RESEARCH REPORT

Epidemiology of hypertension and associated cardiovascular risk factors in a country in transition: a population based survey in Tirana City, Albania

L Shapo, J Pomerleau, M McKee

Study objective: To describe the prevalence of hypertension and other cardiovascular risk factors on the adult population of Tirana City (Albania).

Design: Cross sectional survey.


Participants: 1120 adults aged 25 years and over (response rate=72.7%).

Main results: Overall, hypertension prevalence (blood pressure >140 and/or 90 mm Hg, or known hypertensive receiving anti-hypertensive treatment) was 31.8% (36.6% and 27.4% in men and women respectively). Age standardised prevalence of hypertension (adjusted to the adult population of Tirana) was 30.2% (99% confidence intervals 29.8% to 30.6%) in men and 22.7% (22.3% to 23.1%) in women. Men were significantly more likely to be hypertensive than women (p value=0.001). Of those who had been diagnosed with hypertension, 87% were receiving anti-hypertensive therapy and more than half of them (52%) were adequately controlled. The prevalence of hypertension increased with increasing age and was more common in the obese in both sexes. While the prevalence of hypertension matched that in other industrialised and transition countries, the combination of hypertension with other cardiovascular risk factors was rather less common.

Conclusion: These findings provide important new evidence on the prevalence of hypertension and its association with other cardiovascular risk factors in Albania. Albania is in a state of rapid transition, with evidence that risk factors for non-communicable diseases have already increased considerably over the past two decades. These findings provide a unique baseline against which future change can be compared.

It is well known that hypertension, smoking, obesity, increased blood lipids, unhealthy diet, and physical inactivity are primary risk factors for cardiovascular diseases (CVD). This has recently been confirmed by the Global Burden of Disease (GBD) Study update for 2000, which estimated that hypertension causes 50% of CVD worldwide, high blood cholesterol about one third, and inactive lifestyles, tobacco use and low fruit and vegetable intake about 20% each (percentages sum to >100% as some risks overlap). In Albania, unlike other former communist countries of eastern Europe, mortality from CVD has traditionally been low, similar to other Mediterranean countries. During the communist regime, before the dramatic political changes in 1991, lifestyle was quite unique in Europe. Levels of exercise were high as agriculture was unmechanised and labour intensive. The few cars were reserved for senior officials. Diet was traditional, based on local produce. In the 1990s, however, the country opened rapidly to western influences, car ownership increased, and western foods became widely available, especially in cities. Consequently dietary patterns have changed and, for many, levels of exercise have fallen. It is not clear how these changes will influence cardiovascular diseases. Firstly, epidemiological data are extremely scarce. We have been unable to find any information on the prevalence of CVD risk factors (except diabetes) in Albania before or during the transition period. Secondly, mortality data from the 1990s cannot easily be interpreted because of uncertainty caused by large scale, but unquantified migration. Consequently this cross sectional survey of health and lifestyle provides a baseline against which future changes can be compared.

This paper reports the prevalence of hypertension and its association with other CVD risk factors in the adult population of Tirana, capital of Albania, in 2001.

METHODS

A population based survey was undertaken in 2001 to investigate health behaviours and health status of people aged 25 years and over living in Tirana City. Ethical approval was granted by the Albanian Ministry of Health and the London School of Hygiene and Tropical Medicine.

The least common major condition examined was type 2 diabetes (results will be reported elsewhere). This determined the required sample size, estimated to be 1188 people to be able to detect a prevalence of 2.9%, taking 3.7% as the worst value. To allow for non-response, over-sampling of about 25% was undertaken. Given uncertainties about the precise resident population at the time of study, a two stage cluster sampling technique was used based on the published list of households for the 1997 general elections (UNDP unpublished data). Tirana is divided into 256 zones (map division). Based on this division 58 zones were randomly selected with probability proportional to size. From each zones, 25 households were chosen at random. This yielded 696 households, which was expected to yield at least 1392 adults (assuming an average of two adults aged 25 years and over per household). Of the 1540 people contacted 1120 (535 men and 585 women) agreed to participate (response rate 72.7%). The final sample tended to be slightly older than the reference population. For this reason, the results presented in this paper are stratified by age group and the overall prevalence rates are age standardised. There were no women known to be pregnant in the study.

