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CITIZENSHIP STATUS AND MORTALITY AMONG LATINO YOUNG ADULTS IN THE UNITED STATES, 1998-2015

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J. S. Guadamuz originated the idea and design of this article, conducted the analyses, wrote the first draft of the article, and contributed critical revisions for important intellectual content. R. A. Durazo-Arvizu, D. M. Qato, and J.F. Morales provided suggestions for the analyses and interpretation. All authors reviewed, revised, and approved the final version of the article.

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ABSTRACT

Introduction: Although Latino immigrants, especially noncitizens, endure structural factors that may increase their risk of death at younger ages, little is known about their risk of death in young adulthood. The study objective was to evaluate mortality differences across citizenship status among Latino young adults (ages 18-44 years) in the United States.

Methods: This study used the National Health Interview Survey (1998–2014) with mortality follow-up through 2015. Cox regressions adjusted for age and sex were used to determine baseline differences in mortality. Models adjusted for socioeconomic factors (*i.e.*, English proficiency, education, poverty, and health insurance) were used to determine whether socioeconomic conditions attenuate mortality differences.

Results: Participants included noncitizens (n=48,388), naturalized citizens (n=16,241), and US-born citizens (n=63,388). Noncitizens (hazard ratio [HR] 1.40 [confidence interval [CI]: 1.31-1.51]), but not naturalized citizens (HR 1.04 [CI 0.94-1.16]), were at greater risk of all-cause death than US-born citizens. Both noncitizens (HR 2.46 [CI: 2.07-2.92]) and naturalized citizens (HR 1.76 [CI:1.40-2.21]) were more likely to die of cancer of cancer. Noncitizens were also at greater risk of death due to cardiometabolic diseases (HR 1.46 [CI: 1.20-1.78]) and accidents (HR 1.33 [CI: 1.14-1.55]). Socioeconomic factors attenuated differences in all-cause, cardiometabolic, and accidental deaths, but not differences in cancer mortality.

Conclusions: Contrary to the long-held notion of the "healthy migrant," young Latino immigrants, especially noncitizens, are at increased risk of death in comparison to their US-born counterparts. Efforts to reduce these disparities should focus on improving immigrants' socioeconomic conditions and healthcare access early in adulthood.

INTRODUCTION

Half of the 40 million Latino adults residing in the United States are immigrants, including 11 million without citizenship.¹ Although Latino immigrants, especially noncitizens, endure structural factors²⁻⁴ that may increase their risk of death at younger ages, little is known about their risk of mortality in young adulthood. For example, noncitizens are more likely to experience poverty, hold hazardous jobs, and lack healthcare access³⁻⁵—pathogenic mechanisms that may adversely impact mortality. The magnitude of these disparities are larger among young Latinos.¹

While recent research suggests that Latino immigrants ages ≥ 25 years have higher mortality rates than their US-born counterparts,⁶ a now-dated study using 1999-2000 California and Texas vital records found that Latino immigrants ages 18-44 years are at lower risk of death.⁷ Considering these conflicting and limited reports, an updated examination of mortality among Latino young adults is necessary.

Using data from the National Health Interview Study (NHIS) linked to mortality files, this study examined whether citizenship status is associated with mortality among Latino young adults and whether socioeconomic factors attenuate observed differences. Understanding these relationships is critical considering the persistent policies that build disadvantage into the lives of noncitizens.

METHODS

Data

The NHIS is a nationally representative household survey, where individuals are linked, through probabilistic matching, to the National Health Index.⁸ Study included baseline data from 1998-2014 with mortality follow-up through 2015 and analyses were restricted to Latinos ages 18-44 years. Cohort included 128,499 individuals after excluding participants who did not report their citizenship status, lack follow-up information, and who have lived in US <5 years (**Appendix Figure 1**).

Measures

Outcomes included all-cause, cancer, cardiometabolic disease, and accident mortality.⁸

Participants were followed from their baseline interview to their death or the fourth quarter of 2015, for those who remained alive during follow-up. Citizenship status, the exposure, was determined by the questions “in what country were you born?” and “are you a citizen of the United States?” Covariates included demographic (*i.e.*, age and sex), socioeconomic (*i.e.*, English proficiency, education, poverty, and health insurance), and immigration factors (*i.e.*, birthplace and duration of US residence).

Statistical Analyses

Cox regressions (hazard ratios HR) were used to examine associations between citizenship status and mortality. Estimates and 95% confidence intervals (CIs) incorporate sample weights.

