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Improving Reproductive, Maternal and Newborn Health: Burden, Determinants and Health Systems

Evidence Overview

A Working Paper (Version 1.0)

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Preface to the RMNH Evidence Series

This preface provides the context for a series of evidence reviews relevant to improving Reproductive, Maternal and Newborn Health (RMNH) in low-income countries. The series reflects a process of incremental knowledge-building, with the intention of adding further reviews as required. This flexible approach to evidence synthesis is primarily aimed at informing the implementation of the UK Government's RMNH Business Plan (2011–2015) and in the spirit of sharing evidence the reviews are also made available publicly.

The need for decisions on health policies, programmes and practice to be informed by evidence is indisputable. The current debates are around types and grades of evidence, techniques for knowledge appraisal, management and uptake, and on the varying needs of different decision-making purposes and contexts.[1] What is clear is that to inform decision-making the best available evidence must be found and then applied. This, in turn, points to three requirements: the development of evidence-management skills, the promotion of circumstances conducive to the use of an evidence-based approach and recognition of the need to renew decisions in the light of new evidence. Acknowledging these key requirements has helped to drive and shape this series of RMNH evidence reviews.

This series acknowledges three main types of knowledge, set out in Panel 1 below, but draws primarily on empirical or explicit knowledge based on published, quantitative or qualitative research and other systematic approaches to enquiry. The wealth of experiential knowledge from country programmes will be captured elsewhere. In addition, if the best evidence available is to be found and applied to decision-making, it needs to acknowledge the dynamic nature of knowledge creation. New knowledge emerges continuously. Although policy and programme decisions must be made using the best evidence available at the time, there needs to be a system for regular updating as well as for reviewing earlier decisions.

Panel 1: Three main types of knowledge

Empirical knowledge: explicit knowledge from qualitative or quantitative research or other systematic modes of enquiry (e.g. international survey programme – similar to Demographic and Health Surveys).
Theoretical knowledge: derived from different theoretical frameworks applied to problems or issues, sometimes using research but often intuition or logic.
Experiential knowledge: craft or tacit knowledge built-up over a number of years of practice experience.

Source: Brechin A, Siddell M. 2000. 'Ways of knowing' in Gomm R, Davies C (ed). Using evidence in healthcare. Open University.

The wide scope of policy and programme interventions to improve RMNH requires a diverse and substantial body of knowledge to be identified, appraised, synthesised and shared. The scale of the task has required an incremental approach; with component knowledge products made available at different times over the course of almost a year, as set out in Table 1. Some of these are created using standard systematic review methodology and others from structured literature reviews. They do, however, share two important features in common: all have undergone peer-review processes as part of quality assurance and all seek to appraise and synthesis evidence but do not make specific policy, programme or practice recommendations.

The series of 12 evidence reviews will be made available as online resources or reference materials. We plan to add a search function to enable readers to readily locate relevant sub-

sections, with the assumption that these materials will not be read cover to cover. This incremental approach to appraising and sharing evidence also enables regular updates as well as feedback from users to be acknowledged. Feedback is welcome at RMNH-evidencefeedback@dfid.gov.uk.

Table 1: The evidence series on RMNH

Series number	Title/topic	Source	Type of evidence review	Expected Availability
1.	The Evidence Towards MDG 5	Options Consultancy Services	Structured review	December 2010 (version Feb 2010)
2.	Burden, determinants & functioning health systems	DFID in-house	Structured review	December 2010 (version 1.0)
3.	Interventions to reduce unintended pregnancy	DFID in-house	Structured review	December 2010 (version 1.0)
4.	Private Sector Engagement in MNH/SRH	HLSP/JHU	Systematic review	December 2010
5.	Interventions for integrated care for mothers and newborns	DFID in-house/outsourced	Structured review	April 2011 (tbc)
6.	What kinds of policy and programme interventions around referrals and transport contribute to reductions in maternal mortality?	University of Aberdeen	Systematic review (round 1)	April 2011
7.	What kinds of policy and programme interventions in post-abortion care contribute to reductions in maternal mortality?	Institute of Education	Systematic review (round 1)	April 2011
8.	What are the most effective models of delivery of improved maternal and child health outcomes for poor people in urban areas in LICs?	LSE	Systematic review (round 1)	June 2011
9.	What kind of family planning delivery mechanisms increase family planning acceptance in developing countries?	Portsmouth University	Systematic review (round 1)	March 2011
10.	What is the impact of method mix on contraceptive prevalence in developing countries?	Portsmouth University	Systematic review (round 1)	May 2011
11.	What is the effectiveness of nutrition support programs in reducing maternal mortality and morbidity?	TBC	Systematic review (round 2)	Dec 2011
12.	What is the effectiveness of demand side financing (DSF) measures in increasing maternal health service utilisation and outcomes, particularly for rural, poor and socially excluded women?	TBC	Systematic review (round 2)	Dec 2011

Executive Summary

This Evidence Overview provides a summary of the size of the burden of unintended pregnancy, maternal and newborn mortality, and other adverse outcomes, and on the coverage of the main care packages. The paper then summarizes the evidence on the wider determinants of these outcomes and options for influencing them, followed by setting-out the broader epidemiological context of RMNH. The final two sections address issues that are common to both RH and MNH programmes: removing barriers to access and the role of functioning health systems. The evidence on programme interventions that are specific to reducing unintended pregnancies and to MNH services is covered in separate papers.

What do we know about fertility levels and preferences?

Countries with high fertility levels are mostly concentrated in sub-Saharan Africa. Some of the most fragile West Africa states such as Niger, Mali, and Chad stand out as having particularly high fertility levels. Rates of births to adolescents are particularly high across Sub Saharan Africa, plus a smaller number of countries in South Asia and Latin America, including Afghanistan, Bangladesh and Nepal. Absolute numbers of births to adolescents are higher in Asia. Both married and unmarried adolescents face significant barriers in accessing family planning. Monitoring adolescent fertility rates are crucial for monitoring what is likely to be a group with a high need for contraception.

What do we know about the unmet need for family planning, maternal and newborn health?

Overall it is estimated that some 215 million women have an unmet need for family planning. In other words, they want to avoid or delay pregnancy but are not using contraception. The highest estimates of unmet need for family planning are in South Asia and sub-Saharan Africa. Based on latest data, the countries with especially high unmet need are Uganda with an unmet need of 41%, Rwanda with 38%, and Ghana and Ethiopia with 34%.

For countries which still have high fertility preferences, there is greater relative unmet need for spacing births than for limiting family size, which is important when considering the most appropriate mix of contraceptives. For example, in DRC, about four-fifths of unmet need is for spacing rather than limiting. In contrast, in Swaziland where fertility preferences have fallen rapidly, although there is the same level of unmet need as in DRC, the majority of the need is for limiting. Contraceptive prevalence in sub-Saharan Africa continues to be very low. Surveys show that use of contraception is lowest among rural women, the poorest women and those with no education.

Most developing regions, most significantly sub-Saharan Africa and Southern Asia, are not on track to achieve MDG5 – to reduce the maternal mortality ratio by three quarters between 1990 and 2015. Each year more than one third of a million women and girls die in pregnancy or childbirth and 60 million give birth without skilled care. Postpartum haemorrhage is the main cause of maternal death in sub-Saharan Africa, accounting for about a third of all maternal deaths. Other factors which increase the risk of women's death and disability include HIV/AIDS, undernutrition and malaria. Unsafe abortion is one of the major causes of maternal mortality globally. It is estimated that 47,000 (out of 358,000 maternal deaths) women died in 2008 as a result of unsafe abortions, and many more suffer severe health consequences.

Although there have been significant reductions in infant and child mortality, at least 3.5 million newborns die each year, about 40% of all deaths in children under 5 years old. As overall child mortality decreases, neonatal mortality accounts for a higher proportion of child

mortality. Around 86% of newborn deaths globally are the direct result of three main causes: severe infections (including sepsis/pneumonia, tetanus and diarrhoea), asphyxia and preterm births.

What do we know about the distal determinants of RMNH?

There is a wide but varied evidence base on the determinants of poor RMNH. The association between girls' education, particularly secondary schooling, and maternal health is well documented. Poverty is also a determinant of poor reproductive health, although the evidence on the direct role of women's economic empowerment is more limited. Survey data in sub-Saharan Africa show that poverty and lack of education perpetuate high adolescent birth rates, and that in many countries disparities have widened over time.

Qualitative case study evidence from several countries suggests that continued political commitment to RMNH is a critical factor to achieving sustained improvements in the health of women and their newborns, although more research is needed on what is needed to catalyse political leaders.

Protection and promotion of women's sexual and reproductive rights is important to reproductive and maternal health progress in regions where women's and girls' status is diminished. Evidence gaps remain on how the link between women and girls' status and reproductive health is mediated by poverty, education and employment.

What do we know about removing barriers to access to RMNH services?

Lack of transport and effective referral systems pose significant barriers to access. But the evidence is much more mixed on how best to overcome geographical disadvantages. Public-private partnerships and the modification of existing private transport facilities look promising to address obstetric emergencies. But more systematic research is needed on the impact of different transport interventions on health outcomes.

Referral communications for obstetric emergencies could potentially benefit from increasingly sophisticated technologies. Systematic review evidence suggests that improving communication between community-based workers and medical professionals can reduce transport delays and improve rates of referral of women to the appropriate level of care.

The most reliable evidence on improving access to services and improving neonatal health outcomes is around community mobilisation through women's groups. There is now very strong evidence from Asia showing that women's groups can reduce neonatal mortality by up to a third. There is a strong case for scaling up these interventions to assess the impact of women's groups in other settings.

The case for removal of fees at the point of use is strong and there is good evidence to show that charges contribute to the often catastrophic financial burden faced by those seeking care. There is strong evidence that removal of fees leads to immediate increases in utilisation of services, although evidence on how best to implement fee removal policy change is less clear.

Removing fees is one important step in the process towards equitable financing and universal coverage. Other instruments such as cash transfers, incentives and vouchers look promising and can increase utilisation of services. But more evidence is needed on long-term utilisation, the impact on health outcomes, service quality and cost-effectiveness.

What do we know about functioning health systems?

Improving RMNH requires strong functioning and equitable health systems. In particular it requires sufficient and motivated health workers with the right skills in the right places. Many countries are exploring opportunities for task shifting or task sharing to increase access to and delivery of services. There is growing evidence that appropriately trained mid level providers can produce as high quality care and achieve good health outcomes as doctors. However, the evidence is still limited and more data from more settings is needed. Several authors have cautioned that task shifting is no substitute for training and retaining sufficient numbers of the right cadres of staff for the health system.

It is clear that health workers need a strong enabling environment to operate in. The presence of functional emergency obstetric care facilities with the required infrastructure is associated with improved service provision. Several studies have shown improved service quality, maternal outcomes and staff morale following upgrading or rehabilitation of EmOC facilities. But this needs to take place in tandem with the correct mix and number of staff, adequate staff training, skills and supervision.

Finally, RMNH services are highly dependent on the availability and security of commodities. Country case study evidence suggests that funding constraints, combined with weak national budgets to prioritise the purchase of reproductive health supplies in particular have created an unstable environment for supplies. There is emerging evidence to suggest that focussed interventions (such as technical assistance) can be successful in overcoming these problems and ensure commodity security. This confirms the importance of staffing and co-ordination in managing the complexities of forecasting, ordering and procurement.

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Acroynms

CCT	Conditional cash transfers
CHW	Community Health Workers
DALY	Disability Adjusted Life Year
CP	Contraceptive prevalence
DCE	Discrete choice experiments
DFID	Department for International Development
DHS	Demographic and Health Surveys
DRC	Democratic Republic of Congo
DSF	Demand side financing
EOC	Emergency Obstetric Care
FP	Family Planning
FIGO	International Federation of Gynaecology and Obstetrics
GHI	Global health Initiatives
GHP	Global Health Partnerships
HRH	Human resources for health
HRM	Human Resource Management
HSS	Health Systems Strengthening
ILO	International Labour Organisation
ICM	International Confederation of Midwives
ICPD	International Conference on Population and Development
IPV	Intimate-partner violence
ITN	Insecticide Treated Nets
IUD	Intrauterine device
JSY	Janani Suraksha Yojana
LHW	Lay health workers
MDG	Millennium Development Goals
MOMS	Midwives and Others with Midwifery Skills
MMR	Maternal mortality rate
MVA	Manual Vacuum Aspiration
NGO	Non-government organisation
NICE	National Institute of Clinical Excellence
OECD	Organisation for Economic and Development
PMTCT P	reventing mother-to-child transmission (of HIV)
PMNCH	Partnership for Maternal, Newborn and Child Health
RCT	Randomised Control Trial
RESCUER	Rural Extended Services and Care for Emergency Relief
RHCS	Reproductive Health Commodity Security
RMNH	Reproductive, Maternal and Newborn Health
RH	Reproductive Health
SBA	Skilled birth attendant
SDIP	Safe Delivery Incentive Programme
SSMP	Support to the Safe Motherhood Programme
STIs	Sexually Transmitted Infections
TB	Tuberculosis
TBA	Traditional birth attendants
TFR	Total fertility rates
UCT	Unconditional cash transfers
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development

WHO	World Health Organization
WLHA	Women living with HIV
WRA	White Ribbon Alliance

1. Introduction

Today, a woman living in the United Kingdom is likely to plan and have around two children and faces a risk of dying during pregnancy and childbirth of just 1 in 5,000.[2] The comparison with a woman living in, say, Sierra Leone is stark: she is likely to have 6 children if she completes her reproductive life but also has a risk of 1 in 21 of dying of maternal causes. The contrast for neonatal mortality is equally alarming: respectively 3.1 and 38.6 deaths in the first month of life per 1,000 live births.[3] The current low levels both of unintended pregnancies and of maternal and newborn mortality in high income countries are the hallmark of functioning health systems, achieving high and equitable coverage of efficacious clinical interventions and good quality services for women, for mothers and for babies, supported by broader socio-economic development.[4] This success story, combined with others from lower and middle-income countries, is reflected in the common phrase among the global health community – 'we know what works.'[5]

1.1 Scope of this paper

This paper is one of a series of reviews summarising the current state of evidence on 'what works' to improve RMNH. The primary audience for the series is policy and programme decision-makers in DFID country offices and in partner organisations, and aimed at informing the implementation of the UK Government's RMNH Business Plan (2011-2015). Each paper in the series acts a resource to support practical decisions. The intention is to present the evidence rather than to draw conclusions or recommendations for policy or programmes, important further steps which are taken in other DFID documents. The papers rely heavily on existing evidence summaries and syntheses, with some providing comprehensive structured overviews and others undertaken as full systematic reviews. The structure and content of the evidence series was driven by a simple conceptual framework which sets out the pathways and levels of interventions to improve RMNH, as described below.

This paper provides the background overview of the magnitude of the burden of unintended pregnancy and poor maternal and newborn health, the distal determinants and wider health systems context.

1.2 Conceptual framework for evidence series

The health of women, newborns, children and adolescent girls is inextricably linked across life-cycles and across generations.[6] This synergy is captured in the Continuum of Care framework first promoted by WHO[7] in 2005 and depicted in Figure 1.[8] There are two dimensions implied in this continuum framework: across time and target group – from pre-pregnancy to childhood, and across place – from home to referral hospital. In terms of the former dimension, this evidence series focuses on a sub-set of the life-cycle continuum which covers the period from before pregnancy through to the end of the postnatal period at six weeks for mothers and at 28 days for the newborn. This interval of time captures the extreme negative outcomes – maternal and neonatal deaths and stillbirths, as well as positive outcomes as defined by the World Health Organization (WHO): 'complete physical, mental and social well-being and not the mere absence of disease'.

Figure 1: The RMNCH continuum of care

Source: www.pmnch.org 7

In practical terms, the need to consider the evidence both on interventions to assure positive health outcomes and to prevent negative ones increases the scope and complexity of this evidence series beyond that found in a more disease-focused set of reviews.[9] As with other outcomes, RMNH and avoidance of death can be achieved through both preventive and curative strategies. However, given that pregnancy is the conditionality, by definition, for pregnancy-related health and death, then avoidance of unintended pregnancy is clearly also an important primary preventive strategy. Once pregnant, a woman's health and that of her baby can be assured by routine maternity care – during and after childbirth, and should complications arise – by timely access to effective curative care.[10] Avoidance of unintended pregnancy and safe childbirth are thus the two main intermediate outcomes influencing upon the health and survival of women of reproductive age and of newborns that are considered in this evidence series.

Interventions to avoid unintended pregnancy or to achieve safe childbirth operate at different levels of abstraction and are delivered at different points on the continuum of care from home to referral hospital.[6] In this evidence series, a distinction is made between clinical interventions which directly intervene to avoid pregnancy, such as hormonal contraception, or to prevent death from severe newborn sepsis, such as antibiotics, versus those interventions that affect the availability and quality of services, versus those affecting the demand for care, versus those which involve more distal determinants, such as female education. This hierarchy of levels of interventions has implications not only for the type of evidence available but also how far it can be generalised.[9] For example, magnesium sulphate as the drug of first choice for the management of eclamptic convulsions in pregnant woman has been proven to be efficacious through high quality Randomised Control Trial (RCTs) and is evidence of wide relevance and applicability. On the other hand, interventions to improve emergency transport for obstetric or newborn complications include a diverse range of options often specific to a particular context and with varying effectiveness, so making their relevance and applicability more limited, and this is often further compromised by the use of weak evaluation designs by scientific standards.

This example also highlights the crucial distinction between single interventions, such as insecticide treated nets (ITNS), versus composites or packages of interventions (or care) which are typically delivered as services.[11] A further important distinction is between *content interventions*, such as drugs or clinical procedures, versus *implementation interventions* –

meaning those to improve the delivery of proven interventions. Defining 'what works' under these circumstances must take into account these issues and complexities, as discussed in the Methods section below. Given the main target audience for this evidence series, the main focus is on evidence on interventions to improve the implementation of packages of care.

1.3 Methods

As mentioned earlier, the full evidence series includes some papers which are structured literature reviews and others which are systematic reviews (see Preface); this paper falls into the former category. The methods for finding evidence thus vary somewhat between the papers, although all employ formal search applied to the main literature database. Additionally, snowball searching was also used, along with contacting experts and agencies working on RMNH and reviewing abstracts published in recent relevant conferences. Expert panel reviewers for the evidence series also suggested further key materials.

Identified reports and studies were included in the following categories:

1. Published research summary papers and reports, including systematic and synthetic reviews, providing evidence from primary studies.
2. Published reports from international organisations.
3. Peer-reviewed publications on relevant historical, ecologic or programmatic experiences across multiple countries.
4. Published research paper on major primary studies of high grade, where no systematic or synthetic review was available.

For those papers in the evidence series which are not formal systematic reviews, reliance is placed on strength of evidence according primarily to design and source, and no further grading of quality is undertaken.[12] Given the diversity of types and levels of interventions include in this overview, a scheme was developed, adapted from the National Institute for Clinical Excellence (NICE), SIGN[13] and others[14], for gauging the strength of the evidence (see Table 2). This combines the standard classification of evidence which is based on study design, with an assessment of the strength of non-research evidence on implementation interventions based on plausibility, since evaluation by experimental design may not be realistic for some of these.[15] The aim is to bring findings together to create 'evidence statements' on interventions, and then group these into three categories to differentiate what is known reliably, what looks promising and what are the important unknowns (see Table 3). This synthesis process is ongoing and will be completed in subsequent updates of this working paper.

Table 2: Strength of evidence grading

Narrative used	Specification
Very strong plausibility	Very strong logical or theoretical basis, substantial multi-country programme experience, very strong consensus from respected authorities.
Strong plausibility	Strong logical or theoretical basis, some multi-country experience, strong consensus from respected authorities.
Very strong evidence	Evidence from at least one systematic review of multiple, well-designed RCTs.
Strong evidence	Evidence from at least one properly designed RCT of adequate size.
Moderate evidence	Evidence from well-designed trials without randomisation
Other evidence	Evidence from well-designed observational studies from more than one centre or group.

Table 3: Categorisation of 'what is known'

Category	Basis
What do we know reliably?	Very strong to moderate evidence from studies across multiple (N>3) countries (i.e. generalisable) that an intervention/package is effective, **or** strong plausibility of benefit.
What looks promising?	Very strong to moderate evidence that an intervention/package is effective but only from three or fewer countries, **or** moderate plausibility of benefit.

1.4 Structure of this paper

This third paper in the evidence series provides an overview of the size of the burden of unintended pregnancy, maternal and newborn mortality, and other adverse outcomes, and on the coverage of the five main care packages. The paper then summarises the evidence on the wider determinants of these outcomes and options for influencing them, followed by setting out the broader epidemiological context of RMNH. The final two sections address the crucial influence of functioning health systems. Section 4 looks at evidence on overcoming barriers to access and financing mechanisms. Section 5 looks at human resources and the other building blocks of a strong health system.

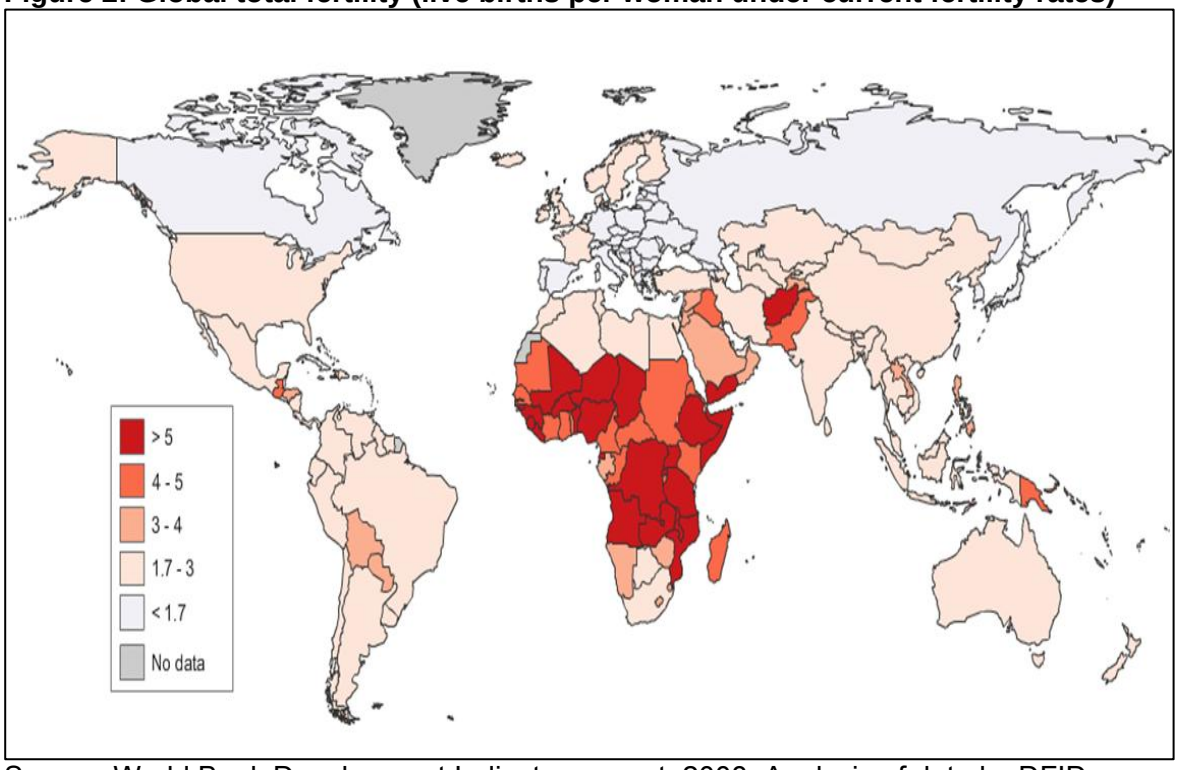
2. Burden and context

2.1 Fertility levels and unmet need for family planning

2.1.2 Fertility levels and preferences

Fertility levels vary substantially between countries. In every society a variety of cultural, economic, and health factors influence fertility levels. These include, for example, cultural values regarding childbearing; social roles; economic realities; and the prevalence of diseases such as gonorrhoea that impair fecundity. The map below shows that countries with high fertility levels are mostly concentrated in sub-Saharan Africa. Southern Africa stands out as the only region in sub-Saharan African which has undergone a significant fertility transition. Some of the most fragile west African states such as Niger, Mali and Chad have particularly high fertility levels with total fertility rates (TFR)[1] of 7.1, 6.5 and 6.2 births per woman respectively. In Asia, many countries have extremely low, below replacement level fertility rates. For example, China and Thailand have TFRs of 1.8 and Vietnam has a TFR of 2.0 Bangladesh and India have also achieved significant fertility reductions with respective TFRs of 2.3 and 2.7.[16]

Figure 2: Global total fertility (live births per woman under current fertility rates)



Source: World Bank Development Indicators report, 2008. Analysis of data by DFID.

[1] TFR is the average number of children that would be born to a woman over her lifetime if (a) she were to experience the exact current age-specific fertility rates (ASFRs) through her lifetime, and (b) she were to survive from birth through the end of her reproductive life.

2.1.3 Adolescent fertility levels

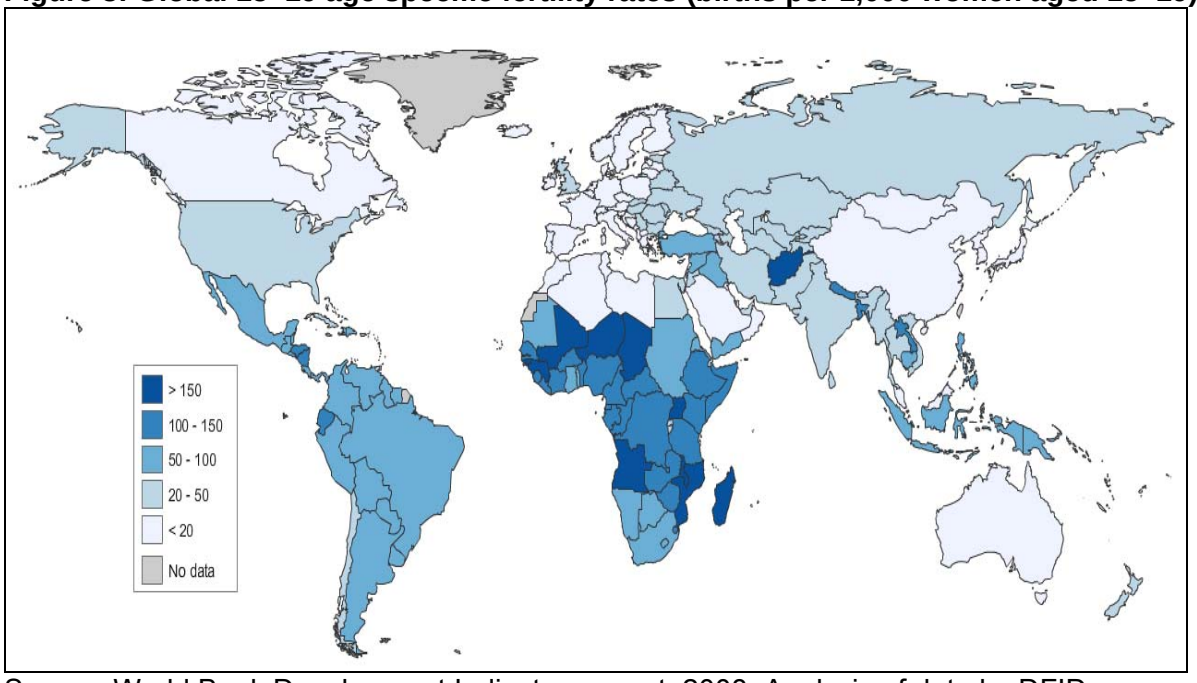
In 2008 there were 14.3 million births to adolescent women aged 15–19; each year and 15–19 year olds account for 16% (some 5 million) of all births in sub-Saharan Africa and 12% (some 6 million) in south central Asia and south-east Asia.[17]

Rates of births to adolescents per 1,000 15–19 year old girls are particularly high across sub-Saharan Africa (west, central and eastern parts in particular), plus a smaller number of countries in Asia and Latin America, including Afghanistan, Bangladesh and Nepal (the White Ribbon Alliance's Atlas of Birth). Absolute numbers are higher in Asia.

Adolescent childbearing is particularly significant because adolescent mothers have a higher risk of adverse maternal outcomes, leading to higher maternal mortality and morbidity, and poor neonatal outcomes, such as prematurity, low birth weight and mortality. Figure 2.2 shows the global age specific fertility rates for females aged 15–19.

While many high fertility countries also have high rates of adolescent childbearing, some with lower fertility do as well. Delaying sexual activity and marriage plays an important role in preventing adolescent fertility and is facilitated by rising levels of female secondary education.[18] Contraceptive practice is important as well but tends to be erratic for this age group.[19] Moreover, sexually active and unmarried young women seeking to postpone pregnancy are in need of contraception but are often not included in estimates of unmet need which tend to based on women in union. This age group faces significant barriers in accessing family planning. As a result, adolescent fertility rates, calculated for all 15–19 year old women irrespective of marital or union status, are crucial for monitoring what is likely to be a group with a high need for contraception.

Figure 3: Global 15–19 age specific fertility rates (births per 1,000 women aged 15–19)

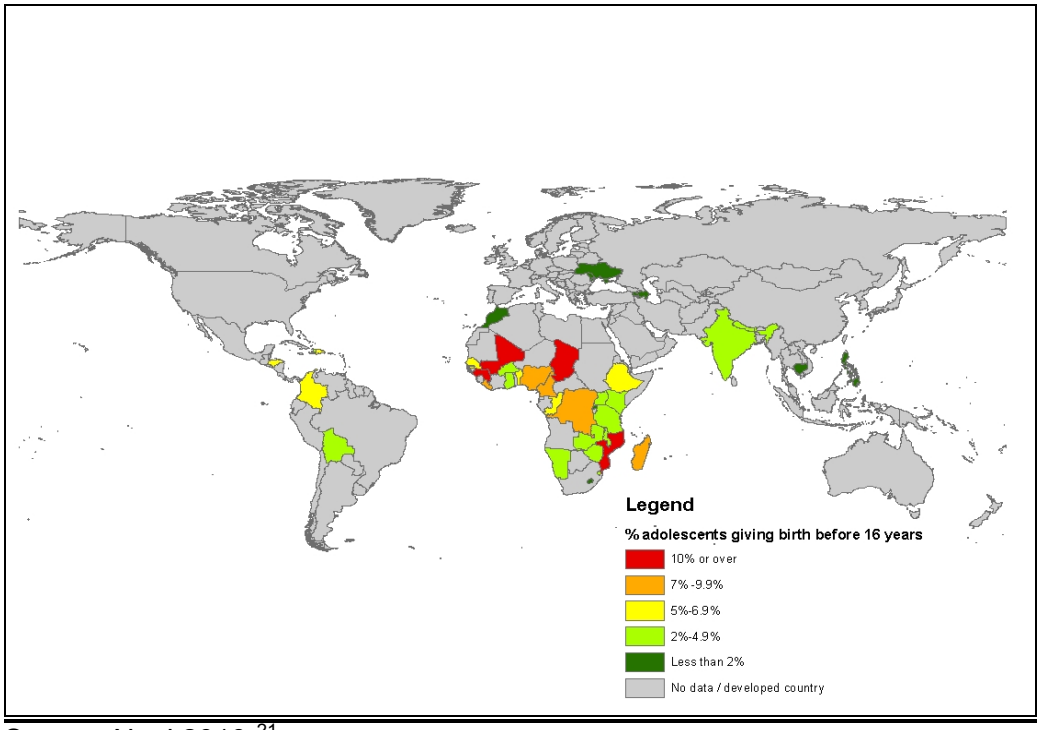


Source: World Bank Development Indicators report, 2008. Analysis of data by DFID.

Very early adolescent motherhood

Analysis of Demographic and Health Surveys (DHS) data by Neal shows that the highest percentages of girls who become pregnant when 15 or under are concentrated in a small number of countries in west and Central Africa and Mozambique.[20]

Figure 4: Distribution of early adolescent pregnancy

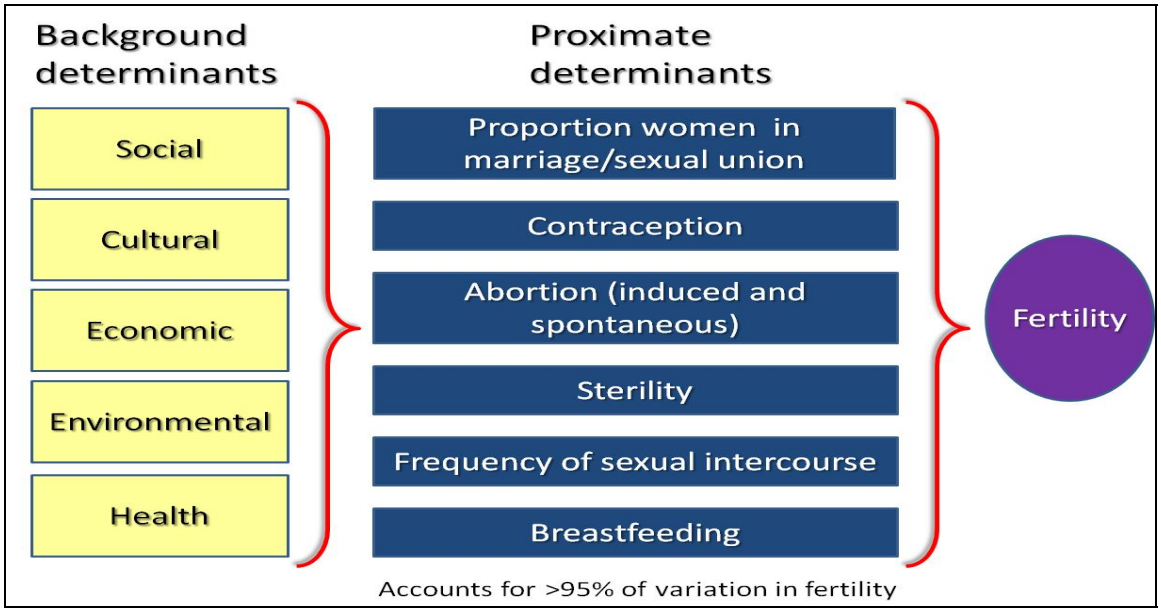


Source: Neal 2010.[21]

2.1.4 Factors influencing fertility rates

Nearly every society realises lower fertility than the biological maximum, even those with a high demand for living children.[22] A useful framework for understanding how the wider social, cultural and economic environment influences fertility is the proximate determinants framework. The proximate determinants are the factors that directly determine fertility levels and the background variables influence fertility by working through these determinants[23].

Figure 5: Determinants of Fertility framework



Different societies have a different set of factors that control their fertility, even where demand for children is very high. For example, in India, girls traditionally married very young with nearly universal marriage. However, they were often married to older men and, with high adult mortality and were often widowed while still of reproductive age. As there was a cultural taboo on widows remarrying, this led to lower fertility. Another example is Nigeria – where women also marry young and there is also universal marriage but there is a strong cultural taboo on sexual relations while a woman is breastfeeding. Given traditionally women breastfeed for extended periods, fertility was lower than the biological maximum.