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Accepted for publication 9 March 2003
All respondents were invited to attend a health centre in Tirana. Interviews were conducted, in three parts: (a) standard questions on demographic and socioeconomic information (sex, age, family status, educational level, family income) and health behaviours (physical activity at work and during leisure time, smoking, alcohol intake, and diet); (b) anthropometric (height, weight, waist, hip circumferences) and blood pressure measurements; and (c) blood samples and a glucose tolerance test.

Questionnaire design drew on earlier surveys conducted in other transition countries. The questionnaire was translated from English into Albanian by the principal investigator and back translated by another Albanian physician and compared before being distributed. Smoking status was divided into three categories: (a) never smokers; (b) former smokers; and (c) current smokers defined as people smoking at least one cigarette each day.

Anthropometric measurements used standardised procedures. Height was measured without shoes with subjects standing fully erect on a flat surface, with heels, buttocks and shoulders flat to the wall, and the subject looking straight ahead. Measurement was to the nearest centimetre. Weight was to the nearest 0.1 kg using digital scales. Subjects wore light clothing with no shoes. Waist circumference was measured to the nearest centimetre, halfway between the lower border of the ribs and the iliac crest, with the tape horizontal. Hip circumference was measured to the nearest centimetre at the maximum circumference, at the level of the greater trochanter. Body mass index (BMI) was calculated as weight (in kg) divided by height (in metres squared). Participants were categorised according to relative body weight status using WHO criteria (underweight: BMI<18.5 kg/m²; normal: BMI 18.5–24.9; overweight: BMI 25.0–29.9; obese BMI≥30.0). Participants were considered centrally obese if waist-hip ratio (W/HR) was 0.95 or over for men and 0.85 or over for women.

Blood pressure (BP) was measured twice using an automatic sphygmomanometer, with participants seated after a five minute rest. Hypertension was defined as systolic blood pressure ≥140 mm Hg and/or diastolic ≥90 mm Hg or current use of anti-hypertensive drugs. Participants were categorised into four groups based on hypertension status: (a) normotensive; (b) newly diagnosed hypertensive; (c) known untreated hypertensive; and (d) known treated hypertensive.

Glucose tolerance and presence of diabetes were defined as per World Health Organization (WHO) criteria using 1999 WHO recommendations. Participants were categorised according to relative body weight status using WHO criteria (underweight: BMI<18.5 kg/m²; normal: BMI 18.5–24.9; overweight: BMI 25.0–29.9; obese BMI≥30.0). Participants were considered centrally obese if waist-hip ratio (W/HR) was 0.95 or over for men and 0.85 or over for women.

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Glucose tolerance and presence of diabetes were defined as per World Health Organization (WHO) recommendations. Impaired glucose tolerance (IGT) was defined as fasting glucose of <7.8 mmol/l and two hour post-load plasma glucose concentration between 7.8 and 11.0 mmol/l. Diabetes was defined as two hour post-load plasma glucose concentration ≥11.1 mmol/l or on treatment for diabetes. Participants with a verified history of diabetes were classified as known diabetics (that is, taking insulin or oral hypoglycaemic agent or diet).

The fasting blood sample was also analysed for total cholesterol, high density lipoprotein (HDL) cholesterol, low density lipoprotein (LDL) cholesterol, and triglycerides.

Statistical analysis was undertaken using SPSS version 10.0. As age and sex are strong determinants of hypertension, descriptive results were presented for men and women separately and stratified by age group. In addition, as younger age groups tended to be under-represented in the study sample, age standardised prevalence rates (for the adult population of Tirana City) were calculated for men and women separately by applying age sex specific rates to the standard population of Tirana City (as it was in 1998).

Because the distributions of plasma triglycerides, plasma HDL, and LDL-cholesterol were skewed, log normal values were used; geometric means are presented in the results. The scale and potential impact of clustering of risk factors were examined in three ways. Firstly, age standardised prevalence of having hypertension plus any combination of other risk factors was calculated. Secondly, the likelihood of being hypertensive according to various risk factors was estimated using multiple logistic regression analysis. Because it was not possible to estimate the variance inflation due to within family clustering, it was decided to use a conservative statistical significance level of p=0.01 to reduce the risk of type I error. Thirdly, as a relatively simple way to place Albania in a comparative perspective in terms of overall burden of risk, people meeting the criteria for the metabolic syndrome (syndrome X), which increases the risk of cardiovascular disease, and for which comparative American data are available, were identified. The syndrome is defined as the presence of three of: waist circumference greater than 102 cm in men and 88 cm in women; serum triglycerides level of at least 1.69 mmol/l; HDL cholesterol level of less than 1.04 mmol/l in men and 1.29 mmol/l in women; blood pressure of at least 130/85 mm Hg; or serum glucose level of at least 6.1 mmol/l.

