

The Prevalence and Health Burden of Self-Reported Diabetes in Older Mexican Americans: Findings From the Hispanic Established Populations for Epidemiologic Studies of the Elderly

ABSTRACT

Objectives. The prevalence and health burden of self-reported adult-onset diabetes mellitus were examined in older Mexican Americans.

Methods. Data from the Hispanic Established Populations for Epidemiologic Studies of the Elderly were used to assess the prevalence of self-reported diabetes and its association with other chronic conditions, disability, sensory impairments, health behaviors, and health service use in 3050 community-dwelling Mexican Americans 65 years and older.

Results. The prevalence of self-reported diabetes in this sample was 22%, and there were high rates of obesity, diabetes-related complications, and diabetic medication use. Myocardial infarction, stroke, hypertension, angina, and cancer were significantly more common in diabetics than in nondiabetics, as were high levels of depressive symptoms, low perceived health status, disability, incontinence, vision impairment, and health service use. Many of the rate differences found in this sample of older Mexican Americans were higher than those reported among other groups of older adults.

Conclusions. Our findings indicate that the prevalence and health burden of diabetes are greater in older Mexican Americans than in older non-Hispanic Whites and African Americans, particularly among elderly men. (*Am J Public Health*. 1999;89:546-552)

Sandra A. Black, PhD, Laura A. Ray, MPA, and Kyriakos S. Markides, PhD

Non-insulin-dependent, or type 2, diabetes mellitus is a common medical condition in the elderly, occurring in an estimated 10% of adults 65 years and older.^{1,2} The disease is particularly prevalent among Mexican Americans, who are estimated to have 2 to 4 times the prevalence of diabetes of non-Hispanic Whites.³ Evidence for this rate differential has been found in studies using diagnostic criteria, such as the San Antonio Heart Study,⁴ the San Luis Valley Diabetes Study,⁵ the Starr County Study,⁶ and the Hispanic Health and Nutrition Examination Survey (HANES),⁷ and in studies relying on the self-reports of physician diagnoses of diabetes.^{7,8} These studies, however, have primarily been confined to middle-aged individuals. As a result, few data are available regarding the prevalence of diabetes and related complications among older Mexican Americans.

Several authors have suggested that, in addition to this higher prevalence, the effects of diabetes in Mexican Americans are more severe than in other groups.⁹⁻¹¹ For example, diabetic Mexican Americans experience higher mortality in comparison with other diabetics¹² and have more peripheral vascular disease, microvascular disease, retinopathy, clinical proteinuria, and microalbuminuria than diabetic non-Hispanic Whites.^{10,13,14}

Several studies have demonstrated that diabetes is associated with increased comorbidity and decreased functional health in the general adult population,¹⁵⁻¹⁸ as well as in Mexican American adults.¹⁹ Using data from the Hispanic HANES, for example, Zhang and colleagues¹⁹ reported significantly higher rates of hypertension, kidney problems, stroke, and disability among Mexican Americans aged 45 to 74 years. For the most part, these studies focused on diabetes among middle-aged adults, used samples that were clinical or limited in size, and included only limited numbers of individuals older than 65 years.

In one study that did focus on community-dwelling adults 65 years and older,²⁰ Moritz and colleagues reported that among elderly African Americans and non-Hispanic Whites, the impact of self-reported diabetes on comorbidity and functional disability is quite substantial. Using data from 4 of the Established Populations for Epidemiologic Studies of the Elderly ("Established Populations") surveys, these researchers demonstrated that in relation to nondiabetics, older diabetics (1) reported higher rates of many chronic health conditions, including myocardial infarction, stroke, hypertension, and angina; (2) were less likely to rate their health as good or excellent; and (3) reported greater functional disability, higher rates of urinary incontinence, more frequent vision impairment, and greater use of health care services.

Despite the increased prevalence of diabetes in Mexican Americans, no comparable study has examined the impact of self-reported diabetes on comorbidity and functional disability in a community-based sample of older Mexican Americans. In this analysis, we used data from the Hispanic Established Populations to examine the association of self-reported diabetes with chronic health conditions, disability, health service use, and selected health behaviors in Mexican Americans 65 years and older. Insofar as possible, the Hispanic Established Popula-

The authors are with the University of Texas Medical Branch, Galveston. Sandra A. Black is with the Center on Aging and the Department of Internal Medicine. Laura A. Ray and Kyriakos S. Markides are with the Center on Aging and the Department of Preventive Medicine and Community Health.

Requests for reprints should be sent to Sandra A. Black, PhD, Center on Aging, 3.324 Jennie Sealy Hospital, University of Texas Medical Branch, Galveston, TX 77555-0460 (e-mail: sblack@utmb.edu).

