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Maternal Health 2

Beyond too little, too late and too much, too soon: a pathway towards evidence-based, respectful maternity care worldwide

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On the continuum of maternal health care, two extreme situations exist: too little, too late (TLTL) and too much, too soon (TMTS). TLTL describes care with inadequate resources, below evidence-based standards, or care withheld or unavailable until too late to help. TLTL is an underlying problem associated with high maternal mortality and morbidity. TMTS describes the routine over-medicalisation of normal pregnancy and birth. TMTS includes unnecessary use of non-evidence-based interventions, as well as use of interventions that can be life saving when used appropriately, but harmful when applied routinely or overused. As facility births increase, so does the recognition that TMTS causes harm and increases health costs, and often concentrates disrespect and abuse. Although TMTS is typically ascribed to high-income countries and TLTL to low-income and middle-income ones, social and health inequities mean these extremes coexist in many countries. A global approach to quality and equitable maternal health, supporting the implementation of respectful, evidence-based care for all, is urgently needed. We present a systematic review of evidence-based clinical practice guidelines for routine antenatal, intrapartum, and postnatal care, categorising them as recommended, recommended only for clinical indications, and not recommended. We also present prevalence data from middle-income countries for specific clinical practices, which demonstrate TLTL and increasing TMTS. Health-care providers and health systems need to ensure that all women receive high-quality, evidence-based, equitable and respectful care. The right amount of care needs to be offered at the right time, and delivered in a manner that respects, protects, and promotes human rights.

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Introduction

The maternal health community has focused on strategies to reduce maternal mortality in low-income and middle-income countries (LMICs), with efforts to address the direct causes of pregnancy-related deaths, increased skilled birth attendance, promotion of facility-births, and assurance of universal access to basic maternal health care.[1,2] These strategies have been partly successful. Globally, an estimated 303 000 maternal deaths occurred in 2015, a 44% reduction from 1990.[3] Over the same period, antenatal coverage increased from 35% to 52%.[4] Skilled birth attendance in LMICs increased from 57% to 70%.[4] By 2013, facility births accounted for 44% of deliveries in LMICs.[5] Nonetheless, maternal mortality and morbidity have not declined as rapidly as hoped, with most countries not reaching Millennium Development Goals targets.[6] Poor maternal quality of care limits gains for improved maternal and perinatal outcomes.[7] A push towards births in facilities that have inadequate staff, training, infrastructure, and commodities, as well as insufficient evidence-based clinical practice, often results in poor quality care.[7] We refer to this care as too little, too late (TLTL). Conversely, the rapid increase in facility use has been accompanied by widespread over-medicalisation of birth, particularly in middle-income countries (MICs). This excessive medicalisation, which we term too much, too soon (TMTS), might offset the gains resulting from improvements in maternal and perinatal health.[8] TLTL and TMTS represent the clinical care aspect of the widening diversity and divergence in maternal health.[8] We suggest that adherence to evidence-based clinical guidelines can help individual practitioners in facilities to avoid TLTL or TMTS. We present results of a systematic appraisal of high-quality global and national clinical practice guidelines (referred to here as guidelines). This review lists recommended and not recommended interventions, as well as recommended interventions that are potentially harmful if overused, and interventions with inconsistent or conflicting recommendations. We also present data from MICs on interventions that are either TLTL or TMTS (low-income[9] and high-income[10] countries have been covered elsewhere). Although we only address maternal health, each evidence-based intervention will also affect fetal and newborn health, as mothers and babies are inextricably linked. Furthermore, newborn guidelines were recently addressed in *The Lancet*'s Every Newborn Series.[11]

Too little, too late

Despite reductions over the past two decades, rates of preventable maternal deaths remain unacceptably high in LMICs, particularly in sub-Saharan Africa and south Asia.[12] The causes are complex and often rooted in

Key messages

- Preventable maternal morbidity and mortality is associated with the absence of timely access to quality care, defined as too little, too late (TLTL)—ie, inadequate access to services, resources, or evidence-based care—and too much, too soon (TMTS)—ie, over-medicalisation of normal antenatal, intrapartum, and postnatal care.
- Although many structural factors affect quality care, adherence to evidence-based guidelines could help health-care providers to avoid TLTL and TMTS.
- TLTL—historically associated with low-income countries—occurs everywhere there are disparities in socio-demographic variables, including, wealth, age, and migrant status. Often disparities in outcomes are due to inequitable application of timely evidence-based care.
- TMTS—historically associated with high-income countries—is rapidly increasing everywhere, particularly as more women use facilities for childbirth. Increasing rates of potentially harmful practices, especially in the private sector, reflect weak regulatory capacity as well as little adherence to evidence-based guidelines.
- Caesarean section is a globally recognised maternal health-care indicator, and an example of both TLTL and TMTS—with disparate rates between and within countries, and higher rates in private practice and higher wealth quintiles. Caesarean section rates are highest in middle-income countries and rising in most low-income countries. Although researchers partly attribute the increase and variable rates to a shortage of clear, clinical guidelines and little adherence to existing guidelines, multiple factors—economic, logistical, and cultural—affect caesarean section rates.
- Quality clinical practice guidelines need to be developed that reflect consensus among guideline developers, using similar language, similar strengths of recommendation, and agreement on direction of recommendations.
- Strategies for enhanced implementation and adherence to guidelines need multisectorial input and rigorous implementation science.
- A global approach that supports effective and sustained implementation of respectful, evidence-based care for routine antenatal, intrapartum, and postnatal care is urgently needed.

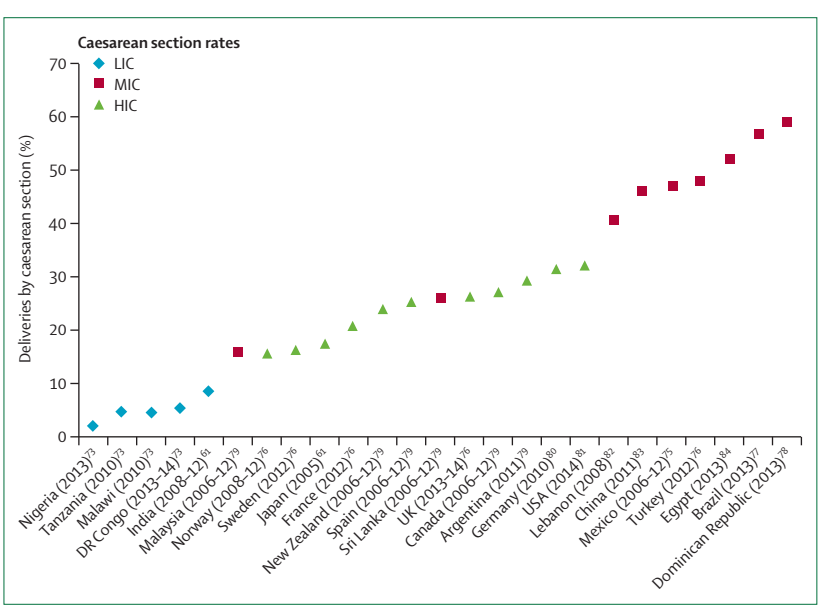

Figure: **Country-specific caesarean section rates in high-income, middle-income, and low-income countries**
LIC=low-income country. MIC=middle-income country. HIC=high-income country.

structural health-system deficiencies, such as insufficient equipment, supplies, and drugs, which prevent health-care providers (referred to here as providers) from delivering even the simplest and most cost-effective evidence-based interventions.[13–20] Inadequate numbers of skilled providers, insufficient training,[18,21–25] or an absence of guidelines for evidence-based care can be a problem even when commodities are available.[26,27] A range of geographical, social, and economic barriers might prevent women from accessing available care.[28] This situation has been the focus of multiple papers, studies, programmes, and policies.[1,9,29–31]

