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Border Health in the Shadow of the Hispanic Paradox: Issues in the Conceptualization of Health Disparities in Older Mexican Americans Living in the Southwest

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Abstract

Mexican Americans have demonstrated lower than what would be expected mortality rates and disease prevalence, given their overrepresentation among those living in poverty. However, Mexican Americans living along the US-Mexico border have been documented as carrying a higher burden of disease and disability that seems to contradict or at least challenge evidence in support of a “Hispanic Paradox”. The purpose of this paper is to evaluate the concept of border health as it relates to the conceptualization and measurement of health outcomes in older Mexican Americans living in the Southwest United States. Data for this study comes from the Hispanic Established Populations for the Epidemiologic Studies of the Elderly (Hispanic EPESE) wave 1 and mortality files up to wave 5. Border residence was determined using La Paz Agreement county and distance from a port of entry classifications. Statistical analysis was conducted to assess border versus non-border differences in cause of death, disability, disease prevalence and premature mortality. Adjusted regression models were used to predict cause of death, disability and disease-free life expectancy and premature mortality (i.e. occurring before life expectancy). Interaction models between border/non-border and median income were also performed. Finally, distance from the US-Mexico border was used to determine the effect of distance to the US-Mexico border in border-residing participants. The findings from this study indicate that participants in the HEPESE were more likely to be alive at Wave 5 if they resided in a border county, however more likely to transition into ADL disability status. These findings were not explained by behaviors, duration in the US or sociocultural characteristics of where they lived. Additionally, Hispanic EPESE subjects that lived in the border region were more likely to have died from old age and were less likely to be lost to follow up. Interaction models revealed significant effects for diabetes as a cause of death. Moreover, distance from a US-Mexico port of entry was significant for being alive at wave 5 for border-residing participants. Relative to non-border residing participants, border residing Mexican Americans in the Hispanic EPESE did not carry a uniformly higher burden of disease, however had a significantly greater odds of 10 year

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survival. These findings bring up issues of measurement and the importance of geographic location when it comes to evaluating disease burden and mortality in Mexican Americans.

Keywords

Hispanics; Disability; Survival; US Mexico border; Disease prevalence

Introduction

There is a well-established relation between poverty and disease and mortality (Ruijsbroek et al. 2011; Crimmins et al. 2009), yet this linkage is less clear among Mexican Americans. Mexican Americans have lower than what is expected cardiovascular disease mortality, favorable birth outcomes and lower rates of certain cancers, given their socioeconomic disadvantage. (Markides and Eschbach 2005; Borrell and Lancet 2012; Willy et al. 2012; Hummer et al. 2007). Moreover, while Mexican Americans enjoy a longevity that is longer than non-Hispanic whites (Arias 2010), they have high rates of diabetes, obesity and disability (Fisher-Hoch et al. 2010; Samper-Ternent et al. 2012), contributing to further perplexity regarding the causal pathways that can explain the Hispanic Paradox.

Research on the Hispanic Paradox has been heavily critiqued due to over generalizing different groups from clearly different socioeconomic and ethnic origins, and documentation problems associated with record quality (Smith and Bradshaw 2006); both issues of measurement (Lariscy 2011). Research over the previous decade has improved the precision in which we describe Hispanic health and understand the Paradox by comparing subgroups of Hispanics to other non-Hispanic groups, as well as, inter-Hispanic group comparisons (Crimmins et al. 2007; Peek et al. 2010; Borrell and Lancet 2012). This research has established clear differences between Hispanic groups in disease and mortality outcomes compared to non-Hispanic groups. However, these studies have not been able to provide explanation for the ‘Hispanic Paradox’, but rather have narrowed our focus.

