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Unraveling the Hispanic Health Paradox

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Hispanics in the United States tend to have lower household income, education, and health insurance coverage when compared to non-Hispanic Whites. Despite these economic disadvantages, paradoxically, Hispanics have displayed an equality with or even advantages over other minority groups and non-Hispanic Whites across a wide range of health outcomes. For example, in 2019, the Hispanic population had a life expectancy advantage of 3.0 years over the non-Hispanic White population and 7.1 years relative to the non-Hispanic Black population, despite having real household income that was 26 percent lower than non-Hispanic White households (Wilson 2020). Hispanic immigrants have also shown lower infant mortality rates and prevalence of mental illnesses. These stylized facts are collectively known as the "Hispanic health paradox." This essay will provide an overview of the Hispanic health paradox literature. We will document different instances of the Hispanic health paradox across various measures: life expectancy at birth, infant mortality rate, death rates, causes of death, and morbidity. We will discuss the leading explanations of the Hispanic health paradox and possible ways for economists to contribute to this discussion.

The origin of the Hispanic health paradox is often traced to the seminal paper by Markides and Hazuda (1980), in which the outperformance of Hispanics was

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deemed an "epidemiological paradox." The authors found that Mexican Americans in southwest Texas had a lower infant mortality rate relative to other groups, including non-Hispanic Whites. Markides and Coreil (1986) reported the same phenomenon for life expectancy, mortality, disease-related health outcomes, and mental and functional health. In fact, the first Hispanic health advantage reported was observed for mental health among Mexican Americans (Karno and Edgerton 1969). Markides and Eschbach (2005) renamed these advantages the Hispanic paradox. In their discussion, they highlight the role of immigration in explaining the paradox, with the initial assumption that immigrants need to be healthy enough to endure the cost associated with immigration: travel, adaptation to new customs, new laws, and potentially with few resources or support available. The Hispanic health paradox is closely tied to the "healthy immigrant effect" (also known as the "healthy immigrant paradox"). The healthy immigrant effect is an observed time path in which the health of immigrants just after the migration is substantially better than that of comparable native-born people, but worsens with additional years in the new country. Stephen et al. (1994) were the first to identify this effect using the 1989 National Health Interview Survey, because this was the first time the survey incorporated the number of years lived in the country. Since then, various authors have identified this effect across numerous health outcomes (Ali 2002; Goel et al. 2004; Kennedy et al. 2015; McDonald and Kennedy 2004; Puyat 2013; Wu and Schimmele 2005; Jasso et al. 2005; Roger et al. 2011; Constant et al. 2018).

A vast majority of the Hispanic health paradox literature has treated Hispanics in the United States as a monolithic group.[1] Leading explanations of the Hispanic health paradox can be different due to backgrounds and characteristics. To that end, whenever possible, we disaggregate our findings by nativity and ancestry.

The Paradox in the Health Statistics

The Hispanic health paradox manifests itself through a variety of different health criteria: life expectancy, death rates, infant mortality, leading causes of death, and morbidity. By looking at differences across these measures, how the measures have been evolving, and differences across Hispanic subgroups (where such information is available), we can begin to explore some possible reasons behind the paradox itself.

The data sources selected are based on three criteria. First, we use nationally representative sources widely used in the literature discussing the paradox. Second,

[1] We use Hispanics throughout the document to be consistent with the word used in most US government surveys, but we recognize there are differences between the groups identified as Latinos (or sometimes Latinx), which refers to the country of origin in Latin America, versus Hispanics, which refers to a Spanish-speaking country of origin.

sample sizes are large enough to allow us to disaggregate Hispanics into subgroups by ancestry and nativity. Third, the data we use are publicly accessible, so those interested in this literature can pursue their research interests.

Life Expectancy at Birth

The Hispanic health paradox is perhaps most prevalent when discussing life expectancy and infant mortality (Markides and Eschbach 2011). Since 2006, Hispanics have had the highest life expectancy at birth of all groups despite their disadvantaged socioeconomic profile.[2] Life expectancy at birth was 81.8 years for the Hispanic population in 2019, 78.8 for non-Hispanic whites, and 74.9 for the non-Hispanic Black. Between 2006 and 2019, life expectancy increased by 1.2 years for Hispanics, 0.7 for the non-Hispanic White population, and 2.0 for the non-Hispanic Black population. To put these gains in perspective, life expectancy at birth in the United States increased by more than eleven years between 1960 and 2019, going from 69.7 to 81.8 years.[3]

Life expectancy is defined as the average number of years of life remaining for a person at a particular age. Data used to calculate life expectancy include death counts and US Census population estimates.[4] Death counts are obtained from death certificates reported to the National Center for Health Statistics (NCHS) as part of the National Vital Statistics System (NVSS). Death certificates include information on the race and Hispanic origin of the deceased. Funeral directors collect information about ethnicity from family members of the deceased or from hospital records. While life expectancy is an important indicator of the population's health, the analysis of the Hispanic population must take into account that life expectancy tables do not consider the possibility that some Hispanic deaths are not accounted for due to return migration.