**RESULTS**

Table 1 shows the distribution of participants according to blood pressure categories. Overall, almost one in three respondents was hypertensive; 12.9% (99% confidence

<table>
<thead>
<tr>
<th>Gender/age (y)</th>
<th>n</th>
<th>Normotensive %</th>
<th>Newly* diagnosed hypertensive %</th>
<th>Known untreated hypertensive %</th>
<th>Known treated hypertensive %</th>
<th>Total hypertensive %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men (all ages)</td>
<td>535</td>
<td>63.4</td>
<td>17.0</td>
<td>3.7</td>
<td>15.9</td>
<td>36.6</td>
</tr>
<tr>
<td>25–34</td>
<td>46</td>
<td>82.6</td>
<td>15.2</td>
<td>2.2</td>
<td>0</td>
<td>17.4</td>
</tr>
<tr>
<td>35–44</td>
<td>90</td>
<td>81.1</td>
<td>11.1</td>
<td>3.3</td>
<td>4.4</td>
<td>18.9</td>
</tr>
<tr>
<td>45–54</td>
<td>132</td>
<td>63.6</td>
<td>21.2</td>
<td>3.8</td>
<td>11.4</td>
<td>35.6</td>
</tr>
<tr>
<td>55–64</td>
<td>132</td>
<td>53.0</td>
<td>21.2</td>
<td>3.8</td>
<td>22.0</td>
<td>46.2</td>
</tr>
<tr>
<td>65+</td>
<td>135</td>
<td>54.8</td>
<td>13.3</td>
<td>4.4</td>
<td>27.4</td>
<td>45.2</td>
</tr>
<tr>
<td>SBP (mm Hg)†</td>
<td>535</td>
<td>125.7 [8.5]</td>
<td>147.6 [10.3]</td>
<td>150.7 [16.6]</td>
<td>152.8 [14.2]</td>
<td>150.1 [13.0]§</td>
</tr>
<tr>
<td>DBP (mm Hg)†</td>
<td>535</td>
<td>75.9 [9.2]</td>
<td>91.2 [8.8]</td>
<td>88.7 [9.9]</td>
<td>88.7 [9.4]§</td>
<td>88.7 [9.4]§</td>
</tr>
<tr>
<td>Women (all ages)</td>
<td>585</td>
<td>72.6</td>
<td>9.6</td>
<td>1.9</td>
<td>15.9</td>
<td>27.4</td>
</tr>
<tr>
<td>25–34</td>
<td>50</td>
<td>96.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0</td>
<td>4.0</td>
</tr>
<tr>
<td>35–44</td>
<td>115</td>
<td>79.1</td>
<td>9.6</td>
<td>2.6</td>
<td>8.7</td>
<td>20.9</td>
</tr>
<tr>
<td>45–54</td>
<td>157</td>
<td>77.7</td>
<td>11.5</td>
<td>2.5</td>
<td>8.3</td>
<td>23.3</td>
</tr>
<tr>
<td>55–64</td>
<td>162</td>
<td>66.3</td>
<td>9.6</td>
<td>1.8</td>
<td>22.5</td>
<td>33.7</td>
</tr>
<tr>
<td>65+</td>
<td>94</td>
<td>55.3</td>
<td>16.3</td>
<td>11.1</td>
<td>34.0</td>
<td>44.7</td>
</tr>
<tr>
<td>DBP (mm Hg)†</td>
<td>585</td>
<td>75.5 [7.3]</td>
<td>87.3 [7.5]</td>
<td>85.2 [8.6]</td>
<td>85.6 [8.1]</td>
<td>85.6 [8.1]§</td>
</tr>
</tbody>
</table>

*Newly diagnosed hypertensive subjects with SBP≥140 mm Hg or DBP≥90 mm Hg diagnosed for the first time from the survey; †SBP, systolic blood pressure (mean [SD]); ‡DBP, diastolic blood pressure (mean [SD]); §p value <0.0001 for differences on mean SBP and mean DBP between normotensives and hypertensives.
Men were significantly more likely to be hypertensive than women (age adjusted odds ratio (OR)=1.43, 99% CI: 1.02 to 2.02).

