

REVIEW

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Cardiac surgery and the sustainable development goals: a review

Hiba Ghandour^{1*} , Dominique Vervoort^{2,3}, Ramanish Ravishankar⁴ and Ja Baris D. Swain⁵

Abstract

Background: In 2015, the United Nations adopted the Sustainable Development Goals (SDGs) as key priorities to improve the global health and international development agenda in an intersectoral manner, highlighting 17 SDGs. Six billion people lack access to safe, timely, and affordable cardiac surgical care due to capacity, geographic, and financial barriers. Nevertheless, cardiac surgery is largely disregarded on the global health agenda. In this review, we explore the intersection between cardiac surgery and the SDGs to delineate potential policy and advocacy avenues for the cardiothoracic surgical community.

Main body: A narrative review was performed using the PubMed/MEDLINE, Scopus, and WHO databases with variations of the search terms “cardiac surgery,” “cardiovascular diseases,” and keywords extracted from individual SDGs. All SDGs were manually reviewed to define intersectionality with global cardiac surgery. Out of 17 SDGs, 15 are relevant and require additional attention from the cardiovascular community. SDG3, “Good Health and Well-being,” is the most relevant, although the intersection between global cardiac surgery and other SDGs is apparent. A call for interdisciplinary collaboration through increased preventive mechanisms, rigorous, all-inclusive clinical trials, advocacy with relevant legislators, and mobilizing capacity building mechanisms are made.

Conclusion: Meeting the SDGs will require recognition of cardiovascular disease management, including cardiac surgical care. Cardiac surgeons are essential stakeholders of multidisciplinary collaborations working to improve access to safe, timely, and affordable cardiac surgery for all. Their role as advocates will be vital to establish local, national, regional, and international partnerships and to ensure progress towards SDG attainment.

Keywords: Cardiac surgery, Global health, Sustainable Development Goals

Background

In September 2015, the United Nations (UN) transitioned from the Millennium Development Goals (MDGs) to the Sustainable Development Goals (SDGs) to address the gaps that persisted. The 2030 agenda of the SDGs constitute a more granular 17-goal approach to improve overall human development worldwide with a projected goal of 2030 (Table 1). Each SDG is defined by a list of targets, amounting to 169 targets for 17 SDGs. Progress to these 169 targets is monitored by a set of 232 indicators,

reviewed annually. This level of granularity aims to guide the road to the SDG 2030 agenda. To engineer this path, and following the adoption of the SDG 2030 agenda, the development of the global indicator framework was initiated. This framework includes the set of 232 indicators, collected by national statistical offices and serves as a guide for national, regional, and international efforts towards attaining the SDG targets.

Global cardiac surgery (GCS) can be defined as “an area for study, research, practice, and advocacy that places a priority on improving health outcomes and achieving health equity for all people worldwide who are affected by cardiac surgical conditions or require cardiac surgical care.” [1] By extension, this framework may include thoracic surgical conditions and thoracic surgical

*Correspondence: hibazghandour@gmail.com

¹ Department of Thoracic & Cardiovascular Surgery, Cleveland Clinic, 9500 Euclid Ave, JJ4-307A, Cleveland, OH, USA
Full list of author information is available at the end of the article

Table 1 The United Nations Sustainable Development Goals

Sustainable Development Goal	Description
1	End poverty in all its forms everywhere
2	End hunger, achieve food security and improved nutrition and promote sustainable agriculture
3	Ensure healthy lives and promote well-being for all at all ages
4	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
5	Achieve gender equality and empower all women and girls
6	Ensure availability and sustainable management of water and sanitation for all
7	Ensure access to affordable, reliable, sustainable, and modern energy for all
8	Promote sustained, inclusive, and sustainable economic growth, full and productive employment and decent work for all
9	Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation
10	Reduce inequality within and among countries
11	Make cities and human settlements inclusive, safe, resilient, and sustainable
12	Ensure sustainable consumption and production patterns
13	Take urgent action to combat climate change and its impacts
14	Conserve and sustainably use the oceans, seas and marine resources for sustainable development
15	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, and build effective, accountable, and inclusive institutions at all levels
17	Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development

