

# Cardiovascular medicine and research in sub-Saharan Africa: challenges and opportunities

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Africa is witnessing an epidemic of cardiovascular disease (CVD), with staggering morbidity and mortality. The spectrum of CVD includes hypertension, rheumatic heart disease, cardiomyopathy, atherosclerotic disease, congenital heart disease and tuberculous pericarditis. Opportunities exist to alter the trajectory of CVD epidemiology but require committed policy makers, functional health systems and an engaged citizenry.

From 31 October to 3 November 2019, five major cardiovascular societies (BOX 1) will join forces in a combined conference in Sandton, South Africa, to discuss the current state of cardiovascular disease (CVD) in sub-Saharan Africa (SSA), to strengthen collaborations and to explore solutions to overcome the epidemic of CVD. The theme of the meeting will be 'Cardiovascular care: meeting the needs of Africa.'

## CVD epidemiology and challenges in SSA

SSA has a population of >1 billion individuals and is experiencing an epidemic of CVDs, attributable to economic, nutritional, demographic and epidemiological transitions<sup>1</sup>. In addition, rapid urbanization, socio-economic development and the embrace of free-market policies contribute to the expanding epidemic of CVD in SSA. Infections, traditional risk factors (including hypertension, obesity, diabetes mellitus, dyslipidaemia, alcohol and smoking), genetics and congenital heart disease all contribute to the rising burden of CVD in the region. In 2013, an estimated 1 million deaths were attributable to CVD in SSA, constituting 5.5% of all CVD-related deaths globally and 11.3% of all deaths in Africa<sup>2</sup>. Between 1990 and 2013, SSA was the only geographical region of the world in which the number of CVD-related deaths increased<sup>2</sup>.

With increased globalization, countries are becoming progressively more interconnected through the movement of people, goods, capital and ideas. In SSA, a high prevalence of CVD risk factors and CVD burden overlap with a high prevalence of infectious diseases<sup>1</sup>. Combined with changes in lifestyle, an ageing population and a health-care environment that is marked by limited capital, inadequate human resources, a short supply of well-equipped screening facilities, delayed

diagnosis, and suboptimal care at primary, secondary, tertiary and quaternary levels, as well as a paucity of national-level data on disease trends, health care in SSA clearly faces substantial challenges. The 2013 Global Burden of Disease Study<sup>3</sup> reported that CVD was the leading cause of death worldwide and the second most common cause of death after HIV/AIDS in SSA; however, CVDs are predicted to surpass HIV and other infections as the leading cause of death in SSA over the next decade<sup>4,5</sup>.

## Spectrum of CVD in SSA

CVD presentations range from infectious origins (for example, rheumatic heart disease, tuberculous pericarditis, and HIV-induced and other virus-induced cardiomyopathies) to noncommunicable causes (such as hypertension, myocardial infarction, stroke and peripheral artery disease). CVD is on the rise in all urban and semiurban areas and is likely to continue to increase owing to the critical burden of diabetes and widespread use of antiretroviral therapy, which reduces mortality but adversely affects the cardiovascular system<sup>1</sup>.

## Hypertension

In SSA, the incidence of hypertension increased by 67% between 1990 and 2010, and hypertension was the leading cause of death in 2010, accounting for 500,000 deaths and 10 million years of life lost<sup>6</sup>. The prevalence of hypertension is 40–50% of the adult population in SSA, and only 9% have controlled blood pressure, suggesting a considerable unmet need<sup>6</sup>. Hypertension-related cardiovascular–renal complications (such as stroke, left ventricular hypertrophy, heart failure and chronic kidney disease) occur more frequently in black

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**Box 1 | Cardiovascular societies at the joint congress****Pan-African Society of Cardiology (PASCAR)**

Founded in 1981, PASCAR is an organization of physicians from across Africa involved in the prevention and treatment of cardiovascular disease (CVD). The PASCAR Governing Council focuses on identifying key issues, brainstorming novel solutions and designing appropriate programmes to combat CVD on the continent — all topics that will be covered during the upcoming conference.

**South African Heart Association (SA Heart)**

Constituted in 1999, SA Heart represents leadership in South Africa in cardiovascular health-care delivery, research and education, with a mission to champion equitable and sustainable health care, lead and innovate in the cardiovascular sciences, and educate health-care professionals and the public, as well as influence cardiovascular health-care policy. In addition to cardiologists and cardiothoracic surgeons, members also include medical technologists, nursing personnel, other physicians and surgeons, and scientists involved in cardiovascular research.

**African Heart Network (AHN)**

Founded in 2001, the AHN is a coalition of heart foundations, cardiac societies, civil society groups and individuals working on CVD in Africa, with a focus on education, health promotion and advocacy. Through its membership of the World Heart Federation, the AHN forms part of a global CVD community and provides an important voice for civil society on CVD issues in Africa.

**AfricaPCR**

Founded in 2014 as a collaborative initiative of the PCR conferences, South African Society of Cardiovascular Intervention, SA Heart and PASCAR, AfricaPCR was built by and for the African cardiovascular community, to address the needs specific to the Africa region, in relation to interventional cardiology.

**Cardiovascular Magnetic Resonance Congress of South Africa (SACMR)**

Founded in 2016, SACMR aims to promote cardiovascular magnetic resonance practice, education, research and advocacy on the African continent and is the only platform that brings together cardiologists, radiologists, radiographers, physicists, biomedical engineers and trainees with an interest in cardiovascular magnetic resonance on the continent. SACMR has endorsement from SA Heart and the Radiological Society of South Africa.

individuals than in white individuals. Adverse consequences of hypertension in Africans are likely to be attributable to a multiplicity of factors: excessive prevalence, disproportionate prevalence of severe hypertension (>180/110 mmHg), inadequate control over the long term and a high frequency of comorbid conditions (diabetes, obesity, albuminuria, chronic kidney disease and pressure-related target-organ injury). Several sessions at the joint conference will be dedicated to the topic of hypertension.