The decline in fertility over time is not uniform across all age groups and each country has its own trajectory of fertility decline (see annex Figure A1). The concentration of births in the younger age groups is clearly seen in Bangladesh with women aged 20–24 having the highest fertility rates and family planning being used for limiting rather than spacing. Zimbabwe has a completely different pattern of fertility decline, with women in their twenties accounting for most of the decline, indicating more use of family planning for spacing. In both Ghana and Kenya, declines in adolescent fertility can be seen and account for a more significant part of fertility decline than in other countries. Although, this may be due to sociocultural factors such as sexual behaviour, especially of unmarried women, family planning is also likely to be responsible for some of the decline.

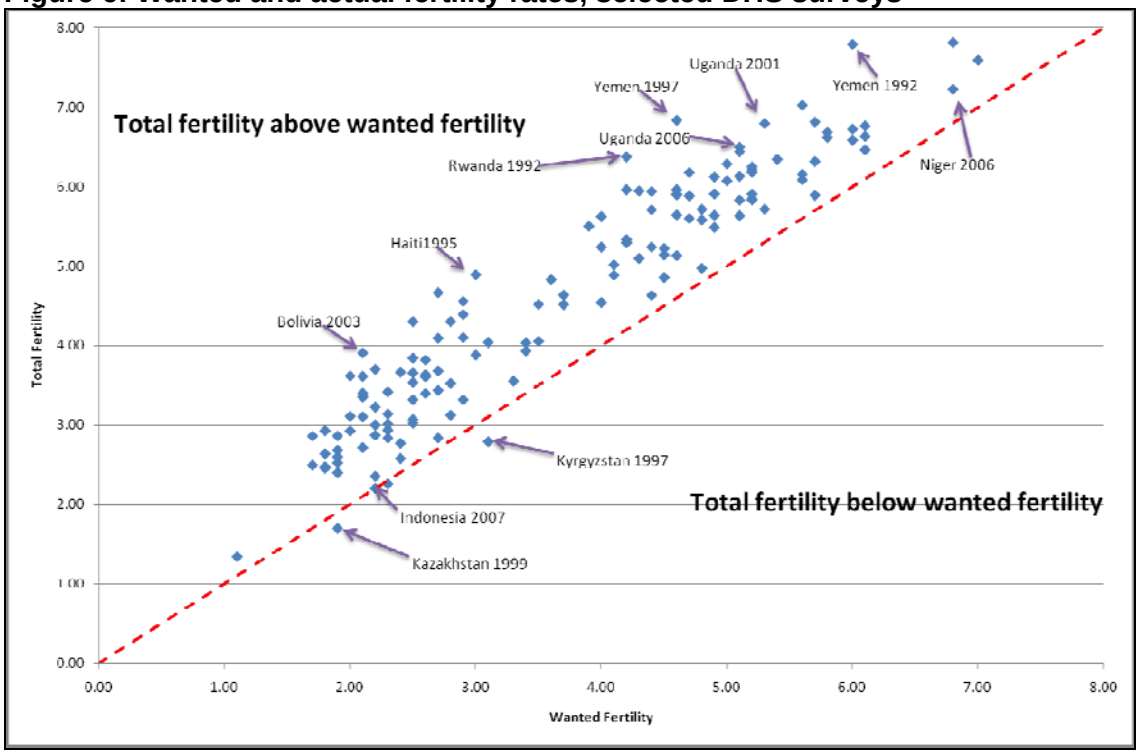
[See Annex, Figure A1: Changes in age-specific fertility rates, selected countries]

While fertility is affected by other determinants such as age at marriage and abortion rates, contraception use, especially modern contraception, is a strong predictor of fertility. Unsurprisingly fertility rates are highest in countries with the lowest contraceptive prevalence. The inverse association between contraceptive use and fertility is either due to high levels of desired fertility (in other words, the unmet need for contraceptives is low) or where there is a conscious desire to control fertility but couples do not have access to contraceptives for a variety of reasons (in other words, the unmet need for contraceptives is high).

One of the main goals of family planning is to ensure that women can meet their desired fertility. If the actual fertility is higher than wanted fertility, then there is most likely an unmet need for family planning. Using DHS data, Figure 6 shows that in most countries surveyed

at different points in time, total fertility is higher than wanted fertility. The further above the line that a country is, the greater the potential need for family planning. For example, in 2006 Niger's actual TFR is similar to its wanted TFR and consistent with its relatively low unmet contraceptive need of 16%. In contrast in Rwanda in 1992 where wanted fertility was about a birth and a half less than realised fertility, indicating high unmet need.

Figure 6: Wanted and actual fertility rates, selected DHS surveys



Source: Demographic and Health Surveys data, various years. Analysis of data by DFID

2.1.5 Contraceptive prevalence and method mix

A review of the estimated contraceptive uptake from the most up to date available data (ranging from 1997 to 2006) reported that least developed countries had a 62% prevalence rate (compared with 67% in more developed countries).[24] The number of married women who had an unmet need for family planning was estimated in 2000 as 105 million married women (17% of married women).[25]

Box 1 summarises the main contraceptive methods available. The specific contraceptive methods that women use vary substantially from country to country and region to region. The method mix in a country reflects many factors, including the availability of various contraceptive methods and people's awareness of them, their cost, and where they can be obtained. In addition, personal preferences, social norms, and perceived acceptability of family planning use affect contraceptive choices.

Box 1: Contraceptive methods

Modern contraceptives include all hormonal methods (i.e. the pill, injectables and implants), IUDs, male and female sterilisation, condoms and modern vaginal methods (e.g. the diaphragm and spermicides).
Natural or fertility awareness methods include lactation amenorrhea method (LAM), periodic abstinence and withdrawal.
Traditional methods include natural methods and any other country specific folk methods.

Table A1 (see Annex) summarises contraceptive method by region. Longer acting methods are the most popular in Asia, with the IUD and female sterilisation accounting for nearly two thirds of women using contraceptives. The use of female sterilisation as the dominant contraceptive method globally is especially influenced by contraceptive practices in China and India. In sub-Saharan Africa, the picture is very different. The IUD and sterilisation only account for about 10% of all contraceptive users. The condom has increased in popularity from 3% in 1980–84 to 8% in 2000–05 – a large relative increase although still representing only a small proportion of contraceptive users. The most popular methods in sub-Saharan Africa are traditional, representing 31% of users – a sharp decrease from the 55% in 1980–84. The high level of use of traditional methods may reflect demand for spacing rather than limiting and also the tradition of extended breastfeeding and postpartum abstinence in many areas of sub-Saharan Africa.

[See Annex, Table A1, Percentage of married female contraceptive users by method and survey period, according to region]

Periodic abstinence and withdrawal account for nearly two thirds of all contraceptive users in the Democratic Republic of Congo (DRC), for example. Although this might reflect social and cultural values, it is also likely that this reliance on less effective, traditional methods is due to difficulties in accessing modern contraceptives. Injectables are popular in many sub-Saharan African countries but condom use varies greatly from 3% in Ethiopia to 36% in Swaziland. Figure A3 (see annex) shows the situation in selected countries based on the latest available DHS.

[See Annex, Figure A3, Contraceptive mix, selected countries]

Even within the broad regional groupings, there are significant differences between countries. India stands out with its reliance on female sterilisation, accounting for two thirds of all contraceptive users. Reliance on this method is partially responsible for women having their children early and having more closely spaced births than Bangladesh with a similar contraceptive prevalence but with lower use of short acting methods such as the pill and injectables.

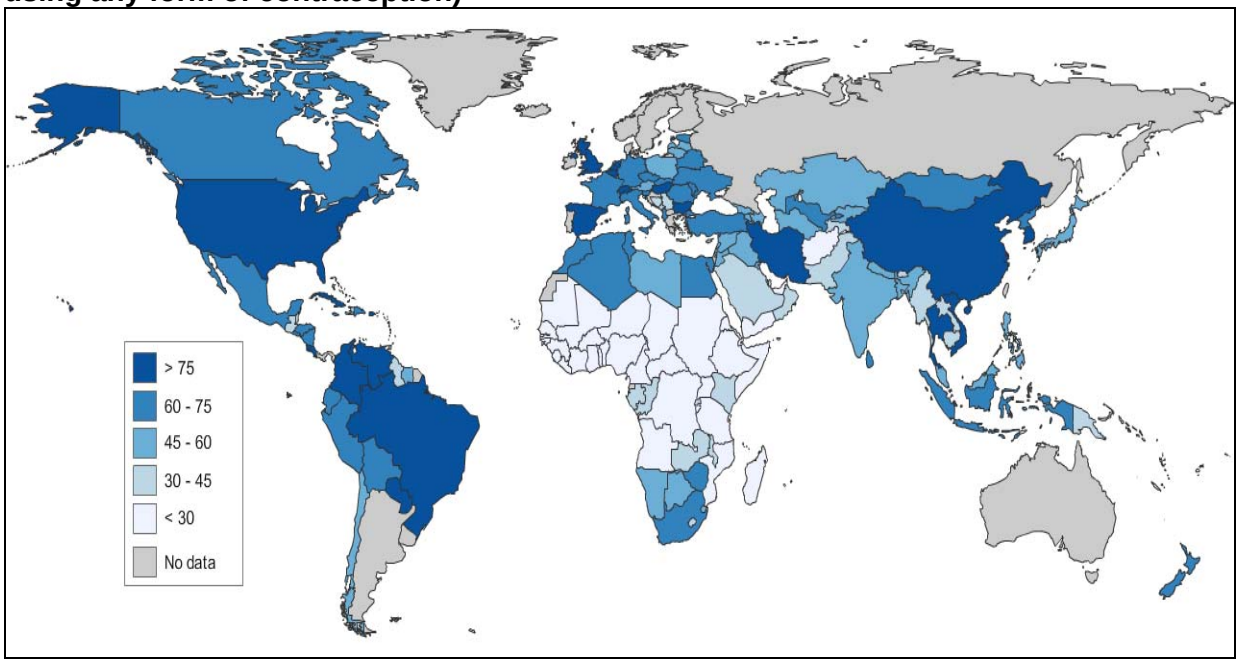
Variations in contraceptive use

In an analysis of survey results from the DHS conducted in over 50 countries, the most common reason for not using a form of contraception amongst unmarried women was reported as being that they had sex infrequently, followed by concerns about the perceived health risk or side effects associated with modern contraceptives[26]. Women also reported that they did not use contraceptives as they were breastfeeding, due to family or spouse restrictions and access to services[27].

Community studies exploring the reasons for contraceptive use in Ghana, Zimbabwe and Tanzania[28] found that a woman's age, location and relationship status influenced the contraceptive method used. In Ghana and Zimbabwe, older women (40 and older) were least likely to use modern contraceptives; in contrast the youngest women (aged 15–19) in Tanzania were the least likely to be using modern methods. In Tanzania and Zimbabwe those with one or more children were more likely to use modern contraception than those with no children at all. Those who have never married and those in polygamous unions were most likely to use modern contraception than those formerly or currently married. The extent to which these decisions were influenced by individual choice, social norms and/or access to contraceptive methods was not assessed in the study making it difficult to ascertain the motivation behind the difference in the findings.[2]

[2] More discussion on what influences the use of contraceptive methods can be found in the accompanying paper on Interventions to prevent unintended pregnancies.

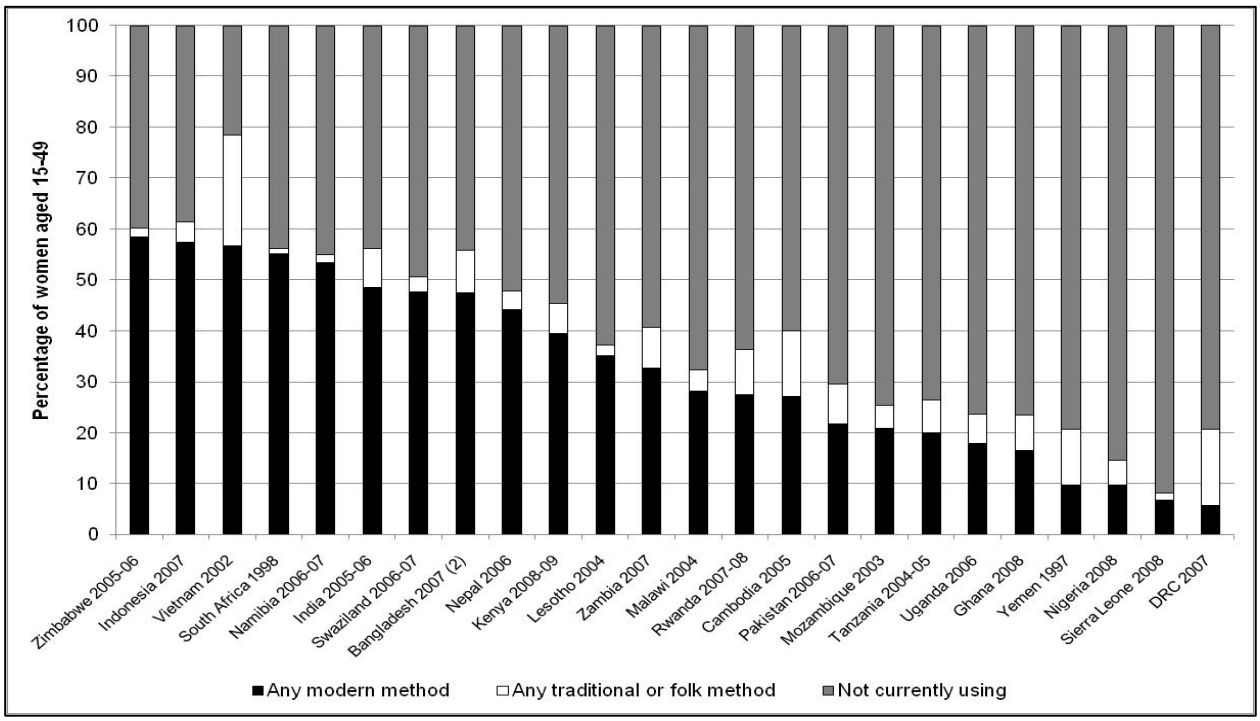
Figure 7: Global contraceptive prevalence rate (percent of women in union aged 15–49 using any form of contraception)



Source: UNICEF report 2010, analysis of data by DFID

Generally, in countries with lower contraceptive prevalence rates, traditional methods of family planning account for a higher proportion of contraceptive use among women using contraceptives. For example, in DRC the majority of women using contraceptives use traditional methods. In contrast, countries in southern Africa have high levels of modern contraceptive use, reflecting the fertility decline in the region.

Figure 8: Contraceptive prevalence rate by type of contraceptive for selected countries



Source: Demographic and Health Surveys data

Inequalities in contraceptive prevalence

There are also differences in contraceptive prevalence by background characteristics, especially modern contraceptives (see Annex Figure A4). In many countries, urban and wealthier women have higher modern contraceptive prevalence rates than their rural and poorer compatriots. Some of the differences are stark; in Nigeria, the wealthiest women are nearly ten times as likely to be using modern contraceptives as the poorest and in DRC urban women are three times more likely to be using modern contraceptives than rural women. The differences are starker than with unmet need since contraceptive prevalence reflects both fertility preferences and family planning supply.

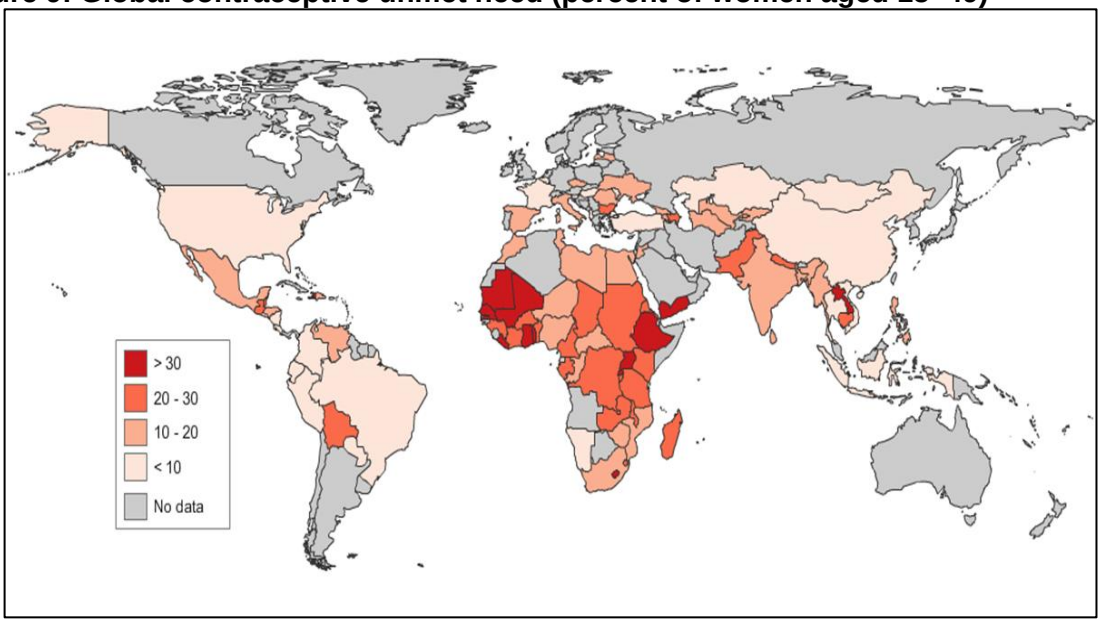
[See Annex, Figure A4: Modern contraceptive prevalence rate by background characteristics, selected countries]

2.1.6 Unmet need for family planning around the world

The highest estimate of unmet need for family planning is in Asia and sub-Saharan Africa as can be seen in Figure 9.[3] Based on latest data, the countries with especially high unmet need in sub-Saharan Africa are Uganda with an unmet need of 41%, Rwanda with 38% and Ghana and Ethiopia with an unmet need of 34%.

Many countries in southern and west Africa have lower levels of unmet need than those in East Africa but for different reasons. For example, both Niger and South Africa have about 15% unmet need. However, in South Africa the relatively low unmet need is due to a relatively high level of met demand. In Niger, fertility preferences are still very high so overall demand is low. In Asia, Laos has unmet need of 40% and Yemen has an unmet need of 39%. On the other hand, a number of low-income countries have managed to achieve very low levels of unmet need. For example, Vietnam has an unmet need of only 5% and Namibia has an unmet need of 7%.

Figure 9: Global contraceptive unmet need (percent of women aged 15–49)

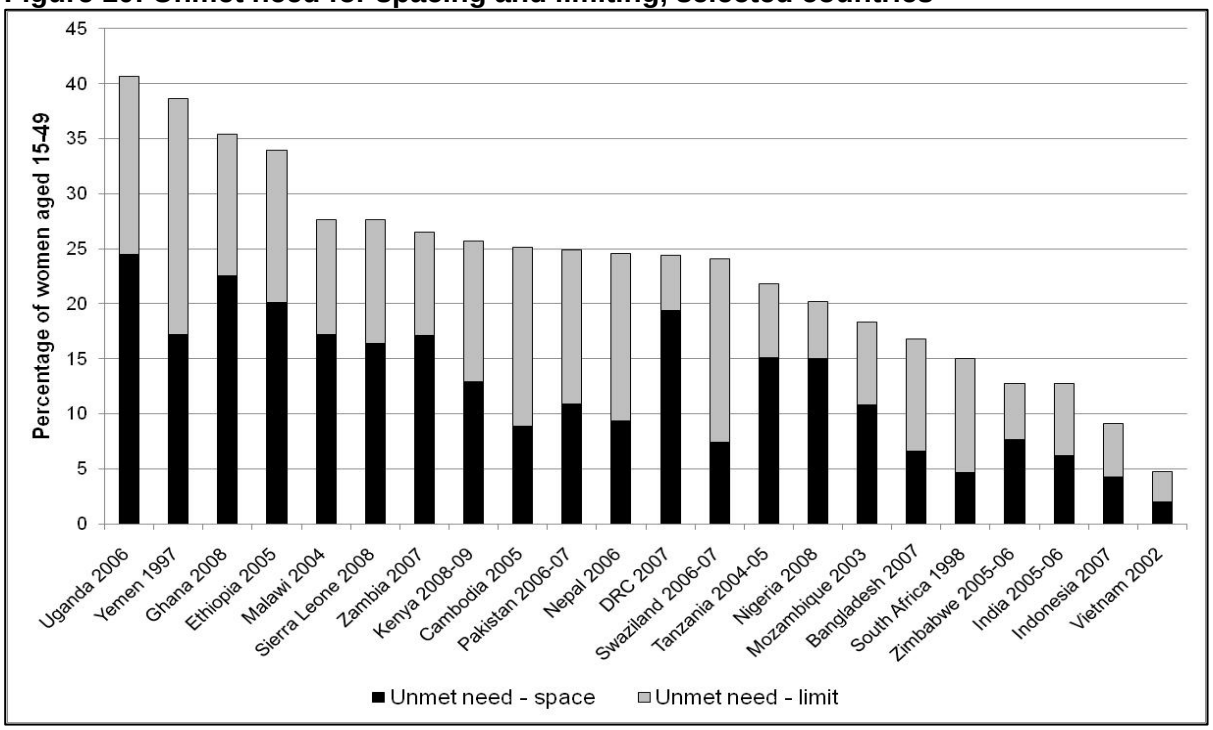


Source: UNICEF report 2010

[3] The WHO defines women with unmet need as those women living in union, who were fecund but were not using contraception at the time of the survey, and yet reported not wanting any more children or wanting to delay the next child.

For countries which still have high fertility preferences, there is greater relative unmet need for spacing than for limiting which is important when considering the most appropriate mix of contraceptives. For example, in DRC, about four-fifths of unmet need is for spacing rather than limiting (see Figure 10). In contrast, in Swaziland where fertility preferences have fallen rapidly, although there is the same level of unmet need as in DRC, but most of the need is for limiting.

Figure 10: Unmet need for spacing and limiting, selected countries



Source: Demographic and Health Surveys data, various years, analysis of data by DFID

While higher socioeconomic groups generally have greater access to family planning, their fertility desires are usually lower as well, which can often translate into relatively high unmet need as shown in Figure A5 (see Annex). For example, Nepal has higher levels of unmet need among the most educated women than among women with no education. However, in some countries with high fertility levels such as Tanzania and Ethiopia, trends over time indicate that the unmet need of more educated women is being addressed whereas the unmet need of the least educated women is not. It is noticeable that there are a significant number of countries where there has been little change or increasing unmet need. This can either be due to increasing demand where supply of family planning has not kept pace or decreasing or static supply of family planning. Other measures, such as contraceptive prevalence and fertility rates, provide more information on the mechanisms behind the unmet need.

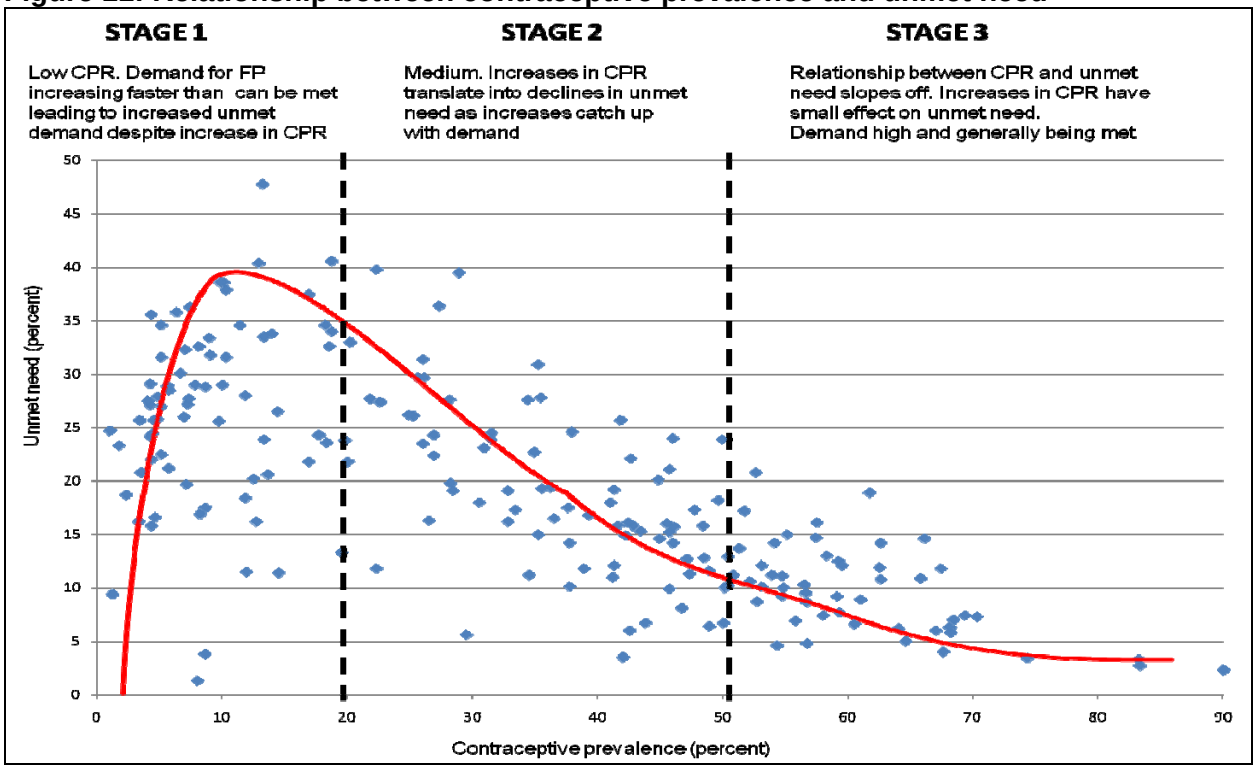
[See Annex, Figure A5: Trends in unmet need for spacing and limiting by educational level, selected countries.]

2.1.7 Unmet need, contraceptive prevalence and fertility desires

Unmet need, contraceptive prevalence and fertility are closely related and all are appropriate measures for family planning interventions. The relationship between unmet need and contraceptive prevalence is not straightforward as shown in Figure 11. In countries with low contraceptive prevalence, as the demand for family planning increases, there is also an increase in unmet need together with an increase in contraceptive use. In other words, demand for fertility regulation is increasing faster than the increase in supply, leading to higher unmet need.

Once contraceptive prevalence reaches an intermediate level of about 20% increases in contraceptive prevalence tend to lead to decreases in unmet need. In other words, at this point, the demand for services is either static or not increasing at as fast a rate as previously, and increases in contraceptive prevalence can now keep pace with the changes in demand. Once a country passes a contraceptive prevalence rate of about 50%, increases in contraceptive prevalence have less of an effect on unmet demand than previously; at higher levels, there is no relationship between contraceptive prevalence and unmet need. Therefore, in order to address unmet need, the most impact can be obtained by firstly addressing countries in Stage 1, followed by Stage 2.

Figure 11: Relationship between contraceptive prevalence and unmet need



Source: Demographic and Health Surveys data, various years, data analysis by DFID

It can be helpful to also plot countries according to their population growth rates (which are important for poverty reduction although affected by factors like population momentum) and the level of unmet need (see Figure A6 in Annex). This classification can be important for programming for family planning and prioritising countries or regions.

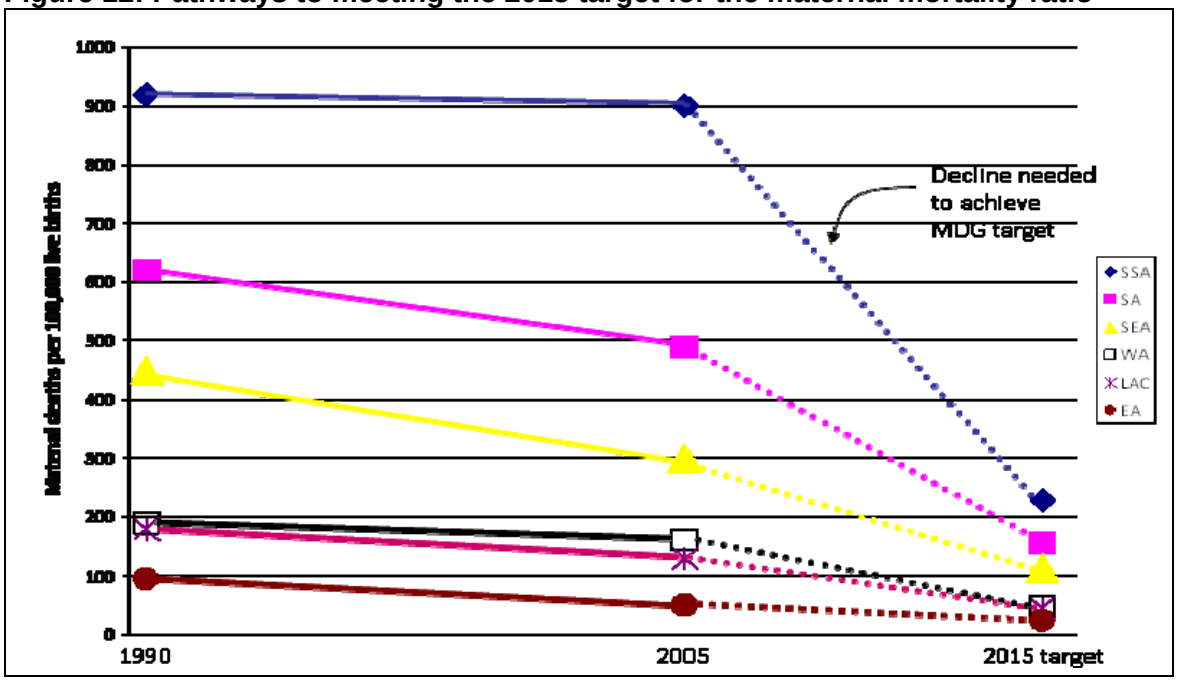
[See Annex, Figure A6, Classification of 75 low–income and lower-middle income countries by population growth and unmet need

2.2 Maternal and newborn health

2.2.1 Maternal mortality[4]

The first target of Millennium Development Goal (MDG) 5 is to reduce by three quarters the maternal mortality ratio (MMR). As Figure 12 shows, most developing regions, most significantly sub-Saharan Africa and southern Asia, are off track to achieve this target and would need to greatly accelerate the rate of decline.

Figure 12: Pathways to meeting the 2015 target for the maternal mortality ratio

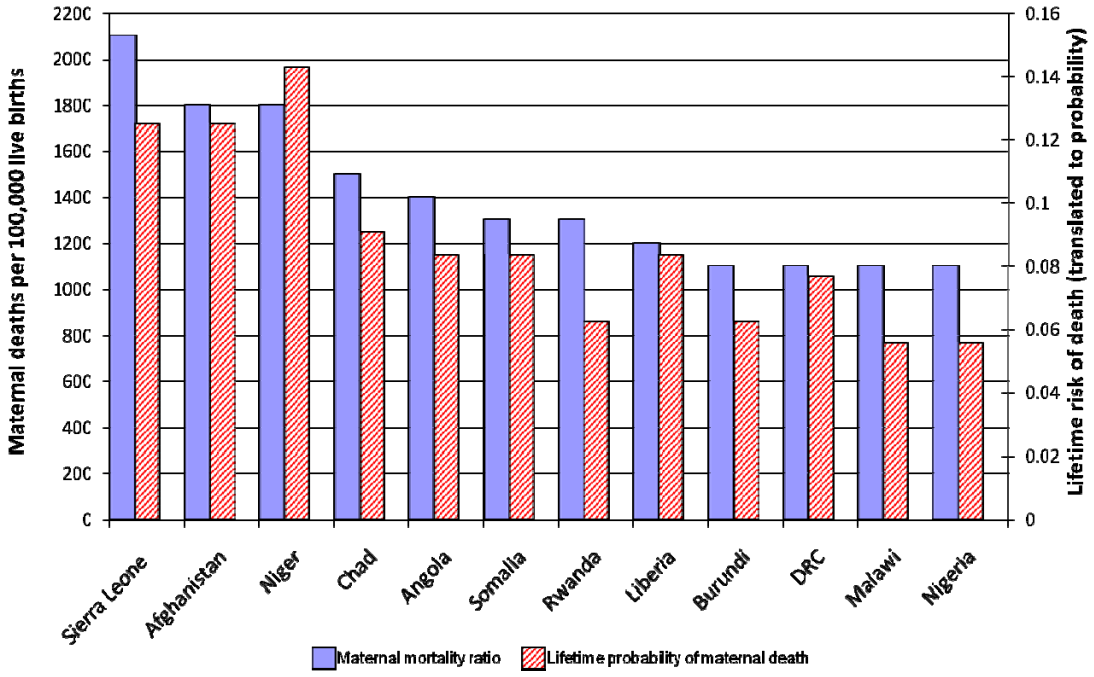


Source: United Nations, 2009
SSA: sub-Saharan Africa, SA: southern Asia, SEA: south-east Asia, WA: west Asia, LAC: Latin America and the Caribbean, EA: East Asia

The burden of maternal mortality is especially high in sub-Saharan Africa and parts of Asia. In particular, there are a number of countries which have very high burden of maternal mortality (see Figure 13).

[44] In this paper, official UN estimates of maternal and neonatal mortality are used. New estimates have been released recently by the Institute for Health Metrics which differ for some countries. However, since the official estimates are the most conservative overall, we have decided to use these. For the IHM estimates please see: 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: 1609-1623.

Figure 13: Countries with highest burden of maternal mortality (UN latest estimates)



Source: UN 2010[5]

It should, however, be noted that these estimates have a high level of uncertainty for the reasons described earlier. Table 4 shows the range of uncertainty on regional maternal mortality ratio estimates[6].

