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ORIGINAL ARTICLE

Gender differences in prevalence and socioeconomic determinants of hypertension: findings from the WHO STEPs survey in a rural community of Vietnam

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In Vietnam, hypertension was estimated to cause a large number of deaths in hospitals. However, population-based knowledge about the magnitude of hypertension in Vietnam and its relationship with socioeconomic status, especially in the rural communities, still remains scarce. This paper, taking advantage of a study on noncommunicable disease (NCD) risk factors in Bavi district, Vietnam, using the WHO STEPs approach, estimates the prevalence of hypertension in the setting and examines its association with some socioeconomic factors. A representative sample comprising 2000 adults aged 25–64 years were selected randomly and surveyed in 2002. The JNC VII criteria for hypertension were used. Socioeconomic status of the study subjects was estimated by assessing their education, occupation and economic conditions. Descriptive techniques and multivariate logistic regression were used. The prevalence of hypertension was 14.1%. Of hypertensives, only 17.4% were aware of their hypertensive status. Men were hypertensive more often than women and age was positively associated with hypertension. The association between hypertension and socioeconomic status was complex and differed between men and women. Among men, those with lower educational and occupational status but who were richer were more likely to be hypertensive. More women with lower occupational and economic status were hypertensive.
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Introduction

Hypertension is an established important risk factor for cardiovascular diseases and has been observed to be a leading contributor to burdens of mortality and morbidity both in developed and developing countries.[1–4] In 2000, according to the World Health Report 2002, the number of people worldwide afflicted with hypertension was about 600 million. Hypertension is estimated to cause 7.1 million deaths annually, about 13% of the total global deaths. Since most blood pressure-related deaths or nonfatal events occur in middle age or among the elderly, the loss of life years comprises a smaller proportion of the global total, but is nonetheless substantial (64.3 million DALYs, or 4.4% of the total).[5] As countries at different levels of development have been progressing through different stages of health transition at different rates, the socioeconomic gradients with hypertension vary. Blood pressure levels and hypertension have been proven to be inversely related to socioeconomic status in developed countries,[6–8] but in the developing world such correlations have not always been evident.[7–12]

Vietnam, a developing country in Southeast Asia, is undergoing an early stage of health transition where the population is suffering from the 'double burden' of old communicable diseases and emerging noncommunicable diseases (NCDs).[13] According to hospital statistics, hypertension was the third contributor to the burden of death and the sixth contributor to the burden of disease in hospitals for the whole country in 2002.[14] However, the population-based knowledge about the magnitude of hypertension in Vietnam and its relationship with socioeconomic status remains scanty, especially for rural communities.

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Taking advantage of a study on NCD risk factors in Bavi district, Vietnam, using the WHO STEPs approach,[15] this paper estimates the prevalence of hypertension in the setting and examines its association with some socioeconomic factors. The prevalence and the background factors are of interest for health professionals in predicting health trends and directing health planning and interventions.

Methods

Study population and sampling

This study was carried out in Bavi district, a rural community located 60 km west of Hanoi, the capital, within the Epidemiological Field Laboratory of Bavi (FilaBavi).[16] The WHO STEPs approach was employed. It is composed of three steps, a structured questionnaire to assess the self-reported behaviour/lifestyle risk factors (step 1), measurement of blood pressure and anthropometrical parameters (step 2), and biochemical analysis of blood samples (step 3). Within each step, different modules – core, expanded and optional – are also available, to allow for collecting more complex risk factor data. The WHO STEPs is a standardized approach that can be applied in any setting depending on resources available and facilitates comparisons within the country or across countries.[15] In this study, a representative sample of 2000 adults aged 25–64 years was selected randomly and surveyed in 2002, using the WHO STEPs questionnaire (step 1) adapted for Bavi and blood pressure measurement (step 2). Blood samples were not taken as step 3 was not applied. The pilot study implemented prior to this main study confirmed the feasibility of the WHO STEPs in Bavi.[17] A total of 12 field workers were involved in this study. They were trained on basic skills of interviewing and standard methods of blood pressure measurement. Data quality was controlled in the field by supervisors, as well as by the investigators of this study.

