

# The Burden of Care of Heart Failure in Patients with Diabetes Mellitus: The Peculiarities of Sub-Saharan Africa

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## Review Article

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### ABSTRACT

Non-communicable diseases are rapidly becoming the commonest cause of mortality in sub-Saharan Africa. Africa has one of the largest prevalence of diabetes mellitus in the world. However, the medical, economic, social and emotional barriers against optimal care of patients with diabetes are very prominent in sub-Saharan Africa. Therefore, poor glycemic control and suboptimal control of other risk factors are not uncommon. These increase the risk of developing cardiovascular complications of diabetes, the endpoint of which is often heart failure.

The care for heart failure patients in sub-saharan Africa has been documented to be significantly low when compared with Asia or Southern America. The direct and indirect costs are unbearable and access to care is often compromised. So, when a patient with diabetes develops heart failure in sub-Saharan Africa, the burden is further magnified out of proportion to other developing regions in the world.

This review article aims to highlight the peculiarities of the burden of care for heart failure patients with diabetes so that concerted efforts can be directed at addressing the challenges. This will lead to improved care of patients with diabetes and prevent them from developing cardiovascular complications like heart failure or to optimally manage these complications if they arise.

## BACKGROUND

The burden of non-communicable disease in sub-Saharan Africa is rising exponentially due to epidemiologic and demographic transition. Concurrently, the burden of infectious diseases such as human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS), tuberculosis and malaria is not declining. The challenges of a patients and health care providers in managing individuals with diabetes mellitus and heart failure are enormous in sub-Saharan Africa.

Heart failure is defined as a clinical syndrome characterized by clinical symptoms of dyspnea, fatigue, and clinical signs of congestion due to structural or functional cardiac abnormalities leading to frequent hospitalizations, poor quality of life, and shortened life expectancy<sup>[1]</sup>. Heart failure is the endpoint of most cardiac disorders and it is a central theme in Cardiology practice in sub-Saharan Africa. Delivering optimal care to patients with heart failure is faced with various challenges.

Diabetes mellitus is a metabolic disorder characterized by disturbances of carbohydrate, protein, and fat metabolism resulting from absolute or relative insulin deficiency<sup>[2]</sup>. According to the International Diabetes Federation (IDF) Diabetes Atlas 9<sup>th</sup> Edition, an estimated 19.4 million adults aged 20-79 years were living with diabetes in the IDF Africa Region in 2019, representing a regional prevalence of 3.9%<sup>[3]</sup>. Africa is the Region with the highest proportion of undiagnosed diabetes, with 60% of adults currently living with diabetes unaware of their condition<sup>[3]</sup>. Comprehensive management of diabetes in low resource settings such as sub-Saharan Africa is challenging.

Patients with diabetes mellitus have two times the risk of developing heart failure<sup>[4]</sup>. The increased incidence of heart failure in diabetic patients persist even after adjusting for other cardiovascular risk factors such as age, hypertension, obesity and dyslipidemia. Studies have shown that cardiovascular outcomes, rates of hospitalization and prognosis in patients with heart

failure are worse if they have concurrent diabetes <sup>[4]</sup>. This is a big burden in low resource settings like sub-Saharan Africa. Some glucose lowering agents like dapagliflozin have been shown to improve the outcomes in heart failure but they are often unaffordable in poor resource settings and also not readily available. Some relatively cheap and readily available glucose lowering agents such as glitazones are contraindicated in heart failure. Use of diuretics in heart failure could also worsen dehydration in poorly controlled diabetes. These challenges become even more pronounced in sub-Saharan Africa where there is insufficiency of skilled health personnel and poor financing of the health sector.

## PECULIARITIES OF HEART FAILURE CARE IN SUB-SAHARAN AFRICA

The sub-Saharan Africa Survey of heart failure (THESUS-HF) revealed that acute heart failure in sub-Saharan Africa appears to affect younger patients in the prime of their lives thereby accounting for a significant portion of the disease adjusted life-years (DALYs) in this region <sup>[5]</sup>. THESUS-HF studied 1006 individuals in 9 sub-Saharan Africa nations. Heart failure is a growing problem worldwide with serious consequences in sub-Saharan Africa where there are limited human and material resources. The rising prevalence of heart failure in sub-Saharan Africa is partly due to increased frequency cardiovascular risk factors such as hypertension, obesity and diabetes and improving life expectancy <sup>[6]</sup>.

In Africa, the causes of heart failure reported from Ghana, Cameroon, Nigeria, and South Africa are mainly hypertension, cardiomyopathy and rheumatic heart disease compared to the developed world where the commonest cause is coronary heart disease <sup>[7]</sup>. Published literature on heart failure in sub-Saharan Africa is scanty but the reported rate of hospital admissions for heart failure in sub-Saharan Africa is comparable with rates reported from the developed world although the pathophysiology and aetiologies are different <sup>[8]</sup>. Some of the peculiarities with the management of heart failure in sub-Saharan Africa include unavailability of modern diagnostics, rising cost of care and paucity of technical knowhow. A reported survey in Kenya and Uganda showed that functional radiography and electrocardiography were available in less than half of hospitals in Kenya and Uganda combined <sup>[9]</sup>. Validated biomarkers such as natriuretic peptides are not readily available in sub-Saharan Africa. Essential medicines such as angiotensin converting enzyme (ACE) inhibitors, statins are not available in many health facilities.

