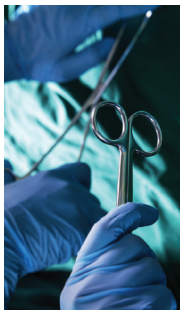

Chapter 17

Workforce Innovations to Expand the Capacity for Surgical Services

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INTRODUCTION

Surgical interventions are often considered complex procedures to be undertaken by highly trained surgeons, but such specialists are rare in many low-income countries (LICs). However, many common surgical problems in resource-limited settings do not require the intervention of specialized staff. Significant documentation demonstrates that cost-effective surgical interventions can be undertaken in LICs with the innovative use and deployment of trained staff, including emergency care for trauma and obstetrical needs. Despite this documentation, surgical workforce innovations that use nonspecialized cadres often meet with resistance from established surgeons and their professional associations.

The most important barrier to the safe provision of preoperative, intraoperative, and postoperative surgical and anesthesia services in LICs is the shortage of trained staff. The well-documented reasons for this scarcity include the following (Chu and others 2009; FAIMER Institute 2008):

- Low number of medical school graduates
- Inadequate initial and ongoing training
- Poor salaries and working conditions
- Inability to motivate and retain staff in remote and rural areas
- Staff attrition due to retirement, death, or resignation, and the consequences of brain drain

The reluctance of governments to invest in human resources compounds the effects of these factors. Current financial constraints, such as those in Tanzania, for example, have forced governments to announce freezes in employing new human resources for health.

Sub-Saharan Africa is most affected by the global shortage of human resources for health (Chankova, Muchiri, and Kombe 2009; Mills and others 2008; WHO 2006). Two countries profiled in this chapter, Mozambique and Tanzania, experienced this crisis some years ago (Liese and Dussault 2004; Mills and others 2008; Smith and Henderson-Andrade 2006). In other countries, despite years of interventions to overcome the scarcity of doctors, the shortage has worsened as the result of population growth, presenting a major challenge to the ability of these countries to achieve the health-related Millennium Development Goals (MDGs) (Anand and Barnighausen 2004; Liese and Dussault 2004) (box 17.1). Available doctors tend to concentrate and work in urban areas and in regional or even national hospitals, limiting access for rural populations, who often constitute up to 75 percent of national populations.

A major reason for Sub-Saharan Africa's high maternal mortality is that few infants are born in the presence

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Box 17.1

Millennium Development Goals (MDGs) for Health

Goal 4: Reduce the under-five mortality rate by two-thirds between 1990 and 2015.

Goal 5: Reduce the maternal mortality ratio by three-quarters; achieve universal access to reproductive health.

Goal 6: Have halted and begun to reverse the spread of HIV/AIDS by 2015; achieve universal access to treatment for HIV/AIDS by 2010 for all those who need it; have halted and begun to reverse by 2015 the incidence of malaria and other major diseases.

A review of progress on the MDGs is available at http://www.hrh-observatory.afro.who.int/en/data-and-statistics/hrh-statistics.html.

Source: United Nations, http://www.un.org/millenniumgoals.

of skilled attendants. The lack of skilled birth attendants contributes to the 5 million to 6 million maternal deaths, stillbirths, and newborn deaths each year worldwide. In 19 of the 52 Sub-Saharan African countries that reported data, fewer than 50 percent of births were attended by skilled health personnel. The World Health Organization (WHO) estimates that 80 percent of births need to be attended by an adequately equipped and skilled birth attendant to reach the fifth MDG target of reducing maternal mortality by three-quarters (UNECA, African Commission, African Development Bank, and UNDP n.d.).

One colleague in Tanzania expressed his frustrations in the following way:

> … [We] are fed up with the government's commitments and the politicians' alleged devotion to the problem of maternal deaths in Tanzania. Our work burden is increasing tremendously, but there are no signs of real support. Imagine: If I am up during the night to make one to two cesarean sections, I have to work the full day the morning after. We are entitled to a symbolic call allowance of US$6 (six!) per night, but we do not receive even that! The government says "there is no money." This is not true.