Stark disparities have also been reported within countries, in which the burden of maternal morbidity and mortality is often concentrated among vulnerable women.[8,32] Women can be disadvantaged in access to health care and have worse outcomes owing to poverty, geography, little or no financial protection, age, and marital or migrant status.[33–35] These differences have been linked to insufficient (or providers' differential adherence to) evidence-based care.[36–38] Even in countries in which most of the population has access to well-resourced services, such as most high-income countries (HICs), many marginalised subpopulations continue to experience a range of inequities in maternal health.[10,39,40] In 2010, black women in New York City were more likely to die in childbirth (56 of 100 000)[41] than were women in MICs such as North Korea (54 of 100 000)[42] and Vietnam (54 of 100 000).[42] Migrant status is an exemplar of TLTL in HICs[10] and LMICs. Recognition of the vulnerabilities of refugee and migrant women is a pressing concern, with unprecedented global numbers of internally and externally displaced women—notably the millions fleeing Syria.[38,43–45] Migration affects maternal care in sending countries (LMICs) and receiving countries (often other LMICs), and frequently results in increased maternal mortality and morbidities. Indigenous women within non-indigenous majority populations have higher maternal mortality than do non-indigenous women[46–50] (appendix, p 1).

Evidence-based care should apply to all women, regardless of background. It should include respect for women's circumstances, rights, and choices, as well as close attention to screening for diseases or conditions, which might be more prevalent among refugee, migrant, marginalised, or indigenous groups.[51]

Too much, too soon

Although TLTL remains a global public health problem, the rapid increase in facility births has introduced new challenges. In many facilities, over-medicalisation of childbirth is common practice, and can include excessive or inappropriate use of interventions. For some of these interventions, no evidence of benefit exists, or there is evidence of harm (eg, continuous electronic fetal monitoring,[52] episiotomies,[53] or enemas on admission for labour).[54] TMTS also includes interventions that improve

outcomes in some contexts, but are potentially harmful and costly when used inappropriately or routinely. For example, although induction and augmentation can be effective (or even life-saving) procedures when indicated, their overuse (without a clear medical indication) has been associated with uterine rupture, perineal lacerations, anal sphincter injury, and uterine prolapse.[55,56] Unnecessary use of interventions can be costly for health systems—a particular problem in LMICs in which resources for maternal health are often scarce. These costs can be compounded if overuse of interventions causes avoidable harm[57] or increases the need for additional interventions.

In many HICs and a growing number of LMICs passing through the obstetric transition—shifting from high to lower maternal mortality, and from direct to indirect causes of maternal mortality[58]—trends towards excessive, unnecessary, or inappropriate use of obstetric interventions in health facilities are a cause for concern. Examples include unnecessary ultrasound examinations,[59] routine continuous cardiotocography,[52] routine episiotomy,[53,60] non-medically indicated caesarean sections,[61] and high rates of labour induction and augmentation.[62,63] In Brazil, longitudinal studies have reported a temporal association between both increased labour inductions (from 2·5% to 43·0%) and increased caesarean section rates (from 27·6% to 43·2%) with increased preterm birth rates (6·3% to 16·2%), without any concomitant improvement in neonatal mortality.[64] Evidence shows that women are frequently not informed of the risks, nor have they given informed consent to use of these interventions.[65] High rates of induction of labour are strongly suggestive of TMTS.[5,66] In a study conducted in LMICs, induction rates in facilities ranged from 8·7% (Tanzania) to 37·9% (Benin).[67] In a World Health Organization (WHO) survey, induction rates ranged from 1·4% (Niger) to 35·5% (Sri Lanka).[56,63]

Caesarean section is a globally monitored maternal health-care indicator and an example of an intervention that can be TLTL or TMTS, with disparate rates between and within countries.[68–70] Low-income countries (LICs)—especially in sub-Saharan Africa—have historically had very low caesarean section rates, probably reflecting inadequate availability,[71–73] whereas HICs generally have higher caesarean section rates, indicating overuse.[74] The highest caesarean section rates globally are seen in MICs: Mexico (46·9%),[75] Turkey (48·0%),[76] Egypt (51·8%), Brazil (56·7%),[77] and the Dominican Republic (58·9%)[78] (figure). High rates are often seen in LMICs in private practice and among women in upper wealth quintiles (panel 1; appendix, pp 2–3), and might be masked in national averages that seem reasonable if rates in other groups of women are very low.

Globally, caesarean section rates are rising, and medically unnecessary caesarean sections are prevalent.[61,114] According to WHO, 18·6% of women globally were giving birth by caesarean section by 2016,[90] with rates in many LMICS rising precipitously, particularly in urban areas.

Respectful maternity care

Evidence-based maternal care in facilities should include care that is humane and dignified, and delivered with respect for women's fundamental rights. International maternal-health organisations have increasingly highlighted

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Panel 1: Caesarean sections

Inequalities in caesarean section rates within and between countries are substantial, reflecting TLTL and TMTS. Low (<9%) caesarean section rates—indicators of TLTL—have been associated with increased maternal and perinatal mortality and morbidity.[71] Low caesarean section rates are found in LICs, particularly those with low rates of facility births, deficiencies in transport, surgical facilities, surgical and anaesthesia personnel and equipment, and blood transfusion capacity, and a shortage of skilled attendants.[29,73,85–88] Overuse of caesarean section for non-medical indications—TMTS—has been associated with increased rates of maternal and newborn adverse outcomes in a WHO multicountry survey.[89] Additionally, unnecessary caesarean sections add financial costs for health systems and individuals, and create barriers to universal health coverage.[61]

Globally, caesarean section rates are rising in nearly every country and region, with 40·5% of all births being by caesarean section in Latin America and the Caribbean, and increases in some LICs in sub-Saharan Africa (figure).[90] However, national caesarean section rates obscure wide ranges within countries, as well as variations within facilities by providers.[91,92] When stratified by insurance status,[93,94] public or private financing,[95–100] and wealth quintile,[29,73,86] these rates can differ widely (appendix, pp 2–4), and disparities exist in multiple factors, including providers' practice differences at facility and individual levels, financial incentives (private providers), and inadequate adherence to clear evidence-based guidelines.[101] For example, although Nigeria and India have overall low coverage of caesarean section (<10%), indicating TLTL, they have the highest ratios between wealth quintiles, suggesting TMTS for wealthy women. Furthermore, hospital-level variations in caesarean section rates within countries have been found, even within the same socio-demographic or economic groups.[102] These differences might reflect a failure to adhere to—or absence of—clear evidence-based guidelines at the individual or facility level.[101]

What is the appropriate caesarean section rate at the population level, avoiding TLTL and TMTS? In 2015, WHO published a statement on caesarean section based on systematic reviews of ecological studies, noting that when population-based caesarean section rates increase above 15%, neither maternal or neonatal mortality rates improve.[71,103,104] Another review slightly extends the limit of observed benefit to 19%.[105]

In 2010, an estimated 3·5–5·7 million unnecessary caesarean sections were done in HMICs, whereas 1–3·5 million caesarean sections were needed, but not performed in LICs[61]—an indication of global extremes (figure). However, this range might not be relevant to facilities in which the case mix varies.[71] WHO identified the Robson classification[106] as a useful tool for assessment of caesarean section rates nationally and at health facility levels.[72,103,107] A 2015 WHO paper proposed a mathematical model to generate expected caesarean section rates for individual health facilities and systems. The C-model[108] is based on clinical-obstetric characteristics, providing a reference for adequate or excessive use of caesarean section. Such a tool could potentially help facilities and individual providers to optimise caesarean section use.