Death Rates

The unadjusted death rate is the total number of deaths per 100,000 population. The unadjusted rates are sensitive to differences in age profiles across populations. Because mortality rates increase with age, a higher mortality rate might simply reflect that the population is older. Mortality rates can be standardized using a weighted average of the age-specific mortality rates to eliminate the effect of different age distributions among different populations. The age-adjusted death rates should be

[2]The first year for comparison is 2006. Estimates calculated before that year are considered unreliable due to quality issues associated with race and Hispanic origin misclassification on US death certificates, leading to underestimating death rates for Hispanics. Additionally, a misstatement of age in vital statistics and census data at the oldest ages observed before 2006 led to underestimating mortality at the oldest ages (Arias 2010).

[3]The US Census Bureau produced population tables in which data for multiple-race persons were bridged back to single-race categories. Life expectancy at birth in 2006 and 2019 is shown in Table A1 in the Appendix.

[4]Population data used to calculate life expectancy in 2006 and 2019 were based on the 2000 and 2010 census counts, respectively. The life expectancy calculation in 2006 also used Medicare data as it was considered more reliable for estimating mortality at the oldest ages as it requires proof of age.

viewed as relative indexes rather than actual measures of mortality risk because they compare the risk of death among two populations with the counterfactual assumption that both groups have the same age distribution. Data used to calculate death rates comes from death certificates and US Census population estimates.

As shown in the left-hand panel of Figure 1, Hispanics have lower unadjusted death rates than the non-Hispanic White and non-Hispanic Black populations. In 2019, the unadjusted death rates were 3.1 and 2.3 times greater for non-Hispanic Whites (1,090 per 100,000) and non-Hispanic Blacks (807) than for Hispanics (351). Across Hispanic subgroups, Americans of Cuban origin have the highest unadjusted mortality rate at 716 deaths per 100,000, followed by Puerto Ricans (466), Mexicans (302), Central Americans (205), and South Americans (246).[5]

The right-hand panel of Figure 1 shows Hispanics also have lower age-adjusted death rates than the non-Hispanic White and non-Hispanic Black populations, although the gaps are not as dramatic. In 2019, age-adjusted death rates were 1.7 and 1.4 times greater for the non-Hispanic Black (871) and non-Hispanic White (737 per 100,000) populations than for the Hispanic population (524). In particular, notice that the age-adjusted rate for non-Hispanic White and Cubans dropped significantly, indicating potential differences in the age distribution of those groups. Moreover, those results are consistent for males and females.[6]

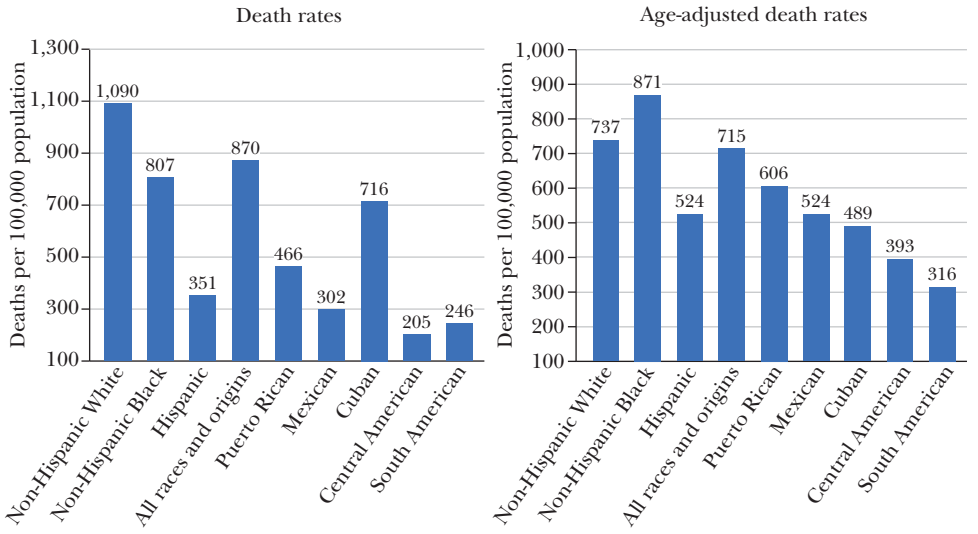
Among Hispanic subgroups (the members of which are self-reported and based on ancestry), Puerto Ricans have the highest mortality rate at 605.7 deaths per 100,000, followed by Mexicans (523.7), Cubans (489.1), Central Americans (393.2), and South Americans (315.5). The age-adjusted rate for Cubans is now below the average rate for Hispanics—a dramatic change, as Cubans had the highest unadjusted death rate of all Hispanic subgroups.

