

Health Professionals for Maternity Services: Experiences on Covering the Population with Quality Maternity Care

Marga Kowalewski¹ and Albrecht Jahn²

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¹ MSc in community health and health management, Abteilung für Tropenhygiene und Öffentliches Gesundheitswesen, Im Neuenheimer Feld 324, 69120 Heidelberg, Germany.

² specialist in obstetrics and gynaecology, Abteilung für Tropenhygiene und öffentliches Gesundheitswesen, Im Neuenheimer Feld 324, 69120 Heidelberg, Germany. Email: Albrecht.jahn@urz.uni-heidelberg.de (correspondence should be addressed to this author).

Summary

In many developing countries human resources to cover quality maternity care and emergency treatment are very unequally distributed. Due to historical development of medical services the main providers of surgical maternity care are still medical professionals. Most countries have only scarce resources on specialist and these tend, like other medical and high qualified paramedical personnel, to stay in the main cities of the countries. Thus rural areas rely mainly on staff who either are not well prepared, or not allowed by the countries legislation to provide major surgical interventions for obstetric problems. An actual lack of anesthetists adds to the low coverage on major obstetric interventions. The visible negative health impact urged many countries to experiment with alternative strategies to improve the coverage of the population with quality maternity care. Several Asian and African countries (e.g. Ethiopia, Malawi, South Africa, Indonesia) set on upgrading training for general practitioners in rural areas. Vocational training in surgical and obstetric skills was made obligatory in South Africa. Others have experience with training non-academic staff to provide a set of surgical and obstetric interventions or anesthesia (e.g. Tanzania, Burkina Faso, Malawi and Democratic Republic of Congo/Zaire). The training is either professional and last two years, or a on the job training in surgical skills. Both approaches have been evaluated successfully. The outcome of interventions does not differ significantly from care by specialists doctors. Legal constraints and hesitant recognition of upgraded general doctors or non-academic staff by professional organisations are slowing the process to increase the coverage of maternity care to the rural areas. Prerequisites to more equal access to quality maternity care and emergency treatment are clear policies which prioritise rural areas, and governments who can carry through an obligatory, timely limited, service of medical personnel in rural hospitals. An official acknowledgement of upgraded medical and non-academic staff in surgery, obstetrics and anesthesia and the formulation of career-paths and incentives can bring quality maternity service nearer to the communities in many countries.

Historical Development of Obstetric Care

Obstetric care has been in the hands of midwives in Europe until the end of the 19th century. With the development of obstetric surgical procedures the responsibility even for uncomplicated deliveries was shifted to medical doctors (Kuntner 1994). From Sweden we have clear evidence that maternal mortality had already drastically declined with the introduction of trained midwives in the rural areas. Surgical delivery, the introduction of blood replacement, antibiotics and intensive care for mothers and new-borns continued the downward trend in maternal and perinatal mortality (De Brouwere *et al.* 1998). In many developing countries modern medicine was first introduced as curative care for colonial settlements and armed forces. Eventually curative medicine was also offered to the native population. Therefore obstetric care relied on medical doctors and well-trained European nurses/midwives who cared mainly for obstetric complications. With the introduction of outreach clinics and preventive care (vaccination, well child clinics, antenatal care) more and more local nurses were trained. The training of medical doctors was limited to very few locals, who had to study abroad. At present most countries have medical personnel either trained in their own country or abroad (within Africa many of them were trained in the States of the former Soviet Union and Cuba). Many of these become specialists and settle in the main towns within their countries. Until the late 20th century the rural areas of most developing countries were largely under-served with medical doctors. To cover the population with preventive and curative services the countries developed different approaches.

Present Legal Situation of Health Personnel

Performance of Major Obstetric Interventions Restricted to Specialists

Some countries allow only specialists to perform surgical obstetric procedures (e.g. China, Indonesia, Pakistan, Madagascar and Morocco). The specialist coverage in each country is different. In Morocco the aim is to post at least one surgeon, one obstetrician and one anaesthetist at each provincial hospital. Still remote rural areas are not covered. Patients needing caesarean section are therefore referred to regional hospitals.

