990 and 2008, although roughly 350,000 women in developing countries still die annually from pregnancy-related causes (Hogan *et al.* 2010, WHO *et al.* 2010). In programming to promote safe motherhood, less attention has been given to addressing maternal morbidity, with sequelae that can last long after a woman gives birth. For every woman who dies of pregnancy-related causes, an estimated 20 women experience acute or chronic morbidity, often with tragic consequences (Reichenheim *et al.* 2009). The title of a recent inquiry on maternal morbidity asked if women suffering from maternal morbidity are *Better off dead?* (UK All Party Parliamentary Group 2009).

Maternal morbidity affects women, their families, communities and societies (National Research Council 2000). Complications force women and their families to

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incur costs and debt for treatment (Ronsmans 2009), and can affect women's ability to work, resulting in loss of productivity and negative outcomes for infants and children (Hoque and Powell-Jackson 2010). An analysis of the global costs of maternal disability calculated an annual cost of US\$6.8 billion (Stanton 2010).

This article addresses the scope of maternal morbidity, including how it is defined and measured, and how programmes are addressing maternal morbidity. It addresses six selected relatively neglected aspects of maternal morbidity that are prevalent in developing countries: anaemia, maternal depression, infertility, fistula, uterine rupture and scarring and uterine prolapse¹ to illustrate the range of acute and chronic morbidities that can affect women related to pregnancy and childbearing. This article ends with recommendations for key actions to address maternal morbidity.

Defining maternal morbidity

Maternal mortality, while a rare event, has a clear definition and can be measured. Maternal morbidity is complex, with multiple causes, duration ranging from acute to chronic, severity ranging from transient to permanent and with a range of diagnosis and treatment options. Maternal, or obstetric morbidity, defined by WHO as morbidity in a woman who has been pregnant (regardless of the site or duration of the pregnancy), from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes, is a subset of reproductive morbidity (National Research Council 2000). Morbidity can be physical or psychological and can result from direct or indirect causes.

Disability Adjusted Life Years (DALYs) measure the number of healthy life years lost due to disability or early death (Murray and Lopez 1996). For women in their reproductive years (15–44), HIV/AIDS and maternal conditions are the primary causes of both morbidity and mortality, with the highest burden in low-income countries. At the same time, mental health conditions are also a leading cause of disability and productivity loss among women (Global Health Council ND). However, calculations of DALYs related to maternal morbidity are likely to be underestimates because a number of conditions, including fistula, incontinence, uterine prolapse, menstrual disorders, non-sexually transmitted reproductive tract infections, female genital mutilation and violence that affects reproductive health, are not included in the calculation (WHO 1998, Astbury 2009).

Co-morbidities, such as poor mental health and poor reproductive health, are difficult to quantify and are not included in the calculations of DALYs. Yet, it is common for women to suffer from co-morbidities. For example, obstetric fistula can lead to infertility and depression. Post-partum interventions are often minimised as a means to fight maternal mortality (Campbell and Graham 2006), even though the risk of maternal death continues up to six months after delivery and some of the problems experienced by women persist beyond the traditional cut-off of 42 days post-partum (Filippi *et al.* 2010).

Estimates of maternal morbidity

The true extent of maternal morbidity is not known given definitional issues and lack of data to measure its incidence and prevalence.² Table 1 shows the best estimates

Table 1. Estimates of incidence and prevalence of selected conditions of maternal morbidity.

Morbidity and definition	Prevalence/incidence	Source
Overall	136 million births annually	UN Population Division (2008); Filippi <i>et al.</i> (2006), based on WHO (2005); Say <i>et al.</i> (2004); and Ashford (2002).
	1.4 million women experience acute obstetric morbidity (near-miss) events	
	9.5 million women experience other complications	
	20 million women suffer from long-term disabilities	
Anaemia	42% of pregnant women worldwide	WHO (2008), Malaria Consortium (2009) and WHO (2010)
	In sub-Saharan Africa, malaria is estimated to cause up to 400,000 cases of severe maternal anaemia per year	
	Almost 90% of anaemic women reside in Asia or Africa	
Maternal mental health	20–30% of perinatal women in developing countries	UNFPA (2009b)
Infertility	Around 186 million ever-married women ages 15–49 in the developing countries (excluding China) were infertile because of primary or secondary infertility in 2002	Rutstein and Shah (2004)
	25% of ever-married women of reproductive age in these countries	
	30% of women with secondary infertility are in sub-Saharan Africa	
Fistula	Global estimates vary from:	www.endfistula.org/fistula_brief.htm
	2 million women worldwide with 50,000–100,000 new cases annually	Stanton <i>et al.</i> (2007)
	654,000 cases, with 262,000 of these in sub-Saharan Africa	
Genital and uterine prolapse	2–20% of women of reproductive age	Columbia University (2009)
Uterine rupture	In the developed world, 1 in 1000 for scarred uteri to less than 1 in 10,000 for unscarred uteri and approximately 10 times higher in developing countries	Lombaard and Pattinson (2006)

available for the maternal morbidities included in this article. Although maternal morbidity is known to be underreported, these estimates³ show widespread suffering

and regional disparities among the conditions. Sources of data include systematic reviews of published literature, as well as hospital- and population-based studies.

Estimates suggest that of the 136 million women who give birth each year, around 1.4 million women experience near-miss events, 9.5 million experience other complications and 20 million suffer from long-term disabilities.⁴ Of the morbidities included here, maternal depression and fistula affect the largest numbers of women.

