

Task shifting and sharing in maternal and reproductive health in low-income countries: a narrative synthesis of current evidence

Angela J. Dawson,^{1*} James Buchan,² Christine Duffield,³ Caroline S.E. Homer⁴ and Kumudu Wijewardena⁵

¹World Health Organization Collaborating Centre in Nursing, Midwifery and Health Development, Faculty of Health, University of Technology, Sydney, NSW 2007, Australia, ²School of Health Sciences, Queen Margaret University, Edinburgh EH21 6UU, UK and Faculty of Health, University of Technology, Broadway, Sydney, NSW 2007, Australia, ³Centre for Health Services Management, Faculty of Health, University of Technology, Sydney, NSW 2007, Australia, ⁴Centre for Midwifery, Child and Family Health, Faculty of Health, University of Technology, Sydney, NSW 2007, Australia and ⁵Department of Community and Family Medicine, Faculty of Medical Sciences, University of Jayewardenapura, Colombo, Gangodawila, Nugegoda 10250, Sri Lanka

*Corresponding author. World Health Organization Collaborating Centre in Nursing, Midwifery and Health Development, Faculty of Health, University of Technology, 235-253 Jones Street Broadway, Sydney, NSW 2007, Australia. E-mail: angela.dawson@uts.edu.au

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Reducing maternal mortality and providing universal access to reproductive health in resource poor settings has been severely constrained by a shortage of health workers required to deliver interventions. The aim of this article is to determine evidence to optimize health worker roles through task shifting/sharing to address Millennium Development Goal 5 and reduce maternal mortality and provide universal access to reproductive health. A narrative synthesis of peer-reviewed literature from 2000 to 2011 was undertaken with retrieved documents assessed using an inclusion/exclusion criterion and quality appraisal guided by critical assessment tools. Concepts were analysed thematically. The analysis identified a focus on clinical tasks (the delivery of obstetric surgery, anaesthesia and abortion) that were shifted to and/or shared with doctors, non-physician clinicians, nurses and midwives. Findings indicate that shifting and sharing these tasks may increase access to and availability of maternal and reproductive health (MRH) services without compromising performance or patient outcomes and may be cost effective. However, a number of issues and barriers were identified with health workers calling for improved in-service training, supervision, career progression and incentive packages to better support their practice. Collaborative approaches involving community members and health workers at all levels have the potential to deliver MRH interventions effectively if accompanied by ongoing investment in the health care system.

Keywords Maternal health; reproductive health; human resources for health; task shifting; skill-mix; health care delivery

KEY MESSAGES

- Shifting obstetric surgery, anaesthesia and abortion tasks may not compromise performance or patient outcomes.
- Little evidence is available for the cost effectiveness of task shifting in maternal and reproductive health.
- There is a research focus on task shifting in acute clinical settings rather than for comprehensive primary health care.
- Numerous barriers indicate that health system strengthening deserves primary focus.

Introduction

Progress towards Millennium Development Goal 5 (MDG 5), reducing maternal mortality and the provision of universal access to reproductive health, has been constrained by a chronic shortage of health workers required to deliver evidence-based interventions (The World Health Organization (WHO) 2006). Health workforce strengthening, particularly midwifery, has received considerable attention as a means to improve global maternal health (UNFPA 2011). Despite this emphasis, a shortage of midwives and obstetricians has meant that task shifting and task sharing to other professionals has been necessary to provide maternal services, especially in emergency obstetric situations.

Task shifting/sharing has been highlighted as an important strategy to optimize health worker performance in resource poor settings (PMNCH/WHO 2010) and provide the right mix of skills required to undertake the activities required for the service (Buchan and Dal Poz 2002). Task shifting is defined in this article as a deliberate process, whereby the task to be shifted is defined and described, and where funding is moved to the new individual assigned to the task. Task shifting frees up midwives, obstetricians or others to provide more complex care and may involve the delegation of specific task/s or the substitution of one type of health care worker for another. Task sharing is also a considered action involving health professionals working together in teams to deliver a task or service that they may not have carried out before. Unlike informal and opportunistic task shifting/sharing deliberate strategies are accompanied by training, certification and support.

Key services in maternal and reproductive health (MRH) include the provision of obstetric and abortion services, the delivery of contraceptives, family planning, antenatal and post-natal care. Other services include cervical screening and treatment of sexually transmitted infections. Aside from tasks associated with normal birth, emergency obstetric care (EmOC) focuses on complications during labour and birth and includes basic and comprehensive care defined by nine interventions (WHO 2003). Basic EmOC includes the administration of parenteral antibiotics, uterotonic drugs and parenteral anticonvulsants, the removal of the placenta and retained products, assisted vaginal delivery and neonatal resuscitation. Comprehensive EmOC involves the addition of obstetric surgery such as caesarean section, hysterectomy for uterine rupture and blood transfusion. Contraception and family planning is often provided by midwives, nurses or doctors and involves the provision of oral hormone therapies, injectable contraceptives [i.e. depo-medroxyprogesterone acetate (DMPA)], condoms, intrauterine devices, sterilization and family planning counselling. Abortion services involve counselling, medical and surgical abortion procedures, emergency treatment of abortion complications, post-abortion care (PAC) and contraception services. These services are traditionally provided by nursing, midwifery and medical personnel.

