

The prevalence of hypertension in rural and urban Cameroon

JCN Mbanya,^a EM Minkoulou,^a JN Salah^a and B Balkau^b

- Background** The quickening pace of change and adoption of western lifestyles by people in developing countries has led to a sharp rise in the incidence of hypertension. Yet epidemiological studies using validated methods are rare especially in Central Africa.
- Methods** The prevalence of hypertension, according to the World Health Organization definition (systolic blood pressure [SBP] ≥ 160 , diastolic [DBP] ≥ 95 mmHg), was estimated by a population-based survey in 1798 Cameroonian subjects aged 25–74 years. There were 746 individuals from a rural area (308 men, 438 women) and 1052 (461 men, 591 women) from an urban area.
- Results** The response rate was 95% and 91% for the rural and urban populations respectively. The age-standardized prevalence of hypertension was significantly higher in the urban than in the rural area. It was 16.4% (95% CI: 11.6–21.2) in urban men and 12.1% (95% CI: 7.9–16.2) in urban women, while it was 5.4% (95% CI: 2.9–8.0) in rural men and 5.9% (95% CI: 3.8–8.0) in women. Borderline hypertension (SBP 140–160, DBP 90–95 mmHg) was detected in 7.4% (95% CI: 4.4–10.4) and 6.6% (3.1–10.2) of urban, and 7.3% (95% CI: 4.7–9.9) and 2.9% (95% CI: 1.5–4.4) of rural men and women respectively.
- Conclusions** These results indicate that hypertension is still uncommon in rural Cameroon but occurs frequently in the urban community, reaching a proportion comparable with industrialized urban communities.
- Keywords** Africans, body mass index, hypertension, prevalence, rural, urban
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High blood pressure is still largely ignored as a public health problem in most developing countries.¹ However, the quickening pace of change and adoption of western lifestyles by people in developing countries has led to a sharp rise in morbidity and mortality from cardiovascular diseases, particularly those related to hypertension.^{2–4}

Epidemiological studies of hypertension in Central Africa are rare. The studies undertaken so far show that hypertension is an important problem in Central and West Africa.^{3–6} However, epidemiological studies using standardized measurement techniques are required to characterize the problem more accurately. This report documents a study of the prevalence of hypertension in two communities of Cameroon.

Subjects and Methods

Cameroonian men and women of African origin aged 25–74 years were studied. The participants were either from an urban area, Cité Verte Housing District in Yaoundé, or a rural area that consisted of three villages in Evodoula, Cameroon. The Cité Verte Housing District is located in the City of Yaoundé, the capital of the Republic of Cameroon. A preliminary house census of the inhabitants of the housing estate aged 25–74 years was conducted before the study. In all, there were 1493 households with an eligible population of 1160—533 men and 627 women. All 1160 eligible subjects were invited to participate in the study and 1058 (91%) consented. Of the 102 subjects who refused to participate, only eight (three men, five women) subjects were over 55 years old. The main reasons for non-participation were: absence from home after several visits and lack of free time due to work schedule. The adult population of this housing estate is mostly middle grade civil servants and middle income earners from the private sector.

Evodoula is a rural area situated about 60 km from Yaoundé. Three of the seven villages in this area; Minwoho, Nkolassa and Nloundou, were randomly selected. Since the population and a

^a Diabetes Research Laboratory, Department of Internal Medicine, Faculty of Medicine and Biomedical Sciences, University of Yaoundé, I, Yaoundé, Cameroon.

^b Unit 21, INSERM, Villejuif, France.

Reprint requests to Dr Jean Claude Mbanya, Diabetes and Endocrine Unit, Department of Internal Medicine, Faculty of Medicine and Biomedical Sciences, University of Yaoundé, I, BP 8046, Yaoundé, Cameroon.

