

Cardiovascular disease: the new epidemic in sub-Saharan Africa

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Sub-Saharan Africa (SSA) is now facing a double burden of disease where patients are suffering from non-communicable diseases such as coronary heart disease, along with the burden of the current human immunodeficiency virus (HIV) epidemic. Due to this double burden, cardiovascular disease (CVD) prevention and treatment has been overlooked, allowing the rates to continue to rise unchecked. A series of searches were conducted using PubMed as the primary database. From these searches, journal articles were compiled that related to diabetes, obesity and smoking rates in SSA. Also, the prevalence of CVD in the USA was reviewed. Although the USA has higher rates of CVD now, the rates were on the decline compared with SSA. Due to 'Westernization' of SSA, the rates of CVD risk factors, such as diabetes, are expected to increase by 50%. Because of this, 80% of CVD deaths worldwide took place in developing countries like those in SSA. Although HIV/acquired immunodeficiency syndrome (AIDS) is the current epidemic in SSA, CVD disease poses a threat as the new epidemic because of the increasing rates of these CVD risk factors. Without combating this disease now, SSA is facing an epidemiological shift from AIDS to CVD being the leading cause of death.

Key words: Africa; health; vascular

We cannot afford to say, 'we must tackle other diseases first – HIV/AIDS, malaria, tuberculosis – then we will deal with chronic diseases (Beran and Yudkin)'¹

Olusegun Obasanjo

Introduction

Many African countries now face a double disease burden, with increasing numbers of patients with non-communicable diseases, such as hypertension, stroke, coronary heart disease (CHD) and diabetes, added to the challenges of human immunodeficiency virus (HIV), malaria and tuberculosis.¹ Due to this double burden, many leaders are choosing to tackle the HIV/acquired immunodeficiency syndrome (AIDS) epidemic rather than the new onslaught of non-communicable diseases such as cardiovascular disease (CVD) that are ravaging people throughout the African

continent. As a result of this, the rates for CVD are now on the rise, making it, unbeknownst to many, the new epidemic.

An estimated 16.7 million, or 29.2% of total global deaths, result from the various forms of cardiovascular disease, many of which are preventable by action on the major primary risk factors: unhealthy diet, physical inactivity and smoking. Some 80% of all CVD deaths worldwide took place in developing, low- and middle-income countries, while these countries also accounted for 86% of the global CVD disease burden.² Although HIV/AIDS is the leading cause of death in this region (sub-Saharan Africa [SSA]), CVD is second overall and first among those over age 30.³ According to the CVD World Health Organization (WHO) fact sheet, by 2010, CVD will be the leading cause of death in developing countries.⁴ This prediction could mean an epidemiological change across SSA, with a shift from HIV/AIDS being the leading cause of death.

But what is causing this sudden rise in CVD in developing countries like those in SSA? The answer to this question lies in the risk factors for this disease. The rise in CVDs reflects a significant change in diet habits, physical activity levels and tobacco consumption worldwide as a result of industrialization, urbanization, economic development and food market globalization. People are consuming a more energy-dense, nutrient-poor diet and are less physically

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active. Imbalanced nutrition, reduced physical activity and increased tobacco consumption are the key lifestyle factors. High blood pressure, high blood cholesterol, overweight and obesity – and the chronic disease of type 2 diabetes – are among the major biological risk factors.² Many countries in SSA are showing signs of an increase in a variety of these risk factors such as obesity, diabetes and tobacco consumption. Because of this increase, the rates for CVD are expected to increase significantly in the next few years.

The global look at CVD

There are many forms of CVD, with CHD being the new leading cause of CVD deaths worldwide. According to the 2004 WHO Atlas on Heart Disease and Stroke (Table 1), the USA along with Russia, China and India have the highest rates of death from heart disease. The USA showed rates of over 500,000 deaths from CVD. However, even with these high rates of death, death rates from CHD have decreased in North America and many western European countries. This decline has been due to improved prevention, diagnosis and treatment, in particular reduced cigarette smoking among adults, and lower average levels of blood pressure and blood cholesterol.⁴ When comparing the USA with SSA, Table 1 shows that the rate of heart disease death is significantly lower, with African countries averaging between 1000 and 100,000 deaths. Nevertheless, it is expected that 82% of the future increase in CHD mortality will occur in developing countries. This can be explained by the fact that heart disease mortality rates are also affected by differences between countries in the major risk factors, especially blood pressure, blood cholesterol, smoking, physical activity and diet.⁴ This paper will discuss the effect of CVD in Africa and its emergence onto the center stage as a new epidemic.