Key neglected maternal morbidities

This set of morbidities, all neglected to varying degrees, illustrates the range of problems women can face related to pregnancy and childbearing. Some are acute, while others are chronic. These morbidities have different aetiologies and some are related to the quality of care women receive during pregnancy and childbirth and others to a broader set of social, personal and other factors outside of the health system. Some can be traced to conditions that start in childhood and can create intergenerational effects.

Anaemia

Anaemia is a condition associated with an insufficient number of red blood cells or concentration of haemoglobin. The most common form is iron-deficiency anaemia, in which the body lacks sufficient iron to keep the red blood cells functioning properly (WHO 2008). Current evidence suggests that severe anaemia directly causes maternal mortality and morbidity due to poor ability to withstand the adverse effects of excessive blood loss, as well as an increased risk of infection or maternal fatigue (Sangvhi *et al.* 2010). Anaemia is associated with increased infection, depression, fatigue and low-work productivity, as well as poor pregnancy outcomes (Girard 2010).

According to WHO (2008), 42% of pregnant women have anaemia worldwide. Half of the anaemia burden is due to iron deficiency, with estimates varying widely depending on the setting (Girard 2010). Almost 90% of anaemic women reside in Asia or Africa (WHO 2008). Steketee *et al.* (2001) estimated that between 200,000 and 500,000 pregnant women in sub-Saharan Africa develop severe anaemia as a result of malaria.

The Global Burden of Disease Analysis in 2004 estimated that the prevalence of maternal anaemia could be reduced by one-third to one-half over a decade if action is taken to launch focused, large-scale programmes that are based on lessons learned from countries with successful programmes, such as Thailand and Nicaragua (Sangvhi *et al.* 2010). Iron-folic acid supplementation during pregnancy, malaria prevention and treatment of parasites (which is safe during pregnancy) can reduce anaemia during pregnancy. Through iron-folic acid supplementation, Thailand successfully reduced the prevalence of anaemia among pregnant women from 25% in 1988 to 15% in 1997 (Winichagoon 2002 cited in Sangvhi *et al.* 2010). Many countries do not meet current WHO standards for iron-folic acid supplementation and coverage remains low (Stoltzfus and Dreyfuss ND, Girard 2010). Programmes to prevent malaria, including increasing use of insecticide-treated bednets, will also have an effect. Reaching women during their first pregnancy is critical since anti-adhesion antibodies, which limit the accumulation of parasites in the placenta, are present 'in

pregnant women from Africa and Asia who have been pregnant on previous occasions (multigravidas), but not in those who are pregnant for the first time (primigravidas)' (Fried *et al.* 1998).

Integrated approaches, which have combined health systems strengthening, kitchen gardens, small animal rotating funds, community-based supplementation of children, non-pregnant and pregnant women plus fortification and nutritional education, have reduced anaemia in Ghana from 63% to 25%, in Malawi from 59% to 48%, in Senegal from 81% to 65% and in Tanzania from 87% to 73% (Girard 2010).

Maternal mental health

Mental health issues following childbirth fall into three distinct conditions: transient mood disturbance [baby blues], depression and psychotic illness (Fisher *et al.* 2009). The most common condition is depression. UNFPA (2009b) estimates that the prevalence of depression is 20–30% among women in the perinatal period in developing countries (see Table 1). Rates of maternal depression vary widely around the world, and have been reported as 15–28% in Africa and Asia (Husain *et al.* 2000), and 35–47% in Latin America (Wolf *et al.* 2002).

In addition to the effects of poor mental health on women, a range of adverse infant and child outcomes have been linked to poor maternal mental health, including under-nutrition, stunting and problems with breastfeeding, behavioural problems, child temperament, childhood depression, cognitive and motor delays and low academic achievement (Wachs *et al.* 2009). Research shows an association between maternal mental health issues and child health outcomes, independent of other variables including poverty, crowded living conditions and infectious diseases (Patel *et al.* 2004).

Awareness of the need to focus on mental health programming in developing countries is increasing (WHO 2009). Addressing maternal mental health and depression in low-resource settings requires a tiered approach, beginning with addressing environmental stressors that increase women's vulnerability to depression, including poverty and gender inequity (Fisher *et al.* 2009). A number of interventions have been shown to reduce the severity of maternal depression, including social support for depressed mothers or mothers at risk of depression in Taiwan, group therapy in Uganda, use of existing health mechanisms in Jamaica, and enhancing mother–infant interactions in South Africa (Wachs *et al.* 2009). A programme in rural Pakistan, using community health workers, improved recovery rates of mothers with depression and led to better outcomes for infants (Rahman *et al.* 2008).

Cost-effective and sustainable approaches are needed to prevent and treat mental health problems among women who experience a perinatal death and near miss-complications (Flenady and Wilson 2008, Filippi *et al.* 2010). Fisher *et al.* (2009) recommend screening for risk factors for poor reproductive mental health during perinatal care. Health providers need more training on psychosocial aspects of health, 'the different situations, resources, demands and power relations of women and men' (Paltiel 1993, p. 212). Patel and Kirkwood (2008) suggest examining the feasibility of placing community health worker programmes for pregnancy-related depression into Integrated Management of Childhood Illnesses (IMCI) and Maternal and Child Health (MCH) programmes.

Infertility

Infertility is considered primary if a couple has never had a child despite trying to conceive, and secondary if a couple fail to conceive after a previous pregnancy (WHO NDa). WHO considers a couple infertile if they have tried to conceive for two years through regular sexual intercourse without using contraception, the woman has not become pregnant and there is no other reason such as breastfeeding or post-partum amenorrhoea. Others define infertility as one year of trying to conceive.