Institutional review board approval was not required as the study relied on de-identified public data (45 CFR §46.102(f)).

RESULTS

Approximately one-third of Latino young adults are noncitizens (**Table 1**). Noncitizens had a poorer socioeconomic profile than naturalized and US-born citizens, including greater rates of limited English proficiency, no high education, poverty, and no health insurance. Among immigrants, 84.1% were born in Mexico or Central America and 47.0% lived in the US for ≥ 15 years.

Models adjusted for age and sex (HR^d) demonstrate that citizenship status is associated with mortality among Latino young adults, and models further adjusted for socioeconomic factors (HR^s) show that adverse socioeconomic conditions substantially attenuate these differences (**Table 2**). For example, noncitizens (HR^d 1.40 [CI: 1.31-1.51]), but not naturalized citizens (HR^d 1.04 [CI: 0.94-1.16]), were at greater risk of all-cause death than US-born citizens per model 1 and this difference was attenuated in model 2 (HR^s 1.06 [CI: 0.97-1.16]). Noncitizens were also at greater risk of cardiometabolic (HR^d 1.46 [CI 1.20-1.78]) and accidental death (HR^d 1.33 [CI: 1.14-1.55]) than US-born citizens—these differences were largely explained by socioeconomic factors. Noncitizens and naturalized citizens were at greater risk of cancer death than US-born citizens (HR^d 2.46 [CI: 2.07-2.92] and HR^d 1.76 [CI:1.40-2.21]), respectively); however, these differences were not explained by socioeconomic factors (HR^s 1.75 [CI: 1.40-2.19] and HR^s 1.55 [CI: 1.20-2.00], respectively). Of note, disparities between noncitizens and US-born citizens

were larger among women than among men in terms of all-cause, cancer, and cardiometabolic death (**Appendix Table 1**).

In analysis restricted to immigrants, noncitizens (HR^d 1.37 [CI: 1.24-1.52]) are at greater risk of all-cause death than naturalized citizens, regardless of duration of residence in the US (**Appendix Table 2**). Differences by birthplace were not examined due to limited sample sizes.

DISCUSSION

Contrary to the long-held notion of the “healthy migrant,” this study finds that young Latino immigrants, especially noncitizens, have higher mortality rates than US-born citizens. While there has been an overreliance on cultural explanations when examining the health of immigrants,⁹ socioeconomic factors attenuate most of the excess risk of death that noncitizens endured.

Cancer results in a disproportionate number of deaths among young Latino immigrants—noncitizens and naturalized citizens were twice as likely to die of cancer in comparison to US-born citizens. While earlier studies suggest that immigrants have lower cancer mortality rates, these studies generally examine all ages in aggregate.^{10,11} Young Latino immigrants may be more susceptible to cancer death because they encounter substantial screening and treatment barriers (*e.g.*, no access to insurance or interpreters),¹¹ increasing their risk of death due to highly treatable cancers (*e.g.*, melanoma and acute lymphocytic leukemia).¹⁰ Mexicans and Central Americans—who disproportionately lack citizenship—die of cancer at younger ages than other Latinos.¹²

Young noncitizens, but not naturalized citizens, are also at higher risk of cardiometabolic death than their US-born counterparts. These results echo recent findings that Latino immigrants, 60% of whom lack citizenship, have higher cardiovascular mortality rates.⁶ These disparities may widen because noncitizens, especially younger adults, are less likely to receive treatment for cardiometabolic conditions than citizens.^{13,14}

Accidental premature mortality rates were also higher among young noncitizens versus US-born citizens. Occupational deaths may play an oversized role in this disparity because immigrants, especially noncitizens, have higher workplace injury and mortality rates.⁵ Noncitizens are likely exposed to more dangerous jobs due to socioeconomic barriers, visa restrictions, or bans from formal labor.⁵

Recent efforts to eliminate immigration protections may exacerbate those socioeconomic factors that attenuate for much of these mortality differences. For example, the Trump administration attempted to rescind the Deferred Action for Childhood Arrivals and modified the Public Charge Rule to expand the government's ability to refuse lawful permanent residence applications for immigrants who use public safety-net programs.⁴ While the Biden administration has reversed these actions, a host of anti-immigrant policies remain.^{3,4} Therefore, to reduce disparities in mortality, efforts should focus on improving immigrants' socioeconomic conditions and healthcare access early in adulthood. Such efforts should include policies that protect and expand pathways to citizenship. States and municipalities may also prevent healthcare amenable deaths by funding insurance for undocumented adults (*e.g.*, Medi-Cal covers undocumented adults ages <26 and $\geq$ 50 years).¹⁵