Measurements

Blood pressure was recorded three times in resting and sitting positions, on the right arm, using a standard digital sphygmomanometer supplied by the WHO (OMRON) and the average of the last two readings was used in the analyses. Hypertensive subjects were defined as those with systolic blood pressure (SBP) equal to or more than 140 mmHg or diastolic blood pressure (DBP) equal to or more than 90 mmHg[18] or those being treated for hypertension.

The socioeconomic status of the study subjects was estimated by assessing educational level, occupational status and the present economic condition of the household. Educational level was classified into three groups: (I) less than secondary school (completion of any school level from the first to the sixth class, or none), (II) secondary school (completion of school level from the seventh to the ninth class), (III) high school and above. Occupational status (main occupation of the study subjects) was grouped as: (I) government staff (currently working in a state-owned office or having retired from government work), (II) farmer (currently farming or having retired from farming because of old age, (III) other jobs (housewives, small traders, construction workers, housekeepers, handicraft makers and the jobless, etc.). Economic condition of households was described as (I) poor, (II) average and (III) rich (according to the Decision number 59 – Ministry of Labour, Invalids and Society, adapted for Bavi District).

Data analysis

Both descriptive and analytical statistics were carried out using Stata8 software (Stata Corporation). Prevalence of hypertension according to different independent variables was calculated. Multivariate logistic regression modellings, using both step-up and step-down methods, were performed to examine demographic and socioeconomic determinants of hypertension. A significance level of $P<0.05$ was used.

Results

Out of the 2000 subjects randomly selected from the FilaBavi study base, 1996 people (997 men and 999 women) responded to the survey. The characteristics of the final study sample are described in Table 1.

Table 2 shows the mean blood pressure levels (with 95% CI) of the 1996 study subjects by gender

Table 1 Characteristics of the study sample

	Men	*Women*
Overall	999 (100)	997 (100)
Age group (years)		
25–34	259 (26.0)	265 (26.5)
35–44	338 (33.9)	354 (35.4)
45–54	279 (28.0)	247 (24.7)
55–64	121 (12.1)	133 (13.3)
Education		
Less than secondary	144 (14.4)	174 (17.4)
Secondary school	625 (62.7)	662 (66.3)
High school and higher	228 (22.9)	163 (16.3)
Occupation		
Government staffs	57 (5.7)	67 (6.7)
Farmers	575 (57.7)	789 (79.0)
Other jobs	365 (36.6)	143 (14.3)
Economic		
Poor	136 (13.9)	119 (12.2)
Average	604 (61.8)	647 (66.2)
Rich	237 (24.3)	211 (21.6)

Figures are number (column percentage).

Table 2 Distribution of blood pressure by gender and age

Gender	*Blood pressure in mmHg*	
Age (years)	*Systolic*	*Diastolic*
Men		
25–34	121.7 (120.0–123.2)	74.0 (72.8–75.2)
35–44	124.8 (123.2–126.4)	77.2 (76.1–78.3)
45–54	125.1 (123.1–127.1)	77.9 (76.5–79.4)
55–64	125.1 (123.1–127.0)	80.0 (77.6–82.6)
All ages (25–64)	124.4 (123.9–125.5)	76.9 (76.2–77.6)
Women		
25–34	114.0 (112.6–115.6)	70.5 (69.4–71.5)
35–44	116.7 (115.0–118.5)	71.7 (70.6–72.8)
45–54	119.7 (117.3–122.1)	72.9 (71.4–74.4)
55–64	123.9 (120.8–127.1)	74.6 (72.7–76.5)
All ages (25–64)	117.7 (116.7–118.9)	72.0 (71.4–72.7)

Figures are means (95% CI).

and age. Both the mean SBP and mean DBP were significantly higher in men than in women (mean SBP and DBP were 124.9 and 76.9 mmHg in men and 117.7 and 72.0 in women, respectively). Both SBP and DBP of men and women increased progressively with age.

The overall prevalence of hypertension in Bavi was found to be 14.1% (281/1996) (95% CI 12.5–15.7). Using the age structure of the WHO standard population,[19] the age-standardized prevalence of hypertension was 16.4% (95% CI 14.8–18.1).

Of 281 hypertensive subjects, only 49 cases (17.4%), 25 men (8.9%) and 24 women (8.5%), were aware of their hypertensive status and the remaining 232 (82.6%) were unaware. Of the hypertensive subjects who were aware of their blood pressure condition, only 18 cases (6.4%), 10 men (3.5%) and eight women (2.9%), were being treated with drugs.

