

# Cardiovascular disease in sub-Saharan Africa: a disaster waiting to happen

M.A.B. van der Sande

MRC Laboratories, PO Box 274, Banjul, The Gambia, e-mail: mvdsande@mrc.gm

## ABSTRACT

The looming threat posed by the emergence of cardiovascular disease (CVD) in sub-Saharan Africa (sSA) is underestimated and often denied. The health services and societies struggle to cope with the direct effects of poverty, war, fragile social and economic structures and AIDS.

The threat of CVD seems less direct and few reliable data are available. This has resulted in neglecting serious warning signs on the emergence of CVD in sSA. This short review deals with the strong increase in a number of risk factors for CVD in certain areas, necessitating preventive measures to lighten the 'double burden of disease' in this part of the world.

## HEALTH TRANSITION

Traditionally, attention for health problems in sSA was focused on infectious diseases. Changes in demographic and epidemiological determinants of health (such as ageing of a population and availability of vaccination and antibiotics to control infectious diseases) and changes in lifestyle associated with urbanisation have resulted in a so-called health transition.<sup>1</sup> This has led to a shift in the patterns of disease with the emergence of non-communicable diseases (NCDs) as a major cause of morbidity and mortality, which is comparable with changes in disease patterns that had occurred earlier in industrialised countries and more recently in some Asian countries. However, whereas prevalence and incidence of infectious diseases declined sharply in industrialised countries, this burden has remained high in sSA. The health transition has, therefore, led to what has become known as a 'double burden of

disease' for the developing world: first the 'unfinished agenda' of infectious diseases (particularly among the young) and second the 'emerging agenda' of NCDs, in particular CVD and malignancies.<sup>2</sup>

The 1993 World Development Report 'Investing in Health' highlighted the need to address CVD in sSA.<sup>3</sup> The report acknowledged the continuous major health threat posed by infectious diseases, but expected the burden of CVD to increase rapidly in the near future. This shift in disease patterns is confirmed in a rare analysis of historical data on causes of death in a developing country. In the West-African capital Banjul the proportion of all deaths due to NCDs increased from 22 to 41% between 1942 and 1997, with CVD accountable for the majority of the NCD deaths (*figure 1*).<sup>4</sup>

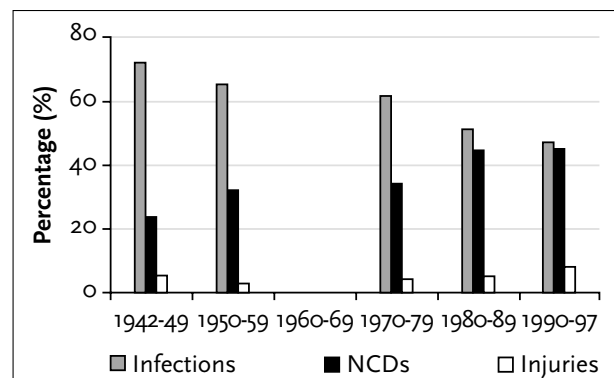


Figure 1

Causes of death in the West-African capital Banjul, 1942-1997<sup>4</sup>

No data were available on causes of death between 1960 and 1969.

NCDs = non-communicable diseases.

Age-specific rates of many CVDs are currently higher in adults in sSA than in populations in industrialised countries.<sup>5</sup> Based mainly on case report studies, it is thought that the main CVD burden is caused by stroke, and cardiac and renal failure.<sup>6,7</sup> Nevertheless, in the absence of reliable mortality and morbidity registers in most of the subcontinent, it is not easy to obtain an accurate picture of the prevalence and incidence of major CVDs among the population. On the other hand, there is strong evidence on the increase in CVD risk factors, which suggests that CVDs will become more and more common.

