

Maternal Survival 3



Going to scale with professional skilled care

Marge Koblinsky, Zoë Matthews, Julia Hussein, Dileep Mavalankar, Malay K Mridha, Iqbal Anwar, Endang Achadi, Sam Adjei, P Padmanabhan, Wim van Lerberghe, on behalf of The Lancet Maternal Survival Series steering group*

Because most women prefer professionally provided maternity care when they have access to it, and since the needed clinical interventions are well known, we discuss in their paper what is needed to move forward from apparent global stagnation in provision and use of maternal health care where maternal mortality is high. The main obstacles to the expansion of care are the dire scarcity of skilled providers and health-system infrastructure, substandard quality of care, and women's reluctance to use maternity care where there are high costs and poorly attuned services. To increase the supply of professional skilled birthing care, strategic decisions must be made in three areas: training, deployment, and retention of health workers. Based on results from simulations, teams of midwives and midwife assistants working in facilities could increase coverage of maternity care by up to 40% by 2015. Teams of providers are the efficient option, creating the possibility of scaling up as much as 10 times more quickly than would be the case with deployment of solo health workers in home deliveries with dedicated or multipurpose workers.

All women who want to have babies want to do so safely, with reassurance and care throughout their pregnancies, during birth and beyond, for themselves and their babies. For a safe birth, women need access to a range of care: from supportive and watchful waiting, to caesarean section (table 1 of the second paper in this series). If professional care is provided (midwifery care and the support that can be provided by a comprehensive essential obstetric hospital) then chances of survival for mothers and infants improve. Most women who have access to and can afford such care choose professionally provided options. In view of this choice, what does it take to move from apparent global stagnation in provision and use of maternal health care to scaling up professional skilled care? For key messages, see panel 1.

Trends and patterns of care

We know the care that is needed, but how far have we moved towards providing care for all women? In this section we provide an overview of progress in scaling up maternity care in poor countries. We focus on available information for professional assistance at childbirth, back-up care in the case of complications at childbirth, and antenatal and postpartum care.

Assistance at childbirth

General trends in assistance at childbirth show a slow but unmistakable movement towards professionalisation. Data from 40 nationally representative household surveys (representing 45% of developing country populations) show that the 40% of women who were able to access professional help at childbirth in 1992 in surveyed countries increased to almost 50% of women by 2000, with a noticeable rise in doctor-assisted births, although births assisted by other professionals have also increased. A similar rise in facility births accompanies this slow rise of professionalisation, since most professional assistance is provided in facilities.¹ There continues to be a sizeable

preponderance of public-sector births, but with a growing element of childbirth in private facilities. Despite these trends, millions of women are still left without care, particularly in some countries and regions. Nearly one in four women in developing countries continues to be either alone or with only a relative or neighbour to assist them at childbirth; this has not changed since the early 1990s.

Progress in professionalisation of childbirth, already high in urban areas in 1992 (>70%) and higher yet in 2000, is held back by a marked stagnation in rural areas, mainly in sub-Saharan Africa and south and southeast Asia where rural populations still constitute a large proportion of total populations.² Rural sub-Saharan Africa shows no improvement; professional coverage at birth was 32% in the early 1990s and remained so a decade later (figure 1). The rural populations of south and southeast Asia started with even lower rates of use in 1992 (about 25%) and have increased to only 35%. The trend is towards births with doctors,

Panel 1: Key messages

- Progress in professionalisation of maternity care has been held back by stagnation in rural areas, mainly sub-Saharan Africa and south and southeast Asia
- Lack of availability constrains progress in areas of massive deprivation, whereas in marginally deprived areas, problems relate to poor quality of care and women's reluctance to use it
- The extent of coverage of birthing care depends on strategic decisions in three areas: training, deployment, and retention of health workers
- Based on simulations, teams of midwives and midwife assistants working in facilities will increase coverage by up to 40% by 2015
- Addressing the major gaps in care and tackling the problems of safe motherhood today requires strong political leadership and a sustained commitment over time

Published Online
September 28, 2006
DOI:10.1016/S0140-6736(06)69382-3

*Group members listed at end of report

This is the third in a **Series** of five articles about maternal survival

ICDDR,B, Centre for Health and Population Research, Dhaka, Bangladesh; Johns Hopkins University, Bloomberg School of Public Health, Baltimore, MD, 21205 USA

(M Koblinsky PhD) Division of Social Statistics, University of Southampton, Southampton, UK (Z Matthews PhD);

IMMPACT University of Aberdeen, Aberdeen, Scotland (J Hussein MRCOG); Public System Group, Indian Institute of Management, Vastrapur, Ahmedabad, India

(D Mavalankar PhD); ICDDR,B: Centre for Health and Population Research, Dhaka, Bangladesh (M K Mridha MPH); Reproductive Health Unit, Public Health Sciences Division, ICDDR,B Centre for Health and Population Research, Dhaka, Bangladesh (I Anwar MPH); Center for Family Welfare, University of Indonesia, Depok, West Java, Indonesia

(E Achadi PhD), Deputy Director General of Health, Government of Ghana, Accra, Ghana (S Adjei MSc) Public Health and Preventive Medicine,

Government of India, Chennai, Tamil Nadu, India

(P Padmanabhan MIH); and Department of Health Financing and Stewardship, WHO, Geneva, Switzerland (W Van Lerberghe PhD)

Correspondence to: Dr Marge Koblinsky margek@icddr.org

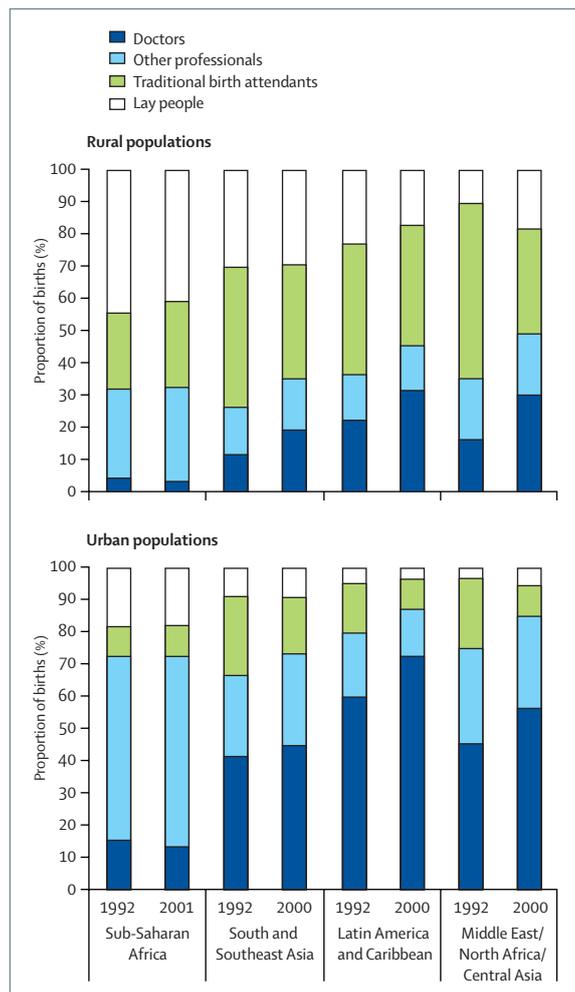


Figure 1: Trends in childbirth assistance by continent: developing world 1992-2001

Figure based on data from 40 demographic health surveys undertaken between 1989 and 2003. Proportions of births by attendant weighted by estimated births in those countries (reference 2). Years refer to weighted average of year of survey; births reported in each survey occurred within 3 years of survey date.

slowly replacing traditional birth attendants. Other professionals, mainly midwives and nurse-midwives, have held their own in terms of coverage of births over the past decade or so, and the increase in the proportion of doctor-assisted births has been at the expense of traditional birth attendants rather than at the expense of other professionals.

