



Fulfilling Colombia's Universal Health Coverage Through National Surgical System Strengthening



This data and analysis is made possible through support from the Colombian Ministry of Health

Executive Summary

The acquisition of vital Colombian health system data provided by the Ministry of Health, has informed the analysis and interpretation of the Lancet Commission on Global Surgery's six core surgical indicators. This process has generated benchmark metrics by which the surgical system can be strengthened in an objective, quality driven, financially viable fashion. Herein, we propose that through the development and implementation of a Colombian Strategic National Surgical Plan, a unique opportunity to fulfill the Colombian Constitutional mandate for universal health care is made feasible through a collaborative prioritization of surgery. Ultimately, the achievement of universal health care will drive a geographic and socially indiscriminate economic growth that enhances the health and productivity of the population through 2030.

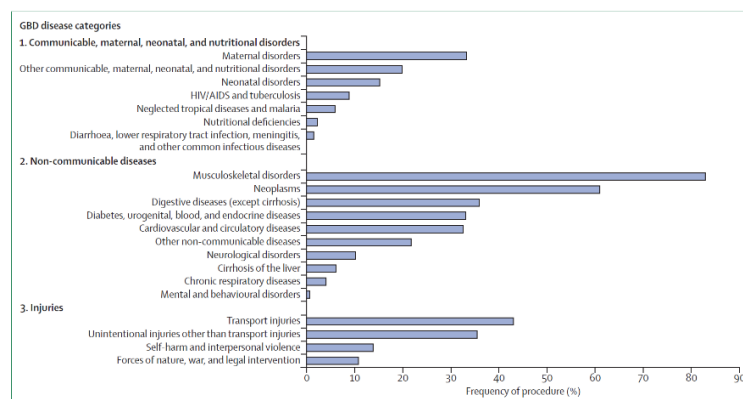
Fulfilling Colombia's Universal Health Coverage Through a Colombian Strategic National Surgical, Obstetric, and Anesthesia Plan

Background

Universal Health Coverage (UHC) is recognized as a human right and a government social responsibility by the Colombian Constitution and the World Health Organization (WHO). UHC has been defined by the WHO as:

“all people and communities can use the promotive, preventive, curative, rehabilitative and palliative health services they need, of sufficient quality to be effective, while also ensuring that the use of these services does not expose the user to financial hardship.”

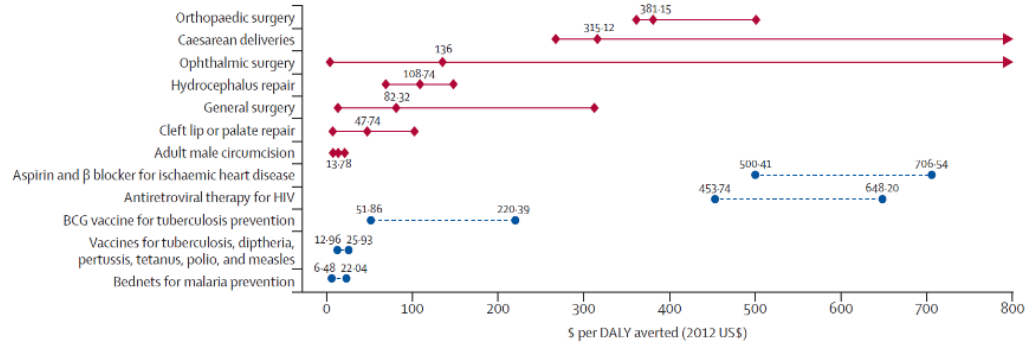
Historically, global efforts to achieve UHC have focused on addressing the burden of communicable diseases (CDs), which have been traditionally understood as the more prevalent contributor to global morbidity and mortality. However, recent advances in understanding the total global burden of disease have challenged (Figure to right)



this long-standing notion and the related disease specific (vertical) approaches to improving access to care. Through a retrospective analysis of a national inpatient care database, in 2014 Rose and colleagues determined that non-communicable diseases (NCDs) in fact require a concurrent delivery of medical and surgical care in approximately **34%** of cases. Shortly thereafter in 2015, reporting for the Lancet Commission on Global Surgery (LCoGS), Meara and colleagues stated that **5 billion** people do not have access to timely, safe, and affordable surgical and anesthesia care when needed, resulting in an unnecessarily high case-fatality rate for common, easily treatable conditions including appendicitis, hernia, fractures, obstructed labor, congenital anomalies, breast and cervical cancer (NCDs). Furthermore, directly addressing this surgical burden is highly cost effective and cost-efficient relative to interventions designed to

address CDs (Figure below). These observations validate the visionary statement made by Jim Kim,