The delegation of MRH care duties to other cadres (occupational groups) is practised in many countries (Hussein *et al.* 2010). One such group has been labelled 'mid-level' cadres and includes non-physician clinicians, nurses, midwives, auxiliary nurses and midwives and community health workers (CHWs). Despite the 2009 Addis Ababa Call to Action on Human Resources for Maternal and Newborn Survival statement on 'Task-Shifting/Sharing for Emergency Obstetric and Newborn

Care' (UNFPA 2009), task shifting/sharing is controversial. The practice has sometimes been thwarted by professional bodies concerned that sharing tasks will erode their power or affect patient safety (McPake and Mensah 2008) and questioned as an answer to the crisis in workforce supply (Lehmann *et al.* 2009). There are also issues concerning from whom the tasks are being shifted and whether this is appropriate.

Systematic reviews of task shifting exist in high-income contexts (Laurant *et al.* 2010; Butler *et al.* 2011), globally (Fulton *et al.* 2011), in HIV/AIDS health care in Africa (Callaghan *et al.* 2010) and in specific EmOC settings (Mavalankar *et al.* 2009). Several reviews of human resources for health intervention in MRH exist (Zulfiqar *et al.* 2010; Dawson and Gray 2011); however, there is no comprehensive systematic review of task shifting/sharing in low- to upper middle-income MRH settings that synthesizes current research knowledge to indicate how, when and where such strategies can be optimally applied. Evidence of task shifting is essential for MRH policy and planning in resource poor settings and an adjunct to future strengthening of key providers.

This article reports on the synthesis of the literature required to determine the extent and quality of the evidence base for task shifting and sharing in low- to upper middle-income country MRH contexts.

The aim of this article is to identify:

- What MRH tasks are being shifted/shared and to what cadres?
- What evidence is there for the effectiveness of task shifting in MRH contexts?
- How are these staff trained and supported?
- What are the barriers and constraints?

Methods

Eight databases were searched to retrieve peer-reviewed literature, and a narrative synthesis methodology was applied to analyse selected research papers. This method was chosen due to the heterogeneous nature of the methodologies of appropriate studies identified.

Search protocol

A Population, Interventions, Comparators, Outcomes, Study design (PICOS) question was formed to guide this review as per guidelines (CRD 2009). The review objective was to assess the performance of staff delivering MRH interventions and explore associated work force issues. We aimed to source studies of participants who are medical doctors, doctor assistants, nurses, midwives, auxiliary nurses, auxiliary midwives and CHWs and lay health workers engaged in task shifting activities in MRH. We aimed to investigate task shifting interventions such as worker substitution, delegation and task sharing across teams. Outcomes of interest include clinical performance, patient outcomes, training outcomes, provider needs and experiences and cost effectiveness. Observational studies, quasi experimental and non-experimental descriptive studies were considered suitable for inclusion.

A systematic search of the contemporaneous literature published from 2000 to 2011 was undertaken using eight

Table 1 Records retrieved from sources

Database	Records retrieved
MEDLINE	55
CINAHL	24
EBM reviews: Cochrane Database of Systematic Reviews	3
PubMed	140
Scopus	123
ScienceDirect	96
Web of Science	28
PsycInfo	29
Google Scholar	11
Hand searching from reference lists of retrieved items	13
	522

MEDLINE: Medical Literature Analysis and Retrieval System Online; CINAHL: Cumulative Index to Nursing and Allied Health Literature.

bibliographic databases, Google Scholar and hand searching of the reference lists of retrieved papers (Table 1). The Medline MeSH subject headings were employed: 'Health Manpower' or 'Health Personnel' and 'Delivery of Health Care' and 'Developing countries', and augmented by the key words 'task shifting' or 'task sharing' or 'delegation', or 'substitution' or 'skill-mix' and 'maternal' or 'pregnancy', or 'neonatal', or 'reproductive', or 'family planning' or 'contraception' or 'abortion'.

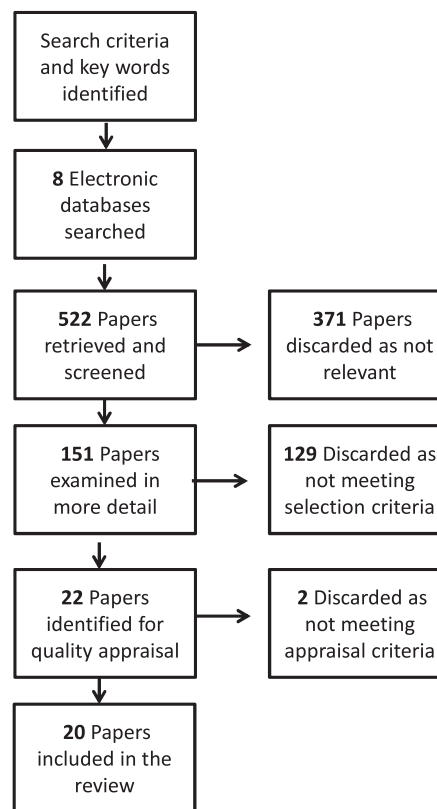
Retrieved records were first screened for their focus as per the PICOS question by the first author and duplicates removed. Discursive papers those older than 10 years or whose focus was not task sharing/shifting were removed. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Moher *et al.* 2009) were used to report the review process (Figure 1). The authors were assigned articles to read in order to reach consensus on the papers suitable for appraisal. Those papers selected for appraisal were then synthesized into one- to two-page summaries and collated into a table.

Appraisal of quality

Twenty-two papers were appraised to ascertain if the research aim and the methodology used were aligned and to evaluate the recruitment, settings, data analysis, ethics, findings and contribution to knowledge. The 3 qualitative papers were assessed for quality using the Critical Appraisal Skills Programme (CASP) tool for qualitative research (National Health Service (NHS) 2006), the 12 non-experimental studies and 5 mixed methods papers were assessed using Pluye *et al.*'s (2009) scoring system and the two randomized control trials (RCTs) using the CASP RCT tool. Twenty papers could be rated against all items included in these tools. Two items were discarded (Pinotti *et al.* 2001; Vernon 2009) as some methodological items could not be rated. The quality of these papers was deemed to be more in line with project evaluations and therefore not suited to this narrative synthesis.

