

The Edgecombe County High Blood Pressure Control Program: I. Correlates of Uncontrolled Hypertension at Baseline

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Abstract: To guide the planning of a multifaceted hypertension control program in Edgecombe County, North Carolina, a baseline survey of a stratified (by township) random sample of 1,000 households was conducted. All adults (≥ 18 years) were interviewed and had their blood pressures (BP) measured. Five hundred thirty-nine individuals, 27 per cent of the survey population, had diastolic BP ≥ 90 mm Hg or were receiving anti-hypertensive drug therapy. The 539 hypertensives were divided into seven subgroups reflecting successive stages in the control of hypertension based on the awareness, treatment, and control of their hypertension. Unaware hypertensives were further subdivided into three groups according to the recency of their last BP check, and those aware but untreated

were subdivided by whether they had previously received treatment. The seven subgroups of hypertensives were compared, separately for women and men, with respect to sociodemographic characteristics, health behaviors, and health status. In general, the progression from undetected hypertension to treatment and control appeared to be associated with being older, female, and White. This progression was further associated with greater educational levels and higher family incomes among women and increasing self-reported morbidity among men. The implications for intervention of these and other described associations are discussed. (*Am J Public Health* 1984; 74:237-242.)

Introduction

Following publication of the results of the Veterans Administration Cooperative Study on Antihypertensive Agents,^{1,2} significant improvements have occurred in the proportion of hypertensives found on community surveys to be receiving appropriate treatment and to have controlled levels of blood pressure.³⁻⁶ Surveys have also indicated that hypertension detection and treatment efforts in ambulatory medical practice have significantly increased.^{7,8}

As one of the National Heart, Lung and Blood Institute rural pilot hypertension control projects, our group faced the challenge of developing, implementing, and evaluating interventions to improve blood pressure control in a rural, Southern, biracial county. Earlier survey research in a similar rural area had documented the previously described improvements in hypertension awareness, treatment, and control in rural North Carolina, but also revealed that these were not evenly distributed across all segments of the population.⁹ The proportions of hypertensives receiving treatment and having controlled levels of blood pressure were considerably greater among women and among those over age 50. Although racial differences were not consistent, levels of treatment and control were lowest among Black males under age 50, findings similar to those of the Hypertension Detection and Follow-up Program (HDFP).¹⁰ Certain behaviors also appeared to be associated with uncontrolled hypertension, e.g., infrequent use of medical care¹¹ and discontinuation of drugs.⁹

We began our efforts to plan hypertension control interventions with a household blood pressure survey in the target county in an effort to delineate subgroups at higher risk of uncontrolled hypertension and to identify factors associated with successful and unsuccessful blood pressure control. In this paper, we describe the prevalence of various subgroups of hypertensives in the county and compare selected sociodemographic, health status, and behavioral characteristics of the individuals found in each group. Subsequent papers will examine issues related to access to medical care, beliefs and knowledge about hypertension, and psychosocial factors among these groups.

Methods

Study Setting

Edgecombe County is a predominantly rural community in northeastern North Carolina. Although the majority of its approximately 38,000 adults (18 years or older) reside in rural areas, 72 per cent of the employed labor force works in industry. The population is 46 per cent Black and the median per capita income (1979) was \$6,961 as compared with the state median of \$7,382. The county's medical care is provided primarily by a large multispecialty group practice located in the county seat with a network of satellite clinics in more remote areas, and by physicians in cities in surrounding counties. The study area is included in the Coastal Plains "stroke belt" as indicated by a standardized cardiovascular disease death rate (1972-1976) more than 50 per cent higher than the overall rate for North Carolina.¹²

Sampling

Edgecombe County is comprised of 14 townships of approximately equal area, although the populations of the townships at the time of the survey varied in size from 980 to 18,664. The selection of households to be visited by the survey team was based on a stratified random sample of dwelling units within each township to ensure adequate representation for all geographic areas. The number of households sampled was proportional to the number in the township, with the exception of three townships which were

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oversampled, and one densely-populated, more urban township which was undersampled. Of the 17,664 households in the county, 1,000 were sampled for study, using maps of dwelling units. If a sampled dwelling unit was unoccupied, a neighboring dwelling unit was selected at random and visited.

Interviewing

Local interviewers were hired and trained in survey methods, questionnaire administration, and height, weight, and blood pressure measurement during an intensive two-week training program. Each interviewer was tested for visual acuity and hearing by audiogram. The survey was conducted in the respondents' home, by an interviewer of the same race for 85 per cent of households. In order to avoid confounding by geographic area, date of interview, or interviewer, visitation schedules were arranged so that all parts of the county had some interviewing taking place throughout the survey period.