President of the World Bank, that: “surgery is an indivisible, indispensable part of health care” and “can help



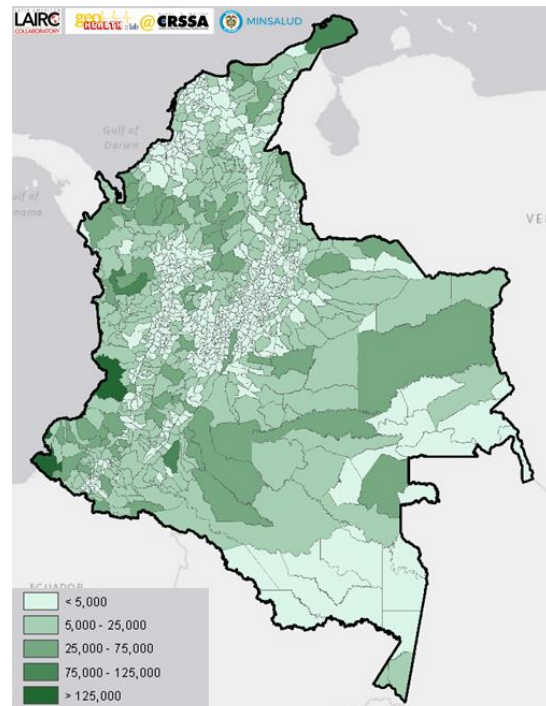
millions of people lead healthier, more productive lives”. This understanding of surgery as an essential component of UHC was accepted by the international community in the 68th World Health Assembly resolution 68.15, which urges member states to strengthen emergency and essential surgical care and anesthesia, identifying core services, and strengthening surgical systems for all in need.

The LCoGS working groups defined and contextualized six core surgical indicators and targets (*Appendix 1*) to assess and inform surgical systems within a transnational surgical system strengthening framework referred to as a National Surgical Obstetric Anesthesia Plan (NSOAP, *Appendix 2*). These observations resulted in the historic assembly of an interdisciplinary, cross-sectoral, interprofessional, international network (LAIRC) with generous Colombian MOH support through data-sharing that has facilitated collection, analysis, and interpretation of the LCoGS indicators for the purpose of informing Colombia’s explicitly stated commitment to achieving UHC.

In the *Plan Decenal de Salud Pública 2012-2021* (PDSP), the four NCDs resulting in the highest mortality were identified as health system priorities; this was further reinforced in the findings of the 2017 *Análisis De Situación De Salud*. Through rigorous and transparent analysis, the MOH concluded that socio-economic determinants of health contribute significantly to care disparities leading to societal harm that is preventable. Parallel work performed by the LAIRC to collect and analyze the LCoGS indicators in Colombia underscores the same conclusions, while adding a linked geospatial interpretation of preparedness, service delivery and cost impact to target “where and how” these disparities may exist in the system, and to avoid loss of Gross Domestic Product and to minimize Value of Lost Welfare. Surgical system preparedness, service delivery and cost impact are nodes in which macro to micro level surgical system interventions may be directed to ensure timely, quality, and affordable NCD care outcomes.

Assessing Colombia's Surgical System Preparedness

Assessment of surgical system preparedness to inform the optimal care of all NCDs and CDs has been examined by analyzing timely access to facilities capable of performing essential and emergency surgical procedures (indicator 1). An estimated **14.8 million** Colombians may be unable to access an appropriate facility within 2 hours, a minimum benchmark associated with optimal outcomes (Figure to right). These data have been geospatially referenced to inform discrete *Departamentos* and *Municipios* where these disparities are greatest. Further informing the concept of preparedness, indicator 2 (SAO density) describes specialist provider availability to ensure the health system's ability to provide essential and emergency surgical services for all citizens. A minimum of 20/100,000 (target 40/100,000) density is associated with acceptable surgical preparedness based on global patient outcomes, specifically maternal mortality. SAO density in Colombia is estimated to be **13.7/100,000**. This observed low SAO density correlates with the national maternal mortality rate of 55.2/100,000 live-births and the conclusion that *"The majority of maternal deaths considered preventable are associated with deficiencies in access to quality health services."* (PDSP pg 60). Thus, opportunities to improve surgical system preparedness exist.