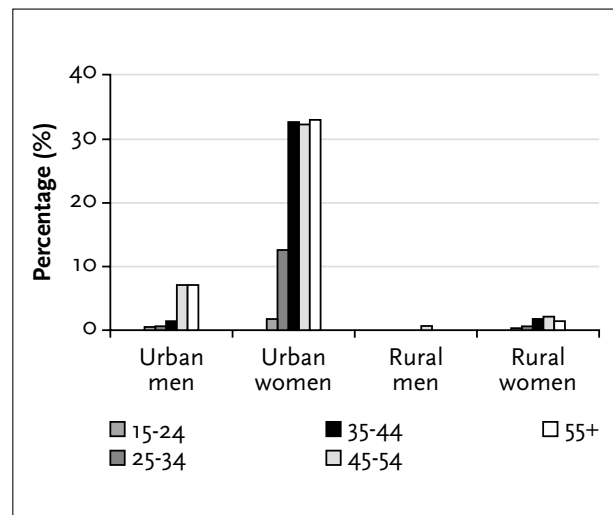
## HYPERTENSION

The best documentation exists on the increasing prevalence of hypertension, the most common CVD risk factor in the world. Studies up to the 1970s showed a low prevalence or virtual absence of hypertension, and no increase in blood pressure with age,<sup>8-10</sup> but this contrasts with studies over the past 20 years.<sup>11-14</sup> Although it is difficult to compare studies due to different methodologies and differences in prevailing definitions of hypertension, estimates from recent studies suggest that about 8% of the rural population and 15% of the urban populations may have a BP  $\geq 160/95$  mmHg, with the highest prevalence found in southern Africa.<sup>13,15,16</sup> Cooper *et al.* estimated that at least 5% of all adult sSA deaths are related to hypertension.<sup>17</sup> A longitudinal study in rural Nigeria, in the early 1990s, found an excess mortality of 7% due to hypertension.<sup>18</sup> The WHO estimates that hypertension-associated mortality in sSA may rise to 20% by the year 2020 (unpublished).

There are phenotypical differences between hypertension in people of black and of white ethnic origin, which might be associated with different genetic susceptibilities. However, there is accumulating evidence that the driving forces behind the steep increase in the prevalence of hypertension are the same risk factors as identified in studies in industrialised countries: increased salt intake, body weight and stress, and decreased physical activity. The strong association with age, which now appears to be nearly universal, might reflect an accumulation of these and other lifestyle-related risk factors with time, rather than a biological phenomenon.<sup>19</sup> This was well illustrated by a longitudinal study in Kenya, which documented an almost immediate rise in blood pressure upon migration from a rural to an urban area.<sup>20</sup> The International Collaborative Study on Hypertension in Blacks (ICSHB) studied blood pressure and associated CVD risk factors among seven populations of West-African origin, including rural Nigeria, urban and rural Cameroon, three Caribbean sites and a site in the USA. They observed a clear increase in blood pressure along the gradient of urbanisation.<sup>13,21</sup>

## O B E S I T Y

Unlike hypertension, which is prevalent in all parts of society, overnutrition and (central) obesity appear currently limited to specific segments of sSA society, particularly those in which lifestyles have become most urbanised and westernised. A study in The Gambia showed that while overall prevalence of obesity (body mass index (BMI)  $>30$ ) was low (2.3%), nearly a third (32.3%) of the urban women aged 35 and over were obese (*figure 2*).<sup>22</sup> This is similar to data obtained in Cameroon,<sup>16</sup> and in the earlier mentioned ICSHB sites, where BMI (as blood pressure) increased along the degree of urbanisation.<sup>23</sup> Abdominal or central obesity is considered particularly detrimental; increases in central obesity are correlated closely with urbanised lifestyle.<sup>24</sup>



**Figure 2**

*Prevalence of obesity (BMI  $>30$ ) by sex and age group in urban and rural Gambia, 1996-1997<sup>22</sup>*

BMI = body mass index = weight (kg) / (height (m)).<sup>2</sup>

It remains unclear why the association between urbanisation and obesity is more marked among women than men. This divergence strongly points to behavioural factors in aetiology, since men and women share most genetic and environmental factors. In contrast to the situation in many western countries, most people in sSA do not perceive obesity as a problem. Obesity, as well as the absence of a need for physical activity, is often considered a sign of prosperity (and protection for potential hard times to come), similar to perceptions in Europe in past centuries. While obesity is a new health problem, undernutrition remains a serious public health problem in sSA, often exacerbated by disasters such as famine and war. This illustrates the 'double burden of disease' faced in sSA.

## INSULIN RESISTANCE

Central obesity is the most common cause of insulin resistance, which can lead to impaired glucose tolerance (IGT) and eventually to diabetes mellitus (DM). Apart from its direct metabolic effects, DM is a major risk factor for CVD. Data on community prevalence of diabetes are sparse, related to the considerable logistic challenges involved. Type 2 diabetes is the predominant diabetes form in sSA. Reported prevalences in rural populations are generally below 1%,<sup>25,26</sup> but higher in elderly urban populations, in which they vary between 2.4% in Sierra Leone<sup>27</sup> to 8.4% in The Gambia.<sup>28</sup>