Although there are a multitude of social, economic, and health-system factors associated with caesarean section use, we focus only on clinical interventions to address caesarean section rates, such as trials of vaginal birth after caesarean section. Global organisations are creating guidelines for interventions to reduce caesarean section rates,[91,109–113] but the evidence is insufficient for most strategies.[92] More research is urgently needed on interventions for appropriate labour management to reduce unnecessary caesarean section and increase vaginal birth after caesarean section rates, thus avoiding TMTS.

TLTL=too little, too late. TMTS=too much, too soon. LICs=low-income countries. HMICs=high-income and middle-income countries.

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See Online for appendix

Panel 2: Interventions recommended for use

Antenatal period

Early detection and treatment for complications and diseases

- Assess maternal health status by maternal weight measurement and body-mass index at admission, and clinical screening for deep vein thrombosis and maternal oedema at each antenatal visit
- Assess the presence of fetal heartbeats at each antenatal visit
- Screen for mental health problems (including depression and anxiety disorders), alcohol and drug misuse, and psychosocial risk
- Routinely test for ABO and D rhesus status, and screen for irregular red cell antibodies
- Screen for pre-eclampsia by clinical risk assessment at admission, routine blood pressure measurement, and proteinuria at each antenatal visit
- Screen for intrauterine growth restriction by routine fundal height measurement of the uterus at each antenatal visit
- Screen for gestational diabetes by 50 g or 75 g 2-h oral glucose tolerance test at 24–28 weeks' gestation
- Request serological screening for maternal infections: HIV, syphilis, hepatitis B, and rubella
- Screen for asymptomatic bacteraemia by urine culture at first visit
- Screen for anaemia with haemoglobin and haematocrit obtained as part of a full blood assessment at first visit
- Screen for cervical cancer with smear test
- If available, offer a first trimester ultrasound for gestational dating
- Offer, through an informed counselling process, the option of a prenatal screening test for the most common clinically significant fetal aneuploidies in addition to a second trimester ultrasound for dating, assessment of fetal anatomy, and detection of multiples
- Manage common symptoms during pregnancy, such as nausea and vomiting, heartburn, constipation, haemorrhoids, and back and pelvic pain

Disease prevention

- Prevent neural tube defects by supplementation with folic acid (400 µg/day) from preconception and until the 12th week of pregnancy
- Prevent pre-eclampsia by calcium supplementation (at least 1 g/day) in women with low dietary calcium intake
- Prevent spontaneous immunisation of Rh-negative women by anti-D immunoprophylaxis at 28 weeks
- Offer vaccines for influenza and tetanus (or tetanus, diphtheria, and acellular pertussis)

Health promotion

- Provide information about normal course of pregnancy, including breastfeeding if possible, by written material
- Advise about healthy lifestyle, including exercise for maintenance of fitness, abstention from drinking alcohol, smoking cessation or reduction, dental care, and mental health
- Provide information about consumption of well cooked meat, drinking water and food preparation hygiene, washing hands after gardening and handling of animals (cats), to prevent toxoplasma infection and other infectious diseases

Organisation of antenatal care

- Coordinate an integrated antenatal care plan with a group of professionals (including mental health) with whom the mother is comfortable, ensuring that everyone involved in a woman's care is trained and appropriately accredited for their responsibilities
- Provide women with normal course of pregnancy antenatal-care models led by midwives, family doctors, trained nurses, or professionals who specialise in maternal and perinatal care
- Establish the timing and number of antenatal care visits for low-risk pregnancies, in a safe environment, with a clear reference system for timely referral of women who require additional care
- Use structured antenatal care records, informed consent procedures for interventions, and auditable records

Intrapartum period

Respectful care and communication and birth companions

- Offer women the possibility of being cared for by a midwife; provide one-to-one continuous supportive care
- Allow and encourage women to have a birth companion of their choice
- Treat every woman with respect, provide her with all information about what she might expect, ask her about her expectations, and involve her in the decisions about her care

Assessments and monitoring of labour progress, and maternal and fetal health

- Perform vaginal examination every 4 h
- Routinely assess the frequency of uterine contractions every 30 min
- Routinely assess maternal pulse every hour, maternal blood pressure and temperature every 4 h, and frequently assess passing of urine
- Consider the psychological and emotional needs of the woman
- Offer intermittent auscultation of the fetal heart rate to women in established first stage of labour in all birth settings (recommendations include frequency, timing, and recording)
- Consider using a partograph; use a 4-h action line to monitor the progress of labour during second stage
- Document the presence or absence of substantial meconium-stained fluid when membranes rupture (waters break)

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Pain relief

- Assess the labouring woman's pain level and her desire for non-pharmacological and pharmacological approaches to pain relief
- Encourage women to adopt any upright position they find comfortable throughout labour
- Advise women that breathing exercises, immersion in water, and massage might reduce pain during first stage of labour, and that breathing exercises and massage might reduce pain during second stage of labour
- Ensure the availability of opioids (eg, pethidine, diamorphine) in all birth settings; inform women about their side-effects; if opioids are used for pain relief, provide antiemetics in case of nausea or vomiting
- Ensure the availability of nitrous oxide (1:1 mixtures with oxygen) for pain relief in all birth settings; inform women about its side-effects
- In obstetric units, ensure the availability of regional analgesia; inform women about risks and benefits and potential implications of epidural analgesia during labour; provide regional analgesia for women who request it (including recommendations for drugs, dosing, maintenance, co-interventions, and precautions); ensure intravenous access before initiation of analgesia

Care during first-stage and second-stage labour

- Routine hygiene measures taken by staff caring for women in labour, including standard hand hygiene and single-use non-sterile gloves, are recommended to reduce cross-contamination between women, babies, and health-care professionals
- Allow and encourage women to drink water, juice, or isotonic drinks, and eat light meals or snacks during labour
- Encourage and help women to move and adopt any position they find most comfortable throughout labour and childbirth, except supine or semi-supine
- Inform women that in the second stage they should be guided by their own urge to push

Care during third-stage and fourth-stage labour

- Inform women that active management of third stage prevents post-partum haemorrhage
- Oxytocin (10 IU, intravenously or intramuscular) is the recommended drug for prevention of post-partum haemorrhage
- Ergometrine or 600 µg of oral misoprostol can be used as an alternative if oxytocin is not available
- Delayed cord clamping (done 1–3 min after birth) is recommended for all births while initiating essential newborn care
- Early cord clamping (<1 min after birth) is not recommended unless the neonate is asphyxiated and needs to be moved immediately for resuscitation
- Cord traction and palpation should be used after cord clamping in settings with skilled birth attendants
- Encourage women to have skin-to-skin contact with their babies as soon as possible after birth
- Avoid woman–baby separation before the first hour following birth, unless at the mother's request; delay postnatal routine procedures (eg, weighing, bathing, and measuring); monitor the neonate's condition during skin-to-skin contact
- Encourage and support breastfeeding initiation within first hour

Postnatal period

Respectful care

- Provide individualised, culturally and contextually appropriate care, responsive to changing needs, and based on individual care plan

During postnatal facility stay

- Following an uncomplicated vaginal delivery, women are advised to stay at least 24 h in the facility
- Evaluate post-partum bleeding, maternal blood pressure, and document urine void
- Evaluate perineal healing and look for signs of infection to identify and treat puerperal infection or sepsis (refer when necessary)
- Provide pain relief
- Ask women about headache, assess bowel movements, and promote early mobilisation to prevent thrombosis
- Facilitate rooming-in (mother and baby should stay in the same room 24 h a day) and promote parent participation in educational activities related to newborn babies' health
- Anti-D immunoglobulin should be offered within 72 h to every non-sensitised Rh-D-negative woman following miscarriage or birth of a positive baby
- Evaluate rubella immunisation and offer immunisation

