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Trends in Hypertension Prevalence, Awareness, Treatment and Control in Older Mexican Americans 1993 –2005

Majd Al Ghatrif, MD[1,5,6], **Yong-fang Kuo, PhD**[1,2,3], **Soham Al Snih, MD, PhD**[1,3,4], **Mukaila A. Raji, MD**[1,3], **Laura A. Ray, MPA**[1,2], and **Kyriakos S. Markides, PhD**[1,2,3]

[1]UTMB Sealy Center on Aging, Galveston, TX.

[2]UTMB Preventive Medicine and Community Health, Baltimore, MD.

[3]UTMB Division of Geriatrics/Department of Internal Medicine, Baltimore, MD.

[4]UTMB Rehabilitation Sciences Division, Baltimore, MD.

[5]Union Memorial Hospital, Department of Internal Medicine, Baltimore, MD.

[6]Longitudinal Studies Section, Clinical Research Branch, National Institute on Aging, National Institutes of Health, Baltimore, MD.

Abstract

PURPOSE—To describe trends in hypertension prevalence, awareness, treatment, and control among older Mexican Americans living in the Southwestern United States from 1993-94 to 2004-05.

METHODS—This is a comparison between two separate cross-sectional cohorts of non-institutionalized Mexican Americans aged ≥ 75 from the Hispanic Established Population for the Epidemiological Study of the Elderly (919 subjects from the 1993–1994 cohort and 738 from the 2004–2005 cohort). Data were collected on self-reported hypertension, measured blood pressure, medications, socio-demographic, and other health-related factors.

RESULTS—Hypertension prevalence increased from 73.0% in 1993-94, to 78.4% in 2004-05. Cross-cohort multivariate analyses showed that the higher odds of hypertension in 2004-05 cohort was attenuated by adding diabetes and obesity to the model. There was a significant increase in hypertension awareness among hypertensives (63.0% to 82.6%) and in control among treated

Corresponding Author: Majd Al Ghatrif, MD, **Address:** 201 E University Pkwy. Department of Internal Medicine\Union Memorial Hospital, Baltimore, MD, 21218, Phone (409) 370-5345, Fax (410) 554-2184, majd.alghatrif@nih.gov.

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hypertensives (42.5% to 55.4%). Cross-cohort multivariate analyses showed that the higher odds of control in 2004-05 cohorts was accentuated by adding diabetes to the model. There were no significant changes in treatment rates (62.2% to 65.6%)

CONCLUSION—Hypertension prevalence in very old Mexican Americans residing in the Southwestern United States was higher in 2004-05 than in 1993-94, and was accompanied by a significant increase in awareness and control rates.

Keywords

Trends; Hypertension; Awareness; Treatment; Control; Mexican American elders

INTRODUCTION

Although hypertension is one of the most common diseases in the United States (U.S.) affecting more than 72 million Americans (1–3), it is a major modifiable risk factor for cardiovascular disease (4,5). Advancements in hypertension diagnosis, treatment, and control have been major contributors to the decline in cardiovascular mortality in recent decades (1,6). Despite considerable progress, hypertension treatment and control rates are still suboptimal (3,7–9).

Mexican Americans are traditionally known for their lower rates of hypertension awareness, treatment, and control compared to other ethnic groups (8,10–12). An analysis of pooled data from the National Health and Nutrition Examination Survey (NHANES), from 1999 to 2004, showed that only 56% of hypertensive Mexican Americans aged 25–84 in the U.S. were aware of having hypertension. Of these, just 50% were treated, and only 44% had their BP under control (11). For older Mexican Americans, a rapidly growing segment of the U.S. population (13), hypertension remains a major health burden that puts them at high risk for cardiovascular morbidity and mortality (14).

A previous report comparing hypertension prevalence between the NHANES III 1988–1994 and NHANES 1999–2004 (3), reflected a significant increase in age-adjusted hypertension prevalence among subjects aged ≥18 years accompanied by an increase in age-adjusted awareness, treatment, and control. There were ethnic differences with non-significant increases in age-adjusted prevalence, awareness, treatment and control among Mexican American men and slight increases in age-adjusted prevalence and control rates among Mexican American women as compared to other major ethnic groups.

Previous reports using the Hispanic Health and Nutrition Examination Survey (HHANES) and the Hispanic Established Population for the Epidemiological Study of the Elderly (Hispanic-EPESE) (15) found no significant change in hypertension prevalence and treatment among older Mexican Americans aged 65–74 from 1982–1984 to 1993–1994. A decrease in mean systolic BP and an increase in mean diastolic BP were found. Previous findings from the Hispanic-EPESE (10,12) showed a 61% prevalence of hypertension among Mexican Americans aged 65 and older in 1993–1994. Sixty-three percent of the hypertensive subjects were aware of their diagnosis, and 51% were under treatment (12).

Several studies using the NHANES data have addressed trends in hypertension in recent years, but few have shed light on trends among older Mexican Americans (3,8). The findings from these studies were limited by the relatively smaller number of older Mexican Americans in the NHANES data and targeted the population of Mexican Americans in the U.S. in general. The Hispanic-EPESE, at its fifth wave (2004–2005), added a new representative cohort of older Mexican Americans aged 75 and older living in the Southwestern U.S., providing the opportunity to examine health trends in this group. In this

analysis, we aim to study trends in hypertension, awareness, treatment, and control among Mexican Americans aged 75 and older residing in the Southwestern U.S. over an 11- year period. Knowledge about trends in hypertension in this population can serve as a basis for the development of health policy to improve hypertension control rates and thus decrease the burden of hypertension.