This paper was accepted October 1, 1998.

tions survey was modeled after earlier Established Populations surveys.²¹ As a result, many of the measures reported here are comparable to those reported for the other 4 Established Populations sites.²⁰

Methods

The Hispanic Established Populations is the latest in a series of panel surveys, conducted in various portions of the United States,²⁰ designed to examine the health status of community-dwelling elderly people. It is the first large-scale study of community-dwelling elderly Mexican Americans residing in the southwestern United States (including Texas, California, New Mexico, Arizona, and Colorado). The initial wave of the Hispanic Established Populations survey, conducted during 1993 and 1994, used area probability sampling. This method resulted in a sample of 3050 Mexican Americans 65 years and older (representing an 86% response rate) who agreed to complete in-home face-to-face interviews in either Spanish or English. All interviewers were fully bilingual and predominantly of Hispanic origin. The findings presented here reflect the reports of all 3050 respondents, which, when weighted, represent more than 500 000 Mexican Americans 65 years and older residing in the Southwest. Face-to-face interviews were completed with 94.2% of the respondents. The remaining 5.8% were too ill or cognitively impaired to complete face-to-face interviews, and an interview was completed by proxy with an informed caregiver. Further description of the survey methods can be found in Markides et al.²¹

Measures

The presence of non-insulin-dependent diabetes was assessed by asking the respondents whether they had ever been told by a physician that they had diabetes. Individuals who responded in the affirmative were then asked the age at which they were diagnosed. In all reported cases of diabetes, the age at diagnosis was greater than 40 years, which indicated that all cases were non-insulin-dependent diabetes. Persons reporting borderline diabetes (impaired glucose tolerance) were not categorized as diabetic for the present analyses.

Diabetes-related characteristics were assessed with a series of items that asked whether respondents had a family history of diabetes and whether they had experienced any kidney problems, eye problems, circulation problems, or amputations as a result of having diabetes. Respondents were also

asked to show current medications, and interviewers recorded medication and dosage information by copying the pharmacist label. For the present study, we were particularly interested in the use of prescribed oral hypoglycemics and insulin (which is sometimes required for the control of hyperglycemia in non-insulin-dependent diabetes).

Body mass index, used as a measure of overall adiposity, was calculated by dividing respondents' weight (measured in kilograms) by the square of their height (measured in meters). A respondent was categorized as obese if he or she had a body mass index of 30 or more. Waist-hip ratio, used as an index of upper vs lower body adiposity, was calculated by dividing a respondent's waist circumference by his or her hip circumference.²²

Physical health conditions were assessed with a series of items in which respondents were asked whether they had ever been told by a physician that they had myocardial infarction, stroke, hypertension, cancer, hip fracture, or gallbladder disease. Angina was assessed with the Rose Angina Scale.²³ Respondents were also asked to rate their health as poor, fair, good, or excellent.

Depressive symptomatology was measured with the Center for Epidemiologic Studies Depression Scale,²⁴ the most widely used survey measure of depressive symptomatology in studies of older adults. Shown to be reliable and valid in the elderly,^{25,26} the instrument consists of 20 items that ask how often specific symptoms were experienced during the previous week. Responses are scored on a 4-point scale, with potential total scores ranging from 0 to 60. For the present study, a dichotomous measure representing a high level of depressive symptomatology was derived on the basis of a score of 16 or greater on the scale.^{27,28} Earlier analyses of Center for Epidemiologic Studies Depression Scale data from the Hispanic Established Populations indicate that more than 25% of all respondents and more than 31% of diabetic respondents report high levels of depressive symptoms.^{29,30}

Major disability included reported impairment in any of 7 activities of daily living measured with the Katz Activities of Daily Living Scale.³¹ Incontinence was measured with an item that asked how often a respondent had difficulty holding urine until getting to a toilet. Impaired vision was based on a direct assessment of visual function during which respondents used any corrective device they would normally use, such as glasses. Directional E's at 4 m were used to test distant acuity from 20/20 to 20/200.³² For the present study, respondents who were moderately or severely impaired (acuity worse than 20/60) or who reported functional

blindness were categorized as having distant vision impairment. A similar method was used to assess near vision acuity, with respondents holding a card at reading distance and being asked to read a series of numbers. Individuals who were moderately or severely impaired (acuity worse than 20/60) and those who reported being functionally blind were categorized as having near vision impairment.³² In the present study, 25.5% of respondents were classified as having distant vision impairment, and 18% had near vision impairment.

Hearing impairment was measured with the screening version of the Hearing Handicap Inventory for the Elderly,³³ a 10-item scale validated in community-dwelling elderly people³⁴ and in older Mexican Americans in the San Antonio Heart Study.³⁵ Total scores range from 0 to 40, with a score greater than 24 indicating moderate to severe handicap. In the present study, 3.7% of respondents were classified as having hearing impairment.

Health behaviors included current alcohol consumption, based on items assessing consumption of beer, wine, or alcohol during the month prior to the interview, as well as current and past smoking. Health service use involved a dichotomous measure of hospitalization in the year prior to the baseline interview and a continuous measure of the number of physician visits during the year prior to the interview. Unlike the case in previous studies,²⁰ we were not able to use a measure of nursing home admissions because none of the older Mexican Americans reported having been a patient in a nursing home.