Table 1 Characteristics, median (quartiles), of the 1798 subjects studied according to sex and rural/urban location

	Men			Women		
	Rural (n = 308)	Urban (n = 461)	<i>P</i>	Rural (n = 438)	Urban (n = 591)	<i>P</i>
Age (years)	45 (34–58)	37 (30–43)	0.0001	46 (34–56)	36 (31–42)	0.0001
BMI (kg/m ²)	21 (20–23)	25 (22–27)	0.0001	22 (20–24)	26 (23–30)	0.0001
Systolic blood pressure (mmHg)	118 (108–129)	120 (110–129)	0.3	110 (102–124)	110 (103–120)	0.7
Diastolic blood pressure (mmHg)	72 (66–81)	79 (72–87)	0.0001	70 (63–77)	73 (67–80)	0.0001

map of the villages were not available, a household census and descriptive map of each village were established by trained villagers at the start of the study. The eligible population of the three villages was 786, comprising 362 inhabitants from Minwoho, 207 from Nkolassa and 217 from Nloundou. Of these, 746 (95%) agreed to participate in the study. The reason for non-participation was mainly lack of free time due to farm work. The occupation of the people of Evodoula is mainly farming and hunting. The study was approved by the Ministry of Health's National Ethical Committee.

All field workers and laboratory technicians were trained to administer the lifestyle questionnaire, blood pressure and anthropometry measurements. A videotaped examination (Shared Care, Inc., Torrance, Ca) was used for the blood pressure training. Readings were taken using a double-headed stethoscope, and formal certification included a series of ten consecutive readings on practice subjects. Those who were certified were selected and were re-certified fortnightly.

Initial screening of study participants included the completion of a lifestyle questionnaire about established hypertension, symptoms of hypertension, past history of stroke, current medications and drug history as well as family history of hypertension.

Participants were seated for 30 min before diastolic (DBP) and systolic blood pressures (SBP) were recorded three times on the right arm using a standard mercury sphygmomanometer with a cuff bladder measuring 23 × 12 cm or larger for obese individuals. The SBP and DBP were defined as the first and fifth phase Korotkoff sounds respectively. The average of the second and third recordings were used in the present analyses. Treated hypertensive subjects were defined from the hypotensive medications mentioned in the list of medications currently being taken. For other subjects, hypertension was defined according to the World Health Organization (WHO) 1973 recommendations for the definition of normotension and hypertension and from the WHO 1993 definitions for borderline hypertension.⁷ Normotension was defined as SBP ≤140 and DBP ≤90 mmHg; borderline hypertension as 140 < SBP < 160 or 90 < DBP < 95 mmHg and hypertension as SBP ≥160 or DBP ≥95 mmHg.

Measurements of weight and height were taken, with subjects dressed in light clothing, and the body mass index (BMI) was calculated (weight/height², kg/m²).

Statistical analysis

The basic characteristics of the subjects were compared using the Kruskal Wallis test. The WHO 'old world standard population',⁷ truncated for the age group 25–74, was used to estimate the age standardized prevalence with the normal approximation for the 95% CI. Urban and rural prevalences were compared using the Comparative Mortality Figure,⁸ after standardizing to the

age and BMI distribution in the rural community; the last two age classes, 65–69 and 70–74, were combined and BMI was classed as < and ≥25 kg/m².

The effect of age, BMI and their interaction was estimated by linear regression on the logarithms of the SBP and DBP in non-hypertensive subjects. The distributions of SBP and DBP in non-treated men and women in both the rural and urban communities were then estimated for a common age of 40 years, with a BMI of 25 kg/m², using the residuals from each of the eight models. The resulting empirical distributions were compared using the Kolmogorov-Smirnov test.

Results

A total of 1804 subjects were included in the survey. However, only 1798 (1052 urban and 746 rural) have been included in the analysis as a female from the urban area was of unknown age and five subjects had no blood pressure measurement.

The men and women living in the urban area were younger and more obese than those in the rural areas (Table 1). Despite the younger age of urban dwellers, there were no differences between the SBP, but the urban men and women had significantly higher DBP (*P* < 0.0001). In total, 44 (2%) of the subjects were treated for hypertension (currently taking anti-hypertensive drugs) (Table 2), 108 men and women were screened as hypertensive, with a further 101 subjects being classed as borderline hypertensive. In the rural area 89% (40/45) of hypertensive subjects were unknown before the survey compared with 64% (68/107) in the urban area (Table 2).