Environment or place is an aspect of Hispanic health research that is growing and potentially may provide some guidance or explanation to the ‘Hispanic Paradox’. Hispanic ethnic concentration has been observed in several papers as protective from certain health outcomes and mortality (Eschbach et al. 2004; Aranda et al. 2011; Gerst et al. 2011; Reyes-Ortiz et al. 2008). It is believed that in Mexican Americans concentrated neighborhoods, or enclaves, the dominant Mexican American culture may provide a buffer to the negative effects of acculturation or adaptation to the US mainstream (Markides and Eschbach 2005). Moreover, Mexican American enclaves may provide the added benefit of high immigrant concentration, thereby creating an environment that closely reproduces the cultural ambiance of Mexico. However, in the most ethnically Hispanic concentrated region of the Texas-Mexico border, poverty prevails and the burden of disease is among the highest in the United States, providing a potential contradiction to the ‘Paradox’. Moreover, the border cultural environment may serve as a risk factor for undiagnosed, highly prevalent, and uncontrolled diabetes in immigrants (Salinas et al. 2012).

In a recent national study on the relationship between county-level economic inequality and premature mortality, Cheng and Kindig (2012) found a stratified effect of county median income on deaths occurring before the age of 75. In lower income counties the effect was stronger than in high income counties. Additionally, health behaviors, such as smoking, and region of the country were the strongest predictors of premature mortality in low income counties. Hispanic ethnic concentration was also observed to be negatively associated with premature mortality overall. However a study in Los Angeles showed that among Hispanics or Latinos the benefits of ethnic concentration were still moderated by overall income at the census tract level (Bjornstrom 2011).

In a comparative study of life expectancy among ‘eight Americans’ types, eight groups of racial and socioeconomic classifications by county were devised to compare blacks, whites and Asian longevity differentials between and within groups (Murray et al. 2006). The findings from this study showed that while Asian and non-Hispanic whites have overall the longest expected life span, there were substantial differences between non-Hispanic whites from more affluent counties and those from poor counties in Appalachia and the Mississippi Valley (Murray et al. 2006). In addition, substantial variation exists within high African American counties by income level. This study did not include any Hispanic groups, a potential weakness, however does nevertheless demonstrate potential within ethnic group variation, even within areas that are highly ethnically concentrated.

Comparisons made between US counties and industrialized countries put many counties in the Deep South well below life expectancy, at same time putting Southwest and Pacific West counties at or well above socioeconomically comparable countries around the world (Kulkarni et al. 2011). Many of the counties at or above life expectancy compared to industrialized countries that were in the Southwest were located on the US-Mexico border, suggesting again that place is an important factor to consider when studying the Hispanic Paradox and the dynamic between health, mortality and socioeconomics in this group. These nuisances of the socioeconomic environment in which older Mexican Americans live have not been fully explored and therefore a key element of the ‘Paradox’ may still have as much to do with socioeconomics as it does ethnic composition of where Mexican Americans live.

Why is place an issue of measurement?

Measurement of risk of disease is dependent upon, to a great extent, the context in which it is measured. People who live in poverty tend to live shorter lives (Crimmins et al. 2009). Immigrant enclaves have been associated with poorer, not better health (Wen and Maloney 2011; Mason et al. 2010; Pérez-Escamilla et al. 2011), however, Mexican Americans who live in high ethnically concentrated neighborhoods are protected from mental health issues, certain cancers, have slower cognitive decline and mortality (Eschbach et al. 2004; Reyes-Ortiz et al. 2008; Sheffield and Peek 2009; Gerst et al. 2011). Therefore, disentangling these relationships can provide insight into the Hispanic Paradox and how it relates to border health.

Border health—The ‘Hispanic Paradox’ is intricately linked to border health, since the majority of US born and immigrant Mexican Americans live within 300 miles of the US-

Mexico border, yet the two topics rarely intersect in the literature. The US-Mexico border is approximately 1,969 miles long and runs along four states and is the home to approximately 7 million people (Peach and Williams 2003), of which the majority are Mexican American, and is one of the fastest growing regions in the country. Despite the growth, the U.S.-Mexico border is also one of the most medically disadvantaged areas of the country, having high rates of uninsured and being medically underserved (Border Health Commission 2010). To illustrate the health challenges of the border in Texas suffers from a disproportionate burden of both chronic and infectious diseases, and there is one general practitioner doctor for every 6,159 people (Border Health Commission 2010; Fisher-Hoch et al. 2010). In many ways the US-Mexico border region is similar to many developing countries, struggling to get a handle on infectious diseases at the same time combating the burgeoning rates of diabetes and obesity (Border Health Commission 2010; Goodman et al. 2005).