Sociodemographic characteristics assessed included respondents' age (as of the most recent birthday), gender, years of education, current marital status, living arrangement, immigrant status (based on country of birth), and the language in which they chose to conduct the interview (Spanish or English).

Analyses

Prevalence rates of non-insulin-dependent diabetes by varying levels of sociodemographic measures were assessed for the entire sample, as well as for men and women separately, via standard epidemiologic methods,³⁶ and chi-square statistics were used in testing differences. The prevalence of diabetes-related characteristics was assessed among only those individuals who reported a physician's diagnosis of diabetes. Comparisons were then made between older diabetics and nondiabetics for each of the health- and function-related measures. Specifically, for categorical measures (e.g., reporting myocardial infarction or a major disability), prevalence

ratios were used to compare the prevalence in diabetics and the prevalence in nondiabetics, and differences were tested via chi-square analysis. This method was selected to facilitate comparisons with data reported for older non-Hispanic Whites and African Americans from the other Established Populations sites.²⁰ For continuous measures (e.g., number of hospitalizations, weight, and body mass index), means were computed for diabetics and nondiabetics, and differences were tested with the Student *t* test. In order to produce results that were representative of older Mexican Americans in the 5 southwestern states, all analyses incorporated weighted data and adjusted for design effects using the SUDAAN program.³⁷

Results

Almost 57% of the respondents were women, and the majority of respondents (66.1%) were between the ages of 65 and 74 years. The level of education was low, with more than 50% reporting less than 5 years of schooling. The majority of respondents were married (55.2%) and lived with others (79.1%). Although 44% of the respondents had been born in Mexico, almost three fourths preferred to conduct the interview in Spanish. Older men were more likely to be married and less likely to live alone than older women.

Prevalence of Non-Insulin-Dependent Diabetes and Related Characteristics

The overall prevalence of self-reported diabetes in this sample was 22.0%, with no substantial gender differences. As can be seen in Table 1, an age gradient was evident, with the prevalence of diabetes much higher in those 65 to 74 years old than in those 75 years or older. Rates did not vary significantly by level of education, marital status, or language of interview. Respondents who lived alone and who were immigrants were less likely to report having diabetes than those who lived with others or were born in the United States.

Table 2 shows the weighted means and percentages of characteristics relevant to diabetes by self-reported diabetes status and gender. More than twice as many diabetics (24.6%) as nondiabetics (10.7%) reported a family history of diabetes. The average weight of diabetics was significantly higher than that of nondiabetics, and diabetics had higher body mass indexes and waist-hip ratios and were more likely to be obese than nondiabetics. These differences were more striking among the older women than among the older men.

TABLE 1—Sociodemographic Characteristics (Weighted Percentages) and Lifetime Prevalence of Self-Reported Diabetes in Older Mexican Americans (n = 3050)

	Sample, No. (%)	Rate of Diabetes, %
Men	1292 (43.1)	22.8
Women	1758 (56.9)	21.5
Age group, y		
65–74	2002 (66.1)	24.6
75–84	834 (26.9)	18.4
85+	214 (7.0)	12.0**
Level of education, y		
<5	1649 (50.9)	22.4
5–11	1102 (38.5)	20.7
12+	299 (10.6)	25.2
Marital status		
Married	1693 (55.2)	23.1
Divorced/separated	229 (7.9)	22.3
Widowed	955 (31.6)	21.3
Never married	173 (5.3)	14.7
Living arrangement		
Lives alone	640 (20.9)	17.9
Lives with others	2410 (79.1)	23.1*
Immigrant status		
Immigrant	1257 (43.9)	19.9
US born	1793 (56.1)	23.8*
Language of interview		
Spanish	2374 (72.6)	21.7
English	676 (27.4)	23.1
Total	3050 (100)	22.0

P* < .01; *P* < .001 (χ^2 analysis).

Among those reporting non-insulin-dependent diabetes, the average age at diagnosis was about 59 years, with little gender variation. Diabetes-related complications were common: more than 13% of respondents reported having diabetes-related kidney problems, almost 37% reported diabetes-related eye problems, 38% reported circulation problems, and almost 9% reported having had an amputation as a result of diabetes, with female diabetics more likely than male diabetics to report kidney or circulation problems. Diabetic medication use was also high in this group, with 57.1% reporting use of oral hypoglycemics, 30.7% reporting use of insulin, 5.3% reporting use of both types of diabetic medications, and only 6.8% reporting no treatment or treatment with diet alone. Older diabetic women were more likely than older diabetic men to use insulin and less likely to require no treatment or treatment with diet alone.

Chronic Health Conditions

Table 3 shows the prevalence ratios of health- and function-related measures among older diabetics vs older nondiabetics. Myocardial infarction, stroke, hypertension, angina, and cancer were significantly more

common in diabetics than in nondiabetics, both for the overall sample and for older men and women considered separately. Myocardial infarction was about twice as common among diabetics as among nondiabetics. Stroke was also about twice as common among diabetics; however, the prevalence ratio was higher for men than for women. The ratios were less dramatic, although still significant, for hypertension, angina, and cancer. Gallbladder disease was significantly more common among diabetic women than among nondiabetic women; no differences were observed among men. Although no differences for hip fracture were apparent in the overall sample, male diabetics were less likely to report hip fracture than nondiabetics.