In Madagascar specialists are only situated in regional hospitals which are usually the only obstetric referral centres. Given the size of the country and the poor infrastructure, it can take many hours to several days to reach one of them, although there are many lower level facilities, staffed with non-specialist medical doctors but not providing obstetric care (centre medical, hospital simple). This situation produces enormous negative health impact (30% perinatal mortality in the provincial hospitals) (Beche & Jahn 1992) (Beche T & Jahn A 1992). In China only 2.7% of senior medical professionals are working in country hospitals (Xiang *et al.* 1996). The health policy emphasises preventive care. The one child policy encourages people to be sensible about antenatal care, this is believed to rule out most emergency situations. In addition pregnant women are expected to take utmost care and to go early to a hospital with specialist care. In reality large rural areas are under served with specialists. In Pakistan flourishing private clinics take advantage of the situation. As they are mainly found in the big cities, the rural areas go virtually unserved. In Indonesia the present specialist care is being gradually replaced by general doctors with vocational training in surgery/obstetrics. The policy makers have reacted in this way to the current situation (Thouw 1992).

Performance of Major Obstetric Procedures by all Doctors

Countries like Bangladesh or the Latin American countries (Chile, Peru, Ecuador) allow all medical doctors to perform caesarean sections. In Bangladesh doctors acting as surgeons must upgrading their training, in Latin America a certificate is not necessary (Shaheen 2000). Nepal has a cadre of medical doctors that follows a two years training for general practitioners which includes surgery and obstetrics. They work in rural hospitals and provide emergency obstetric care (Erpelding pers. comm.). In Pakistan the licence to practice medicine (MBBS) implies that you are able to perform surgery including caesarean section and you are allowed to do so. But in governmental hospitals officially caesarean sections are only performed by specialists in obstetrics and gynaecology (Thaver 2000).

Performance of Major Obstetric Procedures by Doctors and Specifically Trained Non-academics

Some countries chose entirely a different approach to covering the population with emergency obstetric care by training non-academic personnel. Tanzania for example has created the assistant medical officers (AMO), who were to work at the district hospital level (Mbaruku pers. comm.). An upgrading system allows a qualified rural medical aid (working in dispensaries) to go for medical assistant training (three years theoretical and practical training). Qualified medical assistants can follow a two year up-grading course to become an assistant medical officer. AMOs perform surgery and obstetric interventions. With the AMOs the Tanzanian health system has been able to bring qualified emergency obstetric care nearer to the population.

In Burkina Faso registered nurses and midwives must work at least two years in the rural area in a dispensary or health centre. After at least 5 years practical work, they can take upgrading courses of 2 years in surgery, anaesthesia, radiology, laboratory etc. Surgical assistants are posted to district and regional hospital. Their main task is minor surgery but they also assist

medical doctors in major interventions. They are also trained to perform emergency surgery (mainly caesarean sections and strangulated hernias) and assure service in the absence of medical doctors.

The information in Table 1 is based on personal communications by members of Afronets, former and current students of the Master course Community Health and Health Management, Heidelberg, and collaborating researchers and institutions, who were kind enough to reply to our short questionnaire. Their collaboration is very much appreciated.

Table 1. Provider of caesarean sections (who is legally allowed and who is doing it in common practice)

