PREVALENCE OF NONCOMMUNICABLE DISEASES IN ZIMBABWE: RESULTS FROM ANALYSIS OF DATA FROM THE NATIONAL CENTRAL REGISTRY AND URBAN SURVEY

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The disease burden from noncommunicable diseases (NCDs) in Africa is rapidly increasing based on projections from a limited number of reports. In the absence of national health surveys in Zimbabwe, all data nationally generated between 1990 and 1997 were analyzed. From 1990 to 1997, prevalence rates (expressed per 100,000 people) of hypertension increased from 1000 to 4000, rates of diabetes increased from 150 to 550, and rates of cerebrovascular accidents (CVA) increased from 5 to 15. The case fatality rate (CFR) for CVA decreased substantially during the period of study, implying improved case management of the disease, while the CFR for most other diseases did not change significantly throughout the study period. The observation of increased prevalence of some NCDs during the study period was corroborated by findings from a blood pressure survey subsequently conducted in an urban environment of Zimbabwe, which revealed a hypertension (blood pressure ≥140/90 mm Hg) prevalence of 35% in women and 24% in men. In spite of the limitations of the centrally generated hospital-based data, its analysis is still valuable. Countries are therefore encouraged to utilize this easily accessible resource for policy formulation and resource mobilization. (*Ethn Dis*. 2006;16:718–722)

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INTRODUCTION

Limited epidemiologic studies indicate that noncommunicable diseases (NCDs) are emerging as a major disease burden in Africa.[1] This NCD epidemic has emerged at a time when communicable diseases still require tremendous human and material resources, with no respite in sight.[2] The developing countries in Africa are faced with a double burden of disease from preexisting communicable diseases and the emerging NCD epidemic. Most governments have already put in place disease prevention and control programs for communicable diseases, but few standardized studies on NCDs in Africa have been conducted, and prevention and control programs for NCDs are a distant prospect.[3]

Estimations of the burden of NCDs in Africa are based on a combination of reports from a limited number of studies conducted in some countries in Africa and extrapolation from reports done in Western countries.[4] Few African countries have conducted and published studies from national surveys of NCD risk factors.[5] The NCDs of particular concern are the cardiovascular diseases, such as diabetes mellitus and hypertension, and events that result from target organ damage, such as stroke and myocardial infarction. Another disease is rheumatic heart disease (RHD), which has been resurging in some countries.[6]

The pathogenesis of most of these NCDs is not well established, which makes instituting effective national control programs difficult. The available

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prevalence data from published studies conducted among Africans of all races in the continent reveal a variety of NCD features: the metabolic or insulin resistance syndrome,[7] urbanization-related hypertension,[8] and sodium sensitivity.[9] Most hypertensive patients are obese, exhibit insulin resistance, and may have diabetes mellitus and lipid disorders.[7,10] This cluster of risk factors used to be referred to as insulin resistance/metabolic syndrome.[7] Initially it was thought to be a common pathway for essential hypertension, but the existence of hypertension in lean subjects has somewhat clouded this hypothesis and called for alternative mechanisms.[11]

Observations of higher blood pressure and prevalence of hypertension in urban compared with rural subjects have been consistent throughout Africa, with a few exceptions where the opposite was true.[12,13] A number of factors have been attributed to this urbanization-related hypertension, including increased psychosocial stress, dietary salt, and Western lifestyles and diet.[14]

Most countries are rapidly decentralizing their economies and government structures. This economically justified development has essentially transformed previously rural areas into regions in transition to urban areas and is associated

with concomitant increases in NCDs, especially hypertension.[15] No risk factor intervention programs have been implemented to curtail the NCD excess baggage that comes with urbanization. Therefore, baseline studies must be conducted to determine the initial magnitude of the burden of NCDs in African countries. Ideally, NCD risk factor surveys would be conducted according to the World Health Organization (WHO) NCD surveillance tool;[16] however, the cost and logistics may be beyond the scope of many countries. Fewer than 10 African countries have conducted and published the outcome of surveys conducted according to these guidelines. Most countries in Africa have central registration of health information that is generated nationwide from all healthcare service facilities. Electronic health management information systems have replaced manual recording in other African countries, but using these data to generate national health indicators has some limitations.

In spite of these drawbacks and in the absence of cross-sectional health survey-based information, researchers from some countries have analyzed and published hospital-based data to highlight the trend of diseases in these countries, raise awareness among practitioners, and guide resource mobilization and allocation.

