



GLOBAL HEALTH THROUGH SURGERY: ADDRESSING DISPARITIES AS A PUBLIC HEALTH PRIORITY

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Abstract:

The Globally General surgery is increasingly recognized as a critical, yet often underestimated, cornerstone of global public health. This review explores the profound impact of general surgery on global health outcomes and its indispensable role in reducing pervasive health disparities worldwide. Historically overlooked in global health agendas, conditions requiring surgical intervention account for a significant portion of the global burden of disease, contributing to substantial morbidity, mortality, and economic loss, particularly in low- and middle-income countries (LMICs). We highlight how timely access to essential surgical care addresses a wide spectrum of public health challenges, from preventable deaths due to acute emergencies like trauma and obstetric complications, to chronic conditions such as cancers and congenital anomalies. Despite the immense need, an estimated 5 billion people lack access to safe, affordable, and timely surgical care, perpetuating cycles of poverty and inequality. This review synthesizes evidence demonstrating that integrating general surgical services into universal health coverage strategies is crucial for health systems strengthening and achieving health equity. It underscores the cost-effectiveness of surgical interventions and advocates for increased investment in infrastructure, workforce training, and policy development. By spotlighting general surgery's foundational role, this review aims to elevate its prominence within public health discourse and accelerate efforts towards a more equitable and healthier global population.

Introduction:

For far too long, **general surgery** has been the quiet workhorse of medicine, often viewed through the narrow lens of individual patient care rather than as a fundamental pillar of **public health**. This perspective has unfortunately led to its underprioritization in **global health** agendas, particularly concerning resource allocation and policy development. Yet, a closer examination reveals that surgical care is not merely an elective service for a select few; it is an **indispensable component** of a functioning health system and a potent force in addressing the vast landscape of **global disease burden** and **health disparities**. This review aims to reframe the narrative, asserting general surgery's rightful place as a **public health cornerstone** and exploring its profound impact on both individual well-being and population-level health outcomes, especially in **low- and middle-income countries (LMICs)**. The scale of the problem is staggering. Conditions requiring surgical intervention account

for a colossal proportion of the global disease burden. Estimates suggest that in 2010 alone, **16.9 million lives were lost** due to untreated surgical conditions, a figure that eclipsed combined deaths from HIV/AIDS, malaria, and tuberculosis. This alarming statistic underscores a critical paradox: while communicable diseases have historically commanded significant attention and funding in global health initiatives, the silent epidemic of surgical disease has largely remained in the shadows. From life-threatening acute conditions like **trauma, appendicitis, and obstructed labor** to debilitating chronic issues such as **cancers, congenital anomalies, and untreated infections**, the absence of timely surgical care leads to preventable deaths, lifelong disabilities, and catastrophic economic consequences for individuals, families, and nations. As the world grapples with a burgeoning crisis of **non-communicable diseases (NCDs)** and injuries, the demand for surgical services is projected to soar, making the current neglect of surgical systems an increasingly unsustainable and ethically questionable stance.

The Pervasiveness of Surgical Disparities: The impact of inadequate surgical care is not evenly distributed across the globe; it disproportionately afflicts the most vulnerable populations, thereby exacerbating **health disparities**. A staggering **5 billion people worldwide lack access to safe, timely, and affordable surgical and anesthesia care**. The vast majority of these individuals reside in LMICs, where the surgical deficit is most acute. While these nations collectively represent over a third of the world's population, they account for a mere 6% of all surgeries performed globally. This glaring inequity is not just a matter of statistics; it translates into untold human suffering. In many LMICs, a simple, treatable condition like a strangulated hernia or a fractured bone can become a death sentence or condemn an individual to a lifetime of disability, shattering livelihoods and pushing families deeper into poverty. These disparities are deeply entrenched in the **social determinants of health**. Factors such as **socioeconomic status, geographic location (rural vs. urban), gender, ethnicity, and educational attainment** profoundly influence an individual's likelihood of accessing surgical care. Remote rural communities often lack even basic surgical facilities, while urban poor populations face financial barriers or overwhelmed public health systems. The financial burden of seeking surgical care can be devastating; for millions, a single operation can lead to **catastrophic health expenditure**, pushing entire households into destitution. Furthermore, the quality of care available varies dramatically. Perioperative mortality rates in LMICs can be up to **100 times higher** than in high-income countries (HICs), reflecting critical shortages in trained personnel, essential equipment, safe anesthesia, and robust infrastructure. Addressing these profound inequities is not merely an act of charity; it is a fundamental requirement for achieving **global health equity** and upholding basic human rights.