The overall prevalence of hypertension increased with age in both sexes (p value for trend=0.001 in men and <0.0001 in women), peaking at age 55–64 years and staying constant in women after the age of 65 years (fig 1) while the mean levels of DBP decreased in men after the age of 45–54 years and stayed constant in women across age groups.

Given the tendency of risk factors to cluster, the simultaneous occurrence of four major CVD risk factors (hypertension, obesity, smoking, and hypertriglyceridaemia) is described in more detail in the following paragraphs.

### Table 2

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Normotensive</th>
<th>Newly diagnosed Hypertensive</th>
<th>Known untreated Hypertensive</th>
<th>Known treated Hypertensive</th>
<th>Total hypertensive</th>
<th>p Value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of subjects</td>
<td>n=339</td>
<td>n=91</td>
<td>n=20</td>
<td>n=85</td>
<td>n=196</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Mean age (y)</td>
<td>51.8 (13.4)</td>
<td>54.5 (12.0)</td>
<td>55.5 (12.8)</td>
<td>57.6 (11.3)</td>
<td>60.8 (11.3)</td>
<td></td>
</tr>
<tr>
<td>Mean height (cm)</td>
<td>171.7 (6.8)</td>
<td>171.6 (7.3)</td>
<td>172.9 (5.6)</td>
<td>170.5 (5.9)</td>
<td>171.3 (6.6)</td>
<td>0.50</td>
</tr>
<tr>
<td>Mean BMI (kg/m²)</td>
<td>27.3 (3.5)</td>
<td>28.4 (3.5)</td>
<td>29.0 (3.1)</td>
<td>28.3 (3.8)</td>
<td>28.4 (3.6)</td>
<td>0.001</td>
</tr>
<tr>
<td>Mean waist (cm)</td>
<td>91.3 (11.2)</td>
<td>95.3 (10.8)</td>
<td>99.3 (9.2)</td>
<td>96.4 (9.9)</td>
<td>96.3 (10.3)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Mean hip (cm)</td>
<td>102.3 (8.6)</td>
<td>103.7 (8.2)</td>
<td>109.0 (11.0)</td>
<td>105.2 (10.0)</td>
<td>104.9 (9.4)</td>
<td>0.001</td>
</tr>
<tr>
<td>Mean waist/hip index</td>
<td>0.89 (0.08)</td>
<td>0.92 (0.07)</td>
<td>0.91 (0.07)</td>
<td>0.92 (0.07)</td>
<td>0.92 (0.07)</td>
<td>0.001</td>
</tr>
<tr>
<td>Mean total cholesterol (mmol/l)</td>
<td>5.3 (1.1)</td>
<td>5.4 (1.1)</td>
<td>5.3 (1.4)</td>
<td>5.3 (1.2)</td>
<td>5.4 (1.2)</td>
<td>0.70</td>
</tr>
<tr>
<td>Mean triglycerides (mmol/l)</td>
<td>4.71 (4.65 to 4.76)</td>
<td>4.84 (4.73 to 4.95)</td>
<td>4.78 (4.56 to 5.00)</td>
<td>4.77 (4.66 to 4.87)</td>
<td>4.81 (4.74 to 4.88)</td>
<td>0.04</td>
</tr>
<tr>
<td>Mean HDL (mmol/l)</td>
<td>3.68 (3.67 to 3.69)</td>
<td>3.67 (3.65 to 3.69)</td>
<td>3.66 (3.63 to 3.67)</td>
<td>3.67 (3.63 to 3.69)</td>
<td>3.67 (3.65 to 3.69)</td>
<td>0.13</td>
</tr>
<tr>
<td>Mean LDL (mmol/l)</td>
<td>4.91 (4.88 to 4.94)</td>
<td>4.93 (4.86 to 4.99)</td>
<td>4.94 (4.80 to 5.08)</td>
<td>4.94 (4.87 to 5.01)</td>
<td>4.93 (4.89 to 4.97)</td>
<td>0.38</td>
</tr>
</tbody>
</table>

* p Value for difference between hypertensive and normotensive.

