Midwifery 3

Country experience with strengthening of health systems and deployment of midwives in countries with high maternal mortality

Wim Van Lerberghe, Zoe Matthews, Endang Achadi, Chiara Ancona, James Campbell, Amos Channon, Luc de Bernis, Vincent De Brouwere, Vincent Fauveau, Helga Fogstad, Marge Koblinsky, Jerker Liljestrand, Abdelhay Mechbal, Susan F Murray, Tung Rathavay, Helen Rehr, Fabienne Richard, Petra ten Hoope-Bender, Sabera Turkmani

This paper complements the other papers in the *Lancet* Series on midwifery by documenting the experience of low-income and middle-income countries that deployed midwives as one of the core constituents of their strategy to improve maternal and newborn health. It examines the constellation of various diverse health-system strengthening interventions deployed by Burkina Faso, Cambodia, Indonesia, and Morocco, among which the scaling up of the pre-service education of midwives was only one element. Efforts in health system strengthening in these countries have been characterised by: expansion of the network of health facilities with increased uptake of facility birthing, scaling up of the production of midwives, reduction of financial barriers, and late attention for improving the quality of care. Overmedicalisation and respectful woman-centred care have received little or no attention.

Lancet 2014; 384: 1215–25

Published Online June 23, 2014 http://dx.doi.org/10.1016/S0140-6736(14)60919-3

See Comment page 1169

See Perspectives page 1178

This is the third in a Series of four papers about midwifery

Center for Family Welfare, Faculty of Public Health University of Indonesia, Depok, West Java, Indonesia (E Achadi DrPH); **Brussels, Belgium** (C Ancona MD); **Instituto de Cooperación Social Integrare, Barcelona, Spain** (J Campbell MPH, P ten Hoope-Bender MBA); **Department of Social Statistics and Demography, University of Southampton, Southampton, UK** (A R Channon PhD); **UN Population Fund, Geneva, Switzerland** (L de Bernis MD); **Holistic Santé, Montpellier, France** (V Fauveau PhD); **Woman & Child Health Research Centre, Institute of Tropical Medicine, Antwerp, Belgium** (Prof V De Brouwere, PhD);

Introduction

To argue that strengthening health systems makes the difference between successes and reversals in maternal and newborn health has become a cliché.[1–14] This consensus contrasts with the paucity of empirical documentation of the long-term efforts to adapt and strengthen health systems in support of maternal and newborn health.

Of the low-income and middle-income countries with currently more than 5 million inhabitants, 48 had a maternal mortality ratio of 200 per 100 000 livebirths or more in 1990 (Afghanistan, Angola, Bangladesh, Benin, Bolivia, Burkina Faso, Burundi, Cambodia, Cameroon, Chad, Côte d'Ivoire, Democratic Republic of the Congo, Dominican Republic, Eritrea, Ethiopia, Ghana, Guatemala, Guinea, Haiti, Honduras, India, Indonesia, Kenya, Lao, Madagascar, Malawi, Mali, Morocco, Mozambique, Myanmar, Nepal, Niger, Nigeria, Pakistan, Papua New Guinea, Peru, Rwanda, Senegal, Sierra Leone, Somalia, South Sudan, Sudan, Tanzania, Togo, Uganda, Yemen, Zambia, and Zimbabwe). 21 of these 48 countries reduced this maternal mortality ratio by at least 2·5% per year between 1990 and 2000, and again between 2000 and 2010,[15] a median drop in maternal mortality ratio of 63% over 20 years (appendix p 15).[16–26] These 21 countries are all either on track or making good progress towards Millennium Development Goal 5;[15] in many of the other countries the hoped for 75% drop in maternal mortality[15] is unlikely to have occurred before 2015.

These 21 countries made substantial efforts to enhance uptake of health services. Where data were available, they showed substantial increases in facility birthing (figure 1A). This increase in facility birthing contrasts with the slower or no progress made by 17 countries without a sustained or rapid reduction in maternal mortality ratio, for which sequential data on facility birthing were available (figure 1B). Five of those countries made slow but steady gains in facility birthing (Haiti, Honduras, Mali, Senegal, and Uganda). Three experienced drops in mortality from a high baseline, with little progress in facility-birthing (Chad, Nigeria, and Niger). Finally, the remaining nine countries made little or no progress or had a reversal in either maternal mortality ratio or facility birthing.

The evolution of the proportion of births attended by a midwife, auxiliary midwife, or nurse-midwife was documented in 15 of the 21 countries with sustained improvement in maternal mortality ratio: in four (Bangladesh, Bolivia, India, and Pakistan), although professional care at birth has increased, the proportion of births attended by a midwife, auxiliary midwife, or nurse-midwife has decreased in favour of those attended by medical doctors. In Burkina Faso, Cambodia, Indonesia, Malawi, Morocco, and Nepal, and to a lesser extent in

Key messages

- Effective coverage in the countries reviewed has crucially depended on the investment in the overall service delivery network and facility birthing. The expansion of the service network has kickstarted a virtuous cycle of uptake of care by mothers, deployment of midwives to both meet and generate increased demand, pressure to lift financial barriers and further uptake of maternal care.
- Attention for quality of care in the countries reviewed has taken off only when uptake of care had already substantially increased. Until very recent years they have given little or no attention to what midwives and doctors can do to curb overmedicalisation and promote respectful woman-centred care.
- The deployment of midwives in the countries reviewed has been the result of managerial choices to accelerate and operationalise universal access to care. Endorsement in the national political arena came only later in the process, once appreciation by the population of the successful deployment of midwives became apparent and civil society more vocal and assertive.

Norad Oslo, Norway (H Fogstad MHA); **US Agency for International Development, Washington DC, USA** (M Koblinsky PhD); **Lund University, Sweden** (J Liljestrand PhD); **Evidence for Action, University of Southampton, Southampton UK** (Prof Z Matthews PhD); **Rabat, Morocco** (A Mechbal MPH); **International Development Institute, King's College London, London, UK** (S F Murray PhD); **Evidence for Action, London, UK** (H Rehr MSc); **Institute of Tropical Medicine, Antwerp,**

Bangladesh and Eritrea, this proportion has increased (figure 2).

As a complement to the other papers[28,29] in this Series about midwifery, this paper documents the constellation of health-system efforts in support of maternal and newborn health in four of these 21 countries: Burkina Faso, Cambodia, Indonesia, and Morocco. These four countries have shown sustained and substantial reduction of maternal and newborn mortality while deploying midwives as a core constituent of their strategy (appendix p 1–14). These countries have shown gains in facility birthing in every wealth asset quintile (figure 3A) and the proportion of births attended by a midwife, auxiliary midwife, or nurse midwife has increased in the four lowest quintiles (Cambodia, Indonesia, and Morocco) or in all five quintiles (Burkina Faso; figure 3B).

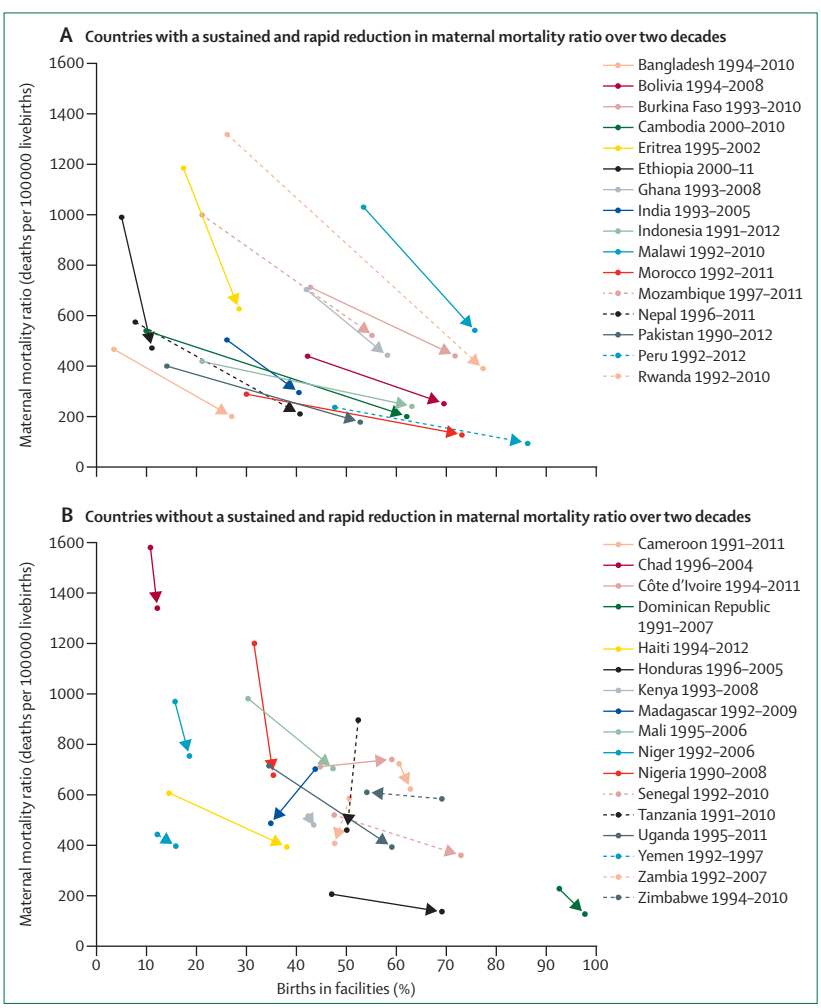

Figure 1: **Change in maternal mortality ratio and proportion of facility births since the 1990s**
(A) Countries with a sustained and rapid reduction of maternal mortality ratio over two decades. This graph shows 16 countries with data; time series data were not available for five other countries (Lao, Myanmar, Papua New Guinea, South Sudan, and Sudan) with a sustained reduction of maternal mortality ratio over two decades. (B) Countries without a sustained and rapid reduction of maternal mortality ratio over two decades. This graph shows 17 countries with data; time series data were not available for ten other countries (Benin, Guatemala, Guinea, Sierra Leone, Tanzania, Togo, Uganda, Yemen, Zambia, Zimbabwe) with a non-rapid sustained reduction in maternal mortality ratio over two decades. Source of data for health facility births: DHS surveys. Data for reduction in maternal mortality ratio: WHO, UNICEF, UNFPA, World Bank 2014.[27]