METHODS

Data used are from the Hispanic-EPESE, a longitudinal study of 3,952 older Mexican Americans residing in Texas, New Mexico, Colorado, Arizona and California. At baseline in 1993–1994, 3,050 Mexican Americans aged 65 and older were selected. An area probability sample design was developed by listing counties in the Southwestern states by the number of Mexican Americans in descending order needed to cover 90% of all Mexican Americans. Census tracts and enumeration districts in the above counties were subsequently listed by the number of older Mexican Americans. Three hundred census tracts were selected as primary sampling units (PSU's). The sampling procedure ensured obtaining a sample that was generalizable to approximately 500,000 older Mexican Americans living in the Southwest (16,17). In 2004–2005, an additional sample of 902 Mexican Americans aged 75 and older from the same region was added using similar area probability and sampling procedures employed at baseline. Both cohorts received identical evaluations at their baseline. In-home interviews were conducted in Spanish or English depending on the respondent's preference. The 1993–1994 and 2004–2005 baseline samples have been described elsewhere (16,17,21).

Sample

This analysis used data on Mexican American men and women aged 75 years and older from the baseline of the original cohort (1993–1994) *(N=1132)* and baseline of the new cohort (2004–2005) *(N=902)*. Two hundred and thirteen subjects from the original cohort and 164 subjects from the new cohort were excluded from the analyses because of missing values in any of the three components of hypertension (Self-reported hypertension, blood pressure measurements, or treatment). The final sample consisted of 919 and 738 subjects from the original and the new cohort, respectively. Subjects excluded were more likely to be older and to be men. No significant differences were noted in characteristics of excluded subjects between the two cohorts.

Outcome variables

Self-reported hypertension was assessed by asking subjects if a doctor had ever told them that they had high BP. Blood pressure data were collected based on the Fifth Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC5) recommendations available at the time of the baseline wave, 1993–94(18). The same protocol was followed in 2004-05 as no changes were made in JNC7 in this regard (19). Blood pressure readings were taken by adequately trained interviewers during in-home visits. Participants were asked to sit quietly on a chair with arms comfortably positioned over a table at the level of the heart for a period of five minutes. Blood pressure was taken using standard stethoscope (Litton Classic II), standard Mercury Column Sphygmomanometer and blood pressure cuff in different sizes (pediatric, regular, large arm) with the proper size chosen to cover at least 80% of the arm. Two sitting BP readings were taken within sixty seconds and an average systolic and diastolic BP were calculated for each subject. Participants were asked to provide the containers of the medications taken in the two weeks prior to the interview, and drugs' names were recorded. Anti-hypertensive medications were identified and categorized into Angiotensin Converting Enzyme Inhibitors (ACE-I), Beta Blockers, Calcium Channel Blockers, vasodilators, and others. A subject was considered hypertensive if, 1) he/she had been told by a physician that he/she had

hypertension, 2) had an average systolic BP of ≥ 140mmHg or an average diastolic BP of ≥ 90 mmHg (3,12), or 3) was on anti-hypertensive medications upon review of the medications they were taking during the two weeks prior to the interview. Hypertension awareness among hypertensives was defined as responding affirmatively to the question: "Has a doctor ever told you that you have high blood pressure?" Hypertension treatment refers to finding any antihypertensive medication while reviewing the medications the subjects had taken in the two weeks prior to the interview, regardless of the indication of the medication taken. Hypertension control was defined as an average BP of < 140/90 mmHg among non-diabetics, and an average BP of < 130/80 mmHg among diabetics, based on the recommendations of the JNC 7 (19).

Covariates

Sociodemographic covariates included age, gender, country of birth, and years of education. A subject was considered diabetic if he/she had reported ever having been told by a doctor that he/she had diabetes or if insulin or oral-hypoglycemics were found among the medications taken in the two weeks prior to the interview. Physician visits were assessed by asking the subjects about the number of visits with a medical doctor in the past 12 months. Subjects were classified as having < 2, 2–4 and > 4 physician visits/year. In this classification, we considered the minimum number of BP follow-ups recommended by the JNC 7 for hypertensive subjects (19). Subjects were asked about their health insurance and were classified as uninsured, Medicare alone, Medicare plus Medicaid, and Medicare plus private insurance. Height was measured using a tape placed against the wall and weight using a Metro 9800 measuring scale. Subjects with BMI's of 30 Kg/m^2 or over were considered obese. Body Mass Index (BMI) was computed as weight in kilograms divided by height in meters squared (20).

Statistical Analysis

Means and 95% Confidence Intervals for continuous variables and proportions for categorical variables for the two cohorts were compared by t-test and Rao-Scott likelihood ratio Chi-square test. Hypertension prevalence, awareness, treatment, and control rates in both cohorts were estimated and compared for the total and for the categories of the covariates by Rao-Scott likelihood ratio Chi-square test. Differences in hypertension prevalence, awareness, treatment, and control by covariates in each of the two cohorts were tested by Rao-Scott likelihood ratio Chi-square test. Multivariate logistic regression models were conducted in each cohort separately with hypertension, prevalence, awareness, treatment, and control as dependent variables to assess the independent association of the covariates of a demographic importance and those found different between the two cohorts. To examine the effect of diabetes and obesity on hypertension trends, multivariate logistic regression models were conducted predicting HTN with all models including age, gender, and survey (2004-05 vs. 1993-94). Subsequently, obesity (BMI≥30 Kg/m^2), and diabetes were added to the model separately then jointly. A similar analysis was done to examine the effect of diabetes, obesity, physician visits, and health insurance on the trends in hypertension awareness and control. Sample weights for each of the two cohorts were calculated as the inverse of the probability of selection. Sampling weights for each wave were raked to population totals. Raking variables were age, gender, state of residence, education, by immigrant status, and percentage Mexican American in census tract of residence. To account for design effects and sampling weights SAS SURVEYFREQ and SURVEYMEANS procedures were used to compare proportions for categorical variables and means for continuous variables, respectively and the SURVEYLOGISTIC procedure was used for multivariate analyses. All analyses were performed using SAS System for Windows, Version 9.2.