care, jointly considered global cardiothoracic surgery. Until 2015, surgical, obstetric, and anesthesia care was neglected within the global health discourse; on 26 May 2015, the World Health Organization's (WHO) World Health Assembly Resolution WHA68.15 "Strengthening emergency and essential surgical care and anesthesia as a component of universal health coverage" was unanimously adopted by all 194 WHO Member States, propelling the field of global surgery. However, it was not until late 2018 that GCS was introduced within this discourse [1]. Myths prevail regarding the role of cardiac surgery within the global health context. However, the growing body of literature suggests otherwise [2, 3]. Nevertheless, the political commitment to cardiac surgical care remains limited on the national and international level [4, 5]. To our knowledge, no comprehensive view exists evaluating cardiac surgical care's role within the United Nations' SDG Agenda.

Here, we analyze the SDGs to assess the intersectionality between the SDGs and GCS, identify gaps, and explore opportunities for streamlined advocacy and targeted global health interventions. This analysis seeks to identify concrete entrypoints for the global cardiac surgery community to engage with and embed in the broader global health discourse in light of the growing recognition of the intersectional impact of cardiovascular diseases (CVD) and health systems strengthening on society as a whole.

Main text

Literature review

A literature review was done using the PubMed/MEDLINE, Scopus, and WHO databases with the search terms "cardiac surgery," "cardiovascular surgery," "cardiothoracic surgery," "congenital heart," and "rheumatic heart disease" until January 2021 and key terms extracted from the individual SDGs (Table 1). The high-level documents identified by Vervoort et al. were referenced for non-academic mentions related to cardiac surgery and the SDGs [5].

Sustainable Development Goals

The SDGs were reviewed to investigate intersectionality with cardiac surgery in a global public health context. SDG 3 is the health-related SDG with nine subgoals, which are analyzed in-depth (Fig. 1).

Results

Of the 17 SDGs, 15 goals can be directly or indirectly influenced by the cardiothoracic community (Table 1), of which SDG 3 is most relevant and described in detail in Table 2. SDGs 14 ("Life Below Water") and 15 ("Life on Land") are not considered of direct relevance to the cardiovascular community.



Table 2 Role of the cardiothoracic community in working towards Sustainable Development Goal 3

Sustainable Development Goal 3	Role of the cardiothoracic community
3.1	<ul style="list-style-type: none"> ● Early detection, treatment, and prevention of peripartum cardiomyopathy ● Increase access to preconception counseling
3.2	<ul style="list-style-type: none"> ● Comprehensive CHD services can prevent nearly 200,000 deaths each year ● Increase community screening
3.3	<ul style="list-style-type: none"> ● Address HIV/AIDS as cardiovascular risk factor ● Increase epidemic response through capacity-building
3.4	<ul style="list-style-type: none"> ● CVD are the leading cause of morbidity and mortality worldwide
3.5	<ul style="list-style-type: none"> ● Substance abuse leads to CVD ● Address intersectional CVD risk factors and prevent substance abuse
3.6	<ul style="list-style-type: none"> ● 60-70% of thoracic trauma is attributed to road traffic accidents ● Increasing research on incidence, severity, management, and morbidity of thoracic trauma
3.7	<ul style="list-style-type: none"> ● Integration of CVD prevention and management in reproductive health services ● Increasing female participation in clinical trials ● Studying gender-specific CVD and cardiac pharmacology
3.8	<ul style="list-style-type: none"> ● Without financial risk protection, cardiac surgical care places insurmountable financial barriers on patients ● Intersectional and high-level advocacy with cardiac surgeons at the table
3.9	<ul style="list-style-type: none"> ● Promoting legislation to reduce pollutant exposure can lead to reductions in CVD