Methods and data limitations

Burkina Faso, Cambodia, Indonesia, and Morocco were selected as countries for three reasons: they have shown two decades of reduction of maternal and neonatal mortality (appendix pp 15–17); they have started up or accelerated investment in cadres of midwives; and accounts by expert witnesses and documented evidence permit a credible reconstruction of the pathways of the efforts in health systems strengthening in support of maternal health services over the past 20–25 years. The appendix (p 15) summarises how data availability has constrained the selection of countries for in-depth study. We triangulated interviews with key informants and expert witnesses with documentation obtained through a structured literature search across a range of electronic databases, complemented by documentation obtained through the country-specific key informants and ministry of health sources.

For every country, we identified specific interventions in health system strengthening relevant to the deployment of midwives and maternal health and iteratively validated them through the literature review and interviews with key informants. We collated and assessed available information on progress with maternal and newborn outcomes against the aspirational quality maternal and newborn health framework.[1] Interviews with the expert-informants related outcomes to efforts in health system strengthening in three linked layers. First, we mapped efforts to enhance the effectiveness of coverage and examined plausible links with outcomes. Second, we identified the efforts to enhance coverage through improved access and uptake of services. Third, we examined the initiatives to improve steering or governance and resource allocation (focusing on availability of information and research, evidence of priority setting, and budgeting) as to their contribution to improved access and effective coverage, with specific attention for the role of domestic political leadership and the sensitivity of external aid to the maternal and newborn health agenda. We gave particular attention to ascertaining the time sequence of these efforts and initiatives.

Extrapolation from individual country experience is hazardous and complicated by the paucity, poor precision, and, at times, contradictions in the data for some years in the period of interest. This issue is compounded by the leaps of faith required to link decades of health system initiatives plausibly to outcomes. Even an in-depth review of sources and documentation inevitably leaves gaps in the reconstitution of the sequence of events.

Data on the decline of maternal mortality—crucial for assessing outcomes—have to be interpreted with some caution. We have used the 2013 WHO/UNFPA/UNICEF/World Bank estimations for decadal change.[27] These are modelled from censuses and surveys, adjusted for under-reporting and misclassification, and finally combined with best-estimate-envelopes of birth and death totals from

WHO/UN databases. They are in line with modelled estimates published in 2012,[15] but diverge substantially from other recently published modeled estimates.[30] Although systematic modelling might provide for more robust estimates of aggregate trends and inter-country comparison, the analysis of individual trajectories over a timespan can be problematic. For example, Cambodia's spectacular acceleration in the decline of maternal mortality ratio after 2005 shown by the direct survey data is smoothed out in the modelled estimates. In Indonesia, recent measurements are above the smoothed modelled trend estimates, whereas in Morocco a large recent multiround survey has generated robust measurements that are lower than the modelled estimates.

Where some data for the evolution of neonatal mortality are available, the story is usually incomplete for stillbirths. Information about morbidity is anecdotal at best, as is information about unsafe abortion, an important cause of maternal mortality. The social outcomes to which better maternal and newborn health care is expected to contribute (social integration, gender equity, women's autonomy and participation) are poorly documented and difficult to attribute to programme performance, as are the contextual elements that influence health decision making and uptake of care: the capabilities of women in a modernising society to make use of the opportunities offered by improved transport, mobile phones, audio-visual information, and education.

Reconstruction of trends in programme output is equally precarious. What is "skilled attendance" and even what is understood by the categories of "nurse-midwife" or "auxiliary midwife" used in the Demographic and Health Survey (DHS) questionnaires varies from one country to the other and over time—and so does the range, effectiveness, and quality of services provided.[31–33] For all the standardisation of the DHS surveys, "facility birthing" covers very different realities, from a midwife's home in an isolated village to well equipped specialised hospitals. By contrast with antenatal care, metrics of quality of birthing care or access to referral care are not readily available in ways that allow for comparison across countries or across time. Metrics to assess trends over time in compassionate and respectful care do not currently exist. Policy and systems interventions are rarely systematically documented, and few key informants can claim objectivity and continuity of memory for the whole period. Past events might be rationalised selectively, underestimating serendipity. Inference about the relative contribution of specific health system efforts is thus tentative at best and requires careful triangulation.

Commonalities and lessons

Creation of a virtuous cycle of access, uptake, and effective coverage

Despite these limitations it has been possible to reconstitute how countries deployed a collection of partly connected initiatives and measures to adapt to and improve on a changing environment, where strategies emerged and self-organised over time, rather than as implementations of a predefined comprehensive plan. The appendix maps the multiple measures that have contributed to making coverage more effective, access and uptake more universal, and steering and resource mobilisation more purposeful. Rather than relying on a magic bullet, each of the four case-study countries has intervened at various levels in the health-care system, innovating or adapting policies, procedures and approaches as obstacles were encountered. The appendix maps measures of health system strengthening taken over the past 25 years to improve maternal and newborn care in each of the case-study countries. Individual country narratives, which for reasons of editorial space policy has been put in the appendix (pp 1–14),[16–26,34–105] provide further documentation, evidence, and details about the interlinkages between the various measures, their time sequence and their relevance to the outcomes that were obtained (figure 4 and 5).

A common pattern emerges from the various interventions for health-system strengthening detailed in figure 4 and in the appendix (pp 1–14). Four sequential lines of action have jointly contributed to improved maternal and newborn health outcomes: (1) extension of a close-to-client network of health facilities, resulting in improved access to and uptake of facility birthing and hospital care for complications; (2) scale-up of the workforce providing professional birthing care to respond to the growing demand; (3) reduction of financial barriers to access to further enhance uptake of care; and (4) attempts to improve quality of care. Figure 6 shows the sequence of those system-wide efforts along an approximate timeline—with somewhat arbitrary starting dates given the gradual build-up of such interventions over years.

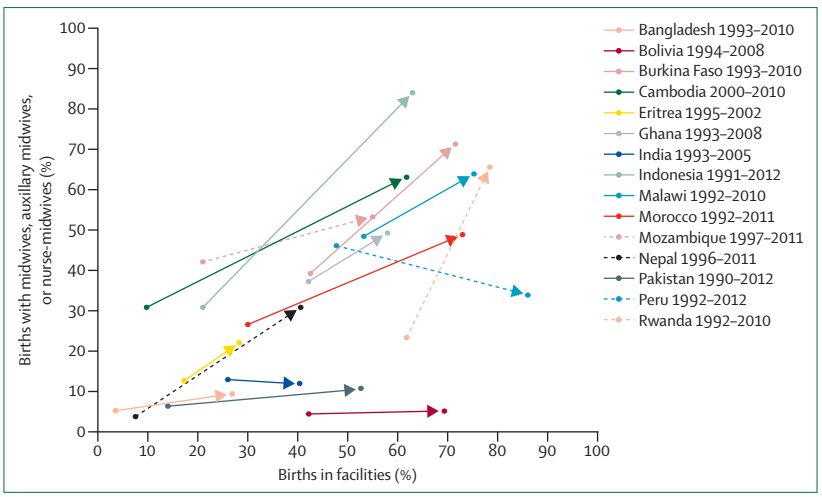

Figure 2: **Trend in facility birthing and proportion attended by midwives after 1990 in countries with a rapid and sustained reduction of maternal mortality ratio over two decades**

Source of data for health facility births: DHS surveys. Data for reduction in maternal mortality ratio: WHO, UNICEF, UNFPA, World Bank 2014.[27] This graph shows 15 countries with data; time series data were not available for six other countries (Ethiopia, Lao, Myanmar, Papua New Guinea, South Sudan, and Sudan) with a rapid and sustained reduction of maternal mortality ratio over two decades.