Table 4: Maternal mortality ratio point estimates 2005 and 95% confidence limits

	Maternal mortality ratio (maternal deaths per 100,000 live births)		
Region	**Point estimate**	**Lower limit**	**Upper limit**
Sub-Saharan Africa	900	450	1500
East Asia	50	31	80
South Asia	490	290	750
Southeast Asia	300	160	550
West Asia	160	62	340
Latin America and Caribbean	130	81	230
Oceania	430	120	1200

Source: WHO, UNICEF, UNFPA and World Bank. 2007. Maternal mortality in 2005. http://www.who.int/whosis/mme_2005.pdf

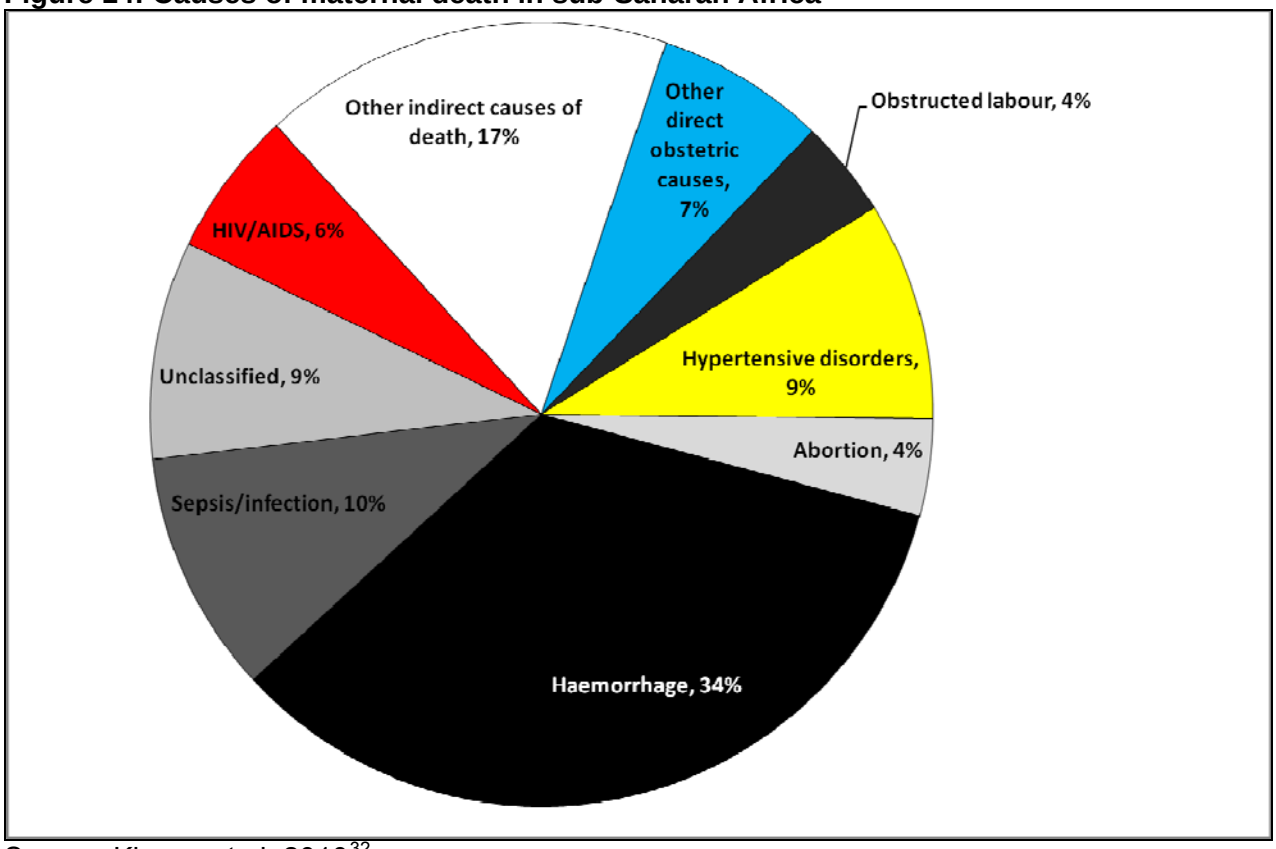
[5] For Chad, Rwanda and Malawi, estimates are based on direct sisterhood methods due to lack of vital registration data (see annex for details). For all other countries presented, estimates based on modelled data due to lack of appropriate maternal mortality data (see annex for details)

[6] This means that there is 95% confidence that the true estimate lies within the lower and upper estimates.

2.2.2 What are women dying of?

According to a recent systematic review haemorrhage, mainly postpartum, is the main cause of maternal death in sub-Saharan Africa, accounting for about a third of all maternal deaths.[29] This is due to the lack of emergency obstetric care, since postpartum haemorrhage often occurs in otherwise low risk women, and exacerbated by the prevalence of anaemia. Sepsis and infection, usually puerperal sepsis, account for another 10%. These numbers are probably higher since a significant number of maternal deaths were due to unclassified causes. HIV/AIDS was a leading indirect cause of maternal death in 6% of cases as it leads to an increased susceptibility to opportunistic infections such as Pneumocystis carinii pneumonia, tuberculosis and malaria.[30] The picture in sub-Saharan Africa is similar to the global distribution of causes of death, although HIV/AIDS features more prominently in sub-Saharan Africa and abortion accounts for a smaller proportion.[31]

Figure 14: Causes of maternal death in sub-Saharan Africa



Source: Kinney et al. 2010[32]

Box 2: Challenges in measuring maternal health

There are significant challenges to accurately measuring **maternal mortality**. Firstly, vital registration systems (which would allow maternal mortality to be directly estimated) in the countries with the greatest burden of maternal mortality are inadequate. Women within these countries at greatest risk of maternal mortality are also the least likely to be covered by any extant civil registration system, as well as generally weak health information systems. As a result, maternal mortality needs to be indirectly estimated and household surveys are often used. However, surveys are not ideal – they are expensive because information needs to be collected on a very large number of women in order to obtain an estimate with a sufficient degree of confidence due to the relative rarity of maternal deaths in a population. There is also potentially a high degree of both sampling and non-sampling bias that can skew the results. Another possible way to measure maternal deaths is to use hospital records. However, this only provides information on the women who specifically sought care in hospitals; women who did not have any contact with institutionalised healthcare may not be recorded at all[33] [34].

All measurement methods face the challenge of **defining a maternal death** as many deaths are misclassified and attributed to non-maternal causes.[35] For example, a woman who has undergone an illegal abortion may wish to conceal this fact (or with the high mortality associated with illegal abortion she may be dead). Furthermore, it is important to classify maternal deaths into direct causes, which are directly linked to a woman's pregnancy (at whatever point), and indirect causes where the cause of death was aggravated by the pregnancy but not due to direct obstetric causes[36]. There are difficulties in differentiating between direct and indirect causes of maternal death but it is vital to do so since it affects the type of intervention required.[37] Data on unsafe abortion is particularly challenging, especially in countries where it is either illegal or socially unacceptable.[38]

Maternal morbidity is even more challenging to estimate. Women who have suffered birth injury are often absent from official statistics and survey data, especially if they do not present at a hospital or healthcare facility for treatment. Maternal morbidity is more likely to affect the most marginalised women in the poorest countries and conditions associated with maternal morbidity often have shame and stigma attached to them. Most epidemiological data are based upon women who are receiving treatment and it is recognised that the estimates are inevitably underestimates.[39,40,41]

2.2.3 Other indicators of maternal health

For every woman who dies from pregnancy-related complications, around 20 more incur injuries, infections and disabilities – approximately ten million women each year.[42] Long term morbidity is important in its own right with maternal morbidity the second leading cause, after HIV/AIDS of lost years of healthy life in developing countries,[43] mainly because women, who are often young at time of injury, can live for decades with their injuries. Severe acute maternal morbidity is important to estimate as it can be a mechanism for identifying health system failures or priorities in maternal healthcare more rapidly than maternal deaths[44]. It is estimated that in resource poor countries, 4–8% of pregnant women who deliver in hospitals will experience severe acute maternal morbidity.[45]

For example, one condition that can lead to long-term maternal morbidity is obstetric fistula, which occurs when prolonged pressure from the baby's head during extended, problematic labour causes tissue damage in the birth canal. In the period following the birth, holes open up and there is leakage from the bladder and/or the rectum into the vagina. Data on obstetric fistula conservatively estimate a rate of 1.2 to 3.5 fistulas developing per 1,000 live births in low resource settings,[46,47] translating into at least 33,000 new cases in sub-Saharan Africa each year. There are between 2 and 3.5 million women living with this condition,[48] with the condition common in some parts of Asia and sub-Saharan Africa,[49,50] even though the condition is treatable by surgery[51]. It is estimated that there are 800,000 unrepaired fistula cases in Nigeria alone.[52]

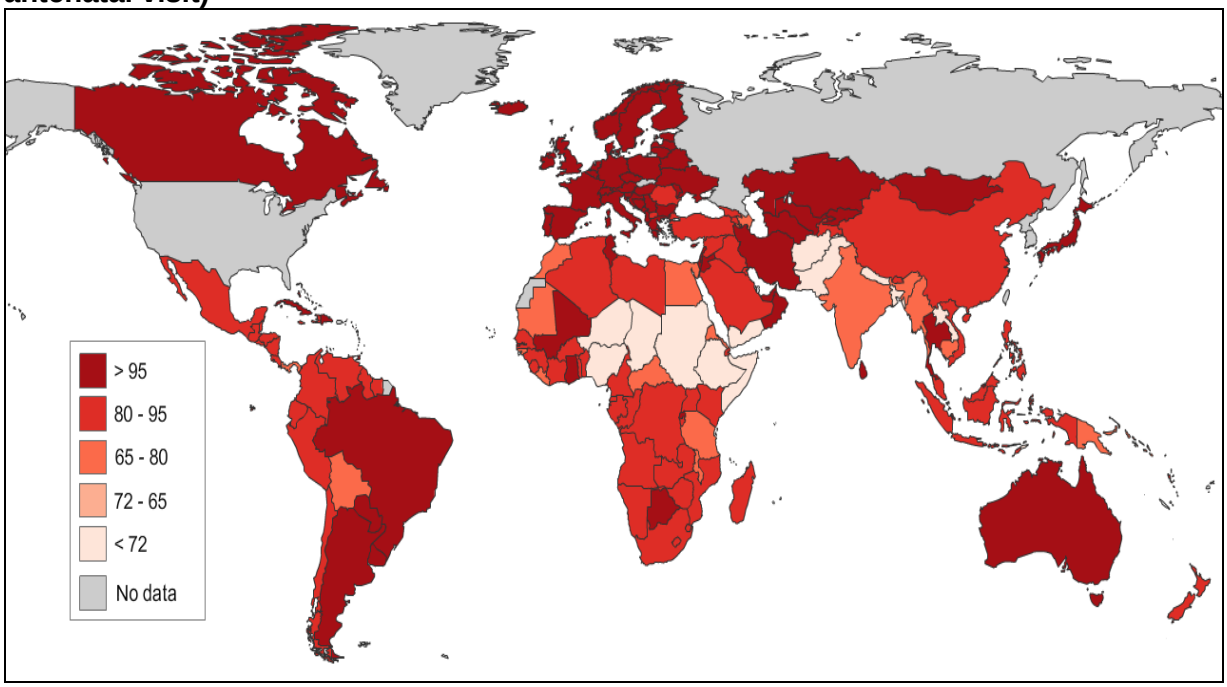
Another example of a debilitating condition is uterine prolapse, which occurs when the muscles, ligaments and tissue supporting the pelvic structure give way, causing the uterus to fall into the vaginal canal. Limited mobility, chronic back pains and urinary incontinence are three consequences of prolapse, which, if severe, can also make it impossible for women to undertake household and other routine tasks. A number of factors can cause uterine prolapse, including prolonged labour, difficult delivery, frequent pregnancies, and inadequate obstetric care. Estimating incidence and prevalence is very difficult and there are currently no reliable statistics from low income countries on direct obstetric morbidity.

Other forms of maternal morbidity include anaemia, infertility, chronic infection, depression and incontinence. Infertility can often arise as a consequence of unsafe abortion and is particularly devastating in societies where fertility is prized.[53] Postpartum depression is often more common in developing countries than in developed. For example, South Africa has a prevalence rate of 35%,[54] Zimbabwe 16%,[55] Pakistan 28%[56] and 23% in Goan women in India.[57] This compares with prevalence of 10–15% in developed countries.[58] The high prevalence indicates that postpartum depression is a significant public health problem. However, few mothers with postpartum depression receive treatment; a study in India showed that not one of the 33 women with postpartum depression identified in the study sought treatment.[59]

2.2.4 Coverage of services

Since maternal mortality and morbidity are difficult to estimate, a number of indicators are used to give a proxy of the coverage of services which are directly related to improved maternal health outcomes. The figure below shows the global disparities in accessing antenatal care, with many women in the lowest income country not having any contact with health professionals during the course of their pregnancies.

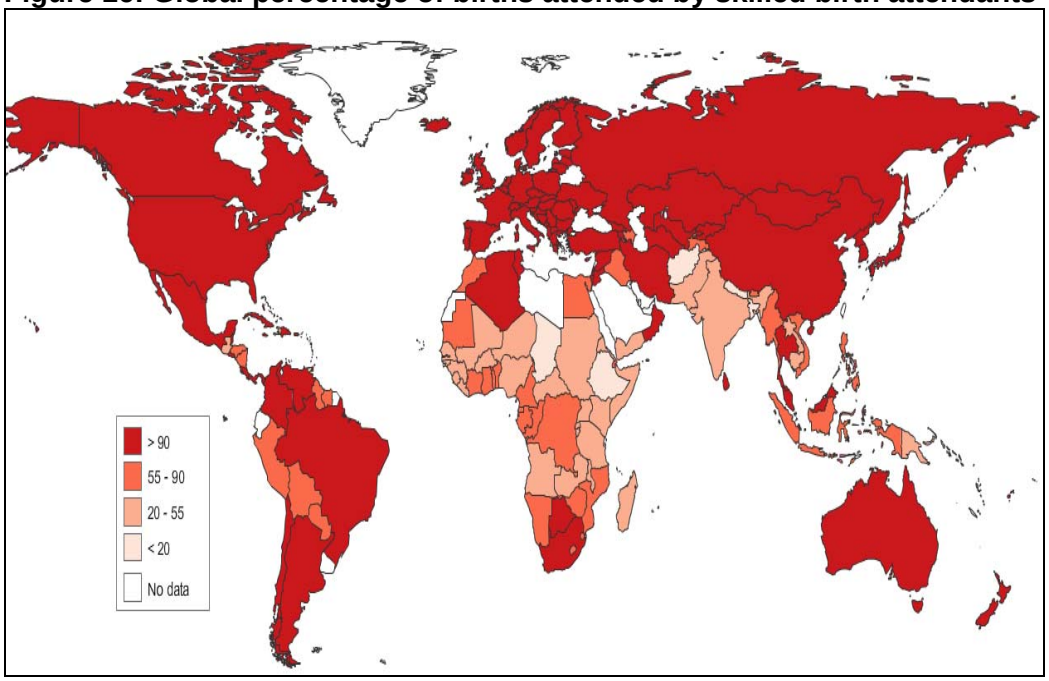
Figure 15: Global antenatal coverage (percentage of pregnant women with at least one antenatal visit)



Source: UNICEF. 2009. The State of the World's Children 2009.
http://www.unicef.org/sowc09/docs/SOWC09-FullReport-EN.pdf

A benchmark indicator for the first target of MDG 5 is the percentage of skilled birth attendants, being closely related to maternal mortality but easier to measure with more reliable and frequent data available. As expected, sub-Saharan Africa and south Asia have low coverage of skilled birth attendants (Figure 16).

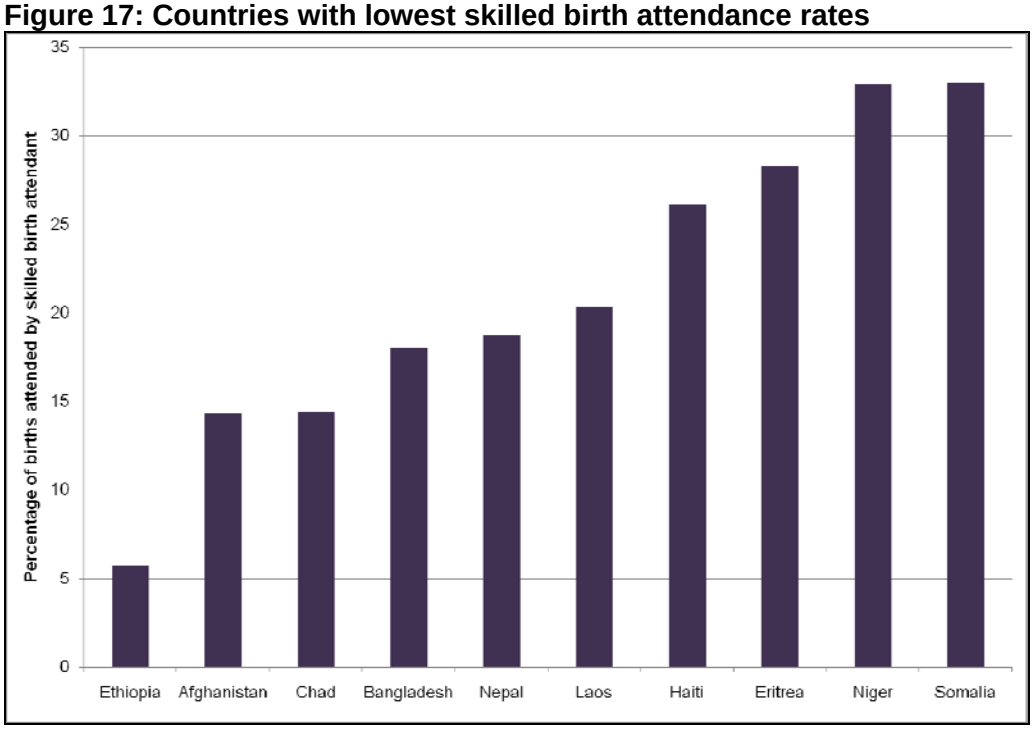
Figure 16: Global percentage of births attended by skilled birth attendants



Source: UNICEF. 2009. The State of the World's Children 2009.
http://www.unicef.org/sowc09/docs/SOWC09-FullReport-EN.pdf

Some countries have particularly low rate of skilled birth attendance. In particular, in Ethiopia, only 5% of births are attended by a skilled attendant. See Figure 17 below.

Figure 17: Countries with lowest skilled birth attendance rates



Source: UNICEF. 2009. The State of the World's Children 2009.
http://www.unicef.org/sowc09/docs/SOWC09-FullReport-EN.pdf

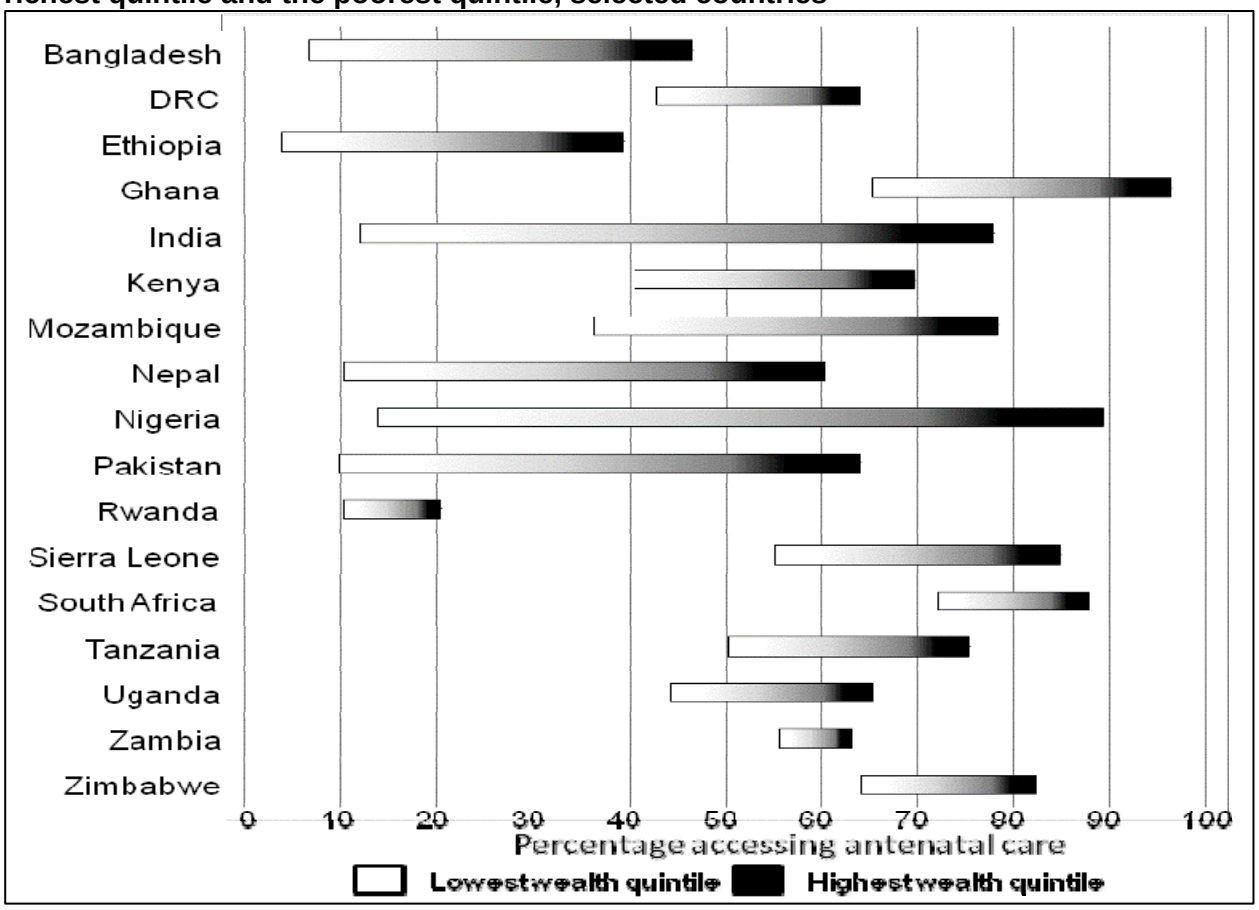
2.2.5 Inequalities in coverage of services

While the differences in access to MNH services between countries are large, there are also difference within countries, with the more disadvantaged having worse outcomes. Maternal mortality data are not robust enough to allow comparative sub-national disaggregation but it is possible to look at proxies of maternal mortality, such as antenatal care, skilled birth attendant at delivery, and prevalence of Caesarean delivery.

Inequalities in access to antenatal care

Disparities in antenatal care, for example in Ethiopia, are also evident by place of residence. Urban women are generally more able to access antenatal care, although this is not true in every country. As expected, urban Ethiopian women are far more able to access antenatal care than rural women. Many of the south Asian countries have wide disparities between urban and rural women as does Nigeria (Figure 18)

Figure 18: Disparities in accessing antenatal care (one or more visits) between the richest quintile and the poorest quintile, selected countries

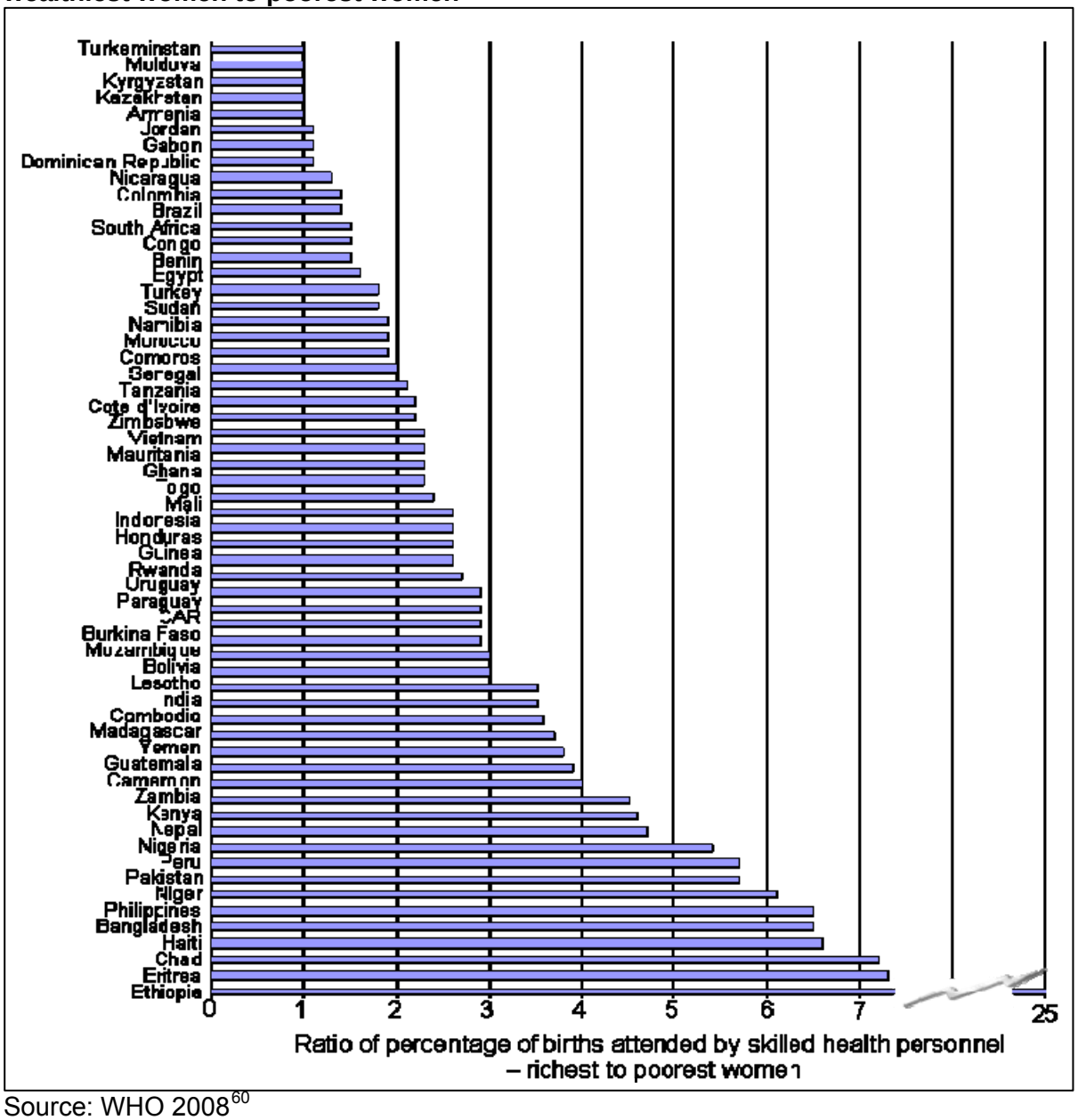


Source: Demographic and Health Surveys data, analysis of data by DFID

Inequalities in access to skilled attendance

There are large disparities in the percentage of births attended by a skilled birth attendant by the wealth quintile of the mother. These differences are often great in both relative and absolute terms. In Ethiopia, for example, women in the poorest wealth quintile have almost negligible rates of skilled birth attendance. While the equivalent figure for women in the wealthiest quintile is still low, if is more than twenty times greater. In Sudan, India and Eritrea, the rates of skilled birth attendance for women in the richest quintile are more than 70 percentage points those for women in the poorest quintile (see Annex, Figure A6). This disparity is emphasised further in Figure 19 below. Ethiopia is the clear outlier with extremely high inequality in access to skilled attendance at birth, mainly due to the extremely low levels among the poorest women. There are also significant disparities according to the education level of the mother (see Annex, Figure A8. Again, Ethiopia stands out as particularly unequal. Generally, the inequalities due to education are not as great as the inequalities due to wealth quintile.

Figure 19: Skilled health personnel at delivery by wealth quintile of mother – ratio of wealthiest women to poorest women



Source: WHO 2008[60]

Inequalities in caesarean sections

The prevalence of Caesarean sections is a good proxy indicator of a functioning maternal health system, particularly emergency obstetric care. A certain percentage of women will always require a Caesarean section in order to save their lives or the life of the foetus and WHO cautions that a rate below 5% indicates inadequate access to the procedure, although this is a very conservative estimate. A range between 10 and 15% is considered more favourable.[61]

Some countries have extremely low levels of Caesarean, particularly among more disadvantaged groups. In Bangladesh, based on DHS data, the Caesarean rate for women with no education nearly doubled between 1999 and 2007 – however, in absolute terms it only increased from 0.6% to 1.1%. At the same time, the percentage for women with secondary or higher education also doubled to an acceptable 15.7% leading to an increase in the absolute disparities according to education. A similar picture is seen with disparities by wealth.

The situation is even more difficult in Ethiopia and Nigeria as shown by DHS data. While wealthier and women have increasing levels of Caesarean section, the poorest women have decreasing access from already sub-optimal levels. In Nigeria, even educated women have decreasing levels of Caesarean section. There are worsening differentials in absolute and also often relative terms. Given the link between emergency obstetric care and maternal mortality, it is likely that disparities in maternal mortality are also increasing in these countries.

2.2.6 Abortion

As can be seen in Table 5 below, Africa and Asia both have abortion rates of around 29 per 1,000 women aged 15–44 and both have declining rates of abortion. In Africa, the absolute number of abortions increased due to the increased population.

Table 5: Global and regional estimates of induced abortion, 1995 and 2003

Region and sub-region	**Number of abortions (millions)**		**Abortion rate***	
	1995	**2003**	**1995**	**2003**
World	45.6	41.6	35	29
Developed countries	10.0	6.6	39	26
Excluding eastern Europe	3.8	3.5	20	19
Developing countries†	35.5	35.0	34	29
Excluding China	24.9	26.4	33	30
Estimates by region				
Africa	5.0	5.6	33	29
Asia	26.8	25.9	33	29
Europe	7.7	4.3	48	28
Latin America	4.2	4.1	37	31
North America	1.5	1.5	22	21
Oceania	0.1	0.1	21	17

*Abortions per 1,000 women aged 15–44
†Those within Africa, the Americas, excluding Canada and the United States of America, Asia, excluding Japan, and Oceania, excluding Australia and New Zealand
Source: Alan Guttmacher Institute 2009[62]

Although women in developed and developing countries have fairly similar rates of abortion, there are much greater differences in rates of unsafe abortion.[7] Almost all abortion-related deaths occur in developing countries where, excluding China and India, more than 8 in 10 women live under highly restrictive abortion laws.[63] The risk of death is highest in Africa where there were an estimated 650 deaths per 100,000 unsafe abortions in 2003, compared with 10 per 100,000 in developed regions. Additional consequences of unsafe abortion include loss of productivity, economic burden on public health systems, stigma and long-term health problems, such as infertility.[64]

Box 3: Measuring abortion incidence

Abortion incidence is very difficult to accurately estimate. Even in countries with legal and safe abortion provision, women tend to under report abortions in surveys. Where abortions are restricted by law, women are even more reluctant to admit to having an induced abortion. Data from surveys therefore have to be adjusted for under reporting.

Alternatively, national unsafe abortion incidence may be estimated from hospital data by simulating the hospitalisation-complications method. A multiplier is applied to the hospital unsafe abortion ratio of abortion complications to births in order to arrive at an estimate of the unsafe abortion ratio. The lower the risk to women's health from abortion then the lower the ratio. The ratio can then be calculated into a rate based on estimates of the numbers of women of reproductive age and the number of births

Country specific estimates are corroborated with information from other sources on total fertility rate, use of modern and traditional contraceptives and other proximate determinants of fertility, as available.

Source: Shah and Ahman 2010[65]

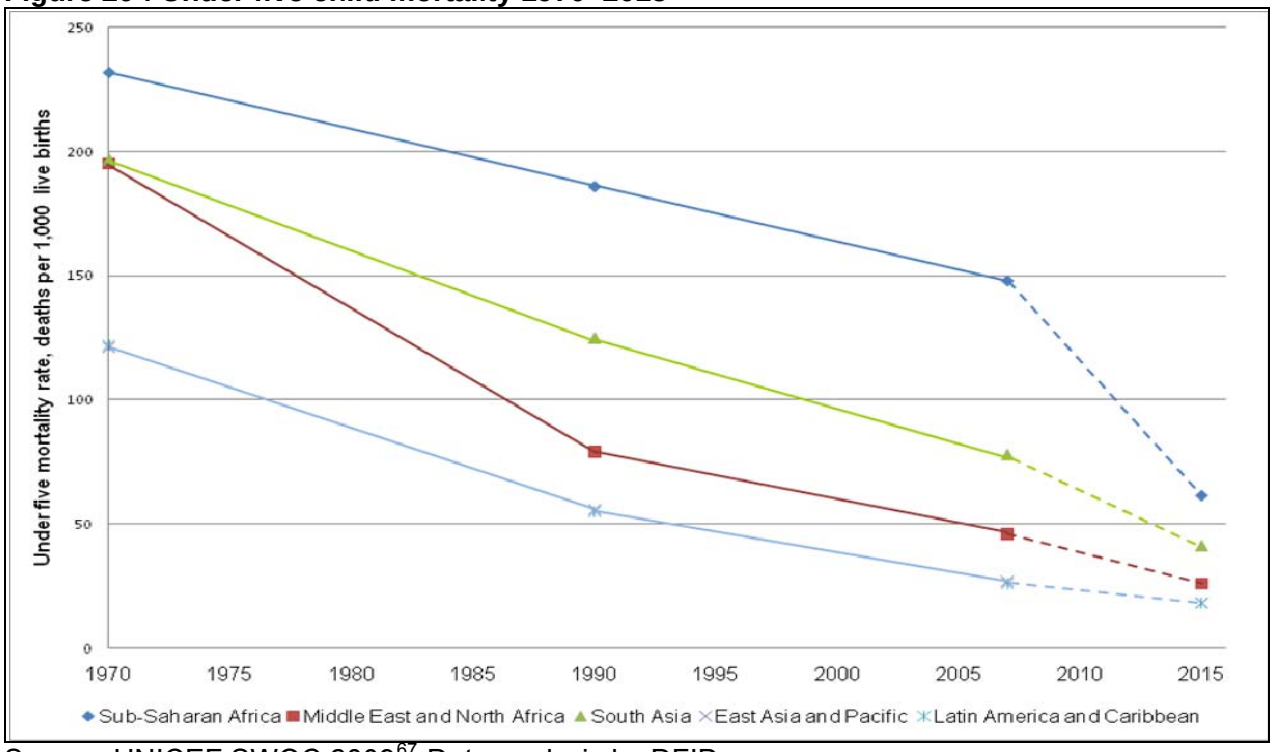
2.2.7 Newborn health and progress towards MDG 4

The target of MDG 4 is to reduce child mortality from its 1990 level by two thirds by 2015. Neonatal mortality is an essential component of child mortality, with about 40% all child deaths under the age of five occurring in the first month of life. As overall child mortality decreases, neonatal mortality accounts for a higher proportion of child mortality. For example, an analysis of results from 44 demographic and health surveys showed that in populations with the highest child mortality rates, just over 20% of all child deaths occurred in the neonatal period, but in countries with mortality rates lower than 35 per 1,000 live births more than 50% of child deaths were in neonates. Overall, some 3.6 million newborns die each year globally[66].

[7] An unsafe abortion is defined by the WHO as a procedure meant to terminate an unintended pregnancy that is performed by individuals without the necessary skills, or in an environment that does not conform to the minimum medical standards, or both.

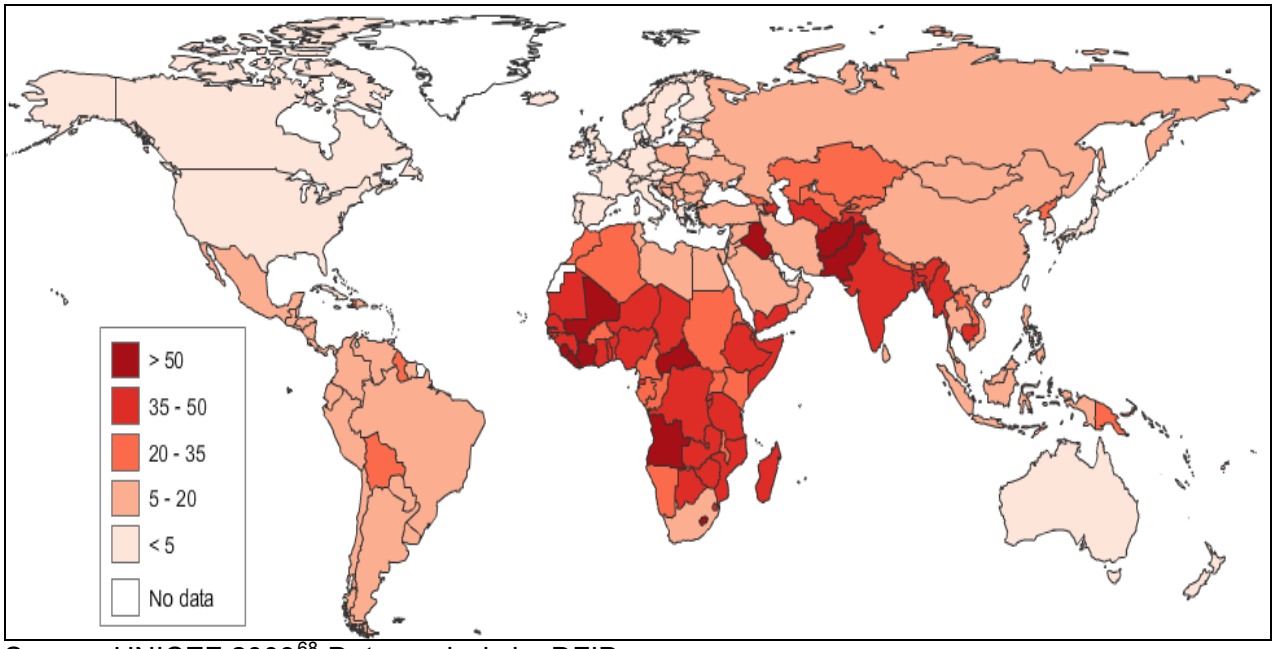
As Figure 20 below shows, Middle East and North Africa and Latin America and the Caribbean regions are on track to meet this target. However, sub-Saharan Africa is unlikely to meet its target and south Asia needs to accelerate the pace of decline to do so.

