Midwifery 1

Midwifery and quality care: findings from a new evidence-informed framework for maternal and newborn care

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In this first paper in a series of four papers on midwifery, we aimed to examine, comprehensively and systematically, the contribution midwifery can make to the quality of care of women and infants globally, and the role of midwives and others in providing midwifery care. Drawing on international definitions and current practice, we mapped the scope of midwifery. We then developed a framework for quality maternal and newborn care using a mixed-methods approach including synthesis of findings from systematic reviews of women's views and experiences, effective practices, and maternal and newborn care providers. The framework differentiates between what care is provided and how and by whom it is provided, and describes the care and services that childbearing women and newborn infants need in all settings. We identified more than 50 short-term, medium-term, and long-term outcomes that could be improved by care within the scope of midwifery; reduced maternal and neonatal mortality and morbidity, reduced stillbirth and preterm birth, decreased number of unnecessary interventions, and improved psychosocial and public health outcomes. Midwifery was associated with more efficient use of resources and improved outcomes when provided by midwives who were educated, trained, licensed, and regulated. Our findings support a system-level shift from maternal and newborn care focused on identification and treatment of pathology for the minority to skilled care for all. This change includes preventive and supportive care that works to strengthen women's capabilities in the context of respectful relationships, is tailored to their needs, focuses on promotion of normal reproductive processes, and in which first-line management of complications and accessible emergency treatment are provided when needed. Midwifery is pivotal to this approach, which requires effective interdisciplinary teamwork and integration across facility and community settings. Future planning for maternal and newborn care systems can benefit from using the quality framework in planning workforce development and resource allocation.

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This is the first in a **Series** of four papers about midwifery

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Introduction

Every year there are an estimated 139 million births.[1] An estimated 289 000 women will die during pregnancy, childbirth, or soon after;[2] 2·6 million will have stillbirths,[3] and 2·9 million infants will die in the first month of life.[4] Poor quality maternal and newborn care is a major factor for these deaths, and continued reductions in maternal mortality needs overall improvements in quality throughout the continuum of care and improved emergency services.[5–7] Poor quality care does not just result in mortality; it contributes to acute and chronic clinical and psychological morbidity for the estimated 20 million women who survive,[8] with a lasting effect on mothers' and infants' physical and psychosocial health and wellbeing, on their need to pay for ongoing health-care costs,[9] and on the ability of their families to escape poverty.[5] Poor maternal and newborn care have an economic effect on communities and countries[10] and hamper efforts to tackle intergenerational inequalities in health.[11] Poor quality care is not just about the available resources in a health system; some high-income countries (eg, the USA) rank lower on the health components of the 2013 Mothers Index[12] than some far less wealthy ones (eg, Poland, Estonia). Neither is poor quality care just about the absence of services. There is global concern about the overuse of interventions that were designed to manage complications.[13] Unnecessary interventions during pregnancy, birth, and the early weeks of life are escalating in high-income, middle-income, and some low-income settings,[14–16] risking iatrogenic harm to women and newborn infants,[17,18] and the economic costs of this overuse are substantial.[19]

Although the degree and type of risk related to pregnancy, birth, post partum, and the early weeks of life differ between countries and settings, the need to implement effective, sustainable, and affordable improvements in the quality of care is common to all. New knowledge is needed to eliminate avoidable maternal and newborn mortality and morbidity, and to inform decision making for universal health care and the UN post-2015 development agenda,[20] the most effective actions for the Global Strategy for Women's and Children's Health[21], and the Every Newborn Action Plan.[22]

There is growing consensus among public health professionals that midwifery care has an essential contribution to make to high-quality maternal and newborn services.[5,21,23–28] This consensus stems from evidence derived from randomised controlled trials in high-income settings,[29] and from practical experience in low-income, middle-income, and high-income countries.[5,23,28,30–37] Although other forms of care have been shown to reduce maternal and newborn mortality[38], these country-level experiences show that the

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introduction of educated, trained, motivated, and respected licensed midwives, working effectively with medical and public health colleagues, has been associated both with a rapid and sustained decrease in maternal and newborn mortality, and with an improvement in quality of care.

In these country examples and in common parlance the term midwifery is used either to describe a collaborative activity involving a range of care providers or to describe the work of midwives, resulting in ambiguity.[39] In this first paper in a Series of four papers about midwifery, we define the terms midwifery and midwife, specifying which term the evidence presented relates to. We aimed to test, comprehensively and systematically, the contribution that midwifery—practised by midwives and others—can make to the quality of care of women and infants globally. Randomised trials can only be used to examine some components of quality,[40,41] so we have used a multimethod approach to assess the key concepts of quality in maternal and newborn care including safe, effective, accessible, appropriate, affordable, equitable, efficient, and woman-centred care.[42]

We devised and tested a framework for quality maternal and newborn care in all settings, using the best available evidence for effective care practices and for what women and newborn infants need, and we used this evidence to assess the potential effect of midwifery and the workforce groups best able to provide midwifery care.

Key messages

- There is growing consensus that midwifery has an important contribution to make to high-quality maternal and newborn infant care. However, understanding of midwifery is restricted by a failure to apply consistent definitions in implementation of midwifery, resulting in a mixed workforce of professional and non-professional staff, many of whom provide only some components of midwifery care.
- We agreed on a definition of midwifery and used a mixed-methods approach to develop and test a framework for quality maternal and newborn care that describes the characteristics of care that childbearing women, infants, and families need in all countries.
- Analysis of 461 systematic reviews shows that 56 outcomes, including survival, health, wellbeing of women and infants, and efficient use of resources can be improved by practices that lie within the scope of midwifery.
- 62% of the 72 effective practices within the scope of midwifery show the importance of optimisation of normal processes of reproduction and early life and strengthening of women's capabilities to care for themselves and their families.
- Findings of studies examining several providers active in provision of midwifery care identified few benefits when reliance was solely on low-skilled health-care workers. Midwifery was associated with improved efficient use of resources and outcomes when provided by midwives who were educated, trained, licensed, and regulated, and midwives were most effective when integrated into the health system in the context of effective teamwork, referral mechanisms, and sufficient resources.
- Case studies from Brazil, China, and India show the tendency of health systems in rapid development to adopt a model relying on the routine use of medical interventions, without the balance brought by midwifery.
- These findings support a system-level shift, from fragmented maternal and newborn care focused on identification and treatment of pathology, to skilled care for all, with preventive and supportive care, and treatment of pathology when needed through interdisciplinary teamwork and integration across facility and community settings. Midwifery is pivotal to this approach.

What is a midwife, and what is midwifery?

The definition of the midwife has been established by the International Confederation of Midwives,[43] as have the competencies of the midwife[44] (panel 1).

In some countries, the full scope of care that could be provided by qualified midwives is limited by health-system and cultural barriers,[46–48] and some overlap inevitably exists in roles and responsibilities between different health professionals. In many countries, some aspects of midwifery care are provided by obstetricians, family doctors, nurses, auxilliary midwives, community health workers, or traditional birth attendants, or by unsupported or inadequately trained midwives, as well as by competent midwives educated to international standards (and by nurse-midwives who are trained both as nurses and midwives).[5,23,49] A definition of midwifery as a package of care is needed to identify the important aspects of this care and to provide a structure for our examination of the quality of midwifery care.

In this Series, we define the practice of midwifery as the "skilled, knowledgeable, and compassionate care for childbearing women, newborn infants, and families across the continuum throughout pre-pregnancy, pregnancy, birth, post partum, and the early weeks of life. Core characteristics include optimising normal biological, psychological, social, and cultural processes of reproduction and early life; timely prevention and management of complications; consultation with and referral to other services; respect for women's individual circumstances and views; and working in partnership with women to strengthen women's own capabilities to care for themselves and their families".

