



FROM NEGLECTED TO CENTRAL: RE-EVALUATING GENERAL SURGERY'S PUBLIC HEALTH IMPACT ON A GLOBAL SCALE.

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Abstract

General surgery, historically marginalized in global health discourse, is increasingly recognized as a vital cornerstone of public health. This review critically re-evaluates general surgery's profound impact on global health outcomes, arguing for its central role in achieving health equity worldwide. Conditions amenable to surgical intervention account for a substantial, yet often underestimated, global burden of disease, leading to millions of preventable deaths and disabilities annually, particularly in low- and middle-income countries (LMICs). We highlight how the pervasive lack of access to safe, timely, and affordable surgical care exacerbates health disparities, pushing vulnerable populations deeper into poverty and hindering national development. The review synthesizes evidence demonstrating general surgery's integral contributions to health systems strengthening, emergency preparedness, maternal and child health, and the management of both communicable and non-communicable diseases. It underscores the high cost-effectiveness of investing in surgical capacity and its critical linkage to achieving Universal Health Coverage and the Sustainable Development Goals. By shifting the perception of surgery from a specialized luxury to an essential public health good, this review advocates for its prioritized integration into global health policies and resource allocation strategies, asserting its indispensable role in fostering a more equitable and healthier world.

Introduction:

For decades, the field of general surgery has largely existed in the periphery of global health discourse, often perceived as a highly specialized, expensive, and resource-intensive endeavor primarily relevant to individual, acute medical crises. This prevailing view relegated surgical care to a secondary or even tertiary concern in international development agendas, with primary focus traditionally directed towards communicable diseases, maternal and child health, and other immediately pressing public health crises. However, this perspective fundamentally misrepresents the pervasive and foundational role that general surgery plays in ensuring population health and achieving equitable health outcomes worldwide. This review asserts that the time has come to shift general surgery from its long-standing position of neglect to a central, indispensable component of comprehensive public health strategies on a global scale. The historical oversight of surgical care in global health initiatives stems from several factors. Early global health efforts, often driven by vertical programs, effectively tackled specific diseases like HIV/AIDS, tuberculosis, and malaria. While hugely successful in their respective domains, these disease-specific approaches inadvertently minimized the cross-cutting importance of surgical conditions, which do not fit neatly into single diagnostic categories.

Furthermore, the perceived high cost, complex infrastructure requirements, and specialized workforce associated with surgery made it seem less amenable to rapid, widespread implementation in resource-limited settings. Coupled with a significant lack of robust data on the true burden of surgical disease and the absence of strong, unified advocacy, general surgery remained a "silent crisis" for far too long. However, the reality of global health demands a profound re-evaluation of this stance. The sheer scale of the unmet need for surgical care is staggering. Estimates suggest that conditions requiring surgical intervention account for a colossal proportion of the global disease burden. In 2010 alone, a seminal finding from the Lancet Commission on Global Surgery revealed that **16.9 million lives were lost due to conditions treatable by surgery**, a figure that tragically surpassed the combined mortality from HIV/AIDS, tuberculosis, and malaria. These preventable deaths, coupled with significant long-term morbidity and disability, represent an immense human tragedy and a formidable barrier to economic development in many nations. From acute traumatic injuries and obstetric emergencies to untreated cancers and neglected congenital anomalies, the absence of timely, safe, and affordable surgical care leaves millions vulnerable to needless suffering, permanent disability, and premature death. The impact of this surgical deficit is not uniformly distributed; rather, it disproportionately afflicts the most vulnerable populations, thereby perpetuating and exacerbating **health disparities**. A staggering **5 billion people worldwide lack access to safe, timely, and affordable surgical and anesthesia care**, with the vast majority residing in low- and middle-income countries (LMICs). While these nations constitute over a third of the global population, they collectively account for a mere fraction of all surgeries performed globally. This glaring inequity is rooted in deeply entrenched socioeconomic, geographic, and systemic barriers. Rural communities often lack even the most basic surgical facilities, while urban poor face prohibitive costs and overwhelmed public health systems. Seeking surgical care can lead to **catastrophic health expenditure** for millions, pushing entire households into deeper poverty and creating a vicious cycle of illness and destitution. Beyond mere access, the quality and safety of surgical care also exhibit stark disparities, with perioperative mortality rates in LMICs being exponentially higher than in high-income countries (HICs), reflecting critical deficiencies in infrastructure, equipment, training, and anesthesia provision. Addressing these profound inequities is not merely a matter of healthcare provision; it is a fundamental ethical imperative and a prerequisite for achieving genuine global health equity. Re-evaluating general surgery's public health impact necessitates recognizing its multi-faceted contributions that extend far beyond the confines of the operating room. From a public health perspective, surgery plays a critical role in:

- 1. Emergency Care and Trauma Management:** General surgeons are often at the forefront of responding to acute emergencies, including road traffic accidents, burns, and interpersonal violence, which contribute significantly to the global burden of injury. Timely surgical intervention can dramatically reduce mortality and prevent lifelong disability from trauma.
- 2. Maternal and Child Health:** Essential surgical procedures like Cesarean sections are vital for safe childbirth, particularly in settings with high rates of obstructed labor, thus playing a direct role in reducing maternal and neonatal mortality, a key public health indicator.
- 3. Cancer Control:** Surgical oncology is a cornerstone of cancer treatment, offering curative or palliative options for a wide range of malignancies. As NCDs, including cancers, rise globally, surgical access becomes increasingly critical for population-level cancer control.
- 4. Infectious Disease Management:** Surgical intervention is often necessary for managing complications of infectious diseases, such as abscesses, osteomyelitis, and chronic infections, which have broader public health implications.
- 5. Rehabilitation and Quality of Life:** Beyond saving lives, surgery plays a crucial role in improving functional outcomes and quality of life for individuals with congenital anomalies, injuries, or chronic conditions, thereby reducing the long-term societal burden of disability.

Furthermore, the economic argument for integrating surgical care into public health strategies is compelling. Investing in basic surgical capacity is increasingly recognized as a highly **cost-effective** intervention, especially when considering the disability-adjusted life years (DALYs) averted and the

restoration of productivity to individuals and communities. By preventing premature death and disability, surgical care directly contributes to a nation's human capital, economic growth, and social stability. Projections indicate trillions of dollars in lost cumulative GDP in LMICs if surgical needs remain unmet, emphasizing that the lack of surgical care is not just a health crisis but an economic one. The past decade has witnessed a pivotal shift in global health discourse regarding surgery. The groundbreaking **Lancet Commission on Global Surgery (2015)**, followed by the **World Health Assembly Resolution 68.15** recognizing essential surgery and anesthesia as integral to universal health coverage, marked a significant turning point. These milestones have fostered greater awareness and catalyzed the development of **National Surgical, Obstetric, and Anesthesia Plans (NSOAPs)** in numerous countries, aiming to strategically strengthen surgical systems. While this represents commendable progress, significant challenges persist in translating these policy aspirations into tangible improvements in surgical access and quality on the ground. Funding gaps, infrastructure deficiencies, and critical shortages of trained personnel continue to impede progress, particularly in the most vulnerable regions. This review aims to synthesize the current evidence and re-evaluate general surgery's profound and multifaceted impact as a public health cornerstone on a global scale. By systematically examining its contributions to addressing the immense burden of surgically treatable conditions, mitigating pervasive health disparities, and strengthening health systems, we seek to underscore its indispensable nature. This paper argues for general surgery's unequivocal position at the core of global health policy and investment, moving it definitively "from neglected to central" in the pursuit of a more equitable and healthier world for all.

Materials and Methods

This review aimed to comprehensively re-evaluate the public health impact of general surgery on a global scale, specifically examining its transition from a historically neglected field to a central component of global health strategies. A systematic approach was adopted to identify, select, and synthesize existing literature addressing this critical shift.

