EMERGING NON-COMMUNICABLE DISEASE EPIDEMIC IN AFRICA: PREVENTIVE MEASURES FROM THE WHO REGIONAL OFFICE FOR AFRICA

The World Health Organization Regional Office for Africa (WHO AFRO) commissioned a study to compile and analyze published reports on non-communicable diseases (NCDs) in Africa to build evidence on the burden of NCDs in the region. Anecdotally, little information or literature was available on this subject. The objective of the study was to establish the status of NCDs in Africa by using published sources of information. A literature search was done through MEDLINE/PubMed and Google to identify studies that reported on prevalence rates of NCD risk factors. The study confirmed that information on NCDs in Africa was lacking. The prevalence of hypertension was found to be rapidly increasing, from 3% in rural areas to >30% in some urban settings. In some populations, hypertension prevalence rates were higher in women than in men while the opposite was true in others. Most people with hypertension were not aware of their condition, and of those who were on treatment, <20% had optimal control. The prevalence of diabetes mirrored that of hypertension, from <1% in some rural areas to >20% in some selected populations and racial groupings in urban settings. The predominant type was type 2 diabetes, which accounted for >80% of all cases in some reports and tended to present later in life. The prevalence of tobacco smoking also varied across the continent, from <1% in rural women to 50% in some urban men. Recent studies based on analysis of hospital-based information have documented NCD trends that were similar to prevalence data generated from national risk factor surveys. NCD risk factors such as hypertension and diabetes are increasing in Africa. (Ethn Dis. 2006;16:521–526)

INTRODUCTION

The rapid rise of non-communicable diseases (NCDs) represents one of the major health challenges to global development. The priority diseases included in the NCD cluster are cardiovascular diseases and their risk factors such as hypertension, coronary heart disease, and cerebrovascular accidents in addition to diabetes, cancers, injuries, chronic respiratory diseases, and mental health. These diseases share common risk factors: unhealthy diet, smoking, excessive alcohol use, and physical inactivity. These diseases are manifested initially as obesity, high blood pressure, and high blood lipids. The focus of this report is on cardiovascular diseases, particularly hypertension and diabetes mellitus. The global burden of NCDs is projected to approach epidemic levels, especially in developing countries. In 1999, NCDs were responsible for 60% of deaths in the world and 43% of the global burden of disease. By the year 2020, the global impact of NCDs has been projected to cause up to 73% of deaths and 60% of the disease burden. NCDs are already of major importance in developed countries and are rapidly becoming a major public health threat in the developing world. According to a WHO NCD Surveillance Strategy report, over a period of 30 years, the burden of disease from NCDs for developing and newly industrialized countries is expected to rise by >60% by 2020.

From the Department of Physiology (JM) and the Department of Public Health (PN), Orotta School of Medicine; WHO Country Representative (AK, AU); Asmara, Eritrea; NCD Division, WHO Regional Office for Africa, Brazzaville, Congo (RC, AF); Anchor Trust, London (YN); Department of Physiology, University of Zimbabwe College of Health Sciences, Harare (JC); Department of Physiology, Michigan State University, East Lansing, Michigan (VHS).

Address correspondence and reprint requests to Jacob Mufunda, MBChB, PhD; Rufaro Chatora, MPH; Yustina Ndambakuwa, MBA; Peter Nyarango, MMed; Andrew Kosia, MD; Jephat Chifamba, MPhil; Antoinie Filipe, MD; Abdulmumini Usman, PhD; V. Harvey Sparks, MD

According to a WHO NCD Surveillance Strategy report, over a period of 30 years, the burden of disease from NCDs for developing and newly industrialized countries is expected to rise by >60% by 2020, compared to a rise of <10% in developed countries.

Developing countries, especially those in Africa, are among the poorest in the world, with per capita gross domestic product (GDP) less than US $200 in some countries. Expenditure on health is low; most countries spend <2% on healthcare services. The available limited resources are committed to communicable diseases such as HIV/AIDS, tuberculosis, and malaria, whose prevalence data and impact on economic development are much more noticeable, leaving the increase in the disease burden from NCDs unchecked.

The conclusions and estimates of NCD burden in developing countries are based on limited literature and extrapolation from studies done in Western societies because the studies done on NCDs in Africa have used different study designs and different case definitions, which complicates
comparing the results with findings from other countries. Therefore, we need to take stock of published literature on the prevalence of NCDs in Africa, focusing on cardiovascular diseases and some of their risk factors.

**METHODS**

Literature on NCDs was accessed by using MEDLINE/PubMed and Google searches with the words noncommunicable diseases, prevalence rates, incidence rates, Africa, hypertension, diabetes, strokes, obesity, tobacco. Fifty-seven studies from 27 African countries were reviewed. However, not all reports were used in the generation of this review.

