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# Prevalence, Treatment, and Control of Hypertension by Sociodemographic Factors Among the Dutch Elderly

Caroline T.M. van Rossum, Hendrike van de Mheen, Jacqueline C.M. Witteman, Albert Hofman, Johan P. Mackenbach, Diederick E. Grobbee

**Abstract**—The study objective was to assess the prevalence, level of treatment, and control of hypertension in a general elderly population according to age and sociodemographic factors. We conducted a cross-sectional analysis of 7983 participants of the Rotterdam Study who were  $\geq 55$  years old and living in a district of Rotterdam. The prevalence of hypertension was based on blood pressure levels ( $\geq 160/95$  mm Hg) and the use of blood pressure-lowering medication for the indication of hypertension, type of treatment, and control of hypertension. Systolic blood pressure rises with age, whereas diastolic blood pressure declines. The prevalence of hypertension increases with age and was higher among women (39%) than among men (31%). About 80% of the hypertensives were aware of having hypertension, and 82% of the 80% were treated. For 70% of them, treatment was adequate with reference to conservative criteria. Hypertension was more prevalent among persons not living in a home for the elderly, for more-educated men, and for less-educated women. Persons without a partner and men living in a home for the elderly had a higher risk of being unaware of or of not being treated for existing hypertension. Treatment was more often successful among those living in a home for the elderly. The prevalence of hypertension was higher among older women and increased with age in both genders. A large proportion of hypertensive elderly persons were aware and were successfully treated for hypertension. The degree of awareness and control appeared to be affected by sociodemographic factors. More importantly, the majority of hypertensives did not have their hypertension well controlled. This group requires more attention by medical practitioners to reduce the burden of cardiovascular diseases in elderly persons. (*Hypertension*. 2000;35:814-821.)

**Key Words:** hypertension, detection and control ■ age ■ sociodemographic factors ■ epidemiology

Hypertension is an important risk factor for cardiovascular diseases. One of the cornerstones of the primary prevention of cardiovascular diseases has been screening for high blood pressure and antihypertensive drug treatment.<sup>1</sup> Until recently, elderly subjects were excluded from treatment studies, despite the fact that they are at high risk for complications or death from hypertension-related diseases.<sup>2</sup> However, the benefits of antihypertensive drug therapy for older persons have been clearly established.<sup>3-8</sup> Results from trials and meta-analyses have shown that antihypertensive drug treatment for older hypertensive persons confers highly significant and clinically relevant reductions in cardiovascular morbidity and mortality rates.<sup>2,8</sup> Nevertheless, a considerable percentage of older persons with hypertension are not detected or are not adequately treated for hypertension.

We provide data on the prevalence, treatment, awareness, and control of hypertension among an elderly Dutch population. In addition, we examined whether there are socioeconomic and demographic differences in the diagnosis and treatment of hypertension.

## Methods

### Study Population

The present study was conducted as a part of the Rotterdam Study, a prospective cohort study among 7983 persons (response rate 78%)  $\geq 55$  years old and living in 1 defined geographic area in Rotterdam, the Netherlands. The rationale and design of the study have been described elsewhere.<sup>9</sup> In summary, the objective of the Rotterdam Study was to investigate the determinants of chronic and disabling cardiovascular, neurogeriatric, locomotor, and ophthalmologic diseases. The baseline examination started in 1990 and continued until June 1993. The examinations consisted of a home visit by trained interviewers and 2 follow-up visits for a clinical examination at the research center. The study was approved by the Medical Ethics Committee of Erasmus University, and written informed consent was obtained from all participants.

### Measurements

#### Blood Pressure

On 1 occasion, systolic and diastolic blood pressures from the right upper arm were measured with a random-zero sphygmomanometer twice with the patient in a sitting position. The mean of the 2 blood pressure readings was used to determine blood pressure levels.