Regional trends mask considerable variation between countries. Attendance at childbirth by professionals varies from as low as 13% to as high as 99% of births according to country context. Care configurations and training time of professionals also vary: Asian skilled providers are often trained for a year or less, placed at community level to cover home births, and link to poor quality hospitals in relatively densely populated rural areas. In Africa, midwives might be trained for about a year or more and work in health facilities with wide

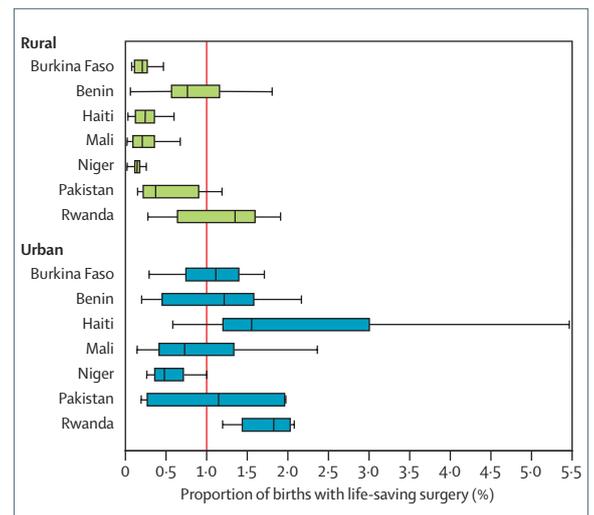


Figure 2: Met need for life-saving obstetric surgery in 220 rural and 97 urban districts in Benin, Burkina Faso, Haiti, Mali, Niger, Pakistan, and Rwanda Boxes=interquartile range for percentage of life-saving surgery across districts; data for 1999-2001. Vertical lines within boxes=median.

geographic coverage in areas characterised by low-density populations. In both settings, referral possibilities are limited. Birthing care in Latin America differs yet again, with care provided by doctors, nurses, and nurse auxiliaries (most without specific midwifery training) at facilities with limited outreach.

Back-up care for complications

Identification of trends over time for access to care when complications arise is problematic because of patchy data, but an impression emerges from caesarean-section rates obtained from surveys since the 1990s. The overall caesarean birth rate for developing countries stands at 12% (8.5% if China is excluded),³ with large variability between and within countries. Rural rates are often less than a third of urban rates, and many countries, particularly in sub-Saharan Africa, still have rural rates much lower than the 5% recommended minimum.⁴ These data imply a continuing shortfall of life-saving surgery in many contexts.

However, during the decade since 1990, overall caesarean rates have been increasing. Outside Africa, increases of 5-20% are not uncommon.³ Such increases have taken place in both urban and rural areas, although sharper rises have occurred in urban areas and are now well above 10%.⁵ Where private-sector caesarean section rates are increasing, as in several states of India, this trend ought to be monitored. Evidence from Egypt and Brazil, for example, does not suggest that medical need or women's preference are the cause of the reported high rates of private caesarean section use.^{6,7} Increasing caesarean rates should be monitored not only because of possible financial exploitation but also because attempts to reverse the caesarean section trend have met with only marginal success.⁸⁻¹⁰

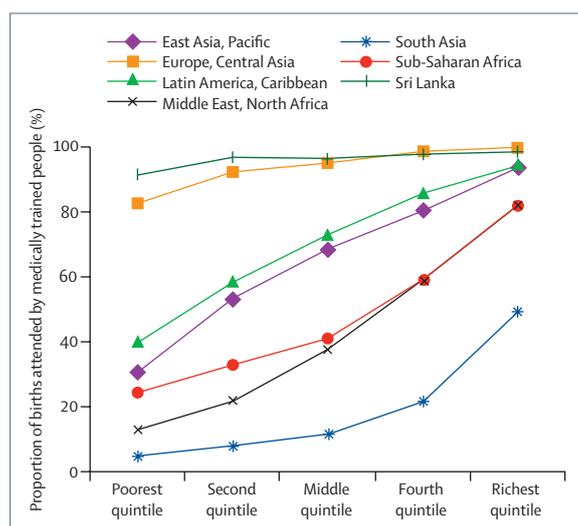


Figure 3: From massive deprivation to marginal exclusion: proportion of births attended by medically trained people* by wealth quintile and region
Data from references 14–16. *Doctor, nurse, or nurse midwife.

Data to determine the extent to which caesarean sections and other surgical procedures are undertaken in life-threatening situations are difficult to obtain. Measurement of met need for obstetric care,¹¹ by identification of medical indications for interventions, enables us to quantify the gap in use of life-saving surgery. As shown in figure 2, a huge disparity exists between urban and rural areas in access to life-saving interventions in six developing countries.¹² These data suggest that most rural and some urban districts suffer a huge shortfall in essential interventions, with most of the rural districts studied falling far below the estimated 1% of pregnant women who will die without recourse to life-saving surgery. An increase in the level of interventions to 1% in these countries would represent a total of 13 000 additional lives saved per year.

Use of antenatal and postpartum care

Notable increases in the use of antenatal care have taken place in all developing regions, with an increase of 20% worldwide during the 1990s.⁵ The popularity of antenatal care is encouraging; however, worrying gaps in provision exist, and coverage statistics are usually based on women who receive one antenatal care contact only, whereas four contacts are recommended, and the quality of antenatal care is variable.¹³

Much less is known about use of postpartum care, the importance of which has only recently become a concern. The use of a skilled attendant at birth should guarantee that care in the immediate postpartum period, and longer if the birth was complicated, is available. Evidence for later check-ups is now emerging, which shows that seven out of ten women who do not give birth in a facility are not currently receiving postnatal care. This number varies considerably by country, with African countries reporting