The interviewer sought to interview all persons, 18 years of age and older, in the household. If one or more members of a household refused to be interviewed, up to two subsequent visits were made by other interviewers. As a result, the refusal rate was only 9 per cent. Reliability checks were conducted by telephone on one-eighth of the households. Questionnaires and blood pressure measurements were monitored continuously throughout the survey for omissions, inconsistencies, digit preference, unusual prevalences of hypertension, etc. These were discussed with the interviewers on a regular basis. The survey, conducted January–September 1980, resulted in information on 2,030 individuals.

Identification and Categorization of Hypertensives

Using a standard mercury sphygmomanometer, three sitting blood pressure measurements were made on the subject's right arm approximately midway through the interview. The fifth phase Korotkoff sound indicated the diastolic blood pressure (DBP). On the basis of discussions with local physicians, individuals with an average DBP ≥ 90 mm Hg were referred to the physician of their choice with appointments made by the study team if the subject so desired. Referred subjects were recontacted by telephone or letter to remind them of their need to be rechecked. For this analysis, hypertensives are defined as those individuals who were currently receiving anti-hypertensive medication and/or had an average DBP (mean of second and third DBP readings) of 90 mm Hg or greater.

Historically, hypertensives have been categorized on the basis of awareness, treatment, and control in an effort to identify problems in hypertension detection, treatment, and follow-up. Conventionally, uncontrolled hypertensives have been categorized into three groups: unaware, aware but not treated, and treated but not controlled.

Unaware hypertensives may be unaware of their elevated blood pressure either because they have not had their blood pressure measured recently or because measurement was not associated with awareness, for whatever reason. Therefore, we divided unaware hypertensives in terms of time since last blood pressure check. Aware but untreated hypertensives include those for whom treatment was never begun and those who discontinued treatment. The resulting seven hypertensive categories are as follows:

Group I

a) Unaware, most recent blood pressure check 25+ months prior to the survey

b) Unaware, most recent blood pressure check 7–24 months prior to the survey

c) Unaware, most recent blood pressure check 0–6 months prior to the survey

Group II

a) Aware, never treated

b) Aware, formerly treated but not currently

Group III

a) Aware, currently treated but not controlled

b) Aware, currently treated and controlled

Other Variables

The questionnaire contained items and scales relating to beliefs and behaviors about hypertension, access to and satisfaction with medical care, perceived health status, health-related behaviors, social support, and economic resources. This report will focus on three categories of variables.

The first, *sociodemographic/personal* characteristics, includes education, family income, employment status, and marital status.

Two *behaviors* comprise a second category of variables: current smoking, and drinking alcoholic beverages.

The final category of variables, *health status*, consists of two measures of self-reported health. The Current Health Scale (CHS) is a nine-item scale developed by Ware, *et al.*,¹³ to measure general health perceptions. Typical items are "I'm as healthy as anybody I know," and "I have been feeling bad lately." Scores could range from 9 to 45 with higher scores indicating better perceived health. A more general Index of Morbidity (IM), created for this analysis, is simply the unweighted sum of four standardized components: the CHS; the number of positive responses to a list of 15 common physical symptoms occurring in the last year¹⁴; the number of days spent in bed during the last year due to illness or injury; and the number of days with restricted activity (not counting bed days) for the same period. More positive scores on the IM indicate better health. Each measure exhibited a high degree of internal consistency (Cronbach's alpha = .88 and .73 for the CHS and IM, respectively).

Data Analysis

The primary objective of the analysis was to use survey data to gain insights into the correlates of uncontrolled hypertension so that community and practice-based intervention programs could be more rationally planned. To this end, we examined variations in the distributions of various sociodemographic, behavioral, and health characteristics among the seven categories of hypertensive respondents.

Differences in the characteristics which could be explained by variations in age or racial composition were removed as far as possible by adjusting for age, race, and their interaction in an analysis of covariance. A logistic regression model was used for the analyses of binary variables. Analyses are reported for males and females separately, because of marked sex differences in the composition of some hypertension categories. This precludes making a direct comparison between the covariance-adjusted values for men and women. Independent variables in the multiple regression analyses, in addition to age, race, and their interactions included the seven hypertension categories defined by a set of six nested, linear contrasts. Interaction terms involving each contrast with age and with race were also constructed. Parallelism was evaluated by first assess-

ing the statistical significance of all interaction terms considered jointly. Non-significant results for the overall test were interpreted as indicating parallelism. If the general test showed at least borderline significance ($p < .10$), the process was repeated separately for those terms involving age and those involving race. The specific interaction within any of these statistically significant subsets was then determined by a backward stepwise procedure. The general criterion for the statistical significance of contrasts and interaction terms was $p = .05$, but p values which approximate this value ($p < .10$) have also been reported.