Future research should focus on formal mediation analysis to examine to what extent structural determinants of health impact mortality among Latinos. Research should also focus on examining whether state and local policies towards immigrants ameliorate/exacerbate mortality disparities. A nuanced examination of disparities among noncitizens is also necessary. For example, undocumented immigrants—who account for approximately half of noncitizens and endure more substantial barriers to health³—may be at elevated risk of death. Finally, Latino young adults experienced a disproportionate amount of death during the COVID-19 pandemic;¹⁶ therefore, it is crucial to evaluate whether mortality disparities across citizenships status have worsened.

Study limitations included that immigrants may overreport citizenship or decline to participate, that deaths may not be fully captured (especially among immigrants and those who return to their home countries), and that citizenship status is measured at baseline. Consequently, this study may understate disparities in mortality among Latino young adults.

Conclusion

Young Latino immigrants, especially noncitizens, are at increased risk of death in comparison to their US-born counterparts. Efforts to reduce these disparities should focus on improving immigrants' socioeconomic conditions and healthcare access early in adulthood.

MAIN TABLES

Table 1. Characteristics of Latino Adults Ages 18-44 Years in the NHIS (1998-2014), by
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Table 2. Citizenship Status and Risk of Premature Mortality Among Latino Adults Ages 18-44
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ONLINE SUPPLEMENT

Appendix Figure 1. Cohort Selection, NHIS Mortality Follow-Up (1998-2015)

Appendix Table 1. Citizenship Status and Risk of Mortality Among Latino Young Adults (18-
44 Years), By Sex, NHIS Mortality Follow-Up 1998–2015

Appendix Table 2. Citizenship Status and Risk of All-Cause Mortality Among Foreign-Born
Latino Young Adults, By Duration of Residence in the US, NHIS Mortality Follow-Up 1998–
2015

Table 1. Characteristics of Latino Young Adults (18-44 Years) in the NHIS (1998-2014), by Citizenship Status

	Characteristics, % (95% CI) ^b			
	Citizenship Status ^c			
	Overall	US-born citizen	Naturalized citizen	Noncitizen
Sample, No. ^a	128,499	63,388	16,241	48,870
Total	100.0	50.6 (49.8, 51.5)	12.7 (12.4, 13.0)	36.7 (35.8, 37.5)
Demographic factors				
Age, y (IQR)	31 (24-37)	28 (22-35)	36 (29-40)	32 (27-38)
Men	52.0 (51.7, 52.3)	49.9 (49.5, 50.3)	49.5 (48.7, 50.3)	55.7 (55.3, 56.1)
Socioeconomic factors				
Limited English proficiency ^d	36.2 (35.4, 37.1)	15.4 (14.8, 16.0)	36.8 (35.6, 37.9)	64.7 (63.7, 65.7)
Education				
< High school	30.5 (29.8, 31.3)	15.3 (14.9, 15.8)	23.7 (22.7, 24.7)	54.3 (53.5, 55.2)
High school	32.6 (32.2, 33.0)	35.5 (35.0, 36.0)	30.8 (29.9, 31.7)	29.0 (28.4, 29.7)
≥ High school	36.9 (36.2, 37.5)	49.1 (48.5, 49.8)	45.5 (44.3, 46.7)	16.6 (16.1, 17.2)
Poverty-to-income ratio				
< 1.0	23.4 (22.9, 24.0)	19.0 (18.4, 19.5)	14.8 (14.1, 15.6)	32.6 (31.7, 33.5)
1.0 - 1.9	29.9 (29.5, 30.4)	24.5 (23.9, 25.0)	28.7 (27.7, 29.7)	37.9 (37.3, 38.6)
≥ 2.0	46.6 (45.9, 47.3)	56.6 (55.8, 57.4)	56.5 (55.4, 57.6)	29.5 (28.7, 30.3)
Health insurance				
Private	44.8 (44.1, 45.5)	55.5 (54.8, 56.2)	58.5 (57.4, 59.6)	25.4 (24.6, 26.3)
Public	13.1 (12.7, 13.6)	15.6 (15.1, 16.1)	10.6 (9.9, 11.2)	10.7 (10.1, 11.3)
Uninsured	42.1 (41.5, 42.7)	28.9 (28.4, 29.5)	30.9 (29.9, 31.9)	63.9 (63.0, 64.7)
Immigration factors ^e				
Born in Mexico or Central America	84.1 (83.4, 84.9)	-	72.0 (70.6, 73.3)	88.3 (87.7, 89.0)
≥ 15 y in United States	47.0 (46.2, 47.8)	-	75.7 (74.7, 76.6)	37.0 (36.2, 37.8)