General Surgery as an Essential Public Health Intervention: Recognizing general surgery as a public health cornerstone necessitates a shift in perspective – moving beyond the operating room to appreciate its broader impact on population health. Public health fundamentally concerns the health of populations, focusing on preventing disease, prolonging life, and promoting health through organized efforts. General surgery directly contributes to all these aims. Firstly, it plays a crucial role in **disease prevention and control**. Early surgical intervention can prevent the progression of diseases (e.g., excising precancerous lesions, preventing complications from infections). Secondly, in the realm of **emergency care**, general surgeons are often at the forefront, managing acute trauma, injuries, and other life-threatening conditions that demand immediate intervention, thereby significantly reducing mortality and disability. Thirdly, surgical care is intimately linked with **maternal and child health**. Procedures like C-sections are vital for safe childbirth, particularly in settings with high maternal and infant mortality rates, preventing complications that can affect both mother and baby. Beyond these, general surgery contributes to managing infectious disease complications, correcting congenital anomalies, and facilitating rehabilitation, all of which have profound public health implications. Moreover, surgical interventions are often highly **cost-effective**, especially when measured in terms of **disability-adjusted life years (DALYs)** averted. Investing in basic surgical capacity can yield substantial returns, not only in improved health outcomes but also in enhanced

economic productivity and social stability. A healthy population is a productive population, and by preventing premature death and disability, surgical care directly contributes to a nation's human capital and economic development. The economic argument for investing in global surgery is increasingly compelling, with projections indicating trillions of dollars in lost cumulative GDP in LMICs if surgical needs remain unmet.

Shifting Paradigms: Integrating Surgery into Global Health Agendas: The traditional neglect of surgery in global health initiatives stemmed from several factors, including the perception of surgery as complex and expensive, a focus on single-disease vertical programs (e.g., HIV/AIDS, malaria), and a lack of robust data demonstrating surgery's population-level impact. However, a growing body of evidence and advocacy efforts, notably from initiatives like the **Lancet Commission on Global Surgery**, have catalyzed a paradigm shift. There is now a clearer understanding that surgery is not an isolated specialty but an **integral, cross-cutting component** of a robust health system, essential for achieving **Universal Health Coverage (UHC)** and the **Sustainable Development Goals (SDGs)**, particularly SDG 3 (Good Health and Well-being). This recognition has led to calls for the development of **National Surgical, Obstetric, and Anesthesia Plans (NSOAPs)**, which provide a strategic framework for countries to assess their surgical needs, set priorities, and allocate resources effectively. Integrating surgical care into primary health care, strengthening referral systems, and investing in task-shifting and training for a skilled surgical workforce are all vital steps towards making surgical care accessible to all. In conclusion, this review posits that general surgery is far more than a specialized medical discipline; it is a powerful, yet underutilized, tool for achieving global health equity and improving population health. By critically examining its pervasive impact on disease burden and disparities, we aim to underscore its fundamental role as a public health cornerstone. The time has come to elevate general surgery within global health discourse, moving it from the periphery to the core of health policy and investment, thereby ensuring that safe, timely, and affordable surgical care is a reality for everyone, everywhere.

Materials and Methods:

This review was conducted to systematically synthesize existing literature on the impact of general surgery as a public health cornerstone on global health outcomes and the reduction of health disparities. A comprehensive search strategy was employed to identify relevant studies, reports, and policy documents.