Country	Legal situation	Common practice	Comments
Bangladesh	Specialists Medical doctors with additional training in surgery	Medical doctors without additional training	Medical doctors without additional training act illegally
Burkina Faso	Specialists Medical doctors Surgical assistants	General doctors with one year training in surgery Surgical assistants	Surgical assistants are allowed to work independently if no doctor is posted or absent
Chile	Specialist Medical doctors	Medical doctors	"Any doctors who feels able to do C/S is allowed to do so"
China	Specialists Medical doctors	Medical doctors General practitioners	
Congo (Zaire)	Specialists Medical doctors	Nurses trained in surgery	Allowed but not officially acknowledged
Ecuador	Specialist Medical doctors	Medical doctors	"Any doctors who feels able to do C/S is allowed to do so"
Ethiopia	Specialists Medical doctors	General practitioners with 6 month course in surgery/ obstetrics	GP not legally acknowledged
Kenya	Specialist Medical doctors with additional training in surgery	Medical doctors	
Malawi	Specialist Medical doctors Surgical assistants	Surgical assistants	Anaesthetist assistants assure functioning theatres
Mozambique	Specialists Medical doctors Surgical assistants	Surgical assistants	
Nigeria	Specialists Medical doctors	General practitioners	
Pakistan	Specialists Medical doctors	Specialists	In governmental hospitals only specialists do C/S
Peru	Specialist Medical doctors	Medical doctors	"Any doctors who feels able to do C/S is allowed to do so"
South Africa	Specialists Medical doctors	General practitioners	single handled surgery plus anaesthesia is illegal vocational training for GPs becomes obligatory
Tanzania	Specialists Medical doctors Assistant medical officers	Assistant medical officers	

Distribution Problems of Health Professionals

Important imbalances in human resources are found in the distribution of health personnel. Many developing countries have insufficient primary care providers and too many specialists. Even these are concentrated in urban areas. The rural/urban disparity in qualified personnel trained in obstetrics is further aggravated by migration of medical and paramedical personnel (nurses, midwives) to other countries. South Africa draws many medical people from other southern African countries, as do the Arab countries from East and Central Africa. In the 90s more Sudanese doctors worked in Arabia than in Sudan. This brain drain is damaging health care in their countries of origin and also the home economy. The high input to training of medical personnel is also lost to the country. Career development paths and in-service training are needed to retain staff. For improving the balance, non-physician primary care providers have many advantages: their training cost less (Myanmar, Pakistan and Sri Lanka indicate that 2.5 to 3 nurses can be trained for the cost of training one physician) they receive lower salaries, they are easier to attract to rural areas, and they communicate more efficiently with the patients (World Bank 1993).

In many governmental health systems 60% (SA) to 90% (Senegal, Nigeria) of medical doctors work in the main cities (Solanke 1997). Specialists in surgery or obstetrics and gynaecology are almost never found outside the national hospitals other than in private clinics. In China only 3% of senior medical doctors work in country hospitals (Xiang *et al.* 1996). In the whole country of Malawi only one specialist in anesthesia is working (Adeloye 1993). In Pakistan we find 3 times more registered doctors than registered midwives (Government of Pakistan 1997). Even with 7% of unemployed medical doctors and 11% working outside the medical profession in Mexico, the rural areas go seriously under-served with medical doctors. They are strictly not willing to leave the major cities (World Bank 1993). In Indonesia, Ethiopia, South Africa and even Australia rural hospitals (first referral level) are staffed by general practitioners or midwives, who are either not trained to perform emergency treatment in obstetrics, and are therefore reluctant to intervene, or who are not allowed to do so (Craig & Nichols 1993, Loutfi *et al.* 1995, Reid *et al.* 1998, Thouw 1992).

In Tanzania, as in many other countries, the rural areas are served by general practitioners and assistant medical officers. Here most of the population manages to access first line health services. E.g. one dispensary covers on average 5,000 population and 80% of them live within a 5 km radius (Tanzania / Bureau of Statistics 1996). Obstetric care is provided by a network of regional and district hospitals, with the non-academic assistant medical officers providing the backbone. Still rural areas are underserved as the effective catchment area drops sharply beyond a distance of 10 km (Jahn *et al.* 1998).