The objective of this study was to determine the prevalence rates of common NCDs in Zimbabwe by using centrally compiled public hospital-based data generated from 1990 to 1997.

Zimbabwe is a country in southern Africa with an estimated population of 11.6 million, according to estimates from a national census in 2002.[17] The country has a viable and competitive health insurance service through many companies, the largest of which is under government control and draws most of its membership from government employees.[18] In addition to public hospitals, an active private healthcare service delivery system is not included in this analysis. As of 1997, an estimated 20% of health care is paid through health insurance, primarily through user fees payment and cost recovery.[19]

METHODS

Data Collection

The records originated from the peripheral hospitals both catering for inpatient and outpatient services. These data were submitted regularly to the provincial health offices for compilation before being sent to the headquarters. The data collection was considered to be >80% timely and >80% complete throughout the study period.

Hypertension was defined as a blood pressure >140/90 mm Hg on at least three different occasions; patients taking antihypertensive medication were also considered to be in the hypertensive group. Diabetes was defined as fasting glucosuria >11 mmol/L. The other diseases were defined according to the Zimbabwean national guidelines, which are annually reviewed to reflect the international trends and WHO guidelines.

The denominator for prevalence calculations was the national population based on the most recent census for the year. The data were presented as prevalence per 100,000 people. The case-fatality rate (CFR) was calculated as a percentage of deaths per number of cases recorded with the disease. The least squares method was used to determine the strength of change of outcome measures over time; the closer R^2 was to one, the greater the change.

A random, house-to-house blood pressure survey was conducted in Marondera, a city 50 km from Harare, the capital city of Zimbabwe, as previously described in detail elsewhere.[8]

RESULTS

All data in 1992 and 1993 appear to have been consistently poorly recorded,

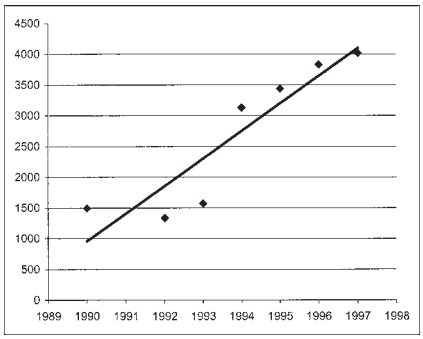

Fig 1. Prevalence of hypertension

and we cannot explain this apparent systematic observation. Although the prevalence of hypertension remained constant in the first three years of recording, the rate increased steeply thereafter. The hypertension prevalence increased four-fold during the study period with R^2=.84 (Figure 1).

The prevalence of diabetes decreased in the first years, especially in 1993, but then increased until 1997. The overall prevalence of diabetes increased three-fold (Figure 2).

The prevalence rate for cerebrovascular accident (CVA) increased markedly during the study period (R^2=.59), whereas that for RHD tended to decrease. The prevalence rate for myocardial infarction (MI) was stable throughout the study period, except for a surge in 1995 (Figure 3).

The CFR for hypertension, diabetes, and MI remained steady or declined during the study period until 1996. A