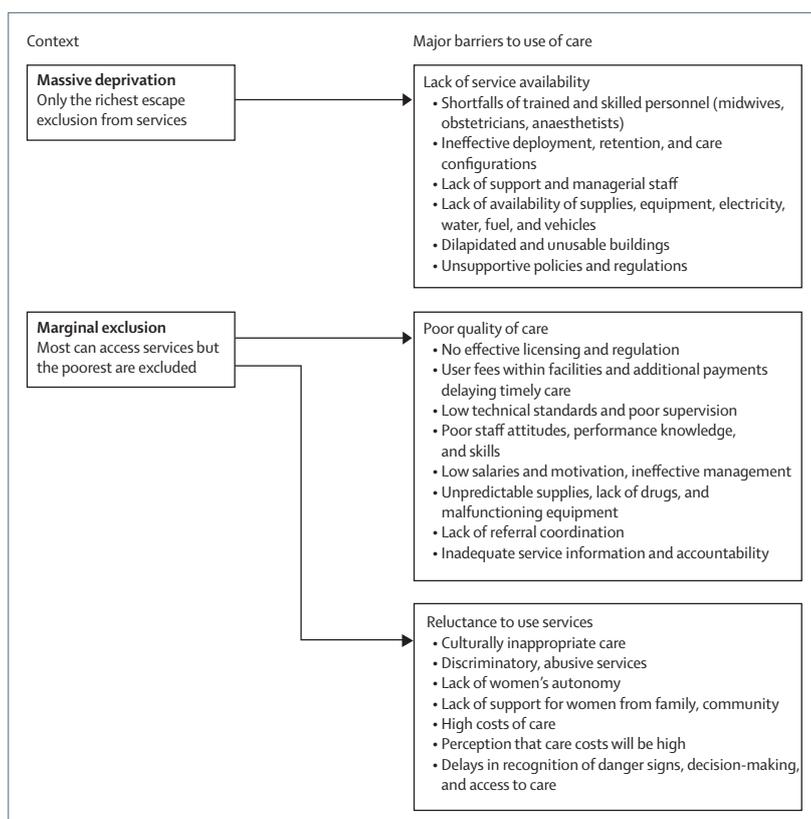


Figure 4: Barriers to scaling up according to context

the proportion of women with no postpartum care between 50% and 95% of those with non-institutional births. In other areas of the world the fraction of women who give birth at home who do not access care after birth is, on the whole, smaller, but rates of more than 80% are still seen in Bangladesh, Colombia, and Egypt, for example (Fort A, Demographic and Health Surveys, personal communication, 2006).

Barriers to progress in use of professional skilled care

The slow movement towards care that is increasingly professional, institutional, and, in a few countries, privately provided is evidence of women's choices. That these increases have kept up with and surpassed the increase in the numbers of births in many settings is encouraging. However, the speed of scale-up globally is not rapid enough and gaps in coverage are all too apparent in almost all developing countries. This leaves those excluded from services at risk and opens up wide inequalities between rich and poor people and those living in urban areas and those living rurally.

The extent to which coverage shortfalls exist varies considerably between countries. However, the main challenge to more rapid increase in coverage of professional childbirth assistance lies in the rural areas of sub-Saharan Africa and south Asia, where availability of

Panel 2: Scaling up quality of care**Little evidence**

The scarcity of evidence for how to scale up quality maternal services belies the complexity of the underlying issues. Individual providers are the heart of quality, and their performance can be said to be determined by their competence, motivation, and the resources available.³⁴ Beyond the individual health-worker level, an adequate management capacity is needed to ensure correct coordination and organisation of services, including supplies, training, and communications. Local health systems do not operate in a vacuum. Overall health system attributes affect how managers and health workers behave (salary scales, supplies, etc). To deal with this complex and layered performance issue, approaches focusing on individual health workers need to be complemented by efforts to strengthen overall management capacity. Scaling up quality management requires context-sensitive responses. In view of the time-specific and place-specific configurations of the previously described elements, a blueprint approach is not desirable. Instead, what should be scaled up is a commitment to facilitating responsive management and organisation of services.

The starting point: tackling medical education

Basic training of health workers needs to instil the essential competences, skills, and attitudes adapted to changing field realities.³⁵ More investments are needed in the training system, including its staff, to ensure a thorough socialisation process. A responsive health workforce can be built on a horizontal cross-professional training to which modules are added in function of required mixes of competences³⁶ and capped by validation of graduates through a transparent process.

What can in-service training do?

Once in service, continuing medical education on the basis of didactic approaches might have little effect: knowledge is essential, but in itself is insufficient to induce change in practitioner behaviour.³⁷ By contrast, provision of active learning opportunities (case discussions, hands-on practice sessions, and interactive workshops), with longitudinal, sequential programming (learn-work-learn) and provision of patient education material, flow charts, and clinical guidelines are effective.³⁷ Assessment of learning needs and demands, interaction between physician-learners, and opportunities to practise what has been learned are essential.³⁸ Continuing medical education could be linked to regular certification and accreditation of providers to ensure maintenance of competencies and accountability. Computer-assisted learning packages and distance learning show mixed results and might be difficult to sustain.³⁹

Improvement of management approaches

Less evidence exists for the improvement of organisational and management capacity,³⁹ and virtually none is available for techniques such as clinical audits. The public release of hospital performance data seems to be associated with an improvement in health outcomes, mainly owing to hospital responsiveness,⁴⁰ but no evidence exists for developing countries. By contrast, supportive supervision has at least short-term effects on performance and might be appreciated by staff as a sign of organisational support, and increase their motivation.⁴¹ To ensure good staff motivation, managers should also ensure correct remuneration and adequate working conditions. Besides these approaches, health-service managers can deploy strategies that aim to increase staff involvement and commitment.⁴²

Working on the larger picture

The larger institutional arrangements (legislation and norms), which guide the health sector, also have a role. These factors affect the decision spaces of managers, and can directly affect the practice of health workers at the operational level.

providers is the key barrier. These areas face massive deprivation and only the very rich escape exclusion from care. By contrast, many other countries show a pattern of marginal exclusion, in which only the poorest groups do

not access services (figure 3).¹⁴⁻¹⁶ Sri Lanka is one country that shows equitable use of health professionals for births across all quintiles.

Figure 4 shows the barriers to uptake of professional birthing care faced by countries with marginal exclusion and those with massive deprivation. In both settings, all of these barriers play a part in coverage. Their programmatic importance differs, however: reluctance to use services and poor quality care detract from use where services are available, whereas the scarcity of providers, supportive infrastructure, and policies are the primary barriers for women in sites of massive deprivation. The question is; how can progress be made in each context?

Where services are available but underused**Poor quality of maternity care**

To address constraints to progress for populations that actually access services is a challenge in itself. At the least, provision of care should not inhibit use and be at a standard that results in the best possible outcome with available resources. Yet various reports show that quality of facility-based maternal services is poor. Studies in Benin,¹⁷ Jamaica,¹⁸ Ecuador,¹⁹ and Rwanda²⁰ suggest that health professionals' knowledge and skills are inadequate, ranging from 40 to 65% of prespecified norms. In Ghana, as few as 17% of births in health facilities at the primary level met criteria of good clinical practice,²¹ and technical quality scores were low in health centres in Nigeria and Côte d'Ivoire.²² Inappropriate management of complications and untimely care in hospitals is also common, even for life-threatening emergencies.^{23,24} Worse yet, women might give birth in hospital alone²⁵ or with unskilled care providers. In selected sites in Ghana and Côte D'Ivoire, unqualified midwife assistants were present without supervision at as much as a third of hospital births.^{21,22} Thus, even if more women are accessing care with health professionals in facilities at childbirth, few are receiving clinical care of an adequate standard.