Selection criteria for the studies included:

- Use of random selection of sample
- Standard definition of NCD risk factors
- Inclusion of demographics of sample such as age and sex
- Clear definition of environment

Exclusion criteria included:

- Unclear study design
- No clear case definition of NCD risk factors
- Use of convention samples or selection process not described

Limitations of the method:

- Not all reports are published.
- Some reports do not appear in the search engines used.
- Some reports are disseminated locally.
- Some national surveys have been conducted but not externally disseminated.
- Most dissertations from universities are not published.

**RESULTS**

The hypertension prevalence with case definition of blood pressure $\geq 160/95$ mm Hg was higher in urban settings compared with rural settings in most countries, with a few exceptions (Table 1). Blood pressure levels were higher in men than in women in some studies, whereas the opposite was true in other populations.

Most studies used the case definition for hypertension of blood pressure $\geq 140/90$ mm Hg, we found a greater rural-urban difference; the urban population fared worse than their rural counterparts (Table 2). No difference

### Table 1. The prevalence of hypertension by environment and sex with case definition of blood pressure $\geq 160/95$ mm Hg

<table>
<thead>
<tr>
<th>Country</th>
<th>Author</th>
<th>Rural</th>
<th>Urban</th>
<th>Rural</th>
<th>Urban</th>
<th>National*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cameroon</td>
<td>Mbanya et al 1998</td>
<td>5.4</td>
<td>5.9</td>
<td>5.6</td>
<td>16.4</td>
<td>12.1</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>Pauletto et al 1994</td>
<td>.4</td>
<td>.4</td>
<td></td>
<td>3.2</td>
<td></td>
</tr>
<tr>
<td>Lesotho</td>
<td>Nair et al 1995</td>
<td>14.9</td>
<td></td>
<td></td>
<td>12.4</td>
<td></td>
</tr>
<tr>
<td>Nigeria</td>
<td>Kadiri et al 1999</td>
<td>10.4</td>
<td>7.1</td>
<td>9.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Senegal</td>
<td>Astagneau et al 1992</td>
<td></td>
<td></td>
<td>10.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Senegal</td>
<td>Lang et al 1988</td>
<td>7.4</td>
<td></td>
<td>10.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seychelles</td>
<td>Aubert et al 1998</td>
<td></td>
<td></td>
<td></td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Seychelles</td>
<td>Bovet et al 1991</td>
<td></td>
<td></td>
<td></td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Sierra Leone</td>
<td>Lisk et al 1999</td>
<td>14.7</td>
<td></td>
<td>23.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>South Africa</td>
<td>Steyn et al 1986</td>
<td></td>
<td></td>
<td></td>
<td>25.6</td>
<td></td>
</tr>
<tr>
<td>South Africa</td>
<td>Seedat et al 1982</td>
<td>8.8</td>
<td>7.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>South Africa</td>
<td>Seedat et al 1980</td>
<td></td>
<td></td>
<td></td>
<td>25.6</td>
<td></td>
</tr>
<tr>
<td>Tunisia</td>
<td>Ghanem et al 1997</td>
<td>14.2</td>
<td></td>
<td>9.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zaire</td>
<td>Mbuyamba-Kabangu 1987</td>
<td>13.6</td>
<td>6.8</td>
<td>10.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zaire</td>
<td>Mbuyamba-Kabangu 1986</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* National = males and females rural and urban combined.

RM = rural males; RF = rural females; All = males and females combined; UM = urban males; UF = urban females; M = males; F = females.

### Table 2. Prevalence of hypertension at country level with case definition of blood pressure $\geq 140/90$ mm Hg

<table>
<thead>
<tr>
<th>Country</th>
<th>Author</th>
<th>Urban Males</th>
<th>Urban Females</th>
<th>Rural Males</th>
<th>Rural Females</th>
<th>Males Combined</th>
<th>Females Combined</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mauritius</td>
<td>Chitson et al 1999</td>
<td>10.5</td>
<td>8.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Morocco</td>
<td>Tazi et al 2003</td>
<td>30.2</td>
<td>37</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tanzania</td>
<td>Edwards et al 2000</td>
<td>37.3</td>
<td>39.1</td>
<td>26.3</td>
<td>27.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>Mufunda et al 2000</td>
<td>24</td>
<td>35</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
was seen between the trends with the two definitions.

The prevalence of hypertension appeared to differ depending on socioeconomic status and geoecologic stratification (Table 3). The prevalence was lowest in the rural areas and increased with socioeconomic status. Some differences were also noted with different geographic areas (Table 3).

The prevalence of hypertension increased from rural to urban areas almost consistently across all reports reviewed, and rates were higher in the urban setting. The prevalence was higher in some population groupings (Table 4).

The prevalence of glucose intolerance was also higher in the urban areas. The coexistence of hypertension and diabetes varied from population to population (Table 5).

