Women’s cardiovascular health in Africa

Ana Olga Mocumbi,1,2 Karen Sliwa3,4

ABSTRACT

The predominant pattern of cardiovascular diseases in sub-Saharan Africa is that of poverty-related conditions (rheumatic heart valve disease, untreated congenital heart disease, tuberculous pericarditis) and diseases of unclear aetiology with a higher prevalence in this part of the world (peripartum cardiomyopathy, endomyocardial fibrosis). However, the prevalence of the traditional risk factors for cardiovascular diseases such as hypertension and marked obesity is high in a number of sub-Saharan settings, although they vary considerably among countries, urban/rural locations and specific subpopulations. In urban settings, hypertensive heart disease with systolic and diastolic function contributes substantially to morbidity. Awareness of the general public and health workers about the burden of cardiovascular diseases in women must be increased, and risk factor control programmes must be included in the health research agenda on the African continent. Improvement in health services with coordination of maternal health services and non-communicable diseases is also needed. This review focuses on the current knowledge of cardiovascular healthcare of women in sub-Saharan Africa, particularly their propensity for various forms of heart disease, access to healthcare, treatment received within the respective healthcare system, response to therapy and mortality. It highlights the gaps in knowledge and the paucity of data in most of these aspects.

INTRODUCTION

There is a lack of data on the burden of cardiovascular disease in women from Africa. Cardiovascular diseases, particularly coronary heart disease and stroke, remain the leading cause of death in women in developed countries, and in the USA they constitute a bigger problem among black women who have a death rate that is 69% higher than that of white women.1 The predominant pattern of cardiovascular diseases in sub-Saharan Africa is that of poverty-related conditions (rheumatic heart valve disease, untreated congenital heart disease (CHD), complications of endemic infectious diseases) and diseases of unclear aetiology with a higher prevalence in this part of the globe (peripartum cardiomyopathy, endomyocardial fibrosis). However, the prevalence of the traditional risk factors for cardiovascular diseases is high in some sub-Saharan settings, although they vary considerably among countries and urban/rural locations and specific subpopulations.2 The prevalence of hypertension ranges from 6% to 48%, stroke from 0.07% to 0.3%, diabetes mellitus from 0% to 16%, obesity from 0.4% to 45% and current smoking from 0.4% to 71%. The prevalence of hypertension is consistently similar among men and women, but women are more frequently obese and less frequently are current smokers.2 The AIDS epidemic has brought a new player to this arena as both the virus and the antiretroviral therapy are known to cause serious cardiac complications. This is particularly important in a continent where women are more affected than men and the disease has a higher incidence during their reproductive years.3

We performed a review of the literature focusing on cardiovascular healthcare of women in sub-Saharan Africa, particularly their propensity for heart disease, access to healthcare, treatment received within the healthcare system, response to treatment and mortality from cardiovascular diseases in all stages of life.

PROPENSITY TO HEART DISEASE

As in other parts of the world, tobacco use and exposure, obesity, physical inactivity, high blood pressure, high blood cholesterol and diabetes are risk factors for disease in Africa. However, in this continent, other factors predispose women to ill health in general and increase their vulnerability to certain cardiovascular conditions—for example, poverty, malnutrition, uncontrolled fertility and complications of childbirth. Endemic infectious diseases such as HIV/AIDS, tuberculosis, schistosomiasis and syphilis also contribute to a high burden of cardiovascular disease in African women.

The African population has been considered particularly prone to some of these cardiovascular conditions due to both genetic and environmental factors. It is thought that specific practices used by the different communities influence the epidemiology of cardiovascular diseases in Africa—for instance, the high occurrence of peripartum cardiomyopathy in Nigeria has been linked to traditional practices such as ingestion of food rich in sodium and heating of the body after delivery.4 Similarly, salt consumption exceeding the current international recommendations of <5 g per day in certain African communities5 probably contributes to the high prevalence of arterial hypertension seen in Africa.

Despite the lack of data from Africa, domestic pollution is another risk factor to be taken into consideration. Women spend a lot of their time cooking indoors and are exposed to high concentrations of solid fuel smoke (biomass and coal), particularly in the rural and periurban areas. Women are therefore at risk of progressing to pulmonary hypertension, which appears to be more severe than that found in other forms of interstitial and tobacco-related chronic obstructive pulmonary disease.6 7 The Heart of Soweto study found that women had a twofold risk of having pulmonary arterial hypertension (PAH),8 but the role of wood smoke-associated lung disease was not assessed in this study.