Figure 20 : Under five child mortality 1970–2015[8]



Source: UNICEF SWOC 2009[67] Data analysis by DFID

Figure 21: Global distribution of neonatal mortality (deaths in first week of life per 1,000 live births, 2004)



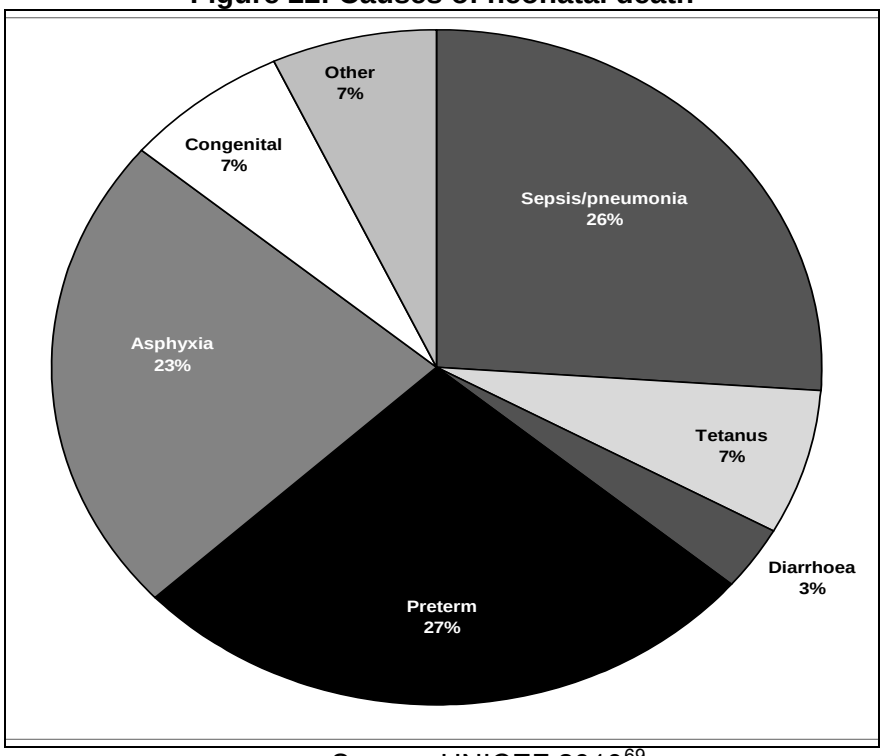
Source: UNICEF 2009[68] Data analysis by DFID

[8] Latin American and Caribbean and east Asia are too close to distinguish between.

2.2.8 What are newborns dying of?

Some 86% of newborn deaths globally are the direct result of three main causes: severe infections (including sepsis/pneumonia, tetanus and diarrhoea), asphyxia and preterm births. Severe infections are estimated to account for 36% of all newborn deaths (Figure 22). They can occur at any point during the first month of life but are the main cause of neonatal death after the first week. About a quarter of deaths are due to complications of preterm delivery and another quarter due to birth asphyxia. Infections (pneumonia/sepsis and tetanus) account for about a third of neonatal deaths. The causes of death for newborns differ from older children who are much more affected by pneumonia and especially diarrhoea. Low birth weight is estimated to be an underlying cause of 40–80% of neonatal mortality. Unsurprisingly, a high prevalence of low birth weight babies is highly correlated with neonatal mortality.

Figure 22: Causes of neonatal death



Source: UNICEF 2010[69]

Box 4: Challenges in measuring stillbirth and neonatal health

Many of the issues around poor vital registration and data availability that affect maternal health estimates also apply to stillbirth and neonatal health although there are separate issues relating to the perinatal period. Firstly, few national systems routinely record stillbirths and national definitions of stillbirth vary[70]. As for maternal mortality, the majority of countries where neonatal mortality is high rely on surveys for estimates. However, infant deaths are underreported and the earlier in infancy that the death occurred then the greater the likelihood that the death will not be reported. Furthermore, in some cultures, pregnancy loss may never be reported or women may have strong cultural reasons for not disclosing pregnancy loss or early neonatal death.[71,72,73] Underreporting of stillbirths is particularly problematic; surveys show a much lower ratio of stillbirths to neonatal deaths than that expected from the established ratio[74].

3. Determinants

The previous section outlined the evidence on the demographic theories of fertility change, and the complex relationships between fertility decline, unmet need and contraceptive prevalence. This touched on the role of the proximate or intermediate determinants of fertility (including age at sexual debut, contraceptive prevalence, and induced abortion).[75]

This section sets out the evidence on the indirect or wider determinants of fertility and reproductive health. In particular it focuses on: a) the distal determinants: the social, political, legal and economic contexts in which reproductive health, sexuality, fertility and reproduction are experienced, and that shape fertility preferences and demand for family planning; and b) other epidemiological factors that increase the risk of death for mothers and newborns.

3.1 What do we know about the distal determinants of RMNH?

There is a growing evidence base on the determinants of RMNH, reflecting the recognition that achieving MDG 4 and MDG 5 is more than a matter of delivering health services and care – and that the wider determinants need to be addressed if inequities in outcomes are to be redressed. The demographic literature contains a large body of robust evidence drawn from the analysis of Demographic and Health Surveys (DHS). These studies correlate women's status – often measured in terms of educational status or survey-based questions about women's ability to make decisions within the household – and contraceptive use, access to health services and fertility outcomes.

3.1.1 Female education

One of the best-researched indicators of women and girls' status is education. The link between women's education and maternal health is well-documented: 'women's education is associated with the use of maternal health services, and is independent of related factors such as urban or rural residence or socioeconomic status, and across the range of services and stages of maternal care'[76]

There is also a large empirical demographic literature demonstrating that gender equity in education is associated with reduced fertility and improved reproductive health. Despite the debates over the needed duration, level, and type of educational provision required to trigger fertility decline, the evidence is compelling in terms of the need for investment in education and the elimination of institutional and cultural barriers to women's schooling in order to promote development and reduce fertility[77].

A paper by Abu-Ghaida and Klasen (2004)[78] reviewed the literature on economic models of fertility. They find the opportunity cost of women's time as well as the bargaining power of women to be important determinants of the fertility rate. Greater female education, and particularly lower gender inequality in education, is therefore likely to lead to reduced fertility. Their study also showed a large number of empirical studies which have performed regression analysis using macro level cross-country panel data have demonstrated this effect. The cross-country evidence is remarkably consistent across studies, suggesting that one more year of schooling reduces fertility by 0.3-0.5 children per woman. Male education, however, tends to have an insignificant or positive effect on fertility, which implies that reducing the gender inequality by boosting female education is the most important factor influencing fertility.

Whilst the association between girls' primary education and reduced fertility holds, female *secondary* education enables women to gain the tools and knowledge to improve their own health even more effectively. A review of the evidence by Grown et al (2005)[79] finds that female secondary education is associated with high age at marriage, low fertility and

mortality, good maternal care, and reduced vulnerability to HIV/AIDS. In a global review of early marriage, girls' secondary school enrolment was inversely related to the proportion of girls married before they are 18.[80] Those with only primary education (seven years or less) are more likely to be married before 18 years old than are girls with higher education.

Whilst a wealth of empirical studies have demonstrated this inverse relationship between women's education and fertility, there are fewer empirical studies that identify the *mechanisms or pathways* through which education affects fertility.[81] Potential pathways are:

I. Fertility desire/preferences: women's education lowers the demand for children through an increase in the opportunity cost of women's time and less need of income from children in terms of child labour or support in old age. Women's education also delays marriage (and thus the timing of the first birth).

II. Contraceptive use: women with more education have a greater ability to adopt new contraceptive technology because they can negotiate contraceptive use with a partner more effectively, through increased access family planning information and services and less resistance to new contraceptive methods.

Women's education and contraceptive use

A recent analysis of the relationship between women's post-primary education and birth spacing in Indonesia over the period 1970–1993 found that higher levels of female education were associated with a shorter birth interval among earlier cohorts but with a longer birth interval among later cohorts.[82] The study concluded that changes in the effects of education on birth intervals over time were primarily driven by education's effect on changes in the uptake of contraceptives rather than by changes in the demand for children. The policy implication being that investment in women's education complements investment in family planning programmes.

Cross-country analysis also demonstrates that women's secondary schooling is associated with contraceptive use. Analysis of data from 64 DHS surveys conducted between 1994 and 2008 demonstrates the strong correlation between women's educational status and contraceptive use (using percent of demand satisfied as a proxy measure of access to family planning services)[83]. In sub-Saharan Africa, women having some secondary education or higher are, on average, two times more likely to have their need for family planning met, compared with women lacking education (unweighted mean 64% versus 32%).

Quintile analysis of DHS data from several countries, including Nicaragua, Ghana and Cambodia, shows how wealth moderates the effect of women's education level on contraceptive use.[84] There is less of a differential in modern contraceptive use between rich and poor if the women are educated, as compared to that among women who are not educated, although the differential is not eradicated completely. Education therefore has a role to play in reducing the gap between rich and poor to a certain extent.

3.1.2 Poverty and women's economic empowerment

Poverty is also a determinant of poor reproductive health, at both the macro and micro levels. Access to and control over economic resources (including land, property, assets and wage employment) is another indicator of women and girls' status, and its impact on contraceptive use and fertility is mediated by education. Evidence on the link between women's economic empowerment and reproductive health is more limited than that linking education and reproductive health.

At the macro level, a review of the literature by Channon et al. (2010)[85] summarises: (a) the longstanding literature on the effect of poverty as a constraint to fertility decline and (b) the more limited literature on the effect of poverty on poor sexual and reproductive health

outcomes. The main sources of data are cross-sectional DHS surveys, using a material definition of poverty based on an estimated wealth of the household. One limitation of these data is that they are taken from cross-sectional surveys, and therefore cannot provide evidence of causality. Longitudinal data sets are required to test this out – these are rare in developing countries.

The link between wealth and fertility can be seen at both a country and regional level. In 58 countries with data, only one country (Chad) had a higher total fertility rate (TFR) for its richest quartile than it did for the poorest group[86]. The mean difference in the TFRs between the richest and poorest quintiles is 2.6 births, with the richest having fewer births. The rich-poor gap occurs at the regional level too, with Latin America and the Caribbean being the region with the greatest difference in the TFR between the richest and poorest. This pattern is also demonstrated by Gillespie et al (2007)[87] in 41 developing countries: the rich have lower fertility and fewer unwanted births, and are more able to access facilities to reduce fertility further, if desired.

The mechanisms through which poverty influences fertility were developed by Bongaarts in his proximate determinants model[88]. Poverty – alongside women's education and family planning policies – is closely related to most of the variables that are mainly responsible for fertility variation between populations: proportion of women married; age at marriage; contraceptive use; postpartum infecundity; induced abortion. Poorer women have a lower average age at marriage and lower contraceptive use[89,90] which increases fertility compared to the richer women. Conversely, poorer women in developing countries usually have a longer period of postpartum infecundity, which lowers the fertility levels in this poorer group, although the effect is small[91].

A study of modern contraceptive use in 55 developing countries found a consistent gap between rich and poor in the use of contraception, within and between countries.[92] Modern contraceptive use is lower in the poorest wealth quintile and the differentials in use between rich and poor are widening as overall use increases in the whole population – therefore increasing inequalities.

Similarly, Greene and Merrick (2005) demonstrate that the unmet need for contraception is greatest among poorer women worldwide.[93] This is reflected in differential contraceptive prevalence rates (CPR) that persist: the rich-poor gap in the CPR is 10 percentage points or higher in all regions of the world, rising to 23 percentage points in Latin America.

At the micro (individual and household) level, several researchers have proposed that large families are a result of poverty, motivated by the need for old-age security.[94] However, evidence for using children as an insurance policy is elusive, and other researchers emphasise the continuing role of the elderly in supporting their children well into adulthood.[95] Old-age security alone is therefore unlikely to account for the very large fertility differences between rich and poor sections of society in all regions of the world.

Poverty is also a determinant of unsafe abortion. Access to safe abortion services is constrained for poor women, even though poverty is one of the main reasons given by women who seek abortion services.[96] In India, although abortion has been legal since 1971, poor women are more likely to use unsafe providers because they are less able to afford the large fees charged in the certified public and private sector.[97]

Looks promising
Evidence on the link between women's economic empowerment and reproductive health looks promising, although is more limited than that linking education and reproductive health. More research from a wider range of settings is needed.

3.1.3 Political commitment to RMNH

In the 1970s and 1980s, family planning was a political and financial priority, at the international level, driven largely by the belief that high fertility and rapid population growth posed a serious barrier to socio-economic development. The influence of a broad coalition of global and national non-government organisations (NGOs) is generally credited with shaping the agenda for the International Conference on Population and Development (ICPD), Cairo in 1994, and, as a result, the direction of the family planning movement.[98] The coalition made vital contributions to the success of ICPD in framing reproductive health around human rights, women's empowerment and societal development, and the move away from an emphasis on population control. Civil society participation opened up the policy debate by bringing the breadth of reproductive health concerns, including sensitive issues such as safe abortion and adolescent pregnancy to the table.

However, in recent years at both national and global levels, political commitment to and funding for family planning has waned. This decline is in part attributed to the weak resonance and understanding of political leaders and policy makers of the holistic and rights-based approach characterised by ICPD.[99] Some experts contend that the ICPD Programme of Action, with its broader focus on reproductive health and rights (rather than education-population links), resulted in diminished political interest and support of finance ministers and donors.[100] This decline was mirrored in falling financial support to family planning programmes[101] and the omission of family planning from the Millennium Development Goals monitoring framework adopted in 2000. Indeed, the views of those working in the policy community reflected the characteristics of an international family planning movement in a state of fragmentation, or even demise.[102]

However, in 2006, after many interventions by member states and civil society advocacy, the United Nations General Assembly agreed to new targets, including one for reproductive health.[103] Indicators of unmet need for family planning, adolescent fertility and contraceptive prevalence rate were added. This shift signalled renewed political commitment to family planning. However, progress was severely hampered by the United States 'Global Gag rule' which refused to fund organisations associated with safe abortion. The change in US leadership in 2009 brought a radical change in US policy, overturning the Global Gag rule and restoring US funding for the United Nations Population Fund (UNFPA).

There has been limited academic research into what drives political will for maternal health or for global health initiatives more broadly. Political factors are often central to the policy process at global and national levels.[104] They can determine which sexual and reproductive health issues are included in national policy agenda, which evidence is examined or excluded, which policy options are considered and adopted, and the degree to which they are implemented. A comparative policy analysis in eight low-income countries (Bangladesh, Pakistan, Thailand, Philippines, Tunisia, Algeria, Zimbabwe, and Zambia) demonstrated that, historically, family planning programmes have been most successful in countries that forged a broad coalition of support across many sectors[105]. This includes political elites, government officials, academics, health professionals and the general public. Spread of policy risk and institutional and financial stability were additional factors which supported or inhibited the adoption of strong population policies and family planning programmes.

A more recent qualitative review by Shiffman identifies the factors that have shaped political priority for maternal mortality in five countries: Guatemala, Honduras[106], India[107], Indonesia, and Nigeria[108]. Findings show wide variation in the level of political priority across the five countries, with the national political and social context bearing a strong influence on enabling

or limiting advocacy efforts. The critical factors underlying successful political advocacy is an area in need of much greater research and attention.[109]

Factors which influence political support

Shiffman and Smith[110] found that a wide range of conditions related to political context influenced advocacy effectiveness; the two most important factors being major political reforms that affect governance arrangements, and competition faced from other health priorities, such as HIV/AIDS. The political dispensation of the return to democracy in Nigeria, for example, created space on the national agenda for social issues such as maternal mortality. In India, Shiffman and Ved[111] found maternal mortality was squeezed out by population control and child survival priorities in the 1980s, finding its way back onto the political agenda only recently. They conclude that while the determinants of political priority can be framed broadly, building political priority is not a formulaic exercise and political strategies have to be tailored to national context.

A case study of the adoption of a Maternity Incentive (later becoming Safe Delivery Incentive) scheme in Nepal is an interesting example of how the timing and use of evidence, in this case on the costs surrounding delivery, converged with political interests to rapidly translate evidence into policy[112]. It found that although research laid important groundwork, it was the convergence of political interests of the weak coalition government to implement a policy with wide public appeal that led to the relatively quick policy acceptance. Political champions who were well connected to the political elite played a supporting role in this process, as did the fortuitous timing of donor negotiations for future support.

The ascendancy of the maternal mortality issue in India shows how champions from within professional associations unblocked implementation bottlenecks to translate political commitment into action.[113] Champions within the Indian Anaesthetic Association and the Federation of Obstetricians and Gynaecologists of India, working in partnership with senior government officers negotiated the training of non-specialists in basic anaesthetics and obstetrics, and resolved a major hurdle in increasing access to emergency obstetric care.

Further political analysis is needed to understand the ideas, interests, and institutions operating within a particular decision-making policy context for reproductive health.[114] With more systematic navigation of the political landscape, it is more likely that evidence will be used to inform policy and programmes.

Reliable evidence

International consensus supported by qualitative case study evidence from several countries suggests that continued political commitment to RMNH is a critical factor to achieving long term sustained improvements in RMNH. But more research is needed on what is needed to catalyse political leaders.

3.1.4 Improving government accountability and transparency

Weak governance inhibit the functioning and delivery of health services, and empowering citizens to demand their entitlements to maternal health, enabling citizens to take part in health sector decision making, are widely seen as a means of increasing policy and service responsiveness. However, evidence on the conditions for effectively empowering citizens to demand entitlements to maternal health services and engage in 'constructive accountability'[115] is weak. This review has found a range of stakeholder participation, voice and accountability initiatives and experiences scattered across health programmes, but generally without impact evaluations.

Programme level evidence from the health sector, including efforts focusing on maternal and reproductive health, show many examples of mobilisation of citizens to make demands on

the system, even in fragile and extremely challenging contexts, through long and short routes of accountability.[116] However, evidence is drawn largely from case studies. For instance experience from Nigeria suggests that raising demand without formal avenues of engagement and response can lead to weak personal and patronage driven responses. Navigating the political landscape and designing best bet approaches for voice and accountability must be driven by the context and actors.[117] Overall, much more in depth, rigorous research is needed to measure impact and test the effectiveness of different approaches.

Important unknown
More research is needed on ways to empower citizens to demand entitlements to high quality RMNH health services.

3.1.5 Economic development

The relationship between economic development and increased demand for family planning looks promising. For instance, it is estimated that up to 87% of the increase in contraceptive prevalence between 1982 and 1987 in Indonesia was attributed to economic development.[118] The classic fertility transition, as witnessed in European societies, is widely attributed to changes in socioeconomic conditions that caused high fertility to be disadvantageous rather than beneficial.[119] However, the emphasis on changes in objective structural development levels was misplaced. Although important, the development conditions associated with fertility decline are varied, even in Europe where the classic fertility transition was born, let alone in other regions.[120] However, purely microeconomic explanations are lacking, as they fail to explain why a fertility transition can occur simultaneously amongst all socioeconomic strata of society.[121] Furthermore, the example of Bangladesh highlights that fertility decline can occur in a society with a very low level of economic development.

3.1.6 Gender inequality and low status of women and girls

There are many inter connected dimensions of women and girls' disempowerment which play out at both the distal and proximate levels and influence reproductive health outcomes: early marriage, sexual violence, intimate partner violence (IPV), lack of autonomy and power to make decisions within the household, lack of education, lack of rights, lack of control over economic resources.

Autonomy in decision-making

A girl or woman's ability to make choices (with her partner whenever appropriate) about if and when she becomes pregnant, how many children she has and at what intervals, and what information, services and care she accesses, are ultimately determined by her ability to discuss, negotiate and control these issues. Her status within a family and wider society determines the importance given to her health and its call on often scarce resources. Inadequate access to reproductive health services, including family planning and safe abortion, are both indicators and manifestations of the fact that women's health is not given priority politically and in society.

Women's lack of control over their own sexuality and fertility, and poor access to reproductive health services is closely linked to a general lack of respect for women's rights to health and self-determination. Recognition of women's sexual and reproductive rights is particularly essential to maternal health progress in regions where women's and girls' status is diminished and their inability to negotiate safe sex increases the risk of unplanned pregnancies, and sexual violence.

Kirrin-Gill et al (2007)[122] review evidence from studies on decision-making and maternal health. These studies demonstrate that, independent of other factors, women's involvement in decision-making on key aspects of life is associated with an increased use of maternal

health services. Moreover, the stronger the woman's decisionmaking power, the greater the effect this will have on maternal health. Women with strong decision-making power were more than twice as likely to deliver their child at a health facility compared with women with little decision-making power.

Sexual violence and coercion

Violence against women by a partner is a global public health problem as well as a human rights violation directly related to women's lack of status and power. Gender norms, patriarchal structures in society and notions of masculinities that are based on control of women and male aggression perpetuate violence against women and girls[123].

Given the sensitivity of these issues, the evidence base on sexual violence and coercion is very incomplete, for the reasons set out by Bott (2010).[124] Respondents often under report coercive experiences due to shame, denial or fear of retaliation. Data comparability across studies is limited by a lack of universally accepted operational definitions for different types of coercion. Many studies on sexual violence and coercion have been small-scale or unrepresentative. For example, small qualitative studies with convenience samples, selective crime data analyses, and facility-based surveys among survivors seeking medical care. Only more recently has the evidence base expanded with the addition of population-based surveys, which enable cross-country comparisons. Many DHS surveys now incorporate modules that ask about physical and sexual violence by intimate partners.[125] In addition, the WHO multi-country study has published findings on sexual violence from ten countries, focusing on intimate partner violence against women of reproductive age.[126]

As Bott (2010) identifies, sexual violence and coercion can lead to adverse sexual and reproductive health outcomes through direct and indirect pathways:

1. Direct: unprotected coerced sex may lead to outcomes such as unintended pregnancy, unsafe abortion, sexually transmitted infections (STIs) including HIV/AIDS and gynaecological disorders.
2. Indirect: sexual violence and coercion may disempower girls and women, making it harder for them to negotiate sex and condom/contraceptive use, or to access services.

Evidence suggests that women and girls who live in contexts of intimate-partner violence often experience forced sex and are generally less able to negotiate protected sex, leading to higher rates of unintended pregnancies.[127,128] The few studies that have considered whether these outcomes result directly from forced sex, or indirectly from living with physical and emotional violence, suggest that both pathways play a role.

Many studies have found an association between forced sexual debut, lack of contraceptive/condom use and unintended pregnancy. A longitudinal study of 1,130 sexually-experienced young women in South Africa found that young women who reported forced sexual debut were significantly more likely to report an unintended pregnancy than those who had not been coerced at first sex.[129] Similarly, a study among girls in Uganda found that non-consensual first sex as significantly associated with a lower use of modern contraception and with early and unintended pregnancy.[130]

Many girls and women who become pregnant as a result of forced sex decide to terminate their pregnancies, whether or not safe abortion is available. The WHO multi-country study (2005) found a statistically significant association between intimate partner violence and induced abortion. In nearly all sites, women who disclosed physical or sexual IPV also reported higher rates of induced abortion than women who said they had not experienced such violence.[131] Research from southern Nigeria found that young women who had

experienced transactional or forced sex were significantly more likely than other women to report ever having an induced abortion.[132]

Intimate partner violence during pregnancy is also quite common. The WHO multi-country study found that between 1% and 28% of women reported being physically abused by a partner in at least one of their pregnancies. Country studies find that violence during pregnancy is associated with abortion,[133] as well as with pre-term labour, miscarriage, stillbirth, low birth weight and lower levels of breastfeeding.

Early marriage

Early marriage is most common in Africa and south Asia.[134] In Ethiopia and parts of west Africa, marriage at the age of seven or eight is not uncommon. Evidence indicates that early marriage is highly correlated with a series of undesirable, often devastating health outcomes, ranging from the risk of early pregnancy to obstetric fistula due to obstructed labour. Focusing on delaying marriage in sentinel areas where early marriage is endemic will reduce the incidence of pregnancies among very young women and decrease the pressures of migration from rural to urban areas.[135]

Overall, additional research is needed to better understand the influence of social determinants on individual behaviour and how health programmes can mitigate this relationship to reduce inequities in reproductive health outcomes.[136] Evidence gaps remain in exploring how women and girls' status is mediated by poverty, education, employment, power, gender norms to impact on reproductive and maternal health in different contexts. Very few studies, 'have specifically examined the [two-way] links between maternal health and several outcomes of women's status and empowerment'.[137]

Reliable evidence

Recognition of women's sexual and reproductive rights is important to reproductive and maternal health progress in regions where women's and girls' status is diminished. Inability to negotiate safe sex increases the risk of unplanned pregnancies, and sexual violence.

3.1.7 Infant mortality as a determinant of fertility

Contraceptive use and reduced fertility lead to a decrease in infant and child mortality. However, the relationship between infant and child mortality and contraceptive use is complex and also runs in the other direction; that is, decreased infant and child mortality leads to a decrease in fertility. There are three mechanisms by which fertility may be affected by infant and child mortality:[138]

- **Physiological effects**. When an infant dies, the sudden termination of breastfeeding can lead to a return to fecundity and therefore the risk of further pregnancy earlier than if the infant had lived and continued breastfeeding. This effect is greatest in societies where extended breastfeeding is common which includes many in sub-Saharan Africa.
- **Replacement effects.** When a child dies at an early age, parents may try to 'replace' that child to achieve their desired number of surviving children. This often occurs at the same time as the physiological effects and is stronger than the physiological effect where there is greater conscious control of fertility through the use of contraceptives.
- **Insurance (hoarding) effect.** Where infant and child mortality is high or perceived to be high, parents are cognisant that there is a high change that not all of their children will survive to adulthood. They therefore bear more children than the desired family size, regardless of whether the children actually die, to ensure that they achieve a minimal family size. Unlike the previous two mechanisms, this effect has a significant

lag as couples need to adjust to perceived child mortality experience in society at large.

In real terms, the physiological and replacement effects are very difficult to separate out[139] and it would not be necessary to do so for the purposes of an intervention. It is also difficult to quantify the exact effect of a reduction of fertility on the insurance effect since it is dependent on parents' perception of infant and child mortality decline. The replacement and physiological effects are generally thought to be less than the mortality decline – in other words, on average, a child who dies will not be fully replaced by a birth. This is because not all parents who wish to replace a child will be able to do so and because not all parents will attempt to replace a deceased child.[140]

There is no evidence of any interventions to reduce infant and child mortality with the explicit aim of increasing contraceptive prevalence. However, there are many interventions which do aim to reduce infant and child mortality. The evidence strongly suggests that this will lead to a reduction in fertility and an increase in use of contraceptives, both traditional through extended breastfeeding and postpartum abstinence in the short-term and modern through the reduction in the replacement and insurance effects.

3.2 Other factors that increase the risk of death or illness

3.2.1 HIV/AIDS and sexually transmitted infections

Almost half the 33.4 million people living with HIV are women in their reproductive years.[141] According to the latest estimates from Joint United Nations Programme on HIV/AIDS (UNAIDS), around 1.4 million pregnant women living with HIV in developing countries gave birth. The burden in sub Saharan Africa is the greatest, accounting for more than 90% of all women currently living with HIV (WLHA).

Programmes designed to prevent perinatal HIV transmission are reaching fewer than 5% of women in sub-Saharan Africa,[142] the region with the highest number of HIV positive individuals and highest percentage of HIV positive adults who are women (58%).[143] HIV prevalence among pregnant women was estimated in 2000 at 29.6% in Namibia, 32.3% in Swaziland and 35% in Zimbabwe[144].

Women living with HIV face numerous barriers to accessing and using family planning services to achieve their pregnancy and childbearing intentions.[145] Unintended pregnancies and unmet need for Family Planning (FP) tend to be much higher than in the general population. For example, studies in Cote d'Ivoire, Rwanda, South Africa and Uganda that 51–91% of WLHA reported an unintended pregnancy[146] and an analysis of DHS data found that almost three quarters of WLHA did not want more children in the next two years or ever, but only 20% in Kenya and 32% in Malawi were practising FP. A study in Uganda found, however, that adolescents who have grown up living with HIV are significantly more likely to report using a modern method of contraception or condoms compared to adolescents who did not know their status.[147]

The extent of the contribution of HIV/AIDS to maternal mortality is difficult to quantify, as the HIV status of pregnant women is not always known. HIV infection and AIDS related deaths have become major causes of maternal mortality in many resource poor settings[148]. There is evidence that maternal mortality is higher among untreated HIV infected women than in HIV negative women: a recent review of maternal mortality data in South Africa found that the maternal mortality ratio was 6.2 times higher in HIV positive than in HIV negative women.[149] Recent estimates of maternal mortality for 181 countries found that of 342,900 estimated maternal deaths worldwide in 2008, 61.400 were attributed to HIV.[150]

HIV impacts on direct causes of maternal mortality through an associated increase in pregnancy complications such as anaemia, postpartum haemorrhage and puerperal sepsis.[151] HIV is also a major indirect cause of maternal mortality due to increased

susceptibility to opportunistic infections such as pneumocystis carinii pneumonia, tuberculosis and malaria. HIV positive women also have unwanted pregnancies and complications related to unsafe abortion, and as well as the usual reasons for needing a safe abortion, HIV positive women also suffer from fear of transmission to the child and financial and health issues related to treatment.[152] Appropriate antiretroviral therapy started in pregnancy could reverse the toll of HIV related maternal mortality.[153,154]

For women living with HIV and their newborns, there are two key elements to ensuring safe motherhood: ensuring access to healthcare during pregnancy and childbirth and ensuring access to services to prevent mother-to-child HIV transmission (PMTCT) to their newborns.[155] Mother-to-child transmission of HIV can occur at multiple points: in utero, during delivery and during breastfeeding. Therefore these are all points for intervention to reduce the possibility of transmission. The availability of PMTCT is intrinsically linked with the quality of maternal health services and significant increases in PMTCT coverage among those at risk can only be achieved by substantially increasing uptake of general antenatal care and delivery services. In fact, all the interventions to benefit maternal and newborn health are even more essential for women living with HIV.[156]

HIV and Tuberculosis

The numbers of women co-infected with Tuberculosis (TB) and HIV are increasing. In countries with HIV prevalence higher than 1%, relatively equal numbers of men and women are diagnosed with TB. Women bear the greatest burden of HIV and TB during their childbearing years.[157] It is estimated that 15% of maternal deaths are among women co-infected with TB and HIV and the development of TB is associated with a four-fold increase in AIDS-related deaths among women co-infected with TB and HIV.[158]

Other STIs

In unborn and newborn children, some STIs such as chlamydial infections, gonorrhoea and syphilis can lead to congenital disease, pneumonia and low birth weight.[159] Syphilis can lead to death in the adult and congenital syphilis in the newborn, with blindness, deafness and brain damage.[160] Syphilis, is present in 4%–15% of women in Africa, and in pregnancy leads to a one in four chance of stillbirth and an overall perinatal mortality rate of about 40%.[161] Syphilis co-infection is also particularly important to treat in HIV-positive women. There is some evidence that having a syphilis co-infection increases the changes of perinatal transmission.[162] All women would benefit from syphilis screening and the reduction in congenital syphilis mortality but women with HIV would also benefit from reduced transmission.

Some STIs such as gonococcal and chlamydial infections cause reproductive health problems**.** When left untreated in women, these can result in pelvic inflammatory diseases, common to around 40% of cases. This in turn leads to women being six to ten times more likely to suffer from ectopic pregnancies, a major cause of maternal death and tubal damage which is responsible for 30%–40% of female infertility.[163]

3.2.2 Under-nutrition

Maternal and child undernutrition contributes to 3.5 million deaths every year and accounts for 11% of total global Disability Adjusted Life Years (DALYs) that equate to lost years of healthy life.[164] The consequences of long-term excesses and/or imbalances in nutritional intake are inter-generational and can increase complications in pregnancy for both the women and infants.[165]

Under nutrition encompasses stunting, wasting and deficiencies of essential vitamins and minerals (which are often collectively known as micronutrients) which form one aspect of the condition known as malnutrition and consistent exposure to lack vitamins and minerals can

result in poor foetal growth and/or stunting in the first two years of life being sustained into adulthood.[166]

Evidence from long term intergenerational studies show that nutrition during the period from pre-pregnancy through to 24 months after the birth is particularly important for adult health and productivity.[167] Maternal and child under nutrition, including chronic energy and micronutrients deficiencies, is prevalent in many regions in the developing world, particularly in south-central Asia.[168] Recent figures tracking the proportion of malnutrition, as measured by child undernutrition, has highlighted that 80% of the challenge are contained in just 20 countries in the world.[169]

Maternal short stature and iron deficiency anaemia increase the risk of death of the mother at delivery, and together account for an estimated 20% of maternal mortality.[170] Maternal short stature is a risk factor for needing caesarean delivery, largely related to cephalopelvic disproportion. A meta-analysis of epidemiological studies found a 60% increased need for assisted delivery among women in the lowest quartile of stature (146 cm to 157 cm, depending on the region) compared with women in the highest quartile.[171] If operative delivery to ensure a healthy birth is not available to women who need it, both mother and baby are at risk.[172]

A meta-analysis conducted of DHS data conducted by WHO suggests that short maternal stature is highly associated with uterine volume, risks of foetal growth restriction and caesarean delivery.[173] A more recent meta analysis of 109 Demographic Health Surveys in 54 countries indicated that children born to women of short stature (<145cm) have a 40% higher risk of mortality and have a 70% higher risk of being stunted than children born to taller women.[174]

3.2.3 Malaria

Recent estimates suggest there are 125.2 million pregnancies at risk of malaria and of these more than 30 million are in sub Saharan Africa.[175] Of these 54.7 million pregnancies occurred in areas with stable *P. falciparum* malaria and a further 70.5 million in areas with exceptionally low malaria transmission or with *P. vivax* only. Sub-Saharan Africa also has the highest level of risk of *P. falciparum* transmission a strain which has the highest rates of complications and mortality with just under 30 million pregnancies at risk.[176]

The effect of infection on the mother can range from negligible to severe depending on the level of immunity to malaria infection that the mother has acquired prior to pregnancy, the table below outlines the adverse effects of malaria in pregnancy on the women, the foetus and the newborn.