At discharge from health facility

- At time of discharge from health facility, provide information about danger signs for the mother and baby, and counsel women on adequate nutrition, hygiene, handwashing, and safe sex
- Provide iron and folic acid supplements for 3 months
- Promote excusive breastfeeding from birth until 6 months of age; observe breastfeeding technique before hospital discharge
- In malaria endemic areas, advise mother to sleep together with the baby under insecticide-impregnated bednets

Organisation and content of postnatal care after discharge

- Recommend two to three post-partum visits after facility discharge
- At each post-partum visit, provide information about danger signs for the mother and baby, and counsel women on adequate nutrition, hygiene, handwashing, and safe sex

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- Ask about dyspareunia and resumption of sexual intercourse, and recommend pelvic floor exercises
- Assess mental health and wellbeing or post-partum depression using screening questions
- Explore social support and assess for signs of domestic abuse
- Promote excusive breastfeeding from birth until 6 months of age; mothers should be counselled and provided with support for exclusive breastfeeding at each postnatal contact
- In malaria endemic areas, advise mother to continue to sleep together with the baby under insecticide-impregnated bednets

Family planning

- Provide family-planning counselling to all women during the post-partum period
- All women who are breastfeeding and less than 6 weeks post partum can use progesterone-only oral contraceptives and levonorgestrel or etonogestrel implants
- Breastfeeding women between 6 weeks and 6 months post partum opting for hormonal contraception can use progesterone-only oral contraceptives, progesterone-only injectable contraceptives, and levonorgestrel and etonorgestrel implants
- Breastfeeding women more than 6 months post partum opting for hormonal contraception can use combined oral contraceptives
- Women not breastfeeding less than 21 days' post partum should not use combined hormonal oral contraception; if they have no risk factors for venous thrombosis, they can begin combined hormonal oral contraception after day 21; however if they are at risk for venous thrombosis, they should not begin combined hormonal oral contraception until after day 42

References given in appendix.

this approach, known as respectful maternity care.[115–120] A systematic review[121] for *The Lancet*'s Midwifery Series identified that women value not only appropriate clinical interventions, but relevant, timely information and support so they can maintain dignity and control. Respectful application of evidence-based guidelines with attention to women's individual, cultural, personal, and medical needs is essential for universal access to quality maternal care.

The need to promote and ensure respectful maternity care has evolved from growing recognition of mistreatment, abuse, disrespect, and neglect of women giving birth in facilities.[122] Mistreatment and quality of clinical care are closely interlinked—many women who experience disrespect and abuse during childbirth might also be subjected to poor standards of clinical care. Furthermore, women who experience mistreatment report they are less likely to return to facilities for future births.[28] Guaranteed provision of respectful maternity care requires efforts to respect and support providers as well as women and families.[123] Use of evidence-based guidelines to tackle TMTS and TLTL needs to be coupled with efforts to ensure that respect and dignity are integral parts of the good quality care that women should receive throughout pregnancy, childbirth, and the postnatal period. These efforts need to be reflected in the health facility and systems as well as in guidelines.

For example, one indicator of respectful, evidence-based care is for women in labour to be allowed and encouraged to have a birth companion of their choosing,[124] which has been proven to improve maternal and newborn health outcomes, and is strongly recommended by WHO.[125]

However, this practice is still not prevalent in publicly funded maternity hospitals in most LMICs. Data from Argentina (City and Province of Buenos Aires) and Brazil showed that continuous companionship during labour and childbirth was as low as 18%.[126] However, 67% of women surveyed in Argentina expressed that they would have wanted a companion.[127] Having a companion is not only a clinical intervention, but requires adaptations to the labour wards to ensure all women privacy.

Clinical practice guidelines

Achievement of Sustainable Development Goal 3.1[128]—a target of less than 70 maternal deaths per 100 000 livebirths by 2030—requires action on TLTL and TMTS. The global increase in facility births presents an opportunity to decrease maternal morbidity and mortality and reduce health inequities. To allow this opportunity to yield the largest effects, providers and women need universal access to evidence-based interventions, so that effective, respectful care can be delivered. Evidence-based interventions use the best available research to guide women's and providers' decision making and optimise maternal, fetal, and newborn outcomes. Guidelines based on this evidence, together with effective implementation strategies,[129–131] have the potential to assist providers to make the right decisions at the right time, and avoid the harmful extremes of TLTL and TMTS.

Guideline classifications

We systematically reviewed evidence-based high-quality guidelines for routine maternity care to identify what interventions and practices are promoted or discouraged for routine care of women at health facilities. We defined intervention or practice as any practice, drug, device, screening test, diagnostic test, therapy, or organisation of management of routine facility-based maternity care. Details on the methods can be found in the appendix (pp 5–6). Three groups of experts in antenatal, intrapartum,

and postnatal care extracted recommendations on interventions for maternity care found in the highest-quality guidelines, and divided them into two groups: recommended-for (the recommendation states that a certain intervention should be used) and recommended-against (the recommendation states that a certain intervention should not be used). Guidelines often use different systems and terminology for development

Panel 3: Interventions recommended against use

Antenatal period

Early detection and treatment for complications and diseases

- Routine prenatal breast examination is not recommended because no evidence supports its effectiveness in promotion of breastfeeding, breast cancer detection, or satisfaction with antenatal care
- Routine ultrasound after 24 weeks of pregnancy, routine umbilical Doppler ultrasound, routine non-stress-test cardiotocography, routine biophysical profile, and routine fetal movement monitoring using specific alarm limits in low-risk women with normal pregnancies are not recommended because they have no associated maternal or perinatal benefit
- Serological tests such as placental growth factor, inhibin A, soluble Fms-like tyrosine kinase, vascular endothelial growth factor, soluble endoglin or serpin, urinary albumin–creatinine ratio, or Doppler ultrasound velocimetry of the uteroplacental circulation are not recommended for prediction of pre-eclampsia, until such screenings have been shown to improve pregnancy outcomes
- Routine screening for preterm delivery with tests such as serum chorionic gonadotropin, serum C-reactive protein, levels of cervicovaginal fetal fibronectin, measurement of cervical length by transvaginal ultrasound or by repeated digital cervical screening (pelvic examination) has no proven effects in prediction of the risk of preterm delivery in pregnant women with normal pregnancies
- Screening for gestational diabetes with 75 g 1-h oral glucose tolerance test is not recommended because no established criteria exist for the diagnosis of diabetes based on the 1-h post-load value
- Maternal age alone should not be used as a basis for recommendation of invasive testing when non-invasive prenatal screening for aneuploidy is available. First trimester nuchal translucency should not be offered as a screen without biochemical markers in singleton pregnancies
- Routine screening for infections such as bacterial vaginosis, chlamydia trachomatis, cytomegalovirus, parvovirus B19, or intestinal parasitism is not recommended for low-risk asymptomatic pregnant women
- Routine treatment of periodontal disease is not recommended to reduce the incidence of preterm birth, low birthweight, restriction of fetal growth, or premature rupture of membranes
- Rutosides are not recommended during pregnancy to improve symptoms of haemorrhoids
- Monitoring of pregnant women for anti-A and anti-B immune antibodies is not recommended