The AIDS epidemic in Sub-Saharan Africa may have aggravated this crisis by depriving health systems of a significant proportion of their trained staff (Chen and others 2004). Sub-Saharan Africa has 11 percent of the world's population and 24 percent of the total estimated global burden of disease; yet it has 3 percent of the global health workforce (Chen and others 2004), only a small percentage of whom are qualified surgeons. Sub-Saharan Africa has less than 1 percent of the number of surgeons that the United States has, despite having a population that is three times as large (Ozgediz, Riviello, and Rogers 2008). Expanding the human workforce is clearly essential to improving the performance of health systems (de Bertodano 2003; Chankova, Muchiri, and Kombe 2009; Liese and Dussault 2004; WHO 2000; World Bank 2004) and improving outcomes, even under difficult circumstances (Chu and others 2009; EQUINET 2007; FAIMER Institute 2008; Mills and others 2008).

In Mozambique, the scarcity of human resources for health 30 years ago was alarming; the country had fewer than 5 physicians per 100,000 population. Our research estimated that there are 33 registered nurses and midwives per 100,000 population (Pereira 2010). In Tanzania, the health workforce shortage was disastrous, according to the report of the Joint Learning Initiative (Chen and others 2004). A study by the London School of Hygiene and Tropical Medicine suggests that the number of health care providers would need to increase by more than 58,000 to provide necessary interventions to meet the health-related MDGs for Tanzania (Anyangwe and Mtonga 2007).

In most countries in Sub-Saharan Africa, the scarcity of human resources for health existed before independence, as a result of colonial training policies and, in some cases, the massive exodus of colonial professionals after independence (Ministry of Health, Mozambique 2008; Ozgediz and others 2008). In Mozambique, a civil war provoked by neighboring South Africa in the early 1980s worsened the situation. Both Mozambique and Tanzania suffered from the consequences of the brain drain, either externally as health professionals moved to high-income countries (HICs) or internally as they migrated from rural to urban areas (Dodani and LaPorte 2005; McKinsey and Company 2006; Mullan and Frehywot 2007).

NONPHYSICIAN CLINICIANS

The literature uses a number of terms to describe categories of health professionals who may serve as substitutes for physicians in providing health care. The most common are *nonphysician clinicians* (NPCs)—nowadays referred to as *associate clinicians*—and *midlevel providers* (MLPs), although others such as *substitute health workers* have been used (Dovlo 2005).

The terms appear to be used interchangeably, although there is inconsistency across the literature in the ways in which the terms are used. In the Sub-Saharan African

literature, the characteristics of the nontraditional cadres of health professionals are generally as follows:

- They have been created as a response to physician scarcity.
- They have a lower initial level of education.
- They receive a shorter period of preservice training than physicians, with the training often limited to a specific set of clinical skills.

These cadres include the Tanzanian *assistant medical officers* (AMOs) and the Mozambican *técnicos de cirurgia* (TCs), whose experiences particularly inform this chapter. Other countries use the terms *medical assistants* (Ghana) or *clinical officers* (Kenya and Uganda) to denote similar cadres.

Studies and commentators differ in their inclusion or exclusion of traditional health professional cadres, including nurses, midwives, pharmacists, and other allied health professionals, who have distinct and complementary clinical roles to play. For example, Warriner and others (2006, 1) define *MLPs* as "health care providers who are not doctors, such as nurses, midwives, and doctor-assistants" in their review of the options for providing induced abortion services in South Africa and Vietnam. Similarly, the American Osteopathic Association, Division of State Government Affairs (2003), based in the United States, counts both new and traditional health professional cadres in the definition of the term NPC. In contrast, Bradley and McAuliffe (2009, n.p.) define MLPs as "cadres of health workers who undertake roles and tasks that are more usually the province of internationally recognized cadres, such as doctors and nurses," implying that nurses are not included among MLPs. This definition is similar to that of NPCs according to Mullan and Frehywot (2007), who list *health officers, clinical officers, physician assistants, nurse practitioners,* and *nurse clinicians* as the labels by which NPCs are known.

This chapter focuses on the role of NPCs or MLPs—AMOs and TCs in particular—in surgical services in Sub-Saharan Africa in situations characterized by physician shortages. These cadres have been central to the debate about ensuring adequate staffing for essential surgery and other physician-delivered services in such environments, although growing interest has been expressed in the greater use of midwives and nurse-midwives in obstetric surgery, and countries have been building on their experiences in such expanded uses (Berer 2009; Warriner and others 2006).