Women have reported receiving poor quality maternity care. Bolivian women who selected home birth spoke about being on display at hospital: "One doctor comes along, then another and another. It's like we're a video for them to watch."²⁶ Maternity care can be disrespectful and inhumane,²⁷ or even exploitative.²⁸ Offensive and demeaning language by health personnel, and ridiculing of women's poverty, clothing, parity, smell, hygiene, cries of pain, or desire to remain clothed is not only disrespectful, but abusive.²⁹ Procedures during labour can be undertaken with little discussion, but might be considered shameful or disgusting to women, and unnecessary by international standards, including episiotomies, perineal shaving, and enemas.^{22,30}

Referral is another important aspect of quality maternal care, and should aid access to the most appropriate care and improve the efficiency of services facing resource constraints. Yet when women become concerned about safety, they will often seek referral facilities themselves,

even when they have no obstetric problems.³¹ Models for effective referral systems have been developed,³² but few assessments of effectiveness of referral interventions exist.³³

Whether in low-coverage or high-coverage settings, tackling quality of care must move beyond standard quality assurance measures at individual institutions. Systems need to be strengthened in terms of management and of technical and caring capacity, and levels of care should be connected and made accountable as a total system that provides the continuum of care. Panel 2 shows some of the issues that should be considered when scaling up quality of care.^{34–42}

Reluctance to use services

Women who remain outside of services even when they are accessible may do so for other reasons: costs of using services (paper four in this series), difficulties in getting to services (eg, finding transport, companions, and funds for associated costs), and absence of decision-making power (male head of household typically makes the final decision concerning type of care and provider especially if funds are required). Recognition of complications and gauging of their severity is part of that decision-making process and is the critical first step towards use of referral care for the mother, but recognition can be delayed because some complications are difficult to distinguish from normal childbirth.^{43–45} More specific to a particular locale are barriers grounded in traditional belief systems that influence birthing generally or affect interpretation of complications or illness.^{45,46} For example, in Bolivia, *sobreparto* is an illness similar to puerperal sepsis and well known locally. However, beliefs associated with its non-medical causes preclude use of medical health care. Social customs in an area might also influence women's internal barriers, such as shame. Few studies explore where or with whom women would actually like to deliver—the positive facilitators to use of services.⁴⁷

Interventions aimed at breaking down barriers at individual and community levels have shown some success: knowledge can be changed more quickly than corresponding behaviours.⁴⁵ Community-level efforts (eg, women's groups) have shown success in reducing mortality.⁴⁸ The types of barriers at these levels point to the need for both demand-side and supply-side interventions. Effectiveness trials are much needed even on small scale projects, and going to scale with such efforts remains a challenge.

Where services are not available: the absence of professional care

Where professional skilled care is not available, coverage gaps cannot be remedied without tackling major health system issues—increased supply of providers through training, provision of incentives for trained providers to live and provide services in places of need, upgrading of facilities and supply systems to ensure safe births, and

ensuring the management capacity, policies, and regulations to support the providers.

Shortfalls in professional skilled care providers

Worker density can affect maternal mortality rates.^{49,50} Yet the gap in human resources and supportive infrastructure for maternal health care is estimated to be large. The World Health Report 2005⁵¹ calculated that nearly three times the current number of professionals—about 700 000 more—are needed for full coverage of women during childbirth by 2030 (330 000 to increase the stock and 370 000 to make up for attrition). By 2015, 73% coverage could be achieved if 334 000 more health-care professionals were recruited. To support them, 24 000 birthing units, 27 000 doctors and technicians, and 11 000 maternity units within facilities would be needed. These estimates, based on new WHO benchmarks of the facilities and human resources that are needed to cover births with essential first level and back-up care in 75 countries,⁵ underscore the need to document the supply and geographic distribution of professional skilled care providers and their required supportive infrastructure.

One example of a national estimate of the sizeable shortfall in needed maternal health providers comes from India. With nearly a quarter of the world's annual births, India has shocking gaps between nationally recommended staffing norms and numbers actually available at post⁵² (figure 5). The ideal norm according to the Indian national situation is two obstetricians at each community health centre covering a 100 000 population, to enable daily 24-h care to be provided; the actual national norm, however, is one obstetrician at this level. Sanctioned posts (budgeted posts stipulated at state level) are fewer than the national norm. Although no data are available, specialists in position are anticipated to be at half the posted level, because they do not often live in rural areas and visit their hospital posts only intermittently. Similar assessments made for nurse midwives at community health centres and auxiliary nurse midwives at sub-centre level suggest

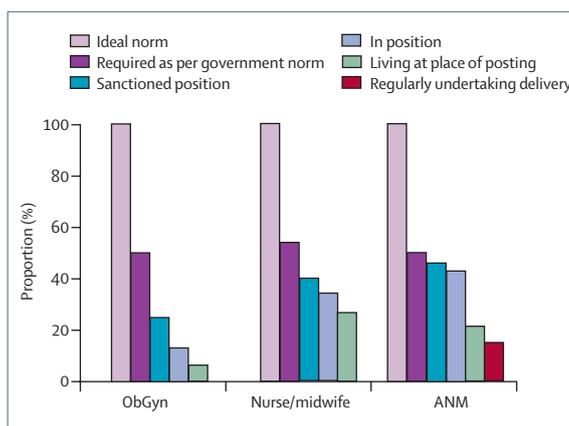


Figure 5: Gaps between ideal norms for maternal health professionals and actual proportion available and providing birthing care in rural India, 2004. ObGyn=Obstetrician or gynaecologist. ANMs=auxiliary nurse midwife.

that the availability of these critical health care providers in rural India was between 6% and 27% of the ideal norms for 2004.^{52,53} In Bangladesh, analysis of hospitals as functioning emergency obstetric care facilities shows that only 14% of subdistrict hospitals and 25% of district hospitals had a team of medical officers trained in obstetrics and anaesthesiology. That some qualified medical officers were posted in facilities not equipped for emergency obstetric care decreases these percentages even further.⁵⁴

Skilled providers require infrastructure support to practise their skills. But according to recent reports by the Averting Maternal Death and Disability project,^{55–59} the number of basic essential obstetric care facilities where normal deliveries should take place were less than 50% of the adequate number per head of population in nine of 14 countries according to UN recommended levels. Even though the numbers of back-up emergency care facilities with the capacity to deal with more life threatening emergencies have been assessed as adequate in most countries, several uncertainties surround this assessment, not least that the available facilities are not distributed within easy reach for many of their country's population. More seriously, the basis on which the UN originally set its levels for adequate coverage⁴ has now been challenged.^{60,61}

Thus the evidence from many developing countries with massive deprivation where maternal mortality is high suggests that the sheer absence of staff and facilities is the most substantial barrier to progress. The management teams that are needed to ensure expanded coverage are often simply not in place. In India, for example, despite policy commitment for reduction of maternal mortality at national level, only three technical managers focus on maternal health; at state level, directors of health services focus on multiple programmes. Technical officers have limited managerial powers and are burdened with much routine and non-technical administrative work. The poor quality and underuse of existing services, where they are available, is of secondary importance to the absence of supply and management capability in these contexts.

Constraints to progress where there is an absence of supply

Birth care requires skills and clinical judgment that come only with knowledge and practice. Questions that need to be addressed by policymakers include who to train and the time needed and the numbers of births to be managed during that time for students to reach proficiency in required skills.