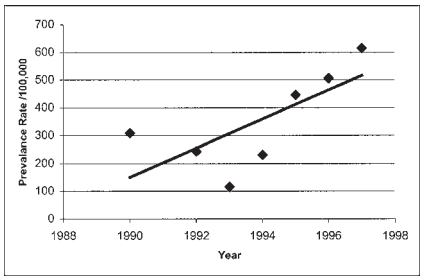

Fig 2. Prevalence of diabetes mellitus

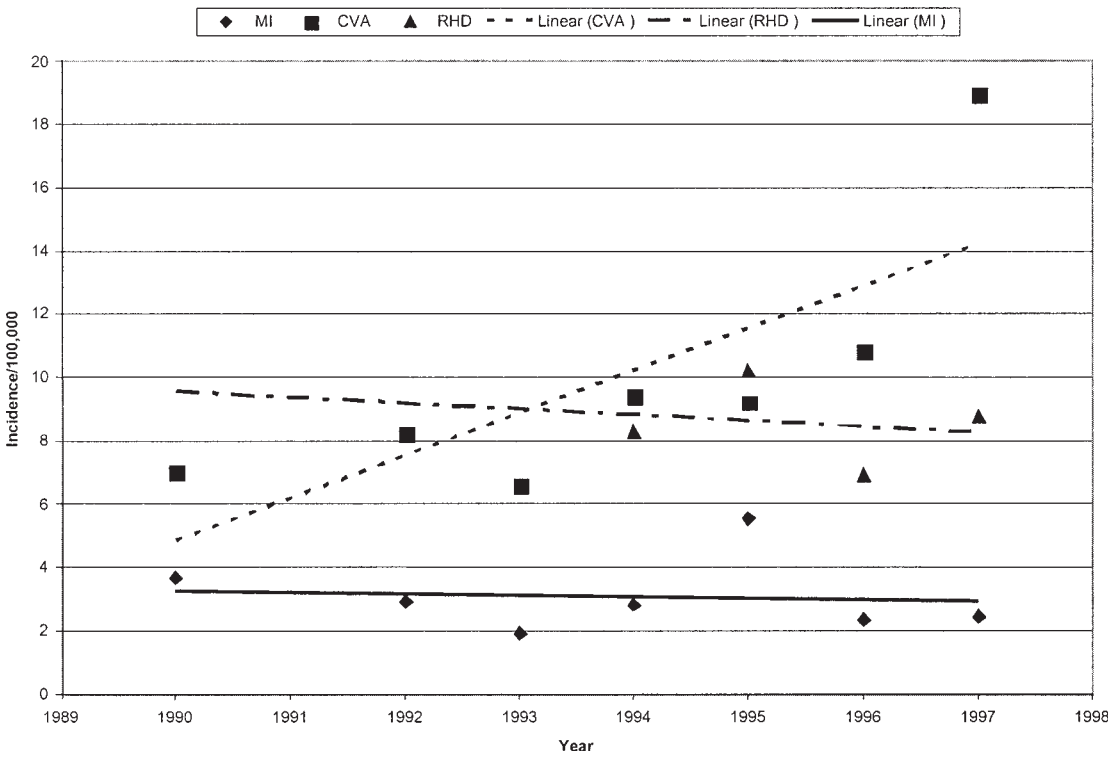

Fig 3. Prevalence of CVA, MI and RHD. MI=myocardial infarct; CVA=cardiovascular accident; RHD=rheumatic heart disease

sudden increase in CFR was seen in 1997 for all diseases except CVA, the rate of which was already high. The overall trend during the period showed a dramatic increase in CFR for RHD (R^2=.69), while that for CVA decreased (R^2=.57) (Table 1).

With data from the urban blood pressure survey, we confirmed the high disease burden from hypertension indicated by data from the central registry. The hypertension prevalence rates were significantly higher in women than in men throughout the entire range of age groups (Figure 4).

DISCUSSION

This was a retrospective study of hospital-based data centrally compiled by the Ministry of Health, Zimbabwe, from 1990 to 1997. The salient findings from the study were that the prevalence rates of hypertension and diabetes increased three-fold during the study period. A follow-up urban blood pressure survey confirmed the status of hypertension as an epidemic, with a prevalence of 35% in women and 24% in men. Analyzing and interpreting hospital-based data was found to be a cost-effective proxy of national prevalence rates for NCDs. However the information does not guide preventive

The salient findings from the study were that the prevalence rates of hypertension and diabetes increased three-fold during the study period (1990–1997).

Table 1. Case-fatality rate for noncommunicable diseases in Zimbabwe, 1990–1997

Disease	Case Fatality Rate (CFR) (%)							R^2
	1990	1992	1993	1994	1995	1996	1997	
Hypertension	2.8	4.2	3.4	3.1	2.7	3.8	8.0	.2252
Diabetes mellitus	4.7	10.4	10.4	1.4	2.1	2.2	12.4	.2547
Myocardial infarct	9.5	18.6	10.2	11.1	4.2	6.9	10.5	.1598
Cerebrovascular accident	29.4	23.9	26.5	17.3	17.7	22.4	18.9	.5682
Rheumatic heart disease	-	-	-	5.1	5.7	5.8	11.4	.6883

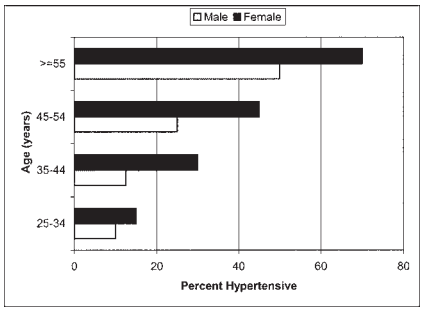

Fig 4. Hypertension prevalence from the urban blood pressure survey

interventions because it did not characterize the risk factors and was anonymous, which makes tracing the source of the diseases difficult.