The age-standardized prevalence of hypertension was significantly higher in the urban than in the rural area, for men and women (Table 3), and was 16.4% (95% CI: 11.6–21.2) in urban men, 12.1 (95% CI: 7.9–16.2) in women. In comparing the urban and rural men (and women) after adjustment for age and BMI, the Comparative Mortality Figure was 2.41 (95% CI: 1.06–5.47) and 1.47 (95% CI: 0.74–2.92) in men and women respectively. Therefore, the prevalence was significantly higher in the urban men, but not in the women. Borderline hypertension was similar in rural and urban men but lower in rural women (Table 3).

After adjustment for age and BMI, the distribution of the SBP differed significantly. In men, while this difference was statistically significant (*P* < 0.04), the median values of 115.7 and 117.5 mmHg in the rural and urban areas respectively differed little (Figure 1). For the women, the median SBP between the urban and rural areas were very similar, 109.4 and 108.8 mmHg, but the distributions differed significantly (*P* < 0.007) (Figure 1). Although the median values were similar, there was a skew to the right for both men and women (Figure 1).

Table 2 Number of subjects with treated, screened and borderline hypertension (HT)

Age (years)	Men				Women			
	n	Borderline	HT screened	HT treated	n	Borderline	HT screened	HT treated
Rural								
						0	0	0
25–34	82	0	2	0	111	0	1	0
35–44	71	6	1	0	85	0	0	0
45–54	54	1	5	0	110	6	8	1
55–64	70	17	5	1	95	7	7	3
65–74	31	3	3	0	37	2	8	0
	308	27	16	1	438	15	24	4
Urban								
		0	0	0	5	0	0	0
25–34	181	9	3	2	222	5	8	5
35–44	180	14	22	2	251	8	7	8
45–54	82	11	14	11	75	6	5	5
5–64	14	1	3	2	31	4	5	4
65–74	4	0	0	0	7	1	1	0
	461	35	42	17	591	24	26	22

Table 3 Prevalence (95% CI) of hypertension (treated and screened combined) and of borderline hypertension in subjects, aged 25–74 years

	Men		Women	
	Rural (n = 308)	Urban (n = 461)	Rural (n = 438)	Urban (n = 591)
Unadjusted prevalences (%)				
Hypertensive	5.6 (3.1–8.2)	13.0 (10.1–15.9)	6.5 (4.2–8.7)	8.2 (6.0–10.4)
Borderline	8.9 (5.9–11.9)	7.7 (5.3–10.1)	3.5 (1.8–5.2)	4.1 (2.5–5.7)
Prevalences (%) age-standardized using the age structure of a WHO standard population⁷				
Hypertensive	5.4 (2.9–8.0)	16.4 (11.6–21.2)	5.9 (3.8–8.0)	12.1 (7.9–16.2)
Borderline	7.3 (4.7–9.9)	7.4 (4.4–10.4)	2.9 (1.5–4.4)	6.6 (3.1–10.2)

The DBP, which before adjustment for age and BMI was significantly higher in the urban area in men and women (Table 1), remained significantly higher ($P < 0.0001$) with median values, for men: 75.9 and 77.9 mmHg in the rural and urban areas respectively, and for women: 70.5 and 72.5 mmHg, respectively (Figure 1).

Discussion

This is one of the first published epidemiological studies of hypertension using standardized methods in rural and urban Cameroon. Recently, there has been a published report on blood pressure distribution in the Pygmy and neighbouring Bantu villages in Southern Cameroon. However, this report did not contain any information on the prevalence of hypertension in these communities.⁹ In the present study, there were few subjects in the older age groups in the urban area, even though up to 91% of the eligible subjects living in this area participated in the study.