Table 6: Adverse effects of malaria in pregnancy

	Morbidity	Mortality
Pregnant women	Parasitaemia Spleen rates Anaemia Febrile illness Cerebral malaria Hypoglycaemia Puerperal sepsis	Severe disease Haemorrhage
Foetus	Congenital infection	Abortion Still birth
Newborn	Low birth weight - pr ematurity - i ntra-uterine growth retardation Malaria illness	Severe disease

Adapted from: World Health Organization. A Strategic Framework for Malaria Prevention and Control during pregnancy in the African Region. Brazzaville: World Health Organization 2004

The symptoms and complications of malaria during pregnancy differ according to the intensity of malaria transmission.[177] In areas of stable transmission the ill health effects are especially apparent in the first and second malaria-exposed pregnancies.[178] However, *P falciparum* infection in pregnant women in these areas is usually asymptomatic or symptoms are non-specific; malaria is therefore often not suspected. Malaria parasites may be present in the placenta, but not in the peripheral blood, making diagnosis of placental malaria difficult.[179] In these settings the major adverse effect of infection is low birth weight and maternal anaemia. In areas with stable malaria transmission, malaria during pregnancy contributes to between 2% and 15% of maternal anaemia and 8% and 14% of low birth weight.[180]

Pregnant women living in an area of low or unstable malaria transmission have little immunity to malaria which means their risk of developing severe disease can be two or three times greater than that of non pregnant women living in the same area. They may die as a direct result of severe malaria or as an indirect result of malaria related severe anaemia. In addition, malaria infection increases their risk of miscarriage, neonatal death and low birth weight.[181]

3.2.4 Water, sanitation and hygiene related diseases

Water, sanitation and hygiene (WASH) interventions are estimated to reduce the incidence of two of the biggest immediate biological causes of maternal mortality: Infections and haemorrhages, which together account for 50% of all such deaths.[182] Puerperal sepsis, or genital tract infection following childbirth, is among the leading causes of preventable maternal death and morbidity and is particularly prevalent in countries where home delivery and unhygienic births/ induced abortion are common.[183] Every year 15% of all maternal deaths[184] mostly in developing countries (some estimates suggest 75,000 women)[185]), are caused by puerperal sepsis. Puerperal sepsis causes the loss of more than one-third of healthy years of life.[186] Women who survive the initial infection may go on to develop pelvic inflammatory disease (in which the infection spreads to the fallopian tubes and ovaries), chronic pelvic pain, damage to reproductive organs (putting women at future risk of ectopic pregnancy), and infertility.[187]

WASH can also affect other fundamental conditions that have longer term implications for maternal and reproductive health together with the risk of maternal mortality. In particular short stature due to the combination of WASH and nutrition increases the likelihood of complications during childbirth; Poor water, sanitation and hygiene contribute to under-

nutrition and short stature among women throughout the life course (Prista et al 2005[188]; Sawaya et al 2005[189]; Solomons et al 1993[190]; Merchant et al 2003[191]). Short stature is a key risk factor for prolonged labour and fistula (Melah et al 2007[192]; Tsu 1992[193]). In addition, poor hydration is a risk factor for prolonged labour (Manz 2007[194]).

Poor WASH conditions in schools has been linked to dropout by girls which increases risk of teenage pregnancy (another risk factor for complications). The rate of teenage pregnancy (15–19 years) is 143 per 1,000 in some sub-Saharan African countries.[195] WHO estimates that the risk of death following pregnancy is twice as high for women aged between 15 and 19 than for those between the ages of 20 and 24.[196] The World Bank estimates that an additional year of schooling for 1,000 women helps prevent two maternal deaths. Yet girls constitute 55% of all out-of-school children. Worldwide, for every 100 boys out-of-school there are 122 girls.[197] In some countries the gender gap is much wider. Household chores, such as fetching water, keep many girls out of school and the lack of facilities/sanitary protection in school to enable menstrual hygiene are another significant reason why girls drop out. A United Nations Children's Fund (UNICEF) programme in Bangladesh found 11% more girls attend school when sanitation is available.

Finally, poor menstrual hygiene can lead to increased maternal and reproductive health problems. A survey by Water Aid in Bangladesh[198] reported health problems resulting from poor menstrual hygiene such as vaginal scabies, abnormal discharge, and urinary infections as well as the embarrassment associated with the odour of menstrual blood. Other studies also suggest clear links between poor menstrual hygiene (that is, lack of facilities, including safe water and clean, private toilets, re-using cloths that have not been adequately cleaned and dried, not having anywhere to change their clothes and not being able to wash regularly), and urinary or reproductive tract infections and other illnesses.[199,200,201,202,203]

3.2.5. Other risk factors for the newborn

Neonatal illness presented as an emergency is a leading cause of neonatal death. Important conditions include neonatal sepsis, pneumonia and tetanus. Sepsis accounts for an estimated 5-7% of neonatal deaths in Africa and Southeast Asia.[204] Pneumonia in the neonatal period is the cause of 3% of all U5 deaths in Africa, and 8% in Southeast Asia.[205] A recent systematic review found evidence for the effectiveness of community case management with antibiotic treatment, with a reduction in mortality from neonatal pneumonia by 42%, including in rural areas with limited access to health services and limited resources.[206] Neonatal tetanus is the cause of 1% of all under five deaths in Africa and Southeast Asia and accounts for an estimated 59 000 neonatal deaths a year globally.[207] This represents a fall from an estimated 500 000 deaths in the early 1980s, but neonatal tetanus persists in at least 44 countries, mainly in Asia and Africa.[208] Neonatal tetanus therefore remains an important cause of neonatal mortality, and is readily preventable through immunisation of pregnant women combined with hygienic delivery practice. Note that integrated interventions for newborns and mothers will be the subject of a separate evidence review in 2011.

4. Removing barriers to access

4.1 Physical access to services

Transport related costs often form a major share of out-of-pocket spending on RMNH services (most especially maternal health) and often delay or inhibit care seeking, especially for poor families living in remote or difficult to reach places. With a few exceptions, health system-led financing mechanisms do not tend to cover transport costs. In Tanzania[209] and Nepal,[210] transport costs have been shown to make up almost 50% of household spending on a normal delivery[211] and 25% of costs for a complicated delivery in Nepal. In Nepal, total travel and waiting time costs were estimated at 9–14% of total household expenditure for a delivery in Nepal and 65–93% in Tanzania.[212] Studies in Burkina Faso and northeast Brazil showed that transport accounted for 28% and 25%, respectively, of total costs to patients of using hospital services.[213]

A number of studies[214,215,216] have shown that delays in transportation are associated with low usage of obstetric care and with increased maternal and newborn morbidity and mortality. Lack of transportation was the primary preventable cause of death in 28% of maternal deaths in rural Zimbabwe[217] and 21% of perinatal deaths in Tanzania.[218,219] The primary mode of transportation for women in poor rural areas remains walking, and the decision whether to seek care is often influenced by the fear of giving birth en route.[220] Transport related delays may occur both between home and first-level health facility and home and referral hospital and between first level health facilities and the referral hospital, especially if emergency obstetric care is not available at the first level.[221] However, there is a scarcity of empirical evidence from developing countries quantifying the availability of, and access to, transport for health.[222]

Unreliable or limited transport facilities are another factor militating against care-seeking behaviour on the part of rural families. In high income countries transport systems for general use are often supplemented by an ambulance service providing transport to health facilities and these are often subsidised for the poor. However, many developing countries are unable to cover the cost of running a fleet of conventional vehicles in often difficult conditions and ambulances. In sub-Saharan Africa and Asia, most countries envisaged a fleet of ambulances as part of a public health service but have been unable to sustain them, with the result that these vehicles often transfer patients between health facilities and not from the location of the emergency.[223]

Other transport factors such as poor road infrastructure and fuel shortages can limit access to transport even where ambulances are theoretically available.[224] Private transport such as private vehicles, taxis and trucks, may be unavailable or expensive, may not be accessible at certain times such as on market days,[225] and may not be sufficiently fast. Private drivers are sometimes wary of transporting obstetric emergencies because of damage to vehicles or concern about death en route.[226] Often, they can only transport the woman, not her accompanying family member, acting as a disincentive to seeking care especially in areas where unaccompanied female travel is frowned upon. Lack of transport with specialised equipment for newborn health may contribute to neonatal mortality individual studies have suggested.[227]

4.1.1 Transport interventions

Organised public ambulance services have been identified as key to successful national maternal mortality programmes in Honduras, Sri Lanka and Malaysia, one literature review has noted.[228] One analysis of ambulance-operating organisations in Nepal[229] found that ambulances run by smaller local, often ideologically based organisations were more flexible and less prone to misuse than those run by public organisations and large NGOs. Some evidence from Pakistan[230] and Nepal suggested that there was potential to recruit citizens as volunteers to provide ambulance care and contracting out to the private sector for ambulance services had been implemented by Benoni City Council in South Africa.[231]

Vehicles for transporting women to facilities include a wide range of options from pick-up trucks to taxis, buses, reconditioned vehicles, tractors, motorcycles, tricycles, bicycles (community based cycle and motorcycle ambulances have been used in the Gambia, Kenya, Nepal and Nigeria[232]) motorboats, canoes, wheelbarrows, homemade stretchers and various combinations of different means of transport. Countries have implemented different approaches depending on the distance-related obstacles to seeking care. A review of the literature on transport and communication for obstetric emergencies[233] concluded that empirical evidence was scarce, but suggested that some form of motorised transport was likely to be the most acceptable and effective for obstetric emergencies since other methods may not significantly reduce delays.

In Malawi the introduction of bicycle ambulances did not reduce transport times and they were infrequently used because of cultural beliefs that publicising labour resulted in summoning evil spirits.[234] On the other hand, motorcycle ambulances were found to be both effective and culturally acceptable in another district in Malawi.[235]

Public-private partnerships and the modification of existing private transport facilities have been attempted to address obstetric emergencies. For example in Nigeria, a local bus driver's union negotiated for free emergency transport for pregnant women on market days.[236] In Pakistan, the largest private ambulance service is run by philanthropic donations and has a fleet of over 400 ambulances, a helicopter and two airplanes that allow access for remote areas out-of-reach of state services.[237] Another public-private partnership option is the funding and authorisation of health workers to hire private vehicles to transport emergency cases in the absence of functioning ambulances, as in Malaysia and Sri Lanka.[238]

Cultural context is important to the success of transport interventions, for example cultural norms in some areas surrounding the need for privacy and for women to be accompanied by family members.[239] A separate review[240] looked at studies showing how cultural factors affected the outcome of interventions in one district in Malawi,[241] where the introduction of bicycle ambulances did not result in frequent uptake as they did not reduce transport time significantly and because of local beliefs that publicising labour led to the summoning of evil spirits, but not in another district of Malawi, where bicycle ambulances were both effective and acceptable.[242]

In locations where road infrastructure is being expanded, transport costs can be expected to fall, but this is a lengthy process.[243] Community initiatives have attempted to pool funds in order to pay for transport in emergencies, including the generation of pooled emergency loan funds and collaboration with local transport groups. [244] Experience with community-based emergency funds is mixed. The success of such schemes depends on community mobilisation and is therefore dependent on strong community leadership.[245] Funds have sometimes faced difficulty collecting sufficient amounts to cover the cost of transport,[246] so that families have to make additional payments.[247] Management of funds, record keeping and dealing with those who default have also been identified as problems.[248] One revolving petrol fund for transport to obstetric services was depleted within a year because of inability to follow up on defaulters.[249] In two small pilot projects in Nigeria emergency loan funds were successfully put in place, provided that interest rates charged on repayments were low (0%–2%).[250,251] A study in Cross River state in Nigeria found that although most villages had established community funds, fewer than half had been used during the study and in many villages where funds were found not to be sufficient.[252]

In other contexts, such as Nepal, experience has been that while women contribute to the saving, they are reluctant to draw on the emergency fund unless they have exhausted other

routes, such as borrowing from family and neighbours[253]. In Makwanpur in Nepal, community maternal and child funds helped some mothers to access care, but there is some evidence that they did not reach the poorest.[254]

All reviews used here highlighted that there is a lack of good research evidence on referral transportation.[255,256] One systematic review[257] graded the evidence on communication and transport systems as low, using the GRADE system. The review found several low-quality before-and-after programme reports showing that communications and transport systems may increase obstetric care seeking. However, there was only one report on perinatal outcomes. More research is needed on how to overcome transport barriers, particularly in remote rural areas

Reliable evidence
Efficient and affordable transport systems, supported by effective referral systems, saves lives but more research is needed on how to overcome geographical barriers, particularly in remote rural areas.

4.1.2 Communications technologies

Referral communications for obstetric emergencies could potentially benefit from increasingly sophisticated technologies.[258] A systematic review on connecting families to healthcare facilities suggested that improving communication between community-based workers and medical professionals may reduce transport delays and improve rates of referral of women to the appropriate level of care.[259] Examples of communications technologies used to improve these links included:

- Mobile two-way radios provided to traditional birth attendants (TBAs) attending home births in the Ugandan programme Rural Extended Services and Care for Emergency Relief (RESCUER) to call medical staff, and to call emergency transport to the home, in the event of labour complications to triage problems led to the increase of TBA referral rates over the period of the project.[260]
- In Bo district, Sierra Leone, the establishment of solar-powered radio communications was aimed at overcoming the difficulties that curfews posed to the existing system of motorbike messengers, and reduced the referral time to the district hospital by two hours for the most peripheral centres.[261]
- Establishment of repeater-based VHF radio communications systems in district health centres to aid the dispatching of ambulances there, increased monthly obstetric admissions, referral rates and referrals within one hour of decision. The median time of transport decreased from three to two hours. But the paucity of available ambulances continued to make the transport time too long for many mothers.[262]

4.2 Community mobilisation and women's groups

Community mobilisation is, 'a capacity building process through which community members, groups, or organisations plan, carry out, and evaluate activities on a participatory and sustained basis to improve their health and other conditions, either on their own initiative or stimulated by others.'[263] Community mobilisation takes many different forms but fundamental is the potential to address the underlying social, cultural and political causes of maternal and newborn mortality.[264] By encouraging community consciousness, social solidarity and action, community mobilisation through women's groups has the capacity to address the social and power imbalances that act as barriers to women, and disadvantaged women in particular, accessing care and promoting maternal and newborn health. By addressing inequality and the social determinants of maternal health, community mobilisation has an important role to play in increasing access to and use of essential maternal healthcare.[265]

Women's groups are an important part of community mobilisation, and there is now strong evidence of their effectiveness for health outcomes in Asia, especially in reducing neonatal mortality. The Makwanpur Project in Nepal (2001–2003) tested the use of women's groups as a platform for community mobilisation for reducing maternal and neonatal mortality as a cluster randomised controlled trial.[266] The trial showed a 30% reduction in neonatal mortality rate, and found significantly fewer maternal deaths in the intervention clusters compared to control areas. The maternal mortality rate (MMR) was 69 per 100,000 live births (two deaths per 2,899 live births) in intervention areas, and 341 per 100,000 live births (11 per 3,226 live births) in the control areas. Both control and intervention clusters received limited supply side strengthening inputs. Compared with the control clusters, women in the intervention areas were more likely to receive antenatal care, give birth in a facility, and use a trained attendant and hygienic care during delivery. Although the trial was not designed to measure maternal mortality and the deaths were low in number, the findings are important evidence of the potential of community mobilisation through women's groups to impact on maternal and newborn mortality and improve health behaviours.

The Dinajpur Safe Mother Initiative in Bangladesh tested the effects of a package of demand side interventions and facility based quality of care inputs on the use of government obstetric services in north western Bangladesh (1998–2001), comparing this with a comparison and control area.[267] The comparison area received basic upgrading of the facility but no quality of care inputs or community mobilisation, while the control area received no inputs. The study found that met need for emergency obstetric care increased by 13% in the comparison area, 24% in the intervention area, and not at all in the control area. The conclusion drawn is that a combined package of demand- and supply-side interventions has greatest impact on maternal mortality.

The results of further cluster randomised controlled trials to test the impact of different women's group models on maternal and child health in Jharkhand and Orissa (India) and three rural districts in Bangladesh were recently published.[268] Contrasting results were found from the two large studies of community-based women's support groups in rural Bangladesh[269] and in the rural Indian areas of Jharkhand and Orissa.[270] In rural Bangladesh, the intervention did not have much effect, and only 2% coverage of newly pregnant women being enrolled into the women's groups was achieved and no significant reduction in neonatal mortality was recorded. Contextual factors and programme design were seen as explaining this result.

However, in Jharkhand and Orissa, the intervention was more successful, with 55% of all pregnant women joining women's support groups by year three of the study and a 32% reduction in neonatal mortality rate. The latter finding was consistent with the finding of reduced neonatal mortality previously observed in Makwanpur in Nepal and cited above.[271] The Jharkhand and Orissa, like many others, was not powered for maternal mortality outcomes, but did find that the maternal mortality ratio was generally lower in intervention than in control clusters. The final results of a trial evaluating the role of community-support groups in rural Malawi are not yet available.[272]

Bhutta and Lassi[273] conducted a pooled analysis in 2010 of recent RCTs in which community-support and advocacy groups and group-advocacy sessions that targeted women were used as part of the intervention. These strategies were found to be associated with significant reduction in neonatal mortality rate as well as a range of other benefits such as early initiation of breastfeeding and care seeking for illness. Possible benefits for female empowerment and family relationships were deemed harder to evaluate objectively. Most recent studies were not powered for maternal mortality outcomes but the Makwanpur study[274] detailed above indicated benefits and a more recent trial in Jharkhand and Orissa, also detailed above, indicated this same direction of effect.

Reliable evidence

There is now very strong evidence from a pooled analysis of several RCTs that women's participatory groups are effective in Asia in changing behaviour and in reducing neonatal mortality by around a third.

Scaling up community mobilisation

Few countries have attempted massive scaling up of community mobilisation; those that have include Bangladesh, Bolivia, Cuba, Peru, and Sri Lanka. Rosato *et al* note that capacity and commitment to scaling up in the poorest countries is weak, and there is a risk that scaling up may not end up benefiting the most vulnerable populations.[275] Kerber *et al* argue that because community and family interventions are not perceived as part of the health system, they have tended not to be integrated into care packages or scaled up[276]. Further research is needed to answer questions on how community mobilisation can be taken to scale effectively; and in which social, political and health contexts community mobilisation makes a cost effective difference to increasing access to maternal and newborn health services given its capacity to 'get below' and enable socially excluded and disadvantaged groups to overcome the multitude of barriers they face in accessing care, and achieving maternal well-being. United States Agency for International Development (USAID) programme experience suggests that community mobilisation programmes receiving less than three years of support may not achieve sustainable results and those that receive 5–10 years of support are more likely to be sustainable.[277]

Although a growing body of literature exists on programme experience with community mobilisation, documenting women's empowerment through this process, published results of cluster randomised controlled trials to date have not explained how community mobilisation works to empower women, to increase community capacity and improve health outcomes. There is a need for more detailed longitudinal research to explain how community mobilisation addresses the social determinants of maternal health and impacts on women's empowerment, social exclusion and discrimination. The Nepal Support to the Safe Motherhood Programme (SSMP) provides qualitative evidence of how women led mobilisation, as part of a broader social mobilisation approach, can empower women in very poor and excluded communities.[278]

4.3 Removing direct financial barriers

Removing direct financial barriers requires a well functioning health financing system. Health financing has to perform two main functions: raise sufficient resources to provide health services and allocate and distribute services and resources effectively and efficiently. These functions are directed by political decisions on overall health system goals and values, such as socially acceptable standards of health (health status), equity of outcomes and satisfaction of users and citizens.

Two key concepts are important to understanding the performance of health financing approaches: financial risk protection and pooling. The financial risk protection provided by a health financing system is the degree to which it ensures that people are neither prevented from using health services by the need to pay at the point of use, nor impoverished by the need to make catastrophically high payments when they do use services. It implies some degree and mechanism for pre-payment for services. Pooling refers to mechanisms for sharing the costs of healthcare across populations and cohorts with different healthcare needs (e.g. old and young, poor and rich). The degree of risk protection and pooling afforded by a health financing system are useful dimensions of comparison.

4.3.1 User fees

User fees refer to out of pocket payments that patients are required to make when they use public sector health services. Fees may cover all or part of the cost of care, and may be levied in a variety of ways including; consultation fees (fixed or variable), fees for treatment and fees for medication or commodities. Fees may be formal or informal.

The case for replacing fees with more equitable financing in order to achieve universal coverage of services for pregnant mothers and their children has very strong logic.[279] Demand is currently inadequate for RMNH services, and one review of the financing evidence shows user fees contribute to the often catastrophic financial burden faced by those accessing care and deter those who cannot generate funds needed at the point of care from seeking treatment promptly or altogether[280]. Studies show that user fees for safe delivery reduce utilisation of services, particularly amongst poor people and the most vulnerable[281] and are a barrier to increasing demand for maternal healthcare services.[282,283]

The effect of user fees on access to RMNH has been addressed in a number of quantitative and qualitative studies.[284,285,286] Although, overall assessment of their impact is complicated by the fact that they have been implemented differently in different countries. A 2005 literature review on financing for maternal health documented a number of studies showing negative impact on maternal health services.[287] Introduction of user fees in Nigeria, Kenya, Zimbabwe, Sudan, and Nepal led to rapid and significant decreases in the numbers of women presenting for care.[288] In addition, evidence from descriptive studies suggests that in practice such fees raise little money to increase and sustain national health budgets and are inefficiently and inequitably managed and costly to administer.[289] The use of exemption policies or waivers to improve access by poor people to maternal health, antenatal care and family planning services within user fee systems have been largely unsuccessful in practice, as they are often inconsistently or unfairly applied.[290]

Impact of user fee removal on utilisation

There is good evidence of impact of fee removal on utilisation. A recent 2010 scoping non-systematic literature review[291] in five African countries suggested that the abolition of user fees had a generally positive effect on using services but there is a lack of research showing what approaches to the process of removing user fees are most effective and what management procedures, financing and governance frameworks should be adopted to cope with the wider repercussions of removing fees.

Other evaluations have showed increased utilisation in Burundi, Malawi, Zambia,[292] Senegal[293] and Burkina Faso[294] following fee removal. Ghana and Uganda simultaneously experienced substantial increases in women presenting for institutional births on removal of user fees, and an evaluation from Ghana confirmed the largest increase in service utilisation occurred amongst the poorest and least educated.[295,296]

The systematic review by Lagarde and Palmer[297] included a reanalysis of data from five studies. Their reanalysis confirmed that the removal of fees led to an abrupt increase in the utilisation of curative services, but that the increase was rarely followed by a sustained increase in the growth of utilisation. The quality of data from which these conclusions were drawn was considered to be low, due to confounding variables such as concurrent policy changes and small sample sizes.

The impact of removing user fees on overall costs to the poorest of seeking healthcare is varied. Unofficial fees are sometimes levied by health workers after the official removal of user fees.[298,299] Where RMNH is concerned, user fees are only one of a number of out-of-pocket costs restricting access to services including costs of medicine when it is unavailable in the public sector, transport and opportunity costs. One study in Tanzania found that out-of-pocket payments for facility delivery were substantial and were driven by high transport costs, unofficial provider payments, and preference for mission facilities, which did charge

for services but were considered higher quality.[300] Data from Nepal showed that transport constituted almost 50% of costs.[301]

Impact of user fee removal on outcomes and the wider health system

There is as yet no direct evidence that removal of fees directly improves health outcomes. The most reliable way of testing the impact of any increased utilisation on health outcomes is through randomised trials, only one of which has been conducted, this found an increase in utilisation of services but no improvement in health outcomes.[302]

There are wider, sometimes unintended, repercussions of user fee removal without planning for the consequent (and predictable) increase in demand. Unintended consequences included drug stock shortages, which occurred after an initial improvement in drug stocks in Ghana,[303] but occurred immediately after fee removal in Uganda and then improved in the year following abolition.[304,305] Effects on quality of services were also recorded in South Africa, where higher numbers of visits meant lower quality: less time for each patient and lack of privacy.[306] Two studies from Uganda reported deteriorating cleanliness of facilities[307] long waiting times and unfriendly staff,[308] while others reported no change.[309] Some studies have also recorded the impact of fee removal on staff workload and morale. In many cases additional workloads were reported,[310] [311] [312][313] and one study reported a 47% average increase per worker. [314]

One concern has been the effect of user fee removal on health system revenues and therefore its sustainability. In Uganda, one study found that the loss to health system revenues of US$3.4 million annually was compensated by the estimated US$9 million gained in revenues not lost due to illness.[315] Other case studies have documented the revenues lost by health facilities and their difficulty in meeting expenses until compensatory funds were released.[316,317] In Ghana, studies showed that compensatory funds were preferred by staff to user fees, but they were insufficient to cover costs and some facilities went into debt to the extent that they had to reinstate user fees.[318] [319]

Overall there have not been many longer-term studies of the impact of removing user fees in the context of broader reforms to build sustainable and more equitable financing systems. Further research (in particular prospective evaluations) is needed to understand the factors behind successful removal of user fees, particularly for maternity and neonatal care, and the consequent impact on the overall demand for services, quality and equity.[320] For instance, recent research from Zambia (not yet unpublished) suggests that utilisation by older children (>5s) following fee removal can be crowded out by an increase in utilisation by adults.[321] More generally, achieving equitable health financing is about much more than user fees. Health financing reforms can drive a better public-private mix in the provision of basic services and, using the broad range of options available such as vouchers or insurance, can build a mixed health delivery system that makes optimal use of resources to reach the greatest number of people. The evidence on these options are discussed below.

Reliable evidence

There is strong evidence that removal of fees leads to immediate increases in utilisation of services. However, more research is needed to understand how to sustain these gains and the impact on the wider health system and health outcomes.

4.3.2 Cash transfers and voucher schemes

New methods for targeting and removing financial barriers to access for RMNH services amongst poor women are being tested. Demand-side subsidies, such as cash or vouchers for skilled birth attendant (SBA) delivery, can give a woman the purchasing power to choose where she delivers from among a group of approved providers, which may be public or private, for-profit or not-for-profit. Demand side or consumer-led financing is increasingly being implemented to promote access to maternal and sexual and reproductive health services in developing countries.[322] They are also often seen as ways to access capacity in

the private sector, improve access for target groups and improve quality and efficiency through market competition.

The basic idea behind such demand side financing is that subsidising demand among priority population groups for specific services (and patient costs related to specific services such as transport and so on), while creating or stimulating a competitive market, may be more beneficial than using the same resources to subsidise the supply of these services.[323] Demand side strategies aim to link subsidies with services delivered, producing incentives to attract more patients as the remuneration received by the service provider depends upon the outputs produced and their quality. Demand-side financing mechanisms can be grouped into two categories: (a) vouchers to increase use of particular services or commodities and (b) cash transfers.

Vouchers and results based financing

Vouchers are a variant of fee-waiver programmes that have been adopted in many countries to remove financial barriers to access, improve service quality and increase utilisation of quality services. Typically, vouchers are seen as a demand-side financing tool. Physical vouchers are distributed to target populations who then use them to pay elected providers for use of health facilities.[324] Vouchers can be given out free of charge or sold at a subsidised price. Voucher programmes can also operate on the supply side by engaging both the public and the private sectors and facilitating greater competition by increasing users' choice. Accreditation or provider approval is integral to voucher programmes, and reimbursements to providers can be structured in such a way as to incentivise quality as part of an overall approach to increase access to quality services for specific groups. They can also increase transparency as administrative data can be used to track distribution, receipt of services by clients and measures of performance. Proper information systems allows for the monitoring of providers, who can then be financially rewarded for providing quality care.[325] Vouchers are often referred to as examples of output-based aid programmes or as examples of results-based financing or performance-based financing.

A recently published systematic review by Bellows et al (2010) analysed the effectiveness of voucher programmes) for reproductive health services – defined as antenatal care, assisted deliveries, other maternity-related services, family planning, treatment and testing for STIs, and other reproductive system ailments.[326] Most of the 13 voucher programmes included in the study were programmes that freely distributed vouchers; only a few where vouchers were purchased from vendors at a subsidised price. The review excluded studies of vouchers used only for commodities and goods (such as insecticide-treated bed nets for pregnant women, and oral contraceptives and condoms). The reason for these exclusions was that the management of voucher programmes for Reproductive Health (RH) services is very different from that for RH commodities. However, the authors recommend future systematic reviews on the effectiveness of RH goods.

Quantitative evaluation information was available in seven of the 13 RH voucher programmes (Bangladesh, Cambodia, three in Nicaragua, Taiwan, Uganda). Evaluation designs varied, including cross-sectional analyses, before and after intervention analyses with and without control data, simulated patients before and after intervention, and cost analysis of administrative data. Only four quantitative studies had strong study designs that would qualify them for inclusion in a Cochrane systematic review. These are the evaluations of the voucher schemes in Bangladesh (maternity), Uganda (STI treatment), Taiwan (family planning) and Nicaragua (STI treatment).

Four studies reported against service utilisation. In Bangladesh and Cambodia, facility-based deliveries had a greater significant increase than in control areas[327]. Additionally, Bangladesh saw significant increases in antenatal and postnatal care visits compared to controls[328]. In Bangladesh, one quality concern had been that increased payment for surgical deliveries would cause unnecessary caesareans, but there was no statistically significant difference in the rate of surgical deliveries between voucher and control areas.[329] In

Nicaragua, the use of contraceptives doubled among sexually active non-pregnant voucher redeemers and voucher receivers had significantly higher use rates of reproductive healthcare, condoms, and other contraceptives compared to non-voucher receivers.[330,331] In Uganda there was not a significant increase in using STI services after the programme was initiated among the general population; however, a significant increase was found among poor people living within ten kilometres of contracted health facilities.[332]

Bellows et al (2010) found only three RH voucher programmes that reported population-level health outcomes, all with relatively strong study designs. Using matched controls, the Taiwan IUD programme calculated that for the first three years the programme prevented 99 live births a year for the first 1,000 IUD insertions.[333] A time series analysis in Nicaragua found significant reductions in the prevalence of three STDs after each round of voucher distribution.[334] In Uganda, a significant reduction in syphilis prevalence was found in treatment areas compared to controls between baseline and follow-up surveys 16 months later.[335]

Some limitations of voucher schemes include the possibility of fraud at the provider level. Stringent targeting and effective monitoring is suggested by one evidence review.[336] Mixed uptake of vouchers by targeted beneficiary groups raises the question of who does or does not participate and why, and whether alternative uses of the same funding would be equally effective. In-depth qualitative evaluations at the community level are required to explore these questions.

The biggest limitation is the absence of robust evidence in low income countries on the effectiveness in terms of population-level health outcomes, and the sustainability of vouchers beyond preliminary evaluations of pilot programmes.[337] There is also a need to assess the relevance of vouchers for family planning commodities (not just RH services).[338]

There is often a fine line between voucher programmes, conditional cash transfers (CCTs) and other types of cash incentive programmes. The *Chiranjeevi Yojana* programme in Gujarat, India, is an example of a 'voucherless' voucher programme which provides small cash incentives at the time of institutional delivery plus a small stipend to mothers to cover transport and lost productivity of an accompanying partner.[339] Targeting is done using the Below Poverty Line (BPL) card. The larger part of the project is reimbursing private sector obstetricians who are contracted by the state government to deliver services. It is the providers who should pass on a small amount of that reimbursement to the women for transport and to the TBA for referral. By 2008 the programme had expanded to all 25 districts of Gujarat, subsidised 165,278 births and had increased institutional births amongst poor people from 27% to 48%. Since its inception, there had been 599 neonatal and 32 maternal deaths amongst beneficiaries giving an estimated NMR of 3.4 per 1,000 and MMR of 19 per 100,000. This compared to the estimated baseline pre-programme NMR was 40 per 1,000 and the MMR was 400 per 100,000.[340]

Cash transfers and cash incentives

CCTs provide money to vulnerable individuals or households, conditional upon their use of pre-specified services. Unconditional cash transfers (UCT) provide to vulnerable households moneys such as social pensions, child and family support grants, that are not conditional upon use of specified services. As with voucher schemes, there is an urgent need for more piloting, and robust monitoring and evaluation of cash transfer schemes for RMNH including obstetric care.[341] The relative benefits of conditional and unconditional cash transfers are currently under scrutiny by DFID, World Bank and others, and large knowledge gaps still exist.

A recent systematic review by Gaarder et al (2010) analysed the evidence on the health and nutrition results from rigorous impact evaluations of CCT interventions in low-income and middle-income countries. The paper included 41 studies related to 11 programmes/interventions in Latin America, Africa, Asia and the Middle East. Studies

selected for the review use experimental (RCT) or quasi-experimental methods (matching techniques, regression discontinuity, and multivariate regression techniques).

The review concludes, 'CCT impact evaluations provide unambiguous evidence that financial incentives work to increase utilisation of those key health services by the poor upon which the cash transfer is conditioned, if the beneficiaries have knowledge of this condition. However, results are mixed with respect to nutrition and health outcomes'.[342] This finding suggests that investment in the quality of health services is required alongside demand-side initiatives and that social determinants of health are also important, as they are for user fee removal. Gaarder et al. (2010) propose that more research is required to unpack the causal pathways (such as direct routes by which cash transfers affect health), to test the need for conditionalities, and to explore cost-effectiveness of investing in the supply side versus the demand-side within the health system. It should be noted that the multiplicity of CCT objectives (e.g. poverty reduction in the short-term and inter-generationally, removing financial barriers to accessing services, creating demand) creates a challenge for evaluation.

It is notable that the systematic review demonstrates that the more rigorously-evaluated CCT programmes have rarely focused on RMNH, either in terms of outcomes or service utilisation. Where they do, the focus tends to be on uptake of antenatal care or postnatal check-ups. For example, an RCT (cluster) in 70 cities in Honduras, in which intervention households were given monthly cash vouchers in exchange for attending routine prenatal and well-child clinics showed that those receiving cash transfers utilised prenatal care 18%-20% more often than the control households.[343] Also, a retrospective case report on the *Oportunidades* conditional cash transfer programme in Mexico showed that participating women were 12% more likely than non-participants to receive prenatal screening or case management procedures.[344]

Very few cash transfer schemes focus on family planning and preventing unintended pregnancy. One example, again from *Oportunidades* in Mexico, is an RCT (cluster) focused on contraceptive use and birth spacing. This study found that in 2000, female household heads receiving cash payments were significantly more likely to use modern contraceptives than were women in the control group, particularly among women who enter the programme with low levels of autonomy. However, by 2003 all beneficiaries had the same probability of contraceptive use. Birth spacing was similar between the beneficiaries and controls over the six-year evaluation period. This study points to the need for further research, including ethnographic approaches, to assess how CCTs affect beneficiaries' reproductive behaviours over a longer time period.[345]

Beyond Central and Latin America, several conditional cash transfer programmes which aim to incentivise institutional deliveries are now beginning to be implemented and evaluated, including India and Nepal.[346,347] In 2005, India launched the national *Janani Suraksha Yojana* (JSY) scheme which gives cash incentives to rural pregnant women below the poverty line at the time of institutional delivery, as well as additional payments for emergency transport, caesarean delivery and post-delivery expenses and post-delivery costs.[348] The government also compensates participating private obstetricians for providing free services to these women.

One of the first impact evaluations of JSY by Lim et al (2010) found significant increases in uptake of antenatal care and institutional deliveries among women receiving the JSY benefit, but large state-to-state variations in the proportion of women receiving the benefit (5% to 44% of women giving birth received JSY cash payments).[349] Some focus states like Madhya Pradesh saw large significant improvements in institutional delivery rates while other focus states such as Bihar and Uttar Pradesh saw smaller, albeit significant, treatment effects. The analysis also shows that not all of the poorest, least educated women have benefited from the scheme. In fact, a positive association was found between uptake of services and increasing levels of education and household wealth. These findings in particular indicate the operation of non-financial barriers to uptake.[350] In the matching analysis, JSY payment was

associated with a reduction of 3.7 (95% CI 2.2-5.2) perinatal deaths per 1,000 pregnancies and 2.3 (0.9-3.7) neonatal deaths per 1,000 live births. These reductions increased slightly when using the with-versus-without comparison.