The significant differences in adjusted and unadjusted rates highlight the importance of analyzing age distribution differences among Hispanic subgroups; in turn, these differences can help to illuminate the mechanisms that can contribute to the existence of the Hispanic health paradox. While Mexicans, Central Americans, and Puerto Ricans have a higher proportion of individuals aged 45 or below (75, 75, and 70 percent, respectively), the Cuban and non-Hispanic White populations have a higher proportion of individuals aged 45 and above (45 and 49 percent, respectively). Similarly, we find significant differences across Hispanic subgroups for the average age at death. In 2019, the Cuban population had the highest average age at death, with 77.6 years, followed by the non-Hispanic White with 75.1 years. On the other hand, the groups with the lowest average age at death include the non-Hispanic Black at 65.9 years, Mexicans at 64.2, and Central Americans at 60.3 years. As we will discuss later in the paper, these differences are affected by age-selective migration, and perhaps especially by differences across Hispanic subgroups in the

[5]Estimates show that mortality among Hispanics may be understated due to the net underreporting of Hispanic origin on the death certificate by approximately 3 percent. However, misclassification of Hispanic origin on the death certificate is relatively stable across age groups (Xu et al. 2021).

[6]Age-adjusted death rates are further disaggregated by gender in the Appendix, Figure A1.

Figure 1
Unadjusted and Adjusted Death Rates



Source: Xu et al. (2021).
Notes: Death rates are deaths per 100,000 population. Mortality data is from the National Vital Statistics System (death certificates) and US Census population estimates. Estimates for males and females are shown in Figure A1 in the online Appendix.

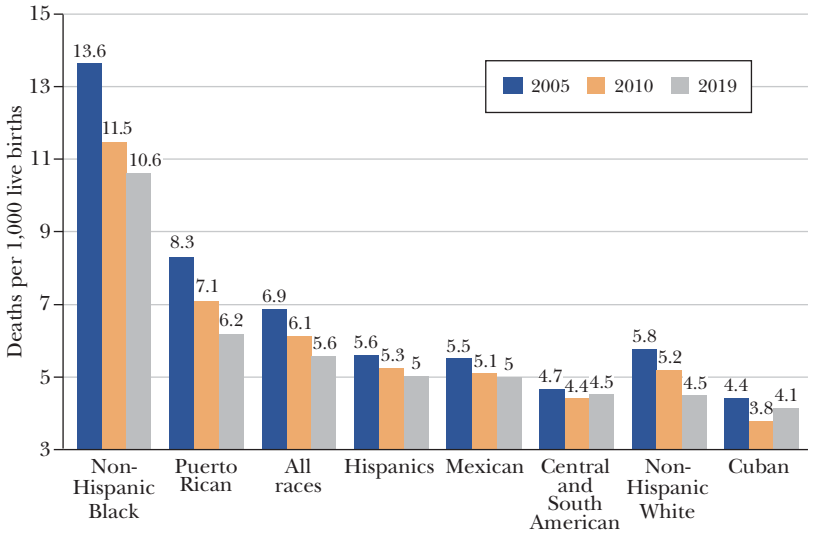
likelihood of those who are older or in poor health to return to their home country. Specifically, Mexican and Central American populations are more likely to return to their home country than immigrants from countries in South America and Cuba (Arenas et al. 2015).

While accounting for age differences across Hispanic subgroups helps explain the sizable raw death rate differentials, health within an age group can still be affected. The return migration of less healthy immigrants to Mexico and Central America (relative to South America and Cuba) would imply that older Hispanics are healthier than non-Hispanic Whites of the same age.

Infant Mortality Rate

Infant mortality rates are calculated as the number of deaths per 1,000 live births (aged <1 year) in the specified group. Data used to calculate infant mortality rates comes from the National Center for Health Statistics (NCHS) linked birth/infant death files and not from birth certificates. As part of the Vital Statistics Cooperative Program (VSCP), each state links information from the birth and death certificate for each infant (aged <1 year) who dies in the United States. The linked birth/infant death data include individuals born in the 50 states and Washington, DC, and maternal ethnicity and nationality are self-reported. For Hispanics, the

Figure 2
Infant Mortality Rate



Sources: Ely and Driscoll (2021), Mathews and MacDorman (2013), and MacDorman and Mathews (2013).
Note: Infant mortality rates are calculated as the number of infant deaths per 1,000 live births in the specified group. Data come from the NCHS linked birth/infant death datasets.

data distinguish six Hispanic groups by place of origin: Mexico, Puerto Rico, Cuba, Central America, South America, and other or unknown origins. Data only include the deaths of infants who were born and died in the United States. These data miss foreign-born deaths, although those deaths appear in the raw mortality files.