In recent years, a welcome terminological shift has occurred, from the NPC concept (which actually is a negation) to the concept of *associate clinician.* A growing network—the African Network of Associate Clinicians (ANAC)—has developed and is based at the Chainama College of Health Sciences in Lusaka, Zambia, a lower-middle-income country. The ANAC is significant; for the first time, differently titled MLPs from a large number of Sub-Saharan African countries have formed a major international association. This development will facilitate the recognition of this category of key health staff for advanced care, including surgery, in rural settings that lack access to physicians.

TASK-SHIFTING AND TASK-SHARING

The literature indicates that informal or formal delegation of tasks from one cadre to another is not a new concept. *Task-shifting* implies the delegation of certain medical responsibilities to less specialized health workers (McCord and others 2009). This is the direct substitution of new and different cadres for an existing traditional profession (Pereira and others 2007; Pereira and others 2011). In surgery, such health workers may provide many of the diagnostic and clinical functions usually performed by physicians. However, opinions have diverged; some experts suggest that *task-sharing* may be a more appropriate concept. These two expressions, however, seem to signify two different realities. Where no physicians are available, the tasks of physicians must be shifted to nonphysicians. Where a few physicians are available, their range of tasks may be shared with nonphysicians.

Training for Safe and Effective Care

In most Sub-Saharan countries, the use of substitute health workers started as a temporary measure until more doctors could be trained. However, in the face of the persisting human resources crisis, this strategy has become permanent. More of these countries have embarked on the expanded training of midlevel health professionals and nonphysician cadres to promote access to care and to contain costs (Dovlo 2004; Ministry of Health, Mozambique 2008; Pereira and others 2011).

This trend to delegate procedures to lower cadres has often met with resistance for various reasons. Surgery is considered a highly specialized field that requires several years of training; hence, it is important to define the boundaries of surgical task-shifting considered essential to ensure quality of care. The WHO has established a list of surgical procedures performed at first-level hospitals that facilitates the classification of various interventions and can help training schools establish which essential interventions could be safely shifted to NPCs (Lehmann, Dieleman, and

Martineau 2008; McCord and others 2009). A district or first-level hospital is usually the most remote, rurally situated hospital with inpatient care and a theater for limited major surgery interventions, such as cesarean sections, open fractures, and bowel resections for strangulated hernias (Chilopora and others 2007).

In Mozambique, the training of NPCs in surgery is well structured and is followed by a formal internship. The recruitment focus is on candidates with previous job experience in peripheral health units or first-level hospitals (Pereira 2010). Studies have shown that NPCs in Mozambique are well appreciated by other professionals, doctors, nurses, and midwives (Cumbi and others 2007). Approximately 90 percent of physicians and other health staff gave positive ratings to the strong practical skills and the critical roles played by NPCs in saving the lives of mothers and newborns at first-level hospitals. With accumulated surgical experience among these NPCs, young doctors deployed in rural areas are increasingly trained in surgery by TCs (Hounton and others 2009). An assessment of the outcomes of cesarean sections between TCs and physicians at the Maputo Central Hospital showed no clinically significant differences between the two cadres (Cherian and others 2004).

In Tanzania, AMOs are selected from among the *clinical officers* who have a minimum of three years of working experience in peripheral health units or first-level hospitals. Their subsequent training is for two years and includes three months each of surgery and obstetrics. Studies show no significant differences in the clinical outcomes, risk indicators, or quality of care indicators for major obstetric operations performed by AMOs and nonspecialized physicians (McKinsey and Company 2006). For example, despite logistic and material resource problems in all the hospitals, the aggregate maternal case fatality rate was acceptable at 1 percent to 2 percent.

Ghana, a lower-middle-income country, initiated its program for training medical assistants, consisting of one year of postnursing qualification training, in 1969. In 2007, this program was converted into a physician assistants program, consisting of four years of direct training after high school. The students were trained to perform only limited surgical procedures and tasks. A nurse anesthetist (now called *anesthetist physician assistant*) program has become the backbone of surgical procedures, even in regional third-level hospitals. The surgical tasks of these cadres remain limited to performing incisions, draining abscesses, suturing wounds, and immobilizing fractures. Most obstetric tasks beyond normal delivery are not part of their responsibilities. According to the director of the College of Health and Well-Being in Kintampo, a move is underway to change the procedures and allow these cadres to perform life-saving surgery and obstetric procedures.