Data abstraction and synthesis

The papers comprised quantitative and qualitative study designs that did not allow for the pooling of research results. As such, a narrative synthesis approach was conducted as per guidelines

**Figure 1** Literature review process.

(Popay *et al.* 2006) drawing upon the six guideline principles of meta-narrative review as outlined by Greenhalgh *et al.* (2005) and the interpretivist analysis and synthesis in the Realist And MEta-narrative Evidence Syntheses: Evolving Standards (RAMESES) standards (Wong *et al.* 2013). This allowed different data from diverse traditions to be examined to provide critical insights. First studies were grouped in terms of countries of focus, the cadres discussed and the MRH service areas and levels identified. The results sections of each of the 20 papers were then analysed to identify evidence for task shifting/sharing in MRH contexts. A thematic analysis was conducted by the first author using tables and discussed with other authors. The relationships within and between studies were explored and coded. A detailed examination of the findings revealed three themes as illustrated in Table 2 that also shows two examples of subthemes. The analysis was guided by the human resources for health framework for performance improvement (Dawson 2010). This framework outlines various workforce performance fields (policy and legislation, management systems, education and competencies and community engagement) that were used to identify interventions that had been employed in the studies to ensure performance of workers involved in carrying out tasks that have not been traditionally in their remit. Concept maps were used to plot patterns and relationships across the themes and subthemes and robustness assessed through critical reflection and discussion among the authors with feedback from peers acknowledged in this article. This allowed clarification of task shifting approaches and interventions that may be needed to support task shifting/

Table 2 Summary of key findings

Reference	MRH service task area				Cadre task shifted to or shared with						Key themes and subthemes					
	PTMTC	EmOC	Contraception FP	Abortion	ANC	Dr Specialist	Dr Assist	Nurse/midwife	Nurse/midwife Aux.	CHW/lay workers	Mid-level	Provider performance	Subthemes	Subthemes	Provider needs and experience	Cost effectiveness
Chilopora <i>et al.</i> (2007)	✓					✓							✓			
Cumbi <i>et al.</i> (2007)	✓					✓							✓		✓	✓
De Brouwere <i>et al.</i> (2009)	✓					✓	✓						✓		✓	
Dickson-Tetteh and Billings (2002)				✓				✓				✓				
Evans <i>et al.</i> (2009)	✓					✓						✓			✓	
Foster <i>et al.</i> (2006)	✓							✓							✓	
Gessesew <i>et al.</i> (2011)	✓					✓							✓			
Hoke <i>et al.</i> (2012)		✓								✓		✓				
Hounton <i>et al.</i> (2009)	✓					✓	✓					✓				✓
Ivers <i>et al.</i> (2011)	✓							✓		✓					✓	
Jejeebhoy <i>et al.</i> (2011)				✓			✓	✓				✓			✓	
Jennings <i>et al.</i> (2011)									✓			✓			✓	
Mavalankar <i>et al.</i> (2009)	✓					✓							✓		✓	
Nielsen <i>et al.</i> (2009)				✓						✓					✓	
Nyamtema (2011)	✓							✓							✓	
Patel <i>et al.</i> (2009)								✓		✓					✓	
Pereira <i>et al.</i> (2011)	✓							✓								
Stanback <i>et al.</i> (2007)			✓							✓					✓	
Warriner <i>et al.</i> (2006)				✓							✓				✓	
Warriner <i>et al.</i> (2011)											✓				✓	

ANC: Antenatal Care; FP: Family Planning.

sharing. The process also enabled theory building concerning the tasks most shifted/shared and why, as well as the identification of gaps providing insight into an inclusive approach to MRH care delivery in resource poor contexts. This theory development was important to the interpretation of the findings which are presented in the discussion section of this article.

Findings

Twenty papers were analysed and are summarized in Table 3. Twelve papers focus on African countries, five on nations in South-East Asia, two on the Caribbean and one paper reports on work in both Africa and Asia. The majority of studies focus on task shifting/sharing in EmOC (10), followed by abortion services (6), contraception or family planning (2) and antenatal care (ANC) (1) including the prevention of mother to child transmission (PMTCT) of HIV (1). The bulk of papers concentrate on several cadres (assistant doctors, midwives, nurses, nurse auxiliaries and CHWs) (14), while two papers focus specifically on doctors and assistant doctors (De Brouwere *et al.* 2009; Hounton *et al.* 2009), two are concerned solely with medical doctors (Evans *et al.* 2009; Mavalankar *et al.* 2009) and two with CHWs (Stanback *et al.* 2007; Hoke *et al.* 2012).

Three key themes emerged from the analysis: 'provider performance' (quality of clinical performance and patient outcomes of individual and team practice and comparisons between cadres), 'provider needs and experiences' and 'cost effectiveness'. These are discussed below under the respective key MRH service delivery areas of EmOC, abortion services and care, the provision of contraception and family planning and ANC.

Provision of EmOC

Provider performance

Research by Evans *et al.* (2009) in India showed that a 16-week course led to an increase in the number of general practitioners performing basic EmOC and a continuation of comprehensive EmOC services despite two specialist obstetricians having left the study facilities. After training, 10 of 15 doctors were performing vacuum extractions with the remaining five lacking the necessary equipment.