Results

The prevalence of hypertension in the survey population, as shown in Table 1, rose with age reaching approximately 50 per cent in those over age 60 and among Blacks aged 40–59. The percentage of hypertensives who were aware, treated, and controlled also increased with age but was consistently higher among women and strikingly so among older White women hypertensives. In contrast, among Black male hypertensives under age 60, less than 40 per cent were aware, only 20 per cent were receiving treatment, and less than 10 per cent were under control.

The age-race-sex composition of the seven hypertensive categories varied widely. Unaware and aware-but-never-treated hypertensives tended to be about a decade younger, on average, than the currently or formerly treated subgroups. Males predominated in those subgroups which had never received treatment while females predominated in those groups which were currently or formerly treated. Blacks comprised the majority of all subgroups except those treated and controlled, but were particularly prevalent among those unaware with a recent blood pressure check, those formerly treated, and those currently treated but not controlled. All the uncontrolled subgroups exhibited mean DBPs (96–101 mm Hg) approximately 20 mm Hg higher than the treated and controlled hypertensives (77 mm Hg).*

*Data not shown.

No statistically significant variation was found among the seven categories of hypertensives with regard to the percentage of those drinking alcoholic beverages daily for both sexes, prevalence of current employment within the female hypertensive groups, or prevalence of smoking among the male hypertensives. Tables 2 and 3 show, for women and men respectively, those characteristics which did vary significantly among the hypertensive categories. The mean value or percentage (adjusted for differences in age and race) are given for each category.

For both sexes, aware hypertensives report themselves less healthy than those unaware of their elevated blood pressure. Whereas approximately 90 per cent of all younger hypertensive men, whether aware or not, and older unaware hypertensive men were employed, substantially lower prevalences of employment ($p = .02$) were evident among the older men aware of their hypertension.*

Untreated hypertensive women tended to have fewer years of education and lower family incomes than those women who were receiving treatment. In addition, currently treated women whose blood pressures were not controlled had lower family incomes than those whose blood pressures were under control. In the subgroups of women who were aware of their hypertensive status but not currently on treatment, those who had discontinued treatment were more likely to smoke cigarettes than those who were never treated.

Younger Black women on treatment were much more likely to be married than those who were untreated, while for older Black women those on treatment were somewhat less likely to be married ($p = .004$).^{*} Among White women, marital status differed little between treated and untreated women regardless of age. Among treated White women, however, there was a striking relationship between being uncontrolled and unmarried although this observation is based on very few women.

Men aware of their hypertension but not currently on treatment perceived themselves as being healthier than did

*Data not shown.

TABLE 1—Blood Pressure Control Status in Edgecombe County, NC at Baseline

Race/Sex	N*	N(%) Hypertensive (DBP > 90 or on treatment)	N(%) Aware [†]	N(%) Treated [†]	N(%) Controlled [†]
18–39 year olds					
White Females	222	5 (2%)	2(40%)	2(40%)	2(40%)
Black Females	278	26 (9%)	20(77%)	12(46%)	8(31%)
White Males	214	25(12%)	13(52%)	4(16%)	3(12%)
Black Males	200	35(18%)	8(23%)	2 (6%)	0 (0%)
Total	914	91(10%)	43(47%)	20(22%)	13(14%)
40–59 year olds					
White Females	204	41(20%)	35(85%)	29(71%)	25(61%)
Black Females	177	89(50%)	75(84%)	55(62%)	36(40%)
White Males	186	54(29%)	36(67%)	26(48%)	16(30%)
Black Males	91	46(51%)	22(48%)	14(30%)	6(13%)
Total	658	230(35%)	168(73%)	124(54%)	83(36%)
≥ 60 year olds					
White Females	151	61(40%)	55(90%)	52(85%)	49(80%)
Black Females	116	75(65%)	69(92%)	61(81%)	49(65%)
White Males	106	46(43%)	37(80%)	33(72%)	23(50%)
Black Males	81	36(44%)	27(75%)	23(64%)	17(47%)
Total	454	218(48%)	188(86%)	169(78%)	138(63%)

*Four individuals deleted because of missing value for blood pressure.