Panel 1: International definition of the midwife

The International Labour Organisation (ILO) describes midwives as the primary professional group to provide midwifery.[45] The International Confederation of Midwives defines the work of midwives[43] and core competencies and standards for their education and practice.[44]

"A midwife is a person who has successfully completed a midwifery education programme that is duly recognised in the country where it is located and that is based on the International Confederation of Midwives' (ICM) Essential Competencies for Basic Midwifery Practice and the framework of the ICM Global Standards for Midwifery Education; who has acquired the requisite qualifications to be registered and/or legally licensed to practice midwifery and use the title 'midwife'; and who demonstrates competency in the practice of midwifery."

A framework for high-quality maternal and newborn care: development and testing

We developed a framework for quality maternal and newborn care to describe the characteristics of care that women, newborn infants, and families need from pre-pregnancy, during pregnancy and birth, and beyond.[5] The framework identified both what a health system needs to provide high-quality care and how it delivers its functions and meets its goals within any particular context.[50] Essential components considered were effective practices, the organisation of care, the philosophy and values of the care providers working in the health system, and the characteristics of care providers; these components are interlinked.

Our multimethod approach (figure 1) used some of the processes of conventional systematic review methods and drew on advances in methods for interpretive synthesis,[51–53] allowing us to incorporate a range of relevant sources of evidence[54] and synthesise the findings. With the expert opinion of the 35 Series co-authors from low-income, middle-income, and high-income settings, we developed an outline framework that was refined in view of analyses of the evidence from three systematic reviews. We also drew on lessons learned from recent developments in three large middle-income countries in transition: Brazil, China, and India. The appendix shows the number and type of sources of evidence that informed each component of the framework for quality maternal and newborn care, and figure 2 shows the final framework for quality maternal and newborn care. The framework is intended to be relevant to any setting, and to all who need, or provide, maternal and newborn care and services. Interdisciplinary teamwork and collaboration are inherent in implementation of the framework.[5,55]

In this paper, we use the framework to structure analyses of the evidence and to identify the scope of midwifery practice. The second paper[56] in the Series used the framework to define the range of interventions included in the scope of midwifery care. The third paper[38] used the framework to identify components of quality care that need to be strengthened in country-level examples. The framework can be used to assess the quality of care; plan workforce development, resource allocation, or an education curriculum; or identify evidence gaps for future research. The framework can be individualised to meet specific demands of population demography and health; available resources; and the political, social, and cultural context in which each health system functions.

Assessment of components of quality maternal and newborn care: review methods and findings

Review 1: women's views and experiences of maternal and newborn care

To assess evidence on what women and newborn infants need from maternal and newborn services, we did a review of meta-syntheses of qualitative studies of women's views and experiences (review 1). The appendix