RESULTS

Table 1 presents the weighted descriptive characteristics of the two cohorts. The two cohorts were similar in age, ranging 75–108 years in 1993–1994 and 75–103 years in 2004-05. Both cohorts were similar in gender and marital status. Subjects in 2004–2005 were significantly more likely to be U.S.-born, to have more years of education, a higher prevalence of diabetes and obesity, and were less likely to be current smokers. There was a significant change in health insurance coverage with subjects in 2004–2005 more likely to have both Medicare plus private insurance. The mean systolic BP and the mean diastolic BP were significantly lower in the 2004-05 compared to 1993-94.

Table 2 shows weighted hypertension prevalence rates. There was a statistically significant difference in the overall hypertension prevalence in 1993-94 compared to 2004-05 (73.0% vs. 78.4%, respectively). The increase in hypertension prevalence was significant for subjects aged 75–79, for U.S.-born subjects, for subjects with diabetes, and for the obese. Table 3 presents the independent association of covariates with hypertension prevalence in each of the cohorts. Diabetics and the obese were more likely to be hypertensive in 2004-05 but not in 1993-94. Subjects with more frequent physician visits were more likely to be hypertensive in both cohorts with the odds ratio being more prominent in 2004-05. A cross-cohort multivariate logistic regression analyses examining the effect of diabetes and obesity on the trends in hypertension between 1993-94 and 2004-05 showed that the odds ratio associated with the survey (2004-05 vs. 1993-94) adjusting for age and gender was 1.44 (95%CI 1.03–2.01). Including diabetes and obesity in the model reduced the odds ratio associated with Survey to 1.29 (0.90–1.85) and 1.35 (0.96–1.895), respectively. Including both diabetes and obesity in the model further reduced the odds ratio associated with survey to 1.23 (0.85–1.78).

Table 4 presents the weighted prevalence of hypertension awareness among hypertensive subjects. Overall hypertension awareness was significantly higher in 2004-05 than in 1993-94 (82.6% vs. 63.0%, respectively) with the increase being more notable in men than women. The first section in Table 5 presents the independent predictors of hypertension awareness in both cohorts. Women were more likely to be aware of hypertension than men in both cohorts. A cross-cohort multivariate analysis examining the effect of diabetes, obesity, physician visits, and health insurance on trends in hypertension awareness showed no attenuation of the association between survey (2004-05 vs. 1993-94) and higher hypertension awareness after including the aforementioned covariates in the model (data not shown.)

Table 6 shows the weighted prevalence of hypertension treatment among hypertensive subjects. Overall hypertension treatment was not significantly higher in 2004-05 than in 1993-94 (65.6% vs. 62.2%, respectively). These trends were similar across age and gender subgroups. However, as men had a relatively higher increase in treatment rates compared to women over this period, the significant treatment disadvantage for men found in 1993-94 was attenuated in 2004-05. There was a significant increase in hypertension treatment among subjects with < 2 physician visits, and those with Medicare plus private health insurance. The second section of Table 5 presents the independent predictors of hypertension treatment in both cohorts. Women were more likely to be treated than men in 1993-94, but not in 2004-05. Similarly, the association between number of physician visits and treatment observed in 1993-94 was not observed in 2004-05. On the other hand, subjects with Medicare only, or Medicare plus Medicaid were less likely to be treated than those with Medicare plus private health insurance in 2004-05. This was not the case in 1993-94.

Table 7 presents the weighted prevalence of hypertension control among treated hypertensive subjects. The overall hypertension control rate was significantly higher in 2004–2005 than 1993–1994 (55.4% vs. 42.5%). Men experienced a higher increase in hypertension control than women. The third section of Table 5 presents the independent predictors of hypertension control in both cohorts. Noninsured subjects, those with Medicare only, or Medicare plus Medicaid were less likely to be controlled than those with Medicare plus private health insurance in 2004-05 but not in 1993–1994. A cross-cohort multivariate analysis examining the effect of diabetes, obesity, physician visits, and health insurance on trends in hypertension control showed that the odds ratio associated with the survey (2004-05 vs. 1993-94) adjusted for age and gender was 1.73 (95%CI 1.06–2.73). Including diabetes in the model increased the odds ratio associated with Survey to 2.32 (1.41–3.81). Including other covariates did not result in any significant changes (data not shown).

DISCUSSION

Hypertension prevalence in Mexican Americans aged 75 years and older residing in the Southwestern U.S. increased from 1993-94 to 2004-05. Hypertension awareness and control rates were significantly higher in 2004-05 compared to 1993-94, while hypertension treatment rates were not significantly higher in 2004-05 compared to 1993-94. These trends in prevalence are analogous to previous reports using NHANES data (3,8) which showed a nonsignificant increase in hypertension prevalence among Mexican Americans aged 70 and older in the U.S. from 1988–1994 to 1999–2004 (3,8). A recent analysis of the Hispanic-EPESE data showed an increase in diabetes prevalence between 1993-94 and 2004-05(21). Our analysis showed increased rates of diabetes and obesity and a more prominent association of diabetes and obesity with hypertension in 2004-05 compared to 1993-94.