Nepal's Safe Delivery Incentive Programme (SDIP) also combines both demand cash incentives and provider incentives with the aim of changing health-seeking behaviour on institutional deliveries. A recent evaluation using interrupted time series methods[351] found that the SDIP in Nepal reduced the probability of a home delivery by 4.2 percentage points, and increased the chances of a delivery in a government health facility (2.6 percentage points), or attendance by a skilled birth attendant (2.3 percentage points) and by any health worker (4.4 percentage points). However, the authors found no evidence that the SDIP had any impact on neonatal mortality or the caesarean-section rate. Nor did it increase use of prenatal care, perhaps because the conditionality was on professional care at childbirth.

Evidence is also emerging that cash transfers targeting areas such as education can have a positive impact on health behaviours such as early marriage, teenage pregnancy and self-reported sexual activity. An RCT evaluation of the on-going Zomba Cash Transfer Programme which provides cash conditional upon satisfactory school attendance for girls, in addition to direct payment of secondary school fees, found that after one year, the probability of getting married and falling pregnant declined for those out of school at the baseline by more than 40 and 30% respectively.[352]

There is very little evidence to support concerns about the effects of transfers on household fertility decisions. In fact, recent analytical work using econometric tools has identified a significant link between pensions (an unconditional cash transfer) and reduction in fertility. Some sub-Saharan African countries have introduced non-contributory pension schemes that benefit the great majority of the elderly, creating 'high-coverage' systems (namely: South Africa, Mauritius, Seychelles, Namibia, Botswana, Lesotho and Swaziland)[353]. The findings indicate that having had a high-coverage pension system for ten years is associated with a reduction in the fertility rate (i.e. the average number of children born to a woman over her lifetime), in the range of 0.5 to 1.5 children per woman.

Overview of the evidence on vouchers and cash transfers

There is strong plausibility based on moderate evidence that well-implemented voucher and cash transfer schemes increase utilisation of RMNH services – in other words, these interventions look promising. There is also observational evidence of other benefits such as the supply-side response to improve quality. There is an urgent need for robust study designs to evaluate the impact on RMNH outcomes and the cost-effectiveness of the new raft of voucher schemes and cash transfer (conditional and unconditional) programmes being implemented in low income countries. Further systematic reviews are needed to evaluate (a) whether vouchers for RH goods such as condoms and oral contraceptives (rather than RH services) have been successful in increasing utilisation, reducing costs and improving health status for the targeted populations; and (b) whether 'paperless' voucher-like programmes (in effect CCTs) have the same impact as physical voucher schemes. The potential innovation of expanding vouchers or cash transfers for long-acting contraceptive methods has yet to be tested.

Looks promising

There is moderate evidence that well-implemented voucher and cash transfer schemes increase utilisation of RMNH services. There is less evidence on impact on health outcomes, impact on service quality and on cost-effectiveness.

4.3.3 Risk pooling/pre-payment approaches

A system in which financial payments are not linked to specific health services has a greater chance of achieving equity objectives. Universal coverage (see box below) depends on raising enough funds from a sufficiently large pool of individuals, supplemented where necessary with donor support and general government revenues. It can be financed through one of four ways: general taxation, social health insurance, community health insurance or private or voluntary insurance. Prepayment simply means that people pay before they are sick, then draw on the pooled funds when they fall ill.

Box 5: Financing for universal coverage

Financing systems need to be specifically designed to:

- Provide all people with access to needed health services of sufficient quality to be effective;
- Ensure that the use of these services does not expose the user to financial hardship

In 2005 the World Health Assembly unanimously adopted a resolution urging countries to develop their health financing systems to achieve these two goads, defined as achieving universal coverage.

Source: WHO. World Health Report 2010.

A system funded purely through general taxation typically only works if there is sufficient funding to finance most services (>80%). Typically this costs about 4-8% of GDP in public expenditures (e.g. the United Kingdomn or Germany). Most poor countries lack sufficient budgetary resources and typically can only afford about 1-2% of GDP in tax subsidies, funding only around 40-60% of overall needs.[354] A typical outcome is that limited public services are captured by the rich, leaving poor people without services.

Reliable evidence

International consensus suggests that progress towards universal coverage depends on raising adequate funds from enough funds from a sufficiently large pool of individuals supplemented where necessary with donor support and government revenues. Prepayment systems based on general tax revenue have the most chance of success.

Several countries have introduced compulsory or social health insurance schemes, but they have not been widely used in lower income parts of sub-Saharan Africa.[355] Social Insurance schemes mean that families make a fixed payment in return for which they avoid, or reduce, catastrophic payments for health services at the time of illness. Some schemes retain out of pocket payments in the form of co-payments. Social insurance schemes generally provide coverage for a range of services ('benefits package') including maternity care. However, these schemes have struggled to providing coverage to the poor.[356,357] Reviews of Bolivia's Mother and Child Insurance Programme (SUMI) show that while it has increased access to and utilisation of delivery and antenatal services overall, it has not overcome pre-existing inequities between income groups and rural-urban populations; coverage in rural areas lags behind urban, in part due to poor physical access to facilities, and cultural barriers.[358]

Some authors have argued that contributory social health insurance schemes have not been effective in achieving universal health coverage because it is often linked to the formal employment sector (e.g. civil servants and public sector workers). Where there is a large informal sector, collecting premiums can be expensive and low yielding. It may not be possible, politically, to rely on a large subsidy from the formal sector. [359] Case study evidence from South Africa and Ghana suggest that these schemes suffer from a high degree of fragmentation, where there exists a large number of separate funding mechanisms each effectively constituting a separate risk pool.[360] This fragmentation prohibits risk related and income related cross subsidies between different groups and also threatens the sustainability of schemes.

Important unknown

There is still limited evidence on how to achieve effective and sustainable cross-subsidisation between risk and income groups where several social insurance type schemes are operating in a country.

Community health insurance schemes that operate more informally and on a smaller scale, usually with voluntary flat-rate contributions, have been attempted in many low income contexts. Much of the evidence for the effect of community insurance schemes comes from small-scale pilot programmes.[361] Studies have shown that they have been successful in increasing institutional delivery where obstetric care was included in the package.[362] For example, assisted delivery rates saw an increase of between 12% and 45% among members in Senegal and Mali,[363] Rwanda and the Gambia.[364]

A World Bank literature review on the impact of community based health insurance schemes found that community involvement in resource mobilisation increased access to healthcare for those covered, and financial protection was also accorded by reducing out-of-pocket spending. However, the report indicated that schemes still exclude the poorest and perhaps those most in need[365] Exempting the poorest from premium payments (via government subsidies) and relating premiums to ability to pay is a possible means of avoiding such exclusion.[366]

Evidence that community based health insurance can be scaled up is still in the balance. A survey conducted in 2000 evaluated 35 out of 66 known community-based healthcare organisations in the Philippines, the majority of which are small or very small. On average, these organisations serve less than 2,000 beneficiaries, with a combined total of less than 200,000 – about 0.25% of the population.[367] Again, these schemes may have challenges in dealing with sufficiency of financing and with risk pooling. The financial viability of insurance schemes can be precarious most rely on government or donor subsidies.[368] Economic theory also suggests that small private and voluntary schemes are at risk of 'adverse selection', where the more healthy eventually drop out of the scheme and it eventually becomes financially unsustainable.[369]

5. Functioning health systems

There is international consensus that an effective health system capable of delivering a core package of essential health services, free at the point of use (where countries choose) will improve access to and utilisation of health services; especially for women and girls.[370,371] Conversely, failing or inadequate health systems neglect the rights of women and girls to enjoy the highest attainable standard of health,[372] result in needless deaths and threaten the attainment of the health MDGs.[373,374]

WHO has categorised 'service delivery', 'health workforce' (or human resources for health), 'information' and 'medical products, vaccines and technologies' as four of the critical 'building blocks' of a health system.[375] These are underpinned by 'financing' and 'leadership/governance'. Health systems strengthening is defined as 'improving these six health system building blocks and managing their interactions in ways that achieve more equitable and sustained improvements across health services and health outcomes'.

The literature and evidence on health systems strengthening (HSS) has rapidly increased in the last 15 years, partly fuelled by the upwards trajectory of international development assistance dedicated to health and the creation of multiple global health initiatives (GHI) and partnerships (GHP). This evidence paper does not attempt to summarise or synthesise this field but instead recognises that the outcome of a health systems intervention is context specific. This includes the social, cultural, economic and political factors that collectively contribute to context in addition to the design and implementation of interventions. This section focuses on particular elements of health systems that regularly emerge as critical to RMNH services.

5.1 Human resources for health

WHO, supported by UNICEF, UNFPA, World Bank and the Partnership for Maternal, Newborn and Child Health (PMNCH) has articulated the essential packages of services for RMNH.[376] These packages are built on WHO standards, supporting the implementation of the global Consensus on Maternal, Newborn and Child Health,[377] and cut across the continuum of care through pre-pregnancy, pregnancy, childbirth, postpartum and newborn care.

Delivery of these packages is premised on one common factor: skilled and motivated health workers, offering health promotion, prevention and treatment services with supportive supervision and effective referral mechanisms. As noted by Chen et al (2004): 'the only route to achieving the health MDGs is through the [health] worker: there are no shortcuts'.[378]

The Global Strategy for Women's and Children's Health,[379] launched by the United Nations Secretary General at the high-level event on the Millennium Development Goals (MDGs) in September 2010, reinforces this. The strategy calls for 'stronger health systems, with sufficient skilled health workers at their core' and requests all partners 'to provide coordinated and coherent support to help countries develop and implement national health plans that include strategies to train, retain and deploy health workers'.

Human resources for health (HRH) is defined by WHO as 'all people engaged in actions whose primary intent is to enhance health.'[380,381] While the focus in this evidence paper is on the cadres who deliver and support the essential packages of RMNH services there are issues generic to all health, health associate and managerial cadres. For instance, the quality of service delivery and equitable access to care is related, amongst others, to the effective management and coordination of the number, skills-mix and competencies, distribution, and the practice environment in a particular country.

Health workers: numbers and density

Evidence confirms positive correlations between the delivery and coverage of essential health services and the density of health workers (i.e. doctors, nurses and midwives per 1,000). In two cross-country econometric studies using regression analysis, Anand and Bärnighausen concluded that the density of human resources for health is important in accounting for the variation in rates of maternal mortality, infant mortality, and under-five mortality[382] and positively and significantly associated with vaccination coverage rates,[383] Density has a greater effect in increasing skilled attendance at birth and reducing maternal mortality possibly because qualified medical personnel can better address the illnesses that put mothers at risk.[384]

Similar findings are available in the reports of the Joint Learning Initiative[385] (2004) and the World Health Report (2006)[386] which respectively argued that a density of health professionals (doctors, nurses and midwives) below 2.5 or 2.28 per 1,000 population limits the ability of a health system to deliver essential services; especially skilled attendance at birth,[387] the only HRH-related indicator in the health MDGs.

Based on national workforce data collated in 2004-2005, WHO estimates that 57 countries have a density of health professionals which is below 2.28 per 1,000 of the population. 36 of these countries are in sub-Saharan Africa. All are described to be in 'crisis'.[388] Common issues are failing to a) train, graduate and employ new health workers in sufficient numbers, b) deploy and motivate existing staff and 3) manage high levels of attrition due to multiple factors including remuneration rates in the state and non-state sectors, migration and the HIV/AIDS epidemic.

The 2008 launch of the Kampala Declaration and the Agenda for Global Action on HRH,[389] since adopted by the G8 as tools to guide collective action,[390,391] set out a framework for addressing the common issues. There are six key areas, incorporating dimensions that need to be addressed at global, regional and national levels:

1. Building coherent national and global leadership for health workforce solution;.
2. Ensuring capacity for an informed response based on evidence and joint learning.
3. Scaling up health worker education and training.
4. Retaining an effective, responsive and equitably distributed health workforce.
5. Managing the pressures of the international health workforce market and its impact on migration.
6. Securing additional and more productive investment in the health workforce.

WHO's Global Atlas on the Health Workforce does not currently provide 2010 data on the health workforce in these crisis countries, thus limiting analysis of progress. However, an observational study in 24 crisis countries conducted by WHO and one of their HRH Collaborating Centres, suggests that the number of nurses and midwives in 17 countries (using data from 2005–2009) is now less than described in the 2006 World Health Report (using data from 2000–2004).[392] In Zambia and Gambia the nurse/midwife density per 1,000 population decreased by more than 50%. Whilst the quality of data is subject to caveats, the authors describe a decrease in density as a result of poor attention to need and implementation including ineffective management and poor governance.

Skilled attendance at birth is affected by a low density of health professionals, including nurses and midwives. This affects the attainment of the health MDGs, in particular indicator 5.2, 'Proportion of births attended by skilled health personnel'. 'Skilled health personnel' has a specific relation to WHO, the International Confederation of Midwives (ICM) and the International Federation of Gynaecology and Obstetrics (FIGO) competencies established in 2004: 'an accredited health professional – such as a midwife, doctor or nurse – who has been educated and trained to proficiency in the skills needed to manage normal

(uncomplicated) pregnancies, childbirth and the immediate postnatal period, and in the identification, management and referral of complications in women and newborns'.[393]

Globally, intrapartum-related conditions are implicated in 23% of neonatal deaths, 32% of stillbirths, and 42% of maternal deaths,[394] yet no more than 40% of births in low income countries are currently being assisted by skilled attendants.[395] Even then the competencies of 'skilled' attendants may not fulfil the WHO/ICM/FIGO criteria and country returns on skilled attendance may be inflated. A recent assessment in Pakistan undertaken by the Aga Khan University, sampling 370 healthcare providers from 10 districts suggested that 70% of Medical Officers failed to meet a minimum level.[396] Further work on 'competency and coverage' assessments is required to better understand the skills and competencies of individuals rather than generic head-counts.

2010 estimates from WHO suggest that an additional 341,336 skilled workers are required by 2015 to reach 95% coverage of skilled birth attendance in the 68 Countdown countries.[397] This includes 210,168 additional doctors, nurses and midwives in the ten countries which account for 48% of the maternal mortality burden.[9] The competencies for each type of skilled attendant will vary. The common denominator, however, is the basic skills required to assist a woman during pregnancy, childbirth and after birth, including essential care to newborns – known internationally as 'midwifery skills' and defined as 'core competencies'.[398]

Scaling-up the workforce

The shortages described above need to be factored into national health and education strategies to scale-up the workforce. Dussault *et al's* [399] recent synthesis of published and grey literature on the process of scaling up the health workforce describes 'scaling up the workforce' as increasing the capacity of human resources to deliver more and better quality health services. The findings conclude with the need for a complementary mix of strategies to improve effectiveness (using quality maintenance and enhancement strategies and mechanisms) and geographical coverage and distribution. Four categories of intervention for scaling up the stock of workers are suggested: a) augmenting the production of new workers, b) improving retention rates, c) recruiting inactive and retired workers and d) importing health workers. The synthesis concludes that success in scaling up the stock of health workers is limited by lack of: strategic planning, stakeholder mobilisation, political will, commitment, continuous assessment of the effects of interventions, and adequate financial resources to cover associated costs (salaries, benefits, training, equipment and so on).

Importantly, numbers must also be aligned with quality. Fauveau et al's review of the literature on human resources for maternal health concluded that both 'scaling up' and 'skilling up' quality of care is required.[400] However, faced with scarce resources, the review supported prioritising adequate numbers of skilled professionals strongly supported by a well performing health system rather than high numbers of multi-purpose workers based in villages (i.e. prioritising quality of care over coverage referred to elsewhere as 'interim strategies').[401] But the review notes the evidence base is poor and that monitoring and evaluation must be built into health workforce programmes to produce evidence on how best to develop a competent midwifery workforce in low-resource settings.

Historical analysis suggests that professionalisation of obstetric care contributed to reductions in maternal mortality in the developing world, and developing countries that have adopted professionalisation amongst other strategies have achieved similar reductions in maternal mortality (e.g. Sri Lanka).[402] However, there is some evidence to show that absolute numbers of trained health personnel is not sufficient to reduce maternal mortality. A systematic review of human resources in emergency obstetric care concluded that staff shortages have a negative impact on maternal health.[403] However, as well as density, the

[9] The ten countries are Bangladesh, Ethiopia, India, Kenya, Malawi, Nepal, Nigeria, Rwanda, Sierra Leone and Uganda.

review concluded that attention needs to be paid to gender, social status and ethnicity balances in the workforce, as well as urban-rural distribution. Studies show for example that women often express a preference for female health personnel, but female health workers are more reluctant to be assigned to rural areas and are associated with higher rates of absenteeism.[404] The case of Afghanistan, where female providers of midwifery services was an essential requirement to address maternal and neonatal health whilst respecting socio-cultural factors is a positive example of contextualised scaling-up.[405]

Box 6: Community midwifery programme in Afghanistan

In 2003, the Afghan Ministry of Public Health identified a severe shortage of healthcare providers and especially female providers. One province had only two female healthcare providers and the total number of Afghan midwives was estimated at 467.[406] The Afghan government, in collaboration with UNICEF and international partners such as USAID, has been developing a comprehensive approach to midwifery. This has included supporting midwifery at the policy level, strengthening and expanding midwifery education, creating a professional association of midwives, and initiatives to increase access to midwives at the community level.

The Afghan Ministry of Public Health identified the need for both ordinary midwives and community midwives. In order to improve access, stringent entry requirements were lowered for an eighteen-month, skilled-based Community Midwifery Education programme. This is aimed at women from districts where there are shortages of skilled birth attendants and the women are deployed in these districts after training. They are based at facilities, but with outreach to communities. Midwives who receive this training meet the WHO internationally accepted definition of a midwife and a skilled birth attendant and are therefore distinct from community health workers (CHW). [407] Community midwives are seen as having contributed significantly to the rise in SBA attended births since 2003. As of May 2009, nearly 2,000 midwives had graduated from the Community Midwifery Education programme and 85% of these were working in a hospital or health facility, according to USAID information.[408]

Deployment/motivation

Country-specific strategies require examination of the underlying factors for health worker shortages, analysis of the determinants of health worker motivation and retention, and testing of innovative initiatives for maintaining a competent and motivated health workforce.[409] Even so, the recurrence of similar themes in studies and evidence reviews suggests that financial incentives, career development, and management issues are core factors.[410]

A systematic review examined motivational issues faced by health workers and the effectiveness of interventions to improve motivation in developing countries.[411] Twenty studies met all inclusion criteria; eight used qualitative research methods, eight used quantitative methods and four used both, although the review notes that many of the studies were exploratory with small sample sizes and included studies from grey literature. Countries studied comprised eleven from Africa and six from Asia.

Overall, the review found good evidence that the following factors effected motivation: financial incentives; opportunities for career development, education and training; the availability of skilled management; well equipped hospitals; and expressions of recognition and appreciation. However, most studies sampled health workers as a whole and so the evidence base does not allow data disaggregation at the level of health cadres, except in specific instances.

For example, in Mali ‘feeling responsible’ received a significantly higher score from physicians compared to nurses; for ‘increase in salary’ the reverse was true, with nurses finding this more motivating than physicians.[412] Motivational factors are also likely to be country or region specific. For example, around 60% of workers in South Africa, Uganda and Zimbabwe reported they found it stressful to care for HIV patients.[413]

The motivating force of financial incentives also varied between countries. In South Africa, rural allowances were found to have a limited effect on retaining workers, and financial allowances had limited effect in Cameroon and Zimbabwe where incentives have been perceived as unequally distributed between health workers.[414] However, efforts to increase salaries in Uganda may be a factor in Uganda having the lowest level of those intending to migrate.

An observational study combined with document analysis undertaken in the Dominican Republic found that in all facilities, quality of care was lacking and that providers in the busiest facilities suffered from compassion fatigue, and were demoralised and overworked.[415] The authors suggest this helps explain why the Dominican Republic has a relatively high maternal mortality ratio despite nearly universal institutionalised deliveries with trained attendants.

The examples above point to the need for a more systematic approach to Human Resource Management (HRM), strengthening the capacity of systems to effectively and efficiently harness the collective education, skills and competencies of the health workforce. HRM is a wider discipline than motivation and deployment encompassing planning, data and information systems and performance management. Extensive literature is available elsewhere. Dubois and Singh's structured review of HRM[416] suggests attention needs to be given to enhancement, enlargement, substitution and delegation of roles to optimise the workforce.

Recent work by Lagarde and Blaauw,[417] identifying the available literature on discrete choice experiments (DCE) to assess health worker's preferences. Existing studies identified the elements, specific to each context, which may be determinants of health workers' motivation and choices. The authors note that understanding the various aspirations and possible behaviours of subgroups of health workers might enable policymakers to craft better policies to recruit and deploy health professionals where they are needed but caution on the implementation complexity of the DCE tool itself.

Attrition and migration

Human resource management of the RMNH workforce must also include a focus on attrition, both voluntary and involuntary. This applies to health workers who exit the public health sector, and to trained personnel who for multiple reasons may no longer be applying their RMNH skills on a day-to-day basis (i.e. moved to a different department or service) . Both have implications on the wasted opportunity costs associated with pre-service and in-service training. A particular cause of attrition is migration, both within and between countries. This is a complex issue, related to the rights of individuals and the global labour market.

Evidence for internal migration, from rural to urban areas, or from public to private sectors is limited.[418] This may be addressed by a Cochrane Review that is due to report on 'Interventions for managing the movement of health workers between public and private organisations in low and middle income countries'.[419]

On international migration, similar data problems exist, but the OECD reports that despite recent trends showing signs of stabilisation or decline in a few countries, overall migration of health personnel to OECD countries is still on the rise[420]. In 2008 (or the latest year available), the percentage of foreign-trained doctors ranged from below 1% in Poland to 39% in New Zealand. High percentages are also recorded in the UK and Ireland where around a third of all doctors were trained abroad. In Australia and the United States, this percentage was respectively 23% and 26% in 2007.

Whilst international migration is often seen as a key contributor of workforce shortages, it is also wise to place this in context. In 2000, all African-born doctors and nurses working in the

OECD represented no more than 12% of the total shortage for the region, as estimated by WHO.

HIV/AIDS and workforce attrition

Ill-health and death is a further element of workforce attrition, of which HIV/AIDS is considered a leading cause. This has been described as creating a 'double burden' in HRH crisis countries[421].

World Bank projections suggest that a country with 15% adult sero-prevalence rate for HIV can expect to lose between 1.6 and 3.3% of its healthcare providers from AIDS annually.[422] Furthermore, a health worker with AIDS is likely to be absent from work due to sickness up to 50% of the time in his/her final year of life.[423] A recent analysis of trends in coverage for maternal and newborn care in sub-Saharan Africa shows that countries with the heaviest HIV/AIDS burden have experienced the greatest erosion of antenatal care, trained staff attending deliveries, and children's immunisation rates.[424].

State/non-state remuneration

Labour market dynamics, wage bill policy and remuneration in the public, private and non-governmental sector are key elements associated with workforce attrition. However, very little evidence of these issues has been documented.[425]

A World Bank study in Kenya, Rwanda, Zambia and the Dominican Republic found significant weaknesses in policies and practices related to payment of public sector health workers, leading to inequities in staffing levels across urban/rural areas.[426]

A 2010 observational study by the Centre for Global Development assessed labour market distortions in three countries in sub-Saharan Africa.[427] AIDS donors were noted to have changed the incentives for health workers, altering the dynamics of employment, career paths and management of the workforce. This leads to attrition from the public sector workforce to national and international non-governmental organisations. Whilst the authors note that the purposive sampling methodology may restrict their findings can be generalised, they note that there are similar circumstances in many countries.

Similarly, a 2009 report on health workers' salaries in sub-Saharan Africa analysing data available from the International Monetary Fund, identified insufficient quality data to adequately study the association between the income of health workers and their morale, motivation, and choices about career and employment. The observational study did however complete detailed research in four African countries and noted that some management of the labour market is necessary in coordinating salary levels between government and non-profit organisations and donor agencies rather than competing for scarce health workers.[428]

These three examples point to the complexity of health labour markets and their management within wider public sector and civil service frameworks and the available fiscal space within a country. The organisational and administrative capacities to efficiently execute standard HR functions (i.e. recruitment, payment of salary) are also critical. Inefficiencies in workforce management including payroll contribute to underperforming health systems and must be addressed.

Skill-mix, competencies and task shifting

For the RMNH intervention packages described by WHO, there is a requirement for health workers across community, primary, secondary and tertiary care including managerial personnel and medical records/health information technicians.

The required number of health workers by cadre is subject to national policy and implementation in respect to the required competencies and the skill-mix between cadres. Whilst there are some simple population-based formulas for planning assumptions (i.e. x doctors per y thousand population; x deliveries per midwife) these are the least evidence-

based approach and based on homogeneous assumptions around practice, productivity and needs[429].

Pre-service and in-service education and training must be tailored to ensure that competencies and skills are applied with consistent practice. For instance, a Cochrane review on the management and care of the seriously ill newborn or child found some evidence of benefit from in-service training but called for more rigorous trials evaluating the impact on long-term professional practices[430].

Countries that have been successful in reducing maternal mortality include Sri Lanka, China, Cuba and Malaysia.[431] These successes have been attributed to prioritising maternal mortality as a public health issue,[432] and by the expansion of professional maternity care and family planning.[433] Implementation of such expanded care requires input from all cadres of healthcare providers: midwives or healthcare providers with maternity skills to manage normal pregnancies and deliveries, and doctors to perform medical interventions when complications arise.

Given available human resources and the time-scale to train and deploy graduate health professionals, countries are exploring opportunities for task-shifting or task-sharing to increase access to and delivery of services.[434] 'Task-shifting involves the rational redistribution of tasks among health workforce teams. Specific tasks are moved, where appropriate, from highly qualified health workers to health workers with shorter training and fewer qualifications in order to make more efficient use of the available human resources for health'.

A Cochrane Review found that at primary care level, appropriately trained nurses can produce as high quality care and achieve as good health outcomes for patients as doctors. However, the authors caution that the research available is limited.[435]

Reproductive Health Matters dedicated a recent issue to task shifting, including a range of examples of innovative efforts to increase access to skilled reproductive healthcare in settings where doctors are in short supply and may not be needed because the skills involved in a procedure have been simplified to the extent that trained mid-level providers can be effectively deployed.[436] These include: intrauterine device (IUD) insertion, taking pap smears,[437] carrying out caesarean sections,[438] providing anaesthesia for essential obstetric care,[439] and providing an early medical abortion.[440]

Studies considering the potential role of mid-level providers have concluded that not only is some degree of task shifting feasible, but it can also be cost effective.[441,442] However, the use of clinical officers to perform caesarean sections in Burkina Faso[443] was associated with higher rates of newborn mortality than when the procedure was undertaken by general practitioners and specialist obstetricians. This suggests that care is needed when undertaking such strategies and due regard should be given to cost and effectiveness evidence, with clarity about the nature of the appropriate comparison. For task shifting to work well, careful implementation is needed, with tutoring and close monitoring of outcomes. Long term investments in trained obstetrician/gynaecologists, anaesthetists, paediatricians, midwives, paediatric and anaesthetist nurses are critical.[444]

Despite evidence that task shifting and task sharing may represent important options for increasing access to core MNH and SRH services, Phillips et al (2008) caution against these as a substitute for training and retaining sufficient numbers of the right grades/cadres of staff for the health system. They warn that focussing exclusively on task shifting issues diverts attention away from the overall human resource problems.[445]

Available evidence on some of the 'right grades/cadres' is considered below. To avoid problems of country-specific job titles this is structured around the ILO's 2008 version of the International Standard Classification of Occupation (recommended by WHO for cross-country comparison of evidence).[446]

Community health workers

There are multiple titles and descriptions for health workers who interact with those seeking care at the community level. Very often these are without formal recognition in the public health sector and may often be engaged in service-specific interventions provided by non-state organisations (e.g. disease management or counselling). This complicates cross-country assessment of the evidence and requires country-specific discussion.

The role of lay health workers (LHWs) in primary and community healthcare has been assessed by a Cochrane Review[447]. 'Lay health workers' were defined as any health worker carrying out functions related to healthcare delivery, trained in some way in the context of the intervention, and having no formal professional or paraprofessional certificate or tertiary education degree. Eighty-two studies met inclusion criteria, of which the majority were conducted in high income countries (n = 55) but many of these focused on low income and minority populations. The review found evidence of moderate quality of the effectiveness of LHWs in promoting immunisation uptake and breastfeeding, improving TB treatment outcomes, and reducing child morbidity and mortality when compared to usual care. For other health issues, evidence is insufficient to draw conclusions about the effects of LHWs. This position may change in the near future with an updated systematic review currently in development by Lewin which is forming part of a WHO programme of work to produce global guidelines in 2011 on 'Optimising the delivery of key interventions to attain MDGs 4 and 5'.

Bhutta et al's 2010 Systematic Review of Community Health Workers (CHWs) has sought to consolidate evidence on the impact of CHWs on health services, including antenatal care, birth and newborn care, postpartum and newborn care, family planning and PMTCT[448]. Eligible studies included randomised, quasi-randomised and before/after trials which had relied upon CHWs in community settings. Less rigorous study designs like observational (cohort and case-control) and descriptive studies were also reviewed. The authors report that almost all of the CHWs driven interventional studies showed a significant impact on reducing maternal, perinatal and neonatal mortality and improvement in perinatal and postpartum service use indicators (see Box 5 below).

However, they identified many factors limiting the range and quality of CHWs impacts, including inadequate and irregular supervision, insufficient initial and continuing education, low status and remuneration, and inadequate linkages with the health system. From the evidence available the authors recommend that CHWs for MDGs 4 and 5 should preferably be female, married and with children not less than five years of age. These characteristics will support a lower tendency for migration and the CHWs will bring their own experience of dealing with issues related to pregnancy and motherhood and taking care of their own children when they were sick. During interview, they should particularly be assessed for their own acceptance and attitude towards family planning.

A recent study by Kash et al[449] concluded that *certified* CHWs are potentially an important cadre of health workers towards improving access to healthcare and social services and improve utility of resources to the underserved.

Box 5: Community health workers: impact on health services

'Almost all of the CHWs driven interventional studies showed a significant impact on reducing maternal, perinatal and neonatal mortality and improvement in perinatal and postpartum service utilization indicators. In most of these studies they were trained and deployed as maternal and child healthcare providers and reproductive health workers. They promoted the concept of antenatal, intrapartum and postnatal care, exclusive breastfeeding, maternal and child nutrition, immunizations and family planning. The newborn care providers amongst these CHWs were trained to teach kangaroo mother care for LBW babies and monitor growth for children under-five years of age. Apart from delivering general health related promotional interventions, these health workers were also involved in the preventive and therapeutic maternal, newborn and childhood illnesses interventions. They managed uncomplicated common childhood illnesses and identified those requiring referral to higher health facility. However, the major barriers that came in the way of their services included traditional beliefs and practices. Their major efforts had to be directed towards behavioralbehavioural change of the community to convince them for the provision of adequate nutrition to the pregnant women, to avoid pre-lacteal feed in newborn and give colostrums and exclusive breastfeed for at least 4-6 months'.

Source: Bhutta Z, Lassi Z, Pariyo G. And, Huicho, L. (2010). Global Experience of Community Health Workers for Delivery of Health Related Millennium Development Goals

Skilled birth attendants

Health professionals with an education and training in the essential WHO/ICM competencies of midwifery, often classified as Midwives and Others with Midwifery Skills (MOMS), are fundamental components in the health system, including provision of skilled intrapartum care.[450] Collectively they are part of the group of health workers referred to as 'Skilled birth attendants'.

Midwife and nurse/midwife cadres have a pivotal role in addressing the first two of the 'three delays' that eventually lead to death from pregnancy related complications, by working with and empowering women and communities and providing basic emergency obstetric and neonatal care . MOMS also contribute to reducing the third delay by providing prompt, high quality, essential midwifery care, and by giving first-line treatment while waiting for medical practitioners with obstetric and or neonatal skills.[451] As such, midwifery services are considered 'emancipatory'. They protect and enhance the health and social status of women, which in turn protects and enhances the health and well-being of society[452]

Observational evidence from a developed country setting suggests that the care system cannot operate safely and effectively when midwives are not adequately skilled or are poorly deployed, and if they are unable to engage in opportunities for training and updating their skills base.[453] This reinforces the need to consider both 'competency and coverage' discussed earlier.

This is similarly apparent in a recent 2010 systematic review[454] on the role of skilled birth attendants (including nurses and midwives) in low- and middle-income countries. The review identified 83 papers which passed the eligibility criteria for inclusion: with 23 being randomised, quasi-randomised and before/after trials. The authors noted that most maternal death can be prevented by having access to skilled attendants at birth and immediately after. Whilst most of the evidence in the retrieved articles related to training, the authors concluded that interventions to improve the availability, training, education and retention of nurses, midwives, doctors and technicians is one of the factors contributing to improved maternal health. A further emphasis was that skilled birth attendants cannot be replaced by unskilled birth attendants. Though they recognised that unskilled birth attendants are the main providers of care for millions of deliveries they reiterate that unskilled providers are not capable of recognising and treating complications.

Health management and support workers

Wagstaff and Claeson's 2004 report from the World Bank[455] highlighted a critical concern on the capacity of managers and management in the public sector. They described how much of the world's public sector is managed through what is, in effect, a command-and-control structure with little or no scope for autonomous decision-making at facilities. They suggested that there are few managers in the true sense of the word. Instead, administrators execute decisions according to previously agreed protocols and rules.

The World Health Report 2006 described health management and support workers as the 'invisible backbone' of health systems; if they are not present in sufficient numbers and with appropriate skills then the system will not function. Ongoing work to strengthen and improve health managers and health management is often considered under the leadership and management pillar of a health system strengthening framework, but equal attention must be given within the workforce itself. As noted by WHO there are very few professional managers and a lack of appropriate management competencies and opportunities for further learning. Management and managerial skills for RMNH therefore need equal, if not greater, attention in developing solutions at country level.

Distribution of the health workforce

Many countries exhibit wide variation in the urban/rural distribution of the already depleted health workforce thus denying access and coverage for rural, remote and underserved populations: *most often poor people*.

A recent WHO report[456] highlights the global nature of this distribution problem, where approximately one half of the global population lives in rural areas, but only 38% of the total nursing workforce and less than a quarter of the total physician workforce serve these areas. WHO suggests the situation is especially dire in HRH crisis countries where an estimated one billion people have no access to essential health-care service. Data from South Africa suggest 46% of the population live in rural areas, but only 12% of doctors and 19% of nurses are working there.

As evident in the 38 *Countdown* countries with Demographic and Health Survey data, intervention coverage is substantially higher among mothers and children from better-off households than among those from poor households.[457] Disparities in interventions that are most frequently delivered in fixed health facilities show greater disparities than do those delivered in the community. This evidence suggests a correlation with health workforce distribution, and using the same *Countdown* data, Bhutta et al's analysis, notes uneven geographic distribution of the health workforce within countries. In those countries where disaggregated workforce data was available the median density was four times higher in urban areas than in rural areas.[458]

However, the focus is not entirely related to urban/rural strata. Underserved populations include those in urban and peri-urban settings. Mathews et al (2010)[459] highlight that high levels of urbanisation are likely to be associated with increased exclusion from care for many mothers in poor countries, and continued high maternal and newborn mortality among the urban poor.