Three studies in the synthesis compare the performance of non-physician clinicians with that of physicians: from Malawi (clinical officers with 3 years training) (Chilopora *et al.* 2007), Ethiopia (health officers with 3 years training and 6 months EmOC) (Gessesew *et al.* 2011) and Tanzania (assistant medical officers with 5 years training). During the study periods, non-physician clinicians performed the bulk of obstetric surgery in the selected facilities with little difference in patient outcomes between cadres.

In Malawi, post-operative outcomes were reportedly similar in both groups in terms of maternal general condition, both immediately and 24 h post-operatively regarding the occurrence of pyrexia, wound infection, wound dehiscence, need for re-operation, neonatal outcome or maternal death (Chilopora *et al.* 2007). In the Tanzanian study (Pereira *et al.* 2011), the case fatality rate for women who had a caesarean section in one study district where assistant medical officers (an intermediate cadre with 5 years training between a clinical officer and a

medical officer) and physicians practised was close to the 1% target set by the UN process indicators while rates were more than double at one government and university hospital reflecting the shortage of basic EmOC facilities and large numbers of referrals with women often arriving in a moribund state. Despite the large contribution of assistant medical officers to the provision of obstetric surgery across all sites (63%), met need for such surgery was reported as very low at 30%, suggesting that assistant medical officers skills could be further optimized. In Ethiopia, maternal deaths, foetal deaths and length of hospital stay did not statistically differ by non-physician clinicians or physicians with non-physician clinicians performed 63% of caesarean section (Gessesew *et al.* 2011).

Comparisons of the caesarean section performance of obstetricians, general practitioners and clinical officers in all public facilities providing caesarean section in Burkina Faso are reported in a study by Hounton *et al.* (2009). Overall, case mixes per provider were found to be comparable across the different cadres. However, the newborn case fatality rates varied significantly for clinical officers (198 per 1000) compared with obstetricians (99 per 1000) and trained general practitioners (125 per 1000).

Team work in MRH can be beneficial. Nyamtema (2011) found that a 3-month competency-based programme to train non-physician clinicians (NPCs) (assistant medical officers and clinical officers) and nurse-midwives as a team to perform obstetric surgery (including caesarean section and laparotomy for ruptured uterus), administer anaesthesia and resuscitate newborns was effective in increasing the total number of births in the facility, including appropriate use of caesarean section in selected Tanzanian health centres. Review of facility records showed a decreased fresh stillbirth rate and reduced obstetric referrals (Odds ratio (OR): 0.2; 95% Confidence Interval (CI): 0.1–0.4). A 6-month EmOC training course for teams in three districts in Senegal, consisting of an anaesthetist, general practitioner and non-physician surgical assistants, revealed an increase in the rate of caesarean section that, although <1%, is close to the national rate of 0.7% and considerably less than WHO recommendations 5–15% (WHO 2009). However, continued obstetric surgery practice was dependent upon the presence of all team members and unmet need persisted (De Brouwere *et al.* 2009).

Provider perceived needs and experiences

Qualitative data synthesized across five studies provides insight into provider perceptions of EmOC performance, motivation to shift or share tasks and barriers to this approach. Study participants noted the importance of shifting/sharing tasks between doctors and non-physician clinicians had increased access to life saving interventions for women and their babies (De Brouwere *et al.* 2009; Hounton *et al.* 2009). The study by Cumbi *et al.* (2007) found health professionals regard the non-physician clinician role 'técnico de cirurgia' in Mozambique as essential with informants stating that rural hospitals are dependent on them for obstetric surgery including caesarean section, hysterectomies and laparotomies. Interviewees reported that the 'técnico de cirurgia' position at district level played a role in alleviating the workloads of second and third referral facilities.

Table 3 Summary of studies included in the synthesis

Reference	Country/focus of task shifting	Method/data gathering	Sample	Aim/s/objective/purpose
Chilopora <i>et al.</i> (2007)	Malawi Obstetric surgery	Prospective observational case study using structured data collection sheet to retrieve information on admission diagnosis, indication for surgery, preoperative condition, designation of surgeon and type of surgery.	2131 consecutive obstetric surgeries conducted in 38 district hospitals.	To validate the advantages and disadvantages of delegation of major obstetric surgery to non-doctors.
Cumbi <i>et al.</i> (2007)	Mozambique Obstetric surgery	Descriptive qualitative study using interviews and group discussions.	71 medical doctors and nurses at both facility and system level were interviewed. 48 maternal child health and general nurses made up 8 group discussions in 8 rural hospitals.	To examine the opinions of health professionals about the performance of NPC.
De Brouwere <i>et al.</i> (2009)	Senegal EmOC	Observational case study and descriptive qualitative design. Data on obstetric interventions, outcomes in newborns and mothers collected from operating theatre and admission registers and hospital files and interviews.	5 hospitals in 3 districts. Interviews: 9 stakeholders at national level, 3 regional medical officers, 3 district medical officers, 4 trained medical officers, 5 anaesthetists and 5 surgical assistants, 4 focus group discussions with representatives of the community and 9 final year medical students.	To evaluate the policy decisions and actions of training district teams in EmOC.
Dickson-Tetteh and Billings (2002)	South Africa MVA	Observational case study and descriptive qualitative design. Data collected by observing abortion procedures and counselling sessions, reviewing facility records and patients' charts and interviewing patients and certified midwives.	42 midwives, 3927 first-trimester abortions in 27 public health care facilities in South Africa's 9 provinces, 8 primary care facilities, 13 secondary care facilities and 6 tertiary care facilities.	To assess the quality of abortion care provided by trained and certified midwives.
Evans <i>et al.</i> (2009)	India EmOC	Observational case study and descriptive qualitative design. Programme documents, 3 facility observation tools and 5 interviews tools.	15 trainees, 14 facilities	To evaluate a pilot project to train MOs in EmOC.
Foster <i>et al.</i> (2006)	Dominican Republic PPH	Ethnographic qualitative design using interviews and participant observation.	24 auxiliary nurses on a maternity unit of a referral hospital.	To understand the process of decision making by auxiliary nurses regarding PPH.
Gessesew <i>et al.</i> (2011)	Ethiopia, Tigray CEmOC	Retrospective review of the obstetric records using facility and patient questionnaires.	All women treated from 1 January 2006 to 31 December 2008 at the 11 hospitals and 2 health centres with CEmOC status.	To assess the contribution of NPC to the delivery of care.
Hoke <i>et al.</i> (2012)	Madagascar Injectable contraceptives	Review of service records; interviews with lay health workers (LHWs), their supervisors and clients.	61 LHWs workers in 6 communes in Anosy and 7 from Alaotora Mangoro.	To determine evidence regarding the safety, effectiveness and acceptability of LHW provision of injectables.
Hounton <i>et al.</i> (2009)	Burkina Faso EmOC	Descriptive survey design of facility records, qualitative interviews and cost effective analysis	2305 caesarean section from 6 hospitals in 6 of 13 districts, obstetricians, trained doctors, clinical officers, surgical aides and policy-makers.	To evaluate the effectiveness and cost effectiveness of alternative training strategies for increasing access to EmOC.
Ivers <i>et al.</i> (2011)	Haiti HIV	Cross-sectional observational case study. Interviews, focus groups discussions, checklist of HIV tasks, review of clinic registers and electronic medical records.	3 rural clinics, 483 healthcare workers of which 21 were facility-based and 462 were community-based staff.	To evaluate a health service delivery model where tasks were shifted from doctors to nurses and CHWs.

