

Chapter 20

Global Surgery and Poverty

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INTRODUCTION

Surgically treated disorders represent a significant proportion of the burden of the diseases associated with poverty. Furthermore, surgery is a cost-effective method of reducing suffering, prolonging life, and restoring sick and injured people to health and economic productivity.

Some 2 billion people worldwide lack access to surgical care (Funk and others 2010). The maldistribution of surgical resources between high-income countries (HICs) and low- and middle-income countries (LMICs) is striking. HICs have an average of 14 operating rooms and 45 trained surgeons per 100,000 population; LMICs have fewer than 2 operating rooms and 1 trained surgeon per 100,000 population (MacGowan 1987). Only 3.5 percent of the estimated 234 million operations performed annually occur in the poorest countries that spend less than US\$100 per capita annually on health care, although these countries account for 34.8 percent of the global population (Weiser and others 2008).

The barriers to surgical access, including lack of awareness, fear, distance, and cultural beliefs, are many. However, the principal barrier appears to be the cost of care (Malhotra and others 2005). For example, 91 percent of the respondents to a survey of cataract patients in Ghana cited cost as a significant barrier to treatment (Gyasi, Amoaku, and Asamany 2007). Similar barriers have been cited for hospital delivery and access to obstetric services in rural Kenya (Myangome and others 2012).

Many hospitals serving poor people charge a fee for care. Sometimes the charge is based on the belief that uncompensated services are not valued by those who receive them, although no literature confirms or refutes this hypothesis. More often, the costs of admission, medications, and food are based on the harsh economic realities of impoverished countries. However, even a nominal fee may serve as a major barrier to destitute patients who need care.

DISPARITIES BETWEEN LOW- AND HIGH-INCOME COUNTRIES

Surgery can have a profound impact on the lives and livelihood of millions of low-income patients worldwide. This section reviews the differential burden of disease and access to surgical care between HICs and LMICs, highlighting conditions with the highest burden and weakest services in LMICs.

Obstetric Conditions

In 2011, approximately 279,000 maternal deaths occurred globally (WHO 2013b). The deaths were primarily due to obstructed labor and peripartum hemorrhage. The burden of these deaths is born primarily by poor women in LMICs; for example, 99 percent of hemorrhage-related peripartum deaths occur in LMICs (Haeri and Dildy 2012). The key to reducing the maternal mortality ratio

is the presence of a trained attendant at every birth and urgent access to obstetric care (Wise and Clark 2010).

Although vesico-vaginal fistula due to obstructed labor is rare in HICs, as many as 3.5 million women may suffer from this condition in LMICs (Wall and others 2008). In a recent study of 278 women with genitourinary fistula in Pakistan, all of the vesico-vaginal fistula were repaired transvaginally, with success rates of 85 percent, 91 percent, and 96 percent, on the first, second, and third attempts, respectively (Sachdev and others 2009). These procedures require advanced training and experience, and the demand greatly exceeds the supply of surgeons and institutions. The ultimate solution is prevention of the initial damage by providing obstetric services to all pregnant women. In the interim, an organized international effort is necessary to help these women who are socially isolated and stigmatized by incontinence and offensive odor.

Trauma

In 2011, nearly 5 million people died of injuries; of these deaths, 88 percent occurred in LMICs (WHO 2013b). Road traffic accidents were the major cause of morbidity and mortality (Hazen and Ehiri 2006).

The vast majority of deaths in LMICs occurs in the field because of the lack of organized prehospital medical care and transport systems (WHO 2004). Patients with lower socioeconomic status have a greater risk of prehospital death (Mock and others 1998). Table 20.1 illustrates this preponderance of prehospital trauma deaths in LMICs compared with HICs.

For every trauma death, many more injured patients sustain temporary or permanent disabilities (Mock and Cherian 2008). Musculoskeletal injuries account for the majority of the disability burden (Peden and others 2004). In most LMICs, musculoskeletal injuries are treated by general surgeons, general practitioners, and nonphysician clinicians (Curci 2012; Mock and

Cherian 2008). Access to trained orthopedists, image intensification, internal fixation, and myocutaneous flap coverage of exposed bone is extremely limited.