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Hypertension was defined as a systolic blood pressure of  $\geq 160$  mm Hg, a diastolic blood pressure of  $\geq 95$  mm Hg, the current use of blood pressure-lowering drugs for the indication of hypertension, or a combination. The use of medication and type of medication were assessed during the home interview by a research assistant. The participants subsequently showed all their currently used medication at the research center, where a physician determined the indication for which each medication had been prescribed. In case of blood pressure levels below the cutoff points and inconsistencies or missing values regarding indication, additional information was used to classify subjects as hypertensive or nonhypertensive. This additional information was obtained, first, from the response to the question, "Have you ever been told by a doctor that you have hypertension?" and, second, from the response to the question, "Were you ever treated with drugs because of high blood pressure?"

On the basis of their awareness, treatment status, and control of hypertension, hypertensives were classified into 4 subgroups: treated and controlled, treated and uncontrolled, untreated and aware, and untreated and unaware. In the hypertensives who were treated, a distinction was made between those for whom blood pressure was  $< 160/95$  mm Hg and thus controlled ("treated and controlled") and those for whom blood pressure was not controlled ("treated and uncontrolled"). Information on awareness was obtained on the basis of the response to the question, "Have you ever been told by a doctor that you have hypertension?" By definition, those who were treated were considered to be aware of having hypertension. Blood pressure-lowering drugs were classified into 3 categories: diuretics,  $\beta$ -blockers, and "other" antihypertensive medication.

### **Sociodemographic Factors**

Information on education, occupation (eg, professionals, routine non-manual workers, small business owners, and manual workers), and household income (in quartiles) as indicators of socioeconomic status was obtained by trained interviewers during the home visit at the study baseline (1990 to 1993). Similar results were observed for the associations of hypertension with these different indicators. We report here the results for the indicator "education" only, because the number of missing values (4%) for this indicator was the lowest. The participants were asked about their formal education, the number of years of each type of education, and whether education had been completed. From this information, the highest attained level of education was defined, and this was classified into 3 categories: low (eg, primary education), medium (eg, lower-level general education, intermediate-level general education, and lower-level vocational education), and high (eg, higher-level general education, intermediate-level vocational education, higher-level vocational education, and university). The other sociodemographic factors (ie, "having a partner," health insurance status, and living situation) were assessed during the same interview with a questionnaire. On the basis of the question regarding partnership, subjects were categorized into 2 groups: those currently with a partner and those without a partner, including widowed and divorced persons. Health insurance was dichotomized into health insurance via the Sickness Fund (for persons below a certain income level) and private insurance (for persons above this income level and civil servants). Living situation was divided into living independently and living in a home for the elderly.

### **Data Analysis**

All analyses were performed with the SPSS package and were performed separately for women and men. The prevalence of hypertension was assessed on the basis of 5-year age groups. These age-specific prevalence rates were weighted according to the age distribution in the Netherlands in 1992 to estimate the prevalence of hypertension for the total Dutch elderly population. Frequencies of awareness, treatment, or control were assessed on the basis of 10-year age groups. Mean blood pressure levels according to 10-year age groups and by subgroups of hypertensives were calculated with regression analysis. In addition, regression analyses in which age was included as an ordinal variable (1, 2, 3, and 4) were performed to test for trend.

Multivariate linear and logistic regression analyses were performed to determine the age-adjusted association between several sociodemographic factors and blood pressure levels, prevalence of hypertension, being unaware of having hypertension compared with being aware, being untreated compared with being treated, and having uncontrolled compared with having controlled hypertension. In addition, the relationship between these factors and the use of a certain type of medication was assessed with multivariate logistic regression analysis.

## **Results**

Distributions of age and sociodemographic variables for the study population are shown in Table 1. The mean age of the women was slightly higher than that of the men (72 [SD 9] and 69 [SD 10] years, respectively). Forty percent of the population had attended only primary school. Generally, men had higher education levels than women; 15% of the men and 4% of the women were classified in the highest educational groups. Educational level was inversely associated with age. Of subjects younger than 65, 13% were classified in the highest educational group versus 6% of subjects older than 65. The majority (84% of the men and 51% of the women) had a partner, and the proportion of widowed or divorced women was higher than the proportion of widowed or divorced men (results not shown). Furthermore, relatively more women were institutionalized than men. Finally, relatively more men than women had private insurance.