Studies have shown that the patients with heart failure in sub-Saharan Africa are most likely to be illiterate, lack health insurance and present in advanced clinical state compared to Asia, Middle East and South America <sup>[10]</sup>. Outcomes are also usually worse in the resource poor sub-Saharan Africa.

## PECULIARITIES OF DIABETES MELLITUS CARE IN SUB-SAHARAN AFRICA

Diabetes mellitus is a chronic non-communicable disease with increasing prevalence and presenting growing health and economic burdens in sub-Saharan Africa (SSA) <sup>[11]</sup>. The growing demand for diabetes care due to rising prevalence of the disease, the enormous economic burden diabetes poses, and the multifaceted nature of the disease and its complications all have major implications for how diabetes care is delivered in sub-Saharan Africa <sup>[11]</sup>.

The economic burden of caring for patients with diabetes mellitus includes direct costs due to hospital fees, cost of investigations and cost of medications and indirect costs due to hours lost when unable to go to work due to illness. The total economic loss in sub-Saharan Africa was more than 11 billion dollars with 56.9% of it as direct costs and 43.1% as indirect costs <sup>[12]</sup>. A Nigerian study reported a high prevalence of diabetes mellitus among young people and this can explain the high rate of indirect costs in sub-Saharan Africa as the disease affects the most economically productive portion of the population <sup>[13]</sup>.

In sub-Saharan Africa, there is gross inadequacy of trained healthcare providers with an average of 15.5 physicians per 100,000 people in sub-Saharan Africa compared to 245 physicians per 100,000 people in the United States in 2011 <sup>[11]</sup>. In 2010, Tanzania has a physician density of 0.6 per 100,000 people, Liberia (1.2), Ethiopia (2.3), Ghana (8.0), Congo (9.2), and Nigeria (32.8) <sup>[11]</sup>.

Moreover, there is also a problem of access to essential medications and diagnostic tests for the delivery of high quality care for patients in sub-Saharan Africa.

Most countries in sub-Saharan Africa have a list of essential medicines for the treatment of heart failure, diabetes and other diseases but the average drug availability in public sector facilities is very low <sup>[11]</sup>. When medications are not available in the public sector health care facilities, patients would have to either forgo the treatments or go to the private sectors for higher-priced drugs, where availability of original drugs is still not guaranteed.

## CONCURRENCE OF HEART FAILURE AND DIABETES MELLITUS

The cardiovascular complications of diabetes could be microvascular or macrovascular. The microvascular complications include nephropathy, neuropathy and retinopathy. The macrovascular complications include coronary heart disease, stroke and peripheral vascular disease. Diabetic cardiomyopathy is a condition associated with clinical consequences such as increased risk of hypertensive heart failure <sup>[14]</sup>.

In patients with diabetes mellitus there is enhanced activation of the sympathetic nervous system which increases myocardial utilization of fatty acids and induces fetal gene re-programming eventually causing depressed myocardial function <sup>[15]</sup>. Moreover, there is activation of the renin-angiotensin system which results in myocardial remodeling. All these make early medical intervention necessary but this is often not the case in sub-Saharan Africa as patients tend to present late.

## THE COMBINED BURDEN OF HEART FAILURE AND DIABETES

The cost of care of the combined pathologies of heart failure and diabetes are often unbearable to the patients<sup>[14]</sup>. The patients usually cannot afford the cost of frequent hospitalization which often makes them seek unreliable alternative care leading to early mortality. The different medicines that have to be taken bear a considerable effect on the finances of such patients in sub-Saharan Africa because the cost of care is often paid out of pocket. Glycemic control is often suboptimal which makes the prognosis of the heart failure worse<sup>[15]</sup>.

Most times the patients also have to pay for the care of co-morbidities such as dyslipidaemia, obesity and hypertension. Government policies are often unhelpful as most of these tend to focus on the communicable diseases especially HIV/AIDS, malaria and tuberculosis.

Rapid urbanization and facilitation between rural and urban settings based on infrastructure enhancements may be facilitating the transfer and introduction of urban practices to rural settings with consequent changes in diets and lifestyles<sup>[16]</sup>. This results in the consumption of energy-dense traditional or processed foods that lead to poor health and obesity. Much evidence shows that lack of healthy dietary choices and limited nutritional guidance among the African population makes the management of diabetes much more difficult within this population.

### CONCLUSION

The prevalence of diabetes mellitus in sub-Saharan Africa is rising and this is associated with medical, economic, social, emotional challenges in getting optimal care. Diabetes can be complicated with cardiovascular disorders such as heart failure. There are also challenges in the diagnosis and treatment of heart failure in sub-Saharan Africa due to multiple reasons. Therefore, the burden of care for patients with both diabetes and heart failure is enormous. This review has highlighted this burden so that further efforts can be focused on alleviating the burden.

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