Mal-distribution of Female Health Workers

Emergency obstetric care is a male dominated field. Most surgeons the world over are men, only in the states of the former Soviet Union are female obstetricians the rule. At health centre level and dispensaries delivery care is mostly provided by female staff. In China the demand for female rural doctors has led to increased recruitment, training and deployment of female doctors. Since 1997 there is at least one female doctor in every village (Koblinsky *et al.* 1999). In Nepal a cadre of mother child aids was formed to staff dispensaries and health centres. Their tasks include assisting in institutional and home delivery and mobile antenatal clinics. Due to strong caste rules the cadre does not work very efficiently (higher caste can not deliver lower caste)(Dar lang 1999). In Pakistan "lady health workers" provide antenatal care through home visits. For women living in strict Purdah the visit to the dispensary or hospital is not acceptable (Jahn 1995). In Burkina Faso male midwives (maieuticiens) are trained and work in health centres and hospitals. Training men as midwives has been necessary to fill the gap left by female midwives leaving the rural areas to join their husbands in the major cities (there is a legal right of rejoining families for civil servants) (Hien, pers. comm.). For women living in the big cities female trained assistance at delivery is the rule, for rural settings it is by chance.

Strategies to Overcome Unequal Distribution of Professionals

Several approaches have been tested and implemented to cover the population with emergency obstetric care. A very interesting example is the Obstetric flying squad in peninsula Malaysia. For 30 years emergencies in obstetrics have been attended to by this service. The service is available at all hours and staffed with specialists in obstetrics. Nevertheless, with the development of telecommunication, road access and rural hospitals an ambulance service proved to be faster and cheaper for most of the communities. A prerequisite for ambulance service was a training of ambulance drivers in first aid. Only very isolated communities could still use the flying squad (Monga & Achanna 1999). Outreach services and home deliveries by trained professionals are not very frequent in Africa and Asia. One example is Malaysia where between the mid-1970s and mid-1980s most births occurred at home assisted by a professional midwife, whereas the role of traditional midwives has shifted to a family supportive role. Home providers are well trained and backed up by a strong referral network (see above). Today even women at low risk predominantly give birth at hospitals. The same trend is visible in Sri Lanka (Koblinsky *et al.* 1999). In China the approach was to shorten medical training (3 instead of 5 years) and thus increase the output of medical doctors (World Bank 1993). Other countries including Ethiopia, Indonesia, South Africa, Malawi and even developed countries like Australia, New Zealand, and Canada established training in emergency treatment skills for general practitioners of rural hospitals and family doctors (Adeloye 1993, Craig & Nichols 1993, Krikke & Bell 1989, Loutfi *et al.* 1995, Reid *et al.* 1998, Thouw 1992). In Tanzania, Mozambique, Burkina Faso and DRC a paramedical cadre was trained in surgical and obstetric emergency treatment (da Luz & Bergström 1992, Duale 1992, Pereira *et al.* 1996).

Delegation of Tasks

Primary care providers include physicians, nurses, nurse practitioners, and midwives (World Bank 1993). In 1992 the FIGO (International Association of Obstetricians and Gynaecologists) recommended a delegation of functions to various levels of personnel. Currently, in developing countries this delegation of functions occurs in an atmosphere of rigid traditions in both teaching and practice inherited from outdated Western medicine. This delegation is frequently inappropriate for the diverse local situations. The situation is further complicated by different professional groups attempting to protect their turf of clinical functions, despite the clearest evidence that they themselves are unable or reluctant to deliver these services where they are most needed. On the other hand, there are honestly held perceptions that the delegation of some functions will increase morbidity and mortality (Rooth & Kessel 1992).

The argument about delegation and transfer of skills is several centuries old. Defining professional boundaries and the fear of losing professional control has focussed discussions on how to preserve professional status and independence instead of how interdependency of various cadres of health professionals can work. But several studies show that delegation of tasks can work without losing quality of care. In Great Britain nurse practitioners provide outpatient-care, hospital nurses replace interns in surgery, in the US nurses have been trained in special diagnostic procedures, provide intensive care at neonatal units and non-medically qualified assistants work in cardiac surgery. These examples have been evaluated with no significant difference found to care provided by medical professionals (Hopkins *et al.* 1995). In defining the staff, equipment and responsibilities of the district hospital as first referral level facility, it should be borne in mind that in reality it is often the last referral level too (General Assembly at the XIII World Congress of Gynecology and Obstetrics 1992). Hardee and Yount (Hardee 2000) see the possible advantages of delegation of activities from higher level to lower level staff in overcoming shortage of trained workers, freeing physicians from routine tasks, conserving specialist's time for emergencies, avoiding long delays in care caused by a centralised system, and promoting worker satisfaction.