The literature on infant mortality rate has found favorable infant survival rates for some Asian and Hispanic groups attributable to a high percentage of births to immigrant women—women characterized as having lower infant mortality than native-born mothers—as well as to sociodemographic, behavioral, maternal health, and birth outcome risk factors. For example, lower mortality rates of Central and South American mothers have been attributed to the large concentration of births to foreign-born women from those groups. Likewise, foreign-born Mexican American women exhibit less risky health profiles than US-born Mexican American women, explaining their lower infant mortality rates (Hummer et al. 1999).

Figure 2 shows that the mortality rate in 2019 was 5.6 infant deaths per 1,000 live births, a historic low for the country. The infant mortality rate for infants of Hispanic women (5.0) is less than half the rate for non-Hispanic Black women (10.6), women who might have similar socioeconomic conditions, and only slightly above the mortality rate for infants of non-Hispanic White women (4.5).

Data can be divided further into Hispanic-origin subgroups: specifically, Mexican, Puerto Rican, Central and South American, and Cuban, in addition to the

residual category of other Hispanics. As shown in Figure 2, infants born to Puerto Rican women had the highest mortality rate (6.2 per 1,000 live births)—higher than the average for "all races"—followed by infants of Mexican (5.0), Central and South American (4.5), and Cuban (4.1). Since 2005, the infant mortality rate has declined by 19 percent for all mothers and 10 percent for Hispanic mothers. Across Hispanic subgroups, the rate dropped 26 percent for Puerto Rican women, 10 percent for Mexican women, 6 percent for Cuban women, and 3 percent for Central and South American women. The graph shows similar rates between Mexicans and Central Americans relative to non-Hispanic White mothers. This evidence supports the Hispanic health paradox given that Hispanics have lower socioeconomic status relative to non-Hispanic Whites.

Leading Causes of Death

Patterns in the causes of death—both between Hispanics and other Americans, as well as between Hispanic subgroups—may help to explain the health paradox. We report mortality rates by cause-of-death in Table 1.

Heart disease and cancer are the two leading causes of death for all population groups: non-Hispanic White, non-Hispanic Black, and Hispanics. Interestingly, some elements of the cause-of-death data seem to sharpen the Hispanic health paradox. For example, while Hispanics have the highest life expectancy at birth and the lowest death rates of all populations, they also have some of the highest disease-specific death rates. Hispanics have higher age-adjusted death rates than the non-Hispanic White population for diabetes, kidney disease, and chronic liver and cirrhosis, and higher age-adjusted death rates than the non-Hispanic Black population due to chronic liver and cirrhosis. These differences only come to light when using the age-adjusted rates. The observed differences in death rates due to diabetes, liver disease, and kidney disease disappear when using unadjusted rates (with additional details in Table A2 in the Appendix).

While crude death rates increase with older populations, age-adjusted rates are constructed based on assumptions of a baseline population distribution. To address these problems, Table 1 shows unadjusted rates by the leading cause of death for different age and Hispanic subgroups. Among Hispanic subgroups, we find significant differences in leading causes of death. Cubans and Puerto Ricans have higher death rates of heart disease, cancer, and Alzheimer's disease. Mexicans aged 55 and above have higher death rates associated with diabetes, kidney disease, and chronic liver disease and cirrhosis than any other Hispanic subgroup. Cubans are older than the other Hispanic subgroups, which helps to explain Cubans higher cause-of-death rates for diseases that predominantly affect older adults like Alzheimer's and heart disease.

Morbidity

Despite the observed advantage of the Hispanic population in aggregated mortality rates, other measures of health among Hispanics offer a mixed picture. We consider the most common morbidities discussed in the literature that directly

Table 1
Leading Causes of Death-Unadjusted Death Rates

	Cubans	*Puerto Ricans*	*Hispanics*	*Mexicans*	*South Americans*	*Central Americans*
Heart disease						
All	263.8	133.6	96.5	79.3	67.0	51.4
35–54	32.8	49.8	37.4	37.0	13.4	26.3
55–74	239.1	290.5	236.9	239.4	87.2	152.6
75+	2,283.0	2,039.7	1,840.5	1,719.1	1,248.8	1,371.3
Cancer						
All	148.2	84.6	71.2	60.6	71.3	44.1
35–54	34.2	41.9	39.7	39.2	27.1	32.3
55–74	284.5	272.3	251.3	243.8	178.1	172.5
75+	872.9	848.1	869.1	843.3	780.7	711.2
Alzheimer's disease						
All	41.4	17.8	13.6	11.5	10.2	5.0
35–54	0.2	0.2	0.1	0.1	0.0	0.1
55–74	8.5	14.4	8.1	7.9	2.8	3.3
75+	442.1	419.7	424.5	447.4	260.7	251.6
Diabetes						
All	23.0	20.3	16.8	16.7	6.2	9.1
35–54	4.4	10.8	8.6	9.3	1.5	5.0
55–74	37.3	59.3	57.8	66.9	12.1	36.8
75+	155.3	223.2	228.9	267.1	95.4	180.1
Chronic liver and cirrhosis						
All	7.1	9.5	11.4	11.9	4.0	8.1
35–54	3.5	8.5	13.8	15.2	2.4	11.5
55–74	18.2	38.0	43.6	51.3	10.9	28.6
75+	25.8	37.9	55.1	69.2	33.9	63.1
Kidney disease						
All	8.8	9.5	7.4	7.5	3.6	3.6
35–54	0.6	3.6	2.9	3.2	0.5	1.5
55–74	8.5	26.0	22.6	26.5	5.9	14.0
75+	77.0	122.0	121.6	145.0	62.2	78.9