Suboptimal quality of trauma and orthopedic care in LMICs leads to an excessive number of amputations, with consequent detrimental effects on mobility and quality of life. A Nigerian study concludes that most of the amputations were preventable and were caused by post-fracture splintage gangrene (Yakubu, Muhammad, and Mabogunje 1996).

Burns

Although few data document the epidemiology of burn injuries, little doubt exists that the global burden of burns is significant, with the majority of cases occurring in Asia and Sub-Saharan Africa (Burd and Yuen 2005). The reasons for the unequal global distribution of burns are unknown, but they probably include the widespread use of open fires for cooking and heating, the absence of fire codes governing building construction, and inadequate burn prevention knowledge in adults (Olabanji and others 2007). The problem is so significant that the World Health Organization (WHO) included burn care education as part of its course on essential emergency surgical procedures in resource-limited facilities (Cherian and others 2004). Burn care has been suggested as an essential part of a context-appropriate curriculum for surgical residents training in Sub-Saharan Africa (Mutabdzic and others 2013).

Cancer

Among the many clinical and sociodemographic factors contributing to disparities in cancer rates, the association between poverty and cancer is so strong that the former director of the National Cancer Institute, Samuel Broder, likened poverty to a carcinogen (Broder 1991; Greenlee and Howe 2009). Each year, 12.4 million cancer cases are newly diagnosed, and nearly 8 million patients with cancer died in 2011; more than half of these cases occurred in LMICs.

The number of new cancer cases diagnosed annually is expected to increase 70 percent by 2030; the largest increases are projected to be in LMICs (Franceschi and Wild 2013). A devastating and largely preventable malignancy in women living in LMICs is carcinoma of the cervix. The annual global burden is 530,000 new cases and 275,000 deaths (Sahasrabudde and others 2012). The human papilloma virus (HPV) causes cervical cancer, and the development of an HPV vaccine offers the hope of preventing this malignancy, which almost always presents as advanced disease in poor women (Woo and

Table 20.1 Proportion of Road Deaths by Setting in Three Cities
Percent

Setting	Kumasi, Ghana	Monterrey, Mexico	Seattle, Washington, United States
Prehospital	81	72	59
Emergency room	5	21	18
Hospital ward	14	7	23

Source: Mock and others 1998.

Omar 2011). However, the cultural, religious, educational, and economic barriers to implementation of a worldwide vaccination program are major challenges, particularly in LMICs.

Visual Impairment

Approximately 285 million people are visually impaired; of this number, 39 million are blind, and 246 million have severe or moderate visual impairment. According to the WHO (2013a), 80 percent of the global burden of visual impairment is preventable. Some 90 percent of visually impaired people live in LMICs (VISION 2020, WHO 2013a), and blindness and poverty are closely correlated. In a survey of blind people in Maiduguri, Nigeria, only 8.2 percent were employed, 75.3 percent were engaged in begging, and 69 percent lived on less than US\$1 dollar a day (Ribadu and Mahmoud 2010).

Eye surgery is a cost-effective method of treating many common forms of visual impairment and blindness. Providing extracapsular cataract surgery to 95 percent of those who need it would avert more than 3.5 million disability-adjusted life years (DALYs) per year globally. The integrated WHO SAFE (surgery, antibiotics, facial cleanliness, and environmental improvement) program for the treatment of trachoma would avert 11 million DALYs per year globally; cost-effectiveness ranges from I\$13 to I\$78 per DALY averted across regions (Baltussen and others 2005).¹ Outreach programs to correct refractive errors with inexpensive eyeglasses would greatly reduce the burden of visual impairment.

INEQUITIES IN SURGICAL ACCESS WITHIN COUNTRIES

Substantial inequities exist in access to surgical services within countries based on residence, income, and age among other social stratifiers. For example, access to obstetric surgeries is inadequate in LMICs compared with HICs. Facility-based health services are less equitable than community-delivered services in the area of maternal, newborn, and child health interventions (Barros and others 2012). Skilled birth attendant coverage, an indicator of facility-based care, was found to be the most inequitable service among maternal, newborn, and child health interventions in 54 countries with high maternal and child mortality—the Millennium Development Goals Countdown Countries. Barros and others (2012) report that households in the richest wealth quintile had 52 percent higher utilization of skilled birth attendants than those in the poorest quintile.