Belgium (F Richard PhD); **National Reproductive Health Program, Phnom Penh, Cambodia** (T Rathavay MPH); **Afghan Midwives Association, Jhpiego, Kabul, Afghanistan** (S Turkmani MPH); **and WHO Regional Office for Europe, Athens, Greece** (Prof W Van Lerberghe PhD)

Correspondence to:
Prof Wim Van Lerberghe, WHO Regional Office for Europe, Athens 11521 , Greece
wvl@euro.who.int

See Online for appendix

In all four countries, enhanced close-to-client access to facility birthing has been the foundation of improved effective coverage. Increased facility birthing in the case-study countries was part of a wider trend in low-income and middle-income countries in the 1990s.[106] It resulted from a combination of increased supply and increased uptake of services, the latter facilitated by modernisation, rising incomes, better roads and transport, improved communication, urbanisation, and more readiness to use services.[107] The slower pace of this trend in sub-Saharan Africa can at least partly be explained by the difficulty of scaling up supply at a speed commensurate with the ongoing annual growth of the number of births, as is well illustrated by the case of Burkina Faso (pp 5–6).

The extension of the network of health facilities, and its subsequent increase in workforce has characterised all four case-study countries from an early stage. In Morocco the extension of the network of health facilities started in the 1980s—first with extension of primary care centres, and in the 1990s with major, albeit not maternal health-specific investments in hospitals. In Indonesia the expansion of the (less systematically structured and unequally distributed) network of public and private facilities started well before the 1990s. In Burkina Faso, the extension dates back to the beginning of the 1990s and accelerated after 2000. In Cambodia, a district system was built from scratch from 1993–95 onwards. The investment in these networks of health facilities was not specific to maternal and newborn health but rather resulted from a generic desire to expand access to health care.

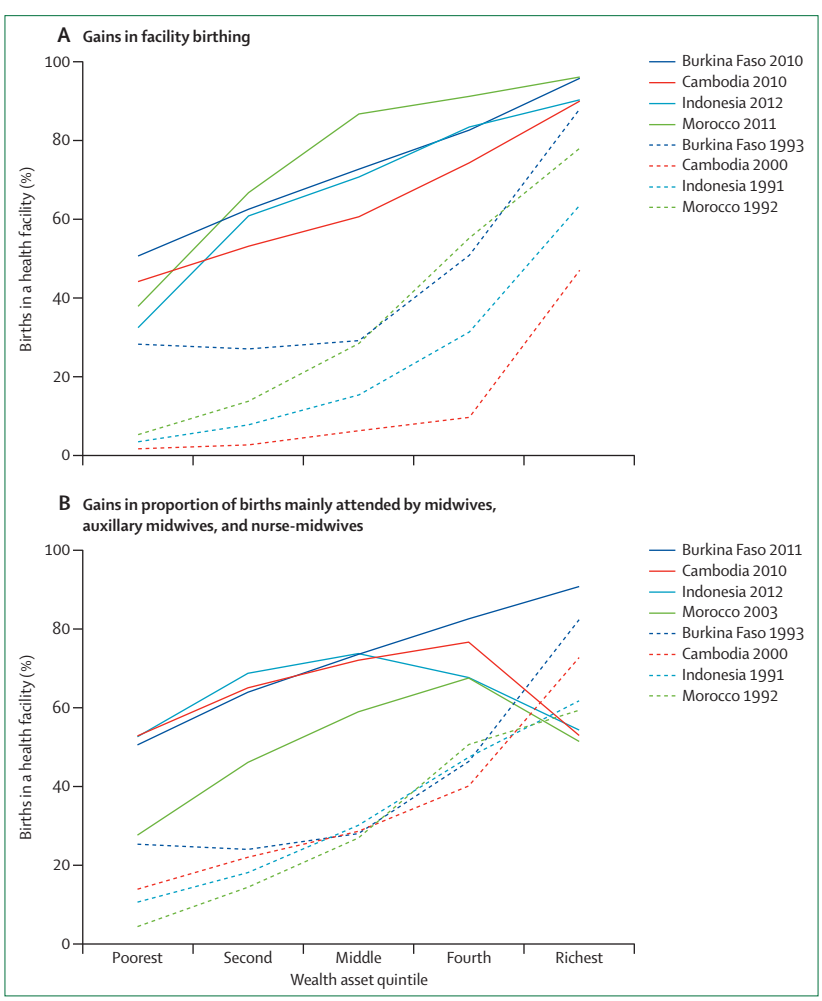

***Figure 3*: Gains in facility birthing and proportion of births primarily attended by midwives, auxiliary midwives, or nurse-midwives by wealth asset quintiles in the case study countries**
(A) Facility birthing. (B) Proportion of births primarily attended by midwives, auxiliary midwives, or nurse-midwives. Source of data: Demographic and health surveys; Enquêtes Nationales Population Nutrition Santé.

Building a network of facilities from scratch, as in Burkina Faso and Cambodia, takes time. Once it is in place, deploying a workforce can proceed quite rapidly. Nevertheless, there has been a substantial lag between the expansion of infrastructure and the deployment of midwives in Burkina Faso, Cambodia, and Morocco. Indonesia stands out as a country where that new workforce was not just intended to staff expanded service infrastructure, but also designed to lead to the ex-novo creation of dedicated, village-level delivery points for maternal health services in parallel to the expansion of infrastructure. However, the low productivity of the Indonesian village midwives operating as a solo practitioner suggests that most of the benefits were reaped through improved access to formal facilities—to which a large proportion of the midwives were deployed.

Women are quick to seize the opportunities of a denser service network, particularly when transport and communications further facilitate physical accessibility. In many countries, the expanded network has kick-started a virtuous cycle of increased supply, expanded access, increased uptake and demand, and scaling up of the midwife cadre. In countries such as Egypt or India, a large supply of doctors has been able to meet the increasing demand, in line with social pressure and professional lobbying. By contrast, health authorities in the countries documented in this paper, as well as Afghanistan, Malawi, and Nepal, or earlier Chile, have opted for the training and deployment of large cohorts of midwives to meet the workload. They did so by scaling up existing efforts, and multiplying new initiatives of pre-service education. The scale-up seems to have been mainly a managerial response to the challenge of service delivery consequent on expansion of the health infrastructure rather than an ideological preference for midwives over medical doctors. Speed and cost considerations have been the determining factor[106] (appendix pp 3, 6).

After densification of the service network and scaling up the workforce, all countries have been confronted with the need to address the financial barriers that continued to constrain access. Cambodia stands out as a country where concerns for financial accessibility, albeit not specific to maternal health, preceded the scaling up of the production and deployment of midwives (figure 5). In the other countries, such efforts came at a later stage. The actual techniques adopted have ranged from equity funds,