Multivariate logistic regression models predicting hypertension showed that diabetes accounted for a part of the increase in hypertension: including diabetes in the model reduced the odds ratio associated with the survey period by 34%. The association between diabetes and hypertension is well established (22,23). Diabetic nephropathy is an important contributing factor to the development of hypertension among diabetics (23). On the other hand, both hypertension and diabetes could be a result of the same metabolic disorder leading to a parallel increase in both entities (22). The latter proposition is supported by our findings of the similar positive association between hypertension and obesity and that adding obesity to the multivariate logistic regression model further reduced the odds ratio associated with survey period by 43%. This positive association between hypertension and obesity is consistent with previous reports (24,25). Data from the NHANES surveys aforementioned showed that non-Hispanic black and white persons of the same age as our study population, experienced an increase in hypertension prevalence which was mainly attributed to an increase in obesity. However these trends were not observed among Mexican Americans in the United States. We think that this is mainly attributed to the small sample size of Mexican Americans in the NHANES data. These findings strongly emphasize the importance of addressing obesity and diabetes as part of hypertension prevention efforts (26,27).

We found an increase in hypertension awareness in 2004-05 compared to 1993-94. NHANES data have shown a non-significant improvement in awareness rates in Mexican Americans aged 70 years and older from 1988–1994, to 1999–2004 (3). The small number of Mexican Americans aged 70 and older in the NHANES data likely weakened the power of these studies. Contrary to previous reports of low rates of hypertension awareness among Mexican Americans compared to other major ethnic groups (3,8,10), our estimates of hypertension awareness (87.8%) in 2004–2005, exceeds those shown for non-Hispanic blacks and whites of the same age (3). This increase was not explained by covariates

measured in this study and is most likely a reflection of better publicity and implementation of community-based education as well as efforts targeting at-risk and disadvantaged populations (28).

Inconsistent with previous reports showing a significant increase in treatment rates in the general population and in Mexican Americans aged 60 years and older (3), we found a non-significant increase in overall hypertension treatment. It is important to consider that we measured treatment by inspecting the medications taken in the two weeks prior to the interview, which gives a more precise estimate of the actual treatment. The higher treatment rate in 2004-05 compared to 1993-94 among subjects with < 2 physician visits might indicate a better utilization of other methods of obtaining prescriptions such as telephone prescriptions when a direct doctor visit is not required or is not possible. This eliminated the treatment disadvantage among those with <2 physician visits in 1993-94. The significant differences noted in the likelihood of being treated based on the health insurance coverage in 2004-05 with those with Medicare plus private insurance being more likely to be treated suggest that improvement in coverage might be a potential way to improve treatment rates in this population. Research has shown that about 58% of physicians wouldn't start pharmacological therapy if systolic BP was greater than 140mmHg in patients aged 85 and older (29,30). However, recent reports from the Hypertension in the Very Elderly Trial (HYVET) (31) provide evidence of the benefits of hypertension treatment in relatively healthy subjects aged 80 and older. Providing clear guidelines for treating hypertension among the very old and a more focused education for physicians who care for Hispanic patients (32) will help improve hypertension treatment rates and therefore hypertension outcomes in this population.

We also found that hypertension control was higher in 2004-05 than in 1993-94 which is consistent with previous finding from the NHANES data (3). Subjects with Medicare plus private health insurance had significantly better control than other groups. Subjects with diabetes had lower rates of control. Although, this is a numerical result of the lower BP goals in this group, this reflects that these recommendations are not strictly followed. Multivariate logistic regression showed a negative role of diabetes on the promising trends in hypertension control demonstrated by an increase in the odds ratio of control associated with the survey (2004-05 vs. 1993-94) after adjusting for diabetes. Barriers against optimal hypertension control include the lack of clear guidelines regarding goals of blood pressure among the very old in general and among diabetics in particular, as well as a fear among physicians of adverse effects of excessive blood pressure control including postural hypotension (33) and cognitive impairment associated with low blood pressure (34).

Our study has some limitations. First, the definition of hypertension and diabetes involved a self-report of a previous diagnosis by a physician, which implies possible errors in both physician diagnosis and subject recall. Previous research, however, has reported good validity for self-reported medical conditions confirmed by physician diagnosis (29). Second, BP measurements were taken only two times 60 seconds apart during one in-home interview which might lead to overestimated prevalence of hypertension as we could not evaluate the persistency of high BP an important criterion in the definition of hypertension. The NHANES data implemented three measurements in mobile examination center in a better controlled environment (19). Third, definition of hypertension included being on any anti-hypertensive medication regardless of the indication. Thus, subjects taking antihypertensive medications for other indications would be considered hypertensive. However, this issue does not appear to be important in our data as only 1 subject in 1993-94 and 4 subjects 2004-05 were considered hypertensives only because they were on an ACE-I that could be used be used for proteinnuria and congestive heart failure. Fourth, our estimates of hypertension control could be biased by the effect of sicker subjects with uncontrolled

hypertension returning to Mexico falsely leading to higher control rates. However our data showed that control rates increased among U.S.-born subjects but not among Mexico-born ones for whom a healthy immigrant effect is supposed to be more prominent suggesting this bias to be minor. Fifth, the comparison with the NHANES surveys is limited by the fact that they targeted Mexican Americans in the U.S. in general while our study targeted those in the Southwestern U.S. This would make our findings less generalizable but more regional specific which allows better tailored approaches for a major section of older Mexican Americans. Lastly, the small sample size in some of the subgroups and application of the weights lead to wide confidence intervals of estimates. At the same time, this study has several strengths including a large, well-defined community sample, the prospective design, and the examination of hypertension trends over 11-year period using two separate cohorts selected using similar procedures from the same region. To our knowledge, this is the first study to describe in detail trends in hypertension and related factors among Mexican Americans aged 75 and older.