Substantial wealth-based differences in access to life-saving obstetric services occur between, across, and within countries. An analysis of cesarean delivery rates over a period of 20 years in 26 countries in South Asia and Sub-Saharan Africa found that the cesarean section rate was less than 2 percent among the poorest quintile in 21 out of the 25 countries, a figure well below the 5 percent to 15 percent threshold suggested by the WHO rate in the richest quintile across countries (figure 20.1) (Cavallaro and others 2013). In the Sub-Saharan African countries included in the study, coverage was less than 1 percent in the poorest quintile. Coverage was also higher for women living in urban areas, with the urban rich faring best, followed by those from rural rich households; the rate was still higher for rural rich women compared with urban poor women (figure 20.2) (Cavallaro and others 2013).

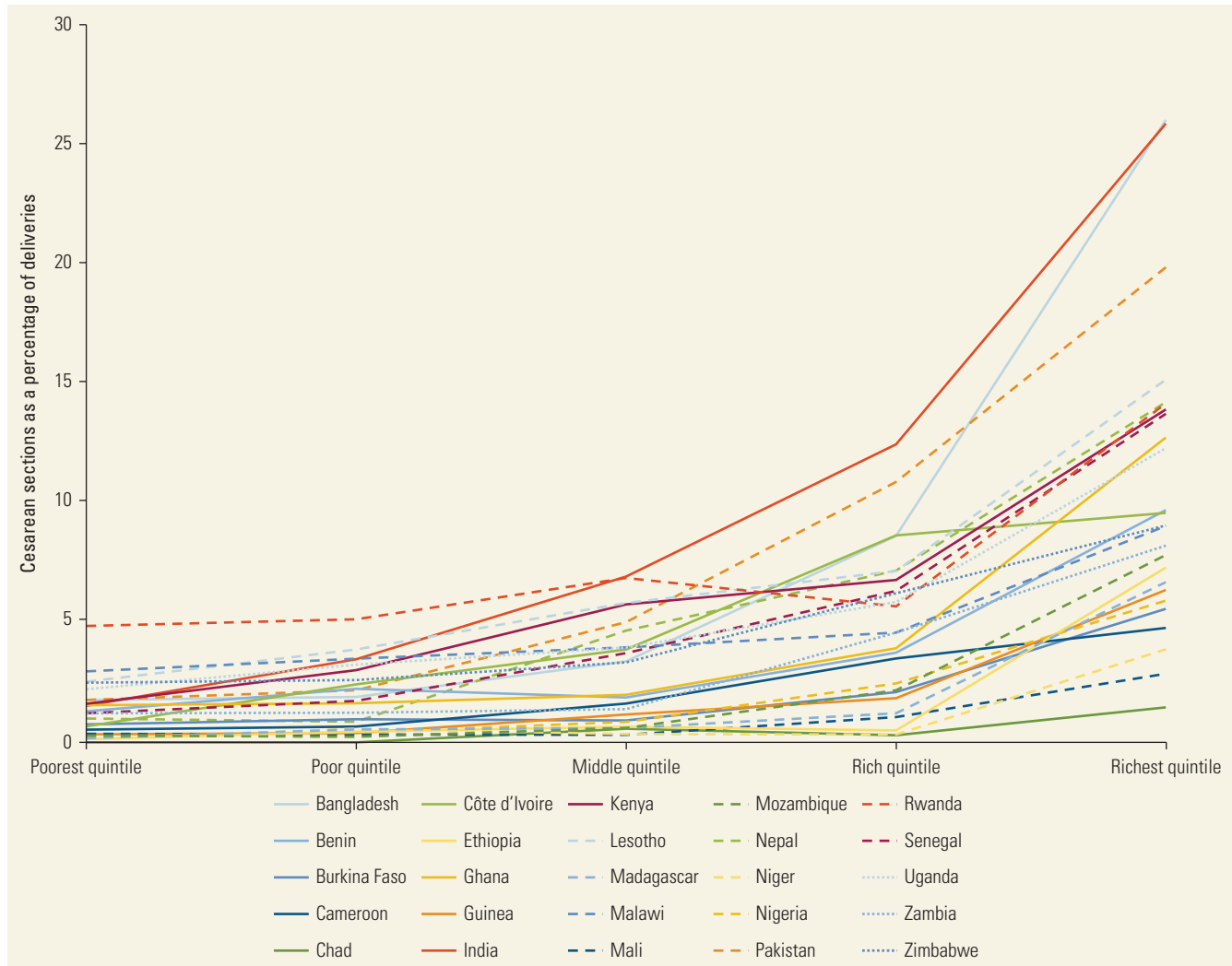
To promote access to care, countries have increasingly implemented user fee exemptions for obstetric surgery. These exemptions have increased utilization of cesarean sections in countries such as Mali and Senegal (Witter and others 2010). However, despite the fee exemptions, women frequently have additional costs for transportation or medical supplies. In Mali, five years after the abolition of user fees for cesarean section, its utilization remained higher among women from richer households; women in the top two quintiles received 58 percent of those surgeries, compared with 27 percent for the bottom two quintiles (El-Khoury, Hatt, and Gandaho 2012). The lack of hospitals in rural areas and high transportation costs continue to be significant barriers to accessing obstetric care in Mali.