†The % aware, treated, controlled are taken as a percentage of the number of hypertensives.

TABLE 2—Sociodemographic and Health Indices, Adjusted for Age and Race: Females

Hypertensives	N	Index of Morbidity	Current Health Scale	Education	Family Income <\$10,000 (%)	Current Smokers (%)
Group 1—Unaware						
a) > 24 months since last BP check	17	0.9	35.5	7.6	82	11
b) 7–24 months since last BP check	4	-1.2	26.3	7.5	89	31
c) 0–6 months since last BP check	20	0.4	31.6	10.6	73	6
Group II—Aware, not currently treated						
a) never treated	17	-1.5	28.4	9.0	78	7
b) formerly treated	28	-2.5	23.2	7.9	87	28
Group III—Aware, currently treated						
a) BP not controlled	42	-1.8	26.4	9.8	77	13
b) BP controlled	169	-1.1	26.5	9.3	62	18
Specific Comparisons of Groups						
I vs II and III		.02	.03	—	—	—
II vs III		—	—	(.09)	(.09)	—
(IIa vs IIb)		—	—	—	—	(.05)
(IIIa vs IIIb)		—	—	—	(.07)	—
Ia and Ib vs Ic		—	—	.02	—	—

— p ≥ .10

those on treatment. These differences only approached statistical significance for the CHS. These same men also had fewer years of education, on average, than those who were currently on treatment. The comparisons between the two subgroups within both the aware and untreated (IIa, b) and treated groups (IIIa, b), respectively, revealed no significant differences in any of the characteristics studied.

Within the unaware hypertensive group, women who did not have a blood pressure check in the last six months had fewer years of education on average than those with a recent check. The unaware but recently checked males had lower (less healthy) scores on the IM and the CHS and were more likely to have had a low family income than those unaware hypertensives without a recent check. Years of education and current employment status were unrelated to the recency of a blood pressure check among these men.

Table 4 summarizes the major differences among various subgroups of uncontrolled hypertensive women and men.

Discussion

In a comprehensive and insightful review of social-psychological issues in community hypertension control, Kasl summarized findings concerning the characteristics of individuals found in each of the classical hypertensive categories and argued that these merely provided "a static, classificatory picture . . . [since] different dynamic processes may contribute to being classified in one or another group."¹⁵ To develop intervention ideas, we have extended the classical hypertensive categories in an effort to reflect further consideration of these various pathways and processes.

It must be recognized that the categorization is based on the responses to a few questions and blood pressures measured during a single interview. Previously, we reported that whereas subject-reported treatment for hypertension in that survey corresponded closely to medical record information (sensitivity 85 per cent, specificity 91 per cent), only 42 per

TABLE 3—Sociodemographic and Health Indices, Adjusted for Age and Race: Males

Hypertensives	N	Index of Morbidity	Current Health Scale	Education	Family Income <\$10,000 (%)
Group I—Unaware					
a) >24 months since last BP check	35	1.1	34.2	7.6	34
b) 7–24 months since last BP check	32	1.3	34.7	8.8	20
c) 0–6 months since last BP check	32	-0.3	30.6	7.6	54
Group II—Aware, not currently treated					
a) never treated	27	-0.5	30.8	8.1	36
b) formerly treated	14	-0.7	29.4	7.0	31
Group III—Aware, currently treated					
a) BP not controlled	37	-1.3	26.4	9.4	27
b) BP controlled	65	-1.6	26.3	9.0	44
Specific Comparisons of Groups					
I vs II and III		.0005	.0006	—	—
II vs III		—	(.06)	.01	—
(IIa vs IIb)		—	—	—	—
(IIIa vs IIIb)		—	—	—	—
Ia and Ib vs Ic		.03	(.07)	—	.02

—p ≥ .10

TABLE 4—Summary of Characteristics of Uncontrolled Hypertensive Women and Men

	Women	Men
Unaware	Younger and healthier than other hypertensives.	Younger, more often Black, healthier, and, if older, more likely to be employed than other hypertensives.
Unaware, Recent BP Check	Better educated than unawares in general.	Less healthy and less affluent than the unawares in general.
Aware, Untreated	Younger, less educated and less affluent than those on treatment. Less likely to be married if younger and Black.	Younger, less educated and somewhat healthier than those on treatment.
Aware, Formerly Treated	Older, more often Black, more likely to smoke than other aware but untreated.	Similar to the other aware but untreated subgroup.
Treated, Uncontrolled	Younger, more often Black, less affluent and less likely to be married if White than those controlled.	Younger, more often Black, than those who are controlled.