Because of its close proximity to Mexico, high concentration of Hispanics and high burden of disease, border health is essential to understand the complexities of the Hispanic Paradox and the health and mortality of Mexican Americans living in the United States. However, few studies have compared risk factors for diseases and mortality by border location. The few that have been conducted have focused on alcohol and drug abuse (Vaeth et al. 2012; Shah et al. 2012; Caetano et al. 2012), birth defects (Lupo et al. 2011), diabetes outcomes (Mier et al. 2010), cancer screening (Fernández and Morales, 2007), and infectious disease risk (Pérez et al. 2006). Moreover, most of these studies have made comparisons between cities or specific areas of the border/non-border, thereby failing to make the regional comparisons needed to best understand this dynamic.

In response to the dearth in comparative research on border/non-border Mexican American aging, health and mortality, this study will explore issues of measurement by border status in disease and mortality risk for Mexican Americans who have been followed for more than 15 years in the used the Hispanic Establish Population for the Epidemiological Study of the Elderly (H-EPESE). The purpose of this study is to explore: 1) how health behaviors, immigration and duration in the US, sociocultural environment and lost to follow-up may explain differences by border status and provide insight into Hispanic aging, health and the ‘Paradox’; 2) to what extent these differences may lead to differentials in the onset of disease and survival to 10 years later; and 3) discussion of regional variations and measurement to understand why a socioeconomically disparate population could have the unusual health outcomes that we observe.

Methods

Data

The Hispanic EPESE is a longitudinal cohort study of older Mexican Americans living in the Southwest United States (Markides et al. 1999). The sample was selected using probability design to represent older Mexicans living in Texas, Arizona, California, Colorado, and New Mexico. The original data was collected in 1993–1994 and has four subsequent waves (1995–1996, 1998–1999, 2000–2001, and 2003–2004). If a respondent was not located in person due to death or relocation, proxy information about him or her was collected from family or friends. The follow-up rate is nearly 86 % of the original sample of

3,050. The Hispanic EPESE provides a unique opportunity to make comparisons by border residence because of its large sample from the Southwestern states creating adequate power.

Variable measurement

Outcomes

Mortality and survival: Two outcomes were used to evaluate survival and mortality. First a dichotomous variable was created from whether subjects were still alive at wave 5 (alive=1). Information on cause of death from diabetes, cardiovascular disease, stroke and cancer was obtained from the National Death Index and compared to family report. Variables were then coded as 0=cause other than cause of interest, 1=cause, 2=still alive. For example diabetes would be coded 0=died but not from diabetes, 1=diabetes cause of death, 2=still alive at wave 5.

Health status: Health status changes were evaluated over time by each wave of data for diabetes, activities of daily living (ADL), instrumental activities of daily living (IADL), heart problems, stroke, cancer, high blood pressure, and hip fracture. An event of any of the health outcomes at any of the waves was coded as yes=1.

Border/non-border: The US-Mexico border is predominantly Mexican American, and is one of the fastest growing regions in the country. In 1983 the Environmental Protection Agency (EPA) signed an agreement with Mexico's Secretariat of Environment and Natural Resources (SEMARNAT) in an attempt to address binational environmental issues that affected both the US and Mexico sides of the border (EPA 2012). They defined the border as being the approximately 2,000 miles that stretches from the Gulf of Mexico in Texas to the Pacific Ocean in California (Peach and Williams 2003), and 62.5 miles (approx. 100 km) into either country. In addition, according to Article 4 of the La Paz Agreement, a county is considered a border county if any portion is within the 62.5 miles from the Mexico border (Joint Advisory Committee for the Improvement of Air Quality 2010). Therefore, these definitions were used to create two border/non-border variables. 1). County location as defined in Article 4 of the La Paz Agreement to create a border/non-border county dichotomous variable. 2). Proximity to the nearest port of entry (POE) from Mexico to create a continuous variable.

Lost to follow-up: Lost to follow-up was based on family or proxy report at Wave 5. If participants, family contacts and proxies were not located to confirm participant status they were considered loss to follow-up. A variable was created for participants whose status was undetermined or loss to follow-up (unknown=1, died=0, confirmed alive =2).