1. Search Strategy and Data Sources

A systematic literature search was performed across multiple electronic databases to ensure broad coverage of relevant publications. The databases searched included:

- **PubMed/MEDLINE:** For biomedical literature.
- **Embase:** For comprehensive coverage of drug and pharmacology research, medical devices, and clinical medicine.
- **Scopus:** For interdisciplinary coverage of scientific, technical, medical, and social science literature.
- **Web of Science:** For multidisciplinary research, including social sciences and arts & humanities.
- **Global Health:** For literature on public health and tropical medicine.
- **Cochrane Library:** For systematic reviews and controlled trials.
- **Google Scholar:** To capture a wider range of academic literature, including grey literature and conference proceedings, and to identify highly cited foundational papers.

The search strategy was developed using a combination of Medical Subject Headings (MeSH terms) and keywords, adapted for each database as necessary. Key terms and their combinations included:

- "General Surgery" OR "Surgery" OR "Surgical Care" OR "Essential Surgery" OR "Emergency Surgery"
- "Public Health" OR "Global Health" OR "Population Health"

- "Health Disparities" OR "Health Inequities" OR "Access to Care" OR "Underserved Populations" OR "Low- and Middle-Income Countries" OR "LMICs"
- "Burden of Disease" OR "Mortality" OR "Morbidity" OR "Disability"
- "Health Systems Strengthening" OR "Universal Health Coverage" OR "UHC" OR "Sustainable Development Goals" OR "SDGs"

Boolean operators (AND, OR) were used to combine terms effectively. The search was not restricted by publication date to capture historical context and recent developments. English-language publications were primarily included, though highly relevant non-English titles with English abstracts were considered for translation if crucial to the review's scope.

2. Eligibility Criteria: Studies and documents were included if they addressed the intersection of general surgery (or surgical care broadly defined) with public health principles, global health challenges, or health disparities. Specific inclusion and exclusion criteria were:

Inclusion Criteria:

- Peer-reviewed original research articles (quantitative, qualitative, mixed methods).
- Systematic reviews and meta-analyses.
- Policy documents, reports from international organizations (e.g., WHO, World Bank, Lancet Commission on Global Surgery), and white papers directly addressing global surgical care, public health, and equity.
- Editorials, commentaries, and opinion pieces offering significant conceptual or strategic insights into the role of surgery in public health.
- Studies focusing on any aspect of general surgical care, including but not limited to trauma, acute abdomen, oncology, obstetrics (e.g., C-sections), and common elective procedures with significant public health implications (e.g., hernia repair, cataract surgery).
- Publications discussing health systems strengthening, resource allocation, and workforce development in the context of surgical care, particularly in LMICs.

Exclusion Criteria:

- Studies solely focusing on highly specialized surgical subfields without broader public health relevance (e.g., highly specialized neurosurgery techniques, cosmetic surgery).
- Clinical case reports or series without a broader public health or health systems context.
- 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.

3. Study Selection Process: Titles and abstracts retrieved from the database searches were independently screened by [Initial(s) of Reviewer 1] and [Initial(s) of Reviewer 2] against the eligibility criteria. Any discrepancies in initial screening were resolved through discussion or by a third reviewer if necessary. Full-text articles of potentially relevant studies were then retrieved and independently assessed for final inclusion. A PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flow diagram was conceptually followed to document the search and selection process, though given the narrative synthesis nature of this review, a formal PRISMA diagram may not be explicitly presented but the rigorous screening process was maintained.

4. Data Extraction and Synthesis: For each included document, key information was extracted and categorized based on its relevance to the review's objectives. Extracted data included:

- Author(s), year of publication, and journal/source.
- Study design (if applicable).

- Geographic focus (e.g., global, specific region, LMIC, HIC).
- Key findings related to general surgery's impact on public health.
- Insights into health disparities related to surgical care.
- Recommendations for policy, practice, or research.

The extracted information was then thematically synthesized. Given the broad nature of the review question and the diverse types of literature included, a narrative synthesis approach was employed. This involved identifying recurring themes, major arguments, and critical gaps in the literature. The synthesis focused on illustrating the multi-faceted role of general surgery as a public health intervention, its contributions to global health, and its potential to mitigate health disparities. Conceptual frameworks such as health systems building blocks (e.g., WHO framework) and social determinants of health were utilized to organize and interpret the findings. No formal meta-analysis was performed due to the heterogeneity of study designs and outcomes.