CVD cardiovascular diseases

SDG 1: No poverty

The Sanitary Awakening in 1850 unveiled a vicious cycle linking poverty to disease: patients who got sick were poor, which led them to become poorer and eventually sicker. This long-existing link demonstrates that improved access to quality healthcare is a driver to reducing poverty. Access to cardiac surgery for more than six billion people living in and low- and middle-income countries (LMICs) is insufficient, leading to high premature mortality [3]. Addressing cardiac surgical conditions, which, if delayed, may lead to the loss of productivity and catastrophic expenditure, plays a vital role in the eradication of poverty and inequalities. Simultaneously, financial risk protection allows patients to cover the expenses associated with cardiac surgical care. Without comprehensive health insurance or philanthropic support, most patients cannot afford cardiac surgery, risking not seeking care or being pushed into poverty due to paying for care [3]. Each year, over 80 million are pushed (further) into poverty due to seeking surgical care, which is especially pronounced in costly interventions such as cardiac surgery [6].

SDG 2: Zero hunger

In 2019, the prevalence of undernourishment was over 820 million people or one in every nine persons around the world [7]. Food security varies between high-income countries LMICs, with little food security facing the latter than the former, affecting the incidence and prevalence of cardiometabolic disorders in different ways [8]. A person who exhibits undernutrition for a prolonged time is starved, and starvation can cause abnormalities in cardiac muscle function, arrhythmias, and eventually congestive heart failure [9]. Undernourished persons present clinically with bradycardia, low blood pressure, and, in the long run, develop myocardial atrophy, a significant cause of sudden and unexplained death [9].

SDG3: Good health and well-being***SDG Target 3.1: By 2030, reduce the global maternal mortality ratio to less than 70 per 100,000 live births***

The rate of peripartum cardiomyopathy (PPCM) varies significantly by race, genetics, and environmental factors, with the highest incidence observed in Nigeria (one per 100 births) and the lowest in Japan (one per 15,000 births) [10]. Furthermore, the highest rates of PPCM have been noted in African Americans in the USA, Haitians, and citizens of the African region [10]. PPCM reflects cardiomyopathy and heart failure of unknown causes in women. The cardiac surgery community's role is not limited to raising awareness about PPCM but advocating for improved perinatal care and participating in pre-conception counseling and preventative maintenance for

women at increased risk. Furthermore, the cardiac surgery community's role lies in improving access to treatment modalities for women suffering from PPCM, given that its density is highest in LMICs.

SDG Target 3.2: By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1000 live births and under-5 mortality to at least as low as 25 per 1000 live births

Congenital heart defects (CHD) are the most common significant congenital disabilities, with a stable global mortality rate despite an overall decrease in childhood mortality [11]. One baby in every 100 live births will have CHD, corresponding to 1.35 million newborns with CHD annually [12]. Despite a stable CHD rate across countries, the burden falls the heaviest on countries with high fertility. The disadvantage is exacerbated by inadequate access to appropriate care, leaving 90% of affected infants without treatment access [13]. Moreover, CHD patients require lifelong access to care. Scaling access to surgery found in high-income countries to countries with a strained burden has the potential to avert up 58% of the global CHD burden [14]. More broadly, comprehensive CHD services can prevent nearly 200,000 child deaths from CHD each year [15].

SDG Target 3.3: By 2030, end the epidemics of AIDS, tuberculosis, malaria, and neglected tropical diseases and combat hepatitis, water-borne diseases, and other communicable diseases

Drug-resistant tuberculosis is increasing in prevalence despite a decrease in tuberculosis incidence and mortality. This led to thoracic surgery's rising role in the management of drug-resistant tuberculosis, characterized by the excision of thick-walled lesions harboring a high replicating viral load [16]. Furthermore, HIV patients are at risk of developing cardiopulmonary comorbidities, including pulmonary hypertension, aneurysmal disease, myocardial events, arrhythmias, and coronary and other vascular diseases [17]. Cardiothoracic surgeons' involvement in ending epidemics is rising. Thus, increasing exposure to and training in responding to outbreaks and increased advocacy efforts with legislators to increase timely treatment access to timely treatment is vital.

