

Review article:

Global surgery: Improving health in low-income countries

Orhan Alimoglu¹, Nuray Colapkulu²

Abstract:

The aim of this report is to examine the definition of global surgery, discuss the problems and propose some suggestions. Global surgery aims to improve the surgical conditions to maintain a standard and equal surgical care, especially in low- and middle-income countries where burden of surgical diseases are increasing over the years. According to Lancet Commission on Global Surgery, 1.27 million more surgical healthcare workers will be required to provide minimal surgical workforce, by 2030. In resource-limited settings of the world-wide where medical education and post-graduation training programs are disrupted due to brain drain, instable conditions and economic reasons, sustaining a standard and accessible surgical care are possible by training surgeons.

*Bangladesh Journal of Medical Science Vol. 20 No. 03 July'21. Page : 483-486
DOI: <https://doi.org/10.3329/bjms.v20i3.52789>*

Background : According to the report, issued by the World Health Organization (WHO) in 2016, it was estimated that a total of 266.2 to 359.5 million operations were performed in 2012 in the world. One out of twenty operations took place in low-income countries, and in fact this population constitutes one third of the world population¹. In particular for example, Africa accounts for 24% of the global burden of disease and can yet reach only 3% of healthcare professionals worldwide and less than 1% of world financial resources²⁻⁴. Seven million people suffer from surgical morbidity and at least 1 million deaths occur. These figures are greater than the sum of AIDS-related and maternal deaths. Beyond that 50% of those complications and deaths are preventable⁵. Surgically treatable diseases are 11% of global disease burden. In addition, 38% of these diseases include injuries, 19% malignancies, 9% congenital anomalies, 6% pregnancy complications, 5% cataracts and 4% perinatal conditions⁶. Surgically

treatable diseases are still significant majority causes of mortality of the poor, and yet almost 25% of the world's population is deprived from basic surgical care^{7,8}.

What is global surgery?

Global surgery and surgical diseases are, unfortunately, two entities whose borders are not clearly defined, and therefore the global burden of surgery is difficult to predict and quantify. Farmer and Kim defined global surgery as: "The neglected stepchild of global health" in 2008⁹. This definition is so accurate that, mortality of 500,000 women each year during labor and inadequacy or absence of surgical services addressing to this problem in poorer regions of the world emphasizes the situation^{9,10}.

The definition of global health has been built on the prevention and treatment of infectious and communicable diseases for many years in low and middle- income countries. However, with the

1. Orhan Alimoglu, Department of General Surgery, Istanbul Medeniyet University, Medical Faculty, Goztepe Dr. SuleymanYalcin City Hospital, Istanbul, Turkey, and Istanbul Medeniyet University Africa Health Training and Research Center (MASAM), Istanbul, Turkey
2. Nuray Colapkulu, Department of General Surgery, Istanbul Medeniyet University, Medical Faculty, Goztepe Dr. SuleymanYalcin City Hospital, Istanbul, Turkey

Correspondence to: Orhan ALIMOGLU, Istanbul Medeniyet University, Department of General Surgery, Dr Erkin Cad Goztepe EAH, 6. Kat, 34722, Kadikoy, Istanbul, Turkey, E-mail: orhanalimoglu@gmail.com

epidemiological changes in these regions (cancer, traffic accidents, etc.), unmet surgical burdens have become a major problem of morbidity and mortality^{9,11,24}. The region with the greatest unmet surgical burden per 100,000 population is Sub-Saharan Africa¹¹. Since more than 2 billion people in the world cannot reach safe and affordable surgery and this number is expected to increase in the following years, the definition of global surgery has emerged.

What is the problem?

Human Resources in Health (HRH) per 1000 people in low-income countries in regions such as Africa, the Middle East and Southeast Asia is below the minimum threshold of WHO¹². Since the threshold of WHO for HRH per 1000 people is 2.5, and this rate is high in European countries as 11.1 when in sub-Saharan Africa and Southeast Asia, these rates are 1.3 and 1.7, respectively². Since only a small proportion of HRH covers the number of trained physicians and staff required for surgery, the numbers are even more depressing in the surgical team numbers per population. While the number of surgeons per 100,000 people is 0.6 in some parts of Africa, this figure is 51 and 26 in the United States and Canada, respectively³. In Africa for example, 42,000 surgeons must be trained to reach the number of surgeons in Canada⁴.

Surgery and surgical care as a full package (anesthesia, operating room etc.) require supplies, well established infrastructures and coordination of skilled health care providers, and beyond that logistic management of these parameters are financially challenging. Many basic or advanced surgical and anesthesia procedures in low-income countries are performed by primary care physicians, midwives, nurses or technicians¹³. Consequently, the risks of surgery-related morbidity and mortality may increase.