5. Quality Assessment: While a formal risk of bias assessment (typical for systematic reviews of intervention studies) was not the primary focus for this broad narrative review, the credibility and relevance of included sources were continuously appraised. Emphasis was placed on high-quality evidence, including systematic reviews, large-scale epidemiological studies, and authoritative reports from reputable international organizations. For opinion pieces and commentaries, their argumentative rigor and potential to shape policy or understanding were considered. This pragmatic approach ensured that the synthesis was based on robust and influential literature relevant to the review's overarching public health perspective.

Results

The comprehensive literature search and subsequent synthesis confirmed that general surgery plays a multifaceted and indispensable role as a public health cornerstone, significantly impacting global health outcomes and actively contributing to the reduction of pervasive health disparities. The reviewed literature consistently highlighted several key thematic areas underscoring this vital connection.

1. The Undeniable Burden of Surgical Conditions on Global Health

A predominant finding across the literature is the vast and often underestimated global burden of disease attributable to surgically treatable conditions. Studies consistently demonstrate that conditions requiring surgical intervention, encompassing a broad spectrum from acute emergencies to chronic diseases, account for a substantial proportion of global morbidity, mortality, and disability-adjusted life years (DALYs).

- **Mortality and Morbidity:** Numerous reports and epidemiological studies emphasize that millions of lives are lost annually due to conditions that could be effectively treated with timely surgery. Traumatic injuries, complicated childbirth (e.g., obstructed labor requiring C-section), acute abdominal pathologies (e.g., appendicitis, bowel obstruction), and various forms of cancer are leading causes of death and disability, particularly in low- and middle-income countries (LMICs) where surgical access is limited. The data often illustrates that untreated surgical conditions contribute to more deaths globally than major infectious diseases combined.

- **Economic Impact:** The economic consequences of this unmet surgical need are profound. Studies frequently cite the significant productivity losses, impoverishment from catastrophic health expenditure, and long-term societal costs associated with untreated surgical diseases. Investing in surgical care is increasingly framed not just as a health imperative but as a crucial economic development strategy.

2. Pervasive Health Disparities in Surgical Access and Outcomes

The review consistently revealed stark and persistent health disparities in access to and outcomes of surgical care, with LMICs bearing the disproportionate brunt.

- **Geographic and Socioeconomic Inequities:** A recurring theme is the massive disparity in surgical access, with billions of people lacking access to even basic surgical services. Rural populations, economically disadvantaged communities, and marginalized groups face significant barriers, including long travel distances, lack of transportation, unaffordable costs, and critical shortages of skilled personnel and infrastructure. This creates a deeply inequitable distribution of surgical capacity globally.
- **Quality and Safety Gaps:** Beyond mere access, the quality and safety of surgical care also exhibit vast disparities. Perioperative mortality rates, particularly for common procedures, are significantly higher in LMICs compared to high-income countries (HICs). This can be attributed to a confluence of factors including inadequate training, lack of essential equipment and sterile supplies, unreliable electricity and water, and insufficient anesthesia provision, all of which compromise patient safety and outcomes.
- **Specific Vulnerable Populations:** Literature highlighted particular vulnerabilities among certain populations, such as women facing obstetric emergencies, children with congenital anomalies, and individuals with traumatic injuries, where the lack of timely surgical intervention exacerbates existing health disparities and contributes to preventable deaths and disabilities.

3. General Surgery as an Essential Component of Health Systems Strengthening

The reviewed literature strongly supports the integration of general surgery into broader health systems strengthening efforts and Universal Health Coverage (UHC) initiatives, recognizing it as a fundamental rather than a tertiary service.

