BIRTHPLACE AND MORTALITY AMONG INSURED LATINOS: THE PARADOX REVISITED

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Objectives: We investigated the Latino paradox in a managed care setting and examined the role of birthplace.

Methods: We evaluated 133,155 non-Latino Whites and 5,237 Latinos (36% born in the United States, 34% in Central and South America, 21% in Mexico, and 8% in the Caribbean Islands) who were enrolled in an integrated healthcare delivery system in northern California. Baseline data were from 1964–1973, and the median followup was 34 years. Main outcome measures were cause-specific and all-cause mortality.

Results: In fully-adjusted analyses, and compared with non-Latino Whites, the risk of death from circulatory causes was significantly lower among US-born Latinos (hazard ratio [HR] .79, 95% confidence interval [CI] .66–.93), among Central and South America-born Latinos (HR .76, 95% CI .63–.91), and Caribbean-born Latinos (HR .66, 95% CI .47–0.93). Risk of death by malignant neoplasms was significantly lower among US-born Latinos (HR .68, 95% CI .56–.83). Risk of respiratory death was significantly lower among Central and South America-born Latinos (HR .50, 95% CI .32–.80). All-cause mortality risk was significantly decreased in US-born Latinos (HR .79, 95% CI .71–.87), Central and South America-born Latinos (HR .81, 95% CI .73–.90), and Caribbean-born Latinos (HR .76, 95% CI .63–.93) but not in Mexico-born Latinos.

Conclusions: In our managed care setting, the Latino paradox phenomenon varied by birthplace; it was more evident among US-born Latinos. This subgroup experienced lower circulatory, cancer, and all-cause mortality than did non-Latino Whites, despite higher prevalences of current smoking, obesity, and asymptomatic hyperglycemia. (*Ethn Dis*. 2009;19:185–191)

Key Words: Hispanic/Latino Paradox, Cohort Study, Risk Factors, Mortality

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INTRODUCTION

According to the 2000 US Census, 35.3 million people in the 50 states (12.5% of the population) and 3.8 million in the Commonwealth of Puerto Rico self-identified as Hispanic or Latino.[1] By 2050, an estimated 25% of the US population (102 million) will be Hispanic or Latino.[2]

The observation that Latinos (particularly foreign-born Latinos) experience lower all-cause and cardiovascular mortality than do non-Latino Whites, despite increased prevalence of obesity, type 2 diabetes, lower socioeconomic status, and increased barriers to health care, has been termed the ''Hispanic paradox'' or ''Latino paradox.''[3] However, this paradox is controversial and has been attributed to problems of data reliability (ethnic misclassification and differential ascertainment of deaths by ethnicity) and the effect of selective out-migration of unhealthy people.[4] A limitation of prior research among Latinos in the United States includes lack of consideration of heterogeneity according to place of birth; the preponderance of studies have been done among Latinos of Mexican descent.

The aim of this article is to shed light on the Latino paradox by examining the cardiovascular risk factor profile and long-term mortality among Latino members of a large health plan in Northern California. The unique aspects of our setting include the fact that it controls for access to care and reduces the chance of out-migration, since most of our members have health insurance provided through employment. In addition, we were able to segregate our Latino sample by place of birth.

The aim of this article is to shed light on the Latino paradox by examining the cardiovascular risk factor profile and long-term mortality among Latino members of a large health plan in Northern California.

METHODS

Study Cohort and Procedures

The study cohort was a subset of a larger sample of 177,750 health plan members who attended Multiphasic Health Checkups at the Kaiser Permanente Oakland and San Francisco medical centers between 1964 and 1973. Kaiser Permanente is an integrated healthcare delivery system providing medical care for one-third of the population in the San Francisco Bay Area. Kaiser Permanente subscribers are representative of the region, although there is underrepresentation of the extremes of the income distribution.[5] At the Multiphasic Health Checkups, information on age, sex, race/ethnicity, country of birth, education level, height and weight, cigarette smoking, alcohol consumption, history of physician-diagnosed hypertension, diabetes mellitus, chronic obstructive pulmonary disease, asthma, coronary heart disease, stroke,

and current medication use was collected by using self-administered questionnaires and procedures previously described.[6] When data from >1 MHC visit were available, only data from the most current visit were used in the analysis.