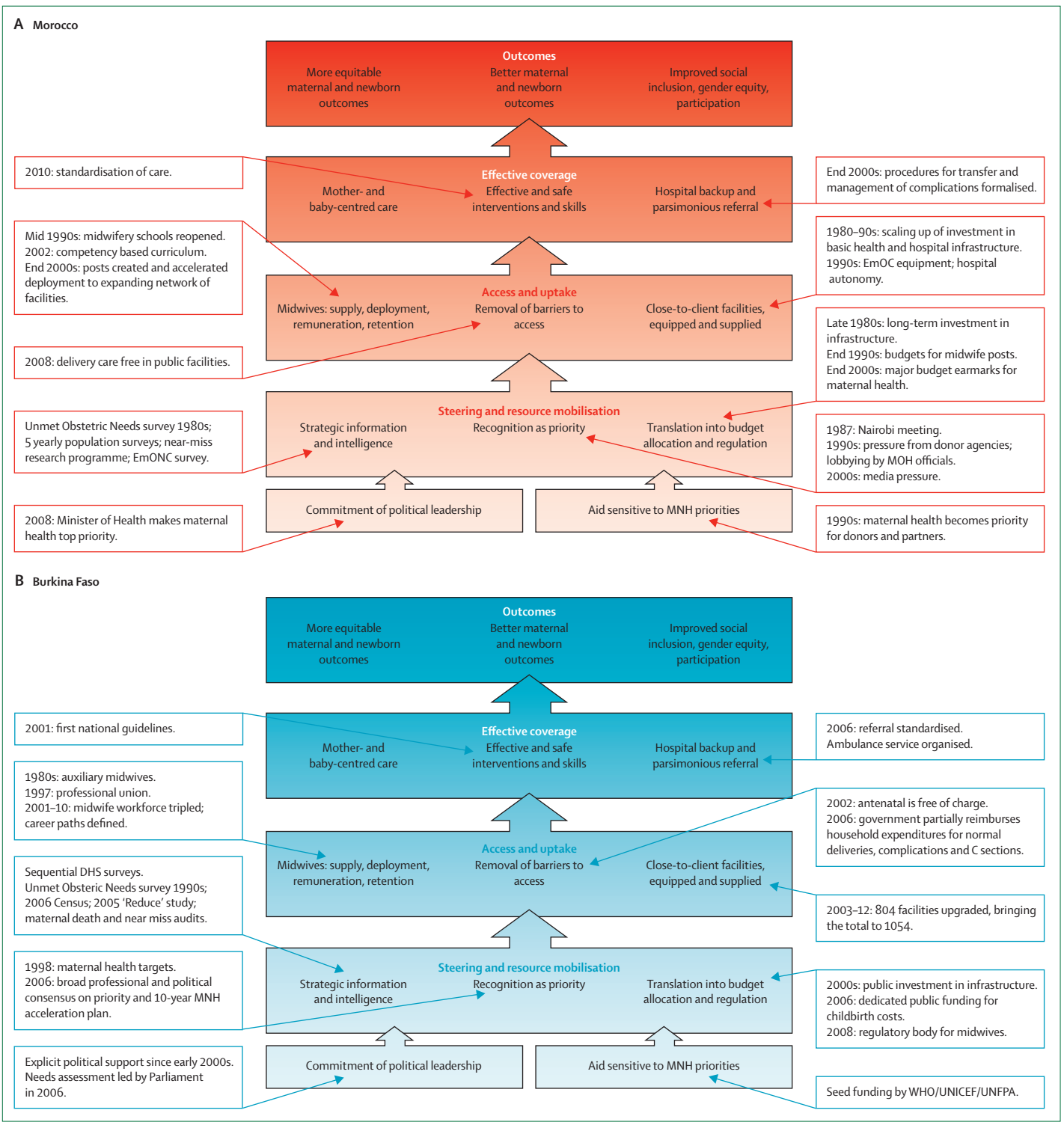

Figure 4: **Health systems strengthening measures aimed at improving maternal and newborn health in Morocco and Burkina Faso since the late 1980s**
(A) Morocco. (B) Burkina Faso. Document analysis and expert witness interviews made it possible to identify health-system strengthening measures that can plausibly be linked to improved outcomes. We mapped these measures according to their contribution to steering and resource mobilisation, improving access and uptake of care, and effective coverage—taking into account key dimensions of quality. This figure only represents a small portion of the analysis that is available in the appendix, which shows a detailed narrative for every case (summarising the available evidence and detailing the inter-linkages between the various measures, their time sequence and their relevance to the outcomes). This information was put in the appendix (pp 1–14) for editorial reasons of space policy. EmONC=emergency obstetric and newborn care. MNH=maternal and newborn health. MOH=ministry of health.

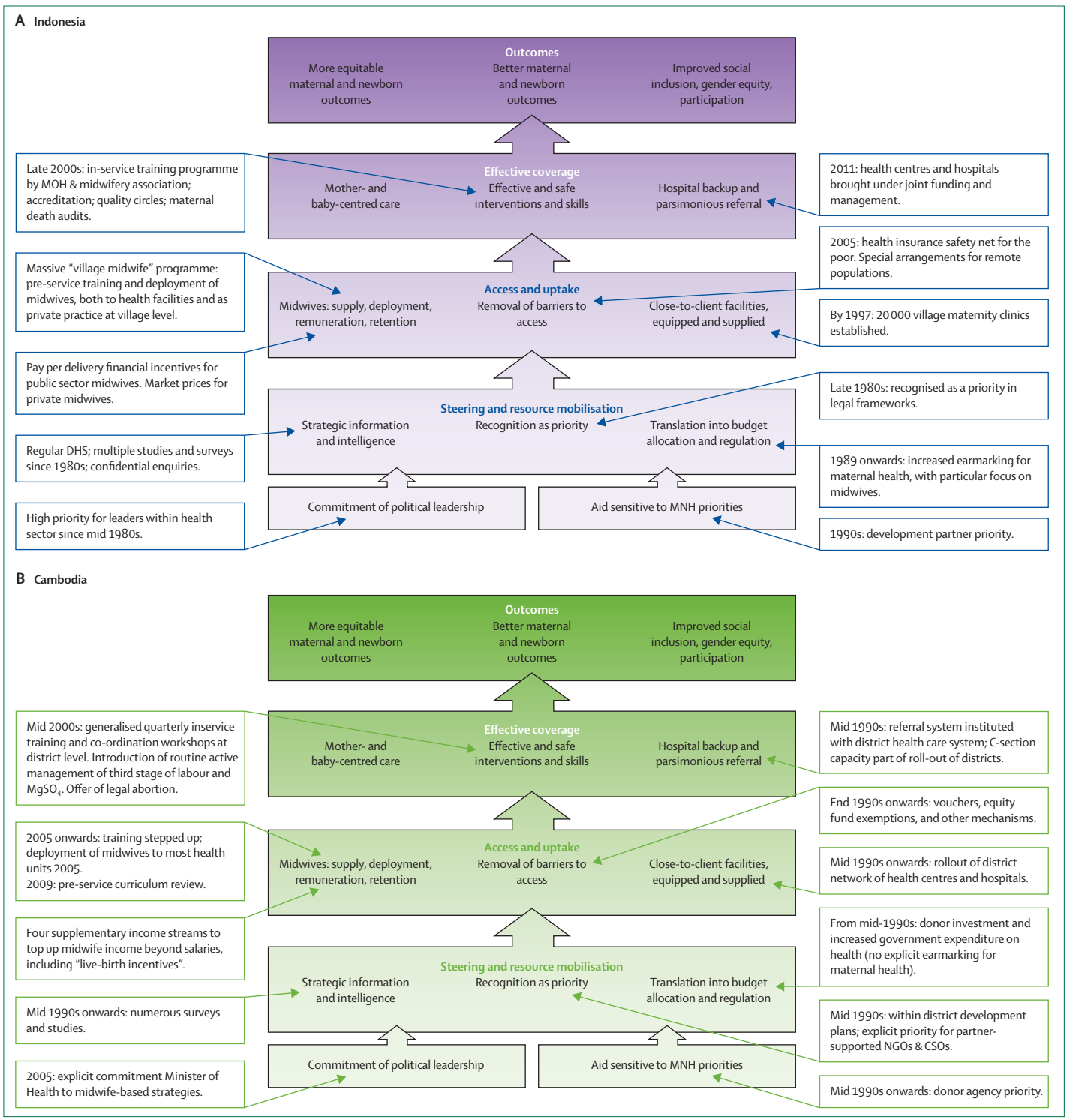

Figure 5: **Health systems strengthening measures aimed at improving maternal and newborn health in Indonesia and Cambodia since the late 1980s**
(A) Indonesia. (B) Cambodia. Document analysis and expert witness interviews made it possible to identify health-system strengthening measures that can plausibly be linked to improved outcomes. We mapped these measures according to their contribution to steering and resource mobilisation, improving access and uptake of care, and effective coverage—taking into account key dimensions of quality. This figure only represents a small portion of the analysis that is available in the appendix, which shows a detailed narrative for every case (summarising the available evidence and detailing the inter-linkages between the various measures, their time sequence and their relevance to the outcomes). This information was put in the appendix (pp 1–14) for editorial reasons of space policy. MOH=ministry of health. DHS=demographic and health survey. MNH=maternal and newborn health. NGO=non-governmental organisation. CSO=civil society organisation.

exemptions, insurance mechanisms, government reimbursement, vouchers, and conditional cash transfers, to, in some instances, a return to free health services (appendix pp 3, 7). Mainly targeted at covering the medical costs for both childbirth and referral, initiatives to cover transport costs have appeared since the 2000s. Cambodia has made explicit attempts to overcome the ubiquitous informal payments to government officials. In the other countries, how the complex equilibrium of financial incentives to public sector staff performance has played out is less clear.

The quality challenge

As of the mid 2000s, these efforts had radically enhanced access and uptake of maternal health care, with midwives taking up a large share of the workload. Concerns about quality of care—about effective coverage as opposed to mere uptake of care—appeared late, well after the countries had started expanding networks and workforces, and reducing financial barriers. Some attention to improve technical standards, competencies, and equipment, has been noted, and death audits and near-miss audits have had an important role in highlighting quality issues[108,109] (appendix pp 2, 9, 10, 14). Nevertheless, in the countries studied, the quality maternal and newborn health framework[1] is far from being translated into the practice of midwives and medical personnel. Awareness among managers of maternal and newborn health programmes of the various dimensions of quality is just beginning.

All observers agree that much remains to be done, not just in terms of technical quality but also in terms of coordination of care and referral between peripheral units and hospitals. The organisation of referrals continues to be a sore point, particularly in situations in which the overall coordination of the care network is wanting, such as in Indonesia (appendix p 10).

Women and families themselves are, however, becoming smarter at overcoming the deficiencies in system integration and coordination, by taking advantage of improved knowledge, communication, and transport to procure access to specialised services when problems occur. The surprisingly low maternal mortality ratio among home births in Morocco and the selective uptake care for complicated cases in public hospitals in Indonesia confirm this trend (appendix pp 1, 8).

Health authorities in the four countries, governmental and other, have shown willingness to maintain continuity of the efforts to improve access, while identifying problems and obstacles as time went by. The design and implementation of solutions might have had delays and setbacks, but on the whole, we have noted a progressive sophistication in the management of the maternal health programmes. This sophistication has created contexts in which substantial increases in midwives were confirmed as a strategic element in the contribution to maternal and newborn survival.

