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Cardiovascular Surgical Services in Bhutan: Current Progress, Challenges and Future Plans

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ABSTRACT

Cardiovascular diseases are rising in Bhutan, with 279 adults and 227 pediatric patients referred to India for cardiovascular disease treatment in the last 3 years. Since its establishment in 2023, the catheterization laboratory has performed close to 400 diagnostic angiograms and numerous interventions, saving many lives and reducing up to 50 million ngultrums in revenue. As Bhutan’s cardiac surgical services are still in their early stages, technical capacity in the form of human resources and equipment needs to be developed. Herein, we discuss the current state of cardiovascular services in Bhutan, the challenges, and future directions.

Keywords: Cardiovascular diseases; Cardiac surgical services; Bhutan; Health policy

INTRODUCTION

Cardiovascular disease (CVD) is a growing health problem and a major contributor to the epidemic of chronic diseases¹. It encompasses coronary heart disease, stroke, peripheral arterial disease, rheumatic and congenital heart disease, and deep vein thrombosis¹. In 2017, CVD was the biggest contributor to the total burden of disease². CVDs also led to the highest age standardized death rate (ASDR), with coronary artery diseases and stroke being the primary contributors.

Epidemiological transition to NCD and the rise of CVD

The disease epidemiology has transitioned from communicable to non-communicable diseases (NCD) over the past two decades, with CVDs being one of the leading contributors. This transition has led to an estimated 17.8 million deaths worldwide due to CVD, with 80% of them occurring in low- and middle-income countries (LMIC)³. Furthermore, congenital heart diseases (CHD) and rheumatic heart disease (RHD) have a looming presence in LMICs, contributing significantly to heart failure and death⁴. A plausible reason for this high occurrence is the limited capacity and resources in LMICs which results in late detection and thus, growing adult congenital heart disease burden⁵⁻⁹. Despite CVD accounting for 30% of all-cause mortality in the Southeast Asia region in 2021, access to cardiac surgical services is limited, especially in LMICs^{10,11}.

Bhutan is no different in terms of the epidemiological

transition to NCDs. With CVD contributing to 18.4% of Bhutan’s total disease burden 24 years ago, ischemic heart disease has caused 64.6 deaths per 100,000 population in 2021¹². Figure 1 reflects the drastic increase in the prevalence of non-communicable diseases, majority of which are risk factors for CVD¹³. In fact, hypertension, diabetes mellitus, ischemic heart disease, and rheumatic heart disease combined have surpassed all other selected non-communicable diseases combined in Bhutan¹⁴.

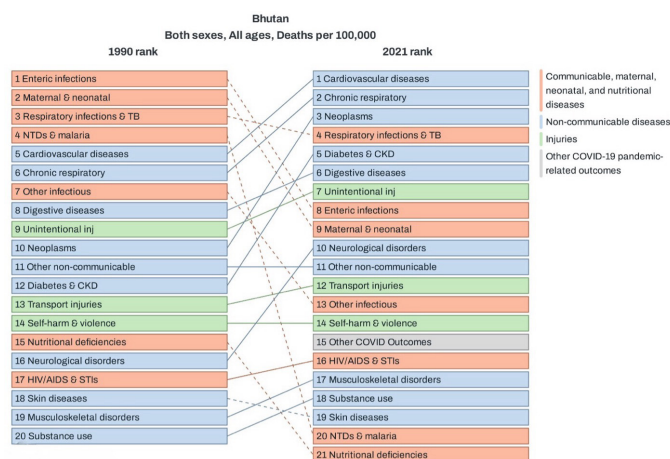


Fig 1. Comparison of Bhutan’s burden of disease between 1990 and 2021¹³.

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Cardiovascular disease burden and its risk factors in Bhutan

This growing burden of risk factors for CVD has had significant morbidity, mortality and economic impacts. Data from the World Heart Observatory reveal that the crude CVD mortality is 160 per 100,000 population with an age-standardized CVD mortality of 247 per 100,000 population, and age-standardized CVD incidence of 698 per 100,000 population³. Data from a study in the eastern regional referral hospital in Bhutan reported the incidence of CHD in their center as 68 per 1000 live births, which is much higher compared to the global incidence of 8-50 per 1000 live births¹⁴⁻¹⁶.