High levels of depressive symptoms were significantly more common in diabetics than in nondiabetics of both genders, although the difference was more dramatic for men. Significant differences in perceived health status were also evident, with older diabetics more often rating their health as poor to fair than nondiabetics.

Disability

Major disability and incontinence were significantly more common among diabetics

TABLE 2—Weighted Means and Prevalence Rates for Selected Health-Related Characteristics Among Older Mexican Americans, by Self-Reported Diabetes and Sex

	Overall		Men		Women	
	Diabetic (n = 690)	Nondiabetic (n = 2360)	Diabetic (n = 291)	Nondiabetic (n = 1001)	Diabetic (n = 399)	Nondiabetic (n = 1359)
Family history of diabetes, % (95% CI)	24.6 (21.4, 27.9)	10.7 (9.0, 12.4)***	24.5 (20.0, 29.1)	9.2 (6.7, 11.7)***	24.7 (20.2, 29.2)	11.8 (9.4, 14.2)***
Weight, kg, mean ± SD	74.8 ± 0.63	70.1 ± 0.30***	79.0 ± 0.88	75.3 ± 0.43***	71.5 ± 0.85	66.3 ± 0.37***
Body mass index, kg/m ² , mean ± SD	29.3 ± 0.24	27.5 ± 0.11***	28.3 ± 0.31	26.8 ± 0.14***	30.0 ± 0.34	28.1 ± 0.15***
Obesity, ^a % (95% CI)	34.2 (30.0, 38.4)	24.5 (22.3, 26.7)**	27.7 (22.2, 33.4)	19.1 (16.0, 22.1)*	39.4 (33.5, 45.3)	28.5 (25.4, 31.6)***
Waist-hip ratio, mean ± SD	0.95 ± 0.01	0.93 ± 0.01***	0.97 ± 0.01	0.96 ± 0.01	0.93 ± 0.01	0.91 ± 0.01***
Age at interview, y, mean ± SD	72.1 ± 0.23	73.2 ± 0.14	72.3 ± 0.34	73.3 ± 0.23	72.0 ± 0.30	73.1 ± 0.19
Age at onset, y, mean ± SD	59.2 ± 0.42	...	60.0 ± 0.63	...	58.5 ± 0.55	...
Diabetes complications, % (95% CI)						
Kidney problems	13.4 (11.9, 15.0)	...	9.6 (7.5, 11.7)	...	16.5 (14.2, 18.7)**	...
Eye problems	36.7 (34.5, 38.9)	...	37.6 (34.3, 40.9)	...	35.9 (33.0, 38.9)	...
Circulation problems	37.9 (35.7, 40.1)	...	33.6 (30.4, 36.9)	...	41.4 (38.4, 44.3)*	...
Amputations	8.7 (7.5, 10.0)	...	10.7 (8.5, 13.0)	...	7.1 (5.7, 8.6)	...
Diabetic treatment, % (95% CI)						
Oral hypoglycemics	57.1 (55.0, 59.3)	...	58.5 (55.2, 61.7)	...	56.1 (53.2, 59.0)	...
Insulin	30.7 (28.7, 32.7)	...	24.6 (21.7, 27.4)	...	35.7 (32.9, 38.4)**	...
Insulin and hypoglycemics	5.3 (4.4, 6.2)	...	5.7 (4.3, 7.2)	...	4.9 (3.7, 6.2)	...
Diet or no treatment	6.8 (5.9, 7.8)	...	11.2 (9.6, 12.8)	...	3.3 (2.1, 4.5)***	...

Note. Comparisons between diabetics and nondiabetics involved χ^2 and t-test analyses; comparisons between male diabetics and female diabetics involved χ^2 analyses. CI = confidence interval.

^aBody mass index of 30 or more.

* $P < .05$; ** $P < .01$; *** $P < .001$.

than among nondiabetics; prevalence ratios were more dramatic among men than women. Diabetic individuals were more likely to report vision problems, both in terms of impaired distant vision and impaired near vision. These differences were apparent for both men and women; however, the prevalence ratios for impaired distant vision were similar for both genders, whereas the ratio for near vision impairment was higher among women than among men. Hearing impairment was more common among male diabetics than nondiabetics.

Health Behaviors and Health Service Use

Reported alcohol consumption during the previous month was considerably lower among diabetics than among nondiabetics. Current and ever smoking were also less common among the diabetics, although significantly so only among men. Both male and female diabetics were significantly more likely to have been hospitalized in the year prior to the interview than nondiabetics, and diabetics reported significantly more physician visits on average (10.1 visits in the year prior to the interview) than nondiabetics (5.9 visits; $P < .001$).

