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## COMMENTARY

### THE GLOBAL SURGERY MOVEMENT: THE CASE OF ETHIOPIA

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The year 2013 marked the creation of the Lancet Commission on Global Surgery (LCoGS), which culminated in two major milestones: the widely-cited Surgery 2030 report of the Commission, and the World Health Assembly Resolution 68.15, which recognized the need to strengthen “essential surgical care and anaesthesia as a component of universal health coverage.”<sup>(1,2)</sup> With 2018 marking the 5<sup>th</sup> anniversary of the creation of LCoGS, it is an appropriate time to review the goals of the global surgery movement, and to consider preliminary successes and enduring challenges in the international effort to recognize surgical access as a public health priority. Here we choose to do so with a focus on Ethiopia. Given the commitment of the Federal Ministry of Health (FMoH) of Ethiopia as well as the ministries of neighboring African nations to establish quality surgical services for the whole of the general public, this overview is important to inform future policy decisions.

Despite international analyses attributing as much as one third of the global disease burden to surgical need, surgery has historically received far less attention and donor funding in comparison to other global health priorities. (3,4) One primary reason for this may be that surgical disease is spread across a wide variety of classifications and conditions which often overlap with other public health priorities. These include traumatic injuries, maternal and obstetric conditions, surgically operable cancers, gastrointestinal problems, and congenital disorders, among many others. This overlap can lead surgical care to be subsumed by categories like injury prevention, maternal care, and non-communicable diseases (NCDs), despite fully “belonging” to none of them.

Moreover, the challenges of building surgical systems in developing countries are compounded by the complex features of surgical care. The quality of surgical care on the population level is closely tied to a host of other hospital systems, including other clinical departments (e.g. anesthesia, emergency medicine, pathology, radiology, nursing and critical care), in addition to adequate levels of training, supplies, infrastructure and maintenance. As such, the problem of surgery from a public health perspective invariably intersects with the broader problem of health systems strengthening. The direct benefits of broad interventions designed to strengthen the health system, which benefit surgical care in tandem with other systems, are difficult to delineate to donor organizations. Consequently, highly-specialized donor agencies may be more reticent to invest in such expansive changes. Economic analyses, both in Ethiopia and internationally, have demonstrated that common essential surgeries are cost-effective compared to other public health interventions,<sup>(5,6)</sup> but perceptions of complexity and costliness may contribute to a lower level of global development funding directed to surgical improvement.

Another barrier to the recognition of surgery as a public health priority is prevention vs. treatment, as public health has traditionally been associated with preventive medicine, while surgery is commonly associated with end of line treatment. While many surgical cases can be prevented with public health measures like improved road traffic safety and care-seeking behavior, others cannot, like essential caesarean sections or inguinal hernia repairs. Regardless of how effective prevention methods may be, there will always be a significant population-level surgical burden. Given the inevitability of surgical need, surgery is a form of preventive medicine deserving recognition. Promptly set fractures prevent patients from being crippled for life, promptly performed caesarean sections prevent the death of mother and child, and prompt laparotomy for many gastrointestinal problems prevents peritonitis, gangrene, and death. LCoGS codified these three procedure types (open fracture repair, caesarean section, laparotomy) as the “bellwether procedures,” which signify the basic preparedness of an institution to provide essential surgery, and which must be available at all district hospitals worldwide.

With the identification of the bellwether procedures as three categories of surgery with the greatest public health impact on lives saved and disabilities prevented, LCoGS took a major step towards defining surgery as a component of preventive medicine essential to global public health. This is crucial for Ethiopia, because the next two to three decades are certain to bring a massive increase in surgical need from the population. As a developing nation, the country remains in the early stages of the demographic transition, with an extremely young population (52.7% under 18) and a high fertility rate (4.6 per woman) relative to populations on other continents. (7) Following global

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trends, rising female education and income will gradually reduce fertility, eventually raising the average age of Ethiopia's young population, with national surgical burden shown to increase as the average population age rises. (8) Furthermore, the Ethiopian population remains largely rural with low per-capita automotive ownership, so continued increases in both urbanization and income, leading to higher urban populations and a larger vehicle fleet, will inevitably lead to a higher nationwide burden of trauma, much requiring surgical evaluation and intervention.