Different Models of Training

Training of Non-academic Staff

Training differs in time and content according to the envisaged tasks of the newly qualified staff. The most complex training is offered in health systems where non-academic staff have been integrated at first and second referral levels already for a longer time, and where the political aim is to offer more and better maternity and surgical services nearer to the communities. In these countries, the non-academic “doctors” are well established with an officially endorsed career path.

Good examples of this are Tanzania and Burkina Faso. In both countries the curricula of assistant medical officers or surgical assistants include theoretical knowledge and practical skills in general surgery and obstetrics/gynaecology focussing on the most frequent causes for emergency interventions. The courses last for 2 years. A precondition for admission to the course in Burkina is registration as a certified nurse or midwife with at least 5 years of practical experience. In Tanzania the course was designed for upgrading medical assistants. In both countries the certificate/licence is officially acknowledged and remuneration higher for such posts (Mbaruku pers. comm., Traoré pers. comm.).

In some health systems paramedical staff are trained to fill the gap left by a lack of physicians without a clear vision for a permanent solution. These courses are often very short. In Malawi medical assistant training lasts one year, the training of surgical technicians in Mozambique lasts 6 months (Adeloye 1993, da Luz Vaz & Bergström 1992). Common to all these courses is a focus on practical skills in general surgery and obstetric/gynaecological surgery. The only way to learn surgery is to do it. Acquiring practice in case management and learning indications for surgical interventions falls short in all these courses. Reconsideration of curricula are therefore envisaged. Common also to these courses is the lack of official acknowledgement by the medical societies of the concerned countries, and no financial or other incentives for the participants in their future posts.

Since the 1950s selected nurses in Congolese (former Zaire) hospitals received practical, on the job, training to conduct caesarean sections. Initiated by a specialist doctor, these nurses attend more than 80% of all emergency cases in obstetrics. In the 1980s their training was extended to cover also gynaecological and general surgical cases. The nurses are carefully chosen according to their personal experience and are specifically trained on the techniques of a limited set of surgical interventions (Rosenfield 1992, Duale 1992).

In Malawi and Burkina Faso assistant anaesthetists are trained in the same manner as surgical paramedical personnel. Both countries have in common a crucial lack of medical professionals in anaesthesia. Thus the newly qualified cadre does not only serve in rural areas which was the first intention, but covers also regional and even national hospitals (Traoré pers. comm.)(Adeloye 1993). The coverage of rural South Africa with anaesthetist service is as difficult as in the above countries. Until now more than half of the emergency surgical interventions in rural hospitals have been carried out single handed by a general practitioner acting as surgeon and anaesthetist at the same time. Not only is this practice dangerous, it is also not legally covered. Therefore the training of medical assistants in anaesthesia is envisaged (Reid *et al.* 1998).

Distance Education

Distance education is another approach of training health workers in rural areas. Distance learning started in Tanzania in 1981. Since then more than 3000 learners participated in the programme. Several modules for learning have been developed among these are: management of labour, obstetric emergencies, medical emergencies etc. Upon completion of the module units a certificate is provided. This method is well suited for maternal health teams: first because the instructions occurs in the work place, with the learning materials

readily accessible; second, it provides a stimulus for isolated workers and thereby promotes morale and effectiveness. A serious set back is the lack of supervised practical experience (Burke & Kisimbo 1997, Parry 1992).

Training of Medical Professionals

Indonesia, Ethiopia and South Africa and even Australia identified general practitioners at rural hospitals and health centres as target group for training in surgical/obstetrical skills. They are often the only available and accessible source of care to the community. But the training in medical school does not provide the necessary skills for a rural doctor. The possibility that a rural GP can refer emergency cases is also limited. Indonesia is considering a training in live-saving skills (manual removal of placenta, uterine curettage etc) for general practitioners of rural health centres and hospitals. South Africa based their decision to implement obligatory vocational training in primary surgery for general doctors on their evaluation of common practice in rural hospitals. They found doctors undertaking surgical interventions to save mothers lives depended more on personal courage than on acquired skills. Ethiopia has already initial experiences with a similar 6 month training course for rural GPs.