In both Mozambique and Tanzania, the real challenge in providing quality care is not primarily in the practical skills in the operating room. The difficult aspect of emergency obstetrics and surgery is rather in the decision-making process, specifically, whether and how to intervene. It is easy to solve most emergency problems in obstetrics by resorting to cesarean section, a simple technique that is easy to learn. Any health worker, NPC (assistant medical officer, clinical officer, or other category of midlevel health worker), or physician who has not been trained in properly assisting vaginal delivery in general and in vacuum extraction in particular would tend to solve many obstetric problems by performing a cesarean section—whether justified or not.

Most often—in practice—no one would blame a health care provider for having performed a cesarean section; however, health care providers would be blamed for not having performed a cesarean section if the mother or the baby died or suffered a serious complication. This reality increases the number of medically unnecessary cesarean sections. This problem has one solution: the careful auditing of cesarean section decision making. This auditing practice is already routine in efforts in Tanzania to reduce maternal mortality rates. Cesarean section auditing has proven to be a necessary corollary to the task-shifting of major obstetric surgery. The audit scrutinizes the circumstances leading to the cesarean section; it then questions each step by examining the details of the partogram to determine whether oxytocin augmentation of labor should have been undertaken, or if assisted vaginal delivery should have been considered to be the preferred option.

Treatment Areas for Task-Sharing or Task-Shifting

Our studies and other literature show that midlevel health professionals carry out the majority of surgical procedures outside urban areas in a number of Sub-Saharan African countries and can be indispensable when physicians are scarce (Chankova and others 2009; Cumbi and others 2007; Dovlo 2004; McCord and others 2009). The studies indicate that TCs in Mozambique perform 92 percent of cesarean sections in first-level hospitals (Pereira 2010; Pereira and others 2007); in Tanzania, AMOs perform 85 percent of cesarean sections, 94 percent of repairs of ruptured uterus, 86 percent of removals of ectopic pregnancy, and 70 percent of hysterectomies in the Mwanza and Kigoma regions in Tanzania (McCord and others 2009; Pereira 2010).

ACCEPTANCE OF MIDLEVEL PROVIDERS FOR MAJOR SURGERY

The literature highlights the problem of reluctance and even resistance among doctors and other professionals to consider task-shifting in surgery (Lehman, Dieleman, and Martineau 2008; McCord and others 2009). Since the inception in 1984 of training of TCs in Mozambique, this reluctance has gradually disappeared; members of this cadre are now well accepted and recognized among physicians. They are also acknowledged to be important for the training and support of recently graduated and inexperienced physicians assigned to first-level hospitals (Cumbi and others 2007). One physician in our research in Mozambique expressed his opinion as follows:

> … [O]ur TC is good, because without him I don't know what would be in terms of the rural hospital [where] he is the surgeon; here in the provincial hospital he works in shifts in equal terms with the other specialists [surgeon, obstetrician, and orthopedist]; when one specialist goes on vacation, she or he is replaced by the TC. At rural hospital level, they [TCs] provide all [types of] care and they decrease the provincial hospital workload, [can you] imagine without their presence [in the districts], what would be the workload at the provincial hospital?

The TCs have been trained and deployed for a quarter of a century, and the young physicians are taught in school to respect these cadres, given that new physicians themselves have limited exposure to surgical interventions.

In Tanzania, this issue has not yet been studied scientifically. Forthcoming research into attitudinal problems related to perceived threats to conventional areas of professional competence in surgical practice by task-shifting will be useful. In Ghana, physician assistants were, until recently, not under any regulatory authority, which may have contributed to their lack of acceptance by physicians and the reluctance to shift certain tasks to them. Associate physicians in Ghana are now registered and regulated by the Medical and Dental Council and may soon be permitted to perform life-saving surgical procedures.