Source: Authors' calculations.
Notes: Mortality rates (deaths per 100,000 population) are calculated using mortality data from the National Vital Statistics System in 2019 and population from the 2019 American Community Survey. For explicitly age-adjusted cause-of-death rates, see Table A2 in the online Appendix.

connect to our previous measures of leading causes of death. Advantages and disadvantages on death rates are likely related to risk factors reflected in morbidity rates. Morbidity is measured as the proportion of individuals within a group with a particular health condition. We measure morbidity using nationally representative data from the National Health Interview Survey from 2016 to 2019, as harmonized by Integrated Public Use Microdata Series (IPUMS) where respondents self-report their ethnicity, country of birth, and medical conditions.

We concentrate our analysis on all adults (age > 17) who were "ever" diagnosed with a particular condition during this time period. We combine four years of data to increase the sample size. The larger sample size provides us with statistical power to explore disaggregated Hispanic groups based on nativity and ancestry. Additionally, we can isolate within group effects from observed gender/age variation.[7] We estimate prevalence rate differences between each Hispanic group relative to non-Hispanic Whites conditional on age, sex, and survey year cohort.

Overall, we find evidence consistent with earlier studies (Markides and Coreil 1986; Sorlie et al. 1993; Abraído-Lanza et al. 1999; Hummer et al. 2000). Hispanics display advantages in cancer (–4 percentage points), cervical cancer (–2 percentage points), and coronary heart disease (–0.5 percentage points). The cardiovascular disease indicators of high blood pressure and hypertension, which are normally positively correlated, give mixed results (–1 percentage point and 1 percentage point, respectively). Conversely, prevalence rates for diabetes, kidney failure, and chronic liver disease are higher for Hispanics than non-Hispanic Whites. On average, Hispanics are more likely to have ever been diagnosed with diabetes (4 percentage points), kidney failure (1 percentage point), and chronic liver disease (0.5 percentage points) than non-Hispanic Whites.

When we disaggregate Hispanics by ancestry and nativity, the differences across Hispanic subgroups become more apparent (where "Island" refers to those born in Puerto Rico but now living on the mainland). Figure 3 highlights the differences in proportions between Hispanics and non-Hispanic Whites across key morbidities and separates Hispanics across nativity/ancestry.[8] The comparison is not only within Hispanic ethnicity but also within country/ancestry identification and place of birth, allowing us to highlight important differences. For example, Mexican immigrants have substantially lower rates of hypertension than Mexican Americans. Hispanics have a higher diagnosis rate for chronic illnesses like diabetes, hypertension, kidney failure, or chronic liver disease than non-Hispanic Whites. This rate is driven by US-born Hispanics rather than by the Immigrant/Island group. For all Hispanic groups, the estimated prevalence rate differences among foreign/island-born Hispanics are lower. Consistent with Young and Hopkins (2014) regarding Hispanics advantage on cancer morbidity rates, this advantage persists throughout all the disaggregation exercises.