Depending on the definition used, estimates of global infertility worldwide vary. A study using data from 47 Demographic and Health Surveys in developing countries estimated, ‘that in 2002, more than 186 million ever-married women of reproductive age... in developing countries (excluding China) were infertile because of primary or secondary infertility’ (see Table 1). ‘This number represents more than one-fourth of the ever-married women of reproductive age in these countries’ (Rutstein and Shah 2004, p. xiii).

Fertility is highly valued in most societies, and the inability to have children, considered a form of maternal morbidity, can lead to negative social outcomes. Despite severe negative consequences for women, infertility has received insufficient attention in safe motherhood and reproductive health programmes. Infertile women face social stigma and marital instability (Fisher 2009). In Tanzania, a study found that the life circumstances of infertile women were considerably worse than circumstances of women with at least one child (Holloos and Larsen 2008).

Prevention and treatment of sexually transmitted infections (STIs) is key to preventing infertility. STIs are the most preventable cause of infertility, particularly in women (WHO NDb). Tubal infertility related to STI can be prevented through primary and secondary prevention efforts. ‘Treating “endstage” tubal infertility is very costly; thus, preventing the condition is imperative’ (Cates 2003, p. 9).

Women and men in developing countries who face infertility need information about treatment possibilities. While access to assisted reproductive technologies (ART) is expanding in developing countries, at costs far below those prevailing in the developed world, for most programmes and couples, the cost of ART remains an inhibiting factor (Vayena *et al.* 2002, Fisher 2009, WHO Bulletin 2010).

Obstetric fistula

Obstetric fistula is a medical condition that occurs as a complication of obstructed labour. The result is an opening between the bladder and the vagina or the rectum with the woman passing urine or faeces through the vagina. ‘While obstetric fistula is both preventable and treatable, once it occurs it has severe health as well as psychological and socio-economic consequences’ (Medina *et al.* 2010, p. 6). Fistula occurs almost exclusively in developing countries and affects girls and women of all ages, both at first pregnancy as well as in later pregnancies (Miller *et al.* 2005, Mehta and Bangser 2006, Ndiaye *et al.* 2009). Worldwide prevalence estimates of obstetric fistula range from 654,000 cases to two million cases and an annual incidence of 50,000–100,000 cases (see Table 1). Stanton *et al.* (2007) estimate that 262,000 of the cases of fistula are in sub-Saharan Africa.

Among the maternity morbidity conditions included in this article, fistula has received the most attention including through The Campaign to End Fistula (ND),

likely due to its extreme adverse effects on women's lives. Yet, awareness of fistula remains low. At the health services level, four key prevention measures are 'family planning, consistent and correct use of the partograph, immediate cauterisation for women who experience obstructed labour and strengthening cesarean delivery services' (EngenderHealth 2010, p. 32). Access to emergency obstetric care is critical. Routine collection of data on fistulas, including at health facilities providing services, is needed to aid programming. Prevention, treatment and rehabilitation services are underfunded. Social factors related to fistula, such as early marriage and child-bearing and poor nutrition, also need to be addressed.

Surgery can normally repair the injury, with success rates as high as 90% when performed by experienced surgeons, although a standard protocol for surgical interventions is needed (HERA and ICRH 2010), maintaining the skills of surgeons is critical (Arrowmith *et al.* 2010), and many women with fistula do not have access to surgery. In some developing countries, substantial progress has been recorded: for example, in south-east Nigeria, the number of genital fistulas seen in one hospital fell from 136 cases in 1981 to 35 cases in 2005, possibly due to increased access to tertiary care and improved nutrition (Obi *et al.* 2008).

Training of nurse midwives to perform caesarean sections has been undertaken in Mozambique, Malawi and Tanzania and is under discussion in a number of other countries, a shift that should assist in preventing fistulas (AMDD ND). In Ethiopia, health extension workers have been trained to identify fistulas so that women can access treatment [Wakabi 2008, Wude 2008, J. Ruminjo (personal communication with Jill Gay, 17 December 2010)]. Referral systems have been established in Tanzania (Bangser 2007).

Outreach campaigns, including radio programmes and community-based activities, have been conducted regarding fistula as a treatable condition in Sudan, Nigeria and other countries (Diop *et al.* 2004, UNFPA 2005, 2009a). Communities can benefit from information on the danger signs that require accessing Emergency Obstetric Care (EmOC) and transport to EmOC (Mehta and Bangser 2006, Miller *et al.* 2006).

Once women have fistula, how best to combat dependence, stigma and social rejection are issues of great importance to the women themselves (Ndiaye *et al.* 2009). Depression is an issue for women even post-surgery (Goh *et al.* 2005, Zheng and Anderson 2009). When surgery fails, women and their providers need counselling and support (Wude 2008). Women who have fistulas from sexual violence may have different needs than women who have fistulas due to obstetric complications (Peterman and Johnson 2009). Reintegration of women living with fistula is critical, and programmes in Tanzania, Bangladesh and Pakistan have shown some success (Bangser 2006, HERA and ICRH 2010).

Uterine rupture

Uterine rupture is a forcible tearing of the uterus, which can result in maternal death, maternal morbidity or fetal death (El Joud *et al.* 2002). Complications related to uterine rupture, besides death, include: fever; bladder injury; wound opening; sepsis, infection carried by the bloodstream from its original site that can overwhelm the body; and the need for blood transfusions and ICU (Zeteroglu *et al.* 2005).