See Online for appendix

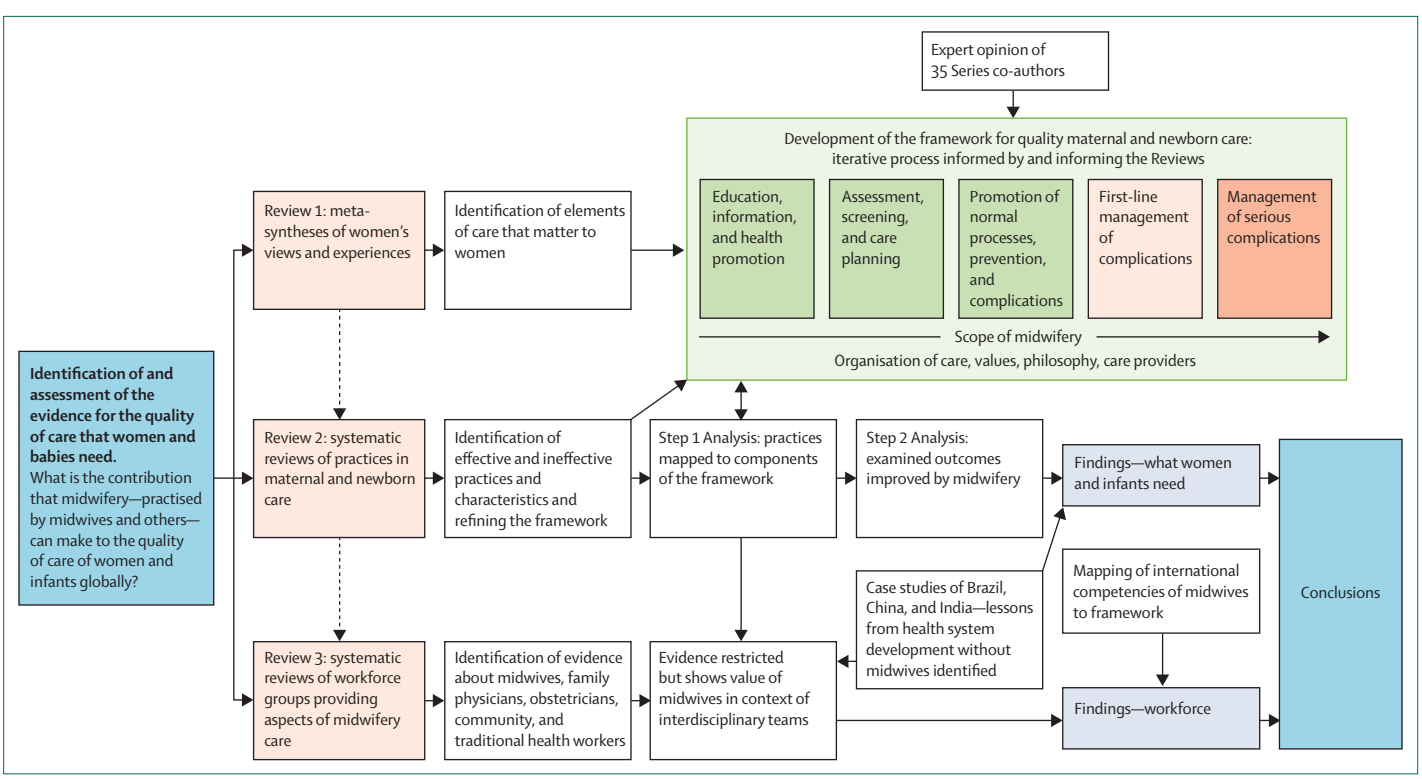

Figure 1: Diagram of the multimethod approach used in this study

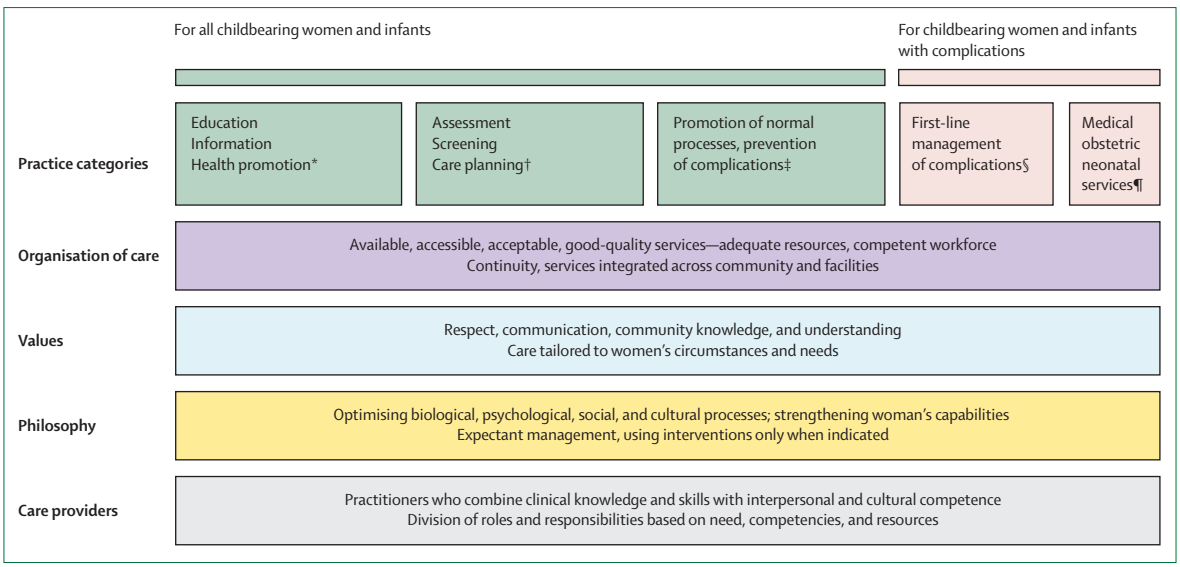

Figure 2: **The framework for quality maternal and newborn care: maternal and newborn health components of a health system needed by childbearing women and newborn infants**

*Examples of education, information, and health promotion include maternal nutrition, family planning, and breastfeeding promotion. †Examples of assessment, screening, and care planning include planning for transfer to other services as needed, screening for sexually transmitted diseases, diabetes, HIV, pre-eclampsia, mental health problems, and assessment of labour progress. ‡Examples of promoting normal processes and preventing complications include prevention of mother-to-child transmission of HIV, encouraging mobility in labour, clinical, emotional, and psychosocial care during uncomplicated labour and birth, immediate care of the newborn baby, skin-to-skin contact, and support for breastfeeding. §Examples of first-line management of complications include treatment of infections in pregnancy, anti-D administration in pregnancy for rhesus-negative women, external cephalic version for breech presentation, and basic and emergency obstetric and newborn baby care (WHO 2009 monitoring emergency care), such as management of pre-eclampsia, post-partum iron deficiency anaemia, and post-partum haemorrhage. ¶Examples of management of serious complications include elective and emergency caesarean section, blood transfusion, care for women with multiple births and medical complications such as HIV and diabetes, and services for preterm, small for gestational age, and sick neonates.

shows detailed methods and results from the 13 meta-syntheses identified and the included studies and quality assessment. Although data were predominantly from high-income countries, 20 of the 229 studies were done in low-income and middle-income countries.

In summary, women's views and experiences reported in these meta-syntheses showed the inter-relationship between the different components of quality care identified in figure 2. Women reported that information and education were essential to allow them to learn for themselves, that they needed to know and understand the organisation of services so they could access them in a timely way, that services needed to be provided in a respectful way by staff who engendered trust and who were not abusive or cruel, and that care should be personalised to their individual needs, and offered by care providers who were empathic and kind. Particularly, women wanted health professionals who combined clinical knowledge and skills with interpersonal and cultural competence. These findings were of crucial importance in identification of components of quality maternal and newborn care.

Review 2: effectiveness of maternal and newborn care practices

Identification of practices

To identify high-quality, up-to-date evidence on effectiveness of specific practices in maternal and newborn care, we used two sources: the 453 systematic reviews contributed by the Cochrane Pregnancy and Childbirth Group to the Cochrane Library[57] and the Partnership for Maternal, Newborn and Child Health Review,[58] which contributed an additional eight reviews where evidence was derived from other Cochrane groups (461 reviews analysed in total). As a final check before publication, we examined Cochrane Pregnancy and Childbirth Group reviews published between May and December, 2013; see appendix for references to 20 new reviews and 15 updated reviews where the conclusions had changed. One of these updated reviews[29] was of central importance to this work, and we have included it in our analyses. The rigorous methods used in Cochrane reviews are recognised internationally as the highest standard in evidence-based health care, hence further quality assessment was not performed.

Figure 3 shows the process of identification and classification of the included reviews. We scrutinised the 461 reviews to identify the effect on outcomes related to the primary aim of each review. All the reviews related to the practice categories (the top line of the framework); some also related to some of the cross-cutting components of organisation of care, values, philosophy, and care providers. Appendix 1 summarises their distribution across framework components.

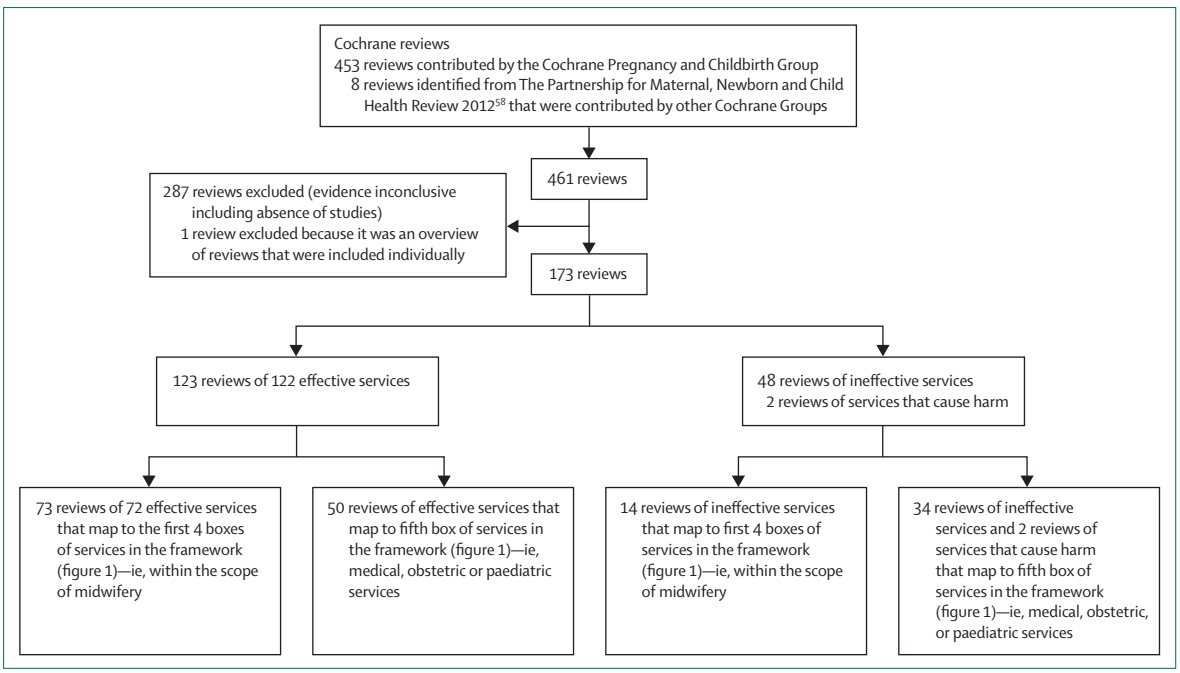

Figure 3: **Flow diagram of numbers of studies and exclusions**

Step 1 analysis: mapping the reviews to the framework for quality maternal and newborn care

We classified the practice examined in each review as effective or likely to be effective, likely to be ineffective or harmful, or inconclusive regarding its effect (including an absence of studies). We then mapped the 173 reviews that had adequate evidence to assess effectiveness (ie, excluding those when findings were inconclusive; figure 3) to the relevant practice categories on the top line of the framework. All figures and percentages refer to the number of practices rather than the number of reviews.