Discussion

Prevalence of Non-Insulin-Dependent Diabetes

The rates of self-reported non-insulin-dependent diabetes found in this study are comparable to those reported elsewhere for older Mexican Americans.⁵ In the Hispanic HANES, for example, the rate of diabetes was 22.7% for adults aged 65 to 74 years.³⁸ Our rates, however, are 2 to 3 times higher than those reported for older adults in general. Rates of 8% to 10%, for example, have been reported among older adults in the National Health Interview Survey^{1,2,39} and the Framingham Study,⁴⁰ and rates of 11% to 14% have been reported among older non-Hispanic Whites at the other Established Populations sites.²⁰

The Mexican American rates found in the present study were more comparable to those reported among older African Americans in the Established Populations surveys,²⁰ which ranged from 16% to 19% among men and from 20% to 24% among women. Data from the 1990 to 1992 versions of the National Health Interview Survey estimated the rate of diabetes among adult African Americans to be about 20% in those aged 65 to 74 years and 14% in those 75 years and older.¹

We also found the rate of diabetes among Mexican Americans 85 years and

TABLE 3—Prevalence Ratios Describing the Association Between Self-Reported Diabetes and Selected Health- and Function-Related Measures Among Older Mexican Americans, by Sex

	Overall (n = 3050)	Men (n = 1292)	Women (n = 1758)
Myocardial infarction	1.73***	1.91***	1.56**
Stroke	1.96***	2.75***	1.39*
Hypertension	1.45***	1.62***	1.38***
Angina	1.41***	1.53*	1.39**
Cancer	1.72***	1.94**	1.59**
Hip fracture	1.03	0.80	1.15
Gallbladder disease	1.32***	1.08	1.44***
Depression ^a	1.29***	1.44**	1.26**
Perceived health status ^b	1.40***	1.44***	1.37***
Major disability	1.56***	1.83***	1.42***
Incontinence	1.62***	2.37***	1.38*
Distant vision impairment	1.33***	1.28*	1.37***
Near vision impairment	1.48***	1.24	1.66***
Hearing impairment	1.07	1.71*	0.66
Any alcohol in past month	0.56***	0.63***	0.32***
Smokes currently	0.77*	0.71*	0.84
Ever smoked	0.93	0.89*	0.98
Hospitalized in past year	1.75***	1.74***	1.76***

^aBased on a score of 16 or more on the Center for Epidemiologic Studies Depression Scale.

^bPoor or fair vs good or excellent health.

* $P < .05$; ** $P < .01$; *** $P < .001$ (χ^2 analysis).

older to be about half that of those aged 65 to 74 years, which has not generally been found in other studies.⁸ Hamman and colleagues⁵ reported a comparable drop in the rate of diabetes among older Mexican American men, but not among women. This drop in prevalence is not apparent in the elderly population in general: data from the National Health Interview Survey, for example, have yielded estimates of 10.2% for adults aged 65 to 74 years and 10.6% for those 75 years and older.² For older Mexican Americans, this drop implies greater negative consequences of non-insulin-dependent diabetes in relation to other elderly groups, potentially resulting in decreased survival.

Correlates of Diabetes in Older Mexican Americans

Similar to other studies, we found no substantial gender differences in the rates of non-insulin-dependent diabetes in this sample of older Mexican Americans.^{5,38,41} Unlike other studies,⁴² however, no rate differences were apparent for level of education in our sample. This may be due in part to the limited education of the respondents, who had an average of only 5 years of education.

Family history of diabetes, obesity, high body mass index, and upper-body adiposity (as measured by waist-hip ratio) were found to be more prevalent among these older Mexican Americans, as in other studies.^{9,42-44} Haffner and colleagues,²² for example, found that Mexican American diabetics had high

waist-hip ratios and body mass indexes. These findings also have important implications for older Mexican Americans, because family history, obesity, high body mass index, and high waist-hip ratio have all been shown to be predictive of diabetes incidence.⁴⁵

Diabetes-related complications were also common in the elderly diabetics in this sample, as has been reported in other studies of younger Mexican Americans.⁴⁶ This helps to confirm the idea that Mexican Americans suffer from a double jeopardy regarding diabetes: they are not only at higher risk for developing non-insulin-dependent diabetes but at increased risk for more severe disease states owing to diabetes.⁹

Health Burden of Diabetes

One possible limitation of the present study is the reliance on self-reports of physician diagnoses of diabetes. Several investigators have noted that from one third to one half of all diabetics in the United States may be undiagnosed,¹ so some proportion of the respondents classified as nondiabetic in the present study may actually have diabetes. Among Mexican Americans older than 65 years, however, the rate of undiagnosed diabetes appears to be low: data from the Hispanic HANES survey, for example, indicate that less than 10% of Mexican Americans aged 65 to 74 years who met criteria for diabetes did not know of their diabetic status. If the true rate of diabetes is underestimated in

the present study, it would result in an underestimate of the magnitude of the prevalence ratios and the strength of the associations found between diabetes and health burden in older Mexican Americans. The majority of differences found between diabetics and nondiabetics in this study of older Mexican Americans, however, are similar to those found among older non-Hispanic Whites and older African Americans and those found in studies of younger Mexican Americans. In particular, myocardial infarction, stroke, hypertension, and angina have been shown to be more common in diabetic than nondiabetic elderly non-Hispanic Whites and African Americans, as have major disability, incontinence, visual impairment, auditory impairment, poor self-ratings of health, and hospitalizations.²⁰ Elevated rates of stroke, hypertension, kidney problems, and disability have also been reported among middle-aged Mexican Americans.¹⁹ In our sample, similar to the case with older non-Hispanic Whites and African Americans, we found no elevated rates of hip fracture associated with diabetes; however, we found that cancer rates were elevated in diabetic Mexican Americans in relation to nondiabetics, which was not the case in these other 2 groups.