(continued)

Table 3 Continued

Reference	Country/focus of task shifting	Method/data gathering	Sample	Aim/s/objective/purpose
Jejeebhoy <i>et al.</i> (2011)	India, Bihar and Jharkhand MVA	Prospective, two-sided equivalence study in five facilities of an NGO. Clinical data and exit interviews with women.	10 physicians and 10 nurses in five facilities of an NGO, 427 women per provider type or 854 in total with gestation ages of ≤10 weeks were recruited.	To determine if efficacy and safety rates associated with MVA provided by newly trained nurses were equivalent to those provided by physicians.
Jennings <i>et al.</i> (2011)	Benin ANC	A non-inferiority quasi-experimental design involving direct observation of antenatal consultations, patient exit interviews and interviews with providers.	48 health care providers: 21 nurse-midwives and 27 lay nurse aides. 409 pregnant women: 206 who were counselled by nurse-midwives and 203 by lay nurse aides in 7 public health maternities.	To compare lay nurse aides ANC counselling with job aids to that provided by nurse-midwives.
Mavalankar <i>et al.</i> (2009)	India EmOC	Descriptive qualitative design using interviews.	14 trainees across Gujarat, programme trainers, officials and national programme administrators.	To evaluate a training programme for MOs in anaesthetic skills for EmOC.
Nielsen <i>et al.</i> (2009)	Tanzania Abortion PAC	Observational case study with data from facility PAC registration books.	11 primary and secondary health facilities, 2031 women with incomplete abortion.	To evaluate upgrading mid-level providers to perform MVA.
Nyamtema (2011)	Tanzania CEmOC and anaesthesia	Observation case study with data from training evaluation and facility records.	Practice of 43 providers during a 3-month training course delivered in 2 institutions and 8-month follow up in 3 health centres.	To evaluate a course to train AMOs, clinical officers and nurse-midwives as a team to deliver EmOC.
Patel <i>et al.</i> (2009)	India, Bihar and Jharkhand Abortion	Observational case study. Survey of health facility staff.	263 mid-level family planning providers, 54 obstetrician-gynaecologists, 88 general physicians from 1346 health facilities and 2039 staff providing family planning.	To identify mid-level provider interest in training for early medical abortion and physician support.
Pereira <i>et al.</i> (2011)	Tanzania CEmOC	Review of clinical data and estimated met need for EmOC and hospital case fatality rates calculated using UN process indicators.	All delivery records ($n = 38758$) in all major hospitals in Mwanza and Kigoma performing obstetric surgery.	To document the contribution of AMOs and MOs.
Stamback <i>et al.</i> (2007)	Uganda Injectable contraception	Non-randomized community trial using a survey.	945 new DMPA users recruited and 777 (82%) followed up including 449 CHW clients and 328 clinic-based clients.	To compare the safety and quality of contraceptive injections by CHWs with those of clinic-based nurses.
Warriner <i>et al.</i> (2006)	Vietnam and South Africa abortion	Randomized, two-sided controlled equivalence trial.	1160 women in South Africa and 1734 in Vietnam. Women presenting for an induced abortion at up to 12 weeks' gestation randomly assigned to a doctor or a mid-level provider for MVA and followed-up 10–14 days later.	Establish whether the safety of first-trimester MVA abortion by mid-level providers is equivalent to that of doctors.
Warriner <i>et al.</i> (2011)	Nepal Abortion	Multicentre randomized controlled equivalence trial.	1295 women were screened, 535 were randomly assigned to a doctor and 542 to a mid-level provider. 514 and 518, respectively, were included in the analyses of the primary endpoint.	Establish whether early first-trimester medical abortion by certified nurses and auxiliary nurse-midwives was as safe and effective as that provided by doctors.

MOs: Medical officers; PPH: postpartum haemorrhage; CEmOC: Comprehensive Emergency Obstetric Care; AMOs: Assistant Medical Officers; UN: United Nations; NGO: Non-governmental organization.