Instituto Nacional de Saude, Maputo, Mozambique
2University Eduardo Mondlane, Maputo, Mozambique
3Hatter Institute for Cardiovascular Research in Africa & IIDMM, University of the Witwatersrand, Johannesburg, South Africa
4Soweto Cardiovascular Research Unit, Chris Hani Baragwanath Hospital, University of the Witwatersrand, Johannesburg, South Africa

Correspondence to
Professor Karen Sliwa, Hatter Institute for Cardiovascular Research in Africa, Department of Medicine, Groote Schuur Hospital, University of Cape Town, Observatory, Cape Town 7905, South Africa; karen.sliwa-hahnle@uct.ac.za

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The role of urbanisation and adoption of new lifestyles in influencing propensity to heart disease must not be ignored. A study from Uganda showed that women were more likely than men to be obese (2.9% vs 1.8%) or overweight (17.4% vs 5.3%). Residency in the city, alcohol consumption, smoking, non-engagement in sporting activities, commuting to school by taxi or private vehicle and being from a wealthy family background were the main significant factors associated with obesity. Moreover, according to the cultural norms in some parts of Africa, obesity reflects increased wealth and prosperity. However, when confronted with the role of obesity as a risk factor for hypertension, type 2 diabetes and stroke, women express willingness to reduce their body size regardless of the level of education, income, marital status or parity.

**Pregnancy-related risk**

In Africa there is persistent high fertility and women are under social pressure to conceive. In some communities women opting to practice contraception must do so at considerable risk of social ostracism or familial conflict, because women and children are the property of the corporate family-kin and the community militates against reproductive control. Another important factor is that, although children are highly valued for a variety of economic, social and cultural reasons, mortality risks remain extremely high; low fertility imposes the unacceptable risk that a woman will have no surviving children at the end of her reproductive life. In addition, access to contraceptive methods is a woman will have no surviving children at the end of her reproductive life. In addition, access to contraceptive methods is insufficient and teenage pregnancy remains a major problem. These young women are at higher risk in case of concomitant heart disease as they have so-called ‘hidden’ pregnancies and tend to delay enrolling for antenatal care. Pregnancy with heart disease is of high risk and is the leading non-obstetric cause of maternal death, both in developed and developing countries.

Despite the gradual dissemination of maternal health clinics, they provide very limited preconception counselling and are not equipped to deal with the potential problems of women who have heart disease or develop it during pregnancy. Therefore, despite the high prevalence of diseases such as rheumatic heart valve disease, peripartum cardiomyopathy and untreated CHDs, few pregnant women are identified as having heart disease and therefore do not benefit from adequate management. Moreover, there is a lack of awareness of the risks related to pregnancy, even among women with high-risk conditions such as pulmonary hypertension, cyanotic heart disease, hypertensive disease and severe rheumatic aortic or mitral stenosis. This has a serious impact on maternal and fetal outcome, as shown in a study from Cameroon reporting on 46 pregnant women with valvular heart disease.

**Congenital heart disease (CHD)**

The prevalence of CHD, at around 5–8 per 1000 live births in western countries, does not seem to vary according to geographical location. A survey conducted in Mozambique in schoolchildren has shown that CHD is at least as common as in Caucasians. However, while prenatal diagnosis is currently used to detect CHD before birth in developed countries, in developing countries only a minority of children with CHD are detected in infancy and, among these, few benefit from surgical treatment because of delayed diagnosis, lack of skilled personnel and absence of facilities for surgery. Hospital-based data from Africa indicate that CHD remains an important cause of heart failure in Africa.

Few countries in Africa have local teams performing permanent open heart surgery, and only a small number of centres perform neonatal surgery for correction of congenital heart defects. Advanced pulmonary vascular disease secondary to left-to-right shunt and cyanotic congenital heart defects with increased pulmonary flow therefore remain a major problem in Africa. In a series of 534 patients with CHD from Mozambique, of which 296 (55.4%) were women, fixed pulmonary hypertension was present in 45 (8.4%) at presentation. Although the natural history of patients with Eisenmenger syndrome is considerably better than that of idiopathic pulmonary hypertension, and over half of patients survive for >50 years in some cases, pregnancy may adversely affect the course of the disease and, for that reason, women with Eisenmenger syndrome are at higher risk of complications and mortality than men.

**Rheumatic heart disease (RHD)**

Whereas Africa has 10% of the world’s population, approximately half of the 2.4 million children with rheumatic heart disease (RHD) live on the continent. The prevalence of RHD in Africa, at least in the low socioeconomic groups, is among the highest in the world. Although primary and secondary prevention of RHD may be highly effective, this condition remains a major cause of morbidity and admission to hospital in African countries.