This study confirms previous reports that hypertension rates remain moderate to low in most rural communities in Africa.⁶ Hypertension was two to three times more prevalent in the urban than in the rural men and women. Cameroonian urban society, like most urban societies in developing countries, is undergoing a transition from traditionally infectious to chronic

diseases along with the adoption of westernized lifestyles. The social, financial, dietary and stress-related influences which accompany these cultural changes have profound long-term blood pressure elevating effects.¹⁰ Unlike in industrialized countries, there is little or no age-related change in blood pressure in acculturated societies but as these societies adopt a western lifestyle, they acquire a predisposition to age-related increases in blood pressure.^{2,11} It follows, therefore, that economic development and the consequent lifestyle changes form the major reasons for the emergence of hypertension in the urban societies of developing countries.

As in this report, urban/rural comparisons of hypertension in other parts of Africa, including Gambia, Ghana, Côte d'Ivoire, Nigeria, Senegal and South Africa, report consistently higher rates (>10%) in urban areas.^{12–17} Moreover, in some parts of Africa, rapid rises in blood pressure have been observed in rural migrants who have taken up residence in urban areas,¹⁸ thus signifying an increase of risk factors for hypertension in urban communities.

This urban Cameroon population though younger, were more obese than the rural population. It has been well established that as the urban African population becomes obese, physically inactive, with high sodium intake and stress levels, hypertension and its sequelae will become a major public health problem in these communities.^{3,4,19,20} The prevalence of hypertension

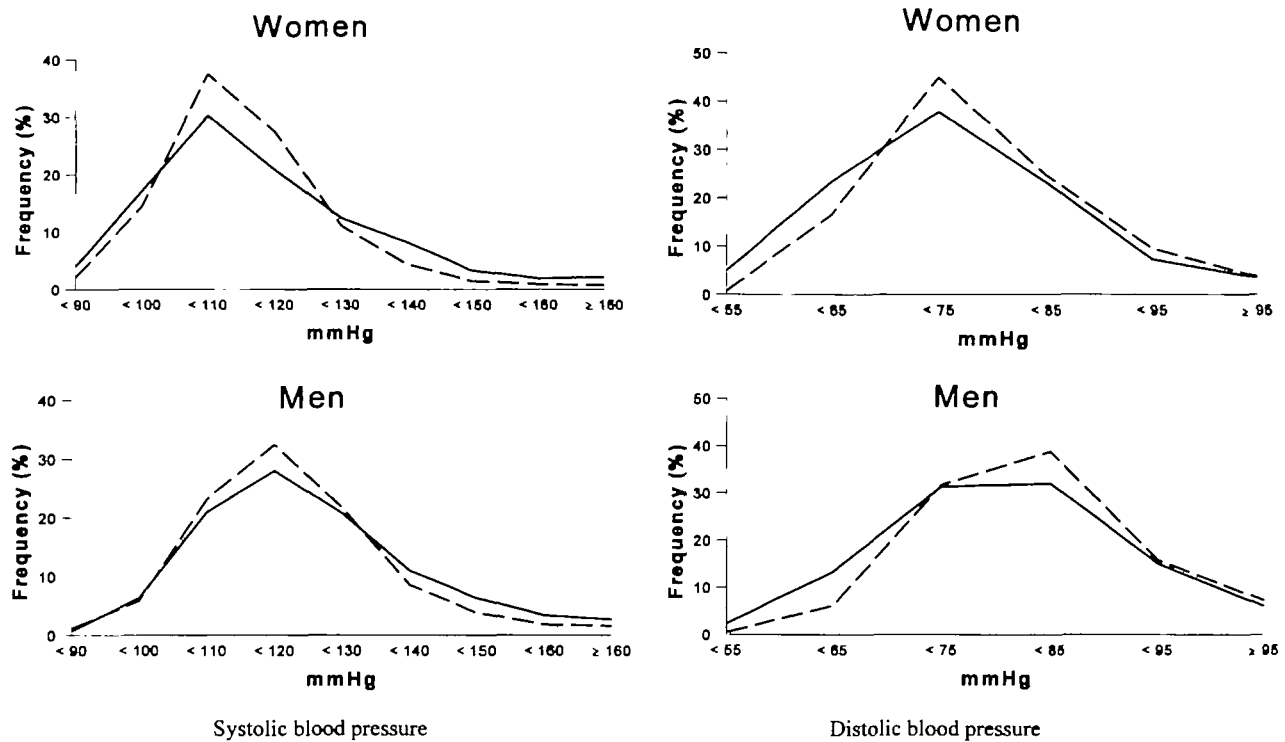


Figure 1 Distribution of systolic and diastolic blood pressure, age and body mass index adjusted by location and by sex: the Cameroon survey