Inequity in the effective provision of health services is an issue of social and political concern[460]. It requires concerted efforts to train and deploy health workers in a manner that protects women's and girl's rights to health in all geographical areas of a country in addition to utilitarian principles of majority coverage. To do so requires detailed awareness and attention to the multiple factors affecting deployment decisions and career pathways.

5.2 Enabling environment for health workforce

It is vital that the practice environment for health workers facilitates application of their skills and competencies in a productive and efficient manner. This includes a) infrastructure, b) medicines, equipment and supplies to perform tasks c) professional, regulatory and accreditation mechanisms, d) referral and importantly e) the absence of work – or gender-based violence[461]. These issues cut across the health systems strengthening components of service delivery, medical products/technology and leadership and governance.

Infrastructure

In Uganda, functional EOC facilities with the required infrastructure (operating theatre, electricity, laboratory, and staffing levels) were found to reduce maternal deaths. However, it was also found that most health facilities lacked the basic infrastructure and equipment to provide quality of care.[462] These basics need to be in place, in tandem with the correct mix and number of staff, adequate staff training, skills and supervision; streamlined management information systems to monitor cases, evaluate and learn lessons; improved communications and community linkages; community mobilisation; and strong referral systems to higher level facilities when the need arises.[463] Upgrading or rehabilitation of emergency obstetric care facilities has also been shown to improve staff morale and service provision.[464,465,466]

Successful examples of interventions that have included a component for facility, equipment and supplies upgrading or rehabilitation and have improved services and maternal outcomes in EOC centres (reducing maternal deaths and increasing utilisation and met need for EOC) can be found in Viet Nam, Peru,[467] Nepal[468] and Bangladesh.[469,470] In the Dinajpur Safe Mother initiative, Bangladesh,[471] it was found that a combination of EOC facility upgrades (renovation of buildings; reorganisation and regular supply of equipment, drugs and supplies; provision of training for doctors and paramedics; introduction of monitoring tools) with a quality of care intervention (prompt attention to emergencies; easy access to services), and community support systems in each village with birth planning and community mobilisation to increase EOC utilisation, resulted in a large increase in met need and percentage of women delivering in medical facilities.

Once EOC facilities have been rehabilitated or upgraded it is necessary to ensure adequate resources are allocated to their ongoing maintenance and provision of equipment and supplies, to prevent their falling into disrepair.[472,473] This necessitates synergy between facility management and resource allocation mechanisms, which are often weak. Given the uneven distribution of qualified EOC facilities, prioritisation of the upgrading of existing non-qualified first referral hospitals to comprehensive EOC standard and upgrading existing strategically located health facilities to basic EOC facility standard, particularly in rural areas, is recommended.[474]

Equipment and supplies

All health workers, including skilled birth attendants can only perform effectively if they are properly equipped and supplied.[475] There is consistent evidence that a lack of, or poor quality, drugs, equipment and supplies at MNH facilities has an adverse effect on the utilisation of non-emergency services and on women's survival chances.[476,477]

A wide range of common problems with equipment and supplies within MNH health facilities have been documented.[478] These include equipment which lacks a recognised evidence base; equipment purchased without being subject to a careful procurement review[479] or without adequate technical support or training; a shortage of skilled maintenance personnel; inadequate funds allocated for inputs, maintenance or replacement; surplus equipment at referral hospitals with shortages of commonly used equipment at peripheral facilities and/or available equipment not working due to lack of maintenance and repair;[480] and barriers to

safe blood supplies which are frequently related to shortages of equipment and supplies such as functioning refrigerators, blood bags, needles and syringes.[481]

To ensure timely maintenance and repair of equipment, there is strong evidence that adequate emphasis needs to be given to including this in the operating costs of health facilities at the time of planning. To counter low budgeting of equipment repair and maintenance, cost centre accounting, or at least a well developed maintenance record system, is necessary as part of planning.[482]

Referral systems

Interventions designed to avert deaths and injuries to women around the time of delivery and in the immediate postpartum period, when the risk to mother and baby is greatest, remain a central challenge in low income countries. The importance of a functioning referral system stands out as a critical foundation for improvements in maternal health outcomes. The strength of the referral network is effectively a test of the broader health system and can reflect and exacerbate the social and economic barriers to access. As strengthening the referral system will itself have multiple benefits to the wider health economy this should be prioritised in national, regional and local strategies. Murray and Pearson's[483] scoping review on maternity referral systems identifies nine priority areas; encompassing organisational, technical, and socio-relational which are important for optimising district level maternity referral systems (see box).

Box 8: Essential components of a well-functioning maternity care referral system

1. A referral strategy informed by assessment of health system capabilities and areas of overload, and by assessment of population needs.
2. An adequately resourced referral centre (including reachable 24-hour provision of CEOC).
3. Active collaboration between referral levels and across government and non-government sectors.
4. Formalised communication and transport arrangements for obstetric and other health emergencies
5. Agreed setting specific protocols for referrer and receiver.
6. Accountability for providers' performance and supportive supervision.
7. Pro-poor protection against the costs of emergency referral.
8. Capacity to monitor effectiveness at district management level.
9. Policy support at national or state level.

Source: Murray SF, Pearson SC. Maternity referral systems in developing countries: Current knowledge and future research needs. Social Science and Medicine. 2006; 62(9):2205–15.

5.3 Commodity security

Ensuring the right drugs, supplies and equipment are in the right place whenever they are needed depends on a functioning and effective procurement system. As safe motherhood and STI commodities tend to fall within government essential drug budgets, procured and supplied through government channels, they are exposed to the systemic problems of drug supply management described in the case study in Box 10. With contraceptive commodities often funded and procured by donors, national governments face the challenge of managing multiple funding and procurement routes for maternal, STI, family planning and HIV/AIDS products, which can lead to fragmented procurement with high transaction costs.[484]

Box 9: Challenges in commodity security in Zambia

Reproductive health commodity security in Zambia (2005) has been hampered by:

- Lack of emphasis on reproductive health in national level policies and plans.
- Lack of overall leadership and responsibility for RHCS , therefore lack of accountability on the issue.
- Limited capacity in the RH Unit and no integration with the Sector Wide approach and government procurement systems. The unit is working in a project based environment.
- Human resource shortages.
- Lack of faith in government systems and lack of political will.
- Parallel arrangements in forecasting, procurement and distribution causing fragmentation and inefficiency.
- Only three donors (USAID, UNFPA and DFID) for RH commodities, and they provide support through parallel financing and procurement.
- Vertical sources of health funds (for example Global Fund to Fight Aids, TB and Malaria) are substituting funds and diverting NGO activity away from RH.

Source: Brown, A., Syacumpi, M., 2006. RHCS Country Case Study: Zambia. DFID Health Resource Centre.

A study of Reproductive Health Commodity Security (RHCS) in four countries with poor maternal health ndicators (Cambodia, Nigeria, Uganda and Zambia)[485] highlights the drawbacks of multiple donor and government procurement where government systems lack adequate oversight capacity. One of the main findings was the inability of the countries to translate national policy objectives into implementation and results. Wider political will was found to be questionable and there was weak ownership, capacity and coordination at all levels. This affected the allocation of funds to RH commodity procurement and logistics at local and devolved levels, where RH may not be a priority. Contraceptives were found to be on the countries' essential drugs lists, but some maternal health drugs and equipment were not. Missing products included magnesium sulphate, uterotonic drugs (i.e. oxytocin) and Manual Vacuum Aspiration kits. All the countries lacked information and strategies for addressing maternal health commodity security, although the importance of supplies was usually stressed in reproductive health policies. Similarly, due consideration should be given to newborn-specific supplies and medicines, for instance antenatal steroids.

The literature suggests a number of broad principles to guide the procurement process but the evidence base is incomplete:

- Government led procurement plans and budgets need to drive government and donor procurement and provide the tool for harmonising inputs.
- A purchasing plan should be drawn up to project annual requirements.
- Finance arrangements need to reflect development and recurrent expenditure.[486]

- Requirements should be clearly defined before potential suppliers are contacted. Tenders
- should be issued with appropriate specifications.
- Appropriate equipment should be defined for each level of care and a detailed list should be prepared bearing in mind user preferences, relevance to priority health problems, ease of use and maintenance and safety.
- Health workers, planners and technical experts should be involved in decision making.
- Investment in government level budgeting and planning expertise is essential.

RMNH services are highly dependent on the availability of the essential drugs, identified as effective and relatively inexpensive[487] and included in the WHO essential drugs list.[488] There is good evidence that the use of national lists of essential drugs has contributed to improvements in quality of care and to a considerable saving in drug costs.[489,490] A national drug policy is a key component of any strategy to improve the management and use of drugs.[491] Despite many essential drugs being cheap and having long shelf lives, many providers lack knowledge about them, clinical guidelines are out of date and drug supply systems are inefficient or ineffective, making access to these drugs either unpredictable and/or entirely absent.

Many countries have weak drug assurance systems because they lack the necessary basic components of adequate drug quality assurance legislation and regulations, and a functioning drug regulatory authority.[492] Without these, substandard and counterfeit products can circulate freely. In addition, inappropriate handling, storage and distribution can alter the quality of drugs leading to serious health consequences and wasted resources.[493,494,495] The drug situation also affects the way in which health services are regarded.[496] Users associate a lack of drugs with poorer quality of care.[497]

In countries where commodity supply is weak, one proposed and short-term solution is the provision of birthing kits. The Global Campaign for the Health MDGs[498] has proposed kits are made available to each woman when she arrives at the facility in labour.[10] The total cost for each kit has been estimated at US$3–4 per delivery (or US$0.10–0.14 per capita) for most developing countries.[499] The Global Campaign acknowledges these basic supplies cannot alone assure a healthy mother and newborn – support from a professional midwife implementing best practices using the kit and a well equipped health facility are also required. However, this approach could be introduced and evaluated in several settings to provide the evidence needed as to its efficacy whilst longer-term solutions are implemented.

[10] Basic kit for quality facility birth aims to prevent deaths from complications of bleeding, infection of both mother and baby, prolonged labour, and asphyxia for babies, and includes: hand-held birth record with partograph, gloves, birth cloth, chlorhexidine swabs, disposable cord clamps, sterile blade, oxytocin injection, mucus extractor and sanitary pads.

Technical Annex

Key terms

Adolescent girl
As defined and measured by the DHS and other surveys, a young woman aged 15-19. Globally, there is growing consensus that the term should include the 10-14 year old group, many of who are 'of reproductive age' and sexually active, especially in countries where early marriage is common.

Antenatal (care)
Period during pregnancy before birth (and the care required/provided during this stage including: recording medical history, assessment of individual needs, advice and guidance on pregnancy and delivery, screening tests, education on self-care during pregnancy, identification of conditions detrimental to health during pregnancy, first-line management and referral if necessary).

Birth asphyxia
Failure to establish breathing – or lack of oxygen - of the baby at birth. A major cause of newborn death.

Commodity security
For reproductive health, exists 'when every person is able to choose, obtain, and use quality contraceptives and other essential reproductive health products whenever s/he needs them'.[500]

Contraceptive prevalence rate
Percentage of women of reproductive age (15-49) or whose partner is using a contraceptive method (modern or modern and traditional; often reported for married women or women in union only).

Couple years of protection (CYPs)
A commonly-used measure of family planning performance at output level, CYPs provide an estimate of protection against unintended pregnancy provided by contraceptive methods, based on volume and types of contraceptive method provided to clients during a one year period.

Disability adjusted life years (DALYs)
Are a measure of the burden of disease from mortality and morbidity

Emergency obstetric care
The treatment of complications that arise during pregnancy and childbirth. Services can be 'basic' (includes treatment of pre-eclampsia and haemorrhage, assisted delivery and basic neonatal resuscitation) or 'comprehensive' (includes surgery/caesarean section, blood transfusion).

ICPD
International Conference on Population and Development held in 1994 that agreed the respect for reproductive rights and provision of universal access to sexual and reproductive health services.

Incidence
Number of new cases of a disease

Intervention
Drug treatments, clinical procedures or non-medical inputs such as information about danger signs in pregnancy for the prevention of treatment of a problem. A package is a combination of single interventions.

Lifetime risk of maternal death
The probability that a 15-year-old female will die eventually from a maternal cause.

Maternal mortality/death
The death of a woman while pregnant or in childbirth, or within 42 days of the end of pregnancy, regardless of the site or duration of pregnancy, from any cause related to or aggravated by the pregnancy or its management.

Maternal mortality ratio
Annual number of deaths of women from pregnancy related causes per 100,000 live births.

Modern contraceptive methods
Includes all hormonal methods (the pill, injectables, implants), Intra-Uterine Devices, condoms and modern vaginal methods (e.g. diaphragm/spermicides) and permanent methods of male and female sterilisation.

Natural methods
Natural or fertility awareness methods include lactational amenorrhea method (LAM), periodic abstinence and withdrawal.

Neonatal (newborn) mortality/death
Death of a baby during the first 28 completed days of life.

Obstetric Fistula
An abnormal opening between the vagina and the bladder and/or the rectum, resulting in uncontrollable leakage of urine and/or faeces, that is both preventable and treatable.[501]

Package
Combinations of single interventions.

Perinatal
The period around the time of birth. Perinatal death is one that occurs in the womb or in the first 7 days.

Postnatal (care)
6 week period following the birth (and the care required/provided during this stage, including a visit from a health worker with the right knowledge and skills)

Post partum period
Usually 10 days following birth.

Prevalence
Number of existing cases of a disease

Price elasticity of damand
The responsiveness of demand to a change in price.

Reproductive Health
ICPD defines reproductive health as: 'a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity, in all matters relating to the reproductive system and to its functions and processes'.

Reproductive Rights
ICPD defines as 'basic right of all couples and individuals to decide freely and responsibly the number, spacing and timing of their children and to have the information and means to do so'; 'right to attain the highest standard of sexual and reproductive health', 'to make decisions concerning reproduction free of discrimination, coercion and violence'.

Skilled attendant at delivery
Accredited health professional, such as a midwife, doctor or a nurse, who has been educated and trained to proficiency in the skills needed to manage normal (uncomplicated) pregnancies, childbirth and the immediate postnatal period, and in the identification, management and referral of complications in women and newborns.[502]

Stillbirth
Death of a foetus occurring after 28 weeks of pregnancy.

Strategy
Specification of the component intervention package, target group and means of distribution

Task shifting
Process whereby specific tasks are moved, where appropriate, to health workers with shorter training and fewer qualifications.[503]

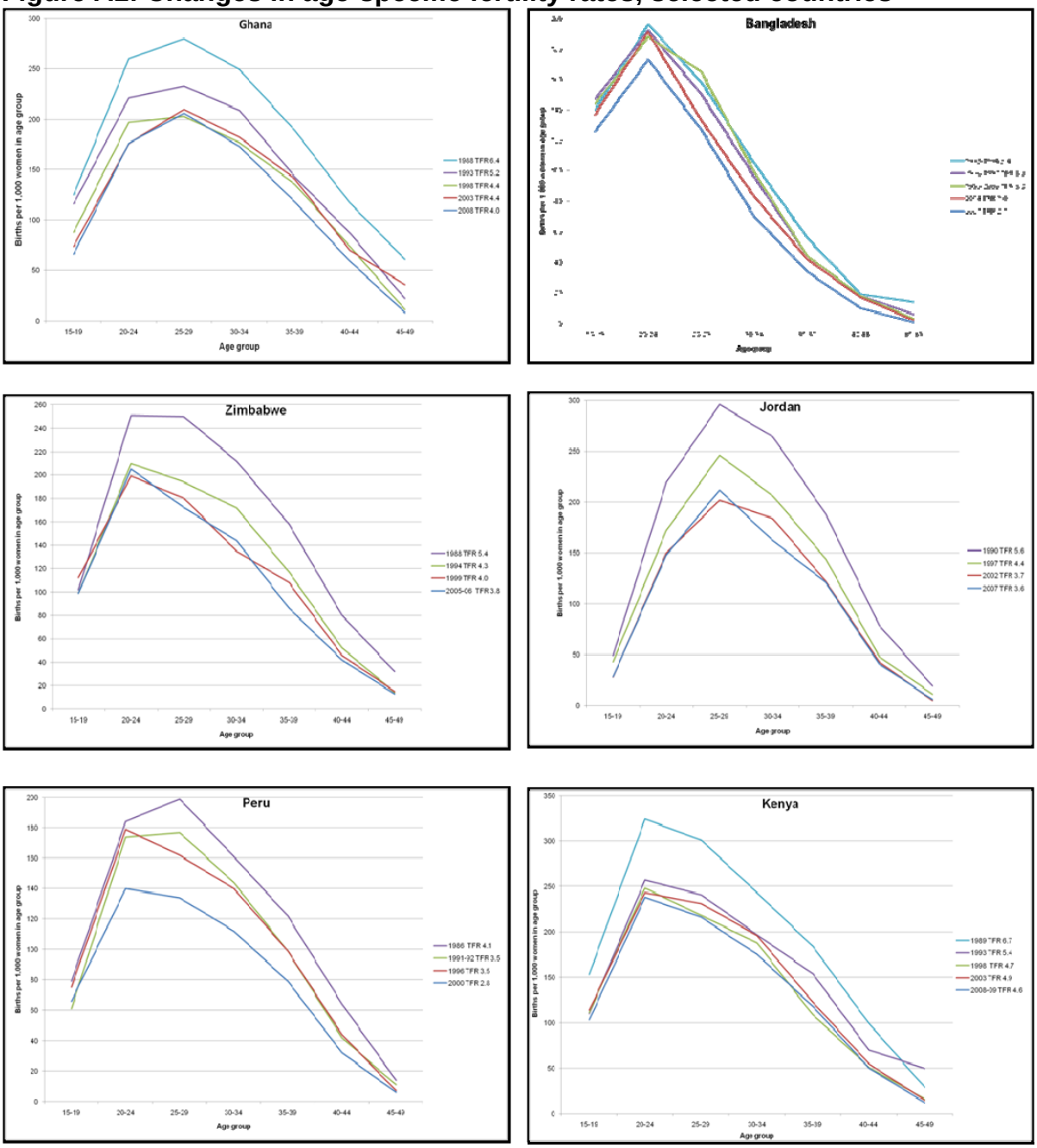
Traditional methods
Traditional methods are defined as natural methods of family planning plus any other country specific folk method.

Unintended pregnancy
A pregnancy that occurs when a woman wanted to postpone conception for at least two years or did not want to become pregnant. The total number of unintended pregnancies includes unwanted and mis-timed births, abortions and unintended pregnancies that end as miscarriages.

Unmet need for contraception
When a woman wants to avoid a pregnancy but is not using any method (modern or modern and traditional); often reported for married women/women in union only.

Unsafe abortion
Procedure meant to terminate an unintended pregnancy that is performed by individuals without the necessary skills, or in an environment that does not conform to minimum medical standards or both.

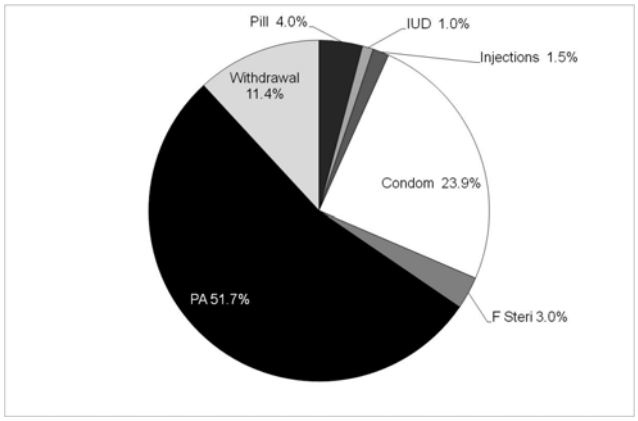
Figure A1: Changes in age-specific fertility rates, selected countries



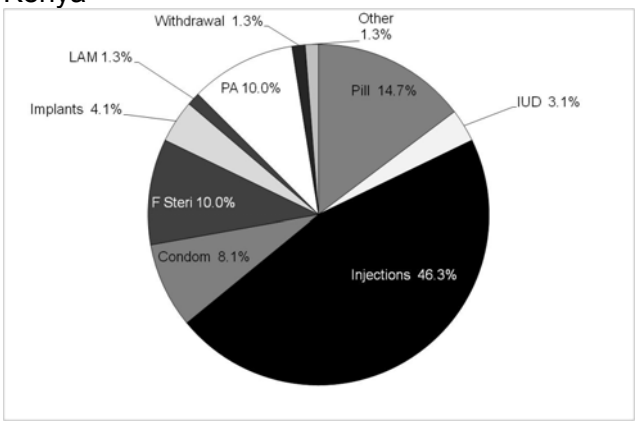
Source: Demographic and Health Surveys

Figure A2: Contraceptive mix, selected countries

DRC



Kenya



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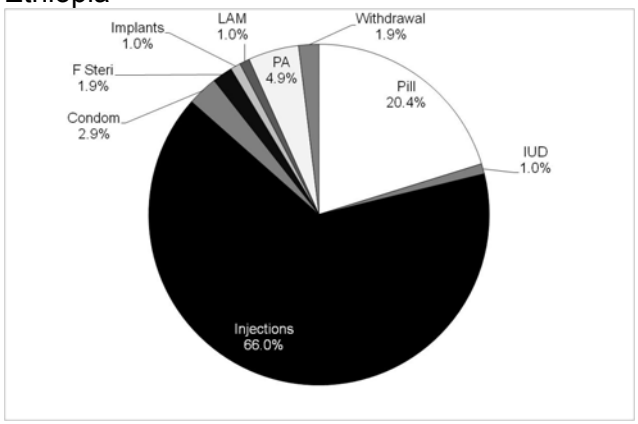
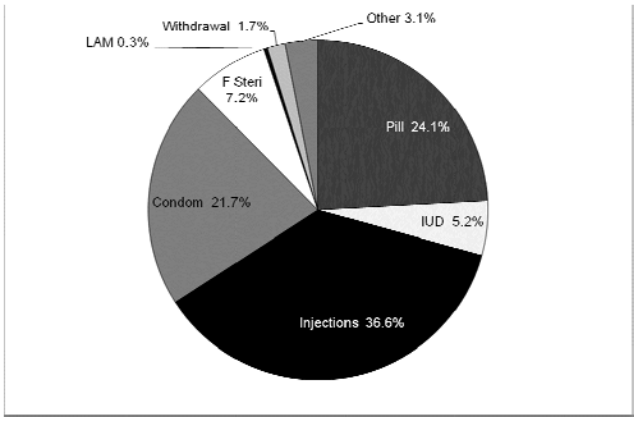
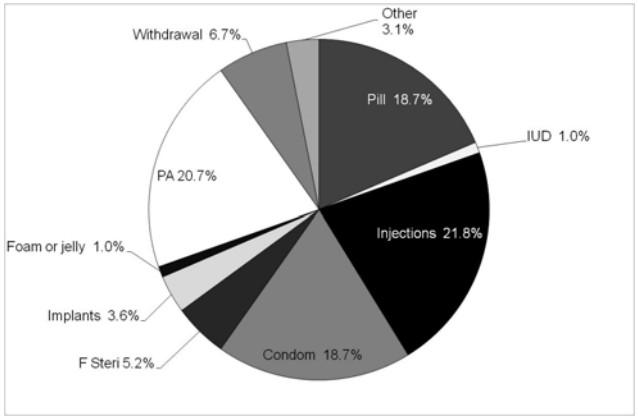


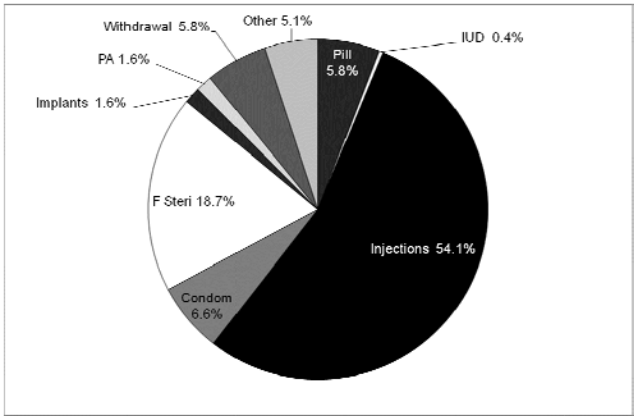
Lesotho



Ghana



Malawi



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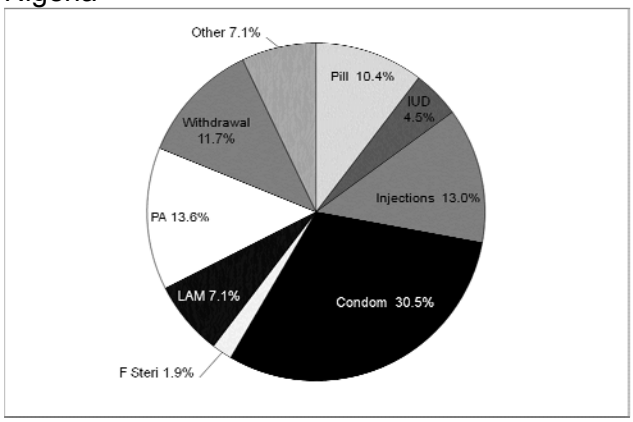
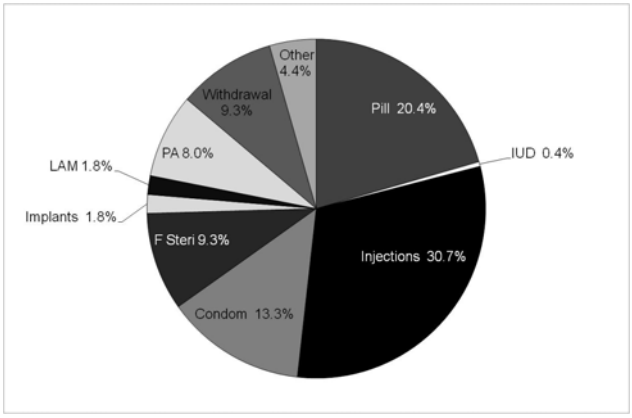


Tanzania



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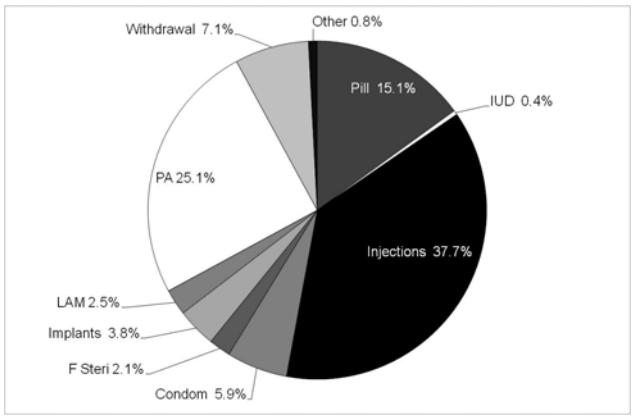

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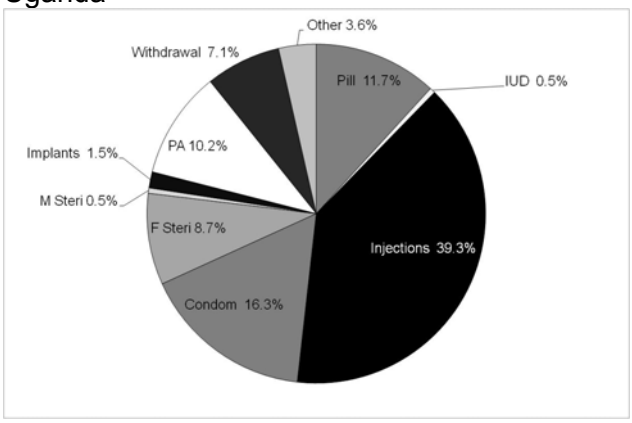
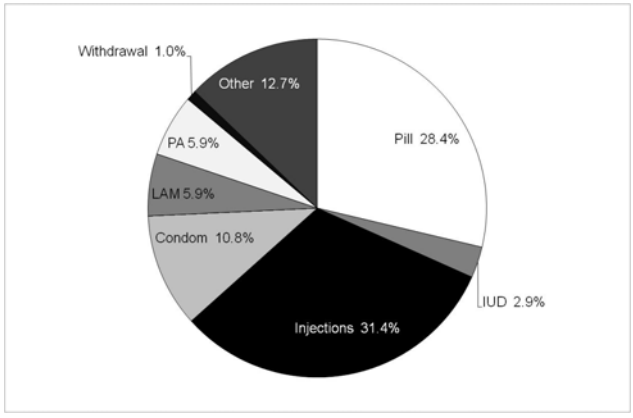
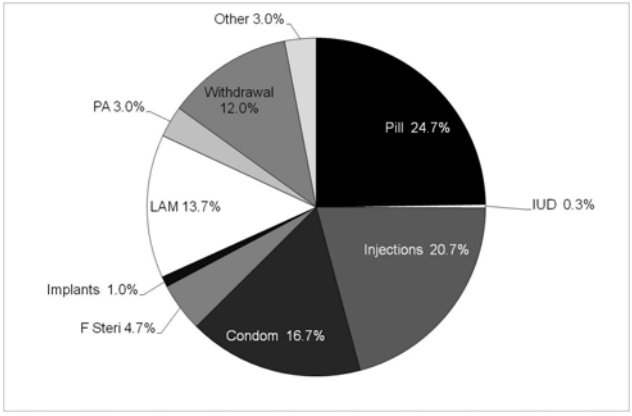


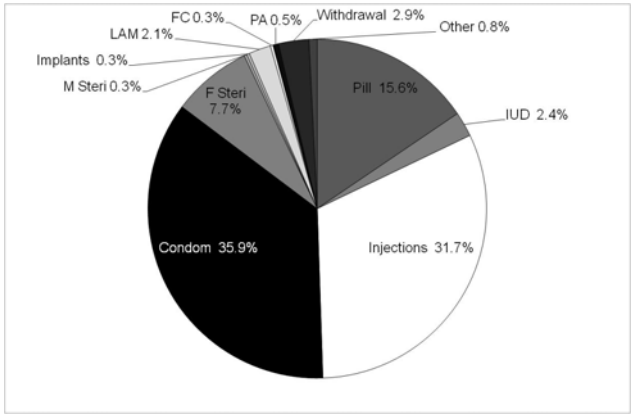
Sierra Leone



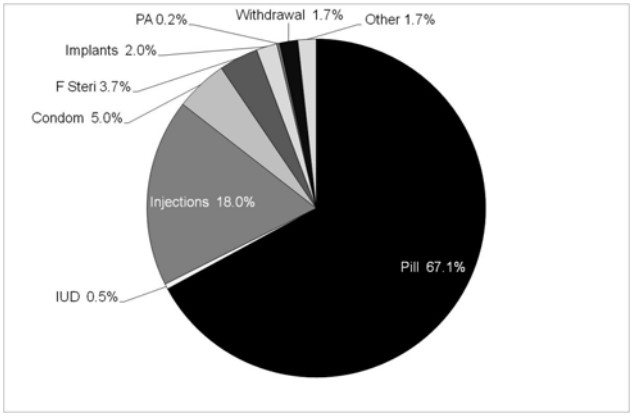
Zambia



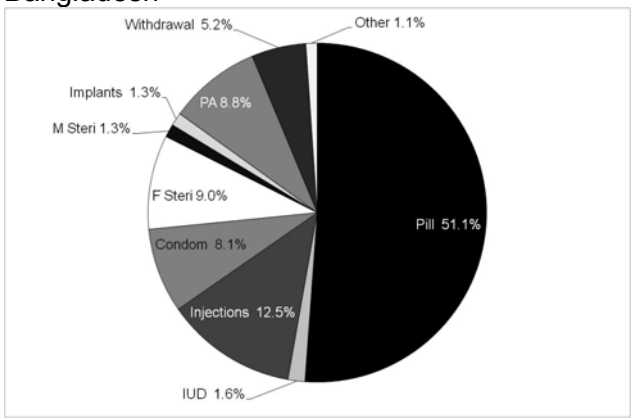
Swaziland



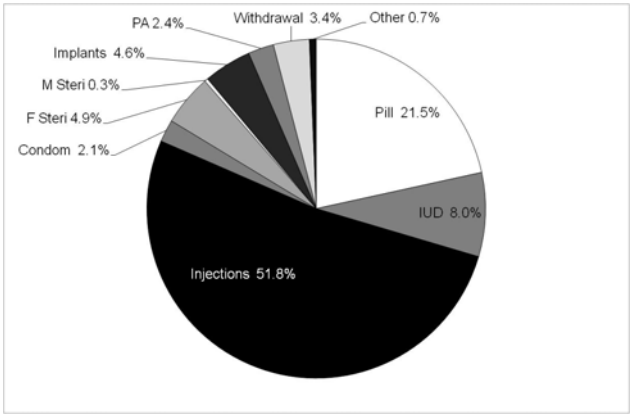
Zimbabwe



Bangladesh



Indonesia



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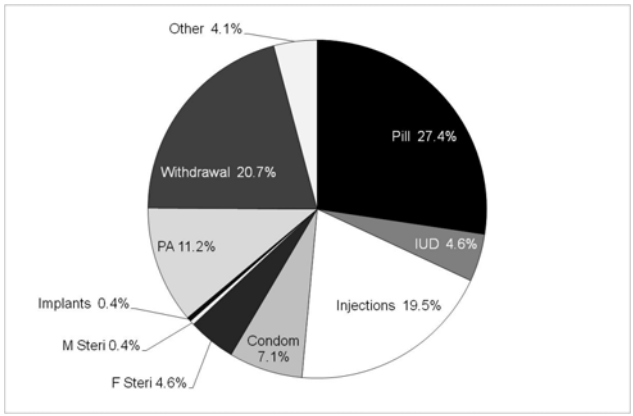
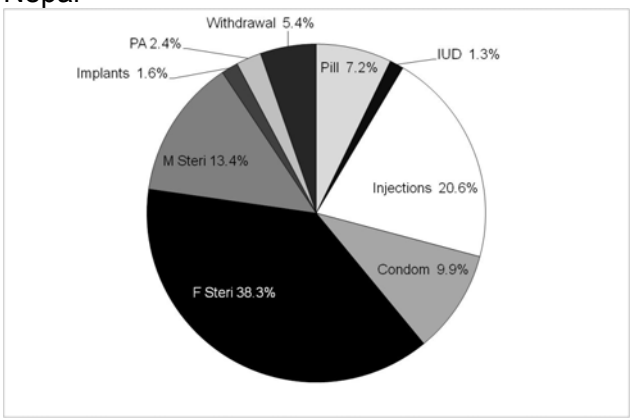


Nepal



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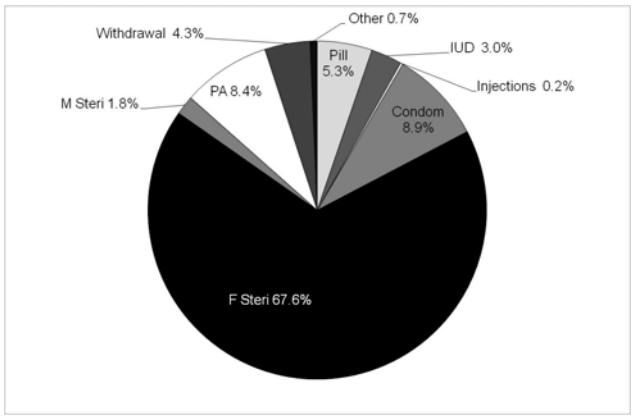