IGT on the other hand is common in both urban and rural areas, reported prevalence ranging from around 8% in rural Tanzania<sup>29</sup> to over 20% in The Gambia.<sup>28</sup> Although there is some debate on the relative importance of IGT as a precursor of DM in sSA,<sup>30</sup> this high prevalence nevertheless suggests that diabetes can be expected to increase considerably in the near future. In some transitional societies, diabetes prevalence has surpassed rates found in industrialised countries.<sup>25</sup> A recent review predicts that prevalence of DM in sSA could triple in the next 25 years.<sup>26</sup>

## SMOKING

Tobacco companies have been very successful at marketing in developing countries. In several studies prevalence of smoking among men was more than 50%; among women it is rarely more than 5%.<sup>31,32</sup> In many societies men start smoking at an earlier age than women, so this epidemic may still be in an early phase. The long-term harmful effects of smoking are often not known to the general population. There are no health warnings on most packages. There is a lack of alternative sources of affordable enjoyment or alternative image creation in poor communities. Absence of taxation results in relatively cheap products. Coupled with aggressive marketing, all this suggests that further increases in smoking in the near future are inevitable, unless well-coordinated counter efforts are made.

## DYSLIPIDAEMIA

Whereas renal failure, cerebrovascular accidents and heart failure are frequent diagnoses, ischaemic atherosclerotic coronary disease is rarely reported.<sup>7</sup> This might be related to generally favourable lipid profiles (low cholesterol and high ratios of high-density lipoprotein) and low homocysteine values among the general population.<sup>33</sup>

Nevertheless, the few data available show that in spite of relatively low mean population levels, hyperlipidaemia is not rare. Elevated serum cholesterol (>5.2 mmol/l) is reported in up to a quarter of the population aged 35 and over in studies in rural Tanzania and The Gambia.<sup>14,34</sup> In Tanzania, hypertriglycerides (triglyceride  $\geq 1.7$  mmol/l) were also found among 15% of the over 35 group.<sup>31</sup> This suggests that within the next generation significant increases in coronary heart disease may occur as well.<sup>35</sup>

## OUT OF AFRICA

Studies in the USA and Europe observed that among people of black African descent the prevalence of CVD risk factors, such as hypertension and obesity, is higher and that at a given blood pressure level the risk of target-organ damage, especially cerebrovascular accidents, is higher compared with the general population.<sup>36</sup> This suggests there may be a lower threshold for target-organ damage in African populations. It has been argued that certain genetic factors that could convey a selective survival advantage for common infectious diseases may put people at increased risk of CVD in a different environment; this hypothesis is known as the 'thrifty genotype'.<sup>37</sup> An alternative explanation is known as the 'thrifty phenotype'. This argues that early life events, in particular foetal undernutrition at critical periods of growth, lead to permanent adaptations in metabolic processes. In later life this increases the risk of hypertension, obesity, diabetes, CVD and premature death.<sup>38</sup> Neither of these theories is as yet proven, nor are they mutually exclusive. Both are consistent with the observation that the risk of CVD in the black African population increases with urbanisation, in and out of Africa.

## CONCLUSION

Regardless of the underlying mechanisms of the potential higher susceptibility of people from sSA to develop CVD, this susceptibility only manifests itself when lifestyle changes associated with urbanisation occur. Efforts should focus on modifying such unhealthy changes as industrialisation and urbanisation can be expected to increase in the near future. The first step for policymakers (often at increased risk themselves) will be to acknowledge the current and projected magnitude of the problem. The next step needs to be implementation of intensive, interdisciplinary, preventive and therapeutic interventions. As with many other health problems facing sSA, implementation of what already is known to work could have a huge impact. It is possible, for example, to modify lifestyle through national health policy: in Mauritius a

population-wide intervention programme promoting a healthy lifestyle resulted in a marked decrease of the prevalence of several cardiovascular risk factors (hypertension, smoking, inactivity and hyperlipidaemia).<sup>39</sup> To circumvent a 'prevention paradox'<sup>40</sup> a population prevention strategy should be complemented by a high-risk strategy.<sup>41</sup> In a pilot project in South Africa, care of CVD and CVD risk factors was successfully decentralised.<sup>42</sup> Optimising existing primary care services has been shown to have a marked impact on adherence to treatment and on adequate control of CVD.

A similar approach has resulted in a decline in CVD rates in much of the industrialised world; sSA should benefit from these experiences. Rather than waiting for a full epidemic to develop, resources must be mobilised now.

## ACKNOWLEDGEMENTS

I gratefully acknowledge the stimulating discussions and cooperation with Rosalind Coleman, Wil Dolmans, Keith McAdam, Paul Milligan, Ousman Nyan, Maarten Schim van der Loeff, Theo Thien and Gijs Walraven.

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