Even Australia, a country with vast distances and problems to cover the rural population with health care, pursues vocational training modules for family practitioner in various topics including emergency surgery, emergency obstetrics, paediatrics, cardiac emergencies etc (Loutfi *et al.* 1995, Thouw 1992, Reid *et al.* 1998, Craig & Nichols 1993).

Very important to all short courses is the regular supervision by specialists after their training is finished. This is the most sensible and most difficult requirement to satisfy. The Ethiopian experience of the first course showed that difficulties were encountered in involving the necessary Ethiopian surgical specialists, as rural health services were not felt to be a priority for the university department of surgery (Loutfi *et al.* 1995).

To create more job satisfaction new approaches to training of health staff are tested. In Nepal a recent programme of the Safe Motherhood Project used a needs assessment with competency checklists to model the training to the specific individual requirements (Koblinsky *et al.* 1999). World Bank, UNICEF and UNAIDS advocate this kind of training programmes. Because of little experience evaluations are not available. But as long as training is driven by supply-side interests and capacities of institutions the needs of the trainees are rarely taken as basis for planning new programmes (Daly *et al.* 1994, UNICEF 2000, Walker 1999).

Quality of Obstetric Care by Medical and Non-academic Staff

A very large cohort study in Canada compared the maternal and foetal outcome for family practitioners and specialist doctors in obstetrics. A significant difference was found in the proportion of primigravid women with spontaneous vaginal delivery, which was higher for family doctors and oxytocin induced labour which was higher in the specialist group. However the results showed no significant difference in maternal and foetal health outcomes (Krikke & Bell 1989).

In Ethiopia a group of general practitioners who underwent surgical training produced high quality results despite their patients being generally in very poor condition. The paramedical personnel in Mozambique was carefully followed and their results evaluated as was the work of the nurse surgeons in DRC (ex-Zaire). All studies show the quality of their work to be satisfactory and in large comparable to specialist care given the same conditions and patient choice (da Luz Vaz & Bergström 1992, Duale 1992, Loutfi *et al.* 1995, Pereira *et al.* 1996, Sohler *et al.* 1999).

The Costs of Training for Obstetric Emergency Care

The costs of training is generally difficult to assess. From Myanmar, Pakistan and Sri Lanka we know that that 2.5 to 3 nurses can be trained for the costs of training one physician (World Bank 1993). In Bangladesh the total costs of the training of one doctor is around 2,500 US\$ and the total cost of training one nurse is around 300 US\$ (Shaheen pers. comm.). In Tanzania the 2 years training for an assistant medical officer is estimated at 1,000 US\$ per person (Mbaruku pers. comm.). In addition the trainees receive their monthly salary. The newly installed 6 months training course for general practitioners in Ethiopia costs 2,000 US\$ per person not counting the salary for two expatriate obstetricians (teaching and supervision). The highest proportion of cost was due to per diems paid to course participants (Loutfi *et al.* 1995).

The follow-up costs must not be neglected. Supervision of newly acquired skills is absolutely necessary. For example replacing senior house officers in neonatal care by specially trained nurses in Bristol, UK, showed a complex balance sheet. The savings for one group were offset by the higher degree of supervision required in the other (Hopkins *et al.* 1995).

Summary of Present Experience

The unequal distribution of trained medical personnel for obstetric interventions has several reasons. One of the main factors is the influence of politics. Often the political will to staff rural hospitals with qualified medical personnel is not seriously formulated, or the political power to exert such policy is weak. By the example of Norway we can see that a strong government can insist on staffing rural posts. Beneficiaries of state bursaries either go to the Northern provinces or they must reimburse the received money. In Burkina Faso exemptions to the staffing regulations undermine the system. Female staff can apply to be posted near to their husbands (if they are governmental employees too). The law on protection of the family guarantees the relocation. By this practice almost all registered midwives are posted in the two main cities. In other countries e.g. Tanzania influential individuals just do not comply with posting to rural areas without fearing any retribution.