Disease prevention

- Prescriptions of medications such as antihypertensive drugs, diuretics, heparin, nitric oxide donors, prostaglandin precursors, progesterone, or coenzyme Q10 are not recommended for pre-eclampsia prevention
- Prescriptions of nutritional interventions such as dietary salt restriction, fish oil, lycopene, or nutritional supplementation with folic acid, magnesium, vitamins C and E, or zinc are not recommended for pre-eclampsia prevention
- Hypocaloric diets for weight loss or weight maintenance in pregnant women who are overweight or exhibiting excessive gain during pregnancy are not recommended because they have not been found to have any beneficial effect on maternal health and might cause fetal damage
- Nutritional and dietary supplemental strategies for the prevention of fetal growth restriction are not effective and are not recommended
- Replacement of iron and folic acid with multivitamins to reduce maternal anaemia during pregnancy is not recommended in normal pregnancy
- Vaccination of pregnant women against hepatitis B to prevent infection in the neonate is not recommended; vaccination of pregnant women with viable vaccines such as chickenpox is not recommended because the adverse effects of live attenuated virus have not been sufficiently studied
- Immunoprophylaxis with anti-D immunoglobulin in an RhD-negative women with an RhD-negative partner is not required, provided that paternity has been ensured by a private interview with the woman

Health systems management

- Routine involvement of obstetricians or gynaecologists in the care of women with normal course of pregnancy is not recommended for improvement of perinatal results
- An antenatal care programme with a reduced number of visits (fewer than five) is not recommended because it is associated with increased perinatal mortality

Intrapartum period

Assessments and monitoring of labour progress, and maternal and fetal health

- Do not carry out a speculum examination if membranes have certainly ruptured
- Do not perform cardiotocography on admission for low-risk women in suspected or established labour in any birth setting as part of the initial assessment
- Do not perform routine fetal pulse oxymetry
- Do not make any decision about a woman's care in labour on the basis of cardiotocography findings alone

(Panel 3 continued from previous page)

Pain relief

- Do not offer transcutaneous electrical nerve stimulation to women in established labour
- Do not offer lidocaine spray to reduce pain in the second stage of labour
- Do not offer or advise aromatherapy, yoga, acupressure, acupuncture, or hypnosis, or water papules for pain relief
- Do not offer either H2-receptor antagonists or antacids routinely to low-risk women

Care during first and second stage

- Do not offer or advise clinical intervention if labour is progressing normally and the woman and baby are well (including amniotomy and oxytocin augmentation, even in women with epidural analgesia)
- Discourage the woman from lying supine or semi-supine in the second stage of labour
- Do not perform routine perineal shaving or enemas
- Do not perform perineal massage in the second stage of labour
- Do not carry out a routine episiotomy during spontaneous vaginal birth
- Do not perform Kristeller manoeuvre

Postnatal period

- Palpation or measurement of uterus in absence of abnormal bleeding is not recommended
- Routine use of antibiotics in low-risk women with a vaginal delivery for endometritis prophylaxis is not recommended
- Aspirin for thromboprophylaxis is not recommended
- Vitamin A supplementation for the prevention of maternal and infant morbidity and mortality is not recommended

References given in appendix.

and formulation of recommendations, therefore we classified all extracted recommendations based only on direction, regardless of other factors (such as the strength of the recommendation or quality of supporting evidence).

	Induction of labour	Augmentation with oxytocin	Caesarean section	Episiotomy
East Asia and Pacific				
China	7·0% (2010–11), 6·4% (2007–08)	1·1% (2007–08)	27·0% (2007–14), 47·2% (2010–11)	44·9% (2002), 82·0% (2001)
Indonesia	25·5% (2006)	18·3% (2006)	12·9% (2012)	53·5% (2005)
Laos	..	..	3·7% (2012)	..
Malaysia	..	..	16·0% (2006–12)	46·0% (2005)
Mongolia	12·8% (2010–11)	..	23·4% (2013), 25·9% (2010–11)	..
Philippines	3·8% (2010–11), 4·3% (2007–08)	25·0% (2007–08)	10·0% (2013), 24·7% (2010–11)	63·7% (2005)
Samoa	..	..	12·8% (2009)	..
Solomon Islands	..	..	6·2% (2007)	..
Thailand	6·1% (2010–11), 8·3% (2007–08)	7·1% (2004–05)	32·0% (2012), 39·1% (2010–11)	91·8% (2005)
Timor–Leste	..	..	2·1% (2009–10)	..
Vietnam	10·6% (2010–11), 5·7% (2007–08)	4·4% (2007–08)	27·5% (2014), 41·6% (2010–11)	..
Europe and central Asia				
Albania	..	..	34·1% (2013)	..
Armenia	..	..	23·8% (2013)	..
Azerbaijan	..	..	17·0% (2013)	..
Belarus	..	..	26·6% (2013)	..
Bosnia and Herzegovina	..	..	24·1% (2013), 13·9% (2012)	..
Bulgaria	..	..	36·0% (2013)	..
Georgia	..	..	37·1% (2013)	17·4% (2003)
Kazakhstan	..	..	15·1% (2013)	..
Kyrgyzstan	..	..	9·2% (2013)	..
Macedonia	..	..	22·2% (2010)	..

(Table 1 continues on next page)

We categorise interventions as recommended-for or recommended-against. We also refer to conflicting recommendations—ie, interventions that are inconsistently recommended-for or recommended-against even in high-quality guidelines. The final category is recommended-for, but potentially harmful (if overused or used without clinical indication)—this category describes interventions, such as induction of labour, which can be life saving, but increase risk if used routinely. We have not conducted any critical appraisal of the evidence supporting the interventions recommended in the selected guidelines, as this was not within the scope of the review.

Intervention recommendations for women in facilities

Three groups of expert reviewers identified 51 high-quality evidence-based guidelines from 163 guidelines from 2010–15, described with their composite AGREE II scores in the appendix (pp 7–12). The selected guidelines included recommendations for antenatal (25), intrapartum (15), and postnatal (19) care. Seven guidelines were issued by WHO and one jointly by WHO, the International Federation of Gynecology and Obstetrics (FIGO), and the national obstetrics and gynaecology societies of the USA, Canada, UK, and Germany. The remaining guidelines were developed by governmental and non-governmental organisations from HICs and MICs (Argentina, Australia, the Basque Country, Brazil, Canada, Colombia, Ecuador, Italy, Japan, New Zealand, Norway, Scotland, Spain, UK, and the USA). We found no guidelines meeting our criteria that were developed by LICs.

We extracted 78 individual or groups of interventions recommended for use in routine antenatal (25), intrapartum (28), and postnatal (25) care in low-risk women attended at health facilities (panel 2). 14 recommended-for interventions for antenatal care were related to assessments and diagnostic and screening procedures of maternal and perinatal

pregnancy complications, four were for prevention of specific pregnancy complications, three for health promotion, and four for organisation and content of antenatal care. For intrapartum care, we identified three interventions for respectful care, seven for assessment and monitoring of the progress of labour and maternal and fetal health, six for pain relief, and 12 for specific care of the different stages of labour. For postnatal care, we identified one recommended-for intervention for respectful care, eight for assessment and care of the mother and the baby during postnatal stay at health facilities, four for care at discharge, seven for organisation and content of postnatal care visits, and five for family planning.

We identified 37 individual or groups of interventions which guidelines recommended were not used in routine maternity care (panel 3). Of 19 recommended-against antenatal care interventions, ten concerned assessments and diagnostic and screening procedures of maternal and perinatal complications, seven were for prevention of specific pregnancy complications, and two were for organisation of antenatal care. Of 14 recommended-against interventions for intrapartum care, four interventions regarded assessment and monitoring of the progress of labour and maternal and fetal health, four were for pain relief, and six were for specific care in the different stages of labour. We identified four recommended-against interventions for postnatal care.

Some interventions had conflicting recommendations among different guidelines (appendix, p 14), and were recommended-for in some guidelines and recommended-against in other guidelines—even when the guidelines were concurrently published, albeit in different countries.