EmOC training needs were reported by participants across the studies. Health professionals felt that the non-physician clinician role in Mozambique required further training in pharmacology and neonatal care skills and longer internships (Cumbi *et al.* 2007). A barrier to providing EmOC for some doctors in India included insufficient training in caesarean section (Evans *et al.* 2009). Participants reported that refresher training for physicians to provide anaesthesia was necessary to improve confidence and update skills (Mavalankar *et al.* 2009). The need for improved supervision was also noted (Cumbi *et al.* 2007; Mavalankar *et al.* 2009).

Some studies reported that inadequate attention was paid to the career progression of assistant medical officers and doctors who provided EmOC (Cumbi *et al.* 2007; De Brouwere *et al.* 2009). Doctors and non-physician clinicians complained that they were inadequately recompensed for pay lost during the additional compulsory training periods (De Brouwere *et al.* 2009). The high turnover of trained non-physician clinicians was said to be due to absence of incentives to remain in post (no supervision, no increase in salary or career path) (Hounton *et al.* 2009). Incentives including job promotion, salary increases, monetary performance-based incentives or entry into postgraduate programmes was reported to improve motivation (Mavalankar *et al.* 2009). Remuneration for health professionals was seen as low (De Brouwere *et al.* 2009) with non-physician clinicians sometimes charging illicit fees to supplement their income (Cumbi *et al.* 2007).

A lack of health programme co-ordination was reported as an obstacle to effective task shifting/sharing initiatives (De Brouwere *et al.* 2009). Approaches to improve co-ordination can be gleaned from a study by Mavalankar *et al.* (2009). Trainees and programme trainers stated that medical officers posted with a specialist anaesthesiologist within a supportive facility increased the likelihood that the medical officer would provide anaesthesia. In addition, having one person in charge of managing, planning and co-ordinating the geographic assignment of doctors with lifesaving anaesthesia and EmOC skills helped to place health professionals where need was greatest and optimize skill-mix. However, this could reportedly be improved if the same person was also responsible for the appointment of specialists, such as gynaecologists or surgeons.

Despite investment in training for shifting the provision of life-saving anaesthetics tasks for EmOC from anaesthetists to medical officers, facilities were found to be under-prepared to tackle emergency obstetric procedures and practice was hampered by a lack of equipment and infrastructure (operating theatre and blood services) (Mavalankar *et al.* 2009). Task shifting basic and comprehensive EmOC to general practitioners from obstetricians was found to be affected by a lack of anaesthetists, forceps and syringes (Evans *et al.* 2009). Barriers to task sharing in the context of obstetric surgery, including caesarean section, were reported including resistance from senior academic clinicians (De Brouwere *et al.* 2009) with non-physician clinicians seen as a threat to the power of the doctor and the district officer resulting in conflict (Cumbi *et al.* 2007). Four of the 15 participants in India reported feeling forced to attend EmOC training and did not subsequently perform well after training or conduct any caesarean section in the study period (Evans *et al.* 2009).

Cost effectiveness

The cost of task shifting in EmOC is the concern of research reported by Hounton *et al.* (2009) which estimated the average cost per averted newborn death ($\times 1000$ live births) for an obstetrician-led team compared with a general practitioner-led team at 11 757 international dollars, and for a general practitioner-led team compared with a clinical officer-led team at 200 international dollars. These figures were reached by calculating an incremental cost effectiveness ratio. This involved subtracting the average cost of 1000 caesarean sections undertaken by general practitioners from that undertaken by obstetricians (513–207 international dollars) divided by the difference in case fatality rates between the cadres '125–99 international dollars per 1000 caesarean section'. General practitioners and particularly clinical officers appear to be cheaper options to increasing coverage of EmOC to avert newborn death. Savings were also perceived to be passed on to patients and their families in the form of reduced out-of-pocket expenses if obstetric surgery tasks were shifted to non-physician clinicians (Cumbi *et al.* 2007).

Provision of family planning

Provider performance

Research in Madagascar (Hoke *et al.* 2012) outlines the effect of a 3-day training programme involving nurses, doctors and NGO staff supervising volunteer lay health workers to provide injectable contraceptives (DMPA). Lay health workers demonstrated competence in injection technique, counselling and management of clients' re-injection schedule. Community distribution of DMPA via the lay health workers appeared to increase contraceptive use, with 41% of women accepting injectables as new family planning users. Nearly, all the clients interviewed said they were satisfied and intended to return to the lay health workers for re-injection and would recommend this service to a friend. All lay health workers and most supervisors indicated the programme should continue. Problems included difficulties completing monthly reports and access to supplies.

A study (Stanback *et al.* 2007) in Uganda compared the safety and quality of contraceptive injections by 20 CHWs with those of clinic-based nurses following a 3-week training course. Ninety-five per cent of CHW clients were 'satisfied' or 'highly satisfied' with services, and 85% reported receiving information on side effects. There were no serious injection site problems in either the CHW client or clinic-based nurse group. There was no significant difference in continuation to second injection, or significant differences in other measures of safety, acceptability and quality.

Abortion services

Provider performance

Two RCTs undertaken by Warriner *et al.* demonstrate that first-trimester manual vacuum aspiration (MVA) and medical abortion by mid-level providers is as safe as that provided by doctors. The first study (2006) found that the MVA rates of complication for midwives and doctor assistants compared with doctors in South Africa and Vietnam met pre-set statistical criteria for equivalence. In South Africa, the rates per 100 patients were 1.4 (8 of 576) for mid-level providers (not specified) and 0 for doctors (difference 1.4, 95% CI: 0.4–2.7). In Vietnam, rates were 1.2 (10 of

824) and 1.2 (10 of 812), respectively (difference 0.0, 95% CI: -1.2 to 1.1). There was one analgesic related complication with delayed complications due to retained products and infection. In Nepal (2011), the risk difference for complete medical abortion undertaken by certified nurses and auxiliary nurse-midwives compared with doctors also met pre-set statistical criteria for equivalence. Abortions were complete in 504 of 542 (97.3%) of women attended by nurses and midwives providers and in 494 of 535 (96.1%) assigned to physicians with the risk difference 1.24% (95% CI: -0.53 to 3.02). One per cent of women did not have a successful termination in the doctor group and none in the nurses and midwives provider cohort. No serious complications were noted.