We defined the Latino subset (n=5237) as anyone whose place of birth was Mexico (n=1106), Central and South America (n=1804), and the Caribbean Islands (n=444) or as anyone born in the United States who self-reported Latino ethnicity (n=1883). Non-Latino Whites were defined as cohort members not previously identified as Latino (by either self-report or place of birth) and whose race was self-reported as White (n=133,155). Thus the final analytic sample comprised 138,392 subjects. Since we did not have an indicator variable for Latino ethnicity in this phase of the Multiphasic Health Checkups, we relied on country of birth and on self-report of Latino ethnicity at subsequent visits in the 1978–1985 phase as well as other miscellaneous surveys on which an indicator for Latino ethnicity was included.

Deaths during this time were ascertained by using complimentary sources of death including the California Automated Mortality Linkage System (which has been satisfactorily validated against the National Death Index),[7] deaths in Northern California Kaiser hospitals or in other California or out-of-state non-Kaiser hospitals (as long as a claim was filed), and deaths from the Social Security Administration dataset for the western United States. Underlying cause of death was categorized according to the International Classification of Diseases (ICD)-7 (1965 through 1968), ICD-8 (1969 through 1978), ICD-9 (1979 through 1998), and ICD-10 (1999 through 2004). The study mortality outcomes included circulatory death (ICD-7 codes 400–467 and 468.3, ICD-8 codes 390–458, ICD-9 codes 390–459, and ICD-10 codes I00–I99), death by malignant neoplasms (ICD-7, ICD-8, and ICD-9 codes 140–239, ICD-10 codes B21 and C00-D48), respiratory death (ICD-7 codes 470–527, ICD-8 and ICD-9 codes 460–519, ICD-10 codes J00–J98), death by other and unknown causes, and all-cause mortality. The research protocol was approved by the Kaiser Foundation Research Institute institutional review board.

Statistical Analysis

We first tabulated descriptive cohort characteristics at baseline by Latino ethnicity and place of birth. Group comparisons were done by using analysis of variance for continuous variables and the χ^2 test for categorical variables. Age-adjusted cause-specific and all-cause mortality rates per 100,000 person-years according to Latino ethnicity and place of birth were estimated by using Poisson regression. The association of Latino ethnicity and place of birth with risk of cause-specific and all-cause mortality (with non-Latino Whites as the referent group) was determined by using Cox proportional hazards models, first in an age- and sex-adjusted model and then in a fully adjusted model with entry of demographic, lifestyle, biochemical, and co-morbidity covariates. To adjust for nonlinear effects, age was entered as categorical variables in 5-year increments, with 18–24 years as reference. Follow-up time began at the Multiphasic Health Checkups and right censoring occurred at death, attainment of age 95, or study termination on December 31, 2004, whichever occurred first. This resulted in 4,285,668 person-years and a median follow-up time of 33.8 years (range,<.5 to 40.5 years).

To assess differential loss to followup by Latino ethnicity and birthplace, we fitted an age- and sex-adjusted Cox regression model in which the outcome was leaving the health plan. To assess the effect of differential disenrollment on the risk estimates, we repeated the analysis in a subset of the cohort for whom we had membership information (in this analysis the overall sample was decreased by 30%, with 93,034 non-Latino Whites, 1793 Latinos born in the United States, 847 Latinos born in Mexico, 1258 Latinos born in Central and South America, and 317 Latinos born in the Caribbean Islands). Since membership information was not available until 1976, follow-up time started at the date of first active membership (the earliest was January 1, 1976) and ended at death, attainment of age 95, first 12-month gap in health plan membership, or study termination on December 31, 2004, whichever occurred first. This censoring scheme resulted in 1,579,894 total person-years. To test for proportionality of hazards over time, we also estimated hazard ratios of circulatory and all-cause mortality in 3 separate time intervals: the first 10 years of followup, years 11–20, and beyond 20 years. All statistical analyses were performed by using SAS version 9.13 (SAS Institute, Inc, Cary, NC), and differences were considered significant at P<.05.