Uterine rupture rates in developed countries vary from one in 1000 for scarred uteri to less than one in 10,000 unscarred uteri, with rates in developing countries approximately 10 times higher (Lombaard and Pattinson 2006). The incidence of uterine rupture is 14 times higher in women with uterine scars (El Joud *et al.* 2002). A very low incidence of uterine rupture can be achieved when functioning maternal health systems are in place (El Joud *et al.* 2002). A study at the University of Nigeria Teaching Hospital in Enugu found that one of 106 deliveries resulted in a uterine rupture (Ezegwui and Nwogu-Ikojo 2005). In a cohort of 20,326 pregnant women in West Africa, 25 cases of uterine rupture were identified, giving an incidence rate of 1.2 uterine ruptures per 1000 deliveries (El Joud *et al.* 2002).

Incidence of uterine rupture is low to non-existent in countries in the Global North for women who do not have uterine scars. Timely laparotomy (incision through the abdominal wall); awareness by women of obstetric emergencies; plans to access EmOC should an emergency arise; functioning referral systems; safe caesarean sections and blood transfusions; and training to eliminate incorrect use of oxytocic drugs and fundal pressure can eliminate uterine rupture (El Joud *et al.* 2002).

Genital and uterine prolapse

Genital prolapse occurs when a weakened pelvic musculature can no longer support the proper positioning of the vagina and uterus. Uterine prolapse is a form of genital prolapse and occurs when the uterus slips from place into the vagina. The global prevalence of genital prolapse is estimated to be 2–20% in women under age 45 (Bonetti *et al.* 2004). A study in Nepal found that over half (57%) of those with symptoms of uterine prolapse had not had any treatment and of the 38 women advised to have an operation, only 8 did so (Kumari *et al.* 2000). Women often do not know that treatment exists and cannot afford to pay for treatment (Bodner-Adler *et al.* 2007).

Uterine prolapse is most commonly caused by trauma or difficulty at childbirth. Genital prolapse can also occur when women carry heavy loads, particularly post-partum (Bodner-Adler *et al.* 2007). Prolapse can drastically affect quality of life, causing difficulty walking, sitting, lifting and squatting. Prolapse can also result in lower back pain, abdominal pain, painful intercourse, stress urinary incontinence and difficulty defecating. Surgery is needed once prolapse occurs; however, no consensus exists on the best operation, which must be tailored to the needs of the individual woman (Kumari *et al.* 2000). Preventive solutions include: establishing regular gynaecological services in rural areas using a genital prolapse checklist; reducing women's workload post-partum; and encouraging men to takeover chores that involve heavy lifting during pregnancy and post-partum (Bonetti *et al.* 2004).

Recommendations for key actions to address maternal morbidity

Building on the momentum started in the 1980s, attention to reducing maternal mortality has grown over the past decade as countries have sought to meet the Millennium Development Goals. Maternal morbidity, which ranges from acute to chronic, has remained a silent issue. While some programming to reduce mortality

will also reduce morbidity, increased political will and resources are clearly needed to expand the scope of programmes to address the full range of maternal morbidities (Starrs and Sankore 2010).

We offer the following recommendations.

Expand the focus of safe motherhood to explicitly include morbidity

Linking safe motherhood almost exclusively to reducing maternal death related to MDG5 has conditioned policies, programmes and funding. Expanding the discourse around safe motherhood to use explicitly both the terms mortality and morbidity (or death and disability) would raise awareness of the need to address neglected morbidities, which have life-altering consequences for women and their families. Expanding the temporal scale of conditions considered related to maternal health beyond the pregnancy, labour and delivery and 42-day post-partum window would be beneficial for addressing both acute and long-term maternal morbidities.

Improve data on the incidence and prevalence of maternal morbidity

Accurate and reliable data are fundamental for programming (Graham and Hussein 2007). Reaching consensus on definitional issues and improving data collection will allow more accurate estimates of the true picture of maternal morbidity. The Child Health Epidemiology Reference Group [CHERG] (2010), studying the incidence and sequelae of maternal morbidity, notes that, 'limited epidemiological evidence suggests that the causal pattern of morbidity is different from the causal pattern of mortality and information on morbidity could change the way interventions are prioritised in safer motherhood' (www.cherg.org). Calls to strengthen morbidity surveillance have come from many organisations (UNICEF 1997, WHO 2009).

Link maternal mortality and morbidity outcomes and programming

Improving the quality of pregnancy and delivery care will result in reductions to both mortality and some morbidity. Reducing haemorrhage, which can lead to death, will also have an impact on anaemia and obstetric fistula. Increasing access to skilled birth attendance and EmOC will also reduce fistula. A study in Mexico found that the same cost-effective interventions which would reduce maternal mortality would reduce maternal morbidity associated with some maternal complications: increasing family planning, ensuring access to safe abortion for women electing to terminate a pregnancy and providing access to intrapartum care for all pregnant women and enhancing access to comprehensive EmOC (Hu *et al.* 2007).

Increase access to facility- and community-based maternal health care

While reduction of maternal mortality depends on strengthening health systems to provide widespread, equitable access to EmOC and skilled birth attendance (Freedman 2007), it is becoming increasingly clear that it can also reduce maternal morbidity. Maternal morbidity can be used to audit the quality of care, understand how women experience health care services and facilities and to assess met need for critical care (Reichenheim *et al.* 2009, Ronsmans 2009). Overused practices that

contribute to maternal morbidity, for example, include medically unnecessary caesarean sections (Karolinski *et al.* 2010) and routine episiotomy.

Increasing access to and use of antenatal care could provide the opportunity to discuss childbirth planning and the danger signs in pregnancy, as well as facilitating care-seeking for obstetric complications among women with little education who are at highest risk (Roost *et al.* 2010). Task shifting could help to reduce maternal morbidity as well as mortality, for example, by reserving specialist time for EmOC and fistula repair.