Notes: CI=confidence interval; IQR=interquartile range; NHIS=National Health Interview Survey; y=years. **a** Sample of Latino young adults (18 - 44 years) from the NHIS (1998-2014) with follow-up mortality data through the end of 2015. Non-response rates range from ~90% in 1998 to ~75% in 2014. **b** Estimates and 95% CIs incorporate sample weights. **c** All differences across citizenship status were statistically significant ($p<.01$). **d** Responded to at least part of the interview in Spanish. **e** Estimated among immigrants.

Table 2. Citizenship Status and Risk of Mortality Among Latino Young Adults (18-44 Years), NHIS Mortality Follow-Up 1998–2015

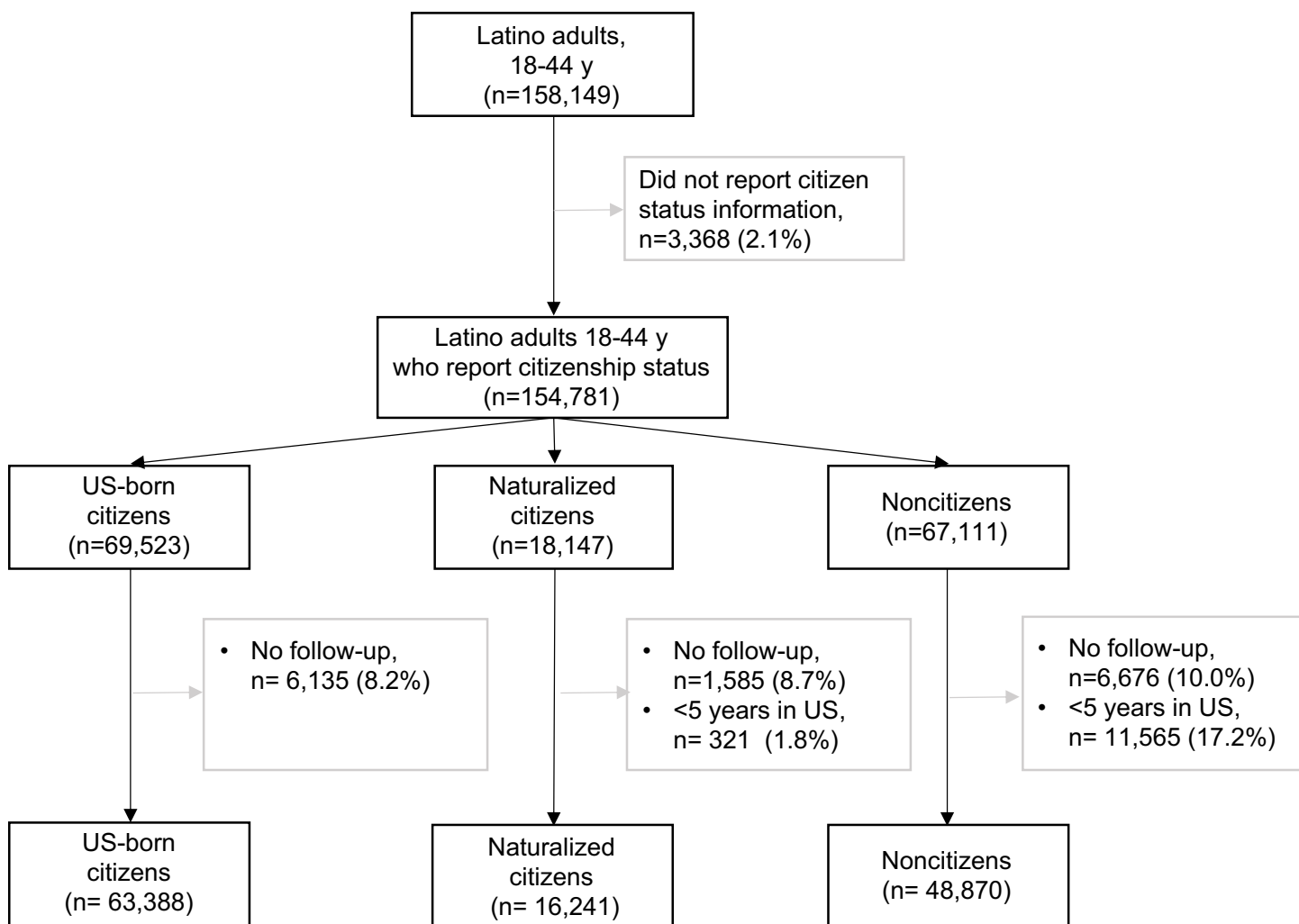
<i>Deaths due to:</i>	Deaths, ^a No.	Mortality rate, ^b No. (95% CI)	Model 1, ^c HR ^d (95% CI)	Model 2, ^d HR ^s (95% CI)
All-Causes				
US-born citizen	1,851	339 (322, 357)	Ref.	Ref.
Naturalized citizen	619	354 (322, 386)	1.04 (0.94, 1.16)	0.97 (0.87, 1.09)
Noncitizen	2,173	473 (450, 495)	1.40 (1.31, 1.51)	1.06 (0.97, 1.16)
Cancer				
US-born citizen	247	46 (40, 53)	Ref.	Ref.
Naturalized citizen	172	81 (67, 95)	1.76 (1.40, 2.21)	1.55 (1.20, 2.00)
Noncitizen	524	112 (101, 123)	2.46 (2.07, 2.92)	1.75 (1.40, 2.19)
Cardiometabolic Diseases ^e				
US-born citizen	304	42 (35, 48)	Ref.	Ref.
Naturalized citizen	115	38 (29, 47)	0.92 (0.70, 1.21)	0.86 (0.64, 1.16)
Noncitizen	373	59 (51, 66)	1.46 (1.20, 1.78)	1.07 (0.83, 1.38)
Accidents				
US-born citizen	440	78 (69, 86)	Ref.	Ref.
Naturalized citizen	109	82 (65, 100)	1.06 (0.83, 1.35)	1.05 (0.81, 1.35)
Noncitizen	423	104 (92, 115)	1.33 (1.14, 1.55)	1.09 (0.90, 1.32)