1. Search Strategy and Data Sources

A rigorous and systematic literature search was conducted across several prominent electronic databases to capture a broad spectrum of relevant publications. The databases utilized included:

- **PubMed/MEDLINE:** A primary source for biomedical and life sciences articles.
- **Embase:** Offering extensive coverage, particularly strong in European literature and drug research.
- **Scopus:** A large abstract and citation database of peer-reviewed literature, encompassing scientific, technical, medical, and social science fields.
- **Web of Science Core Collection:** Providing multidisciplinary coverage with a focus on high-impact journals.
- **Global Health:** Specialized for literature on public health, international health, and tropical medicine.
- **Cochrane Library:** Searched for relevant systematic reviews and meta-analyses.
- **Google Scholar:** Employed for a wider net, including grey literature, conference proceedings, and to identify highly cited foundational papers.

The search strategy was meticulously developed using a combination of Medical Subject Headings (MeSH terms), Embase Subject Headings (Emtree terms), and free-text keywords, tailored for optimal performance across each specific database. Key terms and their Boolean combinations (AND, OR) included:

- **Surgical Interventions:** ("General Surgery" OR "Surgery" OR "Surgical Procedures" OR "Surgical Care" OR "Essential Surgery" OR "Emergency Surgery")
- **Public Health & Global Scope:** ("Public Health" OR "Global Health" OR "Population Health" OR "International Health" OR "Health Policy")
- **Impact & Disparities:** ("Impact" OR "Burden of Disease" OR "Mortality" OR "Morbidity" OR "Health Disparities" OR "Health Inequities" OR "Access to Care" OR "Underserved Populations" OR "Low- and Middle-Income Countries" OR "LMICs" OR "Health Equity")

- **Systemic Aspects:** ("Health Systems Strengthening" OR "Universal Health Coverage" OR "UHC" OR "Sustainable Development Goals" OR "SDGs")

No restrictions were placed on the publication date to capture both foundational historical perspectives and the most recent developments. The search was primarily limited to English-language publications to ensure accurate interpretation and synthesis, though highly influential non-English titles with clear English abstracts were reviewed for potential relevance.

2. Eligibility Criteria

To ensure relevance and focus, specific inclusion and exclusion criteria were applied to the retrieved literature:

Inclusion Criteria:

- Peer-reviewed original research articles (quantitative, qualitative, mixed methods) directly addressing general surgery's role or impact within a public health or global health context.
- Systematic reviews, meta-analyses, and comprehensive narrative reviews.
- Policy documents, reports, and white papers published by authoritative international organizations (e.g., World Health Organization, World Bank, Lancet Commission on Global Surgery) that discuss global surgical care, public health policy, and health equity.
- Editorials, commentaries, and opinion pieces that offer significant conceptual contributions to the re-evaluation of surgery's public health role.
- Studies focusing on any aspect of general surgical care, including trauma, acute abdominal conditions, surgical oncology, essential obstetric surgery (e.g., Cesarean sections), and common elective procedures with population-level health implications.
- Publications discussing health systems strengthening, resource allocation, workforce development, and economic arguments related to surgical care, particularly in LMICs.

Exclusion Criteria:

- Studies solely focusing on highly specialized surgical subfields (e.g., neurosurgery, cardiothoracic surgery, cosmetic surgery) without broader public health or general surgical relevance.
- Clinical case reports or small case series that did not offer broader public health insights.
- Animal studies or *in vitro* research.
- Conference abstracts or dissertations/theses not subsequently published in peer-reviewed journals, unless they were critical policy documents from recognized global health bodies.
- Non-English publications where the full text could not be reliably translated or where the English abstract did not provide sufficient detail for comprehensive analysis.

3. Study Selection Process

The retrieved records were managed using a citation management software. Titles and abstracts were independently screened by the reviewer against the predefined eligibility criteria. Duplicates were removed. Potentially relevant articles proceeded to full-text review. The full-text articles were then meticulously assessed for final inclusion, with any uncertainties resolved through careful re-evaluation of the review's objectives. While a formal PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flow diagram was not explicitly generated given the nature of a narrative review, the systematic process of identification, screening, eligibility, and inclusion was conceptually followed to ensure transparency and rigor.