### **Prevalence of Hypertension**

Figure 1 shows the increasing prevalence of hypertension with age for men and women. The overall prevalence of hypertension, standardized to the total Dutch population, was higher in women than in men (39% and 31%, respectively). For the women, the prevalence of hypertension continuously increased with age, from 22% in the youngest age group to 52% in those  $\geq 85$  years old. For men, the prevalence rate increased with age until 80 years (from 22% to 39%).

### **Awareness, Treatment, and Control of Hypertension**

Figure 2 shows the levels of awareness, treatment, and control of hypertension for male and female hypertensives by age. In total, 25% of the hypertensive men and 18% of the hypertensive women were not aware of having hypertension. Of those aware of having hypertension,  $\approx 82\%$  were treated. Furthermore, 70% of those treated were normotensive with treatment. Of all hypertensives, only 46% had controlled hypertension. For both genders, this proportion of controlled hypertensives decreased with age, whereas the proportion of treated uncontrolled hypertensives increased with age. For men, the proportion of persons aware of having hypertension (treated and untreated) also decreased with age.

### **Blood Pressure**

Table 2 shows the mean systolic and diastolic blood pressure values for the total population and for subgroups classified by awareness and treatment status. In general, systolic blood pressure increased and diastolic blood pressure decreased with age. Women showed a stronger increase in systolic blood pressure with age than did men. The decrease in diastolic blood pressure with age was more marked among

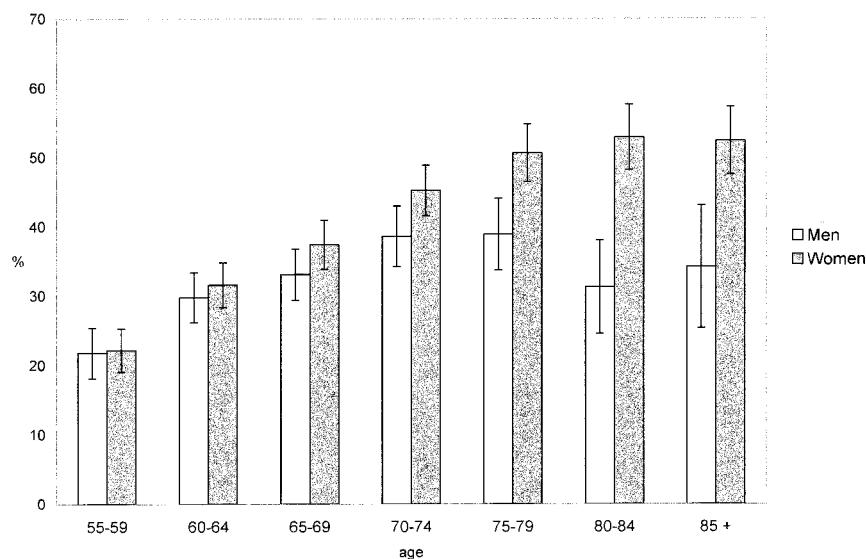
**TABLE 1. Characteristics of Study Population**

Characteristic	Men (n=3105)	Women (n=4878)
Age, %		
55–59 y	16.5	14.7
60–64 y	20.9	17.2
65–69 y	21.1	15.6
70–74 y	16.8	15.7
75–79 y	12.5	13.2
80–84 y	7.4	10.6
≥85 y	4.9	12.9
Education, %		
(n=3017)	(n=4552)	
High: intermediate/higher general education, intermediate/higher vocational education, and university	49.6	23.2
Medium: lower general and lower vocational education	22.5	28.5
Low: primary education	27.9	48.3
With a partner, %		
(n=2662)	(n=4375)	
With a partner	83.7	50.8
Without a partner (including widowed and divorced persons)	16.3	49.2
Living situation, %		
Living independently	94.0	85.4
Living in a home for the elderly	6.0	14.6
Health insurance, %		
Private insurance	51.9	36.8
Sickness fund	48.1	63.5