FINANCIAL BURDEN OF SURGICAL CONDITIONS

Few poor households are able to save sufficient funds for surgery, particularly emergency surgery, which by definition is unpredictable. The cost of emergency obstetric care is frequently a large economic shock for families and can lead to catastrophic health spending—defined as spending more than 40 percent of annual nonfood income on health care—and impoverishment. Studies from LMICs demonstrate that a major portion of expenditures for obstetric care is for drugs and medical supplies, transportation to the facility, and food and hospital stay. Patients in some LMICs seek private service providers when third-level hospitals lack quality of care and have inadequate supplies; this practice significantly increases patient costs (Kruk 2013).

In Burkina Faso, emergency obstetric surgery imposes a major financial burden on families; 30.5 percent of

Figure 20.1 Rate of Cesarean Sections for 25 Millennium Development Goals Countdown Countries



Source: Data from Cavallaro and others 2013.

Note: 2002–06 data for Cameroon, Chad, Côte d'Ivoire, India, Mali, Niger, Mozambique, and Pakistan; 2007–11 data for Bangladesh, Benin, Burkina Faso, Ethiopia, Ghana, Guinea, Kenya, Lesotho, Madagascar, Malawi, Nepal, Nigeria, Rwanda, Senegal, Uganda, Zambia, and Zimbabwe.

women with severe pregnancy complications reported having to borrow money to pay hospital bills, compared with 8 percent of women with normal deliveries. Nearly 33 percent of women in the poorest quintile who experienced severe complications sold assets to pay hospital bills, whereas none of the women in the top two quintiles reported selling assets to cover such costs (Storeng and others 2008).

In Ghana, the cost of a delivery with severe complications, including hemorrhage, was 5 percent to 8 percent of annual cash expenditure of a household, and up to 19 percent of annual household expenditure for the poorest quintile. In Benin, the total cost of

obstetric emergency complicated by dystocia accounted for 34 percent of annual household cash expenditure. About 8 percent of women who received care for severe obstetric complication left the hospital before the discharge date to reduce costs, and 13 percent left the hospital without making any payments (Borghi 2003).

Evidence from Madagascar shows that out-of-pocket costs for cesarean section equate to catastrophic expenses for poorer households (Honda, Randaoharison, and Matsui 2011). Women from the higher socioeconomic group spent 33 percent of their annual nonfood household expenditures on cesarean section, compared with 105 percent for women in the medium

socioeconomic group and 109 percent for women in the lower socioeconomic group. Overall, 62 percent of the total cost of cesarean section was for drugs and medical supplies. In an Indonesian study, households reported spending 23 percent to 32 percent of subsistence-level income on complicated obstetric care. Without insurance, 68 percent of the households in the poorest quintile, compared with 8.8 percent in the richest quintile, had catastrophic expenditures for obstetric care (Quayyum and others 2010).