RESULTS

Thirty six percent of the Latino participants were born in the United States (of those, 53% in California; 26% in Texas, Arizona, or New Mexico; 7% in Colorado; 2% in New York; and 12% in other states), 34% in Central and South America, 21% in Mexico, and 8% in the Caribbean Islands. All Latino subgroups were, on average, younger than non-Latino Whites; the youngest were those born in the United States (Table 1). A greater proportion of women (60%) existed among those born in Central/South America. A gradient in education level was noted, with the highest proportion of persons with high school or lower education among those born in Mexico (75%), followed by Latinos born in the US (68%), Caribbean Islands (59%), Central/South America (57%) and non-Latino Whites (47%). The proportion

Table 1. Baseline characteristics of Non-Latino Whites and Latinos, by place of birth, Kaiser Permanente Multiphasic Health Checkups cohort, 1964–1973

Characteristic	Non-Latino Whites (*n*=133,155)	Latino Subgroup, by Place of Birth				P Value*
		United States (*n*=1883)	Mexico (*n*=1106)	Central/South America (*n*=1804)	Caribbean Islands (*n*=444)	
Mean (SD) age, years	41.7 (14.4)	36.0 (10.3)	40.6 (14.0)	36.8 (11.6)	38.8 (12.4)	<.001
Female sex, *n* (%)	71,584 (54)	998 (53)	562 (51)	1089 (60)	238 (54)	<.001
Education level, *n* (%)						<.001
High school or less	61,982 (47)	1288 (68)	832 (75)	1040 (57)	261 (59)	
Some college	38,479 (29)	386 (21)	147 (13)	483 (27)	109 (25)	
College graduate or higher	25,953 (19)	159 (8)	57 (5)	193 (11)	54 (12)	
Unknown	6741 (5)	50 (3)	70 (7)	88 (5)	20 (4)	
Smoking status, *n* (%)						<.001
Never	47,854 (36)	791 (42)	549 (50)	902 (50)	203 (46)	
Former	23,837 (18)	275 (14)	153 (14)	223 (13)	75 (17)	
Current	50,002 (37)	783 (42)	378 (34)	639 (35)	158 (35)	
Unknown	11,462 (9)	34 (2)	26 (2)	40 (2)	8 (2)	
Alcohol consumption, *n* (%)						<.001
None	21,548 (16)	371 (20)	413 (37)	611 (34)	143 (32)	
<3 drinks/day	87,250 (65)	1286 (68)	586 (53)	1046 (58)	257 (58)	
≥3 drinks/day	18,932 (11)	208 (11)	94 (9)	127 (7)	38 (9)	
Unknown	10,425 (8)	18 (1)	13 (1)	20 (1)	6 (1)	
Mean (SD) BMI, kg/m^2	24.5 (3.9)	25.9 (4.6)	25.5 (4.3)	24.6 (3.8)	25.1 (4.5)	<.001
Obesity, *n* (%)	10,366 (8)	289 (15)	125 (11)	114 (6)	42 (9)	<.001
Mean (SD) height, m	1.68 (.10)	1.64 (.09)	1.63 (.09)	1.62 (.09)	1.63 (.10)	<.001
Mean (SD) total cholesterol, mg/dL	222 (44)	219 (42)	224 (45)	222 (41)	223 (44)	.02
Total cholesterol ≥240 mg/dL, *n* (%)	39,429 (30)	515 (27)	335 (30)	487 (27)	124 (28)	.02
Hypertension, *n* (%)	51,932 (39)	634 (34)	426 (39)	582 (32)	160 (36)	<.001
Stroke, *n* (%)	587 (<1)	9 (<1)	14 (1)	13 (1)	3 (1)	<.001
Coronary artery disease, *n* (%)	2583 (2)	7 (<1)	10 (1)	15 (1)	7 (2)	<.001
Asthma, *n* (%)	9219 (7)	148 (8)	40 (4)	87 (5)	32 (7)	<.001
COPD, *n* (%)	8971 (7)	72 (4)	50 (5)	97 (5)	25 (6)	<.001
Cancer, *n* (%)	9455 (7)	99 (5)	36 (3)	74 (4)	23 (5)	<.001
Glycemic status						<.001
Serum glucose ≥200 mg/dl, *n* (%)	41,986 (21)	493 (26)	331 (30)	484 (27)	108 (24)	
Diabetes, *n* (%)	2861 (2)	46 (2)	31 (3)	38 (2)	9 (2)	
Unknown, *n* (%)	12,832 (10)	314 (17)	173 (15)	216 (12)	77 (18)	