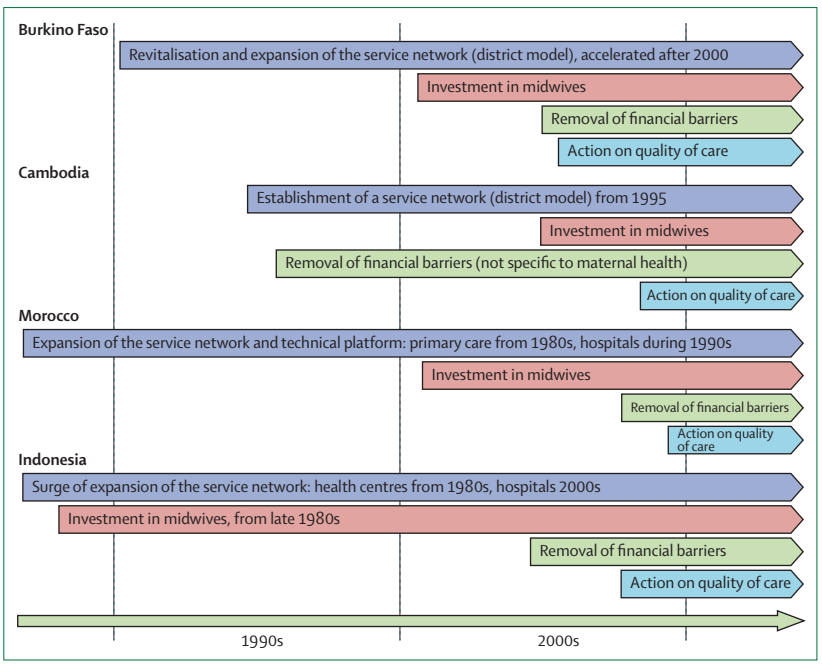

Figure 6: **Sequence of crucial interventions for health-system strengthening in support of quality maternal and newborn health in Burkina Faso, Cambodia, Morocco, and Indonesia, 1980s to present**

Surveys on the size of the challenge and the progress towards addressing the remaining needs have had a real role in all countries (appendix pp 3, 7, 15). In the 1980s and 1990s, information was used for putting maternal health on the policy agenda and keeping it there. Development partners and agencies had a key role in doing so. Later, there seems to have been a shift towards more detailed analytical work that highlights problems with access and performance. All countries can currently avail themselves of much improved—if still patchy—information that combines regular population surveys with improved routine information systems and specific instruments such as maternal death and near-miss audits.

Policy implications

The experience of the four countries suggests that a strategy for improving maternal and newborn health cannot be reduced to a choice of professional category to be scaled up, but crucially depends on the design and investment in the overall network of service delivery: the way it provides a compromise between proximity and technical resources and creates space for uptake of facility birthing. The deployment of the workforce within this network is a question of managing speed, cost and quality. The four countries documented here have opted for a rapid scale-up of a midwife workforce. Over the next decade the absolute number of births primarily assisted by midwives or auxiliary midwives will increase in all four countries. In sub-Saharan Africa, where contrary to much of the rest of the world the number of pregnancies is set to increase year on year, current trends suggest the workload

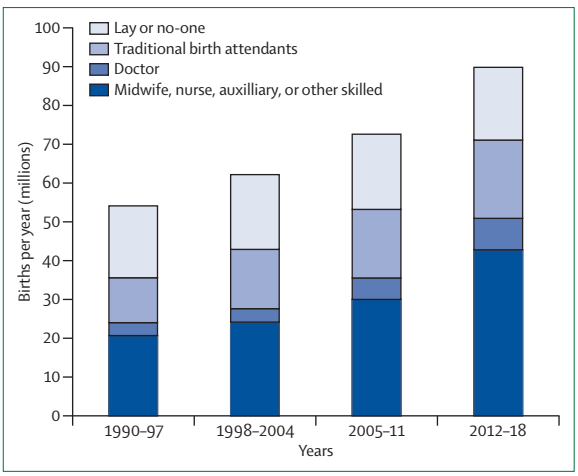

Figure 7: **Projected births attended by midwives, auxiliary midwives, and nurse-midwives; by doctors; by traditional birth attendants; and by lay persons or not attended, in 14 sub-Saharan countries**

taken on by midwives will expand considerably (figure 7). The growth of the workforce will need to accelerate to keep up with this increase. Only if the economic growth of the past decade continues, will Africa be able to afford the workforce expansion required to accelerate coverage and make it more effective.

Both the professional categories of doctors and midwives constitute such an important interface between health services and the population that a dedicated effort to improve quality of care is justified—without the time lag experienced in the past decades between improvement of accessibility and improvement of quality. Managing quality also means addressing two remaining blind-spots.

First, policy makers are only beginning to take the quality dimension of respectful woman-centred care to heart. Things might begin to change: person-centredness and people-centredness is a rapidly growing concern for primary care managers across the world; academic research, the press, and the judiciary system are drawing attention to long existing issues specific to maternal and newborn health.[22,110,111] In the rare instances in which these issues were recognised, they have often been dismissed as something that pre-service education would address perfectly adequately. None of the four countries has designed and implemented a systematic approach on a large scale. This absence of systemic approach is worrying, since quality, along with access, is at the core of legitimate expectations and the rights of mothers and their families.

The second blind-spot is that of overmedicalisation. The most obvious is the epidemic of caesarean sections. This epidemic is clearly linked to the ability and willingness to pay, particularly among the richer. The shift from midwife-assisted to doctor-assisted birthing, which is already visible for the higher income groups in Cambodia and Indonesia, is likely to accelerate the trend. The role midwives can have in mitigating the excessive reliance on birthing by caesarean section is unclear, in contexts in which financial incentives are combined with biased risk-perception, supply-induced demand, and the social sense of what is "modern". Other types of overmedicalisation and iatrogenesis (abuse of anaesthetics, induction drugs, labour augmentation, antibiotics, and others) are poorly documented in the case-study countries, as in most low-income settings. All categories of professionals (doctors, midwives and auxiliary midwives) seem to contribute. The relative role of various professional categories (particularly of doctors versus midwives, auxiliaries, nurse-midwives), of facility ownership (public, private-for-profit, private not-for-profit), and of the interaction between quality standards, working environment and financial considerations remains a largely unexplored area. There is clearly a need for better documentation and intervention research on mitigating of overmedicalisation, specifically of intrapartum care, in midwife-led facilities and in hospital environments.

The four case-study countries currently have high-level political commitment to improvement of maternal and newborn health and to the expansion of the cadre of midwives. With the exception of Indonesia, this phenomenon is relatively recent. In the three other countries the political commitment in the early 1990s was first to a general expansion of the health-care network, with limited visibility of specific commitment to an agenda for maternal newborn and child health and no specific strategy of investment in midwives. Nevertheless, staff from ministries of health and non-governmental organisations in Morocco, Burkina Faso, and Cambodia used the generic drive towards universal access as the vehicle to promote the maternal health agenda. They opted for investment in midwives as matter of expediency in scaling up of the supply of services, and resulted in rapid increase of uptake and coverage.

The absence of political support in these early phases was compensated to some extent by the support of the international community. Later, during the 2000s, the investment in midwives gained political traction: politicians endorsed it publicly and actively, as the maternal health agenda gained visibility and increased access to midwives proved effective and popular (appendix pp 3, 4, 7, 14). This political support gives impetus and continuity to current efforts: failure to provide adequate maternal care is becoming a political liability as civil society becomes more critical and vocal. Civil society's increased ascertiveness exposes both politicians and health authorities to the risk of a backlash if no satisfactory response is given to the quality issues that affect birthing care. The expectations of the increasingly well informed public are rising: access, without crippling financial barriers, to health-care providers (midwives and doctors) who provide effective, safe, respectful, and compassionate care. The credibility and legitimacy of health authorities, also in low-income and middle-income countries, depends on their will and ability to respond to these expectations, and to do so without the delays that have occurred too often in recent years.

Contributors

WVL redesigned the analysis after the first review, provided the health systems framework for the case studies, and wrote the final version of the paper and the case studies. ZM devised the first version of the paper and assisted WVL with the reformulated paper after review. EA participated in the development of the case studies and overall writing and revisions. CA participated in revision discussions and in structuring and finalising the second version. HB was involved in creating a case study that was subsequently dropped and contributed with discussions and comments. JC participated in the initial development meetings, provided comments throughout the process, and collaborated in managing the reference database. AC provided the equity survey data analysis and the projection of births for African countries. LdB participated in the initial development meetings, contributed to the case studies, and provided comments throughout writing and revisions. VDB contributed to the reconstruction and interpretation of the sequence of health systems interventions in Burkina Faso and Morocco and in the identification of relevant grey and published documentation. VF participated in the initial development meetings, contributed to the Cambodia and Morocco case studies, and provided comments throughout the process. HF assisted with initial conceptualisations of the paper, writing of the first version, and discussion of the governance and quality of care issues for the final version. MK participated in the initial development meetings, contributed to the Indonesia case study, and to the design and writing of the final version. JL developed the case studies and contributed to the overall writing and revisions. AM contributed to the overall design of the second version of the paper, identification of the relevant publications, grey literature, and documentation for the Morocco case study. SM participated in the initial development meetings, provided comments throughout the process of drafting and revision, and developed a case study that was subsequently dropped. HR contributed to the paper development, and helped to produce data for some tables and figures. FR helped develop the Burkina Faso case study and commented on the overall revisions. TR helped develop the case studies and commented on the overall revisions. PtH participated in restructuring the paper after the first submission and finalising the paper. ST was involved in creating case studies that were subsequently dropped and commented on the overall revisions.