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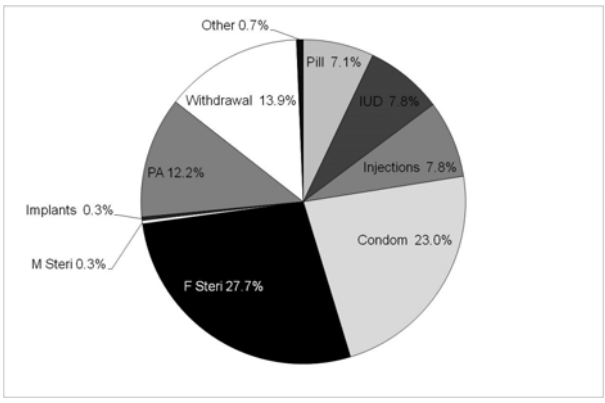
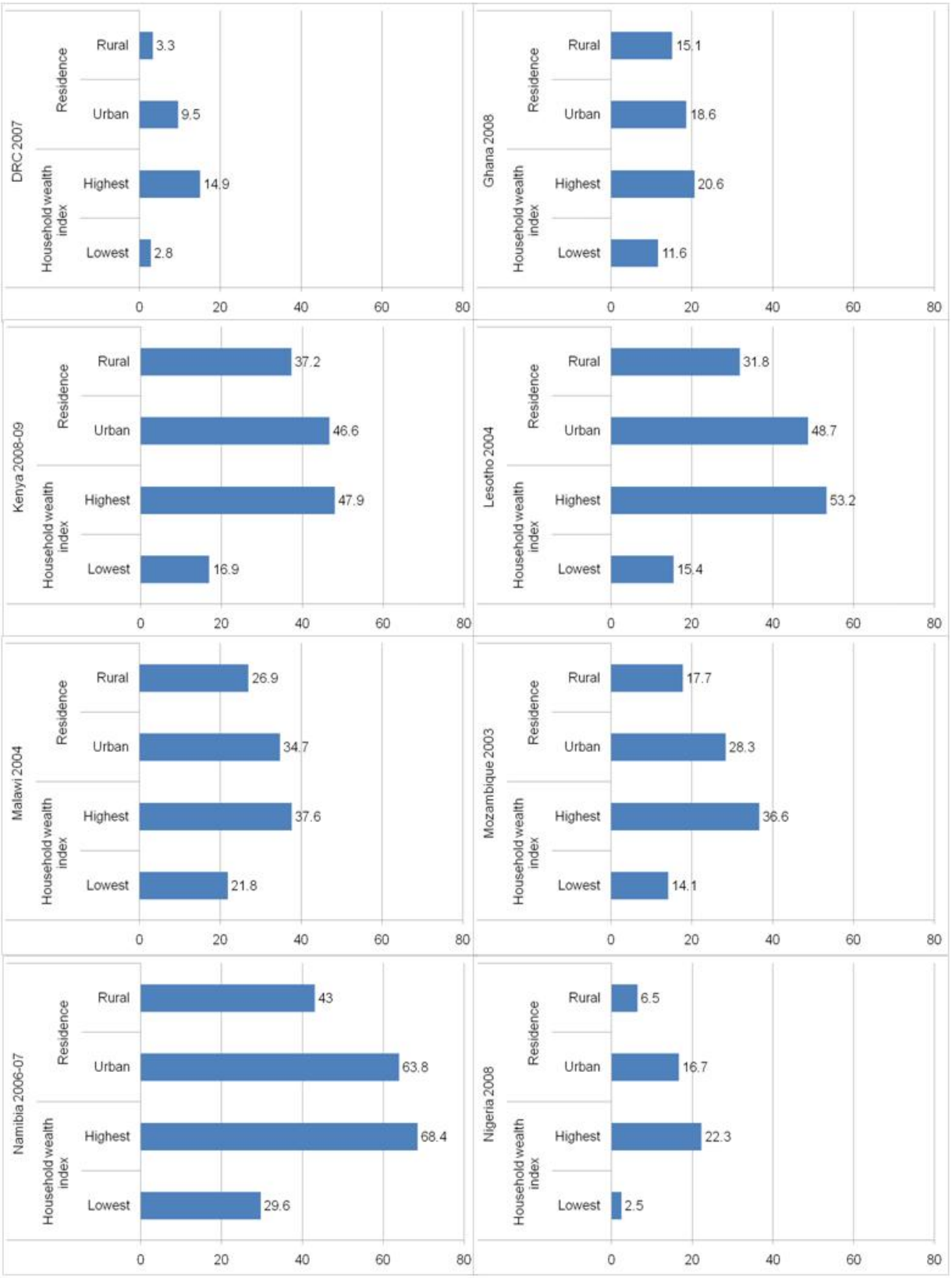
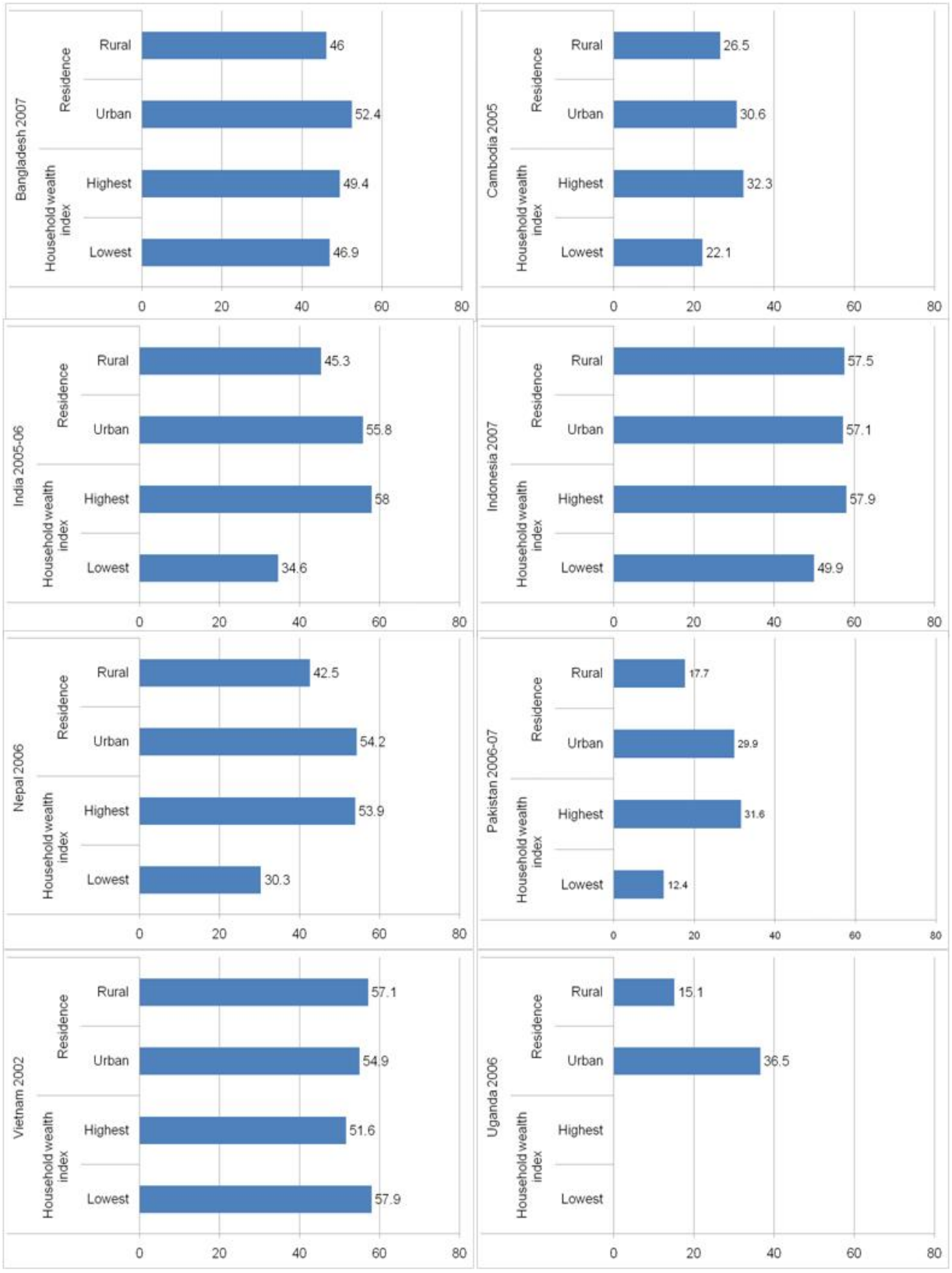


PA = periodic abstinence
F Steri = female sterilisation
M Steri = male sterilisation
Source: Demographic and Health Surveys

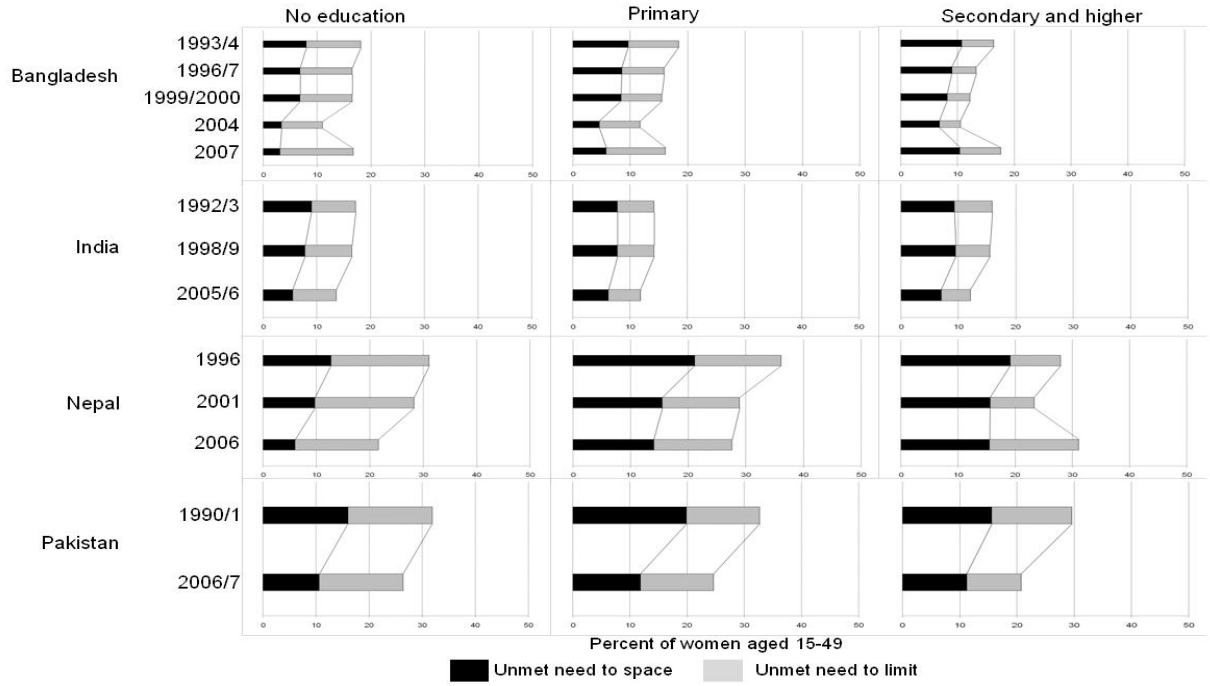
Figure A3: Modern contraceptive prevalence rate by background characteristics, for selected countries





Source: Demographic and Health Surveys

Figure A4: Trends in unmet need for spacing and limiting by educational level, for selected countries



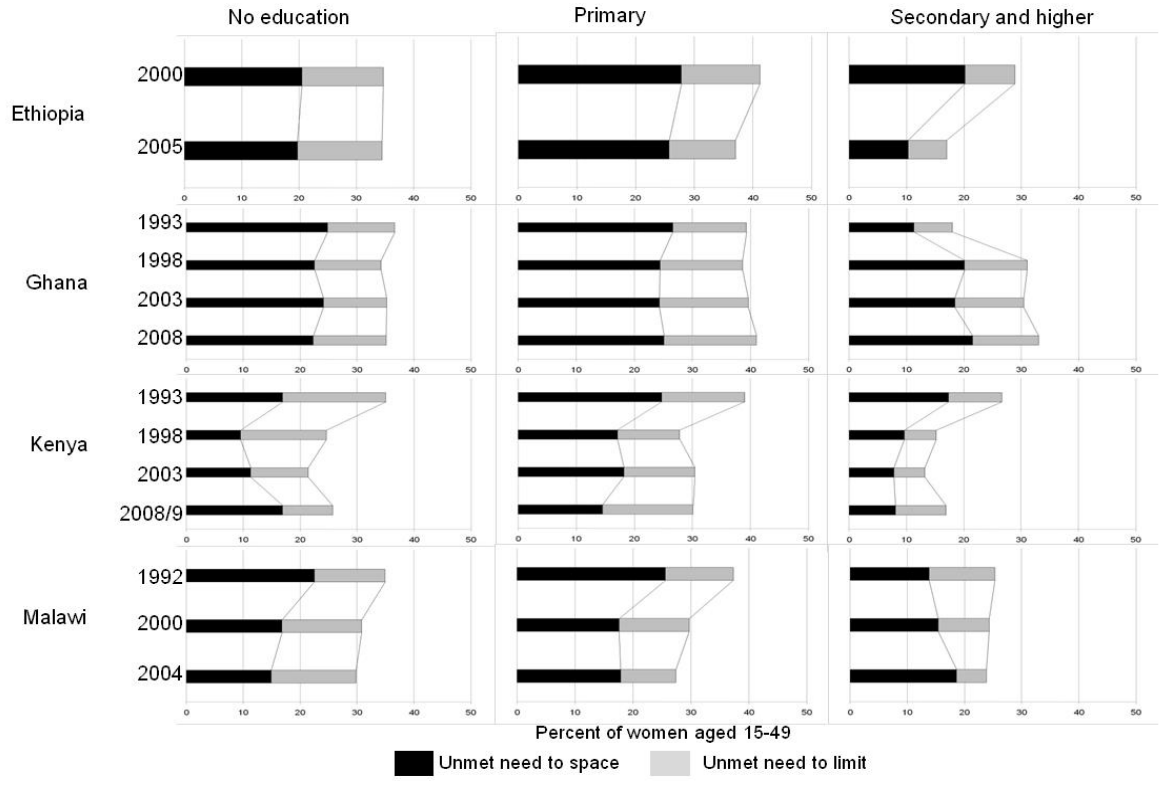
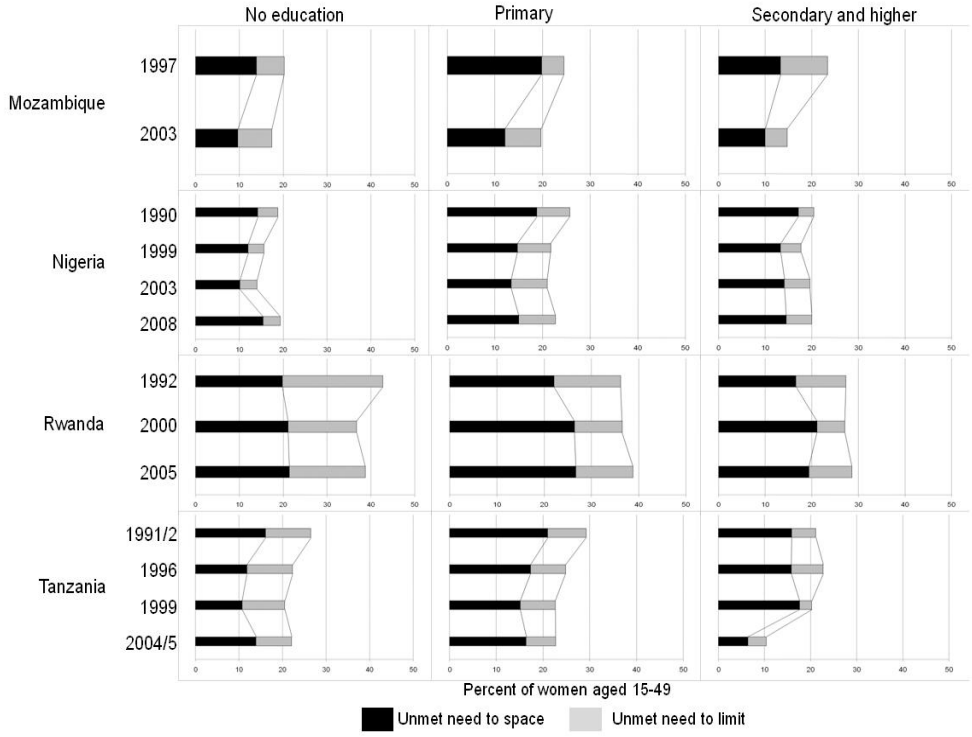


Figure A4 (cont)



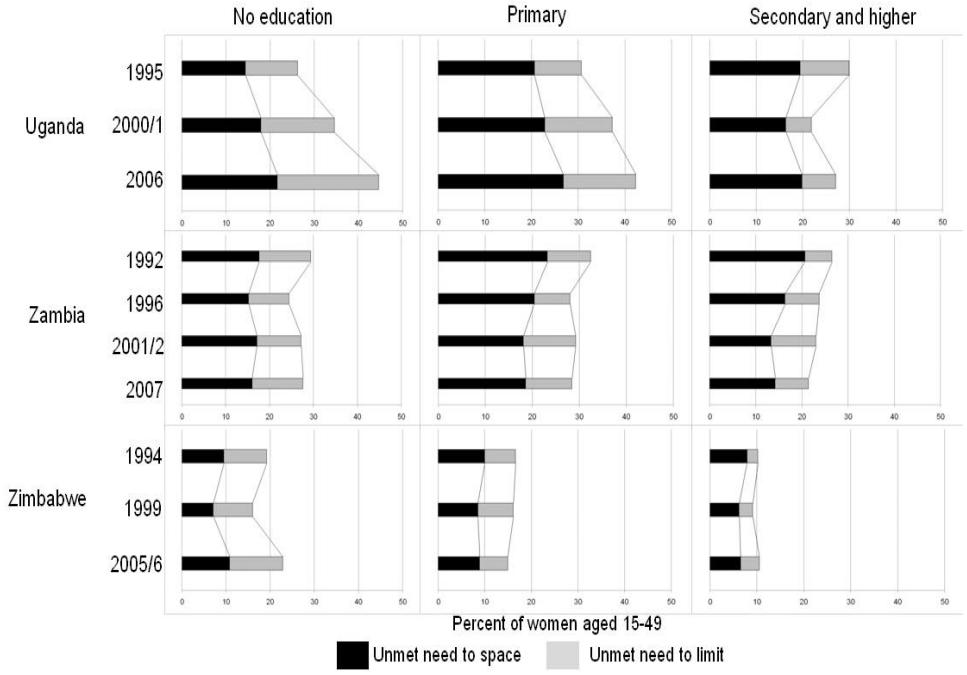
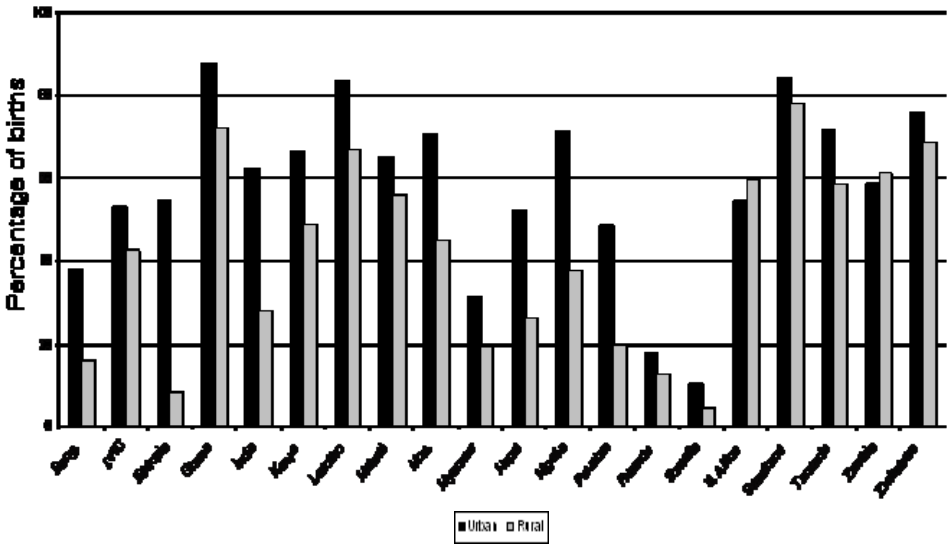
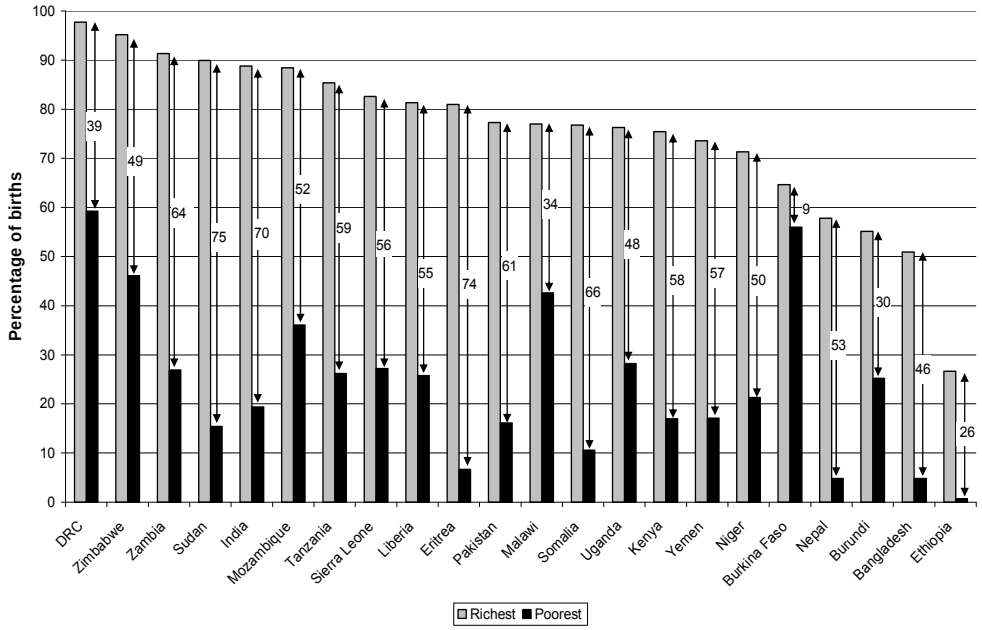


Figure A5: Disparities in accessing antenatal care (recommended four or more visits) between urban and rural, selected countries



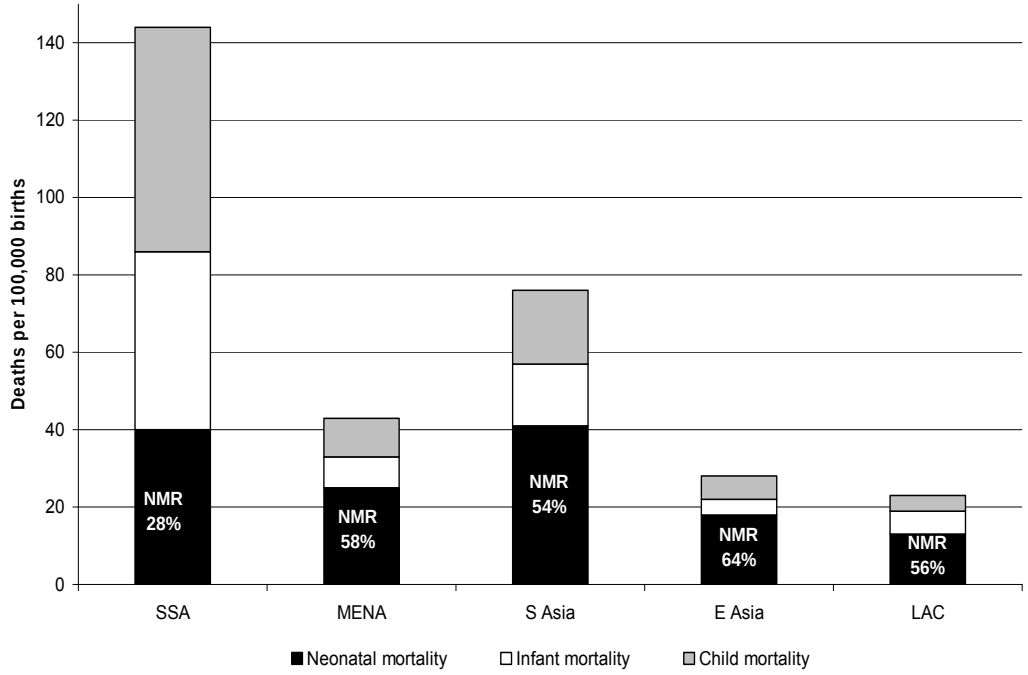
Source: Demographic and Health Surveys data (latest year)

Figure A6: Disparities in percentage of births attended by skilled birth attendant between richest quintile and poorest quintile, selected countries



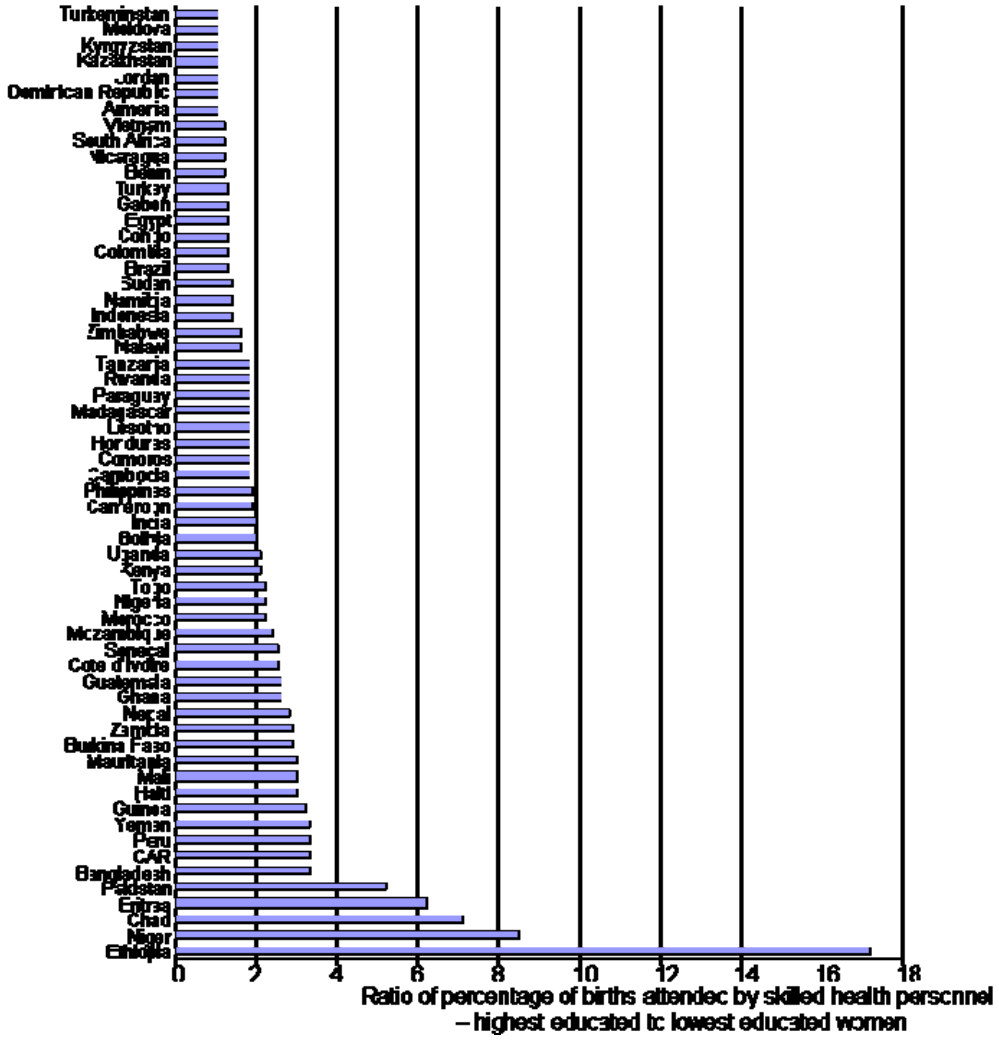
Source: Demographic and Health Surveys data (latest year)

Figure A7: Neonatal, infant and child mortality rates and percentage of overall child mortality attributed to neonatal mortality, 2000-2004



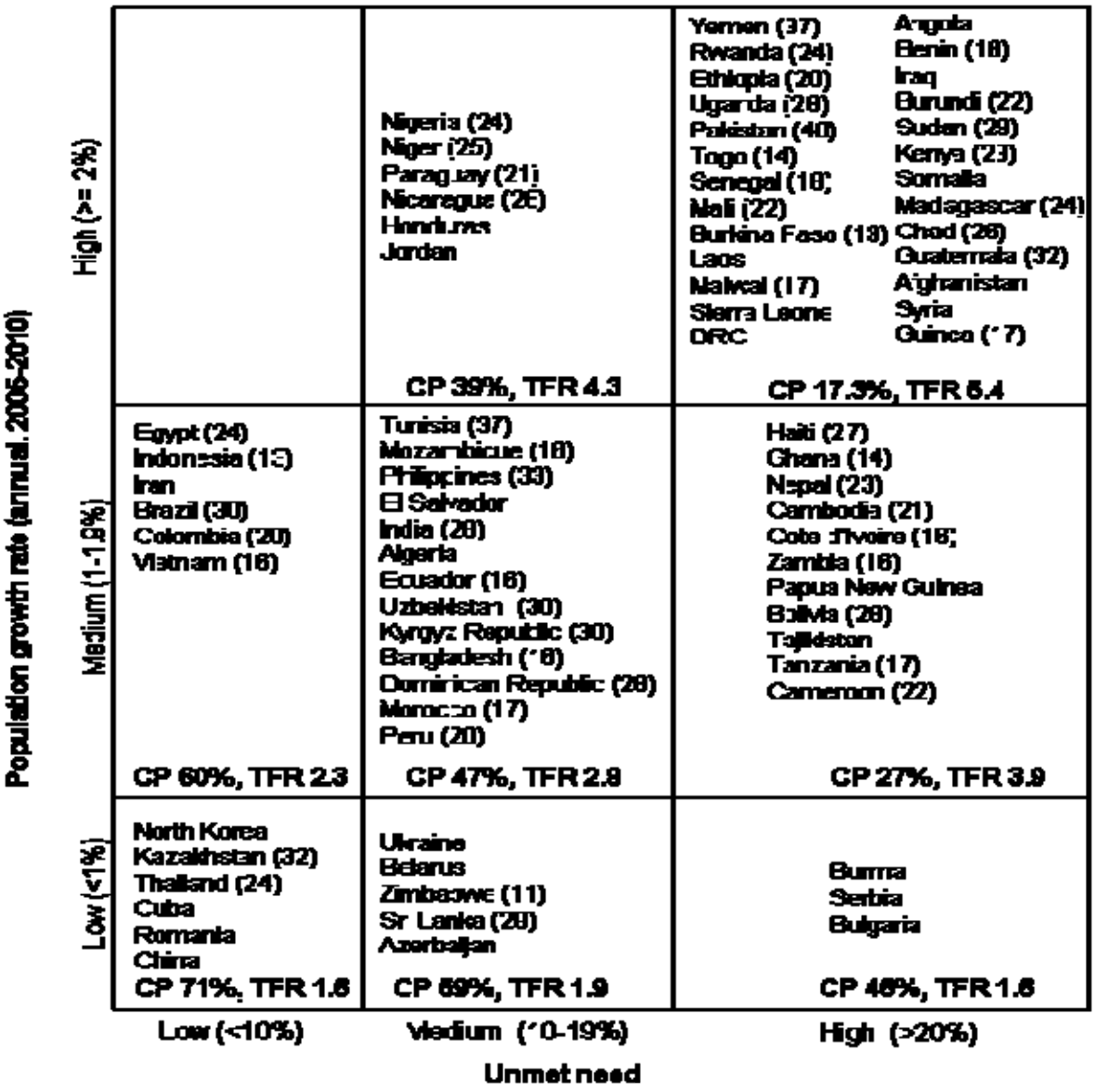
Source: WHO 2006[504]

Figure A8: Percentage of births attended by skilled health personnel by wealth quintile of mother – ratio of most educated women to least educated women



Source: WHO 2008[505]

Figure A9: Classification of 75 low-income and lower-middle income countries by population growth and unmet need



The numbers in parentheses represent percentage of second and higher order births happening less than 24 months since previous birth according to DHS data. CP = unweighted mean contraceptive prevalence in married women for every cell. TFR = unweighted mean total fertility rate for every cell. Within every cell, countries are listed in order of decreasing unmet need. Unmet need imputed for 12 countries without a direct estimate based on contraceptive use and level of unmet need in adjacent countries. Source: Cleland et al. [i]

[i] Cleland J, Bernstein S, Ezeh A, Faundes A, Glasier A, Innis J. Family planning: the unfinished agenda. 2006. 368:1810-1827

Table A1: Percentage of married female contraceptive users, by method and survey period, according to region

Method and period		LAC	SSA	Asia	Other
IUD	1980-84	9.2	5.1	27.9	22.9
	1985-89	10.9	4.7	24.0	26.1
	1990-94	10.7	7.0	22.8	29.0
	1995-99	11.0	5.7	22.9	30.0
	2000-05	9.9	2.9	22.8	29.3
Pill	1980-84	31.4	19.3	11.8	27.8
	1985-89	27.6	19.3	9.3	25.7
	1990-94	19.5	23.7	8.2	25.2
	1995-99	19.5	22.3	8.0	25.2
	2000-05	18.1	18.6	8.2	25.8
Injectable	1980-84	3.5	8.1	0.9	0.6
	1985-89	2.7	9.4	2.4	0.6
	1990-94	2.8	12.2	3.3	0.6
	1995-99	3.9	16.8	4.8	1.3
	2000-05	6.3	25.7	5.8	2.2
Condom	1980-84	2.6	3.2	6.0	8.0
	1985-89	3.2	2.8	6.5	8.3
	1990-94	4.0	4.9	4.9	7.6
	1995-99	6.1	6.2	5.9	7.8
	2000-05	7.0	8.3	6.5	7.7
Male sterilisation	1980-84	0.9	<0.1	5.4	0.2
	1985-89	1.1	0.3	6.5	0.2
	1990-94	0.3	0.3	8.6	0.2
	1995-99	2.1	0.4	5.8	0.2
	2000-05	2.2	0.3	5.1	0.2
Female sterilisation	1980-84	32.9	7.0	34.3	5.4
	1985-89	35.8	7.1	42.5	5.6
	1990-94	47.8	7.9	43.4	5.8
	1995-99	43.4	7.9	43.1	6.1
	2000-05	43.4	6.5	42.1	6.0
Traditional methods	1980-84	17.5	56.4	13.2	33.1
	1985-89	17.5	55.4	8.6	32.0
	1990-94	14.3	42.5	8.1	30.0
	1995-99	13.4	39.4	8.3	27.8
	2000-05	12.3	30.6	8.6	26.8

Source: Seiber et al. 2007[i]

[i] Seiber EE, Bertrand JT, Sullivan TM. Changes in contraceptive method mix In developing countries International Family Planning Perspectives, 2007, 33(3):117–123

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