The proportion of unaware hypertensive subjects was significantly higher among men (86.1%) than among women (76.0%). It was inversely correlated with age (92.3, 86.5, 82.5 and 69.6% among hypertensive people aged 25–34, 35–44, 45–54 and 55–64 years, respectively) but was not different across socioeconomic groups (data not shown).

The prevalence of hypertension according to gender, age and socioeconomic status is presented in Table 3. After adjustments for age, the prevalence of hypertension remained significantly higher among men (18.1%) than among women (10.1%). In both genders, the prevalence of hypertension increased significantly with age (from 10.8% among men and 4.2% among women in the age group 25–34 years to 27.3 and 17.3% among men and women of 55–64 years, respectively).

Men and women with the lowest educational levels were more likely to be hypertensive than the two higher education categories. However, the difference in hypertension between low and high educational groups was only significant in men

Table 3 Hypertension prevalence by gender, age and socioeconomic indicators

	Men prevalence (95% CI)	*Women prevalence (95% CI)*
Overall[a]	18.1 (15.8–20.5)	10.1 (8.2–11.9)
Age group		
25–34	10.8 (7.3–15.2)	10.8 (7.3–15.2)
35–44	17.8 (13.8–22.3)	17.8 (13.8–22.3)
45–54	21.5 (16.8–26.8)	21.5 (16.8–26.8)
55–64	27.3 (19.6–36.1)	27.3 (19.6–36.1)
Education[a]		
Less than secondary	30.9 (23.2–38.6)	13.3 (7.8–18.8)
Secondary school	15.9 (13.0–18.9)	8.8 (6.5–11.1)
High school and higher	17.5 (12.6–22.4)	10.9 (5.7–16.0)
Occupation[a]		
Government staffs	21.2 (12.7–35.8)	7.0 (1.7–16.5)
Farmers	13.1 (10.3–16.0)	5.9 (5.2–8.8)
Other jobs	24.2 (19.8–28.8)	24.1 (17.7–32.4)
Economic[a]		
Poor	15.5 (9.1–21.9)	18.2 (11.5–24.9)
Average	16.6 (13.7–19.6)	8.5 (6.4–10.6)
Rich	21.2 (16.2–26.2)	10.1 (6.4–13.8)

[a]Figures were age-adjusted using overall age structure.

(respective age-adjusted prevalence was 31 vs 18% among men and 13 vs 11% among women).

In terms of the relationship between hypertension and occupation, in both genders, people doing other jobs had the highest hypertension and farmers had the lowest prevalence. The difference in prevalence of hypertension between government staff and farmers was greater among men (respective age-adjusted prevalence was 21 vs 13% among men and 7 vs 6% among women), while the disparity between people doing other jobs and farmers was greater among women (respective age-adjusted prevalence was 24 vs 13% among men and 23 vs 6% among women).

The patterns of hypertension according to economic status also varied and were inconsistent by gender. Affluent men and poor women had the highest prevalence of hypertension as compared with other economic groups of the same gender (age-adjusted prevalence was 21, 17 and 16% in rich, average and poor men, respectively; while it was 10, 9 and 18% in rich, average and poor women, respectively).

Multivariate logistic regression models were constructed to further analyze the association of hypertension with socioeconomic indicators among men and women. As shown in Table 4, in both men and women, age was a significant determinant of hypertension. The prevalence increased with age and was statistically different among people aged 35–44, 45–54 and 55–64 years old as compared with the 25–34 age group.

Table 4 Logistic regression analyses of hypertension in men and women in relation to socioeconomic indicators

Dependent variables	*OR (95% CI)*	
Hypertension	*Men*	*Women*
Explanatory variable		
Age group (years)		
25–34	1	1
35–44	2.5 (1.5–4.2)[a]	2.0 (1–4.2)[a]
45–54	2.9 (1.7–4.9)[a]	4.4 (2.1–9.3)[a]
55–64	2.9 (1.6–5.3)[a]	3.7 (1.5–9.0)[a]
Education		
Less than secondary school	2.8 (1.6–4.9)[a]	0.8 (0.4–2.0)
Secondary school	1.3 (0.8–2.0)	1 (0.5–1.9)
High school and higher as reference group	1	1
Occupation		
Farmer	1	1
Government staffs	2 (0.9–4.4)	1.1 (0.4–3)
Other jobs	2.2 (1.5–3.2)[a]	5 (3.0–8.4)[a]
Economic		
Poor	1	1
Average	1.3 (0.8–2.3)	0.4 (0.2–0.7)[a]
Fair and rich	1.8 (1.1–3.4)[a]	0.5 (0.2–1.0)

[a]Statistically significant results (i.e. 95% CI of OR does not include 1).