cent of individuals reporting awareness of hypertension had the diagnosis mentioned in their medical record.⁹ Conversely, the medical records of 32 per cent of reportedly “unaware” hypertensives mentioned the diagnosis of hypertension. Perhaps most importantly, the HDFP group showed that 30–40 per cent of individuals with elevated DBP (>95 mm Hg) on home screen will be normotensive (DBP < 90 mm Hg) on reexamination.¹⁶ Thus, there may be a significant degree of misclassification among the subgroups, a misclassification which could be greatest, for a variety of reasons, among the previously unaware hypertensives. Further, the data are cross-sectional, a fact which obscures the causal direction of any described associations. Although it does not mitigate the importance of these caveats, our primary objective was to characterize subgroups of the population at risk for uncontrolled hypertension.

Individuals found on this survey to be unaware of their elevated blood pressure viewed themselves as fairly healthy and the men appeared to be functional in terms of employment. These data are consistent with the idea that, because of their excellent self-perceived health, unaware hypertensives have less contact with health services and, as a consequence, have a reduced opportunity for detection, confirmation, and discussion of elevated blood pressure.¹¹ Further support for this notion is suggested by the somewhat poorer levels of health reported by male unaware hypertensives with a more recent blood pressure check. Given the cross-sectional nature of these data, other explanations of these relationships are possible. However, the distinct possibility that the progression from unawareness to awareness may be mediated by self-perceptions of impaired health (and subsequent use of the medical care system) seems to be most reasonable at this time.

Our categorization scheme delineates two distinct pathways to the status “aware but untreated,” depending upon whether the subject had ever received treatment. Kasl concluded that “the fact that the sociodemographic characteristics of aware hypertensives not in treatment are quite similar [to unaware hypertensives] suggests that successive barriers to recognition of HBP status and then to treatment may be comparable.”¹⁵ Our data conform to Kasl’s observation only with regard to the *never treated* subgroup of

“awares” who, like the unaware hypertensives, tended to be younger, predominantly Black, and predominantly male.

In contrast, the formerly treated subgroup included a large proportion of middle-aged Black women who scored the lowest on our two measures of health status. This finding for females is somewhat surprising in view of studies which have reported that the perception of good health is associated with medication discontinuation.^{17,18} Our data suggest that formerly treated hypertensives, especially women, may have a number of other medical and psychosocial problems that contributed to their dropping out of treatment. Perhaps related to their increased morbidity, the formerly treated women had a relatively high prevalence of cigarette smoking, a finding consistent with a recent report from the HDFP indicating an association between cigarette smoking and failure to remain in active treatment.¹⁹ A more detailed analysis of factors contributing to the discontinuation of therapy seems warranted.

The complex relationships among age, race, marital status, and hypertension treatment and control among women suggest the need for further research on the potential impact of social factors, particularly those associated with marriage, on hypertension control. The relatively low prevalence of marriage among aware but untreated younger Black women and treated but uncontrolled White women may reflect the importance of spouse support and/or the logistical and economic problems of child-rearing without a spouse in blood pressure control among women.

This analysis confirms earlier published findings that the progression to awareness, treatment, and control appears to be easiest for older White women and most difficult for younger Black men. Although the observed associations were not entirely consistent, the successful progression to controlled blood pressure was accompanied by higher mean levels of education and family income for women, and lower health status scores for all men and lower employment levels for older men. This latter finding for men—the apparent deterioration in self-perceived health and employment status with awareness, treatment, and control of hypertension—is most interesting. Cross-sectional data cannot clarify the direction of this association, i.e., whether poorer perceived health helps initiate and sustain contact with the medical

care system, or whether the information conveyed and behaviors required in the course of hypertension detection and treatment, including drug side effects, increase the perception of ill health and disability.²⁰

The positive associations between income, education, and hypertension control among women raise a series of important questions about sociocultural and economic factors in hypertension management.

These survey findings have influenced program development in the following ways. Since nearly two-thirds of all unaware hypertensives in Edgecombe County had not had a blood pressure check within the past six months, the issue of blood pressure screening (especially in the more rural, isolated areas of the county) must be reconsidered. Although indiscriminant, non-targeted screening seemed unwarranted, 73 per cent of all unaware hypertensives without a recent blood pressure check were men, and approximately 85 per cent of these men were working. Further, over 90 per cent of younger aware but uncontrolled hypertensive men, whether treated or not, were working. These findings provided support for the development of worksite hypertension detection and follow-up programs which incorporate well planned educational and monitoring activities in two textile industries in Edgecombe County.