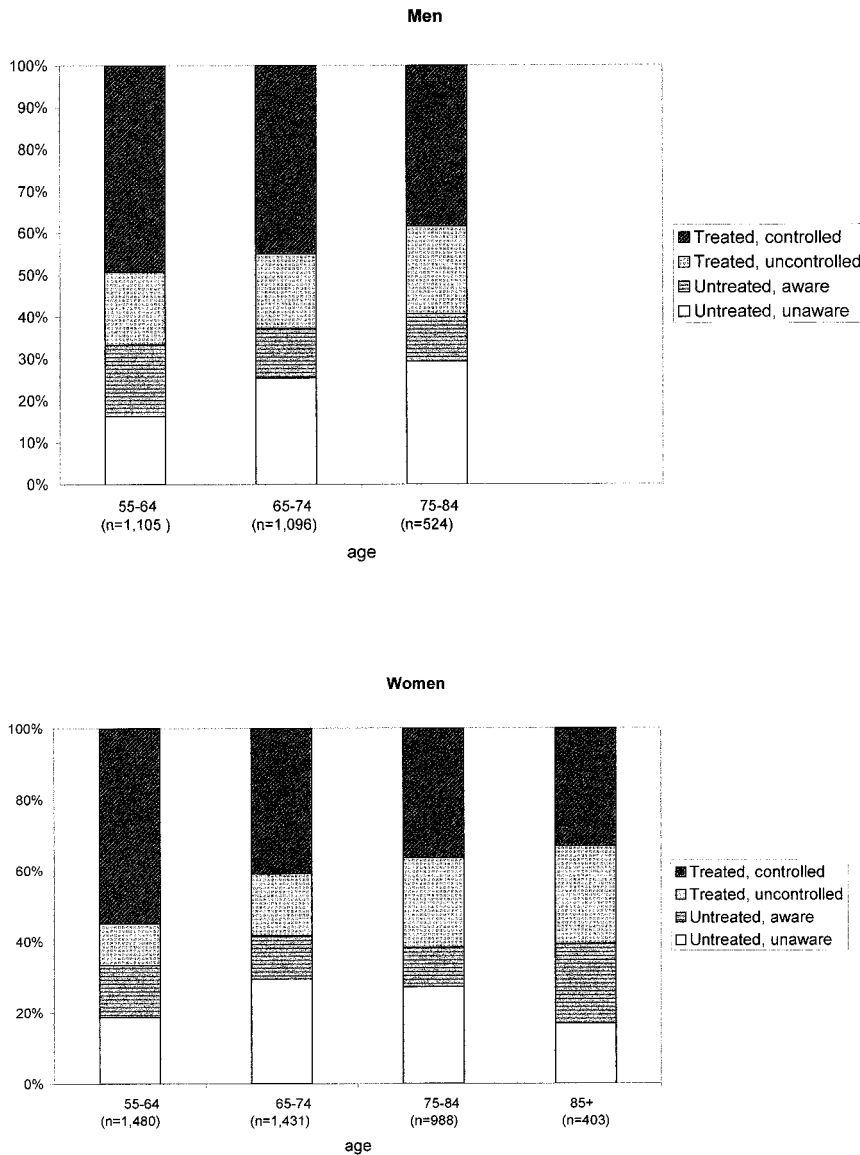
men than among women. Despite these differences between men and women, mean systolic and diastolic blood pressures did not considerably differ between men and women. The mean systolic and diastolic blood pressures of controlled hypertensives were slightly higher than those of the normotensives.

### Antihypertensive Drug Treatment

Table 3 shows the proportions of the various blood pressure-lowering drugs used by men and women in monotherapy or combination therapy. Diuretics were more often prescribed for older patients and for women. Furthermore, the use of  $\beta$ -blockers decreased with age. Other antihypertensive drugs,



**Figure 1.** Prevalence of hypertension by age and gender. Hypertension was defined as a systolic blood pressure of  $\geq 160$  mm Hg, a diastolic blood pressure of  $\geq 95$  mm Hg, or current use of blood pressure-lowering drugs for indication of hypertension.