SD=standard deviation, BMI=body mass index, COPD=chronic obstructive pulmonary disease.
*Analysis of variance for continuous variables or χ^2 statistic for categorical variables.

of current smokers was highest among US-born Latinos (42%) and was similar among non-Latino Whites and other Latino groups (34 to 37%). Abstinence from alcohol was more common in Latinos born in Mexico, Central/South America and the Caribbean Islands than in non-Latino Whites. The prevalence of obesity were highest among US-born Latinos (15%), followed by Mexican-born born (11%). All Latino groups had shorter stature compared to non-Latino Whites, and the shortest were those born in Central/South America. There were no marked differences in total serum cholesterol levels across groups; on the other hand, there was evidence of lower hypertension prevalence among Central/South American Latinos (32%) and among US-born Latinos (34%), compared to non-Latino Whites (39%). Very small percentages (due to the young age of the cohort) reported coronary heart disease or stroke, and there were no marked differences across subgroups. The prevalence of asthma was lowest among Mexican-born Latinos (4%) and highest among US-born Latinos. COPD was slightly lower in US-born Latinos and highest among non-Latino Whites. The prevalence of asymptomatic hyperglycemia was higher in all Latino groups than in non-Latino Whites (21%), and was highest among Mexican-born Latinos (30%); the prevalence of self-report diabetes was also highest among Mexican-born Latinos (3%).

Age-adjusted all-cause mortality rates by study groups ranked as follows (from highest to lowest): non-Latino Whites, Mexican-born, Caribbean-born, and Central and South America-born Latinos. Age-adjusted rates of death by circulatory causes were highest among non-Latino Whites, lowest among Caribbean-born Latinos and in Central and South America-born Lati-

Table 2. Age-adjusted cause-specific and all-cause mortality rates among non-Latino Whites and Latinos (by Place of Birth) Kaiser Permanente Multiphasic Health Checkups cohort

			Latino Subgroup, by Place of Birth (Number; Person-Years)							
	Non-Latino Whites (133,155; 4,115,400)		United States (1883; 63,393)		Mexico (1106; 33,805)		Central/South America (1804; 58,963)		Caribbean Islands (444; 14,107)	
Underlying Cause of Death	Number of deaths	AAR	Number of Deaths	AAR	Number of deaths	AAR	Number of deaths	AAR	Number of deaths	AAR
All-cause	45,839	800	384	679	331	748	347	606	101	637
Circulatory	17,917	256	133	225	125	235	121	191	33	183
Malignant neoplasm	12,462	254	101	182	86	224	98	181	23	159
Respiratory	4,459	69	35	60	29	59	18	30	11	64
Other and unknown	11,001	212	115	206	91	225	110	200	34	228

AAR=age-adjusted rate per 100,000 person-years.

nos, and intermediate and very similar among Latinos born in the United States and in Mexico (Table 2). A similar pattern emerged for death by malignant neoplasms. Age-adjusted rates for death by respiratory causes were also highest among non-Latino Whites, lowest for Latinos born in Central and South America, and intermediate among Latinos born in the United States, Mexico, and the Caribbean Islands. There were no clear differences across study groups for age-adjusted rates by other or unknown causes.