The decline in prevalence of NCDs from 1992 to 1994 was probably related to inadequate personnel to compile data at the headquarters. The increase in prevalence rates appeared to have been genuine and was unlikely to have been due to increased data collection or increased visitation of facilities by patients. In addition, although the timeliness and completeness of the records had not been formally evaluated, both were believed to have been >80%. Therefore, the increased trends may have been actual and reflective of increased disease burden from NCDs and their risk factors.

Awareness, case detection, and management of NCDs or their risk factors are low in developing countries.[20] Part of the explanation is that during the early stages of NCDs such as hypertension, disease is asymptomatic until target organ damage occurs. In addition, developing countries in Africa are among the poorest in the world, and most of their health resources are targeted at the prevention and control of communicable diseases. NCD risk factor surveys have been conducted in <10 countries and published in fewer than half of these.[21]

Hospital-based data can be used as a gauge for national prevalence and incidence rates,[22] despite some limitations in the representativeness of these data. In spite of the shortcomings, hospital-based data are easily available and a cost-effective measure of health statistics in any country.

The publication of reports on new trends of diseases that use hospital data can increase the awareness of healthcare providers and improve case detection and management of those diseases. However, the factors responsible for increase in the prevalence of NCDs in this report have not been examined. Prevention and management of NCDs are distinctly different than those for infectious diseases in Africa.

Most infectious diseases, such as tuberculosis (TB), malaria, and HIV/AIDS, are amenable to prevention interventions because the predisposing and risk factors are known. In the case of NCDs, while some risk factors may be known, that information is based on studies from developed countries. The impact of the risk factors is variable among different populations and racial groups.[23] Most studies have documented increased blood pressures and hypertension prevalence in urban compared to rural environments.[8] Some of the explanations given for this observation are increased stress,[24,25] adoption of Western lifestyles and diets, obesity, and insulin resistance.[8] The observation of a 400% increase in the prevalence in an eight-year period in this study was exceptionally high. By their nature, hospital-based data do not provide information on risk factors. The value of this information was as a surveillance tool to alert researchers of a developing.

From the survey results, we saw that obesity and psychosocial stress played a role in hypertension, especially in explaining the sex difference in blood pressure.[8] The incidence of MI remained unchanged during the study period. This finding was surprising because the rate was expected to be increasing because of increased affluence. Most cases may have been admitted in the private sector, where data were excluded from these public central records. Even then, the incidence rate of MI was double that recently reported in the Horn of Africa with a similar source of data.[22]

Although the prevalence of MI, one form of target organ damage, remained steady, that of CVA increased almost by 300%. The propensity in Blacks for CVA instead of MI has been reported before.[23] Low renin in most Black hypertensive patients may protect them from developing myocardial infarction, although this finding has not been substantiated.[24] The level of CVA in the current study was five times that reported from Eastern Africa during the same period.[22] In that report, the prevalence of hypertension was 18%.

Case fatality rates (CFR) of all the reported NCDs except CVA significantly increased from 1990 to 1997. The reason for the decreased CFR for CVA was not investigated. The CFR was already high for CVA compared to other diseases under study, and the increase in CFR was predominantly due to the uniformly high rate of all the other diseases recorded in 1997. The decline in CFR could have been a reflection of improved case management, but to assume the improved case management was limited to one NCD in a short space of time is not plausible. This area needs to be further evaluated in the future.

The prevalence of RHD, like that of MI, remained stable, but the CFR for RHD increased. This finding could be explained in part by increased re-infection, particularly against the background of the HIV/AIDS pandemic and opportunistic infections that cause early decompensation. However, this explanation is speculative and needs further investigation.

The prevalence of diabetes increased by 400% during the study period. However, the CFR was consistent with that of other NCDs. No risk factor profile was examined to explain this sudden increased disease burden. The

interrelationship of diabetes mellitus with hypertension and adverse events is well recognized and should be prevented at all costs, whether through primary or secondary prevention.[25]

In spite of the recognized limitations of the questionable reliability of hospital-based data, in the absence of national surveys or between surveys, these data can be used as a proxy for national prevalence data on NCDs.