IMPROVING WORKING CONDITIONS AND PROMOTING RETENTION OF MIDLEVEL PROVIDERS

The need to develop policies and programs to improve health worker motivation and retention in rural locations is a crucial area in addressing the health resource crisis, especially in LICs and lower-middle-income countries (Mills and others 2008; Pereira and others 1996). Both motivation and retention are directly influenced by poor remuneration and working conditions, suboptimal management of human resources, and limited opportunities for career progression (Pereira 2010). These challenges are issues for both physicians and NPCs.

In Mozambique, the same factors resulting in poor motivation also prevail (Cumbi and others 2007). A key issue behind the dissatisfaction that TCs express is the heavy workload; they can rarely leave the workplace to attend training in referral hospitals or attend specific seminars to enhance their knowledge. In addition, the scarcity of surgical specialists at the provincial level limits the capacity to provide and receive adequate supervision (Hounton and others 2009).

The NPCs in Ghana and Tanzania face a similar situation, with motivation reportedly weak (Hongoro and McPake 2004). AMOs are overworked, face poor working conditions, and experience a lack of supervision. Unlike nurses and midwives, they are rarely invited to attend professional meetings and workshops, despite their crucial roles. They are seldom moved to referral hospitals for job training to improve their skills and performance. Limited career prospects and opportunities for upward mobility increase their levels of dissatisfaction (Pereira 2010).

Financial Incentives

In Mozambique, the lower salary level for TCs than for other midlevel professionals has been a significant cause of dissatisfaction. The training of TCs was initially controversial, largely due to physician resistance, resulting in the unclear definition of career paths by the Ministry of Health, since TCs were considered midlevel professionals without specialization. This designation affects their position on the salary scale, which has a significant impact on their motivation (Pereira 2010). During the past decade, the salaries of TCs have improved.

Nonfinancial Incentives

Improving Supervision. Initiatives to improve the capacity to provide adequate supervision and management can improve work satisfaction, performance, and quality of work in remote settings (Maestad 2006; Pang, Lansang, and Haines 2002; Pereira and others 2007). Our studies did not specifically address supervision, but the literature reviewed indicates that supervision is irregular or nonexistent in most districts in the two countries (Anyangwe and Mtonga 2007; Dovlo 2005). In Ghana, annual meetings have become popular and

important sources for updating skills and providing forums for professional networking.[1]

Improving Working and Living Conditions. Working and living conditions are important determinants of motivation and retention in HICs, lower-middle-income countries, and LICs (Douglas 1991; Lavy and others 2007; Pereira and others 2007; Stringhini and others 2009). Our studies did not address these issues further, because in the majority of districts, the housing for TCs had been assessed beforehand, a prerequisite to deployment of these cadres at first-level hospitals. In Mozambique, the government is implementing a decentralization program to partner with local authorities and communities to better respond to the health resource problems in remote areas. This consultative process is expected to generate better accommodations for staff, more electricity, better roads, and improvements to health and educational facilities (Loevinsohn and others 1995). The impact of this program has not yet been evaluated.

In Tanzania, the health sector reform strategy, which aims to influence changes in the health system to improve the health status of all citizens, has focused on district decentralization, improvement of the health system, health management, and financing and human resource development (Cavanagh and Coffin 1992; Kunaviktikul and others 2001). An evaluation reveals that the impact on the general health status of the population was unsatisfactory (Lambert and Lambert 2001).

Improving Staff Satisfaction. Staff satisfaction has a large influence on motivation, which affects the performance and retention of health workers (Ministério da Administração Estatal 2001). Training, study leave, the opportunity to work in a team, support from supervisors, and provision of housing and transport increase staff satisfaction and consequently motivation (Dominick and Kurowski 2005; Munishi 2003). In both Mozambique and Tanzania, a widespread opinion among health workers is that the situation is difficult because their salaries do not adequately cover the cost of living. Health workers consider administrative management to be weak (Anyangwe and Mtonga 2007; Dovlo 2005; Ministry of Health, Tanzania 2007).