In conclusion, there was an increase in hypertension prevalence among Mexican Americans aged 75 and older from 1993–1994, to 2004–2005 which was explained in part by the increase in diabetes and obesity. There was also an increase in hypertension awareness and control rates. However, hypertension treatment rates did not improve. More effort should be targeted to reverse trends of both obesity and diabetes as potential causes of increases in hypertension. Further investigations should be directed toward providing clear guidelines and goals for hypertension treatment and control in the very old to improve hypertension outcomes in this population.

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Table 1

Descriptive Characteristics of Mexican Americans Aged 75 and Older in The Hispanic-EPESE. 1993–1994 and 2004–2005.[¶]

Subjects characteristics	1993–1994 N=919	2004–2005 N=738	P-value
Age, years, Mean (95% CI)	80.5 (80.1 –80.9)	81.2 (80.7–81.6)	0.12
Age			0.641
75–79	455 (52.4)	343 (49.0)	
≥80	464 (51.0)	395 (51.0)	
Gender			0.859
Female	546 (60.6)	440 (60.1)	
Male	373 (39.4)	298 (39.9)	
Marital Status			0.673
Married	393 (22.5)	331 (44.0)	
Unmarried	526 (57.5)	407 (56.0)	
Country of Birth			0.042
Mexico	453 (54.1)	328 (43.7)	
USA	465 (45.9)	410 (56.3)	
Years of Education, Mean (95% CI)	4.4 (3.9 – 4.8)	5.3 (4.8 – 5.9)	0.002
Smoking			0.002
Never	538(55.8)	369 (51.5)	
Previous	293 (33.8)	327 (43.2)	
Current	86 (9.4)	39 (5.3)	
Self-reported diabetes			<0.001
No	723 (79.9)	470 (62.1)	
Yes	196 (20.1)	268 (37.9)	
Physician visit			0.266
<2	176 (19.7)	100 (16.1)	
2–4	264 (30.3)	265 (36.2)	
> 4	440 (50.0)	358 (47.7)	
Health Insurance			0.041
None	55 (6.8)	37 (5.1)	
Medicare only	345 (36.7)	206 (29.0)	
Medicare and Medicaid	366 (40.3)	316 (39.8)	
Medicare and private	153 (16.2)	179 (26.1)	
Obesity (BMI ≥ 30 Kg/m^2)			0.001
Yes	205 (19.9)	164 (28.8)	
No	677 (80.1)	471 (71.2)	
BMI, Kg/m^2, Mean (95% CI)	26.7 (26.2 – 27.1)	27.6 (26.9 – 28.2)	0.027
Systolic BP, Mean (95% CI)	135.4 (132.9 – 137.9)	132.3 (130.6–134.0)	0.039
Diastolic BP, Mean (95% CI)	78.5 (77.2 – 79.7)	74.8 (73.7 – 76.0)	<0.001

[¶]The frequencies presented are unweighted and the percentages are weighted.

N varies because of missing values.
BMI: Body Mass Index
BP: blood pressure

Table 2

Hypertension Prevalence among Mexican Americans aged 75 Years and Older in 1993–1994 and 2004–2005.

Independent Variables	1993–1994		2004–2005			
	N	n (Weighted %)¶	N	n (Weighted %)¶	Difference (95%CI)	P-Value
Overall prevalence	919	648 (73.0)	738	559 (78.4)	5.40 (0.01 – 11.30)	0.049
Age						
75–79	455	304 (70.5)	343	263(80.5)	10.04 (2.48–17.59)	0.006
≥80	464	344 (75.3)	395	296 (76.3)	1.05 (–6.00 – 8.11)	0.767
Gender						
Women	546	408 (76.3) ‡	440	344 (79.6)	3.38 (−3.36 – 10.12)	0.315
Men	373	240 (68.0)	298	215 (76.5)	8.52 (−0.27 – 17.30)	0.051
Country of birth						
U.S.	465	327 (70.6)	410	319 (81.6) ‡	10.99 (3.41–18.57)	0.002
Mexico	453	321 (75.2)	328	240 (74.3)	−0.88 (−8.84 — 7.08)	0.828
Education						
< 7 years	714	512 (73.2)	484	366 (78.2)	4.96 (−11.52 – 1.61)	0.129
≥ 7 years	205	136 (72.2)	254	193 (78.8)	6.52 (−4.26 – 17.3)	0.219
Physician visits						
<2	176	95 (59.9)†	100	54 (61.2)*	1.36 (−12.77 – 15.50)	0.849
2–4	264	185 (74.4)	265	199 (79.0)	4.58 (−4.07 – 13.23)	0.285
> 4	440	353 (80.2)	358	296 (84.4)	4.27 (−3.50 – 12.04)	0.267
Health Insurance coverage						
None	55	32 (56.1)	37	26 (69.8)	13.7 (−39.50 – 12.09)	0.298
Medicare only	345	237 (73.5)	206	147 (74.7)	1.17 (−8.90 – 11.23)	0.819
Medicare and Medicaid	366	275(76.2)	316	250 (81.4)	5.19 (−2.75 – 13.13)	0.182
Medicare and private	153	104 (71.0)	179	136 (79.6)	8.61 (−2.96 – 20.19)	0.115
Self-reported diabetes						
Yes	196	153 (77.6)	268	236 (90.0)*	12.35 (1.64 – 23.07)	0.005
No	723	495 (71.8)	470	323 (71.3)	−0.52 (−7.69 — 6.66)	0.887
Obesity (BMI ≥ 30 Kg/m^2)						