4. Data Extraction and Synthesis

For each included document, pertinent information was systematically extracted. This included: author(s), year of publication, journal/source, study type (e.g., original research, policy report), geographical focus, key arguments regarding general surgery's public health impact, evidence related to health disparities, and proposed solutions or policy recommendations.

A **narrative synthesis** approach was employed to analyze the extracted data. This involved grouping findings into thematic categories that directly addressed the review's objectives. The synthesis focused on identifying overarching patterns, consistent arguments, and critical gaps in the literature regarding general surgery's transition from a neglected to a central position in global health. Conceptual frameworks related to public health (e.g., health determinants, health systems building blocks) were used to structure the interpretation and discussion of findings. Due to the diverse nature of the included literature (ranging from epidemiological studies to policy documents and conceptual articles), a formal meta-analysis of quantitative data was not applicable or performed.

5. Quality Appraisal

Given the broad scope and the inclusion of various literature types (empirical studies, policy documents, commentaries), a formal risk of bias assessment (typical for systematic reviews of intervention studies) was not conducted. Instead, the included sources were critically appraised for their credibility, relevance, and methodological rigor where applicable. Priority was given to well-conducted systematic reviews, large-scale epidemiological studies, and authoritative reports from globally recognized health organizations (e.g., WHO, World Bank, Lancet Commission on Global Surgery) that have significantly shaped the global surgery discourse. This pragmatic approach ensured that the synthesis was based on reliable and impactful literature that collectively contributed to the re-evaluation of general surgery's public health standing.

Review of Literature

The comprehensive literature review, guided by the systematic methodology, yielded compelling evidence supporting the re-evaluation of general surgery's role from a historically neglected field to a central cornerstone of global public health. The findings coalesce around several key themes, illustrating its profound impact on global health outcomes and the reduction of health disparities.

1. Quantification of the Historically Neglected Surgical Burden

A consistent and overwhelming finding across the reviewed literature is the immense and largely unrecognized global burden of surgically treatable conditions. Before the re-evaluation, this burden was significantly underestimated, leading to its marginalization in global health priorities.

- **Massive Mortality and Morbidity:** Studies consistently demonstrate that conditions requiring surgical intervention, encompassing trauma, infections, congenital anomalies, and various non-communicable diseases, contribute to a disproportionately high burden of mortality and morbidity globally. Key reports highlighted that **an estimated 16.9 million lives are lost annually** due to surgically treatable conditions, exceeding the combined deaths from HIV/AIDS, tuberculosis, and malaria. This stark comparison underscored the severe neglect and the potential for immense public health gains if this burden were adequately addressed.
- **Significant DALYs and Economic Loss:** Beyond immediate mortality, the literature revealed substantial Disability-Adjusted Life Years (DALYs) attributable to surgical conditions. Untreated or delayed surgical care leads to chronic pain, permanent disability, and reduced productivity, resulting in profound economic losses at both individual and national levels. Studies consistently framed this as a significant barrier to human capital development and economic growth, particularly in LMICs.

2. The Paradigm Shift: From Neglected to Recognized

The review identified a critical turning point in the perception and prioritization of general surgery, largely catalyzed by influential reports and international consensus.

- **The Lancet Commission on Global Surgery (LCoGS) (2015):** This seminal report was a pivotal finding, providing comprehensive epidemiological data, economic arguments, and a clear roadmap for global surgical scale-up. It effectively articulated the argument for surgery as an "indivisible, indispensable part of healthcare" and brought the concept of "global surgery" to the forefront of global health discourse.

- **World Health Assembly Resolution 68.15 (2015):** Directly following the LCoGS, the adoption of this resolution by the World Health Organization (WHO) member states officially recognized the importance of emergency and essential surgical care and anesthesia as integral to Universal Health Coverage (UHC). This marked a definitive shift in policy rhetoric, acknowledging surgery's public health mandate.
- **Integration with Sustainable Development Goals (SDGs):** Subsequent literature has consistently linked the achievement of several SDGs (especially SDG 3 on health, but also those on poverty, gender equality, and economic growth) to strengthened surgical systems, cementing surgery's role in broader development agendas.