Coverage rates of interventions in MICs

To determine levels of underuse (TLTL) or overuse (TMTS), we searched for national, regional, or population-based MIC coverage rates of six intrapartum interventions that are recommended, but potentially harmful if overused or used routinely (table 1). We obtained coverage data for induction of labour (24 countries, range 1·8–71·0%), augmentation with oxytocin (15 countries, 1·1–78·9%), routine amniotomy (Iran, 83·3% [data not shown in table]),[132] caesarean sections (81 countries, 2·1–58·9%), and episiotomy (11 countries, 17·4–91·8%). We found no data for continuous cardiotocography.

We searched for data for two recommended-against postnatal interventions as evidence of TMTS: routine administration of oral uterotonics after the third stage of labour and routine administration of antibiotics after normal vaginal birth (appendix, p 13). Only six countries had national level data for routine postnatal uterotonics (range 17·5–92·0%). Rates of routine postnatal antibiotic use were available from five countries (1·2–60·6%).

We searched for coverage rates of four interventions recommended for routine intrapartum and postnatal care

	Induction of labour	Augmentation with oxytocin	Caesarean section	Episiotomy
(Continued from previous page)				
Moldova	..	..	9·1% (2005)	..
Montenegro	..	..	23·6% (2010)	..
Romania	..	..	40·1% (2013)	..
Serbia	..	..	26·8% (2012)	..
Tajikistan	..	..	4·6% (2012)	..
Turkey	..	..	50·3% (2013)	..
Turkmenistan	..	..	6·6% (2012)	..
Ukraine	..	..	16·9% (2013)	..
Uzbekistan	..	..	11·0% (2013)	..
Latin America and the Caribbean				
Belize	..	..	28·9% (2011)	..
Bolivia	..	..	19·5% (2008)	..
Brazil	38·6% (2010–11)	..	56·7% (2013)	..
Colombia	..	..	43·4% (2012)	..
Costa Rica	..	..	21·9% (2013)	..
Cuba	20·0% (2004–05)	..	12·2% (2004–05)	..
Dominican Republic	..	..	58·9% (2013)	..
Ecuador	12·2% (2010–11)	..	45·4% (2010–11)	..
El Salvador	22·6% (2006)	18·8% (2006)	29·8% (2013)	..
Guatemala	..	..	16·3% (2008)	..
Guyana	..	..	13·7% (2009)	..
Honduras	10·5% (2006)	32·3% (2006)	19·4% (2011–12)	..
Jamaica	..	..	21·2% (2011)	..
Mexico	10·4% (2010–11), 11·8% (2004–05)	..	46·9% (2014)	..
Nicaragua	13·4% (2010–11), 17·1% (2006)	4·5% (2007–08), 32·1% (2006)	29·7% (2011–12), 43·1% (2010–11)	..
Panama	..	..	27·7% (2013)	..
Paraguay	1·8% (2010–11), 7·2% (2004–05)	..	46·3% (2010–11), 33·1% (2008)	..
Peru	5·2% (2010–11), 5·0% (2004–05)	..	26·5% (2013), 41·0% (2010–11)	..
Suriname	..	..	19·0% (2010)	..
Middle East and north Africa				
Algeria	6·8% (2004–05)	15·3% (2004–05)	16·3% (2012), 9·1% (2004–05)	..
Egypt	..	..	55·5% (2014)	..
Iran	71·0% (2011–12)	75·0% (2011–12)	47·9% (2009)	79·2% (2011–12)
Iraq	..	..	22·2% (2011)	..
Jordan	..	..	29·9% (2012)	..
Lebanon	..	..	23·2% (2004)	..
Morocco	..	..	16·0% (2011)	..
Tunisia	..	..	26·7% (2012)	..
Yemen	..	..	4·8% (2013)	..
South Asia				
Bangladesh	..	..	17·1% (2011), 11·2% (2005–11)	..
Bhutan	..	..	12·4% (2010)	..
India	11·8% (2010–11), 12·8% (2007–08)	78·9% (2011), 2·3% (2007–08)	19·2% (2010–11)	45·0% (2003)
Maldives	..	..	41·1% (2011)	..

(Table 1 continues on next page)

	Induction of labour	Augmentation with oxytocin	Caesarean section	Episiotomy
(Continued from previous page)				
Pakistan	10·7% (2010–11)	..	15·9% (2012–13), 34·6% (2010–11)	..
Sri Lanka	35·2% (2010–11), 35·5% (2007–08)	2·9% (2007–08)	31·0% (2007–14), 30·5% (2012)	..
Sub-Saharan Africa				
Angola	6·6% (2010–11), 5·0% (2004–05)	5·9% (2007–08)	12·7% (2010–11)	..
Cameroon	..	..	4·4% (2011)	..
Democratic Republic of the Congo	..	..	5·9% (2011–12)	..
Côte d'Ivoire	..	..	3·1% (2011–12)	..
Gabon	..	..	10·5% (2012)	..
Ghana	..	..	11·4% (2011), 6·4% (2008)	17·4% (2003)
Kenya	8·6% (2010–11), 3·9% (2004–05)	3·6% (2007–08)	23·2% (2010–11), 6·7% (2008–09)	..
Lesotho	..	..	7·0% (2009)	..
Mauritania	..	..	9·6% (2011)	..
Namibia	..	..	15·1% (2013)	..
Nigeria	5·4% (2010–11)	4·5% (2007–08)	2·2% (2013), 19·7% (2010–11)	20·0% (2001)
São Tomé and Príncipe	..	..	5·8% (2008–09)	..
Senegal	..	..	5·7% (2014)	..
South Africa	..	..	24·7% (2014)	63·3% (2003)
Sudan	..	..	6·6% (2010)	..
Swaziland	..	..	12·3% (2010)	..
Zambia	..	..	4·4% (2013–14)	..

Data shown are coverage percentage and years of study. References given in appendix.

Table 1: **Coverage of selected interventions recommended only when clinically indicated during intrapartum care**

(table 2). The interventions were breastfeeding initiated within first hour (77 countries, range 17·4–98·4%), a birth companion (42 countries, 0·1–56·7%), skin-to-skin contact (nine countries, 2·1–82·0%), and keeping the mother and baby together (Brazil, 69·0% [data not shown in table]).[133]

Discussion

Importance of a move beyond TLTL and TMTS

The maternal health field has long focused on TLTL, but TMTS can also produce harm.[10] As facility births increase and the aetiologies of maternal morbidity and mortality shift in LMICs, TMTS becomes a global threat to maternal, fetal, and newborn wellbeing. Coverage data for national level implementation of maternal-health interventions and recommendations are rare. Nonetheless, evidence shows increasing overuse of potentially harmful interventions—especially caesarean section, inductions, and augmentations—in facility births in LMICs. Improvements in development, dissemination, and strategies to globally increase adherence to clearly written guidelines might help providers move beyond TLTL and TMTS.

Intervention recommendations and coverage

Our overview of high-quality, evidence-based guidelines for routine care of women in antenatal, intrapartum, and postnatal care identified 78 recommended-for and 37 recommended-against interventions. In general, we found many examples of interventions in these high-quality guidelines aiming to go beyond TLTL and TMTS, as well as recommending respectful care and communication. Respectful care included recommendations to treat women with respect, ask them their expectations, provide them with clear, concise information to support decision making, and involve them in decisions about their care. Among recommended-against interventions, several have been shown to cause avoidable harm if overused, or are simply unnecessary and disrespectful to women. Examples of these include routine use of non-stress-test cardiotocography, biophysical profiles, ultrasounds after 24 weeks, and routine umbilical Doppler ultrasounds; routine screening for infections (such as bacterial vaginosis); absence of offers or advice on clinical interventions if labour is progressing normally and the baby is well (including amniotomy and oxytocin augmentation); and routine use of antibiotics in women with a vaginal birth.