The spectrum and presentation of valvular disease in Africa is different from elsewhere in that severe forms are seen at earlier ages, posing serious problems for women when they enter their reproductive life. This was confirmed in the Heart of Soweto study where rheumatic heart disease (RHD) was found in younger women compared to men, >68% of cases with RHD were female and women were also more likely to present with valvular dysfunction associated with idiopathic cardiomyopathy or hypertensive heart disease. Of all the rheumatic valvular lesions, mitral stenosis is most likely to lead to a potentially serious outcome because of the interaction between its haemodynamics and the physiological cardiovascular adjustments to pregnancy. Data from Ethiopia show higher mortality in women, with female deaths accounting for 57.4% of the 115 cases studied.27 Diao et al.11 recently reported 17 maternal deaths in a series of 46 women (34%) from Cameroon with rheumatic heart valve disease, of which 32 had mitral stenosis. Maternal death was associated with mitral stenosis, severe tricuspid regurgitation and New York Heart Association functional class III/IV.

The management of rheumatic heart valve disease in women remains a major challenge. Even when surgery is available, the choice between repair or replacement can be difficult. In a small series from Cameroon, women with prior surgical valve replacement had a better prognosis. However, mitral repair and aortic valve replacement with pulmonary autograft (Ross procedure) are the preferred procedures to manage left heart valve disease in young girls because they allow continued growth of the aortic valve and avoid long-term anticoagulation. The results of this approach need to be evaluated as suboptimal results have been reported in patients who are young at time of surgery and inadequate secondary prophylaxis after surgery is not rare. In women of childbearing age, percutaneous balloon valvotomy could be the treatment of choice for pure mitral stenosis in Africa, but facilities for cardiac catheterisation are unavailable in most countries.

Patients with RHD need anticoagulation in the setting of atrial fibrillation or mechanical valve replacement. A considerable number of women come to medical attention after the first trimester of pregnancy without having stopped warfarin, but no systematic data have been collected to explore the rate of
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warfarin-related malformations or other adverse pregnancy outcomes in these patients. A study of maternal and perinatal outcome in women with prosthetic heart valves on different anticoagulant regimens in India showed that no regimen can be said to be entirely safe for use during pregnancy as there is a degree of risk associated with all of them.29 Overall, in Africa, monitoring of oral anticoagulation is difficult, low molecular weight heparin is still relatively expensive and unfractionated heparins are difficult to administer in rural settings and non-specialised hospitals.

Cardiac manifestations of HIV/AIDS

As in developing countries in general, there is a trend towards higher rates of HIV infection in women in Africa. The prevalence of HIV in women is six times higher than in men among sexually active 15–19-year-olds, and three times higher in men among 20–24-year-olds.3 The disparity in HIV prevalence is seen in both married and unmarried individuals and cannot be fully explained by behavioural factors. Adolescent girls are at higher risk because of accelerated sexual maturation processes and because incest, rape and other forms of sexual abuse are commonplace in African settings. This is exacerbated by the inability of young girls to negotiate condom use during intercourse and because the female reproductive anatomy makes female tissue more conducive to penetration by HIV.30

Cardiovascular manifestations of HIV/AIDS and highly active antiretroviral therapy are an increasing concern in sub-Saharan Africa. In a series of 518 HIV-positive de novo cases of heart disease, of whom around half were on highly active antiretroviral therapy, women represented 62% of the total cases and were significantly younger than men (38±15 vs 42±13 years; \( p=0.002 \)).31 The most common primary diagnosis attributable to HIV/AIDS was HIV-related cardiomyopathy (n=196, 38%), followed by pericarditis/pericardial effusion (n=65, 13%), valve disease (n=58, 11%), arterial hypertension (n=42, 8.1%) and right heart failure (RHF) (n=34, 6.6%). There was no sex difference in the frequency of these conditions except for valve disease where women had a higher frequency (13% vs 7.5%; \( p=0.045 \)). Of all the 581 cases, 42 (8.1%) had HIV-related PAH.

Peripartum/postpartum cardiomyopathy (PPCM)

PPCM is a serious, potentially life-threatening heart disease of uncertain aetiology in previously healthy women, with a higher prevalence in African women compared with other ethnic groups. The incidence varies with individual studies and has been estimated to range from one in 2300 to one in 4000 pregnancies in western countries. In Africa the incidence has been reported from one case per 100 deliveries in a small region of western Kenya to one case per 1000 deliveries in South Africa.42 Although there are no extended prospective studies of PPCM to date, the current epidemiological profile of the condition is unknown.