All-cause mortality risk was significantly decreased in all Latino groups except for those born in Mexico. In the fully adjusted model, and relative to non-Latino Whites, US-born, Central and South America-born and Caribbean-born Latinos experienced 21%, 19%, and 24% lower risk of all-cause mortality, respectively. Compared with non-Latino Whites, there was a significantly decreased risk of death by circulatory causes among US-born Latinos and among Latinos born in Central and South America and the Caribbean (Table 3). Also in multivariable analysis, risk of death by malignant neoplasms was significantly lower among US-born Latinos and among Latinos born in Central and South America and the Caribbean. Risk of respiratory death was significantly lower among Central and South America-born Latinos. No significant differences were noted for risk of death by other or unknown cause.

Compared with non-Latino Whites, US-born Latinos were less likely (hazard ratio [HR] .47, 95% confidence interval [CI] .43–.51), whereas Mexican-born Latinos were just as likely (HR 1.03, 95% CI .93–1.13), and Caribbean-born Latinos were more likely (HR 1.20, 95% CI 1.03–1.39) to drop out of the heath plan. However, when the analysis was repeated taking into account health plan membership information, the findings were generally maintained (data not shown). In the analysis stratifying by follow-up time, the reduced risk of all-cause mortality associated with being US-born Latino was more pronounced in the first 10 years; there was still a significant protective effect in years 11–20, but the protection was lost after 20 years (Table 4). On the other hand, the reduced risk associated with being Latino born in Central and South America and the Caribbean was maintained over the years. For Mexican-born Latinos, no significant reduction in all-cause mortality risk was seen in any of the time periods. A similar pattern was seen for deaths by circulatory causes.

DISCUSSION

Our results support the Latino paradox. However, this phenomenon varied by birthplace; it was more evident among US-born Latinos. This subgroup experienced lower circulatory, cancer, and all-cause mortality than did non-Latino Whites, despite higher prevalence of current smoking, obesity, and asymptomatic hyperglycemia. This finding is consistent with National Longitudinal Mortality Study data, in which US-born Latinos had lower mortality than non-Latino Whites.[9]

In our study, the evidence for the Latino paradox was somewhat weaker for Latinos born in Central and South America and in the Caribbean: these 2 groups also showed lower circulatory and all-cause mortality and more asymptomatic hyperglycemia than did non-Latino Whites, but their prevalence of obesity was similar to that of non-Latino Whites. Finally, no evidence for the paradox was found among Mexico-born Latinos, although they exhibited slightly more obesity and more asymptomatic hyperglycemia. The lower mor-

Our results support the Latino paradox.

Table 3. Risk of cause-specific and all-cause mortality associated with Latino ethnicity, by place of birth, Kaiser Permanente Multiphasic Health Checkups cohort, 1964–1973