Explanatory Variables

Individual level

Cultural/behavioral

Health behaviors—Health behaviors that were used for this analysis were ever smoked (yes=1), ever drank alcohol (yes=1) and Body Mass Index (BMI) categories [underweight (BMI<18.5, normal (18.5 to<25), overweight (25 to<30), and obese (≥30)] (NHLBI 2012).

Immigration/duration in the United States—Two variables were used to evaluate immigrant effects and exposure to the United States. First a dichotomous variable was created from whether participants were born in the United States. In addition a categorical variable was created from age at which participants immigrated to this country. Categories were based on life course phases: childhood (0–17), adulthood (18–39), middle age (40–64) and old age (65+) or US born. In both variables US born serves as the reference category.

Control variables—Models are adjusted for age (continuous), gender (female=1), marital status (married =1, not married=0), income (0– $4999, $5000–$9999, $10000–$14999, $15000– $19999, and $20,000 or more).

Community level

Cultural—Measured with two variables were used collected at a census tract level from the 1990 US Census: Mexican origin density and percent who speak Spanish. *Socioeconomic*: Measured with two variables from the census tract level from the 1990 US Census: percent living below the poverty line and percent adults 25 and older with a high school degree.

Analysis

Bivariate analysis was conducted to determine variation in total border status for baseline diabetes, ADL, IADL, heart problems, stroke, cancer, high blood pressure, and hip fracture. Adjusted logistic regression was conducted for being alive at wave 5 by border status. Multinomial logistic regression was conducted to determine differences in border status for each cause of death outcome where cause other than cause of interest served as the referent. For example, for cancer it will be: cancer, not cancer (referent) and still alive at Wave 5. Interaction models border*median household income were conducted for each cause of death. A separate analysis was conducted for participants living in border counties using distance from a US-Mexico port of entry as a predictor to being alive at wave 5, cause specific death, or other cause. Then using STATA, Generalized Estimating Equation (GEE) models were created to evaluate differences in transitions of health status by border status.

Results

Table 1 presents baseline sociodemographic characteristics by border status for the Hispanic EPESE subjects. There were no significant differences in age, gender, marital status, nativity or health behaviors by border status, except that border participants tended to be slightly more likely to be obese or have missing BMI scores than non-border. Density of Mexican Americans, percent who speak Spanish only and percent at or below the poverty line were significantly different by border status. Border participants tended to live in sociocultural environments that are less populated (3422.1 vs. 4765.9 per square mile), have a higher proportion of people who speak Spanish only (3.2 % vs. 2.9 %) and live at or below the poverty line (39.9 % vs. 29.7 %).

Table 2 displays baseline health conditions, cause of death and survival by border status. At baseline border participants were not significantly different in their baseline conditions as non-border participants. However, border participants were marginally significantly more

likely to die from old age (5.4 % vs. 3.7 %, *p*=.091), less likely to be lost to follow-up (11.6 % vs. 16.0 %, *p*=.049) and more likely to be alive at Wave 5 (30.5 % vs. 25.5 %, *p*=.050). There were no significant differences between border and non-border participants in any other cause of death.

Table 3 shows GEE model results for transitions into disease status. Overall, border participants were significantly more likely to transition into a disability for any ADL's (OR=1.52, *p*=.000). The most significant change in the coefficient was observed in Model 2 with the addition of health behaviors (OR=1.43, *p*=.000). No other transitions were significant, however stroke and cancer were both negative, while the others were positive, suggesting that border residents are still less likely to have transitioned into these two health conditions compared to non-border participants of the Hispanic EPESE.

Table 4 shows odds ratios for multinomial regression modeling for survival to Wave 5 and cause of death versus other causes. In the sociodemographic adjusted model, border participants were more likely to have survived to Wave 5 than died compared to non- border residents. When doing a comparison with other causes of death, however, border residing subjects were more like to have died from old age (OR=1.64, *p*=.025). After adjusting for behaviors in Model 2 and age at immigration in Model 3, the significant effects by border residence remained for stroke and old age causes of death. However, in Model 4 when controlling for environmental attributes (i.e. % poverty, % high school graduate, Mexican American density, and % speak Spanish) the effect for old age cause of death is explained.