Another reason for unequal distribution of health workers is a shortage in absolute numbers of qualified medical personnel. The debate has been going for more than twenty years on whether training of more medical personnel or non-academic staff will be the solution. In between many countries have experimented with different approaches to cover the under-served rural areas with adequate obstetric care. The results are encouraging. The experiences show that in the absence or scarcity of physicians at first referral level, non-physician teams can be trained to undertake effectively all functions attributed to that level, including emergency operative procedures (General Assembly at the XIII World Congress of Gynecology and Obstetrics 1992).

The World Bank encourages the employment of paramedical staff for several reason, not the least being their training is cheaper and their salaries lower. They are also easier to attract to rural areas, and generally communicate more efficiently with patients (World Bank 1993). Still the recognition of non-academic staff by professional organisations and governmental bodies is missing in many parts of the world.

Proposal for More Equal Distribution of Qualified Obstetric Care

The different situations of the different countries point to individual and not an uniform strategy. Countries with a high absolute number of medical doctors have different problems assuring maternity care to rural areas than countries where personnel is scarce. Scarcity of personnel can also be due to the small training capacity of medical schools, economic constraints, or to migration of health personnel to greener pastures abroad.

Considering the evidence described above, we suggest the following scenarios:

1. Countries with enough capacity of medical personnel concentrated in the main cities.

The clear political will should be formulated, that the coverage of the rural areas with quality maternity care is a priority. It should be obligatory for all health workers to work for a period of at least two years in rural areas, before being allowed to settle in the bigger cities or private practice. We have evidence from developed and developing countries where this is functional (e.g. Norway, holders of state bursaries must work for 2 years in the northern provinces, Burkina Faso, all medical and paramedical staff must work for 2 years in the districts).

2. Countries with few qualified health workers due to emigration.

The most important measure is to make working in the country more attractive than working abroad. There are many possibilities apart from financial incentives. Faster advancement in the hierarchy of health services, higher salary grades, public acknowledgement of work, upgrading of training and preferential admission to courses are some examples.

3. Countries with few qualified personnel due to limited training capacities or economic constraints.

Up-grading training for existent staff is the first possibility. As we can see from the experience in Ethiopia, South Africa and others, whole groups of personnel are working without enough background training and practical skills. They are willing and able to learn surgical skills and perform well. Delegation of tasks to other cadres of health personnel is another possibility. On-the-job training of nurses in DRC proved to be very successful and sustainable. The creation of a new cadre is the solution for countries where the official policy supports training non-academic personnel and allows them to perform specific tasks independently (Table 2). Tanzania and Burkina Faso have here advanced experiences and others can learn from their experiences.

Table 2. Suggestions for a better coverage of emergency obstetrics

Main actors for emergency obstetric care	Better coverage of emergency obstetrics
Referral level (dispensaries, health centres)	I. Referral level (dispensaries, health centres)
Nurses Midwives auxiliary staff	lifesaving skills for nurses and midwives; e.g. manual evacuation of the uterus, bimanual compression of the uterus, repair of lacerations and episiotomies, perfusions, oxytocin post-partum
Referral level (district hospital)	II. Referral level (district hospital)
general practitioner nurses midwives	a) training of general practitioners in surgical procedures for frequent emergency events (caesarean section, strangulated hernias) e.g. Ethiopia, Australia b) training of non-academic cadre in surgical procedures and anaesthesia (e.g. AMO in Tanzania, nurse-surgeon and nurse-anaesthetist in Burkina) c) up-grading training for nurses and midwives in surgical procedures and anaesthesia (e.g. on the job training of surgical nurses in DRC, assistant medical anaesthetist in Malawi, surgical technicians in Mozambique)
Referral level (regional and national hospital)	III. Referral level (regional and national hospital)
specialist in obstetrics and gynaecology senior medical doctor general practitioner	integration of specialists and senior medical staff in practical training and supervision of 2. referral level staff.

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