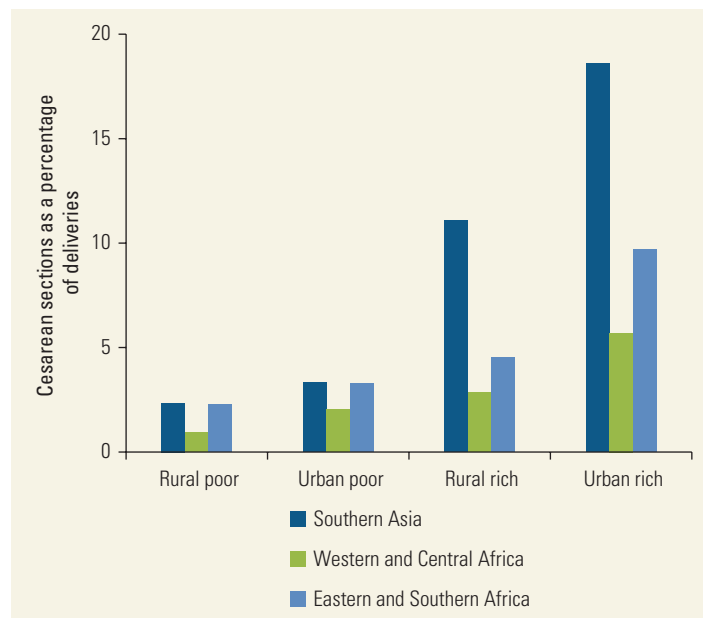
These figures demonstrate the dual burden of poverty in obtaining surgical care. Poor women and men frequently cannot afford the costs of surgery, including transportation to surgical facilities. When they are able to obtain emergency surgery, they suffer financially from high levels of catastrophic spending and impoverishment.

Similar issues pertain to other conditions. For example, injuries can have a devastating effect on low-income households through both the actual treatment costs and the lost wages of the injured persons and family members who must take time off from work or other activities to care for them. One study from Ghana looked at the effect of a serious injury with a disability time of one month or more on families. The majority (64 percent) reported a decline in family income as a result of the injury; a substantial proportion (41 percent) of families had gone into debt. A majority of rural households (54 percent) reported a decline in farm food production due to the loss of labor of the injured persons and others who had to take time off to care for them. A large number (41 percent) of all families, rural and urban combined, reported that family food consumption declined as a result of the injuries. This finding is especially notable given that many of these families already had children who suffered from or were on the brink of malnutrition (Mock and others 2003).

CONCLUSIONS

Poverty and infirmity are closely related. Significant improvement in global health is dependent on the economic development of LMICs, a more equitable distribution of economic resources, and improved education. Emerging data now indicate that surgery is an essential and cost-effective method of treating a significant portion of the global burden of disease engendered by poverty. The international surgical community has a professional responsibility to address the growing disparity in surgical access and standards through an integrated approach of economic, educational, and professional development.

Figure 20.2 Distribution of Cesarean Deliveries by Urban and Rural Households, 2002–11



Source: Data from Cavallaro and others 2013.

Note: Figure groups data from 25 Millennium Development Goal Countdown Countries into three categories by geographic region. *Southern Asia* includes Bangladesh, India, Nepal, and Pakistan. *Western and Central Africa* includes Benin, Burkina Faso, Cameroon, Chad, Côte d'Ivoire, Ghana, Guinea, Mali, Niger, Nigeria, and Senegal. *Eastern and Southern Africa* includes Ethiopia, Kenya, Lesotho, Madagascar, Malawi, Mozambique, Rwanda, Uganda, Zambia, and Zimbabwe.

NOTES

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. One I\$ was the equivalent of one U.S. dollar in 2000.

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