**Figure 2.** Distribution of hypertension across categories of unawareness, treatment, and control by age and gender. As a result of missing data, awareness, treatment, and control classifications could not be made for 224 hypertensives.

such as calcium channel antagonists, were mainly prescribed for male hypertensives aged 65 to 74 years and female hypertensives aged 75 to 84 years. The proportion of patients using other antihypertensive drugs was higher in men than in women.

Note that blood pressure-lowering drugs are also prescribed for indications other than hypertension (for the normotensives as well as for the hypertensives); for example, almost 13% of the normotensives were using blood pressure-lowering drugs for an indication other than hypertension.

### Differences by Socioeconomic and Demographic Factors

Table 4 shows the age-adjusted odds ratios for hypertension and for being unaware, untreated, or uncontrolled according to several sociodemographic factors. Hypertension was slightly more frequent among the more-educated men, less-educated women, and those not living in a home for the elderly. A higher systolic blood pressure was observed among those not living in a home for the elderly (12 and 6 mm Hg for women and men, respectively).

Among male hypertensives, less-educated men, those living in a home for the elderly, and those without a partner tended to be less aware of having hypertension. Among female hypertensives, no clear sociodemographic differences in awareness were observed.

For those aware of having hypertension, men and women without a partner, men with private health insurance, and men living in a home for the elderly were less often treated. Finally, a lower proportion of treated persons living independently had controlled hypertension compared with those living in a home for the elderly.

The type of treatment also differed by these sociodemographic factors.  $\beta$ -Blockers were less often prescribed for the less-educated persons, those with insurance via the Sickness Fund, men with a partner, and women without a partner (results not shown). Diuretics were less often prescribed for the less-educated women and women without a partner. Finally, other antihypertensive agents were more often prescribed for women without a partner and those living in a home for the elderly (results not shown).

**TABLE 2. Mean Systolic and Diastolic Blood Pressures According to Age and Gender in Total Population and Across Categories of Awareness, Treatment, and Control of Hypertension**

Gender/Age Category	Participants With Actual Hypertension												
	Total Population		Normotensives		Untreated, Unaware		Untreated, Aware		Treated, Uncontrolled		Treated, Controlled		
	n	SBP	DBP	SBP	DBP	SBP	DBP	SBP	DBP	SBP	DBP	SBP	DBP
Men, aged 55+ y	2797	138.7	74.5	130.8	71.4	171.1	84.5	170.8	89.6	175.6	87.0	135.8	74.4
55–64 y	1095	134.7	76.1	128.3	73.2	170.1	91.1	171.1	91.4	172.8	91.1	135.1	77.2
65–74 y	1074	140.4	74.5	132.5	71.1	170.9	86.2	169.8	88.5	175.6	86.3	135.6	74.2
75–84 y	518	142.3	71.5	132.5	68.2	171.9	79.9	175.0	86.9	179.4	83.4	137.7	69.4
85+ y	110	145.1	72.9	134.0	69.4	*	*	*	*	*	*	*	*
<i>P</i> trend		<0.001	<0.001	<0.001	<0.001	0.50	<0.001	0.46	0.078	0.008	0.003	0.26	<0.001
Women, aged 55+ y	4212	139.9	73.1	130.0	69.7	170.9	83.0	172.7	85.5	173.6	83.4	137.5	73.1
55–64 y	1470	130.8	73.5	124.4	70.8	168.6	86.8	168.4	88.0	167.8	89.3	134.4	76.3
65–74 y	1392	142.1	73.5	132.9	69.8	171.2	83.4	171.5	85.7	171.9	84.5	139.8	73.5
75–84 y	953	147.8	72.7	135.8	68.3	172.4	79.8	175.5	85.2	176.6	82.2	138.6	70.5
85+ y	396	147.2	71.1	134.9	66.4	170.3	83.7	177.6	81.0	175.6	77.1	135.2	66.3
<i>P</i> trend		<0.001	<0.001	<0.001	<0.001	0.32	0.035	<0.001	0.006	<0.001	<0.001	0.053	<0.001

SBP indicates systolic blood pressure; DBP, diastolic blood pressure. Values are given in mm Hg.