Declaration of interests

We declare no competing interests.

Acknowledgments

The work on this paper was supported partly through a grant from the Bill & Melinda Gates Foundation (OPP1042500) and additional support from ICS Integrare, the University of York, and the University of Dundee. Julie Glanville from the York Health Economics Consortium contributed to the literature searches, and the Midwives Information and Resource Service (MIDIRS) supported the search work. PtH-B's work was supported by the Instituto de Cooperación Social Integrare. The funding organisations had no role in the undertaking of the analysis and synthesis of the findings of this report. The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of their employers. Jenny Brown and Tracy Sparey provided administrative support, and Natalie Muir provided project support. We thank the close readers and colleagues who made helpful contributions: Hamid Ashwal, Hilda Bonilla, Mickey Chopra, Bernadette Daelmans; Frances Day-Stirk, Eugene Declerc, France Donnay, Soo Downe; Elizabeth Goodburn, Wendy Graham, Isaline Greindl, Caroline Homer, Louise Hulton, Peter Johnson, Fran McConville, Blerta Maliqi, Liz Mason, Matthews Mathai, Remo Meloni, Nester Moyo; Mary Renfrew, Arul Sabaratum, Kate Somers, Kate Teela, and Veronica Walford.

References

1 Abouzahr C, Wardlaw T. Maternal mortality at the end of a decade: Signs of progress? *Bull World Health Organ* 2001; **79**: 561–68.

2 Bailey P, Paxton A, Lobis S, Fry D. Measuring progress towards the MDG for maternal health: including a measure of the health system's capacity to treat obstetric complications. *Int J Gynaecol Obstet* 2006; **93**: 292–99.

3 Countdown to 2015, WHO, UNICEF, Health Metrics Network. Monitoring maternal, newborn and child health: understanding key progress indicators. Geneva, Switzerland: World Health Organization, 2011.

4 De Silva A, Lissner C, Padmanathan I, et al. Investing in maternal health in Malaysia and Sri Lanka: health, nutrition, and population. Washington DC, USA: The World Bank, 2002.

5 Goodburn E, Campbell O. Reducing maternal mortality in the developing world: sector-wide approaches may be the key. *BMJ* 2001; **322**: 917–20.

6 Koblinsky MA. Reducing maternal mortality—learning from Bolivia, China, Egypt, Honduras, Indonesia, Jamaica, and Zimbabwe. Washington DC, USA: The World Bank, 2003: 1–152.

7 Målqvist M, Lincetto O, Huy Du N, Burgess C, Phuong Hoa DT. Maternal health care utilization in Viet Nam: increasing ethnic inequity. *Bull World Health Organ* 2013; **91**: 254–61.

8 Muldoon KA, Galway LP, Nakajima M, et al. Health system determinants of infant, child and maternal mortality: a cross-sectional study of UN member countries. *Global Health* 2011; **7**: 42.

9 Jahn A, De Brouwere V. Referral in pregnancy and childbirth: concepts and strategies. In: Van Lerberghe W, De Brouwere V, eds. Safe Motherhood strategies: a review of the evidence studies in health services organisation and policy. Antwerp: ITG press, 2001: 225.

10 McDonagh M, Goodburn E. Maternal health and health sector reform: opportunities and challenges. In: Van Lerberghe W, De Brouwere V, eds. Safe motherhood strategies: a review of the evidence studies in health services organisation and policy. Antwerp: ITG press, 2001: 367.

11 Walt G. WHO's World Health Report 2003. *BMJ* 2004; **328:** 6.

12 WHO. World Health Report 2003: shaping the future. Geneva, Switzerland: World Health Organization, 2003.

13 Ergo A, Eichler R, Koblinsky M, Shah Washington N. Strengthening health systems to improve maternal, neonatal and child health outcomes: a framework. Washington DC: , 2011http://www.mchip.net/sites/default/files/HSS and MNCH Framework_final.pdf (accessed Oct 12, 2013).

14 Abouzahr C. Making sense of maternal mortality estimates. 2010. http://www.uq.edu.au/hishub/docs/WP11/HISHUB-WP11-FULL-WEB-23Oct12.pdf (accessed Oct 12, 2013).

15 UNFPA, UNICEF, WHO, World Bank. Trends in Maternal Mortality: 1990–2010. Geneva: World Health Organization, 2012.

16 WHO. The World Health Report 2005: make every mother and child count. Geneva: World Health Organization, 2005.

17 Berer M. Maternal mortality or women's health: time for action. *Reprod Health Matters* 2012; **20:** 5–10.

18 Ooms G, Hammonds R, Richard F, De Brouwere V. The global health financing revolution: why maternal health is missing the boat. *Facts Views Vis Obgyn* 2012; **4**: 11–17.

19 Lozano R, Wang H, Foreman KJ, et al. Progress towards Millennium Development Goals 4 and 5 on maternal and child mortality: an updated systematic analysis. *Lancet* 2011; **378:** 1139–65.

20 Van Lerberghe W, De Brouwere V. Reducing maternal mortality in a context of poverty. *Stud Heal Serv Organ Policy* 2001; **17:** 1–7.

21 Royaume du Maroc Ministère de la Santé. Enquête Nationale sur la Population et la Santé Familiale (ENPSF). Rabat, 2012. http://srvweb.sante.gov.ma/Lists/Actualites/DispForm.aspx?ID=44 (accessed Nov 26, 2013).

22 Drhimeur A. Intidarat: Conférence nationale de la santé 1–3 juillet 2013. 2013. https://www.facebook.com/IntidaratAssiha (accessed Nov 10, 2013).

23 Royaume du Maroc Ministère de la Sante et Ministere de la Sante Publique. Division de la Planification de la Statistique et de l'Informatique Service & Macro International DHS. Enquête Nationale sur la Population et la Santé au Maroc. ENPS-II 1992. Rapport. Rabat, Morocco: SEIS, 1992.

24 Royaume du Maroc Ministère de la Santé. Santé Maroc en Chiffres 2011 (Edn 2012). 2012. http://srvweb.sante.gov.ma/Publications/Documents/publications/SANTE EN CHIFFRES 2011 Edition 2012.pdf (accessed Nov 5, 2013).

25 UNFPA. Morocco Country Profile. In: The State of the World's Midwifery 2011. New York: UN Population Fund, 2011.

26 Royaume du Maroc Ministère de la Santé et Ministère de la Santé Publique. Division de la Planification de la Statistique et de l'Informatique Service & Macro International DHS. Réduire la Mortalité maternelle au Maroc. Partager l'expérience et soutenir le progrès. 2011. http://arabe.sante.gov.ma/Style Library/StyleInternet/Image/Actualites/forum/maternit%C3%A9.pdf (accessed Nov 28, 2013).

27 Trends in Maternal Mortality: 1990 to 2013. Estimates by WHO, UNICEF, UNFPA, The World Bank and the United Nations Population Division, 2014. http://apps.who.int/iris/bitstream/10665/112682/2/9789241507226_eng.pdf?ua=1.

28 Renfrew MJ, McFadden A, Bastos HM, et al. Midwifery and quality care: findings from a new evidence-informed framework for maternal and newborn care. *Lancet* 2014; published online June 23. http://dx.doi.org/10.1016/S0140-6736(14)60789-3.

29 Homer CSE, Friberg IK, Bastos Dias MA, et al. The projected effect of scaling up midwifery. *Lancet* 2014; published online June 23. http://dx.doi.org/10.1016/S0140-6736(14)60790-X.

30 Kassebaum NJ, Bertozzi-Villa A, Coggeshall MS, et al. Global, regional, and national levels and causes of maternal mortality during 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013. *Lancet* 2014; published online May 2. http://dx.doi.org/10.1016/S0140-6736(14)60696-6.

31 Adegoke A, Utz B, Msuya SE, van den Broek N. Skilled Birth Attendants: Who is Who? A Descriptive Study of Definitions and Roles from Nine Sub Saharan African Countries. *PLoS One* 2012; 7. DOI:10.1371/journal.pone.0040220.

32 Utz B, Siddiqui G, Adegoke A, van den Broek N. Definitions and roles of a skilled birth attendant: a mapping exercise from four South-Asian countries. *Acta Obstet Gynecol Scand* 2013; **92:** 1063–69.