Improving Retention. According to the literature, the retention of human resources for health, particularly in rural areas, is a major and complex problem in most LICs (Pereira and others 2007; Stilwell and others 2001; WHO 2004; Wilbulpolprasert 1999), and no single solution applies in all settings. Comparatively low salaries are the primary source of dissatisfaction. However, socioeconomic status—implying a set of appreciating and depreciating circumstances—such as access or lack of access to housing, positive or negative working conditions, an enabling or disabling work environment, and the availability or lack of availability of further training are the decisive factors in whether to stay in or leave remote areas.

Our results in Mozambique show that 88 percent of TCs remained in rural areas seven years after graduation, while none of the physicians remained after graduation (the first assignment always being in a rural area) (Pereira 2010; Pereira and others 2007). Another study indicates that retention may be related to the recruitment system. If candidates are selected from each region of the country, are mainly from rural areas, and are integrated into scholarship schemes at the provincial level with the commitment to return after completion of training, then the distribution of cadres and their retention may be improved.[2]

Retention is also a major issue in Tanzania (Anyangwa and Mtonga 2007; Ministry of Health, Tanzania 2007), with migratory flows from rural to urban areas and from the public to the private sectors. Most of the skilled health workforce, particularly physicians and specialists, are concentrated in urban areas, where only 20 percent of the population lives. As early as 1982, Tanzania started a decentralization reform that was designed to empower local authorities to recruit health workers. Decentralized recruitment was supposed to be effective in improving retention because the responsibility for hiring was transferred to the local governments. The assessment of the potential impact of this decentralization program is underway, but the initial findings reveal that decentralization enhanced the retention of the lower-cadre health workers in the districts.[3] In Ghana, approximately 75 percent of medical assistants and physician assistants work in rural areas.[4]

COST-EFFECTIVENESS OF SURGICAL TRAINING OF MIDLEVEL PROVIDERS

Few studies have addressed the issue of the cost-effectiveness of training NPCs, associate clinicians, general practitioners, and specialists (Dovlo 2004). In Burkina Faso, NPCs are trained for two years in surgery (*attachés de santé*), and general practitioners receive six months of training to perform emergency surgery in rural areas. These personnel are cost-effective compared with specialists (Hounton and others 2009). In Mozambique, the cost-effectiveness of general practitioners was not addressed in our studies, given that this cadre does not receive additional training in surgery. Such a scheme would increase the training of general

practitioners to a total of nine years after secondary school, which the Ministry of Health did not deem advisable. A comparison of the cost-effectiveness of TCs in relation to physicians demonstrates that the former are significantly more cost-effective if the costs of training and deployment are considered (Kruk and others 2007). In Mozambique, most physicians, after initial rural assignments of a few years, move to urban areas to meet administrative commitments or to start their specialization at teaching hospitals (Pereira 2010). In Tanzania, the literature review shows that training AMOs is less expensive than training physicians (Anyangwe and Mtonga 2007).

ESTABLISHING ENABLING ENVIRONMENTS

The governments of Mozambique and Tanzania have made strong commitments in recent decades to address the crisis in human resources for health. Solving the problem of inadequate numbers of health professionals, however, is not the solution to improving access to health care. Other problems have to be addressed simultaneously. An environment conducive to quality surgical care, as perceived by the health workers, requires that trained NPCs be able to execute their skills in settings that foster and value their professional services. This environment, which is required for well-trained health workers in sufficient numbers to perform optimally, is needed both at the central level of the Ministry of Health and at the provincial and district levels.

Mozambique

In Mozambique, the Instituto Superior de Ciências de Saúde (Higher Institute of Health Sciences) was created to clarify the career path for TCs (ISCISA 2003). The initiation of the national human resources program is a positive step in counteracting the human resources crisis (Pereira 2010). In Ghana, a similar school is under the medical faculty of a university and the program has been upgraded, measures that have improved the environment for task enhancement.[5]

To begin to reduce TCs' heavy workload in Mozambique, a program to train midwives to perform major obstetric surgery has been initiated (Enfermeiras de Saùde Materna) to strengthen teamwork at first-level hospitals.[6] This new training, which results in a licentiate degree, comprises three-and-a-half years of theoretical and practical training, in addition to six months of internship in first- or second-level hospitals. The training is grounded in nursing but emphasizes diagnostic and treatment skills, the practice of major emergency obstetric surgery, and the concept of teamwork. The Ministry of Health expects that more effective teamwork and, consequently, improvement of the quality of work can be achieved because TCs will be relieved of much of the workload of obstetrical and gynecological emergency surgery.