A study in India (Jejeebhoy *et al.* 2011) found 10 newly trained nurses were as skilled as 10 physicians in assessing gestation age and completed abortion status, performing MVA and obtaining patient compliance. Abortion failure and complication rates were low with no difference between nurses and physicians. Women who underwent the procedure found both provider types acceptable.

Nielsen reports on the impact of a comprehensive PAC competency-based training course for mid-level providers (not specified) in one district of rural Tanzania designed to increase access to appropriate services at primary and secondary level facilities. This includes the promotion of MVA for first-trimester incomplete abortion as a safer, less painful, less expensive procedure than dilatation and curettage. More than half the manual and electronic vacuum aspirations were carried out at the primary level with increasing numbers at health centres. However, over time total MVA rates decreased while dilatation and curettage increased to levels that exceeded the MVAs. Among the women admitted with abortion complications, 59.8% left with a family planning method with a higher proportion among women evacuated by MVA at primary level.

Research by Dickson-Tetteh and Billings (2002) provides evidence of technically competent abortion care delivered by midwives in South Africa after legislation and certified training. Of the 96 abortion procedures performed by 40 midwives in the study, 85 involved MVA whose clinical practice was rated 'good' in 75% of the procedures. Midwives consistently provided women with contraceptive counselling after the abortion, and most clients (89%) received a contraceptive method before leaving the facility. No complications or deaths were reported during or as a result of the procedures.

Provider experiences and needs

A survey of Indian health professionals (Patel *et al.* 2009) shows physician support and high levels of interest from providers to deliver medical abortion. Providers based in public health facilities with a more permissive attitude towards abortion and currently providing abortion using pharmacological drugs were associated with greater interest in attending training. Midwives in South Africa stressed the importance of ongoing supervision noting that emergency contraception was not available at most facilities (Dickson-Tetteh and Billings 2002).

Antenatal care

Provider performance

Jennings *et al.* (2011) found that trained lay nurse aides in Benin can deliver maternal and newborn care counselling to pregnant

women as effectively as nurse-midwives. The average proportion of recommended messages provided by lay nurse aides using a set of pictorial counselling job aids was equivalent to counselling by nurse-midwives in adjusted analyses for birth preparedness (-0.0, 95% CI: -9.0, 9.1), danger sign recognition (4.7, 95% CI: -5.1, 14.6) and clean delivery (1.4, 95% CI: -9.4, 12.3). Both cadres expressed positive attitudes towards task shifting, some several preferring 'task sharing' over full delegation.

Performance of teams

Research evaluating a Haitian health service delivery model (Ivers *et al.* 2011) demonstrates that PMTCT tasks can be shared between doctors, nurses and CHWs. Nearly 20% HIV tasks defined under the Haitian package of care were assigned to the PMTCT area with 20 clustered 65 in pregnancy and 6 in newborn care. Of these, doctors and nurses shared an equivalent proportion of tasks (7.3 and 7.5%, respectively) while CHWs undertook 4.8% of PMTCT tasks. Findings indicate that CHWs are considerably more involved in PMTCT care than CHWs are in a traditional doctor-centred model of care. Staff were satisfied with the model of care.

Discussion

Our synthesis has found that with the exception of two papers that focus on CHW provision of contraceptive injections, the limited available published research focused on key MRH tasks that were predominantly clinical being shifted to and shared with doctors, non-physician clinicians and nurses/midwives, in particular the delivery of obstetric surgery, anaesthesia and MVA. This review indicates that shifting tasks and/or sharing them with other cadres can lead to increased service provision, equivalent health professional performance across cadres and patient outcomes in the provision of EmOC, contraceptive and family planning services care and ANC. Shifting EmOC tasks to other, non-traditional cadres appears to be cost effective. A range of training programmes have been implemented for health workers alongside supervisory mechanisms, legislation and resource mobilization. Despite support for task shifting/sharing, a number of barriers were reported including poor staff co-ordination and preparation, low skills, provider absence and resistance, lack of equipment and drugs. Calls for improved in-service training, supervision, career progression and incentive packages were noted.

Support for health providers engaged in task shifting/sharing

The review identified strategies to better support staff to undertake tasks not previously part of their remit. This includes efficient co-ordination to ensure appropriate skill mix and teamwork, training, job aids and tools, supervisory mechanisms, career opportunities, adequate remuneration and access to facilities with equipment and drugs. Approaches to aligning training with the regulation and assessment of health professional practice were not explored in relation to task shifting/sharing in any of the studies in the review. Recent research has found such alignment to be lacking among EmOC providers in Malawi and Tanzania resulting in the ineffective use of health

workers (Lobis *et al.* 2011). Auditing practice may be useful to improve the clinical performance of mid-level staff undertaking additional tasks. In Malawi, well-supported regular audit sessions facilitated learning and a decrease in the incidence of uterine rupture (van den Akker *et al.* 2009). Audits can ensure workers assigned new tasks have appropriate workloads so that staff are neither underutilized (Meel 2003), nor overburdened, thereby impacting upon costs and patient safety (Fiengo 2008).