\*The number in this group is <25, and therefore no mean is given.

### Discussion

This study provides data on the prevalence, treatment, awareness, and control of hypertension among an elderly Dutch population. Furthermore, data are given on sociodemographic differences in the diagnosis, treatment, and control of hypertension. To appreciate the findings, certain methodological aspects of the study should be considered.

First, the potential of selective participation must be addressed. Despite a high response rate, it is likely that our study population is relatively healthy compared with the total Dutch population, because older persons and those with health problems are less likely to participate.<sup>10,11</sup> Consequently, the true prevalence rate of hypertension in Dutch persons  $\geq 55$  years old may be somewhat higher. In addition,

our study population includes relatively more older persons than the total Dutch population in these age groups. This latter problem was solved with calculation of the total prevalence rate of hypertension on the basis of age-weighted prevalence rates.

Blood pressure was measured twice at 1 visit; this may lead to an overestimation of the prevalence of hypertension and to an underestimation of adequately controlled patients among those treated with antihypertensive medication.<sup>12</sup> For this reason, we used a definition of hypertension based on rather conservative blood pressure levels and the use of blood pressure-lowering medication. The relatively high blood pressure criteria limit the potential of misclassification of a diagnosis of hypertension because blood pressure levels were

**TABLE 3. Use of Various Antihypertensive Agents for Men and Women**

Gender/Age Category	n (100%)	Diuretics, %	$\beta$ -Blockers, %	Other Antihypertensive Agents, %
Male treated hypertensives	576	32.7*	51.5	52.5
55–64 y	195	23.1	52.3	51.8
65–74 y	251	30.8	52.0	57.2
75–84 y	117	49.6	50.4	45.3
Male normotensives†	1867	4.9	6.5	5.4
Female treated hypertensives	1191	52.9	45.0	39.1
55–64 y	291	42.1	52.1	32.1
65–74 y	417	48.2	50.6	37.6
75–84 y	362	61.3	39.0	45.0
85+ y	121	70.3	27.3	43.0
Female normotensives†	2521	7.5	4.1	3.4

\*Diuretics,  $\beta$ -blockers, and other antihypertensive agents are prescribed in monotherapy as well as in combination therapy. Therefore, the sum of the proportion of users of diuretics, the proportion of users of  $\beta$ -blockers, and the proportion of users of other antihypertensive agents exceeds 100%.

†Use of these medications for indications other than hypertension.

**TABLE 4. Sociodemographic Factors and Hypertension, Being Unaware of Having Hypertension, Being Untreated, or Uncontrolled (odds ratios adjusted for age)**

Sociodemographic Factor	Total Population		Hypertensives		Aware Hypertensives		Treated Hypertensives	
	Hypertension		Unaware*		Untreated†		Uncontrolled‡	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
<b>Men</b>								
Education								
Medium (vs high)	0.90	0.73–1.10	1.29	0.86–1.92	0.74	0.42–1.39	1.22	0.76–1.95
Low (vs high)	0.85	0.70–1.03	1.26	0.86–1.85	0.83	0.50–1.39	0.90	0.56–1.45
Having no partner (vs having a partner)	1.11	0.87–1.43	1.45	0.93–2.27	2.89	1.65–5.08	0.96	0.50–1.86
Health insurance via Sickness Fund (vs private insurance)	0.93	0.78–1.09	1.13	0.82–1.56	0.59	0.38–0.90	0.92	0.62–1.35
Living in a home for the elderly (vs living independently)	0.84	0.57–1.22	1.49	0.78–2.85	2.51	0.96–6.57	0.36	0.13–1.55
<b>Women</b>								
Education								
Medium (vs high)	1.17	0.98–1.40	1.01	0.68–1.50	0.90	0.59–1.37	0.87	0.58–1.31
Low (vs high)	1.20	1.01–1.42	0.92	0.64–1.32	0.89	0.61–1.32	1.12	0.77–1.63
Having no partner (vs having a partner)	0.94	0.81–1.09	0.97	0.71–1.32	1.39	0.99–1.95	0.87	0.64–1.20
Health insurance via Sickness Fund (vs private insurance)	0.99	0.87–1.13	1.09	0.82–1.44	1.03	0.76–1.40	0.89	0.67–1.18
Living in a home for the elderly (vs living independently)	0.53	0.42–0.67	1.07	0.68–1.68	1.05	0.58–1.89	0.40	0.24–0.66