Obesity

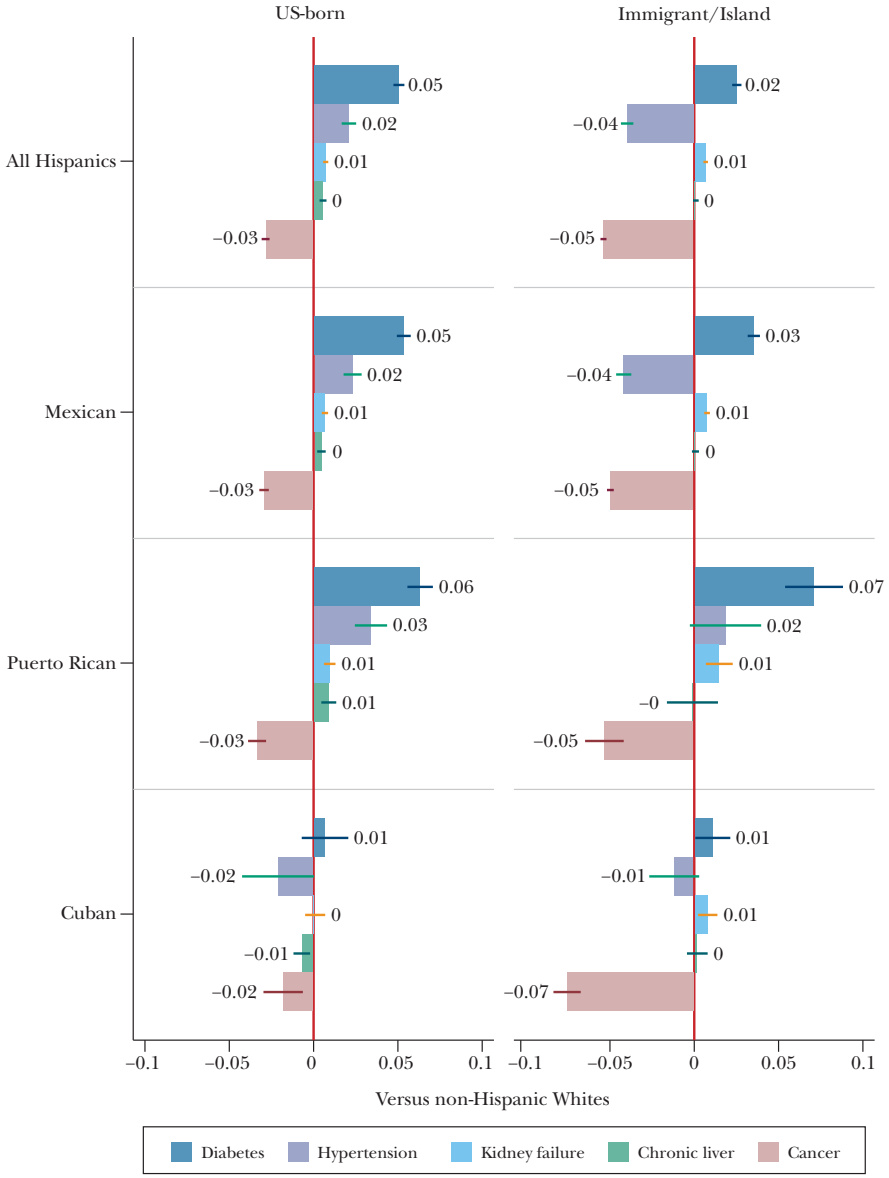
The analysis of diagnosed medical conditions allowed us to illustrate the potential health advantages and disadvantages among Hispanics framed within the leading mortality indicators and the Hispanic paradox. However, another health measure that has researchers' attention is obesity rates among Hispanics. Obesity

[7] Figures A1–A5 in the Appendix show a breakdown of the estimates by gender and age group.

[8] Due to confidentiality issues, ancestry information for respondents selecting a Central or South American country are aggregated to the regional level, limiting our ability to disaggregate even further this group.

Figure 3

Difference in the Likelihood of Ever Being Diagnosed with Condition Relative to Non-Hispanic White



Source: Authors' calculations using 2006–2019 NHIS-IPUMS data.

Notes: The results are the estimated differences in the likelihood of ever being diagnosed with a condition between the identified group and non-Hispanic Whites after controlling for age, sex, and survey year fixed effects. Estimated average diagnostic rates for diabetes (14.24 percent), hypertension (46.72 percent), kidney failure (3.53 percent), chronic liver condition (2.08 percent), and cancer (9.1 percent) are the baseline averages. Values result from linear regressions of ever being diagnosed with the corresponding condition controlled by age and gender with Non-Hispanic Whites as the reference group. Lines represent the confidence intervals. Individuals are classified within the country's ancestry/origin group they self-identified. All Hispanics aggregates all individuals who self-identified as Hispanics in the survey.

is a risk factor that helps to explain the development of other conditions such as cardiovascular disease and stroke. On average, Hispanics have a lower obesity rate compared to non-Hispanic Whites. Also, the age-adjusted percentage of Hispanics that are obese is 45 percent relative to 42 percent for Whites (Hales et al. 2020). A few researchers have found that the likelihood of obesity is highest among Mexicans and Puerto Ricans (Isasi et al. 2015). However, obesity appears to be a growing problem in Hispanic communities. Recent immigrants have lower rates of obesity, but obesity rates increase as time spent in the US increases (Ai, Appel, and Lee 2018).

Mental Health

The majority of our illustrations of the Hispanic health paradox have centered on physical health, but mental health deserves attention too. The evidence is mixed for mental health, but in general, Hispanics, both immigrants and natives, have a lower prevalence of mental health issues, particularly among Puerto Ricans and Cubans (Alarcón et al. 2016). Hispanics have lower rates of depression and suicide than non-Hispanic Whites. Immigrant Hispanics are less likely to report anxiety, depression, or other disorders compared to Hispanic Americans (Vega et al. 2004), but this reverses the longer the immigrant remains in the United States (Cook et al. 2009).

Leading Explanations

The Hispanic health paradox remains an unsolved puzzle. Here, we explore a range of possible explanations, seeking to describe what research has been done and some promising directions for future research.