In a separate interaction model (not shown) border/non-border was interacted with median household income. The only significant relationship observed was with diabetes. Median household income significantly reduced the odds of death from diabetes for border counties. The odds ratio for diabetes as a cause of death was 1.14 for border residing participants, although not significant. However, calculations for San Diego County in California and Cameron County in Texas revealed divergent patterns. In San Diego, a wealthier county the odds for having died from diabetes was .694 times less than a non-border county. However living in Cameron County, the odds for having died from diabetes was 1.386 greater than a non-border county.

An additional multinomial regression analysis to determine whether loss to follow up might explain the differences by border status was conducted using the status of subjects at Wave 5 (not known, alive or deceased). In model 1 (Table 4) controlling for sociodemographic characteristics border residing participants were less likely to be unknown in their status or loss to follow-up (OR=.723, *p*=.062), however, no significant differences were observed for surviving to Wave 5. In Model 2, the marginal significance remains for loss to follow-up (OR=.750, *p*=.099), but the odds ratio for alive is now marginally significant (OR=1.24, *p*=.070). Change in significance does not change in Model 3 with the addition of age at migration, yet in Model 4 with the addition of the environmental sociodemographics, the effect of border status on lost to follow-up is explained (OR=.780, *p*=.213).

Table 5 presents odds ratios from multinomial regression for border residing participants only, using miles from nearest port of entry as a predictor. Proximity to the border was not a

significant predictor of cause of death relative to another cause, but did predict survival to wave 5 in the border participants. For each mile from the US-Mexico port of entry the odds of survival compared to dying from another cause of death decreased for participants living in the US-Mexico border region. While the addition of health behaviors, age at immigration and the census tract level socioeconomic variables attenuated this relationship, in all case, the relationship remained significant.

Discussion

The border is often characterized as carrying a larger burden of disease than other parts of the Southwest. This portrayal plays an important role in how we perceive Mexican American health and how the 'Hispanic Paradox' is interpreted and understood. The findings from this study indicate that participants in the HEPESE were more likely to be alive at Wave 5 if they resided in a border county, however they are also more likely to transition into ADL disability status. Distance from the US-Mexico border was significant for surviving to wave 5, but not cause of death in border residing participants. Moreover, significant variation in median family income on mortality by diabetes was observed by border status. Additionally, Hispanic EPESE subjects that lived in the border region were more likely to have died from old age and were less likely to be lost to follow up.

The Hispanic Paradox is often explained as factors stemming from culture, behaviors, immigrant selection or protective 'enclaves' that somehow provide protection from the known causal effects of poverty on disease and mortality outcomes (Markides and Eschbach 2005). Using these same explanatory factors, we were unable to explain the observed survival advantage or the disability disadvantage. However average county-level income explained the higher odds of mortality from old age, and the lower likelihood of being lost to follow-up in border participants. These findings suggest there may be other factors we have not considered that might explain previous health and mortality outcomes noted in previous literature (Markides and Eschbach 2005). For example, a growing area of research is health care utilization in the Mexico side of the border (Lapeyrouse et al. 2012; Potter et al. 2010; Ramos et al. 2009; Angulo and Guendelman 2002).

These findings present issues of measurement on how we explain risk of mortality and disease in Mexican Americans that live in both the border region, as well as in the Southwest overall. While health behaviors and region have explained premature mortality in other studies (Cheng and Kindig 2012), it has not provided explanation to the findings from this study. Census tract level income explained the higher odds dying of old age in this sample of older Mexican Americans. However, ethnic concentration and Spanish language did not provide explanation to the differences..These findings are difficult to interpret, given the wide-range of county-level median income levels that exist on the border, however, the fact that income, not source of income, and the occupational dynamic (i.e. what type of jobs do people have) in a follow-up analysis, explained the low odds of lost to follow-up (Osypuk et al. 2010) suggests that the stability of the community overall is an important factor.