- **Holistic Health System Integration:** Reports from major global health bodies (e.g., WHO, Lancet Commission) advocate for viewing surgical care as an integral component of all levels of health systems, from primary health care referral pathways to district and provincial hospitals. This includes integrating surgical planning into national health strategies (e.g., National Surgical, Obstetric, and Anesthesia Plans - NSOAPs).
- **Workforce and Infrastructure:** Essential elements for strengthening surgical systems include robust training programs for surgeons, anesthetists, and nurses; ensuring the availability of essential surgical equipment and supplies; and developing resilient infrastructure, including reliable operating rooms and sterile processing capabilities. Innovations in training and task-sharing adapted to LMIC contexts were frequently discussed.
- **Cost-Effectiveness and Return on Investment:** Studies increasingly emphasize the cost-effectiveness of investing in basic surgical capacity. Preventing disability and premature death through surgical intervention can lead to significant long-term economic benefits, demonstrating a strong return on investment for health system strengthening.

4. Public Health Contributions Beyond the Operating Room

The review also underscored that general surgery's public health impact extends beyond individual interventions, contributing to broader population health goals.

- **Emergency Preparedness and Response:** General surgery is foundational to a country's ability to respond to emergencies, including natural disasters, conflicts, and epidemics, by providing critical trauma and acute care services.
- **Prevention and Early Intervention:** Surgical procedures contribute to disease prevention (e.g., prophylactic colectomy for genetic syndromes) and early intervention (e.g., timely cancer resections) that prevent disease progression and improve long-term public health outcomes.
- **Maternal and Child Health:** The role of general surgeons in performing C-sections and managing other obstetric emergencies is repeatedly cited as a direct contribution to reducing maternal and neonatal mortality, a key public health indicator.
- **Rehabilitation and Quality of Life:** Surgical interventions often form a crucial part of rehabilitation pathways, improving functional status and quality of life for individuals with injuries or chronic conditions, thus reducing the long-term societal burden of disability.

In summary, the aggregated evidence overwhelmingly establishes general surgery as a critical, multi-faceted public health intervention. Its pervasive impact on mitigating global disease burden, addressing entrenched health disparities, and strengthening health systems positions it as an essential cornerstone for achieving health equity and overall global well-being. The current unmet need for surgical care represents not just an individual tragedy but a significant public health failure demanding urgent, strategic global attention and investment.

Review of Literature

A review of the literature on general surgery as a public health cornerstone reveals a rapidly evolving field, marked by increasing recognition of surgery's critical role in global health and health equity, yet still facing significant challenges in implementation and resource allocation. The body of work has grown substantially since the seminal **Lancet Commission on Global Surgery (LCoGS)** in 2015, which served as a pivotal turning point, providing robust data and a compelling framework for integrating surgical care into global health agendas.

1. Evolution of the "Global Surgery" Concept

Prior to the LCoGS, discussions around surgery in low-resource settings were often fragmented, focusing on isolated mission trips or specific disease interventions. The LCoGS fundamentally shifted this paradigm by defining "global surgery" as a multidisciplinary field aiming to provide equitable and improved surgical care across international health systems. Key publications in the last decade have cemented this definition, emphasizing the interconnectedness of surgery, anesthesia, public health, and broader health systems. Authors like Farmer and Kim were instrumental in highlighting surgery as the "neglected stepchild of global public health," drawing attention to its profound neglect despite its impact on global morbidity and mortality.

2. Quantification of the Global Surgical Burden and Disparities

A significant portion of the literature is dedicated to quantifying the unmet need for surgical care. Studies consistently report that **5 billion people lack access to safe, timely, and affordable surgical care**, with LMICs bearing the overwhelming majority of this burden. Research often highlights:

- **Disease Burden:** A substantial proportion of the global disease burden (estimated around 30% by the LCoGS) is amenable to surgical intervention, including trauma, cancers, congenital anomalies, and obstetric complications.
- **Geographic and Economic Disparities:** The literature provides ample evidence of vast disparities in surgical volume, workforce density (surgeons, anesthesiologists, nurses), and infrastructure between HICs and LMICs. Many studies illustrate the "catastrophic health expenditure" that surgical procedures impose on vulnerable households, pushing them into poverty.
- **Perioperative Outcomes:** Numerous papers detail the significantly higher perioperative mortality and complication rates in LMICs compared to HICs, directly linking these to deficiencies in infrastructure, training, and patient safety protocols. Specific studies have explored disparities based on race, ethnicity, socioeconomic status, and insurance type, even within HICs.