Training to proficiency in midwifery implies months or years in a midwifery curriculum after basic education of 8–12 years, but the length of time is debatable. According to educators and midwifery students who participated in a survey of the International Confederation of Midwives,⁶² theory and clinical learning each require about a year. Part of the timing debate hinges on whether the person is entering the profession directly or is already a nurse. 2–3 years of training might be needed for direct-entry

candidates, whereas for those who have trained as nurses, 18 months or less might be enough, according to the International Confederation of Midwives.

But where use of skilled birth providers is low, rapid start-up to increase coverage can be hampered by limited facility-based deliveries, and absence of training instructors and training institutions. Each midwifery student should manage 40–50 births during training with supervision, yet countries with massive deprivation typically lack the number of facility-based births needed. Standards might be lowered to accommodate larger student numbers.

Posting choices include provider location (homes, health centres or hospitals with beds for normal deliveries, hospitals for referral deliveries), responsibilities (multipurpose versus dedicated, and basic tasks or life-saving tasks), and provision through teamwork or those working alone. Although many choices need to be made, decisions are typically based on: the present infrastructure, staffing, policies, and regulations; limits on public employment due to fiscal space and donor influence; and staff preferences and the influence of medical constituencies.

The norm is teams of providers in facilities to attend births, most often composed of a mix of professionals and non-professionals. Observations of normal deliveries in hospitals in Benin, Ecuador, Jamaica, and Rwanda report 50% of women in labour had three or more providers whereas paired providers were most common during intrapartum and postpartum phases for mothers and newborn babies.⁶³ In Indonesia, midwife assistants, typically nurses without midwifery training, extend the work of midwives during antenatal care by doing screening tests and assisting during delivery and postpartum visits.

The advantages of birthing teams in facilities are obvious: skilled providers can provide care for (or oversee) a larger number of patients simultaneously, and hours of work are regular. Midwives state that they much prefer facility-based birthing to home births because they feel they are in charge of facility-based births: they can ensure safety, cleanliness, and availability of supplies, accommodate other work, facilitate referrals more easily, and call on clinical colleagues and emergency transport if needed.⁶⁴

By contrast with facility-based births, home births are typically attended by a single provider. In a rural Bangladesh project, a home-based birthing strategy with midwives was followed by a facility-based approach during 15 years. In the homes, families took charge, encouraging cultural norms such as injections to hasten delivery, or refusing referrals and questioning the credibility of the midwife. Midwives felt a lack of control over their time, space, and safety, especially at night.⁶⁴

Regulations concerning what midwives, nurses and community providers can provide to save lives are important, especially where solo workers and long distances from referral sites are the norm. Delegation of responsibility to professional providers to give safe quality care beyond the traditional scope of their specialty has

succeeded through policy plus competency-based training. In Mozambique, assistant medical officers trained in surgery in a 3-year course were able to provide caesarean sections as safely as specialists; complication and mortality rates for the surgical patients of medical assistants were extremely low.⁶⁵ However, many of these assumed reasons for less skilled providers can be challenged, and whether scaling up can be achieved more rapidly with a less skilled workforce is unclear.

Retention of providers is a major part of the supply problem. Marked migration is seen in several sub-Saharan countries including Nigeria, South Africa, and Zimbabwe. Annual outflow of registered nurses to the UK from Ghana increased six times during the 5 years before 2003.⁶⁶ Difficulties in retention of health staff are compounded by the HIV/AIDS epidemic. As many as 50% of deaths in government employees in Africa are estimated to be caused by HIV/AIDS.⁶⁷ In Malawi, death is the most substantial cause of losses in terms of provider numbers,⁶⁸ with the highest death rates in the nursing and midwifery cadres.

Poor distribution of resources compounds this problem. In south and southeast Asia, rural postings go unfilled for reasons of inadequate income, low prestige, poor rural infrastructure for children, and social isolation. Indonesia tried to compensate village midwives with a subsidy scheme with public funds for the midwives' first years to allow establishment of themselves as individual entrepreneurs in rural areas. Since fertility is low, income from families for attendance of births has not been able to sustain most village midwives. Therefore attrition from public-sector posts has been about 20% per year in the past few years.

Retention of workers, especially in the poorest countries, is now a matter of global concern. The call for global oversight for responsible migration policies will require major resources to counter the present momentum of emigration of qualified personnel.^{49,69} At a more local level, government attempts to address poor distribution with bonds on clinical graduates to work in rural areas or incentives for remote postings have achieved only minor success, since transfers are easily purchased in many countries, and the rural shortfall in professional care described results.

Options for increasing coverage where supply is constrained

Since improved training, deployment, and retention are crucial tools with which to break through the supply barrier, what are the configurations of care that have the most potential to extend coverage rapidly? In settings with massive deprivation, less-skilled providers are often chosen to increase coverage of births. Such providers might be more attractive than fully skilled professional workers because they provide value for money (they are cheaper to train both in terms of the theoretical training investment and the practical component); they have low maintenance costs because

Panel 3: Options for training of birth attendants in areas of massive deprivation

- 1 Train multipurpose community workers in midwifery (midwife assistants) for 6 months to work solo with home deliveries. Midwife assistants should link women with back-up care. On the basis of data for Bangladesh, such workers attend about 20 deliveries per year.
- 2 Train single-purpose community workers in midwifery (midwife assistants) for about 6 months to provide home deliveries. On the basis of data from Indonesia, dedicated home-birth providers could attend about 50 deliveries per year.
- 3 Concurrently improve district maternal health systems including district hospital maternity wards staffed with midwives and doctors with obstetric skills as well as support staff. WHO proposes a birthing centre with ten midwives in a hospital, plus other birthing facilities with approximately ten more midwives per 120 000 inhabitants.⁵¹ Based on data from 87 hospitals in African non-governmental organisations, each midwife in such a facility could attend about 175 births a year.⁷⁰
- 4 Similar to option three, but each midwife attends about 220 births a year, based on observational data from African hospitals.²⁸
- 5 Mix teams to include one midwife for every two midwife assistants who together attend 175 births a year per midwife and per midwife assistant.
- 6 Mix teams to include one midwife for every two midwife assistants who together attend 220 births a year per midwife and per midwife assistant.

their salaries are lower than those of more skilled providers, although they do need supervision and continuing education; they are easier to recruit, because of fewer educational criteria (they also might not be attracted or attractive for other training or employment); they are easier to retain because they have fewer other opportunities; and they are more acceptable to women than are more skilled providers, because of less cultural distance from the women whom they serve. However, all these assumptions about the advantages of less skilled workers can be challenged: not least their potential to increase coverage of births.

To test whether birth attendants trained for a shorter time (called here midwife assistants) versus those trained for longer (midwives) actually achieve higher coverage during 10 years, we modelled six possible scenarios based on data from Bangladesh for population, births per year, and training capacity. Bangladesh is an example of extreme deprivation, with only 13% use of skilled birth providers in the years 2001–2003.⁷⁰ Variables include training time (6 vs 18 months) and posting site (home vs facility). We anticipated that those who work in the home work solo, and those who work in facilities work in teams. Attrition was set at 10% a year; a conservative rate in view of the public sector attrition rate reported in Indonesia. The options are shown in panel 3.^{28,51,71}

The team composition and size in models five and six, shown in panel 3, are not known. To a large extent, team composition will depend on the geographic dispersion of the population, and the infrastructure and resources available. It is anticipated that three to four midwives together in a team with double the number of midwife assistants is the minimum to allow for 24-h coverage 7 days a week.