Effective practices related to categories of the framework for quality maternal and newborn care

The appendix shows the distribution across the practice categories and panel 2 shows details of the specific practices. 46 (38%)[29,59–102,129] of the 122 effective practices were relevant for all childbearing women and infants, with 26 (21%)[103–128,130,145] being first-line management for women and infants with complications. 50 (41%) practices required the input of a medical practitioner with advanced skills in obstetrics, neonatology, or medicine, for serious complications.

Step 2 analysis: examination of the effect of midwifery

We focused next on how midwifery fits within the framework for quality maternal and newborn care and what the evidence base tells us about its effect and its contribution. We identified the first four practice categories (education, information, health promotion; assessment, screening care planning; promoting normal processes and preventing complications; and first-line management of complications) within the scope of midwifery using our definition of midwifery. 72 (59%) of the 122 effective practices identified in Step 1 were within this scope (figure 3, and table for details of practices).

Outcomes shown to be improved by effective practices in the scope of midwifery

These reviews of 72 effective practices in the scope of midwifery were analysed further to identify the outcomes improved. Caveats such as concern about the quality or number of trials, or outcomes only shown to be beneficial for subgroups of participants were noted. Two of these reviews examined practices shown to be effective in regard to their primary outcome, but when there was a trade-off between benefits and harms, these have been shown separately in table.

56 outcomes were improved by the combination of practices that fall within the scope of midwifery (table). These outcomes include reduced maternal and neonatal mortality and fetal loss, reduced maternal and neonatal morbidity including preterm birth, reduced use of interventions, improved psychosocial outcomes, improved public health outcomes, and improved organisational outcomes. The scale of the effect of these outcomes varies across settings and depends on the organisation of services and the skills and competencies of the workforce.

Effective practices related to cross-cutting components of the organisation of care and philosophy

We examined these 72 effective practices within the scope of midwifery to assess whether they portrayed the cross-cutting components of the framework. We were

Panel 2: Effective and ineffective practices presented by category of practice in the framework for quality maternal and newborn care : in the scope of midwifery as defined in this paper

Effective practices for childbearing women and infants

*Organisation of care (n=7)**

- Alternative *vs* conventional institutional settings for birth[59]
- Labour assessment programmes to delay admission to the labour ward until labour is in the active phase[60]
- Exclusive breastfeeding for at least 6 months for optimal health benefits[61]
- Community-based intervention packages for reducing maternal and neonatal mortality and morbidity and improving neonatal outcomes[62]
- Midwife-led continuity models vs other models of care for childbearing women[29]
- Not reducing the schedule of antenatal visits in settings where the number of visits is already low (eg, <5)[63]
- Lay health workers in primary and community health care for maternal and child health and the management of infectious diseases[64]

*Education, information, health promotion, and public health (n=11)**

- *Insecticide-treated nets for prevention of malaria in pregnancy*[65]
- *Specific advice to increase dietary energy and protein intakes or energy and protein supplementation in pregnancy*[66]
- Interventions to promote smoking cessation in pregnancy[67]
- *Health education and peer support to promote breastfeeding initiation*[68]
- *Supplementation with folic acid for women ≤12 weeks pregnant or pre-pregnant, for prevention of neural tube defects*[69]
- *Routine zinc supplementation for improving pregnancy and infant outcomes*[70]
- *Daily universal oral supplementation with iron or iron and folic acid during pregnancy for improvement of maternal health and pregnancy outcomes*[71]
- *Intermittent oral supplementation with iron or iron and folic acid or iron and vitamins and minerals during pregnancy for improvement of maternal health and pregnancy outcomes*[72]
- *Calcium supplementation during pregnancy for preventing hypertensive disorders and related problems*[73]
- *Mutiple micronutrient supplementation during pregnancy*[74]
- *Education for contraceptive use by women after childbirth*[75]

*Assessment, screening, and care planning (n=1)**

- *Screening for and treatment of antenatal lower genital tract infection for prevention of preterm delivery*[76]

*Promotion of normal processes and prevention of complications (n=26)**

- *Antiretroviral drugs for reducing the risk of mother-to-child transmission of HIV infection*[77]
- *Drugs for prevention of malaria in pregnant women*[78]
- Antiretroviral therapy for treatment of HIV infection in antiretroviral therapy-eligible pregnant women[79]
- *Antenatal digital perineal massage to prevent perineal trauma*[80]
- *Breast stimulation for cervical ripening or labour induction*[81]
- *Continuous labour support*[82]
- *Upright positions in the first stage of labour*[83]
- *Relaxation techniques for pain relief in labour*[84]
- Inhaled analgesia for pain relief in labour[85]
- *Immersion in water in first and second stage labour*[86]
- *Perineal techniques in second stage labour*[87]
- *Restrictive episiotomy*[88]
- *Unclamping previously clamped and divided umbilical cord and allowing blood from placenta to drain freely*[89]
- Active management of third stage labour[90]
- Prophylactic ergometrine or oxytocin in third stage labour[91]
- Carbetocin to prevent post partum haemorrhage[92]
- Prophylactic oxytocin to prevent post partum haemorrhage[93]
- Prostaglandin (misoprostol) to prevent post partum haemorrhage[94]
- *Skin-to-skin mother-baby contact within 24 h of birth*[95]
- Paracetamol (one dose) for early post-partum pain[96]
- Any type of approved analgesia for pains after vaginal birth[97]
- Analgesic rectal suppositories for the relief of pain from perineal suturing[98]
- *Support for breastfeeding mothers*[99]
- *Tetanus toxoid for pregnant women to prevent neonatal tetanus*[100]
- *Interventions to relieve constipation in pregnancy*[101]
- Topical treatments for vaginal candidiasis in pregnancy[102]

First-line management of complications (n=25 interventions, in 26 reviews)†

- Antibiotics for gonorrhoea in pregnancy[103]
- Interventions for treating genital *Chlamydia trachomatis* infection in pregnancy[104]
- Interventions for trichomoniasis in pregnancy[105]
- Antibiotics for treating bacterial vaginosis in pregnancy[106]
- Antibiotics for asymptomatic bacteriuria in pregnancy[107]
- Treatments for symptomatic urinary tract infections during pregnancy[108]
- *Anti-D administration in pregnancy for preventing rhesus alloimmunisation*[109]
- *Interventions for preventing and treating pelvic and back pain in pregnancy*[110]
- *Oral maternal hydration for increasing amniotic fluid volume in oligohydramnios*[111]
- *External cephalic version for breech presentation at term*[112]
- *Antiplatelet agents (low-dose aspirin) for preventing pre-eclampsia and its complications*[113]
- *Planned early birth vs expectant management for pre-labour rupture of membranes at term*[114]
- Pharmacological and mechanical interventions to induce labour in outpatient settings[115]
- *Massage, reflexology, and other manual methods for pain management in labour*[116]
- *Acupuncture or acupressure for pain management in labour*[117]
- Rapid *vs* stepwise negative pressure application for vacuum extraction assisted vaginal delivery[118]

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- Continuous *vs* interrupted sutures for repair of episiotomy or second degree tears[119]
- *Anti-D administration after childbirth for preventing rhesus allo-immunisation*[120]
- Treatment for women with post-partum iron deficiency anaemia[121]
- Antibiotic regimens for endometritis after delivery[122]
- *Kangaroo mother care to reduce morbidity and mortality in low birthweight infants*[123]
- *Preventive, non-pharmaceutical psychosocial or psychological interventions for the prevention of post-partum depression*[124]
- Fibreoptic phototherapy for neonatal jaundice[125]
- Emergency interventions:
  - Magnesium sulphate for women with pre-eclampsia[126]
  - Magnesium sulphate for eclampsia[127,128]