Keys to symbols. - - - - - Rural
 ————— Urban

in the urban area and in other African urban communities is similar to that of Caucasians in developed countries. Furthermore, African Americans who share genetic ancestry with African Blacks have consistently higher rates.^{6,14-17,21-23} Nevertheless, as observed in this study and from the few African epidemiological reports, blood pressure levels tend to be lower in Africans living in rural areas than in Blacks and Caucasians living in Europe and North America but there does not seem to be any difference in blood pressure in the Africans and whites living in urban areas of Africa.²²⁻²⁴ The rural to urban demographic transition taking place in Cameroon and elsewhere on the African continent can therefore be expected to increase the rates of hypertension if appropriate prevention measures are not put in place.^{12,13,17}

There are methodological differences which make comparison of the results of this study with some previous African studies difficult. These differences include lack of age standardization in previous studies and the application of different definitions of hypertension. The prevalence of hypertension varies considerably depending on the cutoff points chosen and the methods of blood pressure measurement. There is also a great economic disparity found in cities in Africa and it is known that the prevalence of hypertension is influenced by population characteristics such as age, race, gender and socioeconomic status.²⁵ However, it would appear that among the urban poor in Africa, blood pressures are low,³ whereas the elite population has a high prevalence of hypertension.⁴

The excess of hypertension in women in comparison to men, with the most affected age group being 35-54 years, is in general

accordance with previous studies.^{5,12-14,24} The fact that hypertension tends to occur at a younger age group, 25-44 years, in the urban than in the rural populations could be attributed to the psychosocial phenomena of young urban dwellers. Nevertheless, it is difficult to be very conclusive about the true prevalence of hypertension in the older age groups in the urban areas from this study since there were relatively few individuals over 50 years living in the urban area of this study.

Almost 90% of hypertensive patients in the rural area were not diagnosed before the study, compared to under 70% in the urban region. As is the case with other chronic diseases, the proportion of unknown cases is usually lower than 50% in industrialized urban communities; in some populations of the Pacific it is nearly 100%.²⁶ This difference in Cameroon may be due to the fact that the subjects in the urban area are more aware of the symptoms of hypertension, because of their education level and therefore seek medical advice at an earlier stage of the disease than those living in the rural areas. Also, in Cameroon, access to medical facilities is easier in urban than in rural areas.

The high percentage of subjects with borderline hypertension in both the urban and rural populations is an indication of the possibility of a sharp rise in the prevalence of the disease if adequate prevention measures are not put in place. In fact, according to the criteria of the Joint National Committee on the Detection, Evaluation and Treatment of High Blood Pressure, all the subjects with borderline hypertension would be classified as stage one or mild hypertension.²⁷ With this definition, the prevalence of hypertension increases by nearly a third in both

the rural and urban communities. Clearly, prospective epidemiological studies are needed in African populations in order to define the blood pressure cutoff points which are associated with real risks of cardiovascular morbidity and mortality.

In summary, hypertension, once considered rare in Cameroon, remains uncommon in rural populations. It occurs frequently in urban areas reaching a proportion comparable with urban communities in industrialized countries. The high prevalence of borderline hypertension in both the rural and urban communities indicates that the prevalence of hypertension will rapidly increase to make it a gigantic public health problem during the next decade. There is an urgent need for prospective studies to identify specific risk factors of the disease in Cameroon and in other black African countries so as to enable the development of control and intervention programmes in a race with an underlying predisposition to hypertension.

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