33 Lassi ZS, Cornetto G, Huicho L, Bhutta ZA. Quality of care provided by mid-level health workers: systematic review and meta-analysis. *Bull World Health Organ* 2013; **91:** 824–33.

34 Abouchadi S, Alaoui AB, Meski FZ, Bezad R, De Brouwere V. Preventable maternal mortality in Morocco: the role of hospitals. *Trop Med Int Health* 2013; **18:** 444–50.

35 Kingdom of Morocco Ministry of Health, UNFPA. Reducing maternal mortality in Morocco: sharing experience and sustaining progress. Ministry of Health, Rabat, 2011.

36 Royaume du Maroc Ministère de la Santé. Livre Blanc pour une nouvelle gouvernance du secteur de la santé. Rabat, 2013.

37 Royaume du Maroc Ministère de la Santé. Plan national 2008–2012 pour l'accélération de la réduction de la mortalité maternelle et infantile. Etat d'avancement. 2010.

38 Temmar F, Vissandjee B, Hatem M, Apale A, Kobluk D. Midwives in Morocco: seeking recognition as skilled partners in women-centred maternity care. *Reprod Health Matters* 2006; **14:** 83–90.

39 Bennis I, De Brouwere V. Fee exemption for caesarean section in Morocco. *Arch Public Heal* 2012; **70:** 3.

40 De Brouwere V, Van Lerberghe W. Les besoins obstétricaux non couverts. Paris, Montréal: L'Harmattan, 1998.

41 AbouZahr C. Safe Motherhood: a brief history of the global movement 1947–2002. *Br Med Bull* 2003; **67:** 13–25.

42 Filippi V, Ronsmans C, Gohou V, et al. Maternity wards or emergency obstetric rooms? Incidence of near-miss events in African hospitals. *Acta Obstet Gynecol Scand* 2005; **84:** 11–16.

43 World Bank. World development report 2012: gender equality and development. Washington DC, USA: The Wold Bank, 2011.

44 Satriyo HA. 10 years of Reformasi: towards women's equal status in Indonesia. *Asia* 2008. http://asiafoundation.org/in-asia/2008/05/28/10-years-of-reformasi-towards-women%E2%80%99s-equal-status-in-indonesia/ (accessed Sept 5, 2013).

45 Bachelet M. Women's leadership. 2012. Public Lecture by UN Women Executive Director, Michelle Bachelet. Jakarta, Indonesia, Dec 3, 2012. http://www.unwomen.org/en/news/stories/2012/12/women-are-integral-part-of-indonesian-success/#sthash.PPjQ2WpD.JHKWcpQj.dpuf (accessed Nov 15, 2013).

46 Badan Pusat Statistik-Statistics Indonesia (BPS) and ORC Macro. Indonesia demographic and health survey 2002–2003. Jakarta, Indonesia, 2003. http://www.measuredhs.com/pubs/pdf/FR147/FR147.pdf (accessed Nov 5, 2013).

47 Statistics Indonesia (Badan Pusat Statistik—BPS) National Population and Family Planning Board (BKKBN), International Kementerian Kesehatan (Kemenkes—MOH) ICF. Indonesia demographic and health survey 2012. Jakarta, Indonesia, 2013. http://www.measuredhs.com/pubs/pdf/FR275/FR275.pdf (accessed Oct 20, 2013).

48 Central Bureau of Statistics Indonesia, National Family Planning Coordinating Board, Ministry of Health Indonesia, Macro International. Indonesia demographic and health survey 1991. Jakarta, Indonesia: Central Bureau of Statistics, 1992.

49 World Bank."...and then she died" : Indonesia maternal health assessment. Washington, DC: The World Bank, 2010.

50 Statistics Indonesia (Badan Pusat Statistik—BPS) and Macro International. Indonesia demographic and health survey 2007. Jakarta, Indonesia, 2008.

51 Australia Indonesia Partnership for Maternal and Neonatal Health. Survey of midwives in three districts in Nusa Tenggara Timur, 2007: number, characteristics and work patterns. Australia Indonesia Partnership for Maternal and Neonatal Health, 2008.

52 WHO. Using human rights for maternal and neonatal health: a tool for strengthening laws, policies and standards of care. A report of Indonesia field test analysis. Geneva, Switzerland: World Health Organization, 2006.

53 Ensor T, Nadjib M, Quayyum Z, Megraini A. Public funding for community-based skilled delivery care in Indonesia: to what extent are the poor benefiting? *Eur J Heal Econ* 2008; **9:** 385–92.

54 Rokx C, Schieber G, Harimurti P, Tandon A, Somanathan A. financing in Indonesia: a reform road map. Washington DC: The World Bank, 2010.

55 IBI Indonesian Midwives Association. Info Kegiantan IBI. *Mon Arch Oct* 2012.

56 Ministry of National Development Planning/National Development Planning Agency (BAPPENAS). The Roadmap to Accelerate Achievement of the MDGs in Indonesia. Jakarta, Indonesia, 2010.

57 Hort K, Akhtar A, Trisnantoro L, Dewi S, Meliala A. The growth of non-state hospitals in Indonesia: implications for policy and regulatory options. *Health Policy and Health Finance Knowledge Hub* 2011; **12:** 1–17.

58 Risfaskes. MOH, Health facility survey. Jakarta, Indonesia, 2011.

59 Pujiyanto. Sakit, Pemiskinan dan MDGs. In: Thabrany H, ed. Jakarta, Indonesia: Kompas, 2009.

60 UNICEF. Burkina Faso *Country Statistic*s. Statistics (Ber), 2014. http://www.unicef.org/infobycountry/burkinafaso_statistics.html#103 (accessed Jan 1, 2014).

61 Institut National de la Statistique et de la Démographie (INSD) et ORC Macro. Enquête Démographique et de Santé du Burkina Faso 2003. Calverton, MD, USA: ORC Macro, 2004. http://www.measuredhs.com/pubs/pdf/FR154/FR154.pdf (accessed Dec 12, 2014).

62 Institut National de la Statistique et de la Démographie (INSD) et ICF International. Enquête démographique et de santé et à indicateurs multiples du Burkina Faso 2010. International. Ouagadougou, Burkina Faso. Calverton, MD, USA: ICF Macro, 2012.

63 Moran AC, Sangli G, Dineen R, Rawlins B, Yameogo M, Baya BC-P. Birth-preparedness for maternal health: findings from Koupela District, Burkina Faso. *J Heal Popul Nutr* 2006; **24:** 489–97.

64 WHO, UNICEF. Accountability for maternal, newborn and child survival: the 2013 update: Burkina Faso accountability profile. Geneva, Switzerland: World Health Organization, 2013. http://www.countdown2015mnch.org/documents/2013Report/Burkina_Faso_Accountability_profile_2013.pdf (accessed Jan 6, 2014).

65 Storeng KT, Drabo S, Ganaba R, Sundby J, Calvert C, Filippi VC-P. Mortality after near-miss obstetric complications in Burkina Faso: medical, social and health-care factors. *Bull World Health Organ* 2012; **90:** 418–25.

66 Institut National de la Statistique et de la Démographie et Macro International Inc. Enquête Démographique et de Santé Burkina Faso 1993. Ouagadougou, Burkina Faso and Calverton, MD: Macro International Inc, 1994.

67 Institut National de la Statistique et de la Démographie (INSD) Ministère de l'Économie et des Finances et ICF International. Enquête Démographique et de Santé et à Indicateurs Multiples (EDSBF-MICS IV). Calverton, MD, USA: ICF International, 2011.

68 Edmond J, Comfort A, Leighton C. Maternal health financing profile: Burkina Faso. Bethesda, MD, Abt Associates, Partners for Health Reform Plus, 2002.

69 Ouedraogo L, Tal F, Thieba B, et al. A study of the unmet needs for major obstetric interventions: the experience of Burkina Faso [in French]. *Santé* 2003; **13:** 17–21.

70 Burkina Faso Ministère de la Santé. Plan national développement sanitaire 2001–2010. Ouagadougou, Burkina Faso, 2000. http://www.cooperacionaragon.com/ongs/attachments/197_8- PLAN NACIONAL DE DESARROLLO SANITARIO_PNDS_2011-2020_Version_finale_SP-PNDS.pdf (accessed Nov 23, 2013).

71 Burkina Faso Ministère de la Santé Publique. Annuaire Statistique 2003. Ouagadougou, Burkina Faso, 2004. http://www.sante.gov.bf/phocadownload/Publications_statistiques/Annuaire/annuaire_statistique_2003.pdf (accessed Nov 23, 2013).

72 Burkina Faso. Ministère de la Santé Publique. Annuaire Statistique 2012. Ouagadougou, Burkina Faso, 2013. http://www.sante.gov.bf/index.php/publications-statistiques/file/338-annuaire-statistique-2012 (accessed Nov 23, 2013).