Residents living >2h from a facility capable of providing basic emergent and essential surgical care. LAIRC/MOH unpublished data

Assessing Colombia's Surgical System Service Delivery

Surgical system service delivery reflected in LCoGS indicators 3 and 4 serves as a marker of quality (=patient centered outcomes/resources expended). The extent to which surgical and anesthesia care volume is supplied to people who need it, is measured by indicator 3. Indicator 3 is an aggregate measure of all procedures performed within an operating theater. The optimal number of procedures as modelled by Meara et al. 2015 is 5000 procedures per 100,000 population. Once surgical and anesthesia care is supplied, quality of the care supplied is measured by indicator 4, which is defined as all-cause in-hospital post-operative mortality rate (POMR). Currently, between **2690-3090/100,000** procedures are performed annually in Colombia (Figure below) with a significant standard deviation (± 1329) among *departamentos* reflecting further significant disparities in service delivery. The population's current un-met

need represents an opportunity to direct a convergent outpatient and inpatient quality-driven collaborative of preventative, primary, and surgical care network formation such as through *Modelo Integral de Atención en Salud (MIAS)* to ensure “individuals are guaranteed access to services that promote, protect, and restore health” (Rama Judicial de la República de Colombia.

Departamento	OR Volume
Antioquia	2388
Atlántico	2614
Bogotá, D.C.	3616
Bolívar	3406
Boyacá	1830
Caldas	3035
Caquetá	3844
Cauca	3472
Cesar	4825
Córdoba	4126
Cundinamarca	4033
Chocó	1945
Huila	4119
La Guajira	2121
Magdalena	2349
Meta	1108
Nariño	4189
Norte de Santander	1824
Quindío	1809
Risaralda	2812
Santander	2217
Sucre	3361
Tolima	2492
Valle del Cauca	3453
Arauca	2118
Casanare	3665
Putumayo	4133
Archipiélago de San Andrés, Providencia	646
Amazonas	723
Guainía	373
Guaviare	214
Vaupés	5
Vichada	796
National Total	3069
sdev	1329
mean	2556

* OR volume per 100,000 pop.



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estimated that **21% and 6%** of the population are subject to **impoverishing and catastrophic costs respectively**. Thus, opportunities to bolster protection for citizens requiring urgent or emergent surgical and anesthetic care exists.

Constitución Política de Colombia 1991. 2016). POMR was calculated as the total number of deaths in-hospital following a surgical procedure divided by the total number of procedures performed in Colombia. For year 2017, POMR is estimated to be **0.73% ± 0.32%**. Although no specific global benchmark has been proposed in part due to lack of risk-adjustment in this aggregate measure as well as differences in calculation, it is encouraging to observe that the quality of service delivered is in the range of what is anticipated (Watters IARS 2018). Considering the low SAO density, with an anticipated high per provider workload, this is a tremendous achievement and reflects on the dedication of Colombian healthcare professionals. Nonetheless, opportunities exist to decrease POMR to achieve that observed in high income countries (~0.2-0.4) through selective local quality improvement initiatives that scale nationally.

Assessing Colombia’s Cost Protection

An essential component of UHC is *protection from financial hardship*. LCoGS indicators 5 and 6 measure protection against impoverishing and catastrophic expenditure respectively incurred when citizens seek essential and emergency surgical and anesthesia care. To assess these indicators, the most comprehensive and recent data from the National Health Survey 2007 (NHS 2007) were queried. The NHS includes information on the number of times a person was hospitalized in the previous 12 months, if hospitalization included surgical procedures, and the associated out-of-pocket or indirect costs, such as medications, co-payments, hotel/accommodation for the caregiver, transportation and days of employment lost. From these data, it is

Modeled Cost Protection Analysis of Addressing Surgical System Strengthening

The present LCoGS indicator analysis has independently confirmed and augmented the analysis of the MOH presented in the current PDSP. Contextualized by the indicators, the following (Figures to right) is a modeled cost analysis of surgical system