In an effort to reach untreated hypertensives outside of industrial and medical settings, we also instituted church-based detection and surveillance programs utilizing trained community volunteers. Both activities are focusing particular attention on younger men. The educational approach, recognizing that most view themselves as healthy, tries to convey to participants information that will give them an accurate assessment of their health status and the likely effects of treatment.

Similarly, the practitioners in the county's group practice are incorporating the survey findings with respect to perceived health, marital status, and drug discontinuation into the planning of a hypertensive patient education program based in the practice. The possibility that financial barriers interfere with hypertension treatment and control, particularly among women, has led to a consideration of coordinated sharing of routine hypertensive follow-up with the less expensive community-based worksite and church programs discussed above.

REFERENCES

1. Veterans Administration Cooperative Study Group on Antihypertensive Agents: Effects of treatment on morbidity in hypertension: results in patients with diastolic blood pressures averaging 115 through 129 mm Hg. *JAMA* 1967; 202:1028-1034.
2. Veterans Administration Cooperative Study Group on Antihypertensive Agents: Effect of treatment on morbidity in hypertension: II. results in

- patients with diastolic blood pressure averaging 90-114 mm Hg. *JAMA* 1970; 213:1143-1152.
3. Apostolides AY, Entwisle G, Ouellet R, *et al*: Improving trend in hypertension control in a black inner city community. *Am J Epidemiol* 1978; 107:113-119.
4. Hypertension Detection and Follow-up Program: Blood pressure studies in 14 communities, a two-stage screen for hypertension. *JAMA* 1977; 237:2385-2391.
5. Stamler J, Stamler R, Riedlinger WF, *et al*: Hypertension screening of 1 million Americans, community hypertension evaluation clinic program, 1973 through 1975. *JAMA* 1976; 235:2299-2306.
6. Alderman MH, Schoenbaum EE: Hypertension control among employed persons in New York City: 1973-75. *Milbank Mem Fund Q* 1976; 54:367-376.
7. Cypress BK: The role of ambulatory medical care in hypertension screening. *Am J Public Health* 1979; 69:19-24.
8. Kochar MS, Itskovitz HD, Panagis C: Hypertension control among patients referred by a community blood pressure screening program. *J Chron Dis* 1979; 32:493-497.
9. Wagner EH, Slome C, Carroll CL, *et al*: Hypertension control in a rural bi-racial community: successes and failures of primary care. *Am J Public Health* 1980; 70:48-55.
10. Hypertension Detection and Follow-up Program: Five-Year findings of the HDFP. II. mortality by race-sex and age. *JAMA* 1979; 242:2562-71.
11. Wagner EH, Warner JT, Slome C: Medical care use and hypertension. *Med Care* 1980; 18:1241-1250.
12. Tyroler HA, Glenn J, Slome C, *et al*: Recent cardiovascular disease mortality in black females in North Carolina. Presented at the symposium, "Why is blood pressure higher in blacks than whites?" AHA 18th Annual Conference on Epidemiology, Orlando, FL, March 13-15, 1978.
13. Ware JE Jr, Davies-Avery A, Donald CA: Conceptualization and measurement of health for adults in the health insurance study. *General Health Perceptions, Vol V*. Santa Monica, CA: Rand Corporation, 1978.
14. Taylor DG, Aday LA, Andersen R: A social indicator of access to medical care. *J Health Soc Behav* 1975; 16:39-49.
15. Kasl S: A social-psychological perspective on successful community control of high blood pressure: a review. *J Behav Med* 1978; 1:347-381.
16. Hypertension Detection and Follow-up Program Cooperative Group: Patient participation in a hypertension control program. *JAMA* 1978; 239:1507-1514.
17. Cummings KM, Kirscht JP, Binder LR, *et al*: Determinants of drug treatment maintenance among hypertensive persons in inner city Detroit. *Public Health Rep* 1982; 97:99-106.
18. Gillum RF, Neutra RR, Stason WB, *et al*: Determinants of dropout rate among hypertensive patients in an urban clinic. *J Comm Health* 1979; 5:94-100.
19. O'Brian Smith E, Curb JD, Hardy RJ, Hawkins CM, Tyroler HA: Clinic attendance in the hypertension detection and follow-up program. *Hypertension* 1982; 4:710-715.
20. Wagner EH, Strogatz DS: Hypertension labeling and well-being: alternative explanations in cross-sectional data. *Clin Res* 1983; 30:919A.

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