Table 1 Deaths from coronary heart disease in 2002

Country	Number of deaths from coronary heart disease in 2002
USA	500,000 and above
Nigeria	10,000–99,999
South Africa	10,000–99,999
Democratic Republic of Congo	10,000–99,999
Cameroon	1000–9999
Angola	1000–9999
Botswana	<1000
Namibia	<1000

Adapted from Mackay *et al.*⁴

The rise of CVD in developing countries

SSA is the basis of this study due to the growing rates of CVD risk factors in many of the countries. In most urban and virtually all rural regions of SSA, the prevalence of traditional CVD risk factors among the black population is low. However, with urbanization, an increase in conventional cardiovascular risk factors and CHD rates is anticipated. In South Africa, the rapid migration of the black population to urban centers has led to increased poverty, obesity, hypertension and elevated cholesterol. This pattern of increasing risk factors with higher rates of urbanization is likely to affect most of SSA.⁵

There has been a dramatic shift in SSA from a predominantly rural continent to a more urban one, which may have attributed to the increase in CVD risk factors. According to a study done by the Food and Agriculture Organization of the United Nations, the rural to urban migration is increasing rapidly and accounts for at least half of the population growth of African cities, which is 5% overall. This rapid urbanization of the continent is an inevitable consequence of socioeconomic development. Economically, one might term this as a positive consequence, but medically speaking it has a negative effect because with it comes a greater dependence on the market system and unhealthy commercially processed foods. Just fewer than 30% of sub-Saharan Africans were estimated to live in towns and cities in 1990. Figure 1 shows how the growth of the rural population has increased dramatically

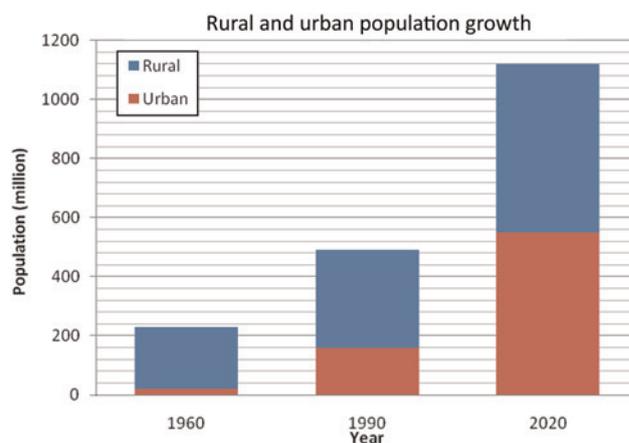


Figure 1 Rural and urban population migration in sub-Saharan Africa from 1960 to 2020. The 1990 and 2020 population urban and rural population growth are projections based on declining fertility rates. This graph was adapted from: Redhead (1997). FAO Corporate Document Repository. Available from Food and Agriculture Organization of the United Nations Website: <http://www.fao.org/DOCREP/W0078e/w0078e02.htm#TopOfPage> (last checked 8 June 2008)

and is projected to grow even more, with researchers estimating that 47.5% of developing countries will live in cities by the year 2010.⁶

Urbanization usually involves varying degrees of modernization and Westernization, which may influence dietary habits and consumption rates. This common and irreversible trend of urbanization can be seen across the African continent with a shift away from starchy roots and coarse grains to wheat and rice. Now populations are abandoning their traditional staples for more Western foods, which are high in fat.⁶ This shift from traditional foods to more energy-dense foods can be seen in many countries; for example, in a study conducted in the Gambia, the increase in urbanization was shown to have already created a difference between the urban and rural areas, specifically in obesity.⁷

This change to a more 'Western' diet is proving detrimental to SSA. The traditional foods found throughout SSA were composed of starchy roots and grains, which provide fiber and many antioxidants that are important in preventing CVD. However, now urbanization has brought a more 'Western diet' composed of energy-dense foods, high in carbohydrates and calories. This diet coupled with a lack of physical activity leads to a prevalence of CVD risk factors. When comparing the USA with SSA, the USA has higher rates of cardiovascular disease. According to Table 1, a table adapted from the WHO Atlas of Heart Disease and Stroke, CHD death rates have reached a high of 500,000 and above in the USA. While in Africa, the rates for CHD range between 1000 and 10,000, with the exception being Egypt, with between 100,000 and 499,999, due to the relatively higher rates of obesity and hypertension. The reason for these high rates in the USA in 2002 was mainly due to a high prevalence of the major risk factors of CVD: smoking, physical activity, diet, etc. Although the rates of CHD were high in 2002, that was not the highest the USA has seen. These rates have actually decreased as shown earlier in Table 1. However, in SSA, these rates, once previously low, are currently on the rise due to an increase in many CVD risk factors.