Effective practice for childbearing women and infants with a trade-off between benefits and harms

*Promotion of normal processes and prevention of complications (n=26)**

- Prophylactic use of ergot alkaloids in third stage labour (significant decrease in mean blood loss, post-partum haemorrhage of at least 500 mL and use of therapeutic uterotonics but adverse effects include elevated blood pressure)[129]

First-line management of complications (n=25 interventions, in 26 reviews)†

- Membrane sweeping (digital separation of the membranes from the lower uterine segment during vaginal examination) for induction of labour (effective in reducing length of pregnancy and number of pregnancies beyond 41 and 42 weeks but with adverse effects [pain, bleeding, irregular contractions])[130]

Ineffective practices for childbearing women and infants

*Education, information, health promotion, and public health (n=11)**

- Vitamin A supplementation for post-partum women[131]
- Calcium supplementation (other than for prevention or treatment of hypertension)[132]

*Assessment, screening, and care planning (n=1)**

- *Continuous cardiotocography as a form of electronic fetal monitoring for fetal assessment during labour (associated with a reduction in neonatal seizures, but no significant differences in cerebral palsy, infant mortality or other standard measures of neonatal wellbeing. However, cardiotocography was associated with an increase in caesarean sections and instrumental vaginal births).*[133]

*Promotion of normal processes and prevention of complications (n=26)**

- *Routine perineal shaving on admission in labour*[134]
- *Hands and knees posture in late pregnancy or labour for fetal malposition (lateral or posterior)*[135]
- *Restricted pacifier use in breastfeeding term infants for increasing duration of breastfeeding*[136]
- *Umbilical vein injection for the routine management of third stage of labour*[137]
- *Enemas during labour*[138]
- *Amniotomy for shortening spontaneous labour*[139]
- Timing of administration of prophylactic uterotonics (before or after delivery of the placenta following vaginal birth)[140]

First-line management of complications (n=25 interventions, in 26 reviews)†

- *Hospitalisation and bed rest for multiple pregnancy*[141]
- Support during pregnancy for women at increased risk of low birthweight babies[142]
- *Umbilical vein injection for management of retained placenta*[143]
- Vitamin supplementation for prevention of miscarriage[144]

able to assess three aspects of two components of the framework; whether they offered continuity of care (organisation), whether they strengthened women's own capabilities (philosophy), and whether they supported the normal processes of pregnancy, birth, post partum, breastfeeding and early life, and avoidance of unnecessary interventions (philosophy).

Panel 2 and the appendix show findings from this stage of the analyses. When the effective service supported normal processes of reproduction and early life, the intervention is shown in italics in panel 2 (44 [61%] of 72 effective practices)[29,59–66,68–78,80–84,86–89,95,99–101,109–114,116,117,120,121,122] within the scope of midwifery. Ten (14%)[29,61,63,65–68,75,84,99] of the 72 effective forms of care for all childbearing women were intended to support women's own capabilities with information or advice that they could act on themselves (appendix). Most of the effective practices (61 [85%]) related to only one phase of maternal and newborn care, usually pregnancy or labour (appendix). Only 20 (28%)[29,61,62,64,68,75,77,95–99,120–128] practices examined any aspect of care after the birth for either mother or newborn infant. Only midwife-led continuity models of care and community-based packages of care applied across the whole continuum.[29,62] 66 (92%) of the effective practices related to care of either the woman or fetus, or both, with five examining both the mother and newborn infant and only one examining care of the infant.

Ineffective practices

Fourteen reviews[131–143] identified practices within the scope of midwifery that were ineffective (panel 2). Nine (64%) of the ineffective practices[133–139,141,143] identified interventions that should not be used routinely (eg, amniotomy in labour). These nine practices are shown in italics in the ineffective practices section of panel 2, and these findings support the approach of not routinely interfering with the normal processes of reproduction and early life (philosophy), bringing the total number of reviews that support optimising normal processes to 53 (62% of the 86 total effective and ineffective practices).

Review 3: characteristics and effect of midwives and other workforce groups providing some or all components of midwifery care

To examine the characteristics and relative contribution of midwives and other workforce groups providing some or all components of midwifery care, we searched the Database of Abstracts of Reviews of Effectiveness (DARE) in 2012, updated in June, 2013, and checked again before publication in January, 2014, using the terms: "midwife" or "midwifery" or "midwives" or "skilled attendant*" or "birth attendant*" or "skilled delivery attendant*" or "community health worker*". We identified seven high-quality reviews of randomised controlled trials that examined the effectiveness of interventions delivered by specific workforce cadres on maternal or infant outcomes, or both. The pre-publication search identified one updated review that is of central importance to this question, and it has been included here.[29] The appendix shows details of included and excluded studies.

For more on the **Database of Abstracts of Reviews of Effectiveness** see http://www.crd.york.ac.uk/CRDWeb/

Midwifery care delivered by midwives and other professionals

We included two reviews with a total of 15 studies, all done in high-income countries.[29,146] Sandall and colleagues[29] included 13 trials of 16 242 women. This Review compared midwife-led continuity models of care, in which the midwife is the woman's lead professional during pregnancy, labour, and birth (one or more consultations with medical staff were often part of routine practice), with obstetrician or family doctor-led care (midwives or nurses,

	First author and year (caveats)
Maternal mortality reduced	Duley 2010[128]
Serious morbidity reduced	Hofmeyr 2010[73]
Fewer maternal infections including malaria and HIV	Brocklehurst 2002,[103] Dare 2006,[114] Gulmezoglu 2011,[105] Brocklehurst 2013,[106] Siriwachirachai 2010,[145] Smaill 2007,[107] Gamble 2006[65] (in malaria endemic regions of Africa)
Less anaemia	Pena-Rosas 2012,[71] Gamble 2006,[65] Garner 2006,[78] Dodd 2004[121]
Less pain	Smith 2011,[84] Beckmann 2006[80] (in women who had previously given birth vaginally); Chou 2013,[96] Deussen 2011,[97] Hedayati 2003[98] (in first 24 h after birth); Klomp 2012[85] (in labour, side-effects noted); Kettle 2012,[119] Pennick 2007[110] (potential for bias in all but one study); Smith 2011[117] (caution about study quality); Smith 2012[116] (caution about study quality)
Reduced incidence of RhD alloimmunisation	Crowther 2013[109], Crowther 1997[120]
Reduced risk of pre-eclampsia	Duley 2007[113] (for women at high risk); Hofmeyr 2010[73] (effect was greatest for women with low baseline calcium intake and women at high risk of pre-eclampsia)
Reduced risk of eclampsia	Duley 2010[126]
After eclampsia treatment: reduction in recurrence of seizures; reduction in risk of pneumonia	Duley 2010,[128] Duley 2010,[127] Duley 2010[127]
Reduced post-partum haemorrhage	Begley 2011,[90] Kavanagh 2005,[81] Tunçalp 2012,[94] Cotter 2001,[93] Liabsuetrakul 2007,[129] McDonald 2004[91]
Reduced perineal trauma	Aasheim 2011,[87] Carroli 2009,[88] Beckmann 2006[80] (statistically significant for women without previous vaginal birth only)
Increased likelihood of spontaneous vaginal birth	Hodnett 2012,[59] Hodnett 2012,[82] Sandall 2013[29]
Less augmentation of labour	Hodnett 2012[59], Hodnett 2012[82]
Reduced pharmacological analgesic use (excluding regional analgesia or epidural) during pregnancy, childbirth, and in the postnatal period	Lauzon 2001,[60] Hodnett 2012,[82] Sandall 2013,[29] Chou 2013,[96] Hedayati 2003[98] (first 24 h after birth); Kettle 2012,[119] Smith 2011[117] (in one or possibly three trials, not well reported)
Reduced use of regional analgesia or epidural	Lawrence 2009,[83] Cluett 2009,[86] Hodnett 2012,[59] Hodnett 2012,[82] Sandall 2013[29]
Fewer instrumental births	Smith 2011,[84] Hodnett 2012,[59] Hodnett 2012,[82] Sandall 2013,[29] Smith 2011[117]
Fewer caesarean sections	Hodnett 2012,[82] Hofmeyr 2012[112]
Fewer episiotomies	Aasheim 2011,[87] Carroli 2009,[88] Beckmann 2006,[80] Hodnett 2012,[59] Sandall 2013[29]
Less perineal suturing	Carroli 2009[88]
Less use of therapeutic uterotonics	Liabsuetrakul 2007[129] (trade-off: effects of the intervention [intramuscular or intravenous ergot alkaloids] include increased blood pressure and pain after birth requiring analgesia)
Fewer blood transfusions	Tunçalp 2012[94]
Less use of uterine massage	Su 2012[92]
Fewer pregnancies beyond 41 weeks	Boulvain 2005[130] (trade-off: adverse effects reported—pain, bleeding, irregular contractions. Number needed to treat to avoid one formal induction, n=8)
Improved satisfaction with pain relief	Smith 2011[84] (caution about study quality); Smith 2011[117]
Reduced anxiety during first stage of labour	Smith 2012[116] (reported in one study, concerns about quality)
Improved feeling of control during childbirth	Lauzon 2001[60]
Improved satisfaction with childbirth experience	Cluett 2009[86] (reported in one study); Smith 2011,[84] Hodnett 2012,[59] Hodnett 2012[82]
Less likely to develop post-partum depression	Dennis 2013[124]