Notes: HR=hazard ratio; CI=confidence interval; NHIS=National Health Interview Survey; No.=number; Ref.= reference.

a Sample of Latino young adults (18 - 44 years) from the NHIS (1998-2014) with follow-up mortality data through the end of 2015, including 63,388 US-born citizens, 16,241 naturalized citizens, and 48,870 noncitizens (representing 1,121,454 person-years).

Estimates and 95% CIs incorporate sample weights. **b** Age- and sex- adjusted mortality rate per 100,000 person-years. **c** Model 1 adjusted for age and sex (HR^d). **d** Model 2 adjusted for age, sex, and socioeconomic factors (*i.e.*, English proficiency, educational attainment, poverty-to-income ratio, and health insurance) (HR^s). **f** Deaths due to coronary heart disease, stroke, chronic kidney disease, diabetes, or hypertension.

Appendix Figure 1. Cohort Selection, NHIS Mortality Follow-Up (1998-2015)



Notes: NHIS=National Health Interview Survey. Sample of Latinos from the NHIS (1998-2014) with follow-up mortality data through the end of 2015. Non-response rates range from ~90% in 1998 to ~75% in 2014. We exclude those who have lived in the US < 5 years because eligible immigrants must generally wait five years to naturalize.

Appendix Table 1. Citizenship Status and Risk of Mortality Among Latino Young Adults (18-44 Years), By Sex, NHIS Mortality Follow-Up 1998–2015

