

## Prioritizing essential surgery and safe anesthesia for the Post-2015 Development Agenda: Operative capacities of 78 district hospitals in 7 low- and middle-income countries

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**Background.** Surgery has been neglected in low- and middle-income countries for decades. It is vital that the Post-2015 Development Agenda reflect that surgery is an important part of a comprehensive global health care delivery model. We compare the operative capacities of multiple low- and middle-income countries and identify critical gaps in surgical infrastructure.

**Methods.** The Harvard Humanitarian Initiative survey tool was used to assess the operative capacities of 78 government district hospitals in Bangladesh (n = 7), Bolivia (n = 11), Ethiopia (n = 6), Liberia (n = 11), Nicaragua (n = 10), Rwanda (n = 21), and Uganda (n = 12) from 2011 to 2012. Key outcome measures included infrastructure, equipment availability, physician and nonphysician surgical providers, operative volume, and pharmaceutical capacity.

**Results.** Seventy of 78 district hospitals performed operations. There was fewer than one surgeon or anesthesiologist per 100,000 catchment population in all countries except Bolivia. There were no physician anesthesiologists in any surveyed hospitals in Rwanda, Liberia, Uganda, or in the majority of hospitals in Ethiopia. Mean annual operations per hospital ranged from 374 in Nicaragua to 3,215 in Bangladesh. Emergency operations and obstetric operations constituted 57.5% and 40% of all operations performed, respectively. Availability of pulse oximetry, essential medicines, and key infrastructure (water, electricity, oxygen) varied widely between and within countries.

**Conclusion.** The need for operative procedures is not being met by the limited operative capacity in numerous low- and middle-income countries. It is of paramount importance that this gap be addressed by prioritizing essential surgery and safe anesthesia in the Post-2015 Development Agenda. (*Surgery* 2014;155:365-73.)

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THE POST-2015 DEVELOPMENT AGENDA will define the new universal development aims that will succeed the Millennium Development Goals (MDGs).<sup>1</sup> This agenda will build on the momentum of the MDGs and their ability to focus attention on several key development objectives. Determining the priorities within the agenda will be the joint responsibility of the United Nations, governments, academic bodies, civil society representatives, and other research organizations.

The MDGs do not directly mention surgical care as a component of global health care,<sup>2</sup> although many studies have reported the ability of essential surgery and safe anesthesia to help attain the MDGs in a cost-effective manner.<sup>3-6</sup> It is critical that the upcoming Post-2015 Development Agenda reflects the role of surgery in global health, the large unmet surgical need, and the cost-effectiveness of emergency and essential surgery.

Many of the contributors to global morbidity and mortality—trauma, cancer, obstetric complications, cataracts and glaucoma, congenital anomalies, acute abdominal conditions, and perinatal conditions—are potentially amenable to operative intervention.<sup>7</sup> Estimates suggest that these and other surgically treatable diseases constitute approximately 11–25% of the global burden of disease.<sup>8,9</sup> Moreover, recent household surveys in Rwanda and Sierra Leone have shown that greater than 30% of deaths were associated with surgical conditions.<sup>10,11</sup>

Despite these realities, vast disparities in surgical accessibility exist in low- and middle-income countries (LMICs). Of the 234 million major operative procedures performed annually, only 3.5% are performed in low-income countries, which account for one-third of the global population and a majority of the global burden of disease.<sup>12</sup> Two billion people, that is, 30% of the global population, lack access to surgical services, and millions more are subjected to unsafe anesthetic procedures.<sup>13,14</sup> With noncommunicable diseases surpassing infectious diseases as the leading contributors to death and disability worldwide, surgical diseases such as cancer, trauma, and obstetric complications will constitute an increasingly large role of the global burden of disease.<sup>15</sup> This epidemiological shift, accompanied by an aging global population, has resulted in an increased need for surgical care in LMICs.<sup>16-18</sup>

Until recently, efforts to strengthen surgery and safe anesthesia in LMICs have been limited by a relative absence of epidemiologic data characterizing surgical disparities, surgical and anesthesia outcomes, and the cost-effectiveness

of essential interventions.<sup>19</sup> Much of the early literature came from small-scale facility- or district-wide studies in LMICs.<sup>20-22</sup> However, several recent single-nation analyses have shed light on the inequities in access to surgical care in LMICs.<sup>3,23-38</sup> These analyses have been largely conducted by the Harvard Humanitarian Initiative (HHI), World Health Organization (WHO), and Surgeons OverSeas. They estimate nationwide operative capacity via comprehensive survey tools and rely on various hospital sampling methods. In this study, we provide an overview of the data from the HHI surveys from multiple LMICs and compare and contrast the results between countries. This study focused on district hospitals, where the WHO expects basic emergency surgery to be available.<sup>39</sup>

## METHODS

**Survey design.** Surveys were conducted using a comprehensive survey tool adapted by the HHI from the WHO Tool for Situational Analysis to Assess Emergency and Essential Surgical Care.<sup>40</sup> Both survey tools assessed operative capacity on the basis of the following eight areas of surgical provision: access and availability, human resources, infrastructure, outcomes recording, types of operations performed, equipment availability, blood products, and pharmaceutical capacity.

**Data collection.** Surveys were conducted from 2011 to 2012. Each of the HHI surveys followed the same research protocol. The Ministries of Health and national medical societies were consulted for countrywide data on surgical and anesthesia providers. All site surveys were conducted at public district hospitals by one or more of the authors (D.G.L., S.C., T.E.C., L.M.K., A.F.L., M.R.N., and C.V.S.) alongside local collaborators. Hospital visits included face-to-face interviews with hospital directors, physicians, surgeons, anesthesiologists, nurses, pharmacists, and data administrators that lasted from 1 to 5 hours. Hospital visits also included on-site inspections of operating facilities, supply rooms, and wards.

Selection of surveyed hospitals was determined by geographical convenience sampling and was not influenced by Ministries of Health or other local influences. Although tertiary care referral hospitals and private facilities were also surveyed, those results were excluded from this analysis to provide an overview of district hospital surgical capacity.

**Ethical considerations.** Institutional review board exemption was obtained from the Harvard

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