However, there were some differences in the gender-specific pattern of socioeconomic determinants of hypertension. Among men, apart from the age effect, the people with less than secondary school education (OR = 2.8, 95% CI: 1.6–4.9), people having other jobs (OR = 2.2, 95% CI: 1.3–3.2) and the rich (OR = 1.8, 95% CI: 1.1–3.4) had a significantly higher prevalence of hypertension as compared with high school –and higher, farmers and the poor, respectively. Among women, the age effect on hypertension was considerably greater than among men. Women doing other jobs (OR = 5.3, 95% CI: 3.0–8.4) and poor women had significantly higher risks of being hypertensive as compared with farming women and women in the average living standard group (OR = 0.4, 95% CI: 0.2–0.7), respectively.

Discussion

Even though we recognized that blood pressure affects cardiovascular health by continuous measure, although not in a dichotomous way, we used the JNC VII definition of hypertension, after consulting with cardiologists in Vietnam, on the threshold of blood pressure that implies a high risk of cardiovascular complications and to ensure comparability with other studies in Vietnam, as well as internationally. The overall 14.1% prevalence of hypertension found in this study indicates that the condition already affects a sizeable proportion of the adult population in Bavi district. This figure was lower than the prevalence of 16.8% found in a study by the Vietnam National Heart Institute in 2001 for both urban and rural areas in some provinces in North Vietnam[20] and of 16.9% among people aged 25–64 years in all Vietnam reported by the Vietnam National Health Survey 2002.[21]

The findings of this study indicate that the prevalence of hypertension seemed to be increasing in rural communities of Vietnam as compared with the figure of 11.7% in 1996.[22] This tendency was consistent with hospital-based figures for all Vietnam: hypertension was the fifth leading cause of death and the sixth leading cause of disease in hospitals in 1998[23] and was the third leading cause of death and the sixth leading cause of disease in hospitals in 2002.[14] According to a mortality study conducted in Bavi, mortality from cardiovascular diseases (including hypertension) also increased.[24,25]

The prevalence of hypertension in Bavi was low compared to national figures in developed countries such as the United States of America, Australia and the United Kingdom, as well as other developing countries such as Thailand, Indonesia and China.[4,26–28]

Comparing studies conducted in rural areas in developing countries, the hypertension prevalence found in this study was slightly lower than the one revealed in a rural community of India (17.3% among people aged 25–64 years)[29] but higher than the figures of 15% in a remote rural region of Pakistan[11] and of 10% in rural communities of Iran.[30]

This study also revealed an unacceptably high percentage of hypertensives (83%) not being aware of their high blood pressure. This was much higher than the figure of 49% in a community of India in 2003,[31] of 55.3% reported in China in 2000[32] and 75.7% in Korea in 2001.[33] As a result of this, urgent strategies and measures for prevention and control of hypertension are needed in this setting.

When comparing the prevalences of hypertension from these data with those from other studies, other factors that might contribute to any observed differences should be taken into consideration, such as differences in age structure between studied subjects, variability in definition of hypertension, time of the study, and urban vs rural characteristics of the population and standardization of blood pressure measurement instruments and procedures, etc.

In this study, men experienced more hypertension than women (18.1 vs 10.1%). This pattern was consistent with Vietnamese findings in 1996 and 2002 but the gender difference in hypertension found in this study was wider.[21,22] The result seems to support a study in 2000, which reported that mortality from cardiovascular diseases was higher among men than among women.[25] This pattern was also comparable to other studies carried out in both

developed and developing countries.[4,34–36] However, this finding was contrary to a study in Indonesia in 2000, which reported that women suffered from hypertension more than men.[27]

A key predictor of blood pressure in many populations is age[4] and the present study found similar results to other international and Vietnamese studies,[2,7,20–22,37–39] confirming age to be positively correlated with hypertension.