(Table continues on next page)

	First author and year (caveats)
(Continued from previous page)	
Increased attendance by a known midwife during birth	Sandall 2013[29]
Increased referrals for pregnancy complications	Lassi 2010[62]*
Shorter stays on labour ward	Lauzon 2001[60]
Increased breastfeeding rates—initiation	Dyson 2005,[68] Lassi 2010[62]*
Increased breastfeeding rates—duration	Moore 2012,[95] Renfrew 2012,[99]* Lewin 2010,[64] Conde-Agudelo 2011[123]
Reduction in smoking in late pregnancy	Lumley 2009[67]
Increased maternal post-partum weight loss	Kramer 2012[61] (in two studies from Honduras)
Increased birth spacing	Kramer 2012[61]
Increased contraceptive use	Lopez 2012[75] (caution about quality of evidence); Ota 2012[66] (only for balanced energy-protein supplementation); Demicheli 2005,[100]* Lassi 2010,[62] Garner 2006[78] (only among first-born or second-born babies); Sturt 2010,[79] Duley 2007,[113] Conde-Agudelo 2011,[123] Duley 2010,[127] Sandall 2013[29] (before 24 weeks); Gamble 2006,[65] Duley 2007[113]
Reduced preterm birth	Ota 2012[66] (for women given nutritional advice); Mori 2012,[70] Sangkomkamhang 2008,[76] Lumley 2009,[67] Hofmeyr 2010,[73] Duley 2007,[113] Sandall 2013[29]
Reduced low birthweight	Sangkomkamhang 2008,[76] Lumley 2009,[67] Smaill 2007,[107] Gamble 2006[65] (not in women with more than four previous pregnancies); Pena-Rosas 2012,[71] Haider 2012[74]
Reduced small for gestational age babies	Ota 2012[66] (only for balanced energy protein supplementation; high protein supplementation increased the risk); Duley 2007,[113] Haider 2012[74]
Fewer neural tube defects	De-Regil 2010[69]
Fewer babies with low 5 min Apgar scores	Hodnett 2012,[82] Duley 2010[128]
Increased average birthweight	Ota 2012[66] (only for balanced energy-protein supplementation); Lumley 2009[67] (only in first and second born infants); Garner 2006[78]
Decreased number of admissions to neonatal intensive care units	Dare 2006[114]
Reduced mother-to-child transmission of HIV	Siegfried 2011,[77] Sturt 2010[79]
Reduced risk of infection	Conde-Agudelo 2011[123]
Reduced risk of hypothermia	Conde-Agudelo 2011[123]
Reduced serum bilirubin	Mills 2001[125]
Improved mother-baby interaction	Moore 2012,[95] Conde-Agudelo 2011[123]
Reduced crying	Moore 2012[95]
Breastfeeding initiation and duration improved	see above re breastfeeding outcomes for women
Increased immunisation uptake	Lewin 2010[64]*
Shorter hospital stay for babies	Conde-Agudelo 2011[123]
Fewer babies in SCBU more than 7 days	Duley 2010,[128] Duley 2010[127]

Based on analysis of included reviews (see methods) contributed to the Cochrane Library by the Cochrane Pregnancy and Childbirth Group and interventions in The Partnership for Maternal, Newborn and Child Health Review 2012.[58] RhD=rhesus antigen. SCBU=special care baby unit. *Denotes review of care provided by lay or community health workers.

Table: **Outcomes shown to be improved by midwifery, as defined in this paper**

or both, provided intrapartum care and in-hospital post-partum care under medical supervision), or shared models of care. Khan-Neelofur and colleagues[146] included three randomised trials of 3075 women, one of which was also included by Sandall and colleagues.[29] This trial compared shared midwife or general practitioner-managed care with routine visits to obstetricians in one trial and backup from obstetricians as needed in the other two trials with standard shared care between obstetricians and midwives in two trials and unspecified care in one trial.

Sandall and colleagues[29] reported that women who had midwife-led continuity models of care were less likely to have regional analgesia, episiotomy, and instrumental birth and were more likely to have no intrapartum analgesia or anaesthesia, spontaneous vaginal birth, attendance at birth by a known midwife, and a longer mean length of labour. No differences were noted between groups for caesarean births. Women who were randomly assigned to receive midwife-led continuity models of care were less likely to have a preterm birth and fetal loss before 24 weeks' gestation, although no differences between groups were noted in fetal loss or neonatal death of at least 24 weeks nor in overall fetal or neonatal death. Most included studies reported a higher rate of maternal satisfaction in the midwifery-led continuity care model. Khan-Neelofur and colleagues[146] reported no difference in clinical outcomes measured. However, women in the shared midwife-general practitioner-managed clinics were more satisfied with continuity of care than those in the control group. Sandall and colleagues[29] noted a trend

towards a cost-saving effect of midwife-led continuity models of care compared with other models of care.

Components of midwifery care delivered by community and traditional health workers

We identified five reviews with a total of 109 included studies. Four reviews[62,147–149] included studies in low-income and middle-income countries, and one[64] included studies from low-income, middle-income, and high-income countries. The focus of two reviews[148,149] was training for traditional birth attendants, whereas three reviews[62,64,147] focused on interventions delivered by other community health workers with varying levels of training and support: paid village or auxiliary health workers and unpaid volunteers;[147] lady health workers or visitors, community or village health workers and facilitators;[62] and lay health workers without professional or paraprofessional training.[64] Training and support generally included practices and resources such as clean delivery kits and resuscitation equipment, referral support, and links with other health workers.

The findings of these reviews of community and traditional health workers are very restricted in regard to the contribution of midwifery to the quality of care. Not only were the interventions heterogeneous but also most studies were set in very low-income settings in which women in the control group might have received no care, or very basic care from less trained community workers. None of the reviews compared one trained cadre with another, or compared care offered by community and traditional health workers with professional groups.