SDG Target 3.4: By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being

In 2017, CVD led to 330 million years of life lost, 35.6 million years lived with disability, and roughly 17.8 million deaths globally [18]. Reducing CVD mortality cannot

be fulfilled without adequate provision of cardiac surgical care [3]. Furthermore, surgery is an essential element of lung cancer diagnosis, staging, and definite treatment. Similarly, patients with chronic respiratory diseases often require surgical management, ranging from bullectomies to lung volume reduction surgery and lung transplants. The fight against non-communicable diseases is an interdisciplinary one, equally requiring surgeons in preventing and treating a complex array of conditions.

SDG Target 3.5: Strengthen the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol

Substance abuse is a global problem ranging from cannabis dependence to opioid overdose [19]. Chronic alcohol use and abuse modify coronary artery disease risk, lead to dilated cardiomyopathy and worsen arrhythmias, conduction disorders, and hypertension [20]. Many of these effects can additionally be noted with drug use disorders; hence, their management can decrease the burden of CVD. When the cardiovascular community participates in awareness campaigns and worldwide preventive mechanisms, it builds capacity in managing cardiac complications and funnels funding to additional research aiming to address intersectional risk factors.

SDG Target 3.6: By 2020, halve the number of global deaths and injuries from road traffic accidents

Contributing to over 1.35 million deaths annually, trauma from road traffic accidents confers a high price for mobility, considering that preventive measures exist [21]. The burden is disproportionate, significantly affecting pedestrians and motorcyclists in LMICs. With 10–15% of road traffic accident injuries being blunt chest injuries and 60–70% of all thoracic trauma, implementing preventive measures would significantly impact the number of patients requiring cardiothoracic surgery [22]. The cardiovascular community's role extends to increased advocacy for their implementation and rigorous research looking at the incidence, severity, management, and morbidity of thoracic trauma.

SDG Target 3.7: By 2030, ensure universal access to sexual and reproductive healthcare services, including family planning, information and education, and the integration of reproductive health into national strategies and programs

Sexual and reproductive health, mostly in maternal-child health, has been the central primary construct of women's health. However, when devising national strategies that aim to focus on women's health, we must address women's health from a holistic perspective. CVD affects females differently than males, with female patients of male cardiologists sustaining worse outcomes than their

male counterparts [23]; given that most clinical trials recruit males primarily, studying CVD in females should be a priority on national agendas treatment options are optimal and inclusive. Factors such as the female reproductive cycle and complicated pregnancies add a level of CVD vulnerability for females [24]. CVD remains the leading cause of death for females. For most of the and with the majority of females experiencing loss of cardio-protection during menopause between the ages of 40 and 60, integrating CVD as part of females' reproductive health care services is vital [25]. Increasing female participation in clinical trials and advocating for additional funding to study the female-specific effects of cardiac pharmacology and CVD are warranted.

SDG Target 3.8: Achieve universal health coverage, including financial risk protection, access to quality essential healthcare services, and access to safe, sufficient effective, quality, and affordable essential medicines and vaccines for all

Access to safe, timely, and affordable surgery is the cornerstone of the Lancet Commission on Global Surgery [26]. Achieving universal health coverage cannot be complete until everyone, everywhere, has access to safe essential surgical services, including cardiac and thoracic surgery, without needing to go through a financial catastrophe. Despite the growth in recognizing recognition of surgical care within LMIC health plans, cardiac surgery has remained absent in health policy plans [4, 5, 27]. This is a multidisciplinary effort, requiring collaboration between surgeons, societies, the United Nations Inter-Agency Expert Group on the SDGs, the UHC2030 consortium, and governments.