The data made it possible to test a hypothesis generated in an earlier study from Bahrain, which had shown an inverse association between education and blood pressure. This was taken as evidence in favour of a link between adverse circumstances in childhood and adult hypertension. In this study, however, there was no such association after adjusting for gender, age, and body mass index. The odds ratio for being hypertensive (with primary education as the index category) was 1.19 (95% CI 0.71 to 1.98) for secondary and 0.98 (95% CI 0.59 to 1.62) for higher education.

Given the tendency of risk factors to cluster, the simultaneous occurrence of four major CVD risk factors (hypertension, obesity, smoking, and hypertriglyceridaemia) is described in more detail in the following paragraphs.
Distribution of hypertension by body weight categories in men and women. Figure 3

Table 3: Mean (SD) values of cardiovascular risk factors by blood pressure in women

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Nonhypertensive</th>
<th>Newly diagnosed hypertensive</th>
<th>Known untreated hypertensive</th>
<th>Known treated hypertensive</th>
<th>Total hypertensive</th>
<th>p Value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of subjects</td>
<td>n=425</td>
<td>n=56</td>
<td>n=11</td>
<td>n=93</td>
<td>n=160</td>
<td></td>
</tr>
<tr>
<td>Mean age (y)</td>
<td>50.2 (11.9)</td>
<td>53.3 (11.0)</td>
<td>50.2 (7.9)</td>
<td>59.2 (9.6)</td>
<td>56.5 (10.5)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Mean height (cm)</td>
<td>160.2 (6.0)</td>
<td>160.6 (6.2)</td>
<td>161.2 (5.6)</td>
<td>159.8 (6.9)</td>
<td>160.2 (6.6)</td>
<td>0.97</td>
</tr>
<tr>
<td>Mean BMI (kg/m²)</td>
<td>28.1 (4.5)</td>
<td>29.3 (4.9)</td>
<td>30.1 (3.8)</td>
<td>30.1 (4.4)</td>
<td>29.8 (4.5)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Mean waist (cm)</td>
<td>83.7 (10.9)</td>
<td>88.5 (10.6)</td>
<td>89.6 (9.3)</td>
<td>91.7 (10.7)</td>
<td>90.5 (10.6)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Mean hip (cm)</td>
<td>103.6 (10.4)</td>
<td>105.9 (8.7)</td>
<td>108.4 (11.2)</td>
<td>109.0 (11.2)</td>
<td>107.9 (10.5)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Mean waist/hip index</td>
<td>0.81 (0.08)</td>
<td>0.84 (0.08)</td>
<td>0.83 (0.04)</td>
<td>0.84 (0.08)</td>
<td>0.84 (0.08)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Mean total cholesterol (mmol/l)</td>
<td>5.4 (1.3)</td>
<td>5.6 (1.3)</td>
<td>6.1 (1.9)</td>
<td>5.8 (1.1)</td>
<td>5.8 (1.3)</td>
<td>0.004</td>
</tr>
<tr>
<td>Geometric mean triglycerides† (mmol/l)</td>
<td>4.64 (4.59 to 4.68)</td>
<td>4.76 (4.60 to 4.92)</td>
<td>5.03 (4.68 to 5.38)</td>
<td>4.75 (4.66 to 4.83)</td>
<td>4.77 (4.69 to 4.85)</td>
<td>0.003</td>
</tr>
<tr>
<td>Geometric mean HDL (mmol/l)</td>
<td>3.69 (3.67 to 3.70)</td>
<td>3.66 (3.63 to 3.69)</td>
<td>3.66 (3.64 to 3.68)</td>
<td>3.66 (3.64 to 3.68)</td>
<td>3.66 (3.64 to 3.68)</td>
<td>0.049</td>
</tr>
<tr>
<td>Geometric mean LDL§ (mmol/l)</td>
<td>4.97 (4.94 to 4.97)</td>
<td>5.02 (4.95 to 5.09)</td>
<td>5.14 (4.99 to 5.29)</td>
<td>5.04 (4.99 to 5.09)</td>
<td>5.04 (5.00 to 5.08)</td>
<td>0.008</td>
</tr>
</tbody>
</table>

*P Value for difference between hypertensives and normotensives. †Geometric mean (99% confidence intervals), means for triglycerides are calculated with plasma HDL-C set to missing for all those who did not fast (n=17; 3.2%). §Geometric mean (99% confidence intervals), means for LDL-cholesterol are calculated with plasma LDL-C set to missing for all those who did not fast (n=17; 3.2%).