Although scarce, available data for the coverage of interventions for TMTS in MICs are concerning. A population-based study[134] of 186 548 births in five LMICs found 52% (n=96 622) of women received maternal antibiotics in labour. Despite a wide range of variation—indicating problems of TLTL and TMTS—we found national-level evidence of rising rates of interventions that could be harmful if overused. These interventions included caesarean section, induction or augmentation, and routine episiotomy. One country—Iran—had an 83% amniotomy rate.[132] All high rates are indications of TMTS, which can carry harmful risks. Over-medicalisation of labour and childbirth is clearly increasing—a complex problem which is being reported.[29,135] An additional complication is that TLTL and TMTS can coexist within countries and facilities; this distinction is often obscured by limited data that does not stratify by demographic or socioeconomic quintiles or other measures of inequity (panel 1). This coexistence can be seen in caesarean section rates stratified by public and private facilities and by wealth quintiles (appendix, pp 2–4).

Finally, as discussed in detail in this Series[10] (and previously explored in the *Lancet*'s Midwifery Series[121]), the lowest-cost option for care with the best outcomes and lowest rates of interventions could be with midwives as care providers and midwifery-led services (whether hospital sited or free standing), with access to emergency services.[121]

Problems in guideline implementation

Although development and dissemination of high-quality, clear guidelines are necessary, they are not

sufficient to ensure evidence-based care. Adherence to guidelines remains an enormous problem globally in all fields of health care. A large body of literature examines the failure of implementation of guidelines and the so-called know–do gap.[19,136,137] Individual studies and systematic reviews show that guideline implementation can be enhanced and sustained through multifaceted approaches—including targeting of providers—such as dissemination of educational materials, audit and feedback, and targeted educational interventions (ie, simulations, continuing professional development, drills, and financial incentives).[130,131,138] New technologies on the horizon, such as simple, low-cost vital-sign monitoring devices[139] or point-of-care diagnostics[140] might help to improve adherence. However, strategies that only target providers are likely to have limited effect.[141] Improvement of adherence to guidelines requires a systems approach, with engagement of women and communities. Increased documentation of successful and unsuccessful approaches can improve guideline adherence in maternity care, and allow these lessons to be shared. New approaches to implementation merge social, political, and organisational strategies to help providers and women to mutually develop and implement quality respectful care.

Guideline inconsistencies and their consequences

Guideline inconsistencies included recommendations for and against the same interventions—eg, routine screening for hepatitis C or gestational diabetes. Conflicting recommendations might simply reflect differences in settings and contextual adaptation.[142] However, this finding highlights the absence of international consensus on the benefits and harms of routinely used interventions. Conflicting recommendations can confuse guidelines users,[143] and create uncertainty as to why differences exist. Inconsistencies in just one recommendation can cast doubt on the entire set of guidelines or even on the use of guidelines completely. Use of different systems for grading of evidence and different terminology can also create confusion for users and policy makers.

Guidelines from LICs

We identified no high-quality maternal-health guidelines from LICs, which was of great concern, although our review did not consider activities or efforts in adaption and implementation of international guidelines to local settings. Although guideline development requires substantial resources and methodological expertise, increased investment and support is urgently needed for LICs to develop and implement locally specific, evidence-based maternal-health guidelines. New tools, such as the ADAPTE Collaboration,[144] might help LICs to move forward.

Data for coverage rates

Representative data for the coverage of interventions selected to demonstrate TLTL and TMTS at national or regional levels were insufficient. Although numerous facility-based studies exist,[132,145] few are representative of practices across the whole country, or their methods rely

	Immediate skin-to-skin contact	Breastfeeding initiated within first hour	Birth companion
East Asia and Pacific			
China	..	59·9% (2007–08)	..
Indonesia	..	49·3% (2012)	2·3% (2012)
Laos	..	39·0% (2009–13)	..
Mongolia	..	77·5% (2005)	..
Philippines	..	49·7% (2013), 39·9% (2007–08)	24·0% (2013)
Samoa	..	88·0% (2009–13)	..
Solomon Islands	..	75·0% (2009–13)	..
Thailand	..	52·6% (2007–08)	..
Timor-Leste	..	67·7% (2009–10)	47·6% (2009–10)
Vietnam	..	50·0% (2011), 63·9% (2007–08)	9·5% (2002)
Europe and central Asia			
Albania	..	41·1% (2008–09)	0·4% (2008–09)
Armenia	..	32·4% (2010)	0·0% (2010)
Azerbaijan	..	36·9% (2007)	0·6% (2006)
Belarus	..	21·1% (2005)	..
Bosnia and Herzegovina	..	56·7% (2006)	..
Georgia	..	36·6% (2005)	..
Kazakhstan	..	67·8% (2010–11)	..
Kyrgyzstan	..	82·5% (2014)	0·1% (2012)
Macedonia	..	26·6% (2005)	..
Moldova	..	66·7% (2005)	0·1% (2005)
Montenegro	..	25·2% (2005–06)	..
Serbia	..	17·4% (2005–06)	..
Tajikistan	..	50·2% (2012), 60·9% (2005)	2·6% (2012)
Turkey	..	39·0% (2009–13)	..
Turkmenistan	..	19·3% (2000)	0·5% (2000)
Ukraine	..	41·5% (2007)	0·2% (2007)
Uzbekistan	..	67·1% (2006)	..
Latin America and the Caribbean			
Belize	..	50·6% (2006)	..
Bolivia	..	62·4% (2008)	22·5% (2008)
Brazil	28·2% (2011–12), 67·7% (2008)	44·5% (2011–12), 69·8% (2004–05)	18·8%* (2011–12)
Colombia	..	64·1% (2010)	2·0% (2010)
Costa Rica	..	60·0% (2009–13)	..
Cuba	..	70·2% (2006), 89·2% (2004–05)	..
Dominican Republic	..	45·0% (2013)	0·4% (2013)
Ecuador	..	20·1% (2004–05)	..
El Salvador	..	31·2% (2002–03)	..
Guatemala	22·6% (2010–13)	75·9% (2010–13), 55·5% (2008–09)	..
Guyana	..	57·8% (2009)	5·6% (2009)
Honduras	..	63·2% (2011–12)	2·3% (2011–12)
Jamaica	..	62·3% (2005)	..

(Table 2 continues on next page)