Demographics and Socioeconomic Differences

Demographic factors can partially explain the original paradoxical findings of Hispanic health statistics. The different age and gender distributions between Hispanics and non-Hispanic Whites have accounted for some of the mortality and life expectancy advantages. However, they do not fully account for the differences. For instance, in the case of lower infant mortality among Hispanics, some of the paradox is explained by younger maternal age among Hispanic mothers, especially Hispanic immigrant mothers (Hummer et al. 1999). Infant mortality increases at older maternal ages (Powers 2013). While different factors can affect infant mortality, socioeconomic disadvantages have been strongly and consistently associated with higher infant mortality rates—except for the case of infants born to mothers of Mexican origin (Elder, Goddeeris, and Haider 2016).

Sample Selection Bias

There are two main reasons why Hispanics might not be accurately depicted in data sources, in a way that can cause estimates of their health to be biased. First, the "healthy immigrant effect" refers to the pattern that in any host country, the immigrant population may be healthier on average than the non-immigrant population.

In general, healthier individuals are more willing to pay the cost of immigration. As a result, recent immigrants are individuals who are positively selected on health and thus have better outcomes when compared to the general US population. However, subsequent generations of these immigrants show regression to the mean as their children's health outcomes tend towards those of non-Hispanic Whites (García-Pérez 2016).

Second, the salmon bias hypothesis is a negative selection effect that refers to a sample selection bias resulting from return migration. Pablos-Méndez (1994, p. 1237) pointed out that "many Hispanics return to their country of birth when they retire, become severely ill, or simply after a temporary job." He referred to this pattern as "salmon bias," "highlighting the compulsion to die in one's birthplace." The deaths of those who return to their country of origin will not be recorded in US mortality statistics: as Pablos-Méndez wrote, "[S]ome individuals are rendered statistically immortal." As a result, the immigrants that remain in the US will tend to be younger and healthier than those who return. Among the other reasons to return to the country of origin, researchers find a lower cost of living, the presence of family members, and lower return migration costs (Arenas et al. 2015). In early studies, Jasso and Rosenzweig (1982) found that all immigrant Hispanics, except for Cubans, have large emigration rates. Conversely, Abraído-Lanza et al. (1999) find evidence rejecting that the salmon bias hypothesis explains the Hispanic health paradox without ruling out some role for selective migration.

These sources of bias can partially explain why observed Hispanic health advantages appear uneven and are not fully generalizable across Hispanic subgroups. For example, we observe more elderly Cubans, relative to other Hispanic groups, in part because the costs of return migration to Cuba have been nearly prohibitive due to political forces. We also observe higher prevalence of elderly-related conditions among Cubans. Conversely, undocumented individuals (largely connected to Mexican migrants) experience a much higher cost of obtaining medical services if they remain in the United States, and thus have an additional incentive to return to their origin country compared to documented immigrants. We observe higher prevalence of chronic conditions among Mexicans, yet lower among immigrant Mexicans. Notwithstanding, the experience of Puerto Ricans can be especially relevant to unraveling the Hispanic health paradox. Puerto Ricans are not immigrants: they are eligible for all US health care programs like Medicare and Medicaid. There are potentially other care access issues affecting this group's differential health outcomes.

The healthy immigrant effect and the salmon bias hypothesis are not mutually exclusive: indeed, they would tend to reinforce each other in supporting the Hispanic health paradox. Several studies have sought to disentangle these two potential sources of selection. Riosmena, Wong, and Palloni (2013) combine data from the Mexican Health and Aging Study in Mexico and the US National Health Interview Survey and find evidence for the existence of both healthy immigrant bias and salmon bias, but also find that they are only a partial explanation for the Hispanic health paradox.

In our own analysis, using age-adjusted death rates significantly reduced the Hispanic health advantage, suggesting the salmon effect has some bite. When we controlled for ancestral country and place of birth, our measures of morbidity described immigrant Hispanics as healthier on average than native Hispanics. Even when considering obesity and mental health rates, the healthy immigrant effect persisted.

However, these two biases alone cannot explain the paradox. One would assume that in the absence of these biases, foreign-born individuals will look similar to their native counterparts. However, differential access to health care is likely to remain due to immigration status, residential location, lack of insurance, and language barriers. If anything, the presence of these barriers suggests that the underlying size of some of the described health advantages—net of these barriers—may be underestimated.

Measurement Error

Survey data of self-reported status and outcomes are always prone to measurement error. In our case, self-reported health outcomes, health status, and Hispanic/race identity are areas of concern (Chatterji, Joo, and Lahiri 2012). Collecting, recording, reporting, and counting deaths and births among Mexican Americans, especially around US border counties, can create accounting issues for the aggregated rates (Markides and Eschbach 2005). Even the question of citizenship has flaws, with some Puerto Ricans appearing as noncitizens in the American Community Survey (Brown et al. 2019). Here we discuss three factors that can create a bias within the Hispanic health paradox.