To improve use of skilled birthing care, these options can be complemented by initiatives that aim to strengthen individual, family, and community behaviours, both in terms of self-care and improved care seeking.

During the 10 years from 2005 to 2015, increased coverage is dependent on the numbers of births attended per provider per year (figure 6). The key to increasing the numbers of births per provider is a deployment choice: working in a facility in a team allows midwives to attend far more births than would be the case if working solo attending home deliveries. A mixed team with fully trained midwives together with midwife assistants achieves greater coverage faster than would be the case with deployment of solo workers or teams with fully trained midwives only, because more teams with this composition can be produced faster than teams of midwives only and can attend more childbirths than could a solo worker. Facility-based birthing with mixed teams increases coverage over 10 years to between 32% and 40% of births compared with a solo midwife assistant, either multipurpose (gain of 5% coverage) or dedicated (gain of 10%) attending deliveries in the home. Even if the training output were doubled (the Bangladesh training capacity allows 1000 trainees a year), these percentages would only double—meaning the facility-based teams still would attend far more births than individual providers providing home births. Staff retention greatly influences the coverage that can be provided. If the loss per year were 5% instead of 10%, coverage rates could be increased by more than 25%.

Facility-based birthing is more efficient than can home birth. Costs to the health system for provision of delivery care at home or at a health centre are dependent on the caseload: if facility caseloads are greater than those of home-based staff, facility-based care becomes less expensive

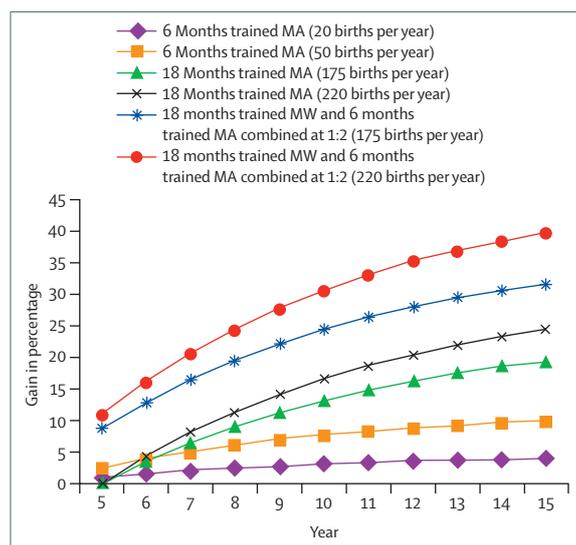


Figure 6: Potential gain in percentage of skilled care at delivery under six scale up options: 2005–15

MW=midwife. MA=midwife assistant.

than even home deliveries (in rural Bangladesh the break point was 136 births a year in a health centre) (Borghi J, Sabina N, Ronsmans C, Hoque E, Killewo J, personal communication). Costs to the Bangladeshi families are about the same for a birth with a midwife at home or at a health centre—less than 10% of the husband's monthly salary. By contrast, normal deliveries at a hospital cost between 2 and 3 months of the husband's yearly income.⁷²

Conclusions

A new era of strategic thinking for maternal and neonatal health should start with a realistic assessment of present care coverage, and move forward by understanding the supply constraints that have blocked progress in developing countries for 20 years. Nowadays, only half the world's women receive care from a skilled professional when giving birth—and they might not receive the quality of care they need. Even fewer women receive the full package of care from pregnancy to the end of the postpartum period. For those who are able to access care, the message is clear: women all need protection, standards need to be improved, care must be respectful, and the health personnel who attend them need to be remunerated and managed properly if they are to remain in service. These principles apply equally in countries in which only a few women are able to access care as in countries where almost all do so: high coverage countries with large proportions of hospital births do not have a monopoly on poor care and exploitation.

For those who do not access care, the argument that services are available to meet their needs but are underused because of reluctance on the part of women is unlikely in countries where mortality rates are high. Available data from such countries show that even given the most possible productivity on the part of existing providers, almost all women cannot possibly be attended at childbirth, let alone be provided with the full essential package of care from pregnancy to the postpartum period. In countries of marginal exclusion, in which only some poor people are excluded from using services, the issues are qualitatively different. For marginal exclusion, the solutions are in expansion of infrastructures that are already established, elimination of barriers to care, targeting of underserved groups, and ensuring financial protection. But the challenge of safe motherhood mainly lies in countries with massive deprivation. The constraint is undersupply and the solution required is scaling up as soon as it can possibly be achieved.

Scaling up is commonly seen in technical terms in view of the dilemmas that need to be addressed, such as choosing home or facility care, training time for professional cadres, or deciding whether to focus on emergency care at the expense of first-level midwifery care. Many of these debates are difficult to solve because no evidence is available to clarify the issues. Use of coverage rates for a projected period as the primary driving force allows the solution to become clearer:

facility-based births with skilled midwives and assistants working under their supervision can effectively increase the number and proportion of women with professionally assisted births. The poor coverage of workers, community or professional, based at community level for home birthing will not rise rapidly to high coverage in countries where the needs are the greatest. Similarly the debate of short versus long training times (6 months vs 18 months) pales beside the selection of where birthing care is provided.

In view of the resources required, scaling up moves the debate from the technical to the political arena. Safe motherhood advocates need to free themselves from the distractions of technical argumentation and, realising the size of the task to be tackled, begin to understand that the true constraints to scaling up are political. Politically, the problem of scaling up looks very different. Political solutions emphasise the speed and visibility of results, affordability, buy-in of professional groups, and the importance of existing hierarchies and structures, however fragile. Political solutions also take into account the views and demands of the electorate. Safe motherhood advocates might not like this, but the strategies that they promote are unlikely to succeed unless political concerns are acknowledged and addressed. All this pleads in favour of professional skilled care provided in facilities. In short there is very little benefit in finding cut-down solutions.

Conflict of interest statement

We declare that we have no conflict of interest.

The Lancet Maternal Survival Series steering group

Carine Ronsmans, Jo Borghi, Oona Campbell, Veronique Filippi, Wendy Graham, Marge Koblinsky, Anne Mills.

Acknowledgments

We thank Ardi Kaptiningsih of the WHO South East Asia Regional Office and Vincent Fauveau of the UN Population Fund for their rigorous and insightful review of this paper; all the participants at the maternal survival series review meeting in Geneva for helpful comments; and Diana Beck, Sandy Tebben Buffington, Lynn Sibley for their substantial contribution to the paper either through reviews or information. Additional work for the series was supported directly by the UK Department for International Development through a grant to the London School of Hygiene and Tropical Medicine, by the US Agency for International Development, and by the Initiative for Maternal Mortality Programme Assessment (funded by the Bill and Melinda Gates Foundation, the Department for International Development, the European Commission and the US Agency for International Development). The funding sources did not influence the content of this article, and have no responsibility for the information provided or views expressed in this paper.