More important, many of the prevalence ratios found in this sample of older Mexican Americans were higher than those reported for older non-Hispanic Whites and African Americans, particularly among men.²⁰ For myocardial infarction, for example, the rate ratio for Mexican American men was considerably higher than rate ratios reported by Moritz and colleagues²⁰ for men at the other Established Populations sites. Similarly, the rate ratios for stroke, hypertension, cancer, major disability, incontinence, and hearing impairment among Mexican American men were also higher than those reported for men at the other Established Populations sites. Among the older Mexican American women, the rate ratios for hypertension and cancer were higher than ratios reported for women at the other Established Populations sites.²⁰ Hospitalization rate ratios were also generally higher among the Mexican Americans than among the other elderly groups, and the rate ratios for weight and body mass index were higher among both the male and female Mexican Americans than among the older adults at the other sites.

In summary, our findings indicate that the prevalence of self-reported non-insulin-dependent diabetes is much higher in older Mexican Americans than in other groups of elderly people. In addition, our findings of a drop-off in rates at later ages, higher rates of factors associated with increased incidence of diabetes, increased rates of diabetes-related

complications, and higher rates of comorbidity, disability, and health care use in comparison with the elderly in general indicate that the health burden associated with self-reported diabetes is greater among older Mexican Americans, particularly older men. These findings would support the suggestion from several authors that diabetes has more severe consequences for Mexican Americans than for the elderly population in general.^{3,9-14} This combination of increased risk for non-insulin-dependent diabetes and increased severity of diabetes once it develops is particularly important for older Mexican Americans because diabetes has been shown to be increasing in both prevalence and incidence, particularly among the elderly.⁴⁷ Given the fact that Mexican Americans represent one of the fastest growing segments of the elderly population,¹¹ the present findings have important implications for the delivery and costs of health care in this population, as well as the prevention of incident disease and declining function. □

Contributors

S. A. Black planned and designed the study, analyzed the data, and wrote the paper. L. A. Ray assisted with the study design, data analysis, and writing of the paper. K. S. Markides contributed to the conceptualization, interpretation of results, and writing of the paper. All 3 authors are guarantors for the integrity of the research.

Acknowledgments

This research was supported by the National Institute of Diabetes, Digestive, and Kidney Diseases (grant DK51261) and the National Institute on Aging (grant AG10939).