The prevalence of tobacco smoking differed between regions and sex. It was highest in urban male smokers and lowest in rural female smokers. Isolated population groupings were found in which the incidence of tobacco smoking was fairly high (Table 6).

A recent analysis of hospital management information system data demonstrated doubling of hypertension incidence rate in a space of just six years.49 Diabetes increased by ≈40% in that report (Figure 1). The other NCDs, such as cardiac failure, myocardial infarction (MI), and cerebrovascular accident (CVA), did not change as much.

The NCD risk factor survey confirmed this emerging epidemic of NCDs. The prevalence of hypertension was 16%, with no sex or environment difference.50

DISCUSSION

The objective of the study was to review literature on the prevalence of NCDs in Africa. The available data have demonstrated that NCDs are increasing in the region, but some shortcomings pertain to the quality of the reports.

Some of the studies were performed on convenience samples and others on special categories of hospital patients, which made generalizing findings to the whole population difficult. These limitations, especially in terms of standard-
The NCDs whose prevalence rates were noted to be increasing were hypertension and diabetes mellitus.
strong, and the relationship appeared to become weaker as BMI increased.\textsuperscript{51} We need to further analyze the relationship between hypertension and BMI in the light of these recent observations, especially looking at the neurohormonal involvement.

The prevalence of diabetes mellitus was confounded by using different case definitions ranging from fasting hyperglycemia and glucosuria to responses to intravenous glucose tolerance tests.\textsuperscript{56} The features of diabetes mellitus resembled those of hypertension in terms of rural-urban dichotomy and sex differences. A mixed picture was seen; rates tended to be higher, with a few exceptions, in women than in men and in urban than in rural areas.\textsuperscript{40} Prevalence was lowest in rural areas, where it was \(<2\%\) on average, while it was \(>20\%\) in some urban areas. The prevalence of type 2 diabetes was higher than type 1 and accounted for \(>80\%\) of cases. Diabetes presented later in life has been reported from studies of Cauca-
sians.\textsuperscript{57}

The prevalence of diabetes needs to be closely monitored because of the devastating consequences when it coex-
ists with hypertension. This association was very high, from as low as 30\% in some settings to 80\% in other set-
tings.\textsuperscript{56,57} The close relationship among diabetes, hypertension, and atheroscle-
rotic target organ damage was worth noting, and the role of smoking was pivotal. The prevalence of smoking was high among high school pupils and adolescents.\textsuperscript{56,57} We must, therefore, introduce interventions and measures targeting youths in order to slow increasing rates of NCDs.

The target organ damage was skewed toward CVA and away from MI. Some studies that used health management information systems (HMIS) have re-
ported steady incidence rates of MI.\textsuperscript{50} In the absence of NCD surveys, analyzing, interpreting, and publishing HMIS-based data was used as a surveillance tool for guiding policy on management and resource mobilization and allocation. In this regard, the WHO regional office for Africa division of NCDs commissioned the instrument for this analysis. The HMIS or data in the central registry compiled from all healthcare centers in the country was analyzed and reported. The prevalence data of most NCDs corroborated with those generated from a national NCD risk factor survey.\textsuperscript{50}

Most African countries have not conducted NCD risk factor surveys to establish the baseline prevalence rates and to accurately quantify the magnitude of the problem. In the meantime, HMIS data have been shown to be a proxy of national prevalence status, provided standard guidelines for case definitions are used to enable comparisons over time and across countries.

ACKNOWLEDGMENTS

We are grateful for the assistance given to this project by the Division of NCDs in the WHO regional office for Africa.

REFERENCES

2. Unwin N, Mugusi F, Asparaz T, et al. Tackling the emerging pandemic of non-
3. Cooper RS, Rotimi CN, Kaufman JS, Muna WF, Mensah GA. Hypertension treat-
13. Astagneau P, Lang T, Delaroque E, Jeanne E, Salem G. Arterial hyperten-
14. Lang T, Pariente P, Salem G, Tap D. Social, professional conditions, and arterial hypertens-
15. Aubert L, Bovet P, Gervasoni JP, Rwobogora A, Wadker B, Paccoud F. Knowledge, atti-
EMERGING NCD IN AFRICA - Mufunda et al

AUTHOR CONTRIBUTIONS

Design concept of study: Mufunda, Chatora, Chifamba, Belhocine, Filipe, Sparks

Acquisition of data: Mufunda, Nyarango, Kosia, Chifamba, Filipe, Usman and Sparks

Data analysis interpretation: Mufunda, Nyarango, Chatora, Kosia, Chifamba, Ndambakuwa, Filipe, Sparks

Manuscript draft: Mufunda, Nyarango, Chatora, Kosia, Chifamba, Ndambakuwa, Filipe, Sparks

Supervision: Mufunda, Chatora, Kosia, Chifamba, Ndambakuwa, Filipe, Sparks

Author contributions are listed in the manuscript.