Underlying Cause of Death	Latino Subgroup, by Place of Birth			
	United States (*n*=1883)	Mexico (*n*=1106)	Central/South America (*n*=1804)	Caribbean Islands (*n*=444)
All-cause				
Age-, sex-adjusted	.79 (.72–.88)	.94 (.84–1.04)	.78 (.70–.86)	.77 (.63–.93)
Fully adjusted*	.79 (.71–.87)	.95 (.85–1.06)	.81 (.73–.90)	.76 (.63–.93)
Circulatory				
Age-, sex-adjusted	.83 (.70–.98)	.92 (.77–1.09)	.78 (.65–1.09)	.68 (.48–.96)
Fully adjusted*	.79 (.66–.93)	.88 (.74–1.05)	.76 (.63–.91)	.66 (.47–.93)
Malignant neoplasm				
Age-, sex-adjusted	.65 (.54–.79)	.88 (.71–1.09)	.72 (.59–.87)	.59 (.39–.89)
Fully adjusted*	.68 (.56–.83)	.97 (.78–1.20)	.81 (.67–.99)	.63 (.42–.96)
Respiratory				
Age-, sex-adjusted	.78 (.56–1.09)	.84 (.58–1.21)	.43 (.27–.69)	.87 (.48–1.57)
Fully adjusted*	.85 (.61–1.19)	.90 (.63–1.30)	.50 (.32–.80)	.88 (.49–1.60)
Other and unknown				
Age-, sex-adjusted	.94 (.78–1.13)	1.06 (.86–1.31	.98 (.81–1.18)	1.05 (.75–1.47)
Fully adjusted*	.91 (.76–1.10)	1.06 (.86–1.30)	1.00 (.83–1.21)	1.04 (.95–1.45)

* Non-Latino Whites as reference; see Methods for adjustment factors.

tality rates among Latinos born in Central and South America is consistent with prior research in New York City.[10] The excess prevalence of type 2 diabetes in Mexican Americans is well known.[11,12] The fact that US-born Latinos had worse cardiovascular risk factor profiles than did other Latino subgroups is also consistent with prior studies.[13,14] Latinos born in Central/America had the lowest prevalence of hypertension, and Mexico-born Latinos had the lowest prevalence of asthma and cancer. Lower asthma prevalence among Latinos born in Mexico has been reported before.[15,16]

A noteworthy finding was the attenuation over time of the lower risk of circulatory and all-cause mortality associated with being US-born Latino, whereas the protective effect of being born in Central and South America and in the Caribbean Islands remained. This finding may be explained by acculturation (and associated deterioration of lifestyle over time) among US-born Latinos and by maintenance of healthier habits and supportive social networks from their native land by those born in Central and South America or the Caribbean. An alternative explanation may be incomplete ascertainment of deaths among US-born Latinos in the early years, but this seems unlikely because the same method was used for all Latino groups and non-Latino Whites.

We found evidence for differential loss to followup according to birthplace. Relative to non-Latino Whites, Latinos born in the United States were ≈50% less likely to drop out of the health plan, whereas Latinos born in Central and South America and the Caribbean were 11% and 20% more likely, respectively, to drop out. No difference was apparent for Mexico-born Latinos. However, when we incorporated censoring by membership termination in a sensitivity analysis, our results did not appreciably change, which suggests that differential loss to followup was not a source of bias.

Several explanations for the favorable mortality outcomes among Latinos in the United States can be found in the literature. Some have argued that they may be an artifact of underreporting of Latino origin on death certificates or incomplete ascertainment of deaths among Latinos (ie, Latinos born outside the United States may be more likely to leave the United States when they get seriously ill and die in their countries of origin).[17] Another possible explanation

Table 4. Risk of circulatory and all-cause mortality associated with Latino ethnicity, by place of birth and follow-up period, Kaiser Permanente Multiphasic Health Checkups cohort, 1964–1973

	Latino Subgroup, by Place of Birth			
	United States (*n*=1883)	Mexico (*n*=1106)	Central / South America (*n*=1804)	Caribbean Islands (*n*=444)
	Number of deaths Fully-adjusted* Hazard Ratio (95% Confidence Interval)			
All-cause Mortality				
First 10 Years	9	45	35	13
	.24 (.12–.46)	.98 (.73–1.32)	.83 (.60–1.16)	.82 (.48–1.42)
Years 11–20	47	76	64	24
	.49 (.37–.65)	.85 (.68–1.06)	.67 (.52–.86)	.79 (.53–1.19)
> 20 Years	328	210	248	64
	.93 (.83–1.04)	.98 (.85–1.12)	.86 (.76–.98)	.73 (.57–.94)
Circulatory Mortality				
First 10 Years	2	11	11	2
	.18 (.05–.74)	.60 (.33–1.09)	.78 (.43–1.42)	.34 (.09–1.37)
Years 11–20	16	30	22	8
	.50 (.31–.83)	.77 (.54–1.11)	.61 (.40–.92)	.68 (.35–1.39)
> 20 Years	115	84	88	23
	.91 (.75–1.09)	.97 (.78–1.21)	.81 (.66–1.00)	.70 (.47–1.06)