Table 4: Odds ratios of having hypertension according to presence of other cardiovascular risk factors, adjusting for age

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Men Odds ratio</th>
<th>99% CI</th>
<th>p Value</th>
<th>Women Odds ratio</th>
<th>99% CI</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family history of hypertension</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relative weight categories*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overweight</td>
<td>1.66</td>
<td>1.01 to 2.73</td>
<td>0.009</td>
<td>1.88</td>
<td>1.11 to 3.19</td>
<td>0.002</td>
</tr>
<tr>
<td>Obese</td>
<td>2.37</td>
<td>1.11 to 5.05</td>
<td>0.003</td>
<td>2.42</td>
<td>1.13 to 5.18</td>
<td>0.003</td>
</tr>
<tr>
<td>Central obesity</td>
<td>1.11</td>
<td>0.65 to 1.91</td>
<td>0.62</td>
<td>1.45</td>
<td>0.86 to 2.44</td>
<td>0.065</td>
</tr>
<tr>
<td>Total cholesterol &gt;6.5 mmol/l</td>
<td>1.35</td>
<td>0.64 to 2.86</td>
<td>0.30</td>
<td>0.79</td>
<td>0.42 to 1.46</td>
<td>0.32</td>
</tr>
<tr>
<td>HDL cholesterol†</td>
<td>1.13</td>
<td>0.69 to 1.85</td>
<td>0.53</td>
<td>0.88</td>
<td>0.15 to 5.29</td>
<td>0.86</td>
</tr>
<tr>
<td>Triglycerides &gt;1.69 mmol/l</td>
<td>1.65</td>
<td>1.00 to 2.71</td>
<td>0.01</td>
<td>1.25</td>
<td>0.74 to 2.12</td>
<td>0.27</td>
</tr>
<tr>
<td>LDL cholesterol &gt;3.38 mmol/l</td>
<td>1.25</td>
<td>0.77 to 2.04</td>
<td>0.24</td>
<td>1.13</td>
<td>0.66 to 2.02</td>
<td>0.51</td>
</tr>
<tr>
<td>Glucose tolerance†</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Impaired glucose tolerance</td>
<td>1.51</td>
<td>0.35 to 6.59</td>
<td>0.47</td>
<td>1.41</td>
<td>0.41 to 4.82</td>
<td>0.47</td>
</tr>
<tr>
<td>Diabetes</td>
<td>1.44</td>
<td>0.58 to 3.56</td>
<td>0.30</td>
<td>0.88</td>
<td>0.31 to 2.49</td>
<td>0.75</td>
</tr>
</tbody>
</table>

*Normal/underweight as baseline category. †Normal glucose tolerance as baseline category. §Low high density lipoprotein (HDL) cholesterol: <1.04 mmol/l in men and <1.29 mmol/l in women. Significant values in bold.

Table 5: Frequency and clustering of CVD risk factors [hypertension, obesity, smoking, and hypertriglyceridaemia] by sex

<table>
<thead>
<tr>
<th>Risk factors [hypertension, obesity, smoking, and hypertriglyceridaemia]</th>
<th>Male (age adjusted)* %</th>
<th>Female (age adjusted)* %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension (HT)</td>
<td>36.6 (30.2)</td>
<td>27.4 (22.7)</td>
</tr>
<tr>
<td>Obesity (O)</td>
<td>22.8 (22.0)</td>
<td>35.6 (30.9)</td>
</tr>
<tr>
<td>Smoking (S)</td>
<td>37.6 (44.4)</td>
<td>19.3 (21.6)</td>
</tr>
<tr>
<td>Hypertriglycerides (HTG)</td>
<td>23.6 (23.9)</td>
<td>19.1 (15.4)</td>
</tr>
<tr>
<td>HT + O</td>
<td>9.7 (8.8)</td>
<td>12.0 (10.4)</td>
</tr>
<tr>
<td>HT + S</td>
<td>12.5 (11.6)</td>
<td>4.6 (4.3)</td>
</tr>
<tr>
<td>HT + HTG</td>
<td>3.9 (4.3)</td>
<td>1.9 (2.2)</td>
</tr>
<tr>
<td>HT + O + S</td>
<td>3.6 (3.2)</td>
<td>2.9 (2.7)</td>
</tr>
<tr>
<td>HT + O + HTG</td>
<td>4.7 (4.2)</td>
<td>1.2 (1.4)</td>
</tr>
<tr>
<td>HT + O + S + HTG</td>
<td>1.7 (1.5)</td>
<td>0.3 (0.7)</td>
</tr>
</tbody>
</table>