Improving outreach education and community support are also showing promising results in increasing access to care and improving health outcomes. In a systematic review of 27 studies of community-based maternal health care, Lassi *et al.* (2010, p. 4) found that the interventions ‘led to reductions in maternal morbidity. . . increased referrals to health facility for pregnancy related complications. . . improved the rates of early breastfeeding. . . and improved other mother and newborn care related outcomes’. The costs of reproductive health, maternity and child health care, including the costs of travel and service fees, inhibit women from benefiting from the continuum of care needed to prevent death and disability (Overbosch *et al.* 2004, Rahman *et al.* 2009, Lim *et al.* 2010). Ongoing research in Sri Lanka and Kenya, measuring the costs, burden of disease and economic impact of maternal morbidity, will yield important information to support and guide maternal morbidity programming (ICRW 2010, Maternal Morbidity Project 2010).

Expand access to reproductive health care, including contraception

Reducing the number of unintended pregnancies, estimated at four in 10 of the 186 million pregnancies that occur in developing countries each year, would contribute to reducing maternal morbidity. Doubling current global investments in family planning and pregnancy-related care (from around US\$11.8 billion to US\$24.6 billion) would, among other outcomes, reduce the annual number of unintended pregnancies from 75 million to 22 million (Guttmacher Institute 2010). That increase in funding would also reduce unsafe abortion by almost three quarters.

Address the antecedents to poor maternal health

Poor nutrition, insufficient sanitation, lack of schooling, lack of agency in families and societies, as well as exposure to gender-based violence, take a toll on women’s physical and mental well-being. Gender norms that expect women to be stoic and to suffer in silence and not reveal events at birth are harmful for women’s health and, by extension, the health of their children.

Addressing a continuum of care, including taking a life cycle approach from adolescence, pregnancy, childbirth, the postnatal period and through childhood, has gained currency in safe motherhood (Tinker *et al.* 2005). While the concept of the continuum of care is commendable, its focus on women in the post-partum period is not sufficiently long to cover longer-term or chronic morbidity. Furthermore, the continuum of care does not sufficiently address intergenerational issues, for example, the effects on infants and children whose mothers are subject to gender-based violence. Thus taking a life cycle approach starting in childhood is critical to addressing the range of morbidities women face in pregnancy and childbirth and

beyond. Gender norms which disadvantage girls compared to boys in access to health services as well as nutrition can lead to malnourished adolescents who become pregnant and in turn bear disadvantaged children.

While substantial progress has been made in reducing maternal mortality, it is critical to the well-being of women to raise maternal morbidity to priority status on the global agenda and to address the key morbidities that continue to affect millions of women worldwide.

Notes

1. Other aspects of maternal morbidity, including the outcomes associated with unsafe abortion, are important but are beyond the scope of this article.
2. One promising approach to measuring morbidity is through analysing life threatening complications associated with acute obstetric morbidity, or 'near misses', that would very likely result in death without hospital care (Filippi *et al.* 2010).
3. Sri Lanka, which has been successful in reducing maternal morbidity, is working to improve maternal morbidity surveillance (Department of Community Medicine 2010). Initial analysis of preliminary data collected shows gross underreporting of maternal morbidity in the study area.
4. Calculations based on 136 million births, 1% near miss. 7% serious complications and 20 million disabilities a year (Ashford 2002, Say *et al.* 2004, Filippi *et al.* 2006 based on WHO 2005).

References

- AMDD, ND. *Who is doing what? Performance of the emergency obstetric signal functions by non-physician clinicians and nurse-midwives in Malawi, Mozambique, and Tanzania*. New York: Columbia University, Averting Maternal Death and Disability (AMDD).
- Arrowmith, S., Ruminjo, R., and Landry, E., 2010. Current practices in treatment of female genital fistula: a cross sectional study. *BMC Pregnancy and Childbirth*, 10, 73.
- Ashford, L., 2002. *Hidden suffering: disabilities from pregnancy and childbirth in less developed countries. MEASURE communication policy brief*. Washington, DC: Population Reference Bureau.
- Astbury, J., 2009. Overview of key issues. In: WHO and UNFPA. *Mental health aspects of women's reproductive health*. Geneva: WHO, 1–7.
- Bangser, M., 2006. Obstetric fistula and stigma. *The Lancet*, 367 (95099), 535–536.
- Bangser, M., 2007. Strengthening public health priority-setting through research on fistula, maternal health, and health inequalities. *International Journal of Gynecology and Obstetrics*, 99, S16–S20.
- Bodner-Adler, B., Shrivastava, C., and Bodner, K., 2007. Risk factors for genital prolapse in Nepal. *International Journal of Urogynecology*, 18, 1343–1346.
- Bonetti, T., Erpelding, A., and Pathak, L., 2004. Listening to 'felt needs': investigating genital prolapse in Western Nepal. *Reproductive Health Matters*, 12 (2), 166–175.
- Campaign to End Fistula, ND. *Proceedings of the workshop on data methodologies for estimating obstetric fistula*, 30 April–2 May 2007, New Delhi. Available from: www.endfistula.org/public/
- Campbell, O.M.R. and Graham, W.J., 2006. Strategies for reducing maternal mortality: getting on with what works. *The Lancet*, 368 (9543), 1284–1299.
- Cates, W., 2003. Preserving fertility. *Network*, 23 (2), 9–10.
- Child Health Epidemiology Reference Group (CHERG), 2010. *Incidence and sequelae of maternal morbidity* [online]. Available from: http://cherg.org/projects/maternal_morbidity.html [Accessed 11 November 2010].
- Columbia University, 2009. *Written evidence. UK All Party Parliamentary Group. 2009. Better off dead? A report on maternal morbidity*. London: UK All Party Parliamentary Group on Population, Development and Reproductive Health.