* Relative to non-Latino whites; see methods for adjustment factors

for the Latino paradox is the "healthy worker effect," a type of selection bias whereby mortality among employed people is considerably lower than among the general population because they are preferably selected for jobs, in particular if physical fitness is a prerequisite for the position.[18] Finally, the notion that variation in European, Native American, and African genetic admixture in the various Latino subgroups may underlie some of the aspects of this paradox is intriguing and deserves further research.[19]

In agreement with our findings, two prior studies have found that no Latino paradox existed among Mexican Americans.[20,21] In the San Antonio Heart Study, Mexican Americans were at higher risk of cardiovascular and all-cause mortality relative to non-Latino Whites.[21] The Corpus Christi Heart Project reported a higher incidence of hospitalized coronary heart disease and higher fatality rate after myocardial infarction among Mexican Americans than among non-Latino Whites.[20] By contrast, the San Luis Valley Diabetes Study found that Mexican Americans with type 2 diabetes were at lower risk of coronary heart disease and cardiovascular mortality compared with non-Latino Whites.[22] Based on the inconclusive and sometimes contradictory data, future prospective studies that account for access to health care and other social epidemiologic risk factors among Latinos are warranted.

The age-adjusted all-cause mortality rate per 100,000 persons in the United States in 2005 was 785 among non-Latino Whites, 582 in the Mexican population, 416 in the Central and South American population, 531 in the Cuban population, and 822 in the Puerto Rican population.[8] In our cohort, the all-cause mortality rates per 100,000 person-years standardized to the US population in 2000 were 689 for non-Latino Whites, 583 for US-born Latinos, 669 for Mexico-born Latinos, 554 for Central and South America-born Latinos and 547 for Caribbean-born Latinos. Thus, the Kaiser population overall death rate was lower than the national rate in the case of non-Latino Whites but higher for all Latino groups except those born in the Caribbean. We speculate that our rate in Latinos may be higher than the national rate for 2 main reasons. First, our population was aged 18–92 years at baseline, so people aged $\leq$18 (who contribute very few deaths) did not contribute to person-years in the denominator, and this may have inflated our rate estimates. Second, our estimates reflect the average mortality experience spanning several decades, whereas the national rate was the most recent one, and there have been significant decreases in mortality in this time period.

The strengths of our study include the large sample size and the long followup, and the fact that, by virtue of the setting, access to care is not a plausible source of bias. In addition, our approach was robust against ethnic misclassification (since we relied on self-report of Latino ethnicity or birthplace and not on surname lists). Some limitations should be pointed out. First, we were unable to ascertain deaths out of the United States, and thus incomplete ascertainment of mortality due to "back migration" remains a possible reason for the Latino paradox. We would argue, however, that this source of bias is less likely in our managed care population than in the general or in the uninsured population, because having access to health care may make Latinos, particularly those with chronic conditions, less likely to go back to their country of origin. This is an area that requires further in-depth investigation, ie, additional surveillance efforts including contacting family members and obtaining death certificates from abroad (which was beyond the scope of this study). Secondly, our Latino and non-Latino White samples were derived from a large healthcare plan in Northern California and thus may not be applicable to uninsured populations. Finally, we had a relatively small sample of Latinos born in the Caribbean Islands.

In summary, our findings demonstrate that there is substantial heterogeneity in long-term mortality risk in the Latino population according to birthplace. In the United States, Latinos are the fastest growing minority. It is therefore imperative to continue to monitor their long-term health outcomes as well as to better understand the forces behind favorable or unfavorable health outcomes in the various Latino subgroups.

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