	Immediate skin-to-skin contact	Breastfeeding initiated within first hour	Birth companion
(Continued from previous page)			
Mexico	..	45·5% (2004–05)	..
Nicaragua	..	68·9% (2004–05)	7·9% (2001)
Paraguay	..	49·5% (2004–05)	..
Peru	64·1% (2012)	62·8% (2012), 54·4% (2012)	4·6% (2012)
Suriname	..	45·0% (2009–13)	..
Middle East and north Africa			
Algeria	..	44·7% (2004–05)	..
Djibouti	..	54·9% (2006)	..
Egypt	56·5% (2008)	27·4% (2014)	0·7% (2014)
Iran	82·0% (2011–12)	96·0% (2011–12)	..
Iraq	..	43·0% (2009–13)	..
Jordan	..	19·4% (2012)	0·3% (2012)
Morocco	..	51·3% (2003–04)	14·9% (2003–04)
Syria		32·4% (2006)	..
Tunisia	..	40·0% (2009–13)	..
Yemen	..	30·3% (2006)	..
South Asia			
Bangladesh	..	45·9% (2011)	56·7% (2011)
Bhutan	..	59·0% (2009–13)	..
India	29·6% (2010–13)	83·6% (2010–13,) 65·8% (2007–08)	15·8% (2005–06)
Maldives	..	60·1% (2009)	0·1% (2009)
Pakistan	2·1% (2010–13)	17·7% (2012–13), 23·4% (2010–13)	5·7% (2012–13)
Sri Lanka	..	88·5% (2007–08)	..
Sub-Saharan Africa			
Angola	..	98·4% (2004–05)	14·8% (2006–07)
Cameroon	..	33·6% (2013)	22·1% (2011)
Democratic Republic of the Congo	..	23·1% (2011–12)	3·8% (2011–12)
Côte d'Ivoire	..	30·6% (2011–12)	16·7% (2011–12)
Gabon	..	32·8% (2012)	5·7% (2012)
Ghana	..	46·8% (2008)	7·7% (2008)
Kenya	25·1% (2010–13)	82·1% (2010–13), 55·2% (2008–09)	21·1% (2008–09)
Lesotho	..	49·8% (2009)	23·2% (2009)
Mauritania	..	62·1% (2000–01)	15·2% (2000–01)
Namibia	..	70·2% (2013)	5·9% (2013)
Nigeria	..	33·6% (2013), 78·3% (2004–05)	22·1% (2013)
São Tomé and Príncipe	..	40·8% (2008–09)	2·9% (2008–09)
Senegal	..	29·9% (2014)	21·6% (2014)
South Africa	..	61·0% (2009–13)	..
Swaziland	..	58·7% (2006–07)	15·4% (2006–07)
Zambia	23·4% (2010–13)	91·6% (2010–13)	14·6% (2013–14)

Data shown are coverage percentage and years of study. References given in appendix. *An additional 56·7% had a companion at some point during the hospital stay including admission and post-partum.

Table 2: **Coverage of selected interventions recommended for routine care**

For more on the **DECIDE Collaboration** see http://www.decide-collaboration.eu

on providers' self-reports.[82,146,147] Furthermore, most population-based data for maternal health in LMICs are obtained via household surveys; these surveys are largely not useful for accurate measurements of the use of facility-based interventions because respondents might not know what interventions were performed or have recall bias,[148] with accuracy declining over time.[149] Data for the implementation of recommended-against interventions were particularly scarce. We could not find any national or regional data for recommended-against antenatal care interventions such as routine vitamin C and E supplementation, routine screening for bacterial vaginosis, routine cardiotocography, routine umbilical artery Doppler, or routine antibiotic prophylaxis to improve pregnancy outcomes. Similarly, data for recommended-against interventions for postnatal care were scarce. We found only two cross-sectional studies—one of 336 facilities in one state in India[145] and one of 66 facilities in Syria[150]—on routine administration of oral uterotonics during the postnatal stay (not for routine prophylaxis). A multicountry study[134] included five countries (Pakistan, Guatemala, India, Kenya, and Zambia) and looked at both routine oral uterotonics and routine postnatal antibiotic administration.

Although many surveys document coverage of emergency obstetric and neonatal care interventions, evidence about the content of routine maternity care is scarce, which makes determination of whether care was in accordance with recommended guidelines difficult.[9] We found limited data for the coverage of recommended interventions. An exception was prevention of post-partum haemorrhage through uterotonic prophylaxis immediately after the birth—a topic of research, implementation campaigns, and international advocacy. We found wide variation (17·7–98·4%) in adherence to the strongly recommended practice of breastfeeding within the first hour, despite 42 (55%) of 77 countries reporting rates higher than 50%, and 12 (16%) reporting rates higher than 75%. The data were from a variety of sources which might not be representative of the total population. We found similar variation in one of the major components of respectful care—a birth companion during intrapartum care. Although the range was 0·0–56·7%, only five (11·9%) of 42 countries had rates greater than 20%, indicating TLTL in respectful care.

Research priorities

Our systematic review identified several issues regarding maternal-health guidelines and appropriate use of specific recommendations that warrant future research. Methodological research on ways to improve the quality of guidelines is a broad topic that affects all areas of health. However, maternal health-care guideline developers should be at the forefront of guideline methodology and quality, ensuring that guideline development is not only rigorous, but that recommendations are formulated and disseminated in ways that facilitate understanding and application by end users. For example, the DECIDE Collaboration has conducted research and developed tools

to improve implementation of evidence-based recommendations by different target audiences, including providers, policy makers, and the public.[151] Although standardisation of maternal-health guideline development might be desirable for guideline developers and users, differences in recommendations could be a long-term reality owing to differences in contextual factors (such as disease burden, organisation of national health systems, and health-care financial arrangements), regional differences in the values and preferences of women and providers, and the acceptability and feasibility of using different interventions. However, global maternal-health organisations and professional associations can provide leadership, evidence, and forums to reach consensus on the use of specific interventions. Studies exploring reasons for conflicting recommendations in different countries could also drive overall improvements in guideline quality, and better define research agendas on specific interventions where insufficient evidence exists.

Scarce coverage data for the use of specific recommendations makes assessment of TLTL and TMTS rates difficult. However, available data strongly suggest an urgent need for more research to assess levels, ranges, and trends in the appropriate use of these interventions. This research should not be conducted in isolation, but linked to quality improvement measures that allow health-system stakeholders to assess current practices and respond accordingly with evidence-based implementation efforts for all levels of care. As countries move through the obstetric transition,[58] and the focus of maternal health care shifts from direct aetiologies of maternal mortality toward indirect aetiologies (such as non-communicable diseases or risk factors including obesity, hypertension, diabetes, cardiac diseases, and infectious diseases such as malaria and HIV),[8] greater emphasis is needed on prevention and early identification of risk factors in antenatal care. Two such efforts are the publications on mapping of antenatal-care guidelines[152] and barriers to integration of screening into antenatal care.[153] This shift in the aetiology of obstetric complications needs to also be reflected in routine monitoring indicators and measurement systems in maternity care. Measurement of adherence to recommended practices might require more innovative, sophisticated approaches. A substantive research agenda regarding the causes, determinants, and interventions to address inadequate adherence to guidelines in different settings is evident.

Conclusion

Although progress is being made to reduce global maternal mortality, a new, broader focus is needed—one that encompasses not only death prevention, but also optimisation of the health status and quality of care for all women. Improvements in respectful care and adherence to best practices, although challenging, are possible. Guidelines need to reflect local priorities, disease burden, and the shift towards improved screening for prevention, early detection, and early treatment during antenatal care. Guidelines should also consider the need to minimise TMTS care, which might not improve outcomes, and could cause avoidable harm and increase health-care costs and inequities.

Individual providers, professional associations, facilities, and health-care systems can seek a path beyond TLTL and TMTS through implementation of and adherence to clear, appropriate, evidence-based guidelines for routine maternal health care. Guidelines do not exist in a vacuum and many other aspects of quality care need attention in order for mothers and newborn babies to have positive outcomes. However, without consistent guidelines with clear, comprehensible steps to implementation, motherhood cannot be safe. Multisectorial, multifactorial, and multidisciplinary methods for creation, maintenance, and continued improvement of guidelines in conjunction with social, economic, and political change are all necessary to go beyond TLTL and TMTS for improved maternal health for all.

Contributors

SM, FA, EA, SG, AL, JPV, JPS, CH, and KM contributed to the conceptualisation. MS, KM, AC, DCol, DCom, MC, VD, CH, VM, IM-B, CPC, VNP, NR, and JPS did the literature research. MS, SM, FA, KM, EA, JPS, and DCol contributed to the data analysis. MS, KM, AC, and DCom provided the figures. SM, FA, SG, AL, CH, KM, JPV, JPS, NR, and EA wrote the manuscript. All authors contributed to data interpretation and commented on drafts of the manuscript.

Declaration of interests

We declare no competing interests.

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