These numbers are expected to rise because the risk factors for CVD including hypertension and diabetes mellitus, have been on a steady rise as depicted in Figure 2¹⁷. The National Health Survey in 2023 revealed that the 1.8% of Bhutanese aged 40-69 years have a $\geq 30\%$ 10-year CVD risk¹⁷. Furthermore, the overall prevalence of smoking is 10% and more than 40% of the population is obese, both modifiable risk factors for CVD^{18,19}.

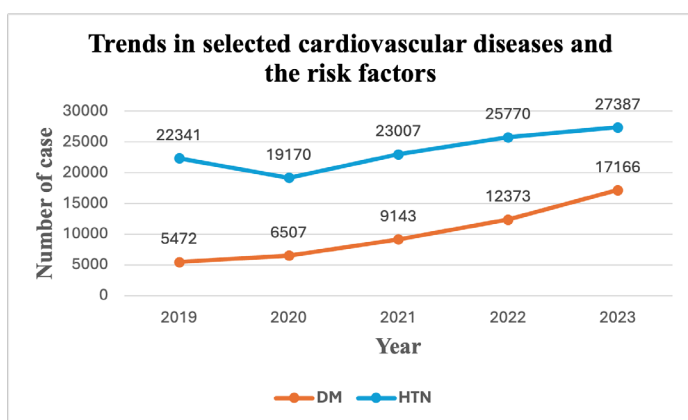


Fig 2. Trend of hypertension and diabetes mellitus, common risk factors of CVD. HTN: hypertension, DM: Diabetes Mellitus¹⁷

Current state of cardiovascular services in Bhutan

With the catheterization laboratory, the intervention cardiologist treats coronary artery disease with stents and patent ductus arteriosus and atrial septal defects with device closure devices. However, an open-heart surgery facility is essential to manage complex cases that cannot be treated with minimally invasive interventions. Without surgical facilities, costly referrals abroad will continue. The constitution of Bhutan mandates free access to basic public health services, but in practice, healthcare remains free at all levels, including advanced surgical interventions and referrals abroad²⁰.

Bhutan’s three-tiered health care system has primary healthcare at the cornerstone translating to remarkable progress in health indicators like maternal mortality rate, infant mortality rate and immunization coverage¹⁸. Despite the success achieved in primary healthcare, access to cardiac surgical services remains a critical gap. Bridging this gap is very important at this juncture when CVD ranks first in the top 10 cause of death in 2023¹².

Bhutan faces a critical shortage of healthcare professionals, with a doctor-to-population ratio of 4.6:10000, far below the WHO’s recommendation of 1:1000 population^{21,22}. Furthermore, the cardiologist and cardiac surgeon ratios stand at 1:385138 and 1:770276, respectively, making cardiovascular care delivery challenging²³. Nurse shortages further exacerbate the issue, with a nurse to population ratio of 20.9:10000, likely worsened by the recent attrition²⁴. Urgent policy intervention is needed to retain healthcare workers and strengthen specialized services.

Bhutan’s free health care system places over 70% of the annual current health expenditure on the government, with approximately 40% spent on non-communicable diseases, including CVD²⁵. This indicates the growing burden of the CVD in Bhutan as well as the government’s commitment to address it²⁶. Bhutan’s total health expenditure as a share of GDP has remained around 4% over the recent years²⁵⁻²⁷. However, funding specialized cardiac surgeries remains a challenge, especially when many CVD patients require referral to India. Between 2021 and 2023 alone, 1.24 billion ngultrums were spent for out-country patient referrals, of which nearly a quarter was spent on 506 referred CVD patients²⁸. In addition to the treatment cost, the government also bears the cost for travel and daily living for both the patient and the caregiver.

Even for the free services provided by the catheterization laboratory, hidden costs and out-of-pocket payments remain, especially for patients residing in remote areas who have to bear high transport and accommodation costs^{22,25}. While Bhutan has one of the lowest out of pocket expenditures (OOP) as a percentage of its total health expenditure in South Asia, financial barriers do persist²². This highlights the importance of ensuring accessibility when introducing specialized healthcare services to prevent disproportionate financial burdens to those in need.