Independent Variables	1993–1994		2004–2005			
	N	n (Weighted %)¶	N	n (Weighted %)¶	Difference (95%CI)	P-Value
Yes	205	163 (81.8)†	164	144 (89.7)*	7.89 (0.00 – 15.90)	0.042
No	677	457 (70.1)	471	338 (74.4)	4.36 (−3.12 – 11.83)	0.249

¶Unweighted frequency and weighted percentage of subjects with hypertension.

N varies because of missing values.

p value * < 0.001.† p value < 0.01. ‡ p value < 0.05, for any difference across covariates strata in each cohort.

BMI: Body Mass Index

Table 3

Multivariate logistic regression models predicting hypertension among Mexican Americans aged 75 and older in 1993–1994 and 2004–2005

Independent covariates.	1993–1994 (N=835) OR (95% CI)	2004–2005 (N=622) OR (95% CI)
Age (years)	0.99 (0.94 – 1.05)	1.02 (0.97 – 1.06)
Gender (Ref: men)	1.40 (0.88 – 2.23)	1.01 (0.66 – 1.54)
Birth country (Ref: Mexico)	0.69 (0.44 – 1.08)	1.58 (0.89 – 2.79)
Education (years)	0.99 (0.92 – 1.06)	1.00 (0.94 – 1.07)
Health Insurance (Ref : Medicare and private)		
None	0.61 (0.25 – 1.46)	1.06 (0.40 – 2.84)
Medicare only	0.81 (0.44 – 1.47)	0.92 (0.46 – 1.85)
Medicare and Medicaid	0.85 (0.42 – 1.71)	1.05 (0.53 – 2.09)
Physician visit (Ref: <2 visits/year)		
2–4	**1.96 (1.17 – 3.29)**	**2.50 (1.39 – 4.51)**
> 4	**2.55 (1.48 – 4.41)**	**3.70 (1.83 – 7.50)**
Smoking (Ref: Never)		
Previous	1.09 (0.73 – 1.63)	1.33 (0.78 – 2.27)
Current	0.68 (0.33 – 1.44)	0.41 (0.15 – 1.11)
Obesity (Ref: Non-obese BMI < 30 kg/m^2)	1.63 (0.96 – 2.74)	**3.32 (1.87 – 5.90)**
Diabetes (Ref: Non-diabetic)	0.89 (0.45 – 1.73)	**2.33 (1.25 – 4.36)**

Table 4

Prevalence of Hypertension Awareness among Hypertensive Older Mexican Americans aged 75 Years and Older.

Explanatory Variables	1993–1994		2004–2005			
	N	n (Weighted %)¶	N	n (Weighted %)¶	Difference (95%CI)	P-Value
Total	648	398 (63.0)	559	467 (82.6)	19.55 (12.98–26.12)	<0.001
Age						
75–79	304	196 (69.8)†	263	223 (86.1)	16.33 (7.34 – 25.32)	0.002
≥80	344	202 (57.3)	296	244 (79.0)	21.70 (12.02–31.38)	<0.001
Gender						
Women	408	277 (71.6)*	344	295 (86.8)§	15.24 (8.40–22.08)	<0.001
Men	240	121 (48.2)	215	172 (75.8)	27.67 (15.42 – 39.92)	<0.001
Country of birth						
US	327	206 (68.4)	319	269 (82.4)	14.07 (4.22 – 23.93)	0.005
Mexico	321	192 (58.8)	240	198 (82.7)	23.98 (15.62–32.35)	<0.001
Education						
< 7 years	512	310 (61.2)	366	302 (81.4)	20.24 (12.95 – 27.53)	<0.001
≥ 7 years	136	88 (69.5)	193	165 (84.6)	15.12 (2.87–27.37)	0.008
Physician visit						
<2	95	42 (37.1)*	54	33 (59.7)*	22.6 (1.18 – 44.01)	0.043
2–4	185	116 (65.1)	199	167 (83.1)	17.97 (7.41–44.01)	<0.001
≥ 4	353	259 (70.2)	296	259 (87.8)	17.63 (9.48–25.77	<0.001
Health Insurance						
None	32	19 (41.6)	26	22 (87.0)	45.44 (15.27 – 76.61)	<0.001
Medicare only	237	143 (64.4)	147	121 (81.8)	17.42 (5.86 – 28.98)	0.006
Medicare and Medicaid	275	173 (65.5)	250	202 (79.6)	14.18 (4.04 – 24.32)	0.004
Medicare and private	104	63 (60.4)	136	122 (87.1)	26.74 (11.47 – 42.00)	<0.001
Diabetes						
No	495	291 (61.7)	323	260 (80.5)	18.89 (11.31–26.47)	<0.001
Yes	153	107 (68.0)	236	207 (85.2)	17.15 (6.07–28.24)	0.002

Explanatory Variables	1993–1994		2004–2005			
	N	n (Weighted %)¶	N	n (Weighted %)¶	Difference (95%CI)	P-Value
Obesity (BMI ≥ 30 Kg/m^2)						
No	457	273 (64.1)	338	275 (79.4)	18.24 (9.84–26.64)	<0.001
Yes	163	105 (68.8)	144	123 (88.2)	20.66 (14.50–26.82)	<0.001

¶Unweighted frequency and weighted percentage of hypertensive subjects aware of having hypertension.