	Cause of Death	% of all deaths	% AVPP	% Surgical Intervention	Surgical Impact on AVPP
1	Circulatory System	31.7%	18.4%	33%	-6.1%
2	Residual Diagnoses	25.4%	21.7%	46.6%	-10.1%
3	Neoplasms	19.8%	18%	61%	-11%
4	External Causes	12.5%	25.3%	35%	-8.9%
			83.4%		-36.1% (43.3% impact)
1. Residual Diagnoses – DM, nutritional deficiencies, nutritional anemias, chronic lower respiratory tract disease, cirrhosis/other chronic liver 2. AVPP – Years of Life Lost Due to Premature Death					

strengthening implementation to address the top four NCDs, collectively accounting for 89.4% of all disease related mortality in Colombia. The modeled cost to address the observed AVPP is USD \$47 per life/year (based on an estimated total annual cost_{LCoGS} of USD \$32million).

Furthermore, global modeling suggests the lost output and lost welfare that the upper middle-income country stands to experience as a result of injury, neonatal, maternal, digestive disorders, and neoplasm, may be

<p>Estimated impact of unmet surgical need = Total_{AVPP} x Surgical Impact x Unmet Burden Unmet Burden = 1- (current national surgical volume / predicted adequate surgical volume) = 1 - 3/5 = 2/5 = 3,904,612 x .43 x 0.4 = 676,278_{years life lost}</p> <p>Modeled Cost to Address_{AVPP} = Annual Cost Estimate_{LCoGS} / Estimated Impact = COP \$149,397 per life/year = USD \$47 per life/year</p> <p>Modeled % increase per capita health expenditure = 12.6%</p> <p style="text-align: right;">* Colombian health expenditure per capita 2015 (WB) = USD \$374.24</p>
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as high as an 18.7% GDP loss. When applied to Colombia, this would reflect an inaction cost risk of USD \$57.8 billion/year. The margin between cost and avoidance of cost risk achieves both reduction of AVPP while also strengthening the entire health system through a concordant financial and human investment for evidence-based budget allocation in a financially viable model that achieves surgical care for all.

Case Study: Buenaventura and Cali

Despite being few in number, the LCoGS indicators provide tremendous insight into surgical disease and surgical

	Valle del Cauca	
	Cali	Buenaventura
% >2h access	1.64%	46.1%
SAO Density	35	2.1
Operative Volume	3523	1788
Socioeconomic Status (subsidiado/contributivo+excepcion)	0.42x	2.15x

care disparities at the local, regional, and national level. For example, in Valle del Cauca, Cali and Buenaventura are the two most populous cities. Despite their geographic proximity to one another, profound disparities are revealed by the present LCoGS data set and analysis (Figure above). Consistent, and concerningly, this correlates with the profound socioeconomic disparities present between these neighboring cities. With an operative volume of 1788/100,000 in Buenaventura, the unmet surgical need in this financially unprotected population is profound and consistent with a lack of access to surgical and anesthetic care. This type of analysis and interpretation allows for prioritization of localities and regions for surgical systems strengthening in a balanced integration of socially and fiscally responsible care.

Achieving Universal Health Care in Colombia by Articulating a National Strategic Plan (i.e., NSOAP)

The recognition of the indivisible nature of medical and surgical care in achieving optimal outcomes for patients across the spectrum of disease, combined with the contemporary acquisition, analysis and interpretation of the LCoGS indicators, presents Colombia with a unique opportunity to fulfill its Constitutional mandate for UHC. Preliminary analysis of surgical system preparedness, delivery, and cost protection indicators begin to inform the “what” of ensuring access to essential and emergency surgical care to all Colombians. However, the “how” of ensuring this universal access, while maximizing return on investment, will optimally occur through the articulation of structure, processes, and outcomes relative to the *development, implementation, and evaluation* of a contextualized National Surgical Obstetric, and Anesthesia Plan. While this process may appear to address the surgical sub-system exclusively, it necessarily results in augmentation of the medical and public health sub-systems engendering an integrated value-based care network. This value-based ecosystem provides a path forward in building a community and in-patient quality oriented, universal healthcare system. Only then can all sectors of health care work effectively with one another to achieve a geographically and socially indiscriminate economic growth that is a direct result of universal access to effective and efficient surgical care.