*Prevalence rates were age adjusted by the direct method using the age distribution of the Tirana population (INSTAT 1998 data).

DISCUSSION

This study provides important new evidence on the prevalence of hypertension and other cardiovascular risk factors in Albania and creates a baseline against which future changes can be assessed. It showed that more than one in three men and one in four women aged 25 years and over in Tirana City suffer from hypertension, which is one of the few other sources of population prevalence of this syndrome.

The percentages in each group meeting the criteria for the metabolic syndrome are shown in figures 4 and 5, for comparison, figures from the American National Health and Nutrition Survey, which is one of the few other sources of population prevalence of this syndrome.23
However, the results cannot be generalised to the whole country, nia (including nearly 20% of the Albanian population).vides the only data on the prevalence of hypertension and clus-
tion (1998 INSTAT data). Another limitation of the study is the
prevalence rates were age standardised to the Tirana City popu-
population in terms of age as it included a lower than expected
final sample was not entirely representative of the general
strength and limitations of the study must be considered.
A major strength of the survey is its relatively high response
rate (72.7%), comparable to the rates achieved in recent surveys
conducted in other countries in transition. Despite this, the
final sample was not entirely representative of the general
population in terms of age as it included a lower than expected
proportion of younger people. As this might have led to an over-
estimation of the true prevalence of hypertension, overall
prevalence rates were age standardised to the Tirana City popu-
lation (1998 INSTAT data). Another limitation of the study is the
fact while some respondents were from the same households,
information on variance inflation due to clustering was not
available. As a result, it is possible that the true standard errors
of the estimates were underestimated and that the risk of type I
error was increased. In an attempt to counterbalance these
findings from surveys conducted in Hungary, as expected, this study showed clear gender differences in
the prevalence of hypertension, with men being more likely to
be hypertensive than women, even after adjusting for various
sociodemographic and lifestyle factors, family history of
hypertension, and excess body weight. Surveys conducted in
other countries in transition found similar gender differen-
ces in the prevalence of hypertension.
In our study population, we observed that more than half
the respondents treated for hypertension were adequately
controlled. This is more than what was expected based on
findings from surveys conducted in Hungary, Belgium, or
China that reported much higher unsatisfactory levels of
blood pressure control (20%-30%) in respondents receiving
treatment for hypertension.
The lack of an association between education and hyper-
tension was not entirely surprising. The massive scale of tran-
sition in Albania means that earlier social hierarchies have
been almost entirely disrupted.
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tension was not entirely surprising. The massive scale of tran-
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In recent years it has been proposed that hypertension is part
of a cluster of metabolic risk factors (syndrome X) involving
hyperlipidaemia (raised plasma triglycerides and low HDL
cholesterol levels) and hyperglycaemia, with hyperinsulinaemia
as the common link. In this survey, only excess weight, fam-
ily history of hypertension and, among men, increased
triglycerides, were associated with hypertension. The associ-
ation with a positive family history of hypertension and excess
weight has been reported in many studies.
To place Albania in a comparative perspective in terms of
overall risk factors, given that the effects of cardiovascular risk
factors tend to be synergic, other studies that had looked at
the combination of factors were identified. The prevalence of a
combination of risk factors (obesity, hypertension, smoking)
from hypertension and that about one in ten people are both
hypertensive and obese. These figures are surprising in a soci-
city that has relatively recently moved from a very traditional
lifestyle. Before the results are discussed further, the strength
and limitations of the study must be considered.