SDG Target 3.9: By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water, and soil pollution and contamination

Environmentally-induced CVD has become increasingly reported [28]. Pollutants, such as persistent organic pollutants, bisphenol A and phthalates, polynuclear aromatic hydrocarbons, and others, are common culprits [28]. Ambient air pollution leads to systemic inflammation in response to fine particulates and is more commonly encountered in LMICs [29, 30]. Biomass fuel use leads to household air pollution, affecting three billion people [31]. Exposure to wood smoke leads to arterial stiffness and a decrease in heart rate variability, contributing to the burden of CVD [32]. Lead leads to the generation of reactive oxygen species, leaving cardiac tissue and endothelial cells at risk of oxidative injury. Globally, 26 million people are at risk of lead toxicity secondary to housing, tobacco, mining, industrial use, and usage of leaded fuel in some LMICs [31]. Arsenic is a notable

contaminant of water; as LMICs have less access to clean water, they are at higher risk of chronic arsenic exposure [31]. This often leads to endothelial dysfunction associated with elevated total cholesterol levels, elevated triglycerides, and type two diabetes mellitus [33].

SDG 4: Quality education

Health is a prerequisite for education. Ensuring and ensuring access to education for all cannot be ensured without ensuring access to care for all, including children with CHD and rheumatic heart disease. Schools are a nidus for health and physical development, educating students on the importance of healthy diets and active living. There lies a positive impact of school-based policies on behavioral outcomes regarding non-communicable disease prevention, notably including CVD [34]. Education is an essential component of health and, therefore, a cause of health [35]. CVD is not only observed among adults, neonates can be born with it, infants could acquire it, teenagers could inherit it, and adolescents could develop it. Without education, cardiac health cannot be adequately ensured.

SDG 5: Gender equality

Despite females making up 50% of the medical student body presently, a little over 5% of cardiothoracic surgeons are female in the USA [36]. Nevertheless, the number of women entering the field of cardiothoracic surgery is exponentially increasing, with 50% having joined the area field between 2002 and 2012 [37]. Recent trends have shown equal career satisfaction and preparation for the boards, and a similar number of interviews and job offers following residency for both males and females [37]. Enabling high-quality and timely GCS necessitates gender equity as a prerequisite and increasing efforts for better inclusion daily.

SDG 6: Clean water and sanitation

Inadequate sanitation and unclean water are a leading cause of childhood mortality and morbidity. Every US\$1 invested in sanitation yields an average of US\$5.5 for the global economy, a benefit highlighting a link between better sanitation and economic growth, and a service benefit felt most by disadvantaged communities [38]. In countries with a high level of inorganic arsenic in groundwater, the population's health depends on access to safe water. Populations exposed to arsenic for prolonged periods are at risk of developing stroke, QT abnormalities, coronary heart disease, and peripheral arterial disease [39]. Ensuring access to clean and safe water implies protection from many myriads of diseases and improved health outcomes.

SDG7: Affordable and clean energy

Operating rooms have been identified as significant primary environmental pollution sources of environmental pollution, requiring concrete, substantial equipment, and numerous disposables [40]. Nevertheless, opportunities exist to reduce energy use and thus the environmental footprint associated with surgical care by reducing the equipment used, increasing the equipment safely reused, and limiting the size of instrument trays, all of which minimize sterilization requirements [41]. Furthermore, in LMICs, continuous access to electricity has significantly been a significant problem of operating rooms, not infrequently causing power outages and requiring surgeons to operate with headlights (if available) or flashlights [42]. Although this is likely less common in cardiac centers, located in urban centers, it remains a reality of concern.

SDG8: Decent work and economic growth

A healthy population can contribute substantially to economic growth. It has been estimated that lack of safe, timely, and affordable surgical care can cost LMICs up to 12.3 trillion dollars in potential economic growth by 2030, requiring urgent investments in surgical ecosystems [26]. Although no estimates are available for cardiac surgical conditions, approximately one-third of CVD is considered surgical [18, 43]. Thus, it can be assumed that lack of access to cardiac surgical care substantially impedes economic growth at the macroeconomic and upward intergenerational economic mobility at the microeconomic level.