N varies because of missing values in the covariates.

p value * < 0.001. † p value < 0.01. ‡ p value < 0.05, for any difference across covariates strata in each cohort.

BMI: Body Mass Index.

Table 5

Multivariate logistic regression models predicting hypertension awareness, treatment, and control under treatment among Mexican Americans with hypertension aged 75 and older in 1993–1994 and 2004–2005

Independent covariates	Awareness		Treatment		Control	
	1993–1994 (N=597) OR (95% CI)	2004–2005 (N=474) OR (95% CI)	1993–1994 (N=597) OR (95% CI)	2004–2005 (N=474) OR (95% CI)	1993–1994 (N=377) OR (95% CI)	2004–2005 (N=317) OR (95% CI)
Age (years)	0.95 (0.90–1.01)	0.96 (0.90–1.03)	0.98 (0.93–1.04)	0.97 (0.92–1.03)	1.01 (0.97–1.05)	1.00 (0.94–1.06)
Gender (Ref: men)	**2.75 (1.77–4.28)**	**2.28 (1.08–4.84)**	**1.81 (1.05–3.13)**	1.05 (0.56–1.97)	1.22 (0.79–1.88)	0.92 (0.58–1.45)
Birth country(Ref: Mexico)	1.18 (0.73–1.90)	0.74 (0.38–1.41)	1.02 (0.95–1.10)	0.99 (0.94 1.05)	0.99 (0.93–1.06)	1.02 (0.96–1.09)
Education (years)	1.01 (0.93–1.10)	1.04 (0.98–1.10)	1.02 (0.63–1.66)	0.91 (0.48–1.71)	1.29 (0.87–1.90)	0.68 (0.42–1.10)
Health Insurance						
Ref : Medicare & private)						
None	0.59 (0.16–2.22)	0.76 (0.15–3.86)	0.85 (0.31–2.30)	0.40 (0.10–1.56)	1.68 (0.75–3.74)	**0.24 (0.11–0.52)**
Medicare only	1.01 (0.48–2.12)	0.83 (0.27–2.58)	1.00 (0.45–2.23)	**0.25 (0.13–0.48)**	1.09 (0.63–1.87)	**0.42 (0.24–0.74)**
Medicare and Medicaid	1.53 (0.68–3.45)	0.51 (0.20–1.31)	1.12 (0.45–2.75)	**0.31 (0.16–0.63)**	0.94 (0.52–1.72)	**0.49 (0.30–0.81)**
Physician visit						
(Ref: <2 visits/year)						
2–4	**2.56 (1.13–5.82)**	2.59 (0.97–6.92)	**3.83 (1.81–8.09)**	1.51 (0.60–3.80)	1.37 (0.77–2.42)	1.18 (0.74–1.88)
> 4	**2.99 (1.38–6.46)**	**3.65 (1.70–7.85)**	**6.76 (3.29–3.86)**	1.74 (0.75–4.02)	0.88 (0.53–1.48)	1.27 (0.70–2.33)
Smoking (Ref: Never)						
Previous	1.59 (0.93–2.72)	1.05 (0.52–2.14)	1.01 (0.54–1.91)	0.63 (0.38–1.04)	1.08 (0.72–1.60)	0.89 (0.57–1.38)
Current	0.67 (0.24–1.88)	0.58 (0.09–3.91)	0.77 (0.20–2.92)	0.69 (0.28–1.69)	1.24 (0.54–2.84)	1.40 (0.66–2.98)
Obesity	1.10 (0.65–1.88)	1.91 (0.86–4.25)	0.73 (0.43–1.24)	0.84 (0.48–1.49)	0.70 (0.44–1.09)	0.68 (0.46–1.00)
(Ref: BMI < 30 kg/m^2)						
Diabetes	1.20 (0.71–2.04)	1.30 (0.59–2.84)	1.77 (1.03–3.05)	1.35 (0.82–2.21)	**0.42 (0.23–0.76)**	0.23 (0.15–0.36)
(Ref: Non-diabetic)						

BMI: Body Mass Index.

Table 6

Prevalence of Hypertension Treatment among Hypertensive Older Mexican Americans aged 75 Years and Older.