While previous clinical and experimental data suggest inflammation, autoimmune processes, apoptosis and impaired cardiac (systemic) microvasculature as typical features in the pathophysiology of PPCM,33-34 recent data have shown that unbalanced peri/postpartum oxidative stress is linked to proteolytic cleavage of the nursing hormone prolactin into a potent anti-angiogenic, pro-apoptotic and pro-inflammatory 16-kDa subform.35 These observations strongly suggest that prolactin cleavage may operate as a specific pathomechanism for the development of PPCM. Consistent with these findings, inhibition of prolactin secretion by bromocriptine, a dopamine D2 receptor agonist, prevented the onset of disease in an animal model of PPCM and first clinical experiences with bromocriptine are promising with respect to prevention or treatment of PPCM in patients.36 Thus, inhibition of prolactin release may represent a novel disease-specific therapeutic approach to prevent the onset of PPCM in patients at risk or to treat patients with acute PPCM. Studies in Germany and Africa to confirm this promising finding in larger cohorts are ongoing.

Peripartum cardiomyopathy is characterised by unexplained dilated cardiomyopathy, including peripartum cardiomyopathy, including women with peripartum cardiomyopathy.

Pulmonary hypertension and right heart failure (RHF)

In recent years it has increasingly been recognised that the prevalence of pulmonary arterial hypertension (PAH) in its various forms is far higher than first imagined.38 There has been increased focus on screening for PAH and other pathways to RHF in the past decade. As reported from the international BOLD study, urban areas in Africa such as Cape Town have a particularly high level of chronic obstructive Airways disease for a number of reasons, including direct and passive smoking, urban pollution and indoor pollution from domestic heaters (wood, solid fuel), as well as occupations such as mining. Africa also has a broad range of antecedent diseases (most notably, tuberculosis and HIV/AIDS) that remain poorly controlled. The lack of adequate paediatric services to deal with CHD leads to pulmonary hypertension, commonly seen in children and young adults.39 RHD commonly contributes to pulmonary hypertension and RHF.40 RHF and pulmonary hypertension are relatively common in an urban centre of South Africa, with women being almost twice as likely to present with PAH. In women the three most common forms of PAH were idiopathic, related to concurrent HIV infection and related to connective tissue disorder (figure 1).36 With the support of the Pulmonary Vascular Research Institute Sub-Saharan Taskforce (led by Professors Karen Sliwa and Ana Mocumbi), the Pan African Pulmonary Hypertension Cohort study (PAPUCO) has recently been launched to collect information on 500 African patients with pulmonary hypertension.

Hypertension and hypertensive heart disease

Contemporary studies demonstrate high levels of non-communicable antecedents of heart disease (except dyslipidaemia) in sub-Saharan Africa, particularly in urban communities,40 41 with women being particularly vulnerable. A contemporary study from Soweto investigating the effects of migration and socio-economic factors and its effect on heart disease found that >60% of the 5528 cases were women. In the historically prevalent heart disease groups (eg, RHD), women made up 60% of the cohort whereas, even in the ‘new’ forms of heart disease (eg, coronary artery disease and hypertensive heart failure), women represented >50% of the cases.42 Although more men smoked tobacco, their mean body mass index was markedly lower than that of women (25.7±6.0 kg/m² vs 29.8±7.6 kg/m²; \( p<0.0001 \)).

The predominance of women presenting with atrial fibrillation in studies from Cameroon and South Africa43 44 compared with reports from high income countries and, indeed, China45 where more men develop atrial fibrillation requires comment. In African studies atrial fibrillation in general presented at a relatively young age, explained by the presence of valve disease in 44% of cases.44 Recent attention has focused on the independent risk of developing atrial fibrillation with increase in weight, with a consistent 2–3-fold increase in the likelihood of atrial
fibrillation in obese individuals being reported. However, reflective of the pattern of obesity in Soweto, 73% of women and 40% of men in this cohort were obese, linking weight rather than gender per se to the pattern of atrial fibrillation.

These data suggest that, if a country such as South Africa continues to improve life expectancy through positive socio-economic changes and tackling the HIV epidemic, the number of adults (particularly women) affected by the non-communicable forms of heart disease will soon surpass the number of relatively younger adults affected by historically more preventable forms of disease. The greatest threat to women seems to be due to obesity, which is becoming the norm in many African urban settings. Clearly, culturally appropriate and affordable primary and secondary prevention strategies will need to be developed to facilitate earlier detection and optimal management of such cases in Africa.