Although global burden of infectious diseases has been significantly reduced through successful international collaborations and interventions, little has been done to address the growing global burden of surgical diseases. Both WHO and many international organizations spent many years for raising awareness and providing financial funding for AIDS, malaria, tuberculosis and many infectious diseases⁹. Organizing and bringing together the team, equipment, materials and logistics required to complete surgical missions have always been

financially challenging¹⁴.

Despite the increase in the population, as well as the chronic diseases, cancer, traffic accidents in low income countries as in every part of the world, the decrease in the level of education in these countries, brain drain and inadequate healthcare workers are the biggest signs that permanent solutions should be sought. In areas where there are no trained surgeons, elective cases remain untreated, seriously ill people have to seek medical help where they can be treated¹⁵. Quality and standards of health care, patient's safety and accessible health system should not vary around the world.

In surgery and surgical care, sustainability is essential. Many surgical interventions are largely provided by voluntary and non-governmental organizations, and because these solutions are short-term, the global surgical burden does not have much benefits out of these solutions^{16,17}. Hereby, as surgeons, we all have a responsibility to find long-term and permanent solutions.

What is the solution?

A system that will be built on a few elements that cannot be ignored in the development of global surgery can only function without disruption. First of all, it is necessary to accept that surgical burden is an important part of global disease burden and surgery is primary, secondary and tertiary preventive medicine service. Finally, surgery should be easily accessible, affordable or free.

Trained and proficient surgeons are still absent in many African countries, and in many regions surgical diseases are managed by surgeons from abroad or non-surgeon medical staff¹⁸. The establishment of postgraduate medical education is essential for free and sustainable health systems. So, all postgraduate medical education programs in low-income countries are very valuable in that they ensure the training of practitioners who can independently serve their countries for life and be responsible for the education of others^{15,19}. In this context, institutes within their own potentials can design and establish various type of educations, such as full residency programs, bilateral twinning programmes, remote educations or subspecialty programs for surgeons.

As a team that has performed short-term "vertical" surgical services in Sub-Saharan Africa and the Middle East for many years, we advocate seeking long-term solutions and implementing them without delay in order to achieve equality in global

surgery^{14,20,21}. However, surgery is also a primary healthcare service that includes the principles of preventive medicine and requires constant time and resource investment, and we believe that it cannot be provided effectively with such tasks. Therefore, the necessity of obtaining long-term results in order to increase the capacity and quality of surgical workforce should not be ignored.

Going abroad for medical missions to low-income countries is the dream of almost every medical student while in medical school. However, even when leaving the comfort zone and participating in such short-term programs in these regions are so difficult; creating an education system from the very beginning is a very demanding time and resource responsibility. Therefore, it is very difficult for surgeons who have a lot of work load in their daily working lives to be motivated for such responsibilities. In this context, surgical associations, training hospitals and universities in high-income countries have great responsibilities in meeting global surgical education burdens²².

Conclusion

Although short-term vertical programs are very important and may benefit surgical diseases, they fail to reduce the global surgical burden. We believe permanent solutions in low-income countries can only be achieved by establishing graduate and post-graduate medical education systems, that is, by training specialist surgeons. And as Confucius said, *“If you plan for a year, plant a seed; if for 10 years, plant a tree; if for 100 years teach the people.”*²³

Author Contributions:

Conceptualizing and idea owner of the study: OA, NC

Study design: OA, NC

Data gathering: OA, NC

Writing and submitting manuscript: OA, NC

Editing and approval of final draft: OA

Funding: This manuscript received no financial support.

Conflict of interest: Authors declare no conflict of interest.

References:

1. Weiser TG, Haynes AB, Molina G, Lipsitz SR, Esquivel MM, Uribe-Leitz T. Size and distribution of the global volume of surgery in 2012. *Bull World Health Organ* 2016;**94**(3):201-209F. <https://doi.org/10.2471/BLT.15.159293>
2. World Bank. 2008. The business of health in Africa: partnering with the private sector to improve people's lives. International Finance Corporation. Washington DC: World Bank.
3. Merson MH, Black RE, Mills AJ. International Public Health: Disease, Programs, Systems, and Policies. Frederick; Aspen Publishers:2001.
4. Taylor RH, Hollaar G. Review of a Canadian forum on international surgery: the Bethune Round Table. *Can J Surg* 2005;**48**(6):479-84.
5. Weiser TG, Regenbogen SE, Thompson KD, Haynes AB, Lipsitz S R, William RB, et al. An estimation of the global volume of surgery: A modelling strategy based on available data. *Lancet* 2008;**372**(9633): 139-44. [https://doi.org/10.1016/S0140-6736\(08\)60878-8](https://doi.org/10.1016/S0140-6736(08)60878-8)
6. Debas HT, Gosselin R, McCord C, Thind A. Surgery. In: Jamison D, ed. Disease control priorities in developing countries. 2nd edn. New York: Oxford University Press; 2006.
7. Beveridge M, Howard A. The burden of orthopaedic disease in developing countries. *J Bone Joint Surg Am* 2004;**86**(8):1819- 822. <https://doi.org/10.2106/00004623-200408000-00029>
8. Funk LM, Weiser TG, William RB, Lipsitz SR, Alan FM, Enright AC, et al. Global operating theatre distribution and pulse oximetry supply: An estimation from reported data. *Lancet* 2010;**376**(9746):1055-61. [https://doi.org/10.1016/S0140-6736\(10\)60392-3](https://doi.org/10.1016/S0140-6736(10)60392-3)
9. Farmer PE, Kim JY. Surgery and global health: A view from beyond the OR. *World J Surg* 2008;**32**(4):533-36. <https://doi.org/10.1007/s00268-008-9525-9>
10. World Health Organization (2005) World health report 2005: making every mother and child count. Available at http://www.who.int/whr/2005/whr2005_en.pdf (Accessed 4 April 2020)
11. Meara JG, Leather AJM, Hagander L, Alkire BC, Alonso N, Ameh EA, et al. Global surgery 2030: Evidence and solutions for achieving health, welfare, and economic development. *Lancet* 2015;**386**(9993):569-24.
12. World Health Organization (2016). Health workforce requirements for universal health coverage and the sustainable development goals. Human Resources for Health Observer Series No 17. <https://apps.who.int/iris/bitstream/handle/10665/250330/9789241511407-eng.pdf?sequence=1> (Accessed 13 March 2020)
13. Chu K, Rosseel P, Gielis P, Ford N. Surgical task shifting in Sub-Saharan Africa. *PLoS Med* 2009;**6**(5): e1000078. <https://doi.org/10.1371/journal.pmed.1000078>
14. Alimoglu O, Eren T, Tombalak E, Leblebici M, Azizoglu S, Sever S, et al. Volunteer surgical team in Somalia. *Indian J Surg* 2017;**80**:447-51 <https://doi.org/10.1007/s12262-017-1626-y>
15. Galukande M, Von Schreeb J, Wladis A, Mbembati N, de Miranda H, Kruk ME, et al. Essential surgery at the district hospital: a retrospective descriptive analysis in three African countries. *PLoS Med* 2010;**9**;7(3): e1000243. <https://doi.org/10.1371/journal.pmed.1000243>
16. Kingham TP, Price RR, Casey KM, Rogers SO, Kushner AI. Beyond volunteerism: Augmenting surgical care in resource limited settings. *Bull Am Col Sur* 2011;**96**(7):16-21.
17. Gosselin RA, Gyamfi YA, Contini S. Challenges of meeting surgical needs in the developing world. *World J Surg* 2011;**35**(2):258-61. <https://doi.org/10.1007/s00268-010-0863-z>
18. Kevau I, Watters DAK. Specialist surgical training in Papua New Guinea: The outcomes after 10 years. *ANZ j Surg* 2006;**76**(10):937-41. <https://doi.org/10.1111/j.1445-2197.2006.03907.x>
19. Hayler M, Hagander L, Gillies R, Riviello R, Chu K, Bergström S, et al. Surgical care by non-surgeons in low-income and middle-income countries: A systematic review. *Lancet* 2015;**27**;385 Suppl 2:S42. [https://doi.org/10.1016/S0140-6736\(15\)60837-6](https://doi.org/10.1016/S0140-6736(15)60837-6)
20. Alimoglu O, Ankarali H, Cigerli O, Shamaileh T, Tuzuner S, Sharif K, et al. Volunteer Surgical Camp at Gombe Hospital in Uganda. *East and Central African Journal of Surgery* 2016;**21**(1):45-49. <https://doi.org/10.4314/ecaajs.v21i1.139027>
21. Alimoglu O, Ankarali S, Eren T, Leblebici M, Burcu B, Shamaileh T, et al. Hernia surgery in Uganda: An experience of Doctors Worldwide. *Anatol Clin* 2016;**21**(1):48-53. <https://doi.org/10.21673/aktbd.68991>
22. Ozgediz D, Wang J, Jayaraman S, Ayzengart A, Jamshidi R, Lipnick M, et al. Surgical training and global health: Initial results of a 5-year partnership with a surgical training program in a low-income country. *Arch Surg* 2008;**143**(9):860-5. <https://doi.org/10.1001/archsurg.143.9.860>
23. Riviello R, Ozgediz D, Hsia RY, Azzie G, Newton M, Tarpley J. Role of collaborative academic partnerships in surgical training, education, and provision. *World J Surg* 2010;**34**(3):459-65. <https://doi.org/10.1007/s00268-009-0360-4>
24. Haque M, Islam T, Sartelli M, Abdullah A, Dhingra S. Prospects and challenges of precision medicine in lower- and middle-income countries: A brief overview. *Bangladesh Journal of Medical Science* 2020;**19**(1): 32-47. <https://doi.org/10.3329/bjms.v19i1.43871>