Emergency obstetrics and gynecology constitutes the predominant work burden for TCs. The task-shifting scenario, however, is changing; NPCs, in all likelihood, will handle more elective surgery in general surgery, as well as in obstetrics and gynecology. Two examples are bilateral tubal ligation and a growing number of planned cesarean sections, whether clinically indicated or not. In middle-class Sub-Saharan Africa, the trend to request cesarean sections is, unfortunately, clearly on the rise.

In Mozambique, the government plan for 2005–09 focused on capacity building, including the rehabilitation of infrastructure and theaters in the whole health system; the timely supply and deployment of human resources in general, and in peripheral areas in particular; the development of norms and guidelines for obstetric emergency care and essential care to newborns; the implementation of a formative system of supervision; and the strengthening of the ability to communicate with radios and to transport patients (ISCISA 2003). The plan from 2010 onward aims to strengthen the system and the previously existing plan (Ministry of Health, Mozambique 2008).

The human resources plan approved by the Ministry of Health for implementation incorporates four main strategic areas:

- Organization of services and a functioning system of rules
- Expanded capacity of management at different levels
- Improved distribution and retention of human resources for health
- Expansion of the institutional capacity to provide training and continuous education

Tanzania

In Tanzania, facilitating the establishment of an enabling environment has received increasing attention (Munga and others 2009; Nyamtema and others 2011). The government recognizes the importance of improving health care and expanding the supply of human resources. It has made a commitment to address the shortage of human resources for health, particularly the skilled workforce. Tanzania has established relationships with other governments, donors, and agencies that are potential partners in these approaches (Anyangwe and Mtonga 2007).

CONCLUSIONS

The shortage of skilled human resources in surgical health care is a major health system problem in Mozambique and Tanzania, as well as in other LICs. Innovative and multifaceted workforce solutions offer viable options for alleviating the consequences of the shortage and building the capacity of countries to provide skilled surgical care. Task-shifting and task-sharing are feasible strategies and should be seriously considered to address the human resources crisis in Mozambique and Tanzania, as well as in other countries facing the same human resources problems.

NPCs perform approximately 90 percent of major emergency obstetric surgeries in rural areas where most of the population live in both Mozambique and Tanzania. A comparison of the quality of care provided by medical doctors and that provided by TCs and AMOs demonstrates no clinically significant differences in outcomes in major obstetric surgery. In Mozambique, physicians (general practitioners and specialists), nurses, and midwives rate TCs and AMOs positively.

In Mozambique, NPCs have a high retention rate in rural areas. NPCs are cost-effective, and the training and deployment of TCs is three times more cost-effective than the training and deployment of medical doctors. Motivation is a problem among NPCs in general and among TCs in particular, for multiple reasons, and programs are being developed to address some of the causes.

Challenges continue for many countries in physician acceptance of midlevel clinicians; the development and implementation of training and regulatory mechanisms; the expansion of the capacity for skills development and improvement, as well as supervision; and better financial and nonfinancial compensation. Initiatives to improve accuracy in decision making in obstetric cases by different professional categories deserve a more specific approach.

NOTES

One of the authors of this chapter is a WHO staff member. The authors alone are responsible for the views expressed in this publication and they do not necessarily represent the decisions or policies of the World Health Organization.

The World Bank classifies countries according to four income groupings. Income is measured using gross national income (GNI) per capita, in U.S. dollars, converted from local currency using the *World Bank Atlas* method. Classifications as of July 2014 are as follows:

- Low-income countries (LICs) = US$1,045 or less in 2013
- Middle-income countries (MICs) are subdivided:
  - Lower-middle-income = US$1,046 to US$4,125
  - Upper-middle-income (UMICs) = US$4,126 to US$12,745
- High-income countries (HICs) = US$12,746 or more

1. Delanyo Dovlo, personal communication.
2. Caetano Pereira, personal communication.
3. Caetano Pereira, personal communication.
4. Delanyo Dovlo, personal communication.
5. Delanyo Dovlo, personal communication.
6. Caetano Pereira and Staffan Bergström, personal communication.

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