In all of the reviews and studies of workforce, the mechanisms underpinning the effectiveness of the care provided were briefly and inconsistently defined.

Scope of practice of midwives

We used the framework to map the scope of practice of trained, licensed, and regulated midwives using competencies of midwives as defined by the International Confederation of Midwives[44] (appendix). All the competencies mapped to one or more components of the framework, and all fell within the first four practice categories, defined by us as the scope of midwifery, showing that midwives meeting these standards practice the full scope of midwifery. One competency, incorporating collaborative working with colleagues, also mapped to management of serious complications and workforce.

Case studies: health system development without midwives

As a final step in our multimethod approach, we examined three case studies from countries where care by midwives has been absent from the health system. These are described in panel 3.

India, China, and Brazil are ranked first, second, and eighth worldwide in annual numbers of births, and combined they account for 35% of all births globally.[170] We purposefully selected them to illustrate countries in transition—they are the three countries with the most rapid economic development since the late 20th century—and where the contribution of midwives was either absent or eliminated in the past.

Despite the diversity of these countries, and recognition of the heterogeneity of circumstances within them, they have common threads that illuminate the consequences of economic development in settings in which midwives have been marginalised or excluded from the health system. The case studies suggest that a focus on facility based and emergency care can result in a reduction in maternal and perinatal mortality. However, without the balancing effect of the full spectrum of midwifery care, this strategy has also resulted in rapidly growing numbers of unnecessary, expensive, and potentially iatrogenic interventions and inequalities in the provision of care and in outcomes. As the case studies show, the prevalence of caesarean sections in Brazil and China is among the highest in the world. India, despite its recent economic development, has a high maternal mortality rate with high inequalities related to poverty. High rates of elective caesarean sections without medical indication are associated with various poor perinatal outcomes,[14,171,–175] and draw scarce resources from community based primary care and prevention. A WHO study[19] identified 3·2 million additional caesarean sections annually were needed in low-income countries, whereas at the same time, about 6·2 million unnecessary caesarean sections were being done in middle-income and high-income countries.

As the case studies show, both China and Brazil have taken steps to reintroduce midwives in recent years, as a strategy to reduce mortality, morbidity, and unnecessary interventions.

Discussion

We used the analyses presented in this paper to develop a new evidence-based framework that describes a system for high-quality maternal and newborn care as a basis for improvements in maternal and neonatal outcomes. Our analyses began, not with the needs of professionals or the health system, but with those described by pregnant and postnatal women. Women's perceptions of their experiences are important in and of themselves,[176] but if systems do not meet their needs, women are less likely to access services and might even reject them altogether.[177] For women, good quality clinical care and improved communication, education, information, and respect from their providers are essential aspects of their care. The combination of these factors is needed to keep them and their newborn infants safe. Low quality services or disrespectful care compromise the health and wellbeing of women and children, and can stall global reduction in maternal and newborn mortality and morbidity.[178]

We developed and tested the framework using a range of sources of evidence. It incorporates the need to balance

Panel 3: Case studies

Brazil and China—reintroducing midwifery to countries in economic transition

We chose these countries since they have shown the most rapid economic development since the late 20th century and together account for 35% of births globally. They have very large and highly developed urban centres, remote rural populations, and large disparities between the rich and the very poor. They have high but falling rates of maternal mortality and some of the highest rates of caesarean section in the world. In India and China, progress in reduction of newborn deaths is slower than expected for their stage of development.[12]

Brazil (52% caesarean section rate in 2010)[150] and urban China (54–64% caesarean section rate in 2008–2010)[151,152] are two contexts where rapid economic growth in recent years has been accompanied by extraordinary increases in interventions, most notably caesarean sections, with growing concerns in each country over the medicalisation of birth and corresponding potential links with an increased maternal or perinatal mortality and morbidity. A 2010 study for WHO[153] identified the two countries as first and second in a global ranking of unnecessary caesarean sections, China: 1 976 606 and Brazil 960 687, with a combined cost per year of over US$553 million. This occurrence has been termed "unnecesareans" in Brazil.[154]

In China, the increase in caesarean sections has been reported to be a result of the national adoption and interpretation of WHO's safe motherhood policy and the Millennium Development Goals (MDGs), resulting in the national policy for hospitalisation of all births.[155] In Brazil, the increases were despite a Ministry of Health regulation in 2000 to reduce the increasing number of caesarean sections;[150] at least some contribution to this is driven by social inequality and relates to women's wish to have a caesarean section to avoid substandard care in labour.[156] Additionally, the underlying trend is towards the increase of caesarean sections without medical indications before labour. In China, caesarean sections without medical indications in some hospitals have grown from 5%[157] in 1990 to 65·6% in 2010.[158,159] China is somewhat unique in that its one-child policy minimises the likelihood of women having several caesarean sections and the associated long-term placental problems. Similar to the situation in China, Brazil's data highlight a ten-fold increase in pre-labour caesarean sections between 1990 and 2010.[160]

The current policy discourses within both countries have now recognised that a continuation of present trends is neither sustainable nor supportive of women's needs. A midwife-led unit established in China in 2008 has succeeded in great reductions in caesarean sections and other forms of medical intervention.[161–163] The success led to further programatic steps to reintroduce midwifery by scaling up midwifery-led units in ten hospitals across the country. China is also reinstating the role of the midwife and striving to increase graduate numbers.[164] In Brazil, a policy initiative by the Ministry of Health launched in March 2011, set up the Stork Network strategy, Rede Cegonha.[150] The Network has a set of measures to guarantee all Brazilians in the public health system appropriate, safe, and humane care from confirmation of pregnancy, through to the first 2 years of the baby's life, by building a network of primary care services for women and children, including 280 midwifery-led birth centres. The Ministry of Health has launched the National Residency Program in Nursing and Midwifery, a federal government initiative to encourage higher-education institutions to promote the training of professionals with expertise in midwifery and nursing to work in the public health system. The initiative aims to enhance the role of midwifery and nursing to provide comprehensive health care of women and children, from the confirmation of pregnancy, to childbirth, post partum, and until the second year of the child's life.

Thus, two of the world's most populous countries have had rapid growth in caesarean sections without medical indications in the past two decades, and then independently began steps to correct an over-reliance on obstetric-led care through enhancement of midwifery-led services. China and Brazil provide a cautionary case study for those developing countries now modelling their maternal and newborn care systems on those of the industrialised countries that rely heavily on costly medical interventions to improve maternal and infant outcomes in birth.

India

India is the leading example among a growing number of countries where there is simultaneous overuse and underuse of interventions. India has 27 million annual births, about one in every five births worldwide. Although India has a relatively large number of midwives, they are not consistently educated to international standards, and they attend fewer than one in six births,[73] with doctors attending most births in urban areas and one fourth in rural areas. The UNICEF 2009 Coverage Evaluation Survey[165] reported an Indian caesarean section rate of 15·1%, almost within the WHO recommended range. However, that overall rate masks enormous disparities within the country. Data from an earlier DHS survey (2005–2006),[166] which reported an 8·5% overall rate, showed mothers in the poorest rural areas had a caesarean rate of 1·5%; and mothers in the wealthiest urban areas had a caesarean rate of 32·1%. Regionally, almost a third of mothers in Kerala (31%) gave birth by caesarean section compared with 2·3% of mothers in Nagaland.[167] The Coverage Evaluation Survey[165] noted a caesarean section rate of 34·6% in private hospitals compared with 12·4% in government hospitals.