We compared lost to follow up, died or still alive at Wave 5 by border status as a potential explanation to the border survival advantage observed in this study, since conceivably if Mexican Americans were returning to Mexico at their final years when they became sick (Palloni and Arias 2004), those living on the border would be more likely to be loss to follow-up, given their close proximity to the border and greater ease to return to Mexico than their non-border counterparts. Additionally, because of the characteristically lower socioeconomic conditions and lower overall resources in the border region, loss to follow-up may be more likely to occur than in the non-border. However, this analysis revealed that border residents of the Hispanic EPESE were less likely to be lost to follow-up than their non-border peers.

The interaction analysis for diabetes showed that there may be variation along the border that may be moderated by income. The odds for diabetes as a cause of death significantly varied by census tract level median income by county on the border to the extent that wealthier counties in California may have significantly less, whereas poorer counties in Texas may have significantly greater odds of death from diabetes. There is substantial literature indicating the burden of diabetes in Mexican Americans on Texas-Mexico border may be higher than in other regions (Border Health Commission 2010; Goodman et al. 2005). The higher prevalence coupled with higher uninsured rates, lower socioeconomic conditions, and lack of access to dependable medical services may be driving these differences along the border, and certainly warrant further investigation as to difference on the border in terms of disease risk and mortality.

The analysis conducted on border participants only indicated that proximity to the border was highly predictive of being alive at wave 5. Increased distance from the border was associated with a lower odds of being alive at wave 5. There are many potential explanations for these findings. For example, there is substantial evidence that distance to the border is predictive of healthcare utilization in Mexico from border residing residents (Lapeyrouse et al. 2012; Potter et al. 2010; Ramos et al. 2009; Angulo and Guendelman 2002). It may be also that older Mexican Americans who live along the border, but live further away, may live in a more rural area which impacts their access to local health services, but also reduces their likelihood of going into Mexico for healthcare services (Su et al. 2013). There may also be a social or cultural protectiveness for older Mexican Americans who live closer to Mexico, whereas they have better access to social and cultural resources such as family, friends, food and cultural traditions that may contribute to longevity. These relationships must be teased out to determine the potential salubrious effect of have access to resources in both the United States and Mexico.

The finding from this study that older Mexican Americans who live on the border are more likely to transition into a disability at the same time as potentially living longer has important implications for how we interpret Mexican American health and wellness, and how we adequately address their public health needs. It is easy to construe that longer life equates better quality of life, and therefore less need. However, even if Mexican Americans living in the border region live longer, they have a greater burden of disability and potentially a greater, not lesser, need for healthcare services. Therefore, interpreting the Hispanic Paradox should be done so with caution and awareness that health needs still exist.

This study is not without limitations. First we used family reported cause of death as the mortality outcome; however the cause of death was by the National Death Index. In addition, we considered what we believed were the most common health conditions and causes of mortality and therefore it is conceivable that if we used other outcomes we would find varied outcomes from what we observed in this study. Another potential shortcoming is that we did not do comparisons by state, since the population landscape of the border region is so diverse in terms of ethnic composition and socioeconomics, it is important to consider how this diversity may influence outcomes or explain the mortality advantages seen in the border region.

The Mexican-origin Hispanic population is diverse ethnically and socioeconomically. It is potentially this diversity that makes the paradox so difficult to explain in this population and creates issues around not how we measure risk in terms of socioeconomic status, but how we define this group collectively. The border is one example of the diversity that exists, however, few previous studies have compared border to non-border residing Mexican Americans in terms of health or mortality. Future research must consider the issues of measurement in how we characterize the Mexican American population overall. While the trend has been large scale trans-regional data analysis, smaller scale or better measurement of differences by location must be incorporated in order to understand whether there is a 'Paradox' and what and how it might be explained. Moreover, further research needs to be conducted making comparisons within the Mexican American population by state or region, as to fully understand the diversity within this ethnic group.