References

- Kenny SJ, Aubert RE, Greiss LS. Prevalence and incidence of non-insulin-dependent diabetes. In: National Diabetes Data Group. *Diabetes in America*. 2nd ed. Bethesda, Md: National Institute of Diabetes and Digestive and Kidney Diseases; 1995. NIH Publication No. 95-1468.
- National Center for Health Statistics. Current estimates from the National Health Interview Survey, 1993. *Vital Health Stat 10*. 1994;No. 190:88.
- Stern MP, Mitchell BD. Diabetes in Hispanic Americans. In: National Diabetes Data Group. *Diabetes in America*. 2nd ed. Bethesda, Md: National Institute of Diabetes and Digestive and Kidney Diseases; 1995. NIH Publication No. 95-1468.
- Mitchell BD, Stern MP, Haffner SM, Hazuda HP, Patterson JK. Risk factors for cardiovascular mortality in Mexican Americans and non-Hispanic whites: the San Antonio Heart Study. *Am J Epidemiol*. 1990;131:423-433.
- Hamman RF, Marshall JA, Baxter J, et al. Methods and prevalence of non-insulin-dependent diabetes mellitus in a bi-ethnic Colorado population: the San Luis Valley Diabetes Study. *Am J Epidemiol*. 1989;129:295-311.
- Hanis CL, Ferrell RE, Barton SA, et al. Diabetes among Mexican Americans in Starr County, TX. *Am J Epidemiol*. 1983;118:659-672.
- Flegal KM, Ezzati TM, Harris MI, et al. Prevalence of diabetes in Mexican Americans, Cubans, and Puerto Ricans from the Hispanic Health and Nutrition Examination Survey, 1982-84. *Diabetes Care*. 1991;14(suppl 3):628-638.
- Samet JM, Coultas DB, Howard CA, Skipper BJ, Hanis CL. Diabetes, gallbladder disease, obesity, and hypertension among Hispanics in New Mexico. *Am J Epidemiol*. 1988;128:1302-1311.
- Diehl AK, Stern MP. Special health problems of Mexican Americans: obesity, gallbladder disease, diabetes mellitus, and cardiovascular disease. *Adv Intern Med*. 1989;34:79-86.
- Haffner SM, Fong D, Stern MP, et al. Diabetic retinopathy in Mexican Americans and non-Hispanic whites. *Diabetes*. 1988;37:878-884.
- Raymond CA. Diabetes in Mexican Americans: pressing problem in a growing population. *JAMA*. 1988;259:1772.
- Mitchell BD, Stern MP. Recent developments in the epidemiology of diabetes in the Americas. *World Health Stat Q*. 1992;45:347-349.
- Haffner SM, Mitchell BD, Pugh JA, et al. Proteinuria in Mexican Americans and non-Hispanic whites with NIDDM. *Diabetes Care*. 1989;12:530-536.
- Haffner SM, Mitchell BD, Stern MP, Hazuda HP. Macrovascular complications in Mexican Americans with type II diabetes. *Diabetes Care*. 1991;14(suppl 3):665-671.
- Barrett-Connor E, Orchard T. Diabetes and heart disease. In: National Diabetes Data Group. *Diabetes in America*. Bethesda, Md: National Institute of Diabetes and Digestive and Kidney Diseases; 1985. NIH Publication No. 85-1468.
- Palumbo PJ, Melton LJ. Peripheral vascular disease and diabetes. In: National Diabetes Data Group. *Diabetes in America*. Bethesda, Md: National Institute of Diabetes and Digestive and Kidney Diseases; 1985. NIH Publication No. 85-1468.
- Bransome ED. Financing the care of diabetes mellitus in the U.S. *Diabetes Care*. 1992;15(suppl):1-5.
- Greene DA. Acute and chronic complications of diabetes mellitus in older patients. *Am J Med*. 1986;80:39-53.
- Zhang J, Markides KS, Lee DJ. Health status of diabetic Mexican Americans: results from the Hispanic HANES. *Ethn Dis*. 1988;1:273-279.
- Moritz DJ, Ostfeld AM, Blazer D, Curb D, Taylor JO, Wallace RB. The health burden of diabetes for the elderly in four communities. *Public Health Rep*. 1994;109:782-790.
- Markides KS, Stroup-Benham CA, Goodwin JS, Perkowski LC, Lichtenstein M, Ray LA. The effects of medical conditions on physical functioning in Mexican American elderly. *Ann Epidemiol*. 1996;6:386-391.
- Haffner SM, Stern MP, Hazuda HP, Pugh JA, Patterson K, Malina R. Upper body and centralized adiposity in Mexican Americans and non-Hispanic whites: relationship to body mass index and other behavioral and demographic variables. *Int J Obes*. 1986;10:493-502.
- Rose GA. The diagnosis of ischemic heart pain and intermittent claudication in field surveys. *Bull World Health Organ*. 1962;27:645-658.
- Radloff LS. The CES-D Scale: a self-report depression scale for research in the general population. *J Appl Psychol Meas*. 1977;1:385-401.
- Blazer D, Hughes DC, George LK. The epidemiology of depression in an elderly community population. *Gerontologist*. 1987;16:118-124.
- Himmelfarb S, Murrell SA. Reliability and validity of five mental health scales in older persons. *J Gerontol*. 1983;38:333-339.
- Boyd JH, Weissman M, Thompson W, Myers JK. Screening for depression in a community sample. *Arch Gen Psychiatry*. 1982;39:1195-1200.
- Newman JP. Aging and depression. *Psychol Aging*. 1989;4:150-165.
- Black SA, Goodwin JS, Markides KS. The association between chronic diseases and depressive symptomatology in older Mexican Americans. *J Gerontol Med Sci*. 1998;53A:M188-M194.
- Black SA, Markides KS, Miller TQ. Correlates of depressive symptomatology among older community-dwelling Mexican Americans: the Hispanic EPESE. *J Gerontol Soc Sci*. 1998;53B:S198-S208.
- Katz SC, Ford AB, Moskowitz RW, Jackson BA, Jaffe MW. Studies of illness in the aged: the index of ADL, a standardized measure of biological and psychosocial function. *JAMA*. 1963;185:914-919.
- Salive ME, Guralnik J, Christen W, Glynn RJ, Colsher P, Ostfeld AM. Association of visual impairment with mobility and physical function. *Ophthalmology*. 1992;99:1840-1847.
- Lichtenstein MJ, Bess FH, Logan SA. Diagnostic performance of the Hearing Handicap Inventory for the Elderly (screening version) against differing definitions of hearing loss. *Ear Hear*. 1988;9:208-211.
- McBride WS, Murlow CD, Aguilar C, Tuley MR. Methods for screening for hearing loss in older adults. *Am J Med Sci*. 1994;307:40-41.
- Lichtenstein MJ, Bess FH, Logan SA. Validation of screening tools for identifying hearing-impaired elderly in primary care. *JAMA*. 1988;259:2875-2878.
- Kleinbaum DG, Kupper LL, Morgenstern H. *Epidemiologic Research*. Boston, Mass: Van Nostrand Reinhold; 1982.
- Shah BV, Barnwell BG, Hunt PN, LaVange LM. *SUDAAN User's Manual, Release 6.34*. Research Triangle Park, NC: Research Triangle Institute; 1993.
- Perez-Stable EJ, McMillen MM, Harris MI, et al. Self-reported diabetes in Mexican Americans: HHANES 1982-84. *Am J Public Health*. 1989;79:770-772.
- Drury TF, Powell AL. *Prevalence, impact, and demography of known diabetes in the United States*. Hyattsville, Md: National Center for Health Statistics; February 12, 1986. Advance Data From Vital and Health Statistics, No. 114:1-16.
- Wilson PW, Anderson KM, Kannel WB. Epidemiology of diabetes mellitus in the elderly: the Framingham Study. *Am J Med*. 1986;80(suppl 5a):3-9.
- King H, Rewers M, World Health Organization Ad Hoc Diabetes Reporting Group. Global estimates for the prevalence of diabetes mellitus and impaired glucose tolerance in adults. *Diabetes Care*. 1993;16:157-177.