Diabetes in SSA: once a disease of the affluent west

CVD has been considered rare in SSA. However, both population- and hospital-based studies now provide evidence for an increasing burden of CVD in SSA, with diabetes mellitus as a major contributor.⁸ Diabetes was a disease thought to appear only in Western countries. However, this disease has now reached many developing countries. Table 2⁹ shows the incidence of diabetes for 2000

Table 2 Incidence of diabetes for 2000 and estimated level in 2010

Location	2000*	2010*	Increase (%)
North America	14.2	17.5	23
Africa	9.4	14.1	50.00
World	151	221	46

*Incidence is in millions
Adapted from Zimmet *et al.*⁹

and the estimated level in 2010. As seen in this table, diabetes is a growing problem in SSA with rates expected to increase by 50%. However, in the USA, the prevalence of diabetes is only expected to increase by about 23%.⁹ This increasingly high prevalence of diabetes can be seen throughout SSA. In a study that looked at cardiovascular complications of diabetes mellitus in SSA, researchers found that diabetes was present in more than one-third of patients presenting with coronary events. The common element in these patients is 'Westernization', which includes a diet higher in total calories and fat but lower in fiber and less need to expend energy because of labor-saving devices.⁸ Presently, diabetes levels are lower than in the USA and a possible hypothesis for this is because of the fact that in people of African descent, diabetes is associated with a metabolic pattern that despite the presence of raised glucose intolerance does show low triglyceride and high high-density lipoprotein (HDL) cholesterol levels. However, because of urbanization, the cases of diabetes are expected to rise secondary to the more Western diets, which are high in low-density lipoprotein (LDL) cholesterol and triglycerides.⁸

The diabetic foot is another complication associated with the growing cases of diabetes in Africa. It is characterized by infection, ulceration and/or destruction of deep tissue in the foot. Because many people do not realize that they have the disease, there are frequent foot complications in diabetes patients resulting in prolonged hospital stays and significant mortality. The epidemiology of peripheral vascular disease is changing across the continent with corresponding communities across Africa becoming more urbanized. For example, in a study done by Akanji *et al.*,¹⁰ there was evidence of peripheral vascular disease in 27 (54%) of 50 Nigerian diabetic patients with foot lesions. A study done in Dar a Salaam, Tanzania, showed that despite a low prevalence rate of peripheral vascular disease in this diabetic population with foot ulcers, amputation is a frequent outcome (33%). Because communities across Africa are becoming more urbanized, there are increases in prevalence rates of peripheral vascular disease in diabetic populations. This is mainly attributed to

the lack of exercise, especially by women, in these urban areas, as opposed to the amount of exercise done in rural areas. The promotion of traditional African diets and exercise routines remains a powerful weapon in fighting diabetes in the hopes of many researchers, but little can be done to stop the rapid urbanization of Africa.¹¹

Obesity in SSA

A major factor of the increasing prevalence of CVD in developing countries is the ongoing nutrition transition, with progressive shifts to a Westernized diet high in saturated fats and sugar, and a more sedentary lifestyle. Urbanization and globalization are fuelling the nutrition transition. These changes result in rapidly increasing levels of obesity. Studies done in Cameroon and in South Africa have shown that exposure to the urban environment is associated with increased risk of obesity, diabetes or hypertension.⁹

A study performed in Cotonou, Benin, assessed the prevalence of diabetes and cardio-metabolic risk factors and explored the association of urbanization status and socioeconomic status (SES) with the risk factors. For this study, an overall lifestyle score was constructed based on four modifiable risk factors: diet, smoking, alcohol consumption and physical activity, and SES score was based on education, occupation and household amenities.¹² It was found that women had a much higher rate of overall and abdominal obesity compared with men. One woman out of three was obese, while over half had abdominal obesity according to international criteria.