References

- 1 Stanton C, Blanc AK, Croft T, Choi Y. Skilled care at birth in the developing world: progress to date and strategies for expanding coverage. *J Biosoc Sci* 2006; 1–12.
- 2 UN. World population prospects: the 2004 revision: population database. New York: United Nations Population Division, 2004.
- 3 Stanton CK, Holtz SA. Levels and trends in cesarean birth in the developing world. *Stud Fam Plann* March 2006; 37: 41.
- 4 WHO/UNICEF/UNFPA. Guidelines for monitoring the availability and use of obstetric services. New York: United Nations Children's Fund, 1997.
- 5 WHO. The World Health Report 2005: make every mother and child count: policy brief one: integrating maternal newborn and child health programmes. Geneva: World Health Organization, 2005.
- 6 Potter J, Berquo E, Perpetuo IH, et al. Unwanted caesarean sections among public and private patients in Brazil: prospective study. *BMJ* 2001; 323: 1155–58.
- 7 Khawaja M, Kabakian-Khasholian T, Jurdi R. Determinants of caesarean section in Egypt: evidence from the demographic and health survey. *Health Policy* 2004; 69: 273–81.
- 8 Sloan N, Pinto E, Calle A, Langer A, Winikoff B, Fassihian G. Reduction of the cesarean delivery rate in Ecuador. *Int J Gynaecol Obstet* 2000; 69: 229–36.
- 9 Flamm B, Berwick DM, Kabcenell A. Reducing cesarean section rates safely: lessons from a breakthrough series collaborative. *Birth* 1998; 25: 117–24.
- 10 Notzon F, Cnattingius S, Bergsjö P, et al. Cesarean section delivery in the 1980s: international comparison by indication. *Am J Obstet Gynecol* 1994; 170: 495–504.
- 11 Belghiti A, De Brouwere V, Kegels G, Van Lerberghe W. Monitoring unmet obstetric need at district level in Morocco. *Trop Med Int Health* 1998; 3: 584–91.
- 12 Ronsmans C, De Brouwere V, Dubourg D, Dieltiens G. Measuring the need for life-saving obstetric surgery in developing countries. *Br J Obstet Gynaecol* 2004; 111: 1027–30.
- 13 AbouZahr C, Wardlaw T. Antenatal care in developing countries. Promises, achievements and missed opportunities: an analysis of trends, levels and differentials 1990–2001. Geneva: World Health Organization, UN Children's Fund, 2003.
- 14 Somanathan A, Equitap partners. Socio-economic differences in maternal and child health care outcomes in Asia (Equitap Working Paper #9), 2005.
- 15 Gwatkin D, Rutstein S, Johnson P, Suliman EA, Wagstaff A. Initial country-level information about socioeconomic differences in health, nutrition, and population. Washington: World Bank, 2000.
- 16 The World Bank. Poverty and health: tables and figures. <http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTHEALTHNUTRITIONANDPOPULATION/EXTPAH/0,,contentMDK:20219054~menuPK:400482~pagePK:148956~piPK:216618~theSitePK:400476,00.html> (accessed Sept 6, 2006).
- 17 Gbangbade S, Harvey SA, Edson W, Burkhalter B, Antonakos C. Safe motherhood studies: results from Benin. Bethesda: Quality Assurance Project, 2003.
- 18 McCaw-Binns A, Burkhalter B, Edson W, Harvey SA, Antonakos C. Safe motherhood studies: results from Jamaica. Bethesda: Quality Assurance Project, 2004.
- 19 Harvey S, Ayabaca P, Bucagu M, et al. Skilled birth attendant competence: an initial assessment in four countries, and implications for the safe motherhood movement. *Int J Gynaecol Obstet* 2004; 87: 203–10.
- 20 Boucar M, Bucagu M, Djibrira S. Safe motherhood studies: results from Rwanda. Bethesda: Quality Assurance Project, 2004.
- 21 Hussein J, Bell J, Nazzar A, Abbey M, Adjei S, Graham WJ. The skilled attendance index (SAI): proposal for a new measure of skilled attendance at delivery. *Reprod Health Matters* 2004; 12: 160–70.
- 22 Delvaux T, Ake O, Diarra J, Ronsmans C. Quality of maternity services before the implementation of prevention of HIV mother-to-child transmission in Côte d'Ivoire. Tours: International Union for the Scientific Study of Population, 2005.
- 23 Miller S, Cordero M, Coleman A, et al. Quality of care in institutionalized deliveries: the paradox of the Dominican Republic. *Int J Gynaecol Obstet* 2003; 82: 89–103.
- 24 Gohou V, Ronsmans C, Kacou L, Yao K, Bacci A, Filippi V. Responsiveness to life-threatening obstetric emergencies in two hospitals in Abidjan, Cote d'Ivoire. *Trop Med Int Health* 2004; 9: 406–15.
- 25 McCaw-Binns A. Jamaica 1991–1995. In: Koblinsky M, ed. Reducing maternal mortality: learning from Bolivia, China, Egypt, Honduras, Indonesia, Jamaica, and Zimbabwe, Vol 1. Washington, DC: World Bank, 2003.
- 26 Bradby B. Like a video: the sexualization of childbirth in Bolivia. *Reprod Health Matters* 1998; 6: 50–56.
- 27 D'Oliveira A, Diniz SG, Schraiber LB. Violence against women in health-care institutions: an emerging problem. *Lancet* 2002; 359: 1681–85.