42. Marshall JA, Hamman RF, Baxter J, et al. Ethnic differences in risk factors associated with the prevalence of non-insulin-dependent diabetes mellitus. The San Luis Valley Diabetes Study. *Am J Epidemiol.* 1993;137:706-718.
43. Stern MP, Gaskill SP, Hazuda HP, Gardner LI, Haffner SM. Does obesity explain excess prevalence of diabetes among Mexican Americans? Results from the San Antonio Heart Study. *Diabetologia.* 1983;24:272-277.
44. Haffner SM, Stern MP, Hazuda HP, Rosenthal M, Knapp JA, Malina RM. Role of obesity and fat distribution in non-insulin-dependent diabetes mellitus in Mexican Americans and non-Hispanic whites. *Diabetes Care.* 1986; 9:153-161.
45. Edelstein SL, Knowler WC, Bain RP, et al. Predictors of progression from impaired glucose tolerance to NIDDM: an analysis of six prospective studies. *Diabetes.* 1997;46: 701-710.
46. Macheledt JE, Vernon SW. Diabetes and disability among Mexican Americans: the effect of different measures of diabetes on its association with disability. *J Clin Epidemiol.* 1992; 45:519-528.
47. Casparie A. Epidemiology of type II diabetes mellitus and ageing of the population: health policy implications and recommendations for epidemiologic research. *Int J Epidemiol.* 1991;20(suppl 1):S25-S29.

Connecting with APHA

<http://www.APHA.org>

By E-mail

Use E-mail to send information, change your address, add an additional APHA section, and ask questions via the Internet.

Membership: membership.mail@apha.org
General Information: comments@apha.org
Government Relations and Affiliate Affairs: graa.mail@apha.org
The Nation's Health: nations.health@apha.org
American Journal of Public Health Submissions: ajph.submissions@apha.org

Using an APHA Discussion Group

APHA E-mail lists offer members a convenient means of exchanging information with their colleagues. In fact, each APHA section and Special Primary Interest Group (SPIG) has its own discussion group to which members may subscribe. To learn more about your section or SPIG list, go to the APHA website at www.APHA.org and click on "For Members Only" and follow the instructions for subscribing to the list. You can call APHA for your password at (202) 789-5600.

Via Fax

Send information to the APHA office by fax.

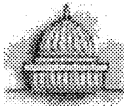

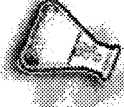

Main APHA fax: (202) 789-5661
Publication Sales fax: (301) 843-0159

Through Fax-on-Demand

APHA makes an abundance of information available to members through its Fax-on-Demand service. Use Fax-on-Demand to get information 24 hours a day, 7 days a week.


To receive an index of topics available through Fax-on-Demand:
 Call (703) 531-0894. Press 1 for the list of documents.
(Listen to the instructions and use your telephone keypad to enter the document numbers you want to receive and where you want the documents sent.)

On the APHA Website:

- 
Legislative Affairs and Advocacy
 - Issue Bulletins
 - Action Alerts
- 
News and Publications
 - Books
 - Journal and Newspaper
- 
Science, Practice, and Public Policy
 - Public Health Models
 - Policy Statements
- 
Public Health Resources
 - Links to other public health websites

Use the resources available on the APHA website to get information on:

- APHA Annual Meeting
- Affiliates and Caucuses
- Continuing Education (CEUs)
- Members Only Information
- Innovations in Practice
- Job Openings
- Membership
- Medicine and Public Health Initiative
- Sections and SPIGs
- World Federation of Public Health Associations
- Public Health Week
- Book Reviews
- Book Proposals



American Public Health Association
 1015 15th St., NW • Washington, DC 20005-2605
 Voice: (202) 789-5600 • Fax: (202) 789-5661
 E-mail: comments@APHA.org • Web: www.APHA.org