While each of the leading theoretical perspectives on the Hispanic Paradox are supported by compelling evidence that this phenomenon may be explained by behaviors, selection or issues with documentation, the window to fully understanding the 'paradox' is still wide open. The growing prevalence of diabetes and obesity in this population provides further complication to how one's socioeconomic status serves as a pathway to disease and mortality. Moreover low healthcare utilization and insurance coverage in Mexican Americans (Rutledge and McLaughlin 2008) would conceivably lead to great undiagnosed or uncontrolled conditions leading to more, not less burden of disease or mortality in this population, particularly in the border region.

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Table 1

Sociodemographic characteristics by border status for the HEPESE

	Border (%)	Non-border (%)	*P*-value
Age (mean (± s.d.)	73.5 (6.8)	73.7 (6.8)	n.s.†
Gender			
Female	961 (41.4)	797 (44.3)	
Male	705 (58.6)	587 (55.7)	
Marital Status			n.s.
Yes	931 (54.6)	762 (55.8)	
No	735 (45.4)	622 (44.2)	
US Born			n.s.
Yes	881 (51.6)	823 (54.3)	
No	783 (48.4)	561 (45.7)	
Health behaviors			
Ever smoked (yes)	669 (43.1)	597 (43.2)	n.s.
Ever drank alcohol	691 (48.7)	702 (49.9)	n.s.
BMI (*p*=.07)			*p*=.07
Under weight	60 (3.2)	51 (3.7)	
Normal weight	390 (23.2)	343 (23.8)	
Overweight	576 (33.5)	521 (40.0)	
Obese	477 (29.7)	351 (24.4)	
Missing	163 (10.3)	118 (8.1)	
Age at immigration			n.s
Us born	935 (55.0)	854 (56.8)	
Childhood	47 (3.3)	67 (6.2)	
Adulthood	158 (10.0)	129 (10.3)	
Middle age	321 (19.8)	201 (16.6)	
Old age	205 (11.9)	133 (10.2)	
Environment			
Mex Am density (mean ± s.d.)	3422.1 (3237.1)	4765.9 (4518.8)	*p*=.000
Percent speaks Spanish only (mean ± s.d.)	3.2 (1.7)	2.3 (1.5)	*p*=.000
Percent at or below poverty line (mean ± s.d.)	39.9 (13.2)	29.7 (12.9)	*p*=.000

†*n.s.* not significant

Table 2

Baseline health conditions, cause of death and survival by border status for the HEPESE

	Border	Non-border	*p*-value
Baseline health conditions			
Any ADL	245 (16.1)	176 (13.0)	n.s.
Any IADL	913 (55.3)	708 (56.6)	n.s.
Diabetes	384 (28.6)	483 (27.1)	n.s.
Heart problems	146 (9.3)	132 (9.1)	n.s.
Stroke	92 (7.3)	112 (8.0)	n.s.
Hypertension	702 (45.7)	598 (42.8)	n.s.
Hip fracture	55 (4.6)	47 (3.8)	n.s.
Cancer	79 (5.4)	83 (7.1)	n.s.
Cause of death and survival			
Cancer	147 (9.2)	127 (8.8)	n.s.
Cardiovascular disease	223 (13.0)	178 (12.4)	n.s.
Diabetes	41 (2.1)	26 (2.0)	n.s.
Stroke	62 (4.0)	50 (4.3)	n.s.
Old age	91 (5.4)	65 (3.7)	p=.091
All other causes	370 (23.0)	324 (26.2)	n.s.
Lost to follow-up	172 (11.6)	203 (16.0)	p=.050
Alive	537 (30.5)	384 (25.5)	p=.049

Table 3

GEE modeling coefficients predicting change in health status over 5 waves in the HEPESE by border/non-border residence

	Any ADL	Any IADL	Diabetes	Heart problems	Stroke	Hypertension	Hip fracture	Cancer
Total								
Border (1=yes)	1.52 (.000)	1.07 (.392)	1.14 (.189)	1.08 (.590)	.966 (.810)	1.14 (.119)	1.18 (.450)	.824 (.203)
Model 2	1.43 (.000)	1.03 (.663)	1.10 (.336)	1.07 (.665)	.917 (.540)	1.10 (.231)	1.20 (.382)	.828 (.210)
Model 3	1.43 (.000)	1.04 (.605)	1.09 (.371)	1.08 (.627)	.911 (.522)	1.10 (.266)	1.19 (.405)	.833 (.229)
Model 4	1.46 (.000)	1.07 (.456)	1.14 (.222)	1.16 (.382)	.997 (.983)	1.11 (.254)	1.27 (.255)	.870 (.376)