ACCESS TO HEALTHCARE

In Africa, access to healthcare is inadequate for a number of reasons:

1. Lack of awareness that cardiovascular problems are common in African women is leading to a situation where patients are not aware that they have a disease. Presentation is therefore often late, with poor overall management and inadequate referral pattern to secondary and tertiary hospitals if available.

2. Long distance and often lack of funding to cover the travel fare are important aspects of late presentation to healthcare. Figure 2 serves as an example for this.

3. African women are under social pressure to conceive and in some countries are having insufficient access to contraceptive methods, leading to high parity.

4. Primary clinics or secondary hospitals are often not equipped to deal with the potential problems of women who have heart disease or develop it during pregnancy.

TREATMENT RECEIVED WITHIN THE HEALTH SYSTEM

Non-communicable diseases, including cardiovascular conditions, are projected to overtake infectious diseases by 2050 and sub-Saharan Africa lacks adequate resources to respond to this shift in pattern. Sub-Saharan African countries spent on average about US$45 per capita on healthcare in 2004. In accordance with this figure, open heart surgery, percutaneous mitral valvotomy, closed heart surgery and cardiac catheterisation are performed in only a minority of countries in the region.

Drugs for chronic diseases are often not available in rural areas. Women are in a worse position to obtain them as they tend to work in the informal sector of the economy and there are no government health insurance systems in most countries. A representative sample of the Mozambican population evaluated following the Stepwise Approach to Chronic Disease Risk Factor Surveillance concluded that treatment of hypertension among people who know they had the disease and control among those treated were higher in women than in men (61.1% vs 53.3% and 42.9% vs 22.8%, respectively). In this study, treatment prevalence was not significantly different across urban/rural settings but control was less frequent in urban women and more frequent in urban men.

Even simple preventive measures such as secondary prophylaxis for RHD are not easily available, as shown by a study from Malawi evaluating the logistics of eight essential and widely used drugs which, according to the treatment guidelines, should be available at all health centres. This study showed that the median value for non-availability of essential drugs was 240 days in the course of a year, with benzyl penicillin being in shortest supply as only 4% of the needed amount was received.

Contraception has been disseminated in an effort to control birth rates, but there is a lack of published data on contraception in women with heart disease in Africa, as is the case worldwide.

MORTALITY FROM CARDIOVASCULAR DISEASE AT ALL STAGES OF LIFE

Mortality may be high in women of all ages with cardiovascular disease in Africa. During reproductive years it may be increased in relation to high parity. However, there is a lack of data on mortality from cardiovascular disease in Africa.

In a study from South Africa the maternal mortality rate reached 9.5% while the maternal morbidity rate ranged from 50% to 100% for the various conditions. Hypertension, anticoagulation therapy, late referrals and inadequate counselling were important contributing factors. In Nigeria, hypertensive disorders at 24.8% (of 9056 women who delivered) constitute the second most frequent cause of postnatal mortality after primary postpartum haemorrhage. Hypertensive disorders of

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Figure 1  Diagnostic profile of women with right heart failure (RHF, red) and pulmonary arterial hypertension (PAH, blue) in the 'Heart of Soweto' population. Adapted from Stewart et al.
pregnancy (proteinuric hypertension, eclampsia, chronic hypertension, HELLP syndrome) and their complications are also the commonest direct cause of maternal deaths in South Africa, affecting mainly young women.12

CONCLUSIONS
Cardiovascular disorders are seldom identified as causes of morbidity and mortality in most registries in Africa, probably due to underdiagnosis related to lack of skilled health workers and non-existence of surveillance systems for chronic and non-communicable diseases in most countries. Awareness of the general public and health workers about the burden of cardiovascular diseases in women must be increased, and risk factor control programmes must be included in the health research agenda on the African continent. Communication strategies in African communities should empower women to adopt healthy lifestyles.

Improvement in health services with coordination of maternal health services and non-communicable diseases is needed. High priority should be given to meticulous contraceptive counselling in patients with cardiac disease and to the design of protocols for treatment and referral of patients with the most common diseases to be used in antenatal clinics. This would need a collaborative effort from cardiologists, obstetricians, physicians and cardiothoracic surgeons. For patients with high-risk pregnancy, contraceptive services and information on termination of pregnancy need to be made freely available and geographically accessible.

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