3. General Surgery's Direct Contributions to Public Health Outcomes

The re-evaluation highlighted general surgery's diverse and fundamental contributions across various public health domains.

- **Emergency and Trauma Care:** A pervasive finding was general surgery's critical role in reducing mortality and morbidity from traumatic injuries, which are a leading cause of death and disability globally. Rapid surgical intervention in cases of road traffic accidents, burns, and other acute injuries was consistently shown to be life-saving.
- **Maternal and Child Health (MCH):** The literature reinforced the direct impact of essential obstetric surgery, particularly Cesarean sections for obstructed labor, on reducing maternal and neonatal mortality and preventing long-term morbidity for both mother and child in high-burden settings.
- **Non-Communicable Disease (NCD) Management:** With the global rise of NCDs, general surgery's role in cancer diagnosis, staging, and definitive treatment (e.g., tumor resection) emerged as increasingly vital for population-level cancer control programs.
- **Infectious Disease Complications:** Surgical management of complications arising from infectious diseases, such as abscesses, necrotizing fasciitis, and chronic osteomyelitis, was also identified as a crucial public health intervention.
- **Addressing Neglected Surgical Conditions:** Recognition grew for common, often neglected, conditions like hernias, cataracts (though often ophthalmology-led, it sets a precedent for high-volume, impactful surgery), and congenital anomalies, whose surgical correction can dramatically improve quality of life and economic participation.

4. Direct Impact on Reducing Health Disparities

The review prominently featured how the re-evaluation of general surgery illuminated its central role in either perpetuating or mitigating health disparities.

- **Pervasive Access Gaps:** Evidence consistently showed that **approximately 5 billion people lack access to safe, affordable, timely surgical care**, with the vast majority concentrated in LMICs. This massive gap perpetuates glaring inequities across geographic, socioeconomic, and even gender lines.
- **Quality and Safety Disparities:** A critical finding was the significantly higher perioperative mortality rates in LMICs compared to HICs (up to 100 times higher for some procedures). These disparities were attributed to deficiencies in infrastructure, equipment, safe anesthesia, trained workforce, and patient safety protocols, highlighting a fundamental inequity in the quality of care.
- **Financial Catastrophe:** Numerous studies highlighted the devastating financial burden of surgical care, where out-of-pocket expenses for surgery in LMICs frequently lead to catastrophic health expenditure, pushing millions into poverty. This underscored surgery as a driver of socioeconomic inequality.

5. Integration into Health Systems Strengthening

The literature firmly established general surgery as an integral and cost-effective component of resilient health systems, moving beyond its isolated perception.

- **Essential Component of UHC:** Surgical and anesthesia care are increasingly recognized as essential services for achieving Universal Health Coverage, not as luxury additions. This shift mandates their inclusion in benefit packages and national health planning.
- **National Surgical, Obstetric, and Anesthesia Plans (NSOAPs):** The development and implementation of NSOAPs emerged as a key strategy to operationalize the integration of surgical care into national health policies, allowing countries to assess needs, set priorities, and build capacity systematically.
- **Workforce and Infrastructure Investment:** Findings emphasized the critical need for investment in training surgical, anesthesia, and nursing workforces in LMICs, alongside developing appropriate infrastructure and ensuring access to essential equipment and supplies, often through context-specific, sustainable models.
- **Cost-Effectiveness:** Several analyses demonstrated that basic surgical interventions are highly cost-effective, offering a strong return on investment in terms of DALYs averted and enhanced economic productivity, thereby justifying their central position in public health resource allocation.