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REFERENCES

1. Murray CJL, Lopez AD. The Global Burden of Disease. In Murray CJL, Lopez AD, eds. *The Global Burden of Disease: A Comprehensive Assessment of Mortality and Disability from Disease, Injuries and Risk in 1990 and Projected to 2020*. Cambridge, Mass: Harvard School of Health; 1996:1–52.
2. Forrester T, Cooper RS, Weatherall D. Emergence of Western diseases in the tropical world: the experience with chronic cardiovascular diseases. *Br Med Bull*. 1998;54(2):463–473.
3. Mensah GA, Barkey NL, Cooper RS. Spectrum of hypertensive target organ damage in Africa: a review of published studies. *J Hum Hypertens*. 1994;8:799–808.
4. Steyn K, Fourie J, Bradshaw D. The impact of chronic disease lifestyle and their major risk factors on mortality in South Africa. *S Afr Med J*. 1992;82(4):227–231.
5. van der Sande MA, Bailey R, Faal H, et al. Nationwide prevalence study of hypertension and related non-communicable diseases in The Gambia. *Trop Med Int Health*. 1997;2(11): 1039–1048.
6. Chitson P, Hemraj F, Radhakeesoon R. Mauritius non-communicable disease survey. Preliminary report to minister of health and quality of life, 1998.
7. Domanski M, Proschan M. The metabolic syndrome. *J Am Coll Cardiol*. 2004;43:1396–1398.
8. Mufunda J, Scott L, Chifamba J, et al. Correlates of blood pressure in an urban Zimbabwean population and comparison to other populations of African region. *J Hum Hypertens*. 2000;14:65–73.
9. Mufunda J, Chifamba J, Chitate N, Vengesa PM. Salt sensitivity is not associated with hyperinsulinemia in a sample of rural Black Zimbabweans. *S Afr Med J*. 1998;88(3): 361–364.
10. Mufunda J, et al. Hyperinsulinemia: possible cause of high blood pressure in unemployed urban Black women. *High Blood Press*. 1995; 4:137–140.
11. Swai AB, McLarty DG, Kitange HM, et al. Low prevalence of risk factors for coronary heart disease in rural Tanzania. *Int J Epidemiol*. 1993;22(4):651–659.
12. Simmons DT, et al. Blood pressure and salt intake in Malawi: an urban rural study. *J Epidemiol Community Health*. 1986;40(2): 188–192.
13. M'Buyamba-Kabangu JR, et al. Correlates of blood pressure in rural and urban Zaire. *J Hypertens*. 1987;5(3):371–375.
14. Strogatz DS, et al. Social support, stress and blood pressure in Black adults. *Epidemiology*. 1997;8:482–497.
15. Olowu D, Smoke P. Determinants of success in African local governments: an overview. *Public Adm Dev*. 1992;12:1–5.
16. Bonita R, de Courten M, Dwyer T, Jamrozik K, Winkelmann R. *Surveillance of Risk Factors for Non-Communicable Disease: The WHO Stepwise Approach*. Geneva: World Health Organization; 2001.
17. Central statistical office. *Zimbabwe Census 2002*. Harare: Government Printers. 2002.
18. Wekwete K. Urban local government finance in Zimbabwe: the case of Harare City Council. *Public Adm Dev*. 1992;12:15–17.
19. *International Monetary Fund 1990 Government Financial Statistics Yearbook*. Vol 14.
20. Matenga JA, Allain TJ, Wilson AO, et al. Hypertension management in Zimbabwe–awareness, treatment and blood pressure control. A community-based study. *S Afr Med J*. 1997;87(10):1371–1373.
21. Unwin N, Mugusi F, Aspray T, et al. Tackling the emerging pandemic of non-communicable diseases in sub-Saharan Africa: the essential NCD health intervention project. *Public Health*. 1999;113:141–146.
22. Mufunda J, Nyarango P, Kosia A, et al. Non-communicable diseases in Africa: a silent hypertension epidemic in Eritrea. *J Hum Hypertens*. 2005;19:255–256.
23. Lang T, Pariente P, Salem G, Tap D. Social, professional conditions and arterial hypertension: and epidemiological study in Dakar, Senegal. *J Hypertens*. 1988;6(4):271–276.
24. Strogatz DS, et al. Social support, stress and blood pressure in Black adults. *Epidemiology*. 1997;8:482–497.
25. Ducorps M, Bauduceau B, Mayaudon H, Sonnet E, Groussin L, Castagne C. Prevalence of hypertension in a Black African diabetic population. *Arch Mal Coeur Vaiss*. 1996;89(8): 1069–1073.

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