**Rheumatic heart disease**

An estimated 33 million people globally are living with rheumatic heart disease (RHD). RHD accounts for 350,000 deaths per year, and the majority of these occur in low-income and middle-income countries, with >80% of those affected living in SSA<sup>7</sup>. Accordingly, an RHD summit is positioned within the joint conference and will focus on medical and surgical treatment, as well as the sociocultural, political, policy and humanitarian aspects of tackling this disease. Evidence-based interventions that should be used to improve outcomes are known and have been shown to be either lacking or underutilized in Africa. RHD outcomes in Africa are very poor<sup>8</sup>, and life-changing and life-saving surgery is largely not available on the continent. In the past few years, global efforts have led to a remarkable shift in high-level policy: the African Union ratified the Addis Ababa Communique on Eradication of RHD in Africa, and the World Health Organization adopted a RHD global resolution calling for progress within 3 years. The time has come for substantial action on RHD in Africa to address the needs of millions living with this preventable disease.

**Cardiomyopathies**

Cardiomyopathy accounts for 20–30% of heart failure in Africans<sup>5</sup>. Most commonly, patients who present with heart failure have a dilated phenotype, and potentially treatable causes of dilated cardiomyopathy are often underdiagnosed. Endemic cardiomyopathies include dilated cardiomyopathy, peripartum cardiomyopathy and endomyocardial fibrosis. Non-endemic cardiomyopathies occur at the same frequency as in other parts of the world and include hypertrophic cardiomyopathy,

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arrhythmogenic cardiomyopathy and left ventricular noncompaction cardiomyopathy<sup>5</sup>. Myocarditis is frequently underdiagnosed.

### Ischaemic heart disease

Ischaemic heart disease is fairly uncommon, accounting for <10% of hospitalization for CVD in SSA<sup>4,5</sup>. Although ischaemic heart disease is considered uncommon among black Africans, a notable rise in the risk factors for atherosclerotic vascular disease has occurred in both urban and rural communities over the past few decades.

### Congenital heart disease

Congenital heart disease is the most common birth defect globally and leads to the death of more children than all childhood cancers combined. Furthermore, ongoing technological advances in both imaging strategies and catheter-based cardiovascular interventions have enabled patients to live longer, leading to a new era of grown-up congenital heart disease. Africa lags behind western countries in the coordinated rollout of programmes to tackle childhood morbidity and mortality caused by congenital heart disease, with clear regional disparities. Some regions still rely on medical missions to offer basic cardiac care to children. Part of the joint conference, themed ‘What does the future hold?’, will establish a footprint for a renaissance in innovative cardiovascular care for African children. Exploring the role of basic echocardiography and advanced cardiovascular magnetic resonance in planning percutaneous and surgical therapeutic interventions, especially for unique patients who often present late with congenital heart disease, will be a major take-home message for delegates.

### Pericardial disease

Pericardial disease has a broad aetiology, but tuberculous pericarditis is the most common cause of pericardial effusion, cardiac tamponade and constrictive pericarditis in SSA<sup>9</sup>. Pericardial disease carries a high mortality despite antituberculous therapy, pericardiocentesis and pericardiectomy.

### Access to cardiac surgery

Most Africans with RHD, congenital heart disease, ischaemic heart disease or refractory heart failure from cardiomyopathy do not have ready access to cardiac surgical services. In many low-income and middle-income countries, including those in SSA, estimates of need range from 200 to >1,000 operations per million, but the provided levels of cardiac surgery are approximately 0.5 per million in many of these countries<sup>10</sup>. A substantial degree of underdelivery of often-lifesaving, open-heart surgery exists in many SSA countries. The Pan-African Society for Cardiothoracic Surgery (PASCATS) aims to improve the surgical care for CVD in Africa, is active in several countries and has presented courses in Ghana, Nigeria, Tanzania and Uganda.

### Opportunities for CVD care in SSA

A major shortage of high-quality data on the epidemiology of CVD, especially at the population level, exists in SSA. Several strategies might improve our understanding

of the biology and outcomes of CVD in the region, including those listed below.

- Improvement in the diagnosis and management of CVD at the primary care level, including via an integrated service with the management of infectious diseases, such as HIV infection and tuberculosis
- Development of human resources, including task sharing and task shifting
- Improving salaries to retain health-care professionals in the public sector
- Increased and easier access to essential medicines for CVD by promoting simplified regimens, generic drugs and combination tablets
- Development of appropriate, context-specific guidelines and algorithms for risk stratification and medical management
- Population-wide interventions promoting a healthy diet, physical activity, healthy environment and cessation of smoking and alcohol misuse
- Strengthening surveillance and quality-assurance systems

Furthermore, given that >80% of CVD is preventable by living a healthier lifestyle, it is important for Africans to learn how to make healthy choices. Foundations and other not-for-profit organizations act as the community and patient voice, ensuring that underserved individuals obtain the best knowledge about CVD and are provided with good standards of health care. Mobilizing key stakeholders and communities to ensure the provision of health services by capacitated national and subnational departments of health is central to improving the current situation. All African citizens should ensure that they participate in shaping the CVD agenda on the continent.

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### Competing interests

The authors declare no competing interests.