SDG9: Industry, innovation, and infrastructure

Rapid and collective innovation is needed to sustainably scale cardiac care in a low-cost and high-quality manner. Industry plays a core role in cardiac surgery, given the technical complexity and the field's inherent innovation mindset since the early days. Public-private partnerships have been successfully introduced on a smaller and local scale in various LMIC centers and can be leveraged in budding and growing centers [3]. Similarly, to achieve economies of scale in collaboration with industry suppliers, the adoption of regionalization and spoke-and-hub models can ensure that complex cardiac care is provided at higher volumes and thus better outcomes and lower costs in regional hubs [44].

SDG10: Reduced inequality

Inequalities and inequity pervade medicine at the provider (e.g., gender-based workforce gaps) and patient level (e.g., racial disparities). In the USA, less than 5% of cardiothoracic surgeons are female, with comparably low

projections elsewhere in the world [36]. In LMICs, only a handful of cardiac surgeons are present and most commonly male, creating an imbalanced workforce from the start. Similarly, disparities have been identified in patient care and outcomes in terms of socioeconomic status, race, gender, and other patient characteristics, which require closer investigation and scrutiny to move towards equitable cardiac surgical care [27]. Providing the best possible care to our patients requires a balanced workforce and active advocacy and policymaking to reduce disparities [27, 45].

SDG11: Sustainable cities and communities

Tertiary healthcare is often located in major cities and sparsely available in LMICs; thus, access can be significantly inhibited, owing to limited public transport and nearly half of the global population living in slums or rural areas. Moreover, crowding in less affluent cities is linked to rheumatic heart disease, endomyocardial fibrosis, and Chagas disease [46]. Furthermore, methods such as bypass circuit diversion from regulated medical waste to municipal solid waste through additional saline rinsing may reduce annual waste by several tonnes and maximize efficiency [47]. Finally, the lack of air quality shows how alarming associations with squamous cell and small cell carcinoma [48] and non-malignant cardiac and respiratory disease with over 700,000 deaths attributable to air pollution [49]. In dense cities, air pollution may also increase heart failure prevalence of heart failure, suggesting our current understanding masks the true burden [50].

SDG12: Responsible consumption and production

Global material consumption was estimated to be 92 billion tons in 2017 and growing [51]. SDG12 aims to focus on conserving water and food through mindful consumption. LMICs present with surgical discrepancies such as lacking personal protective equipment, including eye protection and sterilizers, found in only 29% and 64% of selected countries, respectively [52]. This scarcity is mirrored in cardiac surgery, with disposable perfusion cannulas being reused following sterilization [53]. The sustainability of new centers when delivering such services and adopting such strategies must be considered. Although reducing consumption in cardiothoracic surgery presents challenges, minimizing disposable use should be pursued where feasible.

SDG13: Climate action

Growing recognition of surgical services' impact on climate change illustrates the need for climate-friendly policies and practices [40]. Common anesthetic gasses include desflurane and sevoflurane, which are known

for their cardioprotective qualities [54]. However, these halogenated anesthetics exhibit a significant burden on the environment due to their pollutive nature; in the UK, anesthetic gasses contribute to 5% of the National Health Service's carbon footprint [55]. Although hydrofluorocarbons' usage has declined, their use cannot be discounted in cardiothoracic centers due to medical necessity. With their global warming potential being over 2000 times compared to carbon dioxide, implementing scavenging systems is crucial [56]. Additionally, the cardiopulmonary bypass' carbon footprint should be addressed, such as considering off-pump procedures, installing LED lights in operating rooms, and being mindful of heating and air-conditioning [57].

SDG16: Peace and justice strong institutions

A relationship between exposure to violence and the development of ischemic heart disease and hypertension has been observed, particularly in the long-term [58]. Furthermore, surgical inequalities disproportionately affect rural and poverty-ridden areas, thus further creating conflict [59]. Consequently, the lack of infrastructure leads to a reduction in specialized tertiary services, such as cardiac surgery, being deployed to the local population, subsequently leading to further surgical disparity in a vicious cycle. By targeting such inequalities while alleviating violence and conflict, the provision and delivery of cardiac surgery can be vastly improved.