- Department of Community Medicine, 2010. *Beyond maternal mortality investigations: improving maternal morbidity surveillance in Anuradhapura Sri Lanka* [online]. Available from: <http://maternalhealthtaskforce.org/discuss/wpblog/> 2010/10/19 [Accessed 28 November 2010].
- Diop, N.J., Fay, M.M., Moreau, A., Cebral, J., Benga, H., Mane, F.C.B., Baumgarten, I., and Melchang, M., 2004. *The Tostan Program: evaluation of a community based education program in Senegal*. Washington, DC: Population Council, GTZ, Tostan.
- El Joud, D., Prual, A., Vangeenderhuysen, C., Bouvier-Colle, M.H., and Group, MOMA, 2002. Epidemiological features of uterine rupture in West Africa (MOMA Study). *Paediatric and Perinatal Epidemiology*, 16, 108–114.
- EngenderHealth, 2010. *Fistula care: associate cooperative agreement GHS-A-00-07-0021-00, annual report summary, October 2009 to September 2010*. Submitted to USAID, WDC on 18 November 2010.
- Ezegwui, H. and Nwogu-Ikojo, E., 2005. Trends in uterine rupture in Enugu, Nigeria. *Journal of Obstetrics and Gynaecology*, 25 (3), 260–262.
- Filippi, V., Goufodji, S., Sismanidis, C., Kanhonou, L., Fottrell, E., Ronsmans, C., Alihonou, E., and Pastel, V., 2010. Effects of severe obstetric complications on women's health and infant mortality in Benin. *Tropical Medicine and International Health*, 15 (6), 733–742.
- Filippi, V., Ronsmans, C., Campbell, O.M.R., Graham, W.J., Mills, A., Borghi, J., Koblinsky, M., and Osrin, D., 2006. Maternal health in poor countries: the broader context and a call for action. *The Lancet*, 368 (9546), 1535–1541.
- Fisher, J., 2009. Infertility and assisted reproduction. In: WHO and UNFPA. *Mental health aspects of women's reproductive health*. Geneva: WHO, 129–146.
- Fisher, J., Cabral de Mello, M., and Izutsu, T. 2009. Pregnancy, childbirth and the postpartum period. In: WHO and UNFPA. *Mental health aspects of women's reproductive health*. Geneva: WHO, 8–43.
- Flenady, V. and Wilson, T., 2008. Support for mothers, fathers and families after perinatal death. *Cochrane Database Systematic Review*, 23 (1), CD000452.
- Freedman, L., 2007. Health system strengthening: new potential for public health and human rights collaboration. *Reproductive Health Matters*, 15 (30), 219–220.
- Fried, M., Nosten, F., Brockman, A., Brabin, B.J., and Duffy, P.E., 1998. Maternal antibodies block malaria. *Nature*, 395, 851–852.
- Girard, A., 2010. Maternal undernutrition: evidence, links and solutions. Presentation to the Woodrow Wilson International Center for Scholars, 15 December 2010, Washington, DC. Global Health Council, ND. *Global view of mortality and morbidity* [online]. Available from: http://www.globalhealth.org/womens_health/global_view/ [Accessed 1 December 2010].
- Goh, J.W., Slone, K.M., Krause, H.G., Browning, A., and Akhter, S., 2005. Mental health screening in women with genital tract fistulae. *BJOG*, 112, 1328–1330.
- Graham, W.J. and Hussein, J., 2007. Minding the gaps: a reassessment of the challenges of safe motherhood. *American Journal of Public Health*, 97 (6), 978–983.
- Guttmacher Institute, 2010. *Facts on investing in family planning and maternal and newborn health (update)*. In brief. New York: Guttmacher Institute.
- Health Research for Action (HERA) and International Centre for Reproductive Health (ICRH), 2010. *Thematic evaluation of the national programmes and UNFPA experience in the Campaign to End Fistula: assessment of national programmes. Volume II: Final Synthesis Report*. Reet, Belgium: HERA.
- Hogan, M.C., Foreman, K.J., Naghavi, M., Ahn, S.Y., Wang, M., Makela, S.M., Lopez, A.D., Lozano, R., and Murray, C.J.L., 2010. Maternal mortality for 181 countries, 1980–2008: a systematic analysis of progress towards Millennium Development Goal 5. *The Lancet*, 375 (9726), 1609–1623.
- Hollos, M. and Larsen, U., 2008. Motherhood in sub-Saharan Africa: the social consequences of infertility in an urban population in Northern Tanzania. *Culture, Health & Sexuality*, 10 (2), 159–173.
- Hoque, M.E. and Powell-Jackson, T. 2010. *Economic consequences of maternal illness in rural Bangladesh* [online]. Available from: http://papers.ssrn.com/sol3/cf_dev/AbsByAuth.cfm?per_id=1462253 [Accessed 5 December 2010].