This study concluded that the risk of obesity increased significantly with SES in Benin, and a longer exposure to the urban environment was associated with a higher risk of hypertension. The observed high rate of obesity found among women was consistent with previous studies in urban Africa. More sedentary lifestyles were common in urban women compared with men, where women were only

involved in activities that were not physically demanding. Furthermore, cultural values and the positive social attitudes toward fatness among women in Africa were also conducive to feminine obesity in this study.⁹

In this study population, the country is still in the early stages of the nutrition because excess weight is currently seen primarily among the affluent before shift to the lower-income groups. This is due to the risk of obesity that rises significantly with rising SES. Those with higher SES have better access to food, making it easier to maintain a higher energy balance. As the affluent in these urban centers continue to become more obese, the more prevalent are other cardiovascular risk factors that are present in Benin.

Another study similar to this one focused on urbanization and obesity in the Gambia. The main focus of this study was to investigate the distribution of overweight and obese individuals and its relationship with socioeconomic and behavioral factors in a developing-country population undergoing rapid nutritional transition. Several socioeconomic and behavioral factors were investigated. Composite indices for SES, education, healthy lifestyle and Western influences were created. Body weight, height, waist and hip circumferences were measured and body mass index was calculated.⁷

Table 3 shows the anthropometric measurements that were made. From these data, the study confirmed that the highest proportion of obesity was in women and that there was a complete absence of overweight and obesity in young men. This finding appeared to be correlated with the regular physical activity of the women and men. In the Gambia, obesity, in urban areas, has moved beyond just being an emerging problem and has turned into a phenomenon among women. Furthermore, with the improvement of education that comes with Westernization and urbanization, the younger generations could potentially be counterbalanced by the negative impact of Westernization on food choice and availability.⁷ Because of the availability of these

Table 3 Anthropometric and biological characteristics of the subjects and prevalence of CVD risk factors

Prevalence of CVD risk factor	All (n = 200)	Men (n = 100)	Women (n = 100)
Overall obesity	18 (13.1–23.6)	8 (3.7–14.4)	28 (19.9–37.2)
Abdominal obesity	32.5 (23.6–39.2)	11 (5.9–18.1)	54 (44.3–63.5)
Hypertension	23 (17.5–29.1)	20 (13–28.5)	26 (18.1–35.1)
Hypertriglyceridemia	2 (1.0–4.6)	3 (0.7–7.7)	1 (0–4.6)
Low HDL cholesterol	13 (8.8–18.1)	10 (5.1–16.9)	16 (9.7–21.0)
Diabetes	0.5 (0.–2.3)	1 (0–4.6)	0

CVD, cardiovascular disease

All values are expressed as prevalence (95% CI)

Adapted from Sodinou *et al.*¹²

energy-dense foods, an increase in obesity and other CVD risk factors in younger generations can be expected.

Tobacco use in SSA: not just a risk factor for lung cancer

According to the WHO Atlas on Heart Disease and Stroke, tobacco use causes a fifth of CVD worldwide. Smoking promotes CVD through several mechanisms. It damages the endothelium lining of the blood vessels, increases cholesterol plaques in the arteries, increases clotting, raises LDL cholesterol levels and lowers HDL and promotes artery spasm. Nicotine accelerates the heart rate and raises blood pressure. By smoking, women especially, increase their risks of CVD.⁴

Cigarette consumption is disturbingly increasing in most African countries. From 1995 to 2000, there was an alarming 38.4% increase in cigarette consumption in the region,¹³ and the percentage of those who smoke is only going to increase because of the control tobacco companies have throughout the African continent. Transnational tobacco companies are exploring every part of Africa for market expansion prospects. For example, the British American Tobacco Company (BAT) controls over 90% of the market share in 11 countries across SSA.¹¹ This presents a problem in SSA because these tobacco companies make up a large proportion of revenue many of the countries in SSA receive from cultivating it. Table 4 shows countries in Africa that have devoted hectares to tobacco cultivation. Between 1970 and 2000, tobacco cultivation increased by over 20%. Due to this, there is not a very strong incentive to ban tobacco use in these countries because it creates new jobs that help boost the economy. That is why the African continent has

Table 4 Countries in which the number of hectares devoted to tobacco cultivation increased by more than 20% from 1970 to 2000

Country	1970	2000
Africa		
Zimbabwe	43,668	90,769
Malawi	41,354	118,752
Tanzania	17,500	44,000
Ghana	1630	4500
Rwanda	1100	2800
Niger	720	6200
Kenya	500	14,160
Mali	87	372
Chad	12	145

Adapted from Shafey *et al.*¹³

not made much progress toward effectively curbing the spread of tobacco use. Only a few countries have antitobacco laws, while the rest have no form of regulation on tobacco advertising in the media.¹¹ If the countries in SSA continue to cultivate more tobacco, consumption will inevitably increase. An increase in consumption is highly detrimental to CVD because tobacco usage coupled with the other CVD risk factors discussed, will increase the chances of CVD in SSA as a whole.