\*Risk for being Untreated Unaware for all hypertensives.

†Risk for being Untreated Aware for all aware hypertensives (Treated Controlled, Treated Uncontrolled, and Untreated Aware).

‡Risk for being Treated Uncontrolled for all treated hypertensives.

based on measurements obtained at a single occasion. The definition of normotension includes subjects with borderline isolated systolic hypertension to such an extent that systolic blood pressure was between 140 and 160 mm Hg. This applied to 20% of the men and women. A comparison of the prevalence of hypertension with that of other studies should be done with caution because of different cutoff points, number of measurements, or different measurement techniques.<sup>13,14</sup> For example, if we had chosen lower cutoff points of blood pressure levels (eg, 140/90 mm Hg) instead of 160/95 mm Hg, the prevalence rates of hypertension would have been 52% and 58% for men and women, respectively. In our study, we did not include in the prevalence estimates persons with a normal blood pressure who are using blood pressure-lowering drugs for other indications than hypertension. Results from this study indicate that blood pressure-lowering drugs are frequently used for other indications, especially in an older population. In several other reports, however, users of blood pressure-lowering drugs were not specified by indication.

The classification of hypertensives into “untreated and unaware,” “untreated and aware,” and “treated and uncontrolled” categories may be affected by the differences in cognitive performance in this elderly population. Persons with cognitive decline could be misclassified, because they are likely to have had more problems with answering the questions. Furthermore, it is likely that cognitive decline with age is more prevalent among those with a lower socioeconomic status,<sup>15</sup> among older persons, and possibly even in those with clinically elevated blood pressure levels. The direction in which this misclassification has affected the results is unclear.

To classify socioeconomic status in this study, we used the indicator “education.” Each indicator (eg, education, occupation, and income) represents another dimension of socioeconomic status. However, there is some overlap among the main indicators of socioeconomic status. This is confirmed by our findings (not shown) that other available indicators of socioeconomic status (eg, income and occupational level) in general showed the same trends.

The results of this study demonstrate that hypertension is more prevalent among elderly women than among men and that the prevalence increases with age. Although a comparison with other studies is difficult due to the problems mentioned earlier, our results do not substantially differ from those obtained from a recent overview of studies on the prevalence of hypertension in the Netherlands.<sup>13</sup> Other studies among elderly subjects have similarly shown a higher prevalence of hypertension among women compared with men and an increase with age.<sup>6,14,16–18</sup> Hormonal factors, postmenopausal weight gain, and a different risk profile might account for the higher age-specific prevalence rates of hypertension among women compared with men.<sup>16</sup> Diastolic blood pressure levels off with age,<sup>17,19</sup> and at older ages systolic blood pressure rises, resulting in a higher prevalence of isolated systolic blood pressure.<sup>16</sup> Possibly, the decline in diastolic blood pressure reflects increased atherosclerosis in this aging population due to stiffening of the large arteries.<sup>20</sup>

Several studies have demonstrated a beneficial effect of treatment in older persons. Trials of patients older than 60 years have shown that antihypertensive drug therapy reduces the risk of stroke, cardiovascular diseases, heart failure, and death.<sup>3–7,21</sup> Nevertheless, several studies, including ours, have shown that a considerable proportion of the hypertensives are

not aware of having hypertension and that among those who are aware, a considerable proportion are not treated.<sup>17,22–26</sup> The frequencies of awareness, however, appear to vary substantially, ranging from 23% in China to 97% in women in the United States.<sup>25</sup> The percentage of aware of hypertensives in our study population, about 75%, is lower than that reported from most industrialized countries.<sup>17</sup> Similar to most other studies, the women in our population have a better awareness than men.<sup>23,25</sup> This finding suggests that general practitioners make different monitoring and treatment decisions according to gender or that health consciousness differs between genders.