73 Secrétariat General-Direction Général de la Santé. Plan de mise en oeuvre de la stratégie nationale de subventions des accouchements et des soins obstétricaux et néonatals d'urgence au Burkina Faso. Ouagadougou, 2006. http://www.sante.gov.bf/phocadownload/Textes_fondamentaux/Autres/2.pdf (accessed Nov 23, 2013).

74 Ridde V, Morestin F. A scoping review of the literature on the abolition of user fees in health care services in Africa. *Health Policy Plan* 2011; **26:** 1–11.

75 Richard F, Ouédraogo C, Compaoré J, Dubourg D, De Brouwere V. Reducing financial barriers to emergency obstetric care: experience of cost-sharing mechanism in a district hospital in Burkina Faso. *Trop Med Int Health* 2007; **12:** 972–81.

76 Burkina Faso Ministère de la Santé. Politiques, normes et protocoles de services de la Santé de la reproduction. Ouagadougou, Burkina Faso, 2001.

77 Hounton S, Newlands D, Meda N, De Brouwere V. A cost-effectiveness study of caesarean-section deliveries by clinical officers, general practitioners and obstetricians in Burkina Faso. *Hum Resour Health* 2009; **7**: 34.

78 Richard F, De Brouwere V, Ouédraogo C. Programme d'amélioration de la qualité et de l'accès aux soins obstétricaux d'urgence dans les pays en développement Burkina Faso. Rapport Annuel d'Activités 1er Septembre 2002–31 Décembre 2003. Antwerp, Belgium, 2003.

79 Filippi V, Ganaba R, Baggaley R. Health of women after severe obstetric complications in Burkina Faso: a longitudinal study. *Lancet* 2007; **370**: 1329–37.

80 World Bank. World Bank data profile: Cambodia. Data pages. 2014. http://data.worldbank.org/country/cambodia (accessed Jan 1, 2014).

81 National Institute of Statistics Directorate General for Health [Cambodia] and ORC Macro. Cambodia Demographic and Health Survey 2000. Calverton, MD USA: ORC Macro, 2001.

82 National Institute of Statistics Directorate General for Health [Cambodia] and ORC Macro. Cambodia Demographic and Health Survey 2005. Calverton, MD, USA: ORC Macro, 2006. http://www.measuredhs.com/pubs/pdf/FR185/FR185%5BApril-27-2011%5D.pdf (accessed Dec 2, 2013).

83 National Institute of Statistics Directorate General for Health [Cambodia] and ORC Macro. Cambodia Demographic and Health Survey 2010. Calverton, MD, USA: ORC Macro, 2011. http://www.measuredhs.com/pubs/pdf/FR249/FR249.pdf (accessed Dec 8, 2013).

84 The Kingdom of Cambodia's Health Coverage Plan, Ministry of Health, Phnom Pen, 1996; and: Cambodia Ministry of Health; Health Strategic Plan 2008–2015. Phnom Penh, Cambodia, 2008. http://www.wpro.who.int/health_services/cambodia_nationalhealthplan.pdf (accessed Dec 17, 2013).

85 Walford V, Ghandhi D, Greaves M, Chhi-Vun M, Pigott W, Steen SH. Mid term review of the health sector reform phase III project Cambodia. London, 1999. erc.undp.org/evaluationadmin/downloaddocument.html?docid=311 (accessed Dec 13, 2013).

86 Van Lerberghe W. Safer motherhood component of the World Bank, DFID and ADB Health health sector support programme. London, UK: DFID Centre for Sexual and Reproductive Health, 2001.

87 Von Schreeb S. A survey of essential obstetrical needs, Siem Reap Province, Cambodia. Phnom Penh, Cambodia, 2000.

88 Ministry of Health Cambodia. Mid-term review report 2003–June 2006: Health Sector Support Project. Phnom Penh, Cambodia, 2006.

89 Ministry of Health Cambodia. Joint annual performance review. Phnom Penh, Cambodia, 2007. http://www.moh.gov.kh/files/dphi/japr/JAPR2007_EN_Rn.pdf (accessed Dec 22, 2013).

90 Ministry of Health Cambodia. Health Strategic Plan 2008-2015. Phnom Penh,Cambodia, 2008. http://www.wpro.who.int/health_services/cambodia_nationalhealthplan.pdf (accessed Dec 22, 2013).

91 Ministry of Health Kingdom of Cambodia. Implementation of the Health Equity Funds Guideline. Phnom Penh, Cambodia, 2009. http://www.moh.gov.kh/files/hssp2/hefim/HEF Implementation Gudelines-Eng.pdf (accessed Dec 6, 2013).

92 Barber S, Bonnet F, Bekedam H. Formalizing under-the-table payments to control out-of-pocket hospital expenditures in Cambodia. *Health Policy Plan* 2004; **19:** 199–208.

93 Bhushan I, Keller S, Schwartz B. Achieving the twin objectives of efficiency and equity: contracting health services in Cambodia. *Asian Dev Bank ERD Policy Briefs* 2002. http://www.adb.org/publications/achieving-twin-objectives-efficiency-and-equity-contracting-health-services-cambodia (accessed Dec 2, 2013).

94 Soeters R, Griffiths F. Improving government health services through contract management: a case from Cambodia. *Health Policy Plan* 2003; **18:** 74–83.

95 Annear P, Bigdeli M, Eang R, Jacobs B. Providing access to health services for the poor: health equity in Cambodia. In: Health and social protection: experiences from Cambodia, China and Lao PDR. Antwerp, Belgium: ITG Press, 2008: 189–226.

96 Kremer M, Bloom E, King E, et al. Contracting for health: evidence from Cambodia. *Brookings Res Pap Washingt DC* 2006.http://www.brookings.edu/research/papers/2006/07/healthcare-kremer (accessed Dec 3, 2013).

97 Wilkinson D, Holloway J, Fallavier P. The impact of user fees on access, equity and health provider practices in Cambodia (WHO Health Sector Reform Phase III Project Report). Geneva: World Health Organization, 2001.

98 Fort C, Ravenholt B, Stanley H. Private sector assessment report. Phnom Penh, Cambodia: Reproductive and Child Health Alliance Studies, number 1.

99 RACHA. Training, employment and activity level of Cambodia Midwife Association members. Phnom Penh, Cambodia: Reproductive and Child Health Alliance Studies, number 5. 1999.

100 Fujita N, Abe K, Rotem A, et al. Addressing the human resources crisis: a case study of Cambodia's efforts to reduce maternal mortality (1980–2012). *BMJ Open* 2013; **3:** e002685.

101 RACHA. A Trailer Study of the Cambodian Midwives Association's Continuing Education Program (Reproductive and Child Health Alliance Studies: Number 7). Phnom Penh, Cambodia, 1999. http://www.racha.org.kh/rc2008/41/CMATra.pdf (accessed Dec 3, 2013).

102 Sherratt DR, White P, Chhuong CK. Final report of the comprehensive midwifery review. Phnom Penh, Cambodia, 2006. http://www.unfpa.org/sowmy/resources/docs/library/R067_Sherratt_etal_2006_Cambodia_FINAL_REPORT_COMPREHENSIVE_MIDWIFERY_REVIEW_2006.pdf (accessed Dec 6, 2013).

103 Liljestrand J, Moore J, Tholandi M. Active management of the third stage of labor and eclampsia management as critical components of skilled care during birth in Cambodia. *Int J Gynaecol Obstet* 2010; **111:** 188–89.

104 Eng S, Rathavy T, Krasovec K, Liljestrand J. Quality of maternal and newborn health care in Cambodian hospitals in 2011, 2012 and 2013. University Research Corporation, Phnom Penh. In press, 2014.

105 Bulatao A, Ross J, Ketsana. C. Ratings of maternal and neonatal health programs across developing countries. Cambodia's ranking (Reproductive and Child Health Alliance Studies: Number 12). Phnom Penh, Cambodia, 2001.

106 Koblinsky M, Matthews Z, Hussein J, et al. Going to scale with professional skilled care. *Lancet* 2006; **368:** 1377–86.

107 Koblinsky M. Reducing maternal mortality: learning from Bolivia, China, Egypt, Honduras, Indonesia, Jamaica, and Zimbabwe. Washington DC, USA: The World Bank, 2003.

108 Muffler N, El Hassane Trabelssi M, De Brouwere V. Scaling up clinical audits of obstetric cases in Morocco. *Trop Med Int Heal* 2007; **12:** 1248–57.

109 Soura Y, Lankoande J, Siho N, Ouedraogo C, Zigani C, Richard F. Rapport de mission atelier regional sur les audits des deces maternels et des cas de morbidites maternelles et neonatales graves. Ouidah, Burkina Faso, 2005.

110 Bowser D, Hill K. Exploring evidence for disrespect and abuse in facility-based childbirth report of a landscape analysis. Washington DC, USA: USAID, 2010.

111 Jaffré Y, Olivier de Sardan J. Une médecine inhospitalière: les difficiles relations entre soignants et soignés dans cinq capitales d'Afrique de l'Ouest [Inhospitable medicine: difficult relations between carers and cared for in five West African capital cities]. Paris, Karlhala, 2003.