India has lost what was once a strong tradition of midwifery-based practice[168] and has been slow to reintroduce it. Midwives have a restricted scope of practice and, over time, experience the associated loss of skills.[169] India is already showing signs of following the model of China and Brazil, with high caesarean rates in wealthy mothers in urban areas, leading to a culture of non-medically indicated caesarean sections. As a rapidly emerging economy, with an improving health infrastructure and reliance on private obstetrical providers, India has obvious parallels to Brazil and China. Whether India will also follow a path of high levels of medical interventions followed by a re-emphasis on midwifery remains to be seen.

community-based preventive and supportive services for all childbearing women and newborn infants with the elective and emergency services needed by those with complications. Our findings are supported by recent empirical data from a multicountry WHO study,[6] suggesting that women need a health system that helps them to stay healthy and care for their families and provides a timely transition to elective and emergency care for those who develop complications.[179] The framework differentiates between what care is provided, how it is provided, and who should provide it, in all settings. As well as offering a context for debate about the care and services that childbearing women and infants need, the framework might have other uses, such as structuring analyses of health system provision, planning new services, or developing an education curriculum, and it can be tested, debated, and further refined for different settings and population groups. It could similarly be analysed using appropriate evidence to describe the scope and effect of obstetrics, family practice, nursing, skilled birth attendance, and community and public health systems.

Specifically, our analyses suggest that midwifery has a particular contribution to make to the quality care identified in the framework in regard to education, information and health promotion; assessment, screening, and care planning; and promoting normal processes and preventing complications in the context of respectful care that is tailored to need and works to strengthen women's capabilities.

Analyses of systematic reviews of the maternal and neonatal care workforce reported several providers active in providing midwifery care, but few benefits when reliance was solely on less skilled health-care workers. Care led by midwives—educated, licensed, regulated, integrated in the health system and working in interdisciplinary teams—had a positive effect on maternal and perinatal health across the many stages of the framework, even when compared with care led by other health professionals in combination with midwives. In the high-income settings in which resource use has been examined, there are indications that midwife-led care for low-risk women and in the context of an interdisciplinary team is a more cost-effective option than medically led care.[29,180] Empirical evidence in low-income and middle-income settings is scarce, but analysis of the competencies of the midwife in relation to our framework shows that competent midwives offer comparative advantages in providing continuity of care across the spectrum needed by women and newborn infants regardless of setting. When midwives work in collaboration as part of interdisciplinary teams providing integrated care across community and hospital settings, they also provide effective midwifery care for women and infants who develop complications.

In low-income and some middle-income settings where there is a shortage of midwives and specialist and general medical practitioners, there is a focus on 'skilled birth attendants',[181] defined as accredited health professionals educated and trained to proficiency in the skills needed to manage uncomplicated pregnancies, childbirth, and the immediate postnatal period, and in the identification, management, and referral of complications in women and newborn infants. The implementation of skilled birth attendants over the past decade has contributed to the overall decrease in maternal mortality.[18] However, its implementation in practice varies widely across countries, and skilled birth attendants have uneven levels of proficiency, restricted scope of practice, and varying levels of training. They might not work across the continuum of care or be trained to deal with unexpected complications, all of which can result in harm.[5,23,182–184]

Findings from our case studies of countries in economic transition show that care led mainly by obstetricians without the balance midwives bring to the health system might reduce mortality and morbidity, but might also reduce quality and increase cost. Beyond the effect on some women and infants of unnecessary interventions, the economic costs of such systems of care are likely to be unsustainable.[19] For example, the cost of unnecessary interventions in maternity care in the USA has been estimated at around $18 billion annually.[185] The case studies also suggest a need for a whole-system solution, rather than a focus on one component of maternal and newborn care, such as the centralisation of services in hospitals in the absence of well developed community-based services. Implementation of midwifery without adequate education, regulation, support, and referral systems is likely to be ineffective, as Van Leberghe and colleagues show in the example of Indonesia in this Series.[38]

The sample size of trials and even meta-analyses in maternal and newborn care are generally too small to provide insights into mortality, especially maternal mortality. To address this, Homer and colleagues, in this Series,[56] use modelling to estimate the effect of midwifery on saving maternal, fetal, and neonatal lives. Our analyses are not designed to identify the scale of the effect of midwifery in different countries; this effect will depend on the resources available, the organisation of services, and the skills and competencies of the workforce. However, we have shown that midwifery can have an effect on specific practices that can save lives, such as the early initiation and support of breastfeeding in the first weeks of life. Continued breastfeeding has the potential to save the lives of hundreds of thousands of infants and to reduce health-care costs.[16,186] Our Review has shown that midwifery can reduce maternal anaemia and infection, including malaria and HIV, and pre-eclampsia and eclampsia. Midwifery therefore has an important contribution to make to meeting international goals for both maternal and newborn mortality and health.[21,22,187]

In common with studies of other complex interventions,[188] the absence of detail included in some of the trials examined restricted our findings. The

characteristics of midwifery and of care offered to the women in control groups were ill-defined and inconsistent, which is likely to dilute the noted effect of midwifery. Recognising these constraints, we used a multimethod approach to maximise the strength and transparency of our analyses.

There is substantial under-investment in research on midwifery and specifically on midwives, and the research has been dichotomised by development status. Studies of care by midwives in low-income and middle-income settings, integrated into the health system and working in teams with medical staff and with properly trained support staff, are an urgent priority. A focus on long-term psychosocial outcomes and clinical outcomes is needed, in view of improved understanding of the links between the mental and physical health of the woman and the health and development of her infant.[189–193] Future research will need resources of a scale that portrays the fundamental importance of midwifery to the short-term, medium-term, and long-term health and wellbeing of women and children in all settings. The achievement of consensus on research priorities will need partnerships between all relevant stakeholders, including the active engagement of service users and advocacy groups.

Conclusion

Despite progress in reducing the numbers of avoidable deaths in pregnancy, birth, post partum, and the early weeks of life, continued success in achievement of internationally targeted reductions in these numbers and meeting new challenges will need a substantial shift in direction. Our analyses have informed the development of a new framework for high-quality, cost-effective maternal and newborn care that can be used for analysis and planning of future services. With the use of this framework, we have shown that midwifery has specific contributions to make with regard to skilled supportive and preventive care for all, promotion of normal reproductive processes, first-line management of complications, and skilled emergency care; all in the context of respectful care that is tailored to need and works to strengthen women's capabilities, and is integrated across facility and community settings. Midwifery was associated with more efficient use of resources and improved outcomes when provided by midwives who were educated, trained, licensed, and regulated, and midwives were most effective when integrated into the health system in the context of effective teamwork and referral mechanisms and with sufficient resources. There are few benefits from relying on less-skilled health-care workers. These findings support a system-level shift from fragmented maternal and newborn care focused on identification and treatment of pathology for the minority, to skilled care for all. Midwifery is pivotal to this approach. Future planning for maternal and newborn care systems can benefit from incorporating the quality framework into workforce development and resource allocation.

Contributors

MJR devised the paper and wrote the first draft of the article, contributed overall leadership to the project, and led revision of drafts. ED, AMcF and AC contributed to the development of the paper and contributed to the writing and revisions. AMcF led the work on the literature reviews. ED, MHB, and NFC developed the case studies, and contributed to the analysis, writing, and revisions. FM contributed to the literature reviews and contributed to the writing and revisions. LW, AM, JC, HK and SD contributed to the development of the paper, including analysis of the literature reviews, writing, and revisions. DD contributed a service user and advocacy perspective, and contributed to the writing and revisions. All authors contributed to the development of the framework, helped to interpret the findings, and undertook reviews and revisions of the paper.

Declaration of interests

We declare no competing interests.

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