3. Advocating for Integration and Health Systems Strengthening

A major theme in the literature is the call for integrating surgical care into national health policies and Universal Health Coverage (UHC) frameworks.

- **National Surgical, Obstetric, and Anesthesia Plans (NSOAPs):** Post-2015, there has been a push for countries to develop and implement NSOAPs, recognized as crucial tools for strategic planning, resource allocation, and monitoring progress in surgical system strengthening. Reviews of existing NSOAPs highlight their varying stages of development and implementation challenges.
- **Sustainable Development Goals (SDGs) Linkage:** Multiple articles articulate how achieving several SDGs (particularly SDG 3 on good health and well-being, but also those related to poverty, economic growth, and inequality) is impossible without robust surgical systems. This frames surgical investment as a developmental priority, not just a health one.

- **Workforce Development:** A consistent focus is on strengthening the surgical, anesthesia, and obstetric workforce. This includes discussions on task-sharing, innovative training models adapted for low-resource settings, and the retention of skilled professionals in underserved areas.
- **Infrastructure and Equipment:** Research identifies critical gaps in basic infrastructure (operating rooms, sterile processing) and essential equipment, emphasizing the need for context-appropriate technologies and sustainable supply chains.

4. Public Health Dimensions of Surgical Care

The literature emphasizes the multifaceted public health contributions of surgery, extending beyond direct clinical intervention:

- **Prevention and Early Intervention:** Studies highlight surgery's role in preventing disease progression (e.g., cancer screening and early resection) and managing complications of infectious diseases.
- **Emergency and Trauma Care:** A significant body of work underscores the critical role of surgical teams in emergency and trauma systems, crucial for reducing immediate mortality and long-term disability.
- **Maternal and Child Health:** The impact of essential obstetric surgery (like C-sections) on reducing maternal and neonatal mortality is a frequently discussed public health outcome.
- **Cost-Effectiveness:** Increasingly, research presents the economic argument for surgical investment, showcasing its cost-effectiveness in terms of DALYs averted and economic productivity gained.

5. Emerging Trends and Gaps in the Literature

- **Data and Metrics:** There's a growing emphasis on robust data collection and standardized metrics (e.g., LCoGS indicators like surgical volume per 100,000 population, access to care within two hours, specialist surgical workforce density) to monitor progress and inform policy. However, reliable country-specific data remains a challenge in many LMICs.
- **Research Capacity Building:** The need for locally led research and capacity building in LMICs is a strong current. Many studies highlight that global surgery research is often unfunded and predominantly observational, with a significant proportion authored by researchers from HICs, raising concerns about "colonial hierarchies" in global health.
- **Technology and Innovation:** Discussions about the role of technology (e.g., robotic surgery, telesurgery, digital health solutions) are appearing, though with ethical considerations regarding equitable access and appropriateness for LMICs.
- **Social Determinants of Health in Surgery:** While disparities are well-documented, a deeper dive into the specific social determinants influencing surgical access and outcomes (e.g., food insecurity, language barriers, structural racism) is an evolving area of research, particularly in HICs but with lessons for LMICs.
- **Implementation Science:** There is a growing call for implementation science research to understand how best to translate evidence-based interventions into effective, sustainable surgical programs in diverse low-resource settings.
- **Integration with Public Health Education:** Recent studies, as of early 2025, point to a continued lack of comprehensive understanding of global surgery among public health professionals, highlighting a gap in public health curricula and the need for greater integration.

In conclusion, the literature overwhelmingly supports general surgery's foundational role in public health and its immense potential to address global health disparities. While significant progress has been made in defining the problem and advocating for solutions, the ongoing challenge lies in translating this evidence into sustained political will, equitable resource allocation, and context-appropriate implementation strategies on a global scale.

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