In our male study population, unawareness of hypertension tended to increase with age. Several explanations for this increase with age can be considered. First, it is likely that physicians are still more hesitant to diagnose hypertension in elderly persons due to a lack of consensus on the cutoff points for hypertension and a possible awareness of white coat hypertension among elderly persons.<sup>27</sup> Second, it is possible that the physician-patient communication differs with age. Third, cognitive function of the participants may have affected the awareness.

Approximately 66% of the hypertensives in our study population were treated, and for a majority of those (70%), this treatment was adequate with reference to our conservative criteria. A comparison of this proportion with the “rules of halves,” which has been the dogma of the past (ie, only half of the hypertensives are detected, half of which are treated, of which only half achieve adequate blood pressure control), and other recent surveys among the elderly,<sup>19,28</sup> suggests that there is an increasing tendency for medical treatment among the elderly and a better quality of control. However, a considerable proportion of the hypertensives are not treated or are treated ineffectively, especially at older ages. Indeed, in view of the recent data from the Hypertension Optimal Treatment (HOT) study, only 30% of the treated hypertensives in our study population reached the rather low targets defined in this trial. However, the public health impact of even a small decline can be substantial.

Until now, no single drug class is regarded as uniquely suitable as the first-line therapy for all elderly patients. For example, Messerli et al<sup>29</sup> reported poor impact of the use of  $\beta$ -blockers on blood pressure levels and the prevention of cardiovascular diseases exclusive of stroke in older hypertensives.<sup>29</sup> Therefore, it is not possible to judge whether the persons are treated in an optimal way. The most appropriate choice of antihypertensive drug often depends on comparative adverse profiles, the presence of comorbidity,<sup>12</sup> and the use of other medication.<sup>30</sup> This might explain why treatment strategies differ according to gender and age. For example, diuretics were more often prescribed for patients at older ages and for women, and  $\beta$ -blockers were less often prescribed for patients at older ages. In addition, our study showed that these medications are also frequently prescribed for other indications.

Several studies have reported an inverse association between socioeconomic status and hypertension or blood pressure level.<sup>31,32</sup> Our findings among women are consistent with these studies. The positive association observed among

men, however, is in contrast to these studies and is also in contrast to recent studies conducted in the Netherlands among younger persons.<sup>33</sup> Nevertheless, the results in men are in line with Dutch studies carried out some decades ago.<sup>34,35</sup> Hoeymans et al<sup>33</sup> reported a change in the association between socioeconomic status and hypertension with time in the Netherlands. Our findings suggest, however, that this change may not occur within a generation but rather across the generations.

Our finding that health insurance status affects the treatment of male hypertensives suggests either that Dutch physicians distinguish between the type of insurance held by a patient or that men with private insurance use medical care in a different way compared with those without private insurance. Especially among men, “having a partner” may have a beneficial effect on the awareness and treatment of hypertension.<sup>36</sup> Explanations for these associations with partnership require further investigation.

For 54% of the hypertensives, blood pressure levels were not controlled. To achieve a better control of hypertension among elderly persons, more attention should be given to the detection and subsequent treatment and control of hypertension. Subgroups of persons who require special care are men without a partner and men living in a home for the elderly.

In conclusion, the prevalence rate of hypertension is higher among older women and increases with age for both genders. A substantial proportion of hypertensive elderly persons are aware of and successfully treated for hypertension. However, a still considerable proportion of persons, which increases with age, do not have their hypertension well controlled. These hypertensives require more attention by medical practitioners to reduce the burden of cardiovascular diseases in the elderly.

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