As noted above, Albania has been extremely isolated during
much of the 20th century and, to our knowledge this study pro-
vides the only data on the prevalence of hypertension and clus-
tering of CVD risk factors in the largest urbanised part of Alba-
nia (including nearly 20% of the Albanian population). However, the results cannot be generalised to the whole country,
as it is probable that diet, physical activity levels, and
consequently the prevalence of hypertension would differ in rural areas. Thus, our estimates may be higher than what would
be found in a nationally representative survey. A better under-
standing of the impact of changing lifestyles in both urban and rural areas is thus urgently needed in this society in transition.
Elsewhere we have reported how this population has experi-
enced a rapid increase in the prevalence of diabetes since the
transition. Unfortunately, as already noted, we do not have
historical data with which to compare our findings. However,
data are available from the Seven Country Study, which had
study sites in Greece and Italy. Data on a range of risk factors
were recorded at entry in 1960-1961 and repeated 10 years later.
The data in the present survey indicate that the urban popula-
tion of Albania exhibit a risk profile that is consistent with what
existed in Greece and Italy in the early 1960s (table 6).

However, a different pattern is seen when the percentage of
people classified as hypertensive is considered, rather than the
mean blood pressure. In this case, the percentage that is
hypertensive is identical among men (30.2%) although rather
lower (22.7% versus 27.1%) among women in comparison
with contemporary Greeks. However, the prevalence of
hypertension is still considerably lower than in other, albeit
rather more industrialised former communist countries, such
as Hungary (37.2%) or in Russia (36%).

As expected, this study showed clear gender differences in
the prevalence of hypertension, with men being more likely to
be hypertensive than women, even after adjusting for various
sociodemographic and lifestyle factors, family history of
hypertension, and excess body weight. Surveys conducted in
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### Table 6: Comparison of 2000 Albanian data with data from Italy and Greece in 1960/61 and 1970/71

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Body mass index</td>
<td>28.6</td>
<td>25.2</td>
<td>23.1</td>
<td>26.1</td>
<td>24.3</td>
</tr>
<tr>
<td>Systolic blood pressure (mm Hg)</td>
<td>133.7</td>
<td>143.3</td>
<td>135.9</td>
<td>152.6</td>
<td>141.4</td>
</tr>
<tr>
<td>Cholesterol (mmol/l)</td>
<td>5.4</td>
<td>5.2</td>
<td>5.3</td>
<td>5.7</td>
<td>5.9</td>
</tr>
</tbody>
</table>

Source of Italian and Greek data: Donats et al.
Cardiovascular risk factors in Albania was considerably lower than in Hungary, in what was the most comparable study from a society in transition, although the Hungarian study did not report lipid levels. However, what was most striking was that the combination of risk factors that make up the metabolic syndrome, which can be very much lower than in the American population.

In conclusion, these findings provide important new evidence on the prevalence of hypertension and its association with other cardiovascular risk factors in Albania. Albania is changing rapidly. The prevalence of hypertension is, as in other societies in transition, a cause for concern but the levels of other cardiovascular risk factors remain somewhat lower than in other industrialised and transition countries, suggesting that Albania has so far not entirely lost its relative advantage.

The findings have important implications for both health care and health promotion. Although there was a relatively low frequency of undiagnosed hypertension, a substantial number of those affected had not achieved adequate control. There is now compelling evidence from several countries in this region that have experienced a turbulent transition that the management of longstanding diseases often suffers.

It will be important that future Albanian health care reforms, which in other post-transition countries have tended to focus on acute care, do not make the management of longstanding disorders more difficult. The risks are particularly great because those suffering from chronic diseases are often old and with limited resources. It is almost inevitable that the risk factor profile in Albania will worsen in the coming years. Given the many profound challenges facing Albania the development and implementation of an effective health strategy will inevitably be very difficult. However, it is essential not to allow the magnitude of the task to prevent any action. It may not be easy to influence the changing pattern of nutrition but other risk factors, such as smoking, whose actions are synergistic with those discussed here, can be tackled now.

ACKNOWLEDGEMENT
We would like to thank all the staff of Diabetic Centre “Neo-Style” in Tirana for their collaboration and support.

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Funding: this study was funded by the Wellcome Trust (project grant no. 061573). However, the Wellcome Trust cannot accept any responsibility for any information provided or views expressed.

Conflicts of interest: none declared.

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12. Reference withdrawn.