Another key contribution of LCoGS was to raise awareness of the estimated 5 billion people globally who lack access to affordable surgery, of which the greatest proportion of unmet need resides in sub-Saharan Africa. This finding focuses the challenge to development of country-level strategies for improving surgical access and quality, and solid long-term implementations of those strategies. In Ethiopia, the Federal Ministry of Health designed the Saving Lives Through Safe Surgery (SaLTS) national surgical improvement plan with a group of international partners in response to this call to action. (9) The plan organized key targets for staff, facility resources and data collection metrics, among other goals, to achieve by 2020.

As part of SaLTS, Ethiopia invested major sums into health infrastructure expansion, augmenting the number of facilities with operating theatre services and building oxygen production plants. Increased quantities of surgical equipment and supplies were bought and distributed throughout the country over the last two years. Efforts were also made to engage leadership at managerial and facility levels for the planning, implementing, monitoring and evaluation of surgical services by establishing SaLTS implementation leaders at hospitals nationwide. The Jhpiego NGO initiated training and mentorship programs to bolster leadership at 10 hospital facilities, and these programs showed positive initial results in reducing surgical site infections and reducing the surgical backlog. (10) While these are all promising developments, the need for greater interventions in surgical workforce development and data collection presents opportunities for improvement, as does the need to scale up these promising interventions.

The surgical workforce gap remains one of the greatest unmet needs raised by LCoGS and the SaLTS program in both Ethiopia and sub-Saharan Africa. Ratios of surgeons in 10 African nations calculated by accreditation body COSECSA range from 0.18 (Burundi) to 1.22 (Kenya) per 100,000 people, including 0.41 in Ethiopia, in contrast to Lancet Commission estimates of 54.71 in the United States and 112.71 in Germany. (1,11) Ethiopia's current progress falls short of the LCoGS target of 20 surgery, anesthesia and obstetric professionals per 100,000 people to be achieved by all countries by 2030.

Geographic disparity in surgical workforce development within Ethiopia presents an additional barrier to equal access to care for the entire population. According to Federal Ministry of Health data, the only residency programs in surgical subspecialties like plastics and pediatric surgery are in Addis Ababa, with an official population of 3.24 million in a country of over 100 million, (12,13) while training for specialties like orthopedics and neurosurgery is only available in limited sites outside the capital. Consequently, patients seeking surgical services from other regions often travel to Addis, increasing the overcrowding seen at some specialized hospitals.

Overcrowding and increased referral burden at the few public facilities with surgical subspecialists increases strain on the physicians working in the public system, which simultaneously promotes provider flight to high income nations and private facilities and worsens the prognosis for many patients crossing great distances to reach the facility. (14) There is great need for surgical workforce partnerships to increase surgical subspecialty residencies and fellowships in peripheral cities within Ethiopia to address the source of this problem. Moreover, the public system must become more economically competitive with the private system for surgeons across Ethiopia. Funding for improved salaries and structural reforms should be led by the FMoH, as well as the World Bank, African Development Bank, and international partners interested in human resources for health (HRH) development.

It is also essential to further research the role of non-physicians in Ethiopian surgery. Limited academic study has been done on surgical, perioperative, and trauma training for nurses and integrated emergency surgery and obstetrics (IESO) providers in the country, with the exception of obstetric surgery, (15) and how training can be integrated into improved surgical team-building. Additional studies of task-sharing, as well as a larger landscape analysis of causes of perioperative death including anesthesia safety, in addition to programs testing the impact of team-building strategies on perioperative morbidity and mortality, could be promising research directions to pursue. Academic centers and partners should also consider supporting additional training programs in critical care and surgical nursing techniques with a strong practical focus, as well as developing improvements in IESO training and career pathways.