First, in order to avoid detection, undocumented immigrants may be less likely to answer surveys or to use health care, a fact sometimes known as the "chilling effect." Even when health care is used, undocumented immigrants may instead focus on only their immediate ailments, thereby never documenting a broader diagnosis. As a result, survey questions focused on Hispanics living in the United States or the use of medical records may both underestimate health issues for this population. This chilling effect can have an externality even among documented individuals who fear an undocumented family member may become exposed. Alsan and Yang (2022) find that Hispanic citizens reduce their participation in the Supplemental Nutrition Assistance and Social Security Income programs when immigration enforcement intensifies.

Second, researchers point to "ethnic attrition," the tendency of second and later generations of Hispanic immigrants to fail to self-identify as Hispanics, resulting in a downward bias in the estimated health of children of immigrants as a result of assimilation (Antman, Duncan, and Trejo 2020). For example, approximately half of all fourth-generation Hispanics still identify as Hispanic (Lopez, Krogstad, and Passel 2022). As the rate of ethnic attrition increases, aggregate values of vital statistics and health outcomes become more immigrant-centric. The direction of the bias will depend on the health status of those Hispanics who stop identifying. If healthier individuals are more likely not to identify, then the observed health

advantages should diminish. However, if sicker individuals stop identifying, health advantages will only increase.

Third, health care usage among immigrants has been tied to length of time in the United States. A shorter tenure implies less health care usage as immigrants may have trouble navigating the US healthcare system. A by-product of this behavior is that the children of immigrants may also have a reduction in access to and usage of health care, resulting in an underreporting of health outcomes (García-Pérez 2013; 2016).

Cultural and Lifestyle Differences

Cultural and social factors could potentially protect individuals from developing certain negative health outcomes. These factors provide an informal support mechanism for care. Culture can shape an individual's risk and lifestyle behaviors. Therefore, if Hispanics differ from other groups in categories concerning smoking, alcohol consumption, risky behavior, and food consumption, these community-constructed individual behaviors could result in a collective gain in terms of health outcomes. Strong social and family ties are associated with reductions in stress and anxiety, but community factors can also reverse that positive relation, such as discrimination and language barriers (Alegria et al. 2007). Eschback et al. (2004) find evidence of a "barrio neighborhood advantage" to explain low adult mortality among Hispanics living in immigrant neighborhoods. However, Palloni and Arias (2004) find no evidence of cultural/social factors, such as marital status and segregation index, to explain the advantages in adult mortality rates.

Smoking and alcohol consumption has consistently been connected to lower risk factors for developing conditions such as cancer and cardiovascular disease, lower mortality, and higher life expectancy among Hispanics. Smoking and alcohol consumption habits are often influenced by social interactions. In the case of low infant mortality, the literature emphasizes the cultural aspect of caring for expecting mothers in the Mexican American community. One potential explanation for the paradox is the differential smoking and drinking rates of Hispanic immigrants versus Hispanic Americans. Immigrants are less likely to drink or smoke, which could contribute to better infant outcomes.

Hispanics daily smoking rate is 8 percent, which is lower than that of non-Hispanic Whites (Cornelius et al. 2022). Puerto Ricans and Cubans are more likely to smoke compared to Mexicans, Dominicans, and Central Americans (Martell, Garrett, and Caraballo 2016; Kaplan et al. 2014). Hispanic immigrants display positive selection in that they have lower smoking rates than individuals in their home country and Hispanics in the United States (Bosdriesz et al. 2013).

Similarly, Hispanics are less likely to drink alcohol when compared to Whites. Seventy percent of White Americans reported having one drink in the past year compared to 54 percent of Hispanics (National Institute on Alcohol Abuse and Alcoholism 2021). However, Hispanics are more likely to binge drink than Whites (42 percent versus 32 percent for Hispanics and White drinkers, respectively). Puerto Ricans have the highest percentage of drinkers, binge drinkers, and

individuals with alcohol dependence, while Cubans report the lowest percentage across all of these categories.

The Role of Health Insurance and Usage in the Hispanic Health Paradox

Health Insurance

We believe that the potential role of health insurance in the Hispanic health paradox has been understudied. Aggregate statistics suggest that Hispanics tend to have lower-than-average health insurance rates and health care use. Such patterns might potentially affect the Hispanic health paradox in two ways.

First, individuals with access to insurance coverage or greater use of health care may become more aware of their health and more likely to report specific health conditions in a survey. Second, to the extent that differential access to health insurance also leads to differences in the usage of health care, it may also lead to differences in recorded health outcomes. The lack of health insurance may lead to a greater degree of survey nonresponse for certain health conditions, leading some to believe that Hispanics are simply healthier. The lack of insurance leading to less health care usage would imply that administrative claims data would also underreport certain health outcomes. To go one step further, it might imply that if Hispanics had equal rates of health insurance and health care usage, the Hispanic health paradox might be even larger.

Which of