The study by Foster *et al.* (2006) in this review highlights the decision making processes of auxiliary nurses providing insight into bottle necks that could be addressed by training and effective supervisory strategies. Job aids such as books or cards can act as 'aide memoires' to guide the completion of tasks which could help to support mid-level cadres to make critical decisions. For example, research into task delegation in diabetes shows the potential of a computerized tool (Cleveringa *et al.* 2007) at primary health care level that could be adapted for MRH in low- to upper middle-income settings. The process of delegating or assigning tasks also involves decision making by supervisors or managers but there is a lack of understanding into how this can also be best supported for effective task sharing and shifting. A learning needs assessment tool described in research by Hopkins (2002) might be useful for building supervisors delegation skills in MRH.

Education and training lessons for enhancing MRH task shifting/sharing outcomes can be gleaned elsewhere. Innovative continuing medical education in Nepal (Zimmerman 2009) and pre-service nurse training in Zambia (Msidi *et al.* 2011) offer examples of up-skilling doctors and mid-level cadres. Inter-professional education although untested in this context may also provide an efficient, collaborative and practical means to improve the shifting and sharing of MRH tasks across and between cadres. The WHO's recent recommendations for optimizing health worker roles to improve access to key maternal and newborn health interventions through task shifting provide clear guidance on interventions to support health workers (WHO 2012).

Issues with task shifting/sharing

While this synthesis shows that shifting/sharing MRH tasks to and with other cadres can be done effectively it should be noted that it is not always clear what the impact was on service delivery effectiveness. An increase in the number and frequency of procedures does not necessarily specify improved health worker performance or patient outcomes. For example, in the study by Evans, it is not known if the reported increase in caesarean section was within the purported optimal rate of 10–15% (WHO 2009) and in the study by Nielsen *et al.* (2009), it is unknown if need for abortion and contraception was met within the study population. Longitudinal research is required that provides insight into cumulative effect of task shifting and sharing strategies using standard indicators such as those employed in Pereira *et al.*'s (2011) study. Despite its apparent success the impact achieved through task shifting/sharing is not always sustainable (Nielsen *et al.* 2009), nor sufficient to address need (Chilopora *et al.* 2007; De Brouwere *et al.* 2009; Pereira *et al.* 2011). This serves as a reminder that task shifting/sharing is one of many strategies that may contribute to

achieving MDG 5 alongside comprehensive health systems strengthening approaches.

Perspectives on task shifting/sharing

A focus on shifting/sharing clinical tasks, in particular EmOC and surgical abortion, rather than promotive or preventative tasks emerged from this synthesis. This suggests an acute, biomedical research focus on task shifting/sharing in MRH rather than a comprehensive primary health care approach to care. This focus may be the result of the fact that such tasks lend themselves to clear delineation. The emphasis on narrow technical tasks, often related to vertical programme delivery, especially in relation to CHWs and lay health worker programmes could serve to underutilize a valuable human resource which may have much wider social and health impact (van Ginneken *et al.* 2010). CHWs provide a crucial link to the household level which is important not only for the successful delivery of health interventions (Lewin *et al.* 2009; GHWA 2010; Perry and Zulliger 2012) but also for community mobilization, which alongside improved health worker performance plays a significant role in the reduction of maternal mortality (Lawn *et al.* 2009). This highlights a need for research focused on identifying evidence-informed strategies to improve workforce supply, planning and management and also to increase community engagement in health. The focus of research may not necessarily be on how to shift and share tasks effectively among health workers, but how to best engage teams of health workers and community members in delivering and advocating for interventions at primary, secondary and tertiary levels.

A broader perspective to task shifting/sharing recognizes and supports role confluence and role diversification in response to changing contexts (Watts *et al.* 2001) and moves beyond the health care facility to consider shared health service delivery in other settings such as schools (Weiss *et al.* 2011). A comprehensive settings-based approach has been found to have value in Kenya where maternal reproductive as well as HIV/AIDs care was delivered by community people and health workers (Selke *et al.* 2010). Models of shared care may be more appropriate to deliver MRH care and services collaboratively in resource poor contexts. Experience in mental health shows that building community capacity and a pool of multi-skilled workers at primary health care level linked to specialist providers has potential to address health care needs (Petersen *et al.* 2011). However, success in this study was hampered by lack of specialists and poor drug supply showing that task shifting/sharing is limited by the capacity of the health care system.

In summary, this synthesis has identified a number of knowledge gaps in particular evidence for task shifting/sharing in relation to post-natal care and reproductive health disorders, although reports of work undertaken in Brazil and Honduras indicate that training nurse assistants to screen for common gynaecological problems (Pinotti *et al.* 2001) and provide vaginal cytology (Vernon 2009) show promise. Despite the fact that task shifting/sharing also refers to the delegation or distribution of tasks to junior staff, as well as more senior personnel, no studies could be found that describe the latter. Only two RCTs and one study examining cost effectiveness were identified in this synthesis, indicating a need for more rigorous evidence to inform MRH practice.

This study has a number of limitations. The review includes only published peer-reviewed studies in English and is thus susceptible to publication bias. It excluded grey literature and was limited to a 10-year time period due to funding and time constraints. Hand searching was undertaken using the reference lists of articles which enabled published peer-reviewed studies that were not retrieved through the search to be collated and analysed. It is also likely that this review has focused on studies that depict successful task shifting/sharing experiences.

This synthesis of peer-reviewed literature has found that shifting/sharing tasks may increase access to and availability of MRH services without compromising performance or patient outcomes and may be cost effective. However, a number of issues and barriers must be addressed including improved in-service training, supervision, career progression and incentive packages to better support health worker practice.

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