Results

The re-evaluation of general surgery's public health impact is largely a product of a dynamic and evolving body of literature, marking a significant paradigm shift over the past decade. Prior to this re-evaluation, the prevailing academic and policy discourse in global health predominantly centered on infectious diseases, maternal and child health programs, and primary care interventions. Surgical care was often omitted from national health plans in low- and middle-income countries (LMICs) and received minimal attention from major international funding bodies, largely due to its perceived complexity, high cost, and lack of quantifiable population-level data on its burden. Early commentaries, such as those by Farmer and Kim (2008), began to challenge this oversight, rhetorically positioning surgery as the "neglected stepchild" of global health, but a truly comprehensive and data-driven articulation of the problem was yet to emerge. The landscape dramatically shifted with the publication of the **Lancet Commission on Global Surgery (LCoGS)** in 2015. This landmark report served as the catalyst for the re-evaluation, providing unprecedented epidemiological data, economic analyses, and a clear set of indicators for assessing surgical system strength. The LCoGS rigorously quantified the immense unmet need, demonstrating that 5 billion people lacked access to safe, affordable, and timely surgical and anesthesia care, and critically, that 16.9 million lives were lost annually due to surgically treatable conditions. This finding fundamentally redefined the global burden of disease, compelling the public health community to acknowledge surgery's pervasive impact, which previously rivaled or exceeded that of well-funded infectious diseases. Subsequent research, drawing upon Global Burden of Disease (GBD) data (e.g., Gakidou et al., 2017), has consistently reinforced these figures, solidifying the evidence base for surgery's essential role in addressing global mortality and morbidity. Following the LCoGS, the **World Health Assembly Resolution 68.15** (WHO, 2015) formally recognized emergency and essential surgical care and anesthesia as integral components of universal health coverage (UHC). This policy endorsement signaled a critical shift from academic advocacy to intergovernmental commitment. Literature since 2015 has largely focused on operationalizing this resolution, advocating for the integration of surgical care into national health policies and the development of **National Surgical, Obstetric, and Anesthesia Plans (NSOAPs)**. Reviews of NSOAPs (e.g., Brouwer et al., 2019) have highlighted their conceptual importance in strategic planning, but also revealed varying stages of implementation, often hampered by persistent funding gaps, competing health priorities, and lack of local expertise in comprehensive planning. A significant body of literature illuminates the profound **health disparities** that define surgical access and outcomes. Studies consistently show that the **5 billion people lacking access** are overwhelmingly concentrated in LMICs, particularly in rural and remote areas (Ng-Kamstra et al., 2018). These geographical inequities are compounded by socioeconomic barriers;

numerous analyses detail the "catastrophic health expenditure" associated with surgical care, driving millions into poverty (Shih et al., 2021). Beyond access, the literature extensively documents stark disparities in the quality and safety of surgical care. Perioperative mortality rates in LMICs are often reported to be many times higher than in HICs, attributed to critical deficiencies in infrastructure, equipment, sterile supplies, safe anesthesia, and the availability of adequately trained surgical and anesthesia providers (Graling et al., 2021). This body of evidence underscores that the neglect of surgical care not only creates a burden of disease but actively perpetuates and exacerbates global health inequalities. The re-evaluation has also spurred a deeper understanding of general surgery's direct and indirect **public health contributions**. Literature frequently details its indispensable role in:

- **Trauma and Emergency Care:** Studies on trauma systems and injury prevention consistently highlight general surgeons as critical first responders and definitive care providers, significantly impacting outcomes from road traffic injuries, burns, and other acute emergencies (Mock et al., 2015).
- **Maternal and Child Health (MCH):** Research emphasizes the life-saving impact of essential obstetric surgery, particularly Cesarean sections for obstructed labor, on reducing maternal and neonatal mortality in high-burden settings (Conteh et al., 2020). This positions general surgery as a key intervention in MCH efforts.
- **Non-Communicable Disease (NCD) Management:** As NCDs, including various cancers, rise globally, the literature increasingly highlights the integral role of surgical oncology in diagnosis, staging, and curative or palliative treatment, particularly relevant for public health cancer control strategies in LMICs.
- **Economic Productivity:** A growing number of papers articulate the compelling economic argument for surgical investment, demonstrating high rates of return on investment through DALYs averted and increased economic productivity (Shih et al., 2021). This evidence is crucial for advocating for general surgery's central position within developmental and economic planning.

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