Collection of surgical data has made impressive progress in Ethiopia and other African nations since the inception of LCoGS, but challenges remain. The most widely dispersed study on African perioperative mortality recently collected 7-day prospective data across 247 sites in 25 countries across Africa, mostly tertiary facilities. (16) Within Ethiopia, as part of the SaLTS program, an ongoing surgical data collection effort led by Harvard's Program in Global Surgery and Social Change (PGSSC) focused on collecting a set of Key Performance Indicators (KPIs) including rate of surgical site infection (SSI), length of stay, perioperative mortality, surgical safety, and blood availability.

While this effort was initiated at 10 facilities in the Amhara and Tigray regions, it urgently needs to be scaled to additional facilities nationwide to develop comparable national estimates of surgical volume, burdens, and outcomes. Investigations by the authors of surgical registries at Ethiopian referral hospitals have revealed numerous issues, including missing cases, incorrectly recorded data, and difficulties in linking case numbers to patient charts and outcomes due to misfiled patient records. Many of these problems could be addressed by implementing an electronic registry system linked to outcomes, which would create a reliable evidence base for future resource allocation. However, this must be matched with efforts spearheaded by the Regional Health Bureaus (RHBs) to improve data quality at the facility level and foster a culture of dedication to high-quality data collection.

In the next five years, we hope to see the initial KPI effort broaden towards the creation of a national electronic operative registry, with the goal of recording all surgical procedures carried out at the specialized hospital level in a standardized fashion, eventually extending to the general and primary hospital levels. At facilities with sufficient resources, integration of aggregate surgical data collection at regional and national levels with patient-level electronic medical records (EMR) should also be piloted. We support the adaptation of the Federal Ministry's open-source electronic District Health Information System 2 (DHIS2) platform to track and report aggregate surgical data across the 9 regions and nationally. Efforts should also begin to study longer-term post-discharge survival rates, along the lines of recent international studies. (17) It will be important to secure regional government and site-based support, as well as the support of the national surgical, anesthesiologist, anesthetist, and emergency surgical officer associations, to reliably collect and release surgical outcome data in order to prioritize the deployment of government and partner resources in a rational and effective fashion.

In conclusion, we echo the recommendations of the Lancet Commission for Global Surgery in calling for increased funding mechanisms to support essential surgery as a cornerstone of the health system, in keeping with its recognition

Recommendation	Progress Made	Development Priorities
Surgical specialist workforce development	Some specialized hospitals providing surgical sub-specialty care, leadership training at 10 hospitals	Increased sub-specialist faculty in regions, increased North-South educational partnerships, improved competitiveness of public hospitals w/private system
District hospital improvement & mid-level provider engagement	Increased number of OR blocks, oxygen and supplies provided	Increased educational support for nursing and emergency surgical officers, increased team-building activity, increased perioperative safety studies & interventions
Surgical data collection improvement	Surgical KPI data collection implemented at 10 hospitals	Development of electronic registries using DHIS2, scale up indicator collection and reporting on regional and national levels

as a core

public health priority. This should lead to an increased number of bidirectional North-South exchanges in specialized surgery, the expansion of improved training and team building programs for critical care nurses, scrub nurses, anesthetists and IESOs, and a "whole country" approach that emphasizes lifting up specialist care, improving district-level quality, and establishing standardized surgical data collection across all Ethiopian regions. There is a great amount of work to be done, but the commitment and enthusiasm from a wide array of partners has never been higher. A systematic approach to address these priorities (Table 1) will surely yield great fruits in the twin priorities of increased access and increased quality of surgery for the whole population, making Ethiopia a stronger regional leader in health development, and ultimately saving lives.

**Table 1.** Core surgical development priorities**REFERENCES**

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