Model 1 Adjusted for demographics

Model 2=Model 1+health behaviors

Model 3=Model 2+age at immigration

Model 4=Model 3+% poverty, % high school graduate, Mexican American density, % speak Spanish

† all models adjusted for sex, age, marital status, income and nativity

Table 4

Odds ratios for survival to Wave 5 or cause of death by border residence for the Hispanic EPESE sample

	Lost to follow-up		Cancer		CVD		Diabetes		Stroke		Old Age	
	Lost	Alive	Cancer COD	Alive	CVD COD	Alive	Diabetes COD	Alive	Stroke COD	Alive	Old Age COD	Alive
Total												
Model 1	.723 (.062)	1.21 (.110)	1.13 (.519)	1.33 (.011)	1.20 (.241)	1.35 (.009)	1.14 (.665)	1.32 (.014)	1.12 (.680)	1.33 (.011)	1.64 (.025)	1.34 (.010)
Model 2	.750 (.099)	1.24 (.070)	1.16 (.458)	1.36 (.006)	1.16 (.319)	1.37 (.006)	1.14 (.652)	1.35 (.009)	1.09 (.764)	1.34 (.009)	1.57 (.039)	1.36 (.006)
Model 3	.739 (.082)	1.25 (.061)	1.14 (.495)	1.37 (.005)	1.17 (.314)	1.39 (.005)	1.22 (.498)	1.36 (.006)	1.07 (.812)	1.37 (.005)	1.58 (.038)	1.37 (.005)
Model 4	.780 (.213)	1.28 (.058)	1.17 (.459)	1.39 (.008)	1.06 (.766)	1.38 (.011)	1.05 (.878)	1.38 (.009)	.948 (.866)	1.37 (.011)	1.35 (.206)	1.38 (.009)

Border (1=yes) and all models adjusted for sex, age, marital status, income and nativity; p-values in (parentheses)

Model 1 Adjusted for demographics

Model 2=Model 1+health behaviors

Model 3=Model 2+age at immigration

Model 4=Model 3+% poverty, % high school graduate, Mexican American density, % speak Spanish

Table 5

Odds ratios for survival to Wave 5 or cause of death by distance to the nearest port of entry for the Hispanic EPESE participants living in a border county

	Lost to follow-up		Cancer		CVD		Diabetes		Stroke		Old age	
	Lost	Alive	Cancer COD	Alive	CVD COD	Alive	Diabetes COD	Alive	Stroke COD	Alive	Old Age COD	Alive
Total												
Model 1	.999 (.833)	.993 (.009)	1.00 (.790)	.993 (.008)	.999 (.815)	.995 (.020)	1.00 (.543)	.994 (.007)	1.00 (.864)	.994 (.036)	.993 (.092)	.993 (.004)
Model 2	.999 (.711)	.994 (.010)	1.00 (.705)	.994 (.010)	.999 (.849)	.994 (.009)	1.00 (.515)	1.01 (.009)	1.00 (.302)	.993 (.081)	.994 (.102)	.994 (.005)
Model 3	.998 (.627)	.994 (.010)	1.00 (.857)	.995 (.011)	.999 (.875)	.995 (.001)	1.00 (.442)	.995 (.012)	1.00 (.489)	.996 (.096)	.994 (.130)	.994 (.006)
Model 4	.997 (.509)	.990 (.004)	1.00 (.600)	.991 (.007)	.999 (.957)	.991 (.005)	1.01 (.214)	.991 (.005)	1.00 (.302)	.993 (.081)	.992 (.208)	.990 (.003)

Border (1=yes) and all models adjusted for sex, age, marital status, income and nativity; p-values in (parentheses)

Model 1 Adjusted for demographics

Model 2=Model 1+health behaviors

Model 3=Model 2+age at immigration

Model 4=Model 3+% poverty, % high school graduate, Mexican American density, % speak Spanish