Respectfully,

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Appendix 1 – LCoGS Indicator Definitions and Targets

	Definition	Target
Access to timely essential surgery	Proportion of the population that can access, within 2 h, a facility that can do caesarean delivery, laparotomy, and treatment of open fracture (the Bellwether Procedures)	A minimum of 80% coverage of essential surgical and anaesthesia services per country by 2030
Specialist surgical workforce density	Number of specialist surgical, anaesthetic, and obstetric physicians who are working, per 100 000 population	100% of countries with at least 20 surgical, anaesthetic, and obstetric physicians per 100 000 population by 2030
Surgical volume	Procedures done in an operating theatre, per 100 000 population per year	80% of countries by 2020 and 100% of countries by 2030 tracking surgical volume; a minimum of 5000 procedures per 100 000 population by 2030
Perioperative mortality	All-cause death rate before discharge in patients who have undergone a procedure in an operating theatre, divided by the total number of procedures, presented as a percentage	80% of countries by 2020 and 100% of countries by 2030 tracking perioperative mortality; in 2020, assess global data and set national targets for 2030
Protection against impoverishing expenditure	Proportion of households protected against impoverishment from direct out-of-pocket payments for surgical and anaesthesia care	100% protection against impoverishment from out-of-pocket payments for surgical and anaesthesia care by 2030
Protection against catastrophic expenditure	Proportion of households protected against catastrophic expenditure from direct out-of-pocket payments for surgical and anaesthesia care	100% protection against catastrophic expenditure from out-of-pocket payments for surgical and anaesthesia care by 2030

These indicators provide the most information when used and interpreted together; no single indicator provides an adequate representation of surgical and anaesthesia care when analysed independently.

Table 1: Core indicators for monitoring of universal access to safe, affordable surgical and anaesthesia care when needed

Meara et al. *Global Surgery 2030: evidence and solutions for achieving health, welfare, and economic development*. *Lancet*. 2015 Aug 8;386(9993):569-624. doi: 10.1016/S0140-6736(15)60160-X. Epub 2015 Apr 26.

Appendix 2 - National Surgical Obstetric Anesthesia Plan Framework

Infrastructure	
Components	Assessment Methods
<p>Surgical facilities Facility readiness Blood supply Access and referral systems</p>	<ul style="list-style-type: none"> Proportion of population with 2 hour access to first-level facility WHO Hospital Assessment Tool (eg, assessment of structure, electricity, water, oxygen, surgical equipment and supplies, computers and inventory) Proportion of hospitals fulfilling safe surgery criteria Blood bank distribution, donation rate
Workforce	
Components	Assessment Methods
<p>Surgical, anaesthetic and obstetric providers Allied health providers (nursing, operational managers; biomedical engineers; radiology, pathology and laboratory technician officers)</p>	<ul style="list-style-type: none"> Density and distribution of specialist surgical, anaesthetic, and obstetric providers Number of surgical, anaesthetic and obstetric graduates and retirees Proportion of surgical workforce training programmes accredited Presence of task sharing or nursing accredited programs and number of providers Presence of attraction and retention strategies Density and distribution of nurses, ancillary staff including operational managers, biomedical engineers, and radiology, pathology and laboratory technicians
Service Delivery	
Components	Assessment Methods
<p>Surgical volume System coordination Quality and safety</p>	<ul style="list-style-type: none"> Proportion of surgical facilities offering the Bellwether Procedures Number of surgical procedures done per year Surgical and anaesthetic related morbidity and mortality (perioperative) Availability of system-wide communication
Financing	
Components	Assessment Methods
<p>Health financing and accounting Budget allocation</p>	<ul style="list-style-type: none"> Surgical expenditure as a proportion of gross domestic product Surgical expenditure as a proportion of total national health-care budget Out-of-pocket expenditures on surgery Catastrophic and impoverishing expenditures on surgery
Information Management	
Component	Assessment Methods
<p>Information systems Research agenda</p>	<ul style="list-style-type: none"> Presence of data systems that promote monitoring and accountability related to surgical and anaesthesia care Proportion of hospital facilities with high speed internet connections

The components addressing surgical care should be incorporated within a broader strategy of improvement of national health systems. NGO = non-governmental organization.
WHO = World Health Organization

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