Explanatory Variables	1993–1994		2004–2005			
	N	n (Weighted %)¶	N	n (Weighted %)¶	Difference (95%CI)	P-Value
Total	648	409 (62.2)	559	383 (65.6)	3.44 (−3.92 – 10.81)	0.359
Age						
75–79	281	174 (61.1)	263	179 (67.2)	3.33 (−6.57 – 12.97)	0.147
≥80	344	212 (60.6)	296	204 (64.0)	3.40 (−7.62 – 14.42)	0.548
Gender						
Women	408	271 (65.9)‡	344	245 (68.8)	2.87 (−5.95 – 11.96)	0.523
Men	240	138 (55.8)	215	138 (60.7)	4.93 (−6.97 – 16.84)	0.412
Country of birth						
US	327	207 (60.8)	319	213 (65.8)	4.97 (−3.91 – 13.85)	0.261
Mexico	321	202 (63.2)	240	170 (65.3)	2.10 (−9.90 – 14.10)	0.733
Education						
< 7 years	512	322 (63.2)	366	247 (64.0)	0.8 (−7.74 – 9.36)	0.852
≥ 7 years	136	87 (58.6)	193	136 (68.4)	9.85 (−4.88 – 24.58)	0.178
Physician visit						
<2	85	29 (30.6)*	54	26 (50.9) ‡	20.30 (2.28 – 38.32)	0.021
2–4	185	117 (61.4)	199	138 (64.8)	3.38 (−10.36– 17.13)	0.628
≥ 4	353	252 (71.5)	296	212 (69.7)	−1.88 (−11.26 — 7.50)	0.694
Health Insurance						
None	32	19 (49.9)	26	19 (67.1)*	17.14 (−10.54 – 44.83)	0.214
Medicare only	237	142 (59.4)	147	91 (56.7)	2.73 (−14.15 – 8.69)	0.635
Medicare and Medicaid	275	178 (66.8)	250	166 (61.9)	−4.85 (−15.85 — 6.14)	0.379
Medicare and private	104	70 (60.38)	136	107 (80.4)	20.01 (3.24 – 36.79)	0.005
Diabetes						
No	495	299 (59.0)†	323	212 (61.7)	7.3 (−1.8 – 16.3)	0.541
Yes	153	110 (73.8)	236	171 (70.7)	−3.07 (−15.24 — 9.11)	0.616
Obesity (BMI ≥ 30 Kg/m^2)						

Explanatory Variables	1993–1994		2004–2005			
	N	n (Weighted %)¶	N	n (Weighted %)¶	Difference (95%CI)	P-Value
No	457	290 (62.9)	338	228 (64.3)	1.37 (−7.36 – 10.10)	0.757
Yes	163	100 (61.9)	144	96 (61.9)	0.00 (−14.93 – 14.97)	0.718

¶Unweighted frequency and weighted percentage of hypertensive subjects on antihypertensive treatment.

N varies because of missing values in the covariates.

p value * < 0.001. † p value < 0.01. ‡ p value < 0.05, for any difference across covariates strata in each cohort.

BMI: Body Mass Index.

Table 7

Hypertension Control rates among Treated Hypertensive Older Mexican Americans aged 75 Years and Older.

Explanatory Variables	1993–1994		2004–2005			
	N	n (Weighted %)¶	N	n (Weighted %)¶	Difference (95%CI)	P-Value
Overall	409	184 (42.5)	383	203 (55.4)	12.91 (1.63–24.20)	0.018
Age						
75–79	197	88 (43.9)	179	90 (53.2)	9.26 (5.46 – 23.98)	0.204
≥80	212	96 (41.2)	204	113 (57.7)	16.56 (3.65 – 29.47)	0.007
Gender						
Women	271	120 (41.8)	245	121 (49.3)†	7.48 (6.50– 21.01)	0.266
Men	138	64 (43.8)	138	82 (66.2)	22.40 (7.90– 36.91)	0.001
Country of birth						
US	207	93 (41.6)	213	123 (58.5)	16.94 (1.84– 32.04)	0.018
Mexico	202	91 (43.2)	170	80 (51.0)	7.78 (−5.62 – 21.19)	0.241
Education						
< 7 years	322	148 (44.2)	247	121 (51.6)	7.39 (−5.29– 20.08)§	0.240
≥ 7 years	87	36 (36.0)	136	82 (61.7)	25.62 (8.93– 42.31)	<0.001
Physician visit						
<2	29	15 (48.2)‡	26	9 (46.7)	−0.01 (4.27 — 39.8)	0.946
2–4	117	64 (56.4)	138	79 (57.0)	0.59 (−16.54 – 17.72)	0.946
≥ 4	252	100 (35.4)	212	112 (56.6)	21.17 (8.90 – 33.4)	<0.001
Health Insurance						
None	19	10 (57.3)	19	9 (54.1)†	3.20 (−39.00 – 32.59)	0.867
Medicare only	142	60 (44.2)	91	47 (54.6)	10.43 (−9.68– 30.53)	0.308
Medicare and Medicaid	178	77 (37.9)	166	78 (47.2)	9.35 (−6.09– 24.78)	0.221
Medicare and private	70	37 (48.1)	107	69 (66.0)	17.92 (0.00– 35.80)	0.028
Diabetes						
No	299	159 (49.2)	212	145 (70.6)*	21.44 (8.84– 34.05)	<0.001
Yes	110	25 (22.7)	171	58(38.1)	15.40 (1.05 – 29.75)	0.030
Obesity (BMI ≥ 30 Kg/m^2)						

Explanatory Variables	1993–1994		2004–2005			
	N	n (Weighted %)¶	N	n (Weighted %)¶	Difference (95%CI)	P-Value
No	290	135 (40.7)	228	124 (58.1)	17.31 (5.01– 29.62)	0.003
Yes	100	41 (43.9)	96	47 (48.6)	4.72 (15.56 – 24.99)	0.646

¶Unweighted frequency and weighted percentage of hypertensive subjects with controlled blood pressure.

N varies because of missing values in the covariates.

p value * < 0.001. † p value < 0.01. ‡ p value < 0.05, for any difference across covariates strata in each cohort.

BMI: Body Mass Index.