- 28 Jaffre Y, De Sardan O. Une medecine inhospitaliere: les difficiles relations entre soignants et soignes dans cinq capitales d'Afrique de l'ouest. Paris: Karthala and Marseilles, 2004.
- 29 Harvey S, Ayala GF, Bermeo PH. Reframing authoritative knowledge about childbirth in Ecuador. 104th annual meeting of the American Anthropological Association 2005.
- 30 Kabakian-Khasholian T, Campbell O, Shediak-Rizkallah M. Women's experiences of maternity care: satisfaction or passivity? *Soc Sci Med* 2000; **51**: 103–13.
- 31 Jahn A, De Brouwere V. Referral in pregnancy and childbirth: concepts and strategies. In: Van Lerberghe W, Kegels G, De Brouwere V, eds. Safe motherhood strategies: a review of the evidence. Antwerp: ITG Press, 2001: 229–46.
- 32 Murray S, Davies S, Kumwenda Phiri R, et al. Tools for monitoring the effectiveness of district maternity referral systems. *Health Policy Plann* 2001; **16**: 353–61.
- 33 Krasovac K. Auxiliary technologies related to transport and communication for obstetric emergencies. *Int J Gynaecol Obstet* 2004; **85**: 14–23.
- 34 Chartered Institute of Personnel and Development. Sustaining success in difficult times: research summary. London: Chartered Institute of Personnel and Development, 2002.
- 35 Global Health Trust. The JLI strategy report: Human Resources for Health: overcoming the crisis. Cambridge, MA: Global Health Trust, 2004.
- 36 Hargadon J, Plsek P. Complexity and health workforce issues. Working paper: Joint Learning Initiative, 2004: 1–24.
- 37 Davis D, O'Brien MA, Freemantle N, Wolf FM, Mazmanian P, Taylor-Vaisey A. Impact of formal continuing medical education: do conferences, workshops, rounds, and other traditional continuing education activities change physician behavior or health care outcomes? *JAMA* 1999; **282**: 867–74.
- 38 Mazmanian PE, Davis DA. Continuing medical education and the physician as a learner: guide to the evidence. *JAMA* 2002; **288**: 1057–60.
- 39 Rowe AK, de Savigny D, Lanata CF, Victora CG. How can we achieve and maintain high-quality performance of health workers in low-resource settings? *Lancet* 2005; **366**: 1026–35.
- 40 Marshall MN, Shekelle PG, Leatherman S, Brook RH. The public release of performance data: what do we expect to gain? A review of the evidence. *JAMA* 2000; **283**: 1866–74.
- 41 Dieleman M, Toonen J, Toure H, Martineau T. The match between motivation and performance management of health sector workers in Mali. *Hum Resour Health* 2006; **4**: 2.
- 42 Clarke HF, Laschinger HS, Giovannetti P, Shamian J, Thomson D, Tourangeau A. Nursing shortages: workplace environments are essential to the solution. *Hosp Q* 2001; **4**: 50–7.
- 43 Nachbar N. Report on the use of the community diagnosis to explore safe motherhood: a two-country comparison and methodological critique. Washington DC: MotherCare, 1996.
- 44 Afsana K and Rashid SF. The challenges of meeting rural Bangladeshi women's needs in delivery care. *Reprod Health Matters* 2001; **9**: 79–89.
- 45 Kureshy N. Review of select family & community practices for safe motherhood. Washington DC and Geneva: MotherCare, World Health Organization, 2000.
- 46 Moore M, Copeland R, Chege I, et al. A behaviour change approach to investigating factors influencing women's use of skilled care in Homa Bay District, Kenya. Washington DC: Change Project, 2002.
- 47 Kabakian-Khasholian T, Campbell O, Shediak-Rizkallah M, et al. Women's experiences of maternity care: satisfaction or passivity? *Soc Sci Med* 2000; **51**: 103–13.
- 48 Manandhar D, Osrin D, Shrestha B, et al. Effect of a participatory intervention with women's groups on birth outcomes in Nepal: cluster-randomised controlled trial. *Lancet* 2004; **364**: 970–79.
- 49 WHO. The World Health Report: working together for health. Geneva: World Health Organization, 2006.
- 50 Anand S, Bärnighausen T. Human resources and health outcomes: cross country econometric study. *Lancet* 2004; **364**: 1603–09.
- 51 WHO. The World Health Report: make every mother and child count. Geneva: World Health Organization, 2005.
- 52 Directorate General of Health and Family Welfare. Health information of India, 2004. New Delhi: Central Bureau of Health Intelligence, Directorate General of Health and Family Welfare, Government of India, 2004.
- 53 National Commission on Macroeconomics and Health and Family Welfare. Report of the National Commission on Macroeconomics and Health: section III: building a health system for improving health in India: the way forward. New Delhi: Government of India, 2005: 99.
- 54 Management Information System: Health, Human resources and EmOC performances. Voice of MIS-Health, Newsletter 1. In: DG Health Services. Ministry of Health and Family Welfare, ed: Directorate General of Health Services, 2005.
- 55 Averting Maternal Death and Disability project Working Group on Indicators. Using UN process indicators to assess needs in emergency obstetric services: Morocco, Nicaragua and Sri Lanka. *Int J Gynaecol Obstet* 2002; **80**: 222–30.
- 56 AMDD Working Group on Indicators. Using UN process indicators to assess needs in emergency obstetric services: Bhutan, Cameroon and Rajasthan, India. *Int J Gynaecol Obstet* 2002; **7**: 277–84.
- 57 AMDD Working Group on Indicators. Using UN process indicators to assess needs in emergency obstetric services: Niger, Rwanda and Tanzania. *Int J Gynaecol Obstet* 2003; **83**: 112–20.
- 58 AMDD Working Group on Indicators. Using UN process indicators to assess needs in emergency obstetric services: Benin and Chad. *Int J Gynaecol Obstet* 2004; **86**: 110–20.
- 59 Bailey P. Using UN process indicators to assess needs in emergency obstetric services: Bolivia, El Salvador and Honduras. *Int J Gynaecol Obstet* 2005; **89**: 221–30.
- 60 Gay J, Hardee K, Judice N, et al. What works: a policy and program guide to the evidence on family planning, safe motherhood, and STI/HIV/AIDS interventions. Washington, DC: Policy Project, 2003.
- 61 Koblinsky M, Campbell O. Factors affecting the reduction of maternal mortality. In: Koblinsky M, ed. Reducing maternal mortality: learning from Bolivia, China, Egypt, Honduras, Indonesia, Jamaica, and Zimbabwe, Vol 1. Washington, DC: World Bank, 2003.
- 62 Fullerton J, Severino R, Brogan K, Thompson J. The International Confederation of Midwives' study of essential competencies of midwifery practice. *Midwifery* 2003; **19**: 174–90.
- 63 Jenning L, Burkhalter B. Comparison of two data collection methods for determining the number and identity of all providers attending during normal labor and delivery: results from Benin, Ecuador, Jamaica, and Rwanda. Bethesda: Quality Assurance Project, US Agency for International Development, 2005.
- 64 Blum LS, Sharmin T, Ronsmans C. Attending home vs clinic-based deliveries: perspectives of skilled birth attendants in Matlab, Bangladesh. *Reprod Health Matters* 2006; **14**: 51–60.
- 65 Vaz F, Bergstroëm S, da Luz Vaz M, Langa J, Bugalhos A. Training medical assistants for surgery. *Bull World Health Organ* 1999; **77**: 688–91.
- 66 Buchan and Calman. The global shortage of registered nurses: an overview of issues and actions. Geneva: International Council of Nurses, 2004.
- 67 Tawfik L, Kinoti SN. The impact of HIV/AIDS on the health sector in sub Saharan Africa: the issue of human resources. Washington DC: Support for Analysis and Research in Africa Project, US Agency for International Development, 2001.
- 68 Malawi Ministry of Health and Population. Malawi National Health Plan: health sector human resource plan 1999-2004. In: Ministry of Health and Population Government of Malawi. Ministry of Health and Population, Government of Malawi, 1999.
- 69 Chen L, Evans T, Anand S, et al. Human resources for health: overcoming the crisis. *Lancet* 2004; **364**: 1984–90.
- 70 National Institute of Population Research and Training. Bangladesh demographic health survey 2004. Dhaka, Calverton, Maryland: National Institute of Population Research and Training, Mitra & Associates, and ORC Macro, 2005.
- 71 Van Lerberghe W, Van Balen H. Typologie et performances des hopitaux de premier recourse en Afrique sub-Saharienne. Antwerp: Institute de Medicini Tropical, 1992.
- 72 Borghi J, Sabina N, Blum LS, Hoque E, Ronsmans C. Household costs of health care during pregnancy: a case study from Matlab, Bangladesh. *J Health Popul Nutr* (in press).