<i>Deaths due to:</i>	Men^a				Women^a			
	Deaths, No.	Mortality rate, ^b No. (95% CI)	Model 1, ^c HR ^d (95% CI)	Model 2, ^d HR ^s (95% CI)	Deaths, No.	Mortality rate, ^b No. (95% CI)	Model 1, ^c HR ^d (95% CI)	Model 2, ^d HR ^s (95% CI)
All-Causes								
US-born citizen	1,263	474 (444, 504)	Ref.	Ref.	588	196 (178, 214)	Ref.	Ref.
Naturalized citizen	381	475 (420, 530)	1.00 (0.88, 1.14)	0.95 (0.82, 1.09)	238	225 (193, 256)	1.15 (0.97, 1.36)	1.05 (0.87, 1.25)
Noncitizen	1,414	591 (557, 626)	1.26 (1.15, 1.37)	1.00 (0.90, 1.12)	759	349 (320, 377)	1.79 (1.59, 2.03)	1.23 (1.05, 1.44)
Cancer								
US-born citizen	129	47 (37, 57)	Ref.	Ref.	247	46 (37, 55)	Ref.	Ref.
Naturalized citizen	69	79 (56, 101)	1.67 (1.17, 2.39)	1.54 (1.02, 2.32)	103	84 (66, 102)	1.85 (1.38, 2.47)	1.57 (1.14, 2.16)
Noncitizen	219	90 (76, 103)	1.94 (1.51, 2.50)	1.63 (1.18, 2.27)	305	137 (119, 155)	3.02 (2.39, 3.82)	1.86 (1.37, 2.52)
Cardiometabolic Diseases ^e								
US-born citizen	156	59 (48, 70)	Ref.	Ref.	67	23 (17, 29)	Ref.	Ref.
Naturalized citizen	49	45 (32, 59)	0.77 (0.54, 1.09)	0.72 (0.49, 1.04)	38	30 (19, 40)	1.29 (0.83, 2.01)	1.23 (0.76, 2.01)
Noncitizen	197	76 (64, 88)	1.33 (1.05, 1.69)	1.00 (0.74, 1.36)	93	41 (32, 50)	1.80 (1.28, 2.54)	1.26 (0.79, 2.00)
Accidents								
US-born citizen	337	121 (106, 137)	Ref.	Ref.	103	31 (24, 38)	Ref.	Ref.
Naturalized citizen	85	128 (96, 159)	1.06 (0.80, 1.39)	1.04 (0.78, 1.40)	24	33 (18, 48)	1.09 (0.65, 1.82)	1.07 (0.64, 1.79)
Noncitizen	347	161 (142, 180)	1.32 (1.11, 1.57)	1.10 (0.89, 1.37)	76	42 (31, 53)	1.37 (0.96, 1.95)	1.04 (0.69, 1.57)

Notes: HR=hazard ratio; CI=confidence interval; NHIS=National Health Interview Survey; No.=number; Ref.=reference.

a Sample of Latino young adults (18 - 44 years) from the NHIS (1998-2014) with follow-up mortality data through the end of 2015, including US-born citizens (men = 29,759 and women = 33,629), naturalized citizens (men = 7,531 and women = 8,710), and noncitizens (men = 25,314 and women = 23,556). Estimates and 95% CIs incorporate sample weights. **b** Age-adjusted mortality rate per 100,000 person-years. **c** Model 1 adjusted for age (HR^d). **d** Model 2 adjusted for age and socioeconomic factors (*i.e.*, English proficiency, educational attainment, poverty-to-income ratio, and health insurance) (HR^s). **e** Deaths due to coronary heart disease, stroke, chronic kidney disease, diabetes, or hypertension.

Appendix Table 2. Citizenship Status and Risk of All-Cause Mortality Among Foreign-Born Latino Young Adults, By Duration of Residence in the US, NHIS Mortality Follow-Up 1998–2015

Duration of Residence in the US:		Sample, ^a No.	Death, No.	Mortality rate, ^b No. (95% CI)	Model 1, ^c HR ^d (95% CI)	Model 2, ^d HR ^s (95% CI)
All immigrants	Naturalized citizen	16,241	619	375 (342, 409)	Ref.	Ref.
	Noncitizen	48,870	2173	513 (488, 537)	1.37 (1.24, 1.52)	1.13 (1.01, 1.27)
< 15 y	Naturalized citizen	3,742	101	268 (209, 327)	Ref.	Ref.
	Noncitizen	29,359	1160	426 (399, 454)	1.61 (1.28, 2.03)	1.34 (1.05, 1.72)
≥ 15 y	Naturalized citizen	12,066	498	439 (395, 483)	Ref.	Ref.
	Noncitizen	17,941	923	628 (583, 673)	1.44 (1.27, 1.63)	1.18 (1.03, 1.36)

Notes: CI=confidence interval; HR=hazard ratio; NHIS=National Health Interview Survey; No.=number; Ref.= reference.

a Sample of Latino young adults from the NHIS (1998-2014) with follow-up mortality data through the end of 2015. Non-response rates range from ~90% in 1998 to ~75% in 2014. Estimates and 95% CIs incorporate sample weights. **b** Age- and sex- adjusted mortality rate per 100,000 person-years. **c** Model 1 adjusted for age (HR^d). **d** Model 2 adjusted for age and socioeconomic factors (*i.e.*, English proficiency, educational attainment, poverty-to-income ratio, and health insurance) (HR^s).

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