The establishment of Bhutan’s first cardiac catheterization laboratory operated by the only interventional cardiologist, was a significant milestone in combating CVD. It immediately reduced monthly referrals to India from 20 to 4, saving nearly 50 million ngultrums in revenue^{29,30}. This success underscores the need for more specialized services within Bhutan.

While the cardiac catheterization laboratory is a significant achievement, disparities remain. North America has one such center per 120,000 population, while Europe and Australia have one per million population, highlighting the disparity in the distribution of cardiac surgical services⁴. This imbalance is alarming, considering CVDs are the main cause of disability and death in LMICs^{11,31,32}.

Globally, there is one cardiovascular and thoracic (CVT) surgeon per 0.61 million people, but in Asia, it is 1 per 25 million¹¹. Bhutan, with one cardiac surgeon for 0.7 million, fares better, provided cardiac surgical services are fully operational.

Challenges and way forward

Bhutan is making gradual progress in cardiac surgical care, with one interventional cardiologist and a cardiothoracic surgeon

providing specialized cardiac interventions, and a technician training in perfusion technology abroad. The procurement of cardiac surgical equipment is in progress and the recently established surgical intensive care unit at the national referral hospital will enhance its capacity to manage cardiac cases. These developments are important strides towards establishing comprehensive cardiac surgical services in the country.

Despite the high initial cost, cardiac surgery services will have significant long-term benefits, given Bhutan’s 70% rise in the all-age mortality rate from CVD, the highest amongst neighboring countries³³. Establishing a comprehensive cardiac surgical center is challenging but is feasible with support from the government, partners and non-governmental organizations^{34,35}. With the gradual withdrawal of external donors owing to Bhutan’s graduation from the LDC category, innovative health financing strategies are needed to fund training and equipment for cardiac surgery services. Partnering with overseas experts for training, skill transfer and technical support, as seen in other developing countries, can accelerate progress³⁶. With key infrastructure and human resources such as operation theatre, intervention cardiologist, and intensivist already in place, leveraging on these will minimize cost and time.

Skilled human resources are essential for successful cardiac surgery services. Urgent recruitment of key personnel including cardiac anesthesiologist, specialized scrub nurses, critical care and rehabilitation teams is needed (Table 1). With Bhutan’s own medical college increasing the pool of medical doctors, this is apt time to develop a sustainable human resource plan for sustainable cardiac services³⁷. Without a concrete plan, Bhutan risks missing the third sustainable development goal of reducing premature NCD deaths by one-third by 2030⁴.

Table 1. Existing requirement to meet the minimal standards of human resources and equipment to initiate open heart surgery in Bhutan

Requirement	Number
Additional cardiac surgeon	1
Perfusionists	2
Intensive care unit (ICU) beds	2
Pediatric cardiologist with experience in diagnostic catheterization procedures	1
Cardiac anesthesiologist	1
Specialized scrub nurses	5
Cardiac ICU nurses	6
Heart-lung machine	1
Extracorporeal membrane oxygenator machine	1
Intra-aortic balloon pump	1
Post-operative cardiac care nurse	2
Specialized physiotherapist	1

CONCLUSION

Bhutan’s reliance on neighboring countries for much of the specialized healthcare services including cardiac care is unsustainable in the long run as healthcare cost continues to rise. With the burden of disease shifting from communicable to non-communicable, CVDs have become the leading cause of all-age mortality, underscoring the urgent need for a localized solution. To tackle this growing challenge, stakeholders must take decisive action.

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AUTHORS CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under:

TC: Concept, design, data collection, manuscript writing, editing and review.

MG: Concept, design, data collection, manuscript writing, editing and review.

PG: Concept, design, data collection, manuscript writing, editing and review.

Authors agree to be accountable for all respects of the work in ensuring that questions related to the accuracy and integrity of any part of the work are appropriately investigated and resolved.

CONFLICT OF INTEREST

None

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