The results of this study showed that hypertension was associated with some socioeconomic factors but the nature of the associations was complex. In terms of relationships between hypertension and education, an inverse significant association was found when comparing the risk of being hypertensive between men with the lowest educational level (less than secondary school) and the highest one (high school and higher). This inverse association was also found in almost all studies carried out in developed countries such as the United States of America, Canada, Australia, Sweden and the Netherlands.[7] In developing countries, the pattern of association varied: meanwhile, hypertension was found to be inversely associated with educational levels in some studies, for example, in Brazil[39] and China,[40] while a direct association was observed in others, for example in India.[41,42] Mortality from cardiovascular disease in Bavi in 2000 was also higher among less educated people but the difference was not statistically significant.[25]

In terms of occupational status, farmers were found to be less likely to suffer from hypertension as compared with people doing other jobs. Farmers in Bavi were also shown to be less likely to die from cardiovascular diseases.[25] In fact, farmers may be less exposed to lifestyle risk factors as they have little sedentary time due to hard agricultural work, and their living standard is generally too low for the excessive consumption of saturated fat.[17] On the contrary, people doing other jobs (traders, construction workers, handicraft makers, etc.) were more at risk of hypertension, possibly because of unhealthy lifestyles (drinking, smoking) and job pressure.

In this study, hypertension was found to have a complex association with economic status. The rich men and the poor women had a higher risk of being hypertensive than people of the same gender in the average living standard group. This is supported by a Jamaican study[43] and may imply a diverse range of factors associated with hypertension in particular and cardiovascular diseases in general. High risks of hypertension among the rich men of Bavi may reflect the adoption of Western lifestyle such as high-fat diet, smoking, alcohol consumption and office stress, etc. A relatively high prevalence of hypertension among poor women may reflect alternative risk factors in this setting, such as early undernutrition. Another Jamaican study[44] confirmed that growth retardation in infancy was associated with higher blood pressure in later life. The joint effects of gender and economic status on hypertension are not simple and need to be further investigated.

The complex relationships between hypertension and economic status found in this study were different from those reported elsewhere: some studies in the United States of America found an inverse association between hypertension and economic status but a study from a rural area of India found a direct association.[7]

In summary, our findings showed that hypertension in rural Vietnam is becoming a serious problem, which should no longer be ignored, both because of its magnitude and the unacceptably high unawareness rate in the population.

Even though the prevalence of hypertension among women in this setting was found to be relatively low as compared with men, the problem with cardiovascular disease in women must not be underestimated because hypertension in women has been shown to be strongly associated with coronary heart diasese.[45]

It is clear from our data that health transition in Vietnam is at a complex stage, where different groups in the population have moved through the course of the transition at different speeds. Public health actions (such as health education, early detection of cases, etc.) dealing with the problems of hypertension are urgent, while taking into account its relationship with gender and socioeconomic status. It is clear that the interventions should address all people in society, with a focus on disadvantaged groups.

The association between hypertension, gender and socioeconomics is complex and involves some overlap or confounding of the relationship among indicators (e.g., of the relationship between educational level and economic status, etc.). This study was just a starting point. Deeper and more sophis-

(a) What is known on this topic?

Hypertension is an established and important risk factor for cardiovascular diseases and has been observed to be a leading contributor to burdens of mortality and morbidity both in developed and developing countries. Hypertension has been shown to be inversely related to socioeconomic status in developed countries, but in developing countries, such a correlation has not always been evident.

Population-based findings on the magnitude of hypertension in Vietnam and its relationship with socioeconomic status, especially in rural communities, still remain scarce.

(b) What does this study adds?

This study showed that hypertension in rural Vietnam is becoming a serious problem because of its magnitude as well as the unacceptably high unawareness rate in the population.

The study also demonstrated the complexity of health transition in developing countries where different groups in population have moved through the course of the transition at different speeds, resulting in the nonlinear relationship between hypertension, gender and socioeconomic status.

ticated analyses are needed to understand the situation in more detail. Nonetheless, the simple but valuable information emerging from this study will certainly help in planning and policy-making processes.

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