- Hu, D., Bertozzi, S., Gakidou, E., Gakidou, E., Sweet, S., and Goldie, S.J. 2007. The costs, benefits and cost-effectiveness of interventions to reduce maternal morbidity and mortality in Mexico. *Plos One*, 2 (8), e750.
- Husain, N., Creed, F., and Tomenson, B., 2000. Depression and social stress in Pakistan. *Psychological Medicine*, 30, 395–402.
- ICRW, 2010. Website for project to study the costs of maternal morbidity and mortality in Kenya [online]. Available from: <http://www.icrw.org/where-we-work/costs-maternal-morbidity-and-mortality-kenya> [Accessed 21 November 2010].
- Karolinski, A., Mazzoni, A., Belizan, J., Althabe, F., Bergel, E., and Buekens, P., 2010. Lost opportunities for effective management of obstetric conditions to reduce maternal mortality and severe maternal morbidity in Argentina and Uruguay. *International Journal of Obstetrics and Gynecology*, 110, 175–180.
- Kumari, S., Wallia, I., and Singh, A., 2000. Self-reported uterine prolapse in a resettlement colony of north India. *Journal of Midwifery & Women's Health*, 45 (4), 343–350.
- Lassi, Z.S., Haider, B.A., and Bhutta, Z.A. 2010. Community-based intervention packages for preventing maternal morbidity and mortality and improving neonatal outcomes. *Cochrane Database of Systematic Reviews* (11). Art. No. CD007754. doi: 10.1002/14651858.CD007754.pub2
- Lim, S., Dandona, L., Hoisington, J., James, S.L., Hogan, M.C., and Gakidou, E., 2010. India's Janani Suraksha Yojana, a conditional cash transfer programme to increase births in health facilities: an impact evaluation. *The Lancet*, 375, 2009–2023.
- Lombaard, H. and Pattinson, R., 2006. Uterine rupture: the road ahead? *European Clinics in Obstetrics and Gynaecology*, 2, 131–138.
- Malaria Consortium. 2009. *Written evidence. UK All Party Parliamentary Group on Population, Development and Reproductive Health. 2009. Better off dead? A report on maternal morbidity*. London: UK All Party Parliamentary Group on Population, Development and Reproductive Health.
- Maternal Morbidity Project, 2010. Website for the project to study disease burden and the economic impact of maternal morbidity in Sri Lanka [online]. Available from: <http://sites.google.com/site/maternalmorbidityproject/home> [Accessed 11 November 2010].
- Medina, M., Roedee, G., Decosas, J., et al., 2010. *Thematic evaluation of the national programmes and UNFPA experience in the Campaign to End Fistula: assessment of national programmes. Volume II: Final Synthesis Report*. New York: UNFPA.
- Mehta, M. and Bangser, M. 2006. *Risk and resilience: obstetric fistula in Tanzania. Dar es Salaam, Tanzania, Women's Dignity Project and Engenderhealth* [online]. Available from: www.womensdignity.org [Accessed 2 December 2010].
- Miller, S., Buffington, S.T., Beck, D., de Graft-Johnson, J., Daly, P., Otchere, S., McNatt, K.E., Turan, J.M., and Bray, E.H., 2006. *Saving women and newborn lives: home and community interventions*. Baltimore, MD: ACCESS Project.
- Miller, S., Lester, F., Webster, M., and Cowan, B., 2005. Obstetric fistula: a preventable tragedy. *Journal of Midwifery & Women's Health*, 50 (4), 286–294.
- Murray, C.J.L. and Lopez, A.D., 1996. *The global burden of disease*. Boston: Harvard School of Public Health.
- National Research Council, 2000. *The consequences of maternal morbidity and maternal mortality: report of a workshop*. Washington, DC: National Academy Press.
- Ndiaye, P., Kini, A., Idrissa, A., Diagne Camara, M., and Tal-Dia, A., 2009. Parcours de la femme souffrant de fistule obstétricale au Niger [The path of women who suffer from obstetric fistula in Niger]. *Médecine Tropicale*, 69 (1), 61–65.
- Obi, S., Ozumba, B., and Onyebuchi, A., 2008. Decreasing incidence and changing aetiological factors of vesicio-vaginal fistula in south-east Nigeria. *Journal of Obstetrics and Gynaecology*, 28 (6), 629–631.
- Overbosch, G., Nsawah-Nuamah, N., Van Den Boom, G., and Damnyag, L., 2004. Determinants of antenatal care use in Ghana. *Journal of African Economies*, 13, 277–301.
- Paltiel, F., 1993. Women's mental health: a global perspective. In: M. Koblinsky, J. Timyan, and J. Gay, eds. *The health of women. A global perspective*. Boulder: Westview Press, 197–216.