SDG17: Partnerships to achieve the goals

There has been no better time to utilize interdisciplinary collaboration to ensure the advancement of nations. Global partnerships facilitate multi-stakeholder partnerships, essential for technology transfer, capacity building, and policy coherence. These partnerships facilitate North-South, South-South, and triangular cooperation. GCS requires capacity-building mechanisms rooted in global partnerships to improve the quality of cardiac surgery globally. Additionally, GCS aims to increase access to essential technology with the potential to improve patient outcomes and decrease the cost associated with cardiac surgery. Combined with the increasing role of telemedicine and databases to track progress, improve quality, and guide surgical decision-making, global partnerships are vital.

Discussion

Traditionally, cardiac surgery has been regarded as the last addition—the cherry on top—of a developing health system, given the complexity and upfront costs of service. Nevertheless, its role in the SDGs is substantial, affecting 15 of the 17 SDGs, notably because of CVD's major burden [18]. Access to GCS is disturbingly different: six

billion people are estimated to lack care when needed, representing 93% of the population in LMICs [3]. Millions of individuals die every year from cardiac surgical conditions, even though they could have been saved should care have been available; the subsequent loss of socioeconomic potential may not be underestimated [3, 15, 26].

GCS is a young and budding academic field, moving from traditional mission trip models to more sustainable health system interventions. This requires an understanding of the socioeconomic and political landscape and calls for a new type of surgeon: the surgeon-advocate [27]. Cardiac surgeons become leaders by nature—leading cardiac teams—but are rarely challenged to step outside their comfort zone, the operating room. Where trauma surgeons advocate for gun restriction, neurosurgeons lobby helmet laws, and generalists advocate for refugee health, cardiac surgeons have traditionally been limited in health policy and health systems change. Further cultivating such an environment, such as the Society of Thoracic Surgeons' Capitol Hill advocacy, will ensure inclusion of these voices when policymakers and funders consider new public and global health priorities.

The Cardiac Surgery Intersociety Alliance is a step in the right direction [60]. Professional societies ought to be concerned with what goes on within the operating room and on the outside. One the Alliance may become a global voice is needed to unify GCS efforts not only in terms of capacity-building but also in terms of high-level cardiac surgical advocacy geared towards influencing national and international policymaking. Amidst the growing movement of National Surgical, Obstetric, and Anesthesia Plans developed by dozens of countries worldwide and catalyzed by local Ministries of Health and the WHO, cardiac surgery receives little mention due to a lack of individual and societal voices at the table [4]. Failing to do so for the years to come may result in the cardiothoracic community missing the train—an expensive one—as global health interventions fail to address one of the most significant burdens worldwide.

Conclusions

The cardiothoracic community plays a pivotal role in the United Nations' Sustainable Development Agenda for 2030. A better understanding of cardiac surgery's role in global health and increased involvement of professional societies in this discourse are necessary to bridge gaps and move towards universal health coverage by 2030.

Abbreviations

CHD: Congenital heart defect; CVD: Cardiovascular disease; GCS: Global cardiac surgery; LMIC: Low- and middle-income country; PPCM: Peripartum

cardiomyopathy; UN: United Nations; SDGs: Sustainable Development Goals; WHO: World Health Organization.

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Competing interests

The authors declare that they have no competing interests.

Author details

¹Department of Thoracic & Cardiovascular Surgery, Cleveland Clinic, 9500 Euclid Ave, JJ4-307A, Cleveland, OH, USA. ²Institute of Health Policy, Management and Evaluation, University of Toronto, Toronto, Ontario, Canada. ³Division of Cardiac Surgery, University of Toronto, Toronto, Ontario, Canada. ⁴Faculty of Medicine, University of Edinburgh, Edinburgh, UK. ⁵Division of Cardiovascular Surgery, Department of Surgery, Hospital of the University of Pennsylvania, Philadelphia, USA.

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