The 'new' epidemic

HIV/AIDS has been the reigning epidemic in Africa. The epidemiology of the disease is essentially different from the rest of the world. SSA contains about 10% of the world's population; yet, in 2001, SSA accounted for over two-thirds of the 40 million people living with HIV.¹⁴ However daunting the HIV/AIDS epidemic may sound, there is a new epidemic looming in the background that requires immediate action, cardiovascular disease.

Many of the health-care systems in SSA are burdened by the HIV/AIDS epidemic. Because of this, rates for CVD and its risk factors will only begin to rise, as the health-care system in SSA, unlike in the USA, will not be able to keep up with the growing rates. Families in third-world developing countries like in SSA have to buy their own medications, e.g. insulin, which further complicates the rates of CVD and its risk factors.¹ Without the money to get the necessary medications or treatments needed, many will continue to die from these diseases.

In the USA in 2003, 16% of the gross domestic product (GDP) was spent on health care. By 2016, it is projected that 20% of US GDP is going to be spent on health care. Sub-Saharan African countries fall within the spending range of 8.6% of GDP in South Africa and 3.5% of GDP in the Democratic Republic of the Congo.¹⁵ So, overall, the USA is spending a lot more on health care, making them better suited to combat the complications associated with CVD. Table 5 shows the total expenditure on health care *per capita* all around the world. According to this table, the USA spends more than \$5000 on health care, while the majority of SSA spends less than \$25. When looking at SSA versus USA, it becomes apparent that although the rates of CVD are higher in the USA than in SSA, the rates are still on the decline from previous years due to more spending on health care and better overall health care. The lack of health-care expenditure further fuels the lack of resource availability in SSA, and without resources like proper medications and facilities, CVD will continue to spread unabated.¹⁶

Table 5 Total expenditure on health *per capita*, 2004 (in US\$)

Country	Total expenditure on health in 2004 <i>per capita</i>
USA	More than 5000
South Africa	301–1000
Botswana	301–1000
Namibia	101–300
Gabon	101–300
Cameroon	51–100
Angola	26–50
Ivory Coast	26–50
Ghana	26–50
Nigeria	≤25
Democratic Republic of Congo	≤25
Tanzania	≤25
Kenya	≤25

Adapted from WHO¹⁶

Conclusion

What lies ahead for sub-Saharan African nations? Health care in SSA faces many challenges, including a high burden of communicable disease and a scarcity of financial and human resources. Diabetes and other chronic conditions present an additional challenge.¹ With this increased burden there is an increased need for more health-care professionals in SSA. But health-care workers are not going to be easy to come by without governmental assistance. More of the GDP in SSA needs to be used toward health care in these countries. The key to combating these diseases is through government-sponsored interventions, many of which are already in place to combat HIV/AIDS. By adjusting those interventions already in place to CVD, knowledge and education gained from them would begin the move towards lowering CVD rates. Furthermore, a problem found in many of these studies was the lack of proper documentation of cases of CVD in SSA. Without proper documentation, the number of subjects with cardiovascular diseases could be significantly higher than what we believe they are today. Also, due to the lack of proper documentation, many cases of CVD are presented late, which makes it hard to treat and may lead to death.

The common denominator that was found across SSA was the shift to a more Western society. As the rural population moved to urban areas, these urban centers continue to grow, promoting more sedentary lifestyles. Sedentary lifestyles coupled with more starchy Western foods lead to a high occurrence of CVD risk factors among many populations in SSA. **The best solution to this problem would be for Africans to return to the traditional ways, forgoing the**

'Western diet' for the rural traditional diet of starchy roots and grains. More physical activity in these urban areas, especially by women, will also help to promote a healthier lifestyle. In rural areas, healthier diets and rigorous physical activity are a lot more prevalent, whereas they are almost non-existent in the urban centers; thereby explaining the increase in CVD risk factors in urban areas. So in response to the quote by Olusegun Obasanjo, a former president of Nigeria, if we wait to tackle these other diseases first, this new epidemic may spread all over SSA, making it hard to combat later. Taking action now will be the best thing that sub-Saharan African nations can do as this 'new' epidemic will only continue to burden health-care systems and governments until it is finally tackled.

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