- Peterman, A. and Johnson, K., 2009. Incontinence and trauma: sexual violence, female genital cutting and proxy measures of gynecological fistula. *Social Science & Medicine*, 68, 971–979.
- Patel, V. and Kirkwood, B., 2008. Perinatal depression treated by community health workers. *The Lancet*, 372, 868–869.
- Patel, V., Rahman, A., Jacob, K.S., and Hughes, M., 2004. Effects of maternal mental health on infant growth in low income countries: new evidence from South Asia. *British Medical Journal*, 328, 820–823.
- Rahman, A., Malik, A., Sikander, S., Roberts, C., and Creed, F., 2008. Cognitive behaviour therapy-based intervention by community health workers for mothers with depression and their infants in rural Pakistan: a cluster randomised control trial. *The Lancet*, 372, 902–909.
- Rahman, M.M., Rob, U., and Kibria, T., 2009. *Implementation of maternal health financial scheme in rural Bangladesh*. Final report. Dhaka: Population Council.
- Reichenheim, M., Zylberstajn, F., Moraes, C., and Lobato, G., 2009. Severe acute obstetric morbidity (near-miss): a review of the relative use of its diagnostic indicators. *Archives of Gynecology and Obstetrics*, 280, 337–343.
- Ronsmans, C., 2009. Severe acute maternal morbidity in low-income countries. *Best Practice & Research Clinical Obstetrics and Gynaecology*, 23, 305–316.
- Roost, M., Altamirano, V., liljestrang, K., and Essen, B., 2010. Does antenatal care facilitate utilization of emergency obstetric care? A case-referent study of near-miss morbidity in Bolivia. *Acta Obstetrica et Gynecologica*, 89, 335–342.
- Rutstein, S.O. and Shah, I.H., 2004. *Infecundity, infertility, and childlessness in developing countries. DHS comparative reports*. Calverton, MD: ORC Macro and the World Health Organization, No. 9.
- Sanghvi, T., Harvey, P., and Wainwright, E., 2010. Maternal iron-folate acid supplementation on programs: evidence of impact and implementation. *Food and Nutrition Bulletin*, 31 (2), S100–S107.
- Say, L., Pattinson, R., and Gulmezoglu, A., 2004. WHO systematic review of maternal morbidity and mortality: the prevalence of severe acute maternal morbidity (near miss). *Reproductive Health*, 1, 3.
- Stanton, M.E. 2010. A case for investment in maternal survival and health. Presentation at the Woodrow Wilson International Centre for Scholars, Washington, DC [online]. Available from: <http://www.wilsoncenter.org/events/docs/Mary%20Ellen%20Stanton%20Presentation.pdf> [Accessed 29 July 2011].
- Stanton, C., Holtz, S., and Ahmed, S., 2007. Challenges in measuring obstetric fistula. *International Journal of Gynecology and Obstetrics*, 99, S4–S9.
- Starrs, A. and Sankore, R., 2010. Momentum, mandates, and money: achieving health MDGs. *The Lancet*, 375, 1946–1947.
- Steketee, R., Nahlen, B., Parise, M., and Menendez, C., 2001. The burden of malaria in pregnancy in malaria-endemic areas. *American Journal of Tropical Medicine and Hygiene*, 64, 28–35.
- Stoltzfus, R.J. and Dreyfuss, M., ND. *Guidelines for the use of iron supplements to prevent and treat iron deficiency anemia*. Washington, DC: ILSI Press.
- Tinker, A., Hoop-Bender, P., Azfar, S., Bustero, F., and Bell, R., 2005. A continuum of care to save newborn lives. *The Lancet*, 365, 822–825.
- UK All Party Parliamentary Group on Population, Development and Reproductive Health, 2009. *Better off dead? Report on maternal morbidity*. London: UK All Party Parliamentary Group.
- UN Population Division, 2008. *World population prospects: the 2008 revision*. New York: United Nations.
- UNFPA, 2005. *The fistula fortnight, healing wounds, renewing hope, 21 February–6 March, 2005 – Kano, Katsina, Kebbi and Sokoto States*. Nigeria, NY: UNFPA and Campaign to End Fistula.
- UNFPA, 2009a. *The maternal health thematic fund: accelerating progress towards millennium development goals: annual report 2009*. New York: UNFPA.

- UNFPA, 2009b. *Written evidence. In UK All Party Parliamentary Group on Population, Development and Reproductive Health; 2008. Better off dead?* London: UK All Party Parliamentary Group on Population, Development and Reproductive Health.
- UNICEF, 1997. *Guidelines for monitoring the availability and use of obstetric services.* New York: UNICEF, WHO, UNFPA.
- Vayena, E., Rowe, P.J., and Peterson, H.B., 2002. Assisted reproductive technology in developing countries: why should we care? *Fertility and Sterility*, 78, 13–15.
- Wachs, T.D., Black, M.M., and Engle, P.L., 2009. Maternal depression: a global threat to children's health, development, and behavior and to human rights. *Child Development Perspectives*, 3 (1), 51–59.
- Wakabi, W., 2008. Ethiopia steps up the fight against fistula. *The Lancet*, 371, 1493–1494.
- WHO, 1998. *DALYs and reproductive health: report on an informal consultation.* Geneva: WHO, WHO/RHT/98.28.
- WHO, 2005. *World health report 2005: make every mother or child count.* Geneva: WHO.
- WHO, 2008. *Worldwide prevalence of anaemia report 1993–2005* [online]. Available from: www.who.int/vmnis/publications/anaemia_prevalence/en/index.html [Accessed 3 December 2010].
- WHO, 2009. *Monitoring emergency obstetric care: a handbook.* Geneva: WHO.
- WHO, NDa. *Infertility.* Geneva: WHO. Available from: <http://www.who.int/topics/infertility/en/> [Accessed 2 February 2011].
- WHO, NDb. *Sexually transmitted infections* [online]. *Fact sheet no. 110.* Geneva: WHO. Available from: <http://www.who.int/mediacentre/factsheets/fs110/en/index.html#> [Accessed 2 February 2011].
- WHO Bulletin, 2010. Mother or nothing: the agony of infertility. *Bulletin of the World Health Organization*, 88 (12), 881–882.
- WHO, UNICEF, UNFPA, and the World Bank 2010. *Trends in maternal mortality: 1990 to 2008.* Geneva: WHO.
- Wolf, A.W., De Andraca, I., and Lozoff, B., 2002. Maternal depression in three Latin American samples. *Social Psychiatry and Psychiatric Epidemiology*, 37, 169–176.
- Wude, S., 2008. *Site visit at Bahir Dar Fistula Clinic and interview with Jill Gay.* Ethiopia: Bahir Dar.
- Zeteroglu, S., Ustun, Y., Engin-Ustun, Y., Sahin, H.G., and Kamaci, M., 2005. Eight years' experience of uterine rupture cases. *Journal of Obstetrics and Gynaecology*, 25 (5), 458–461.
- Zheng, A. and Anderson, F., 2009. Obstetric fistula in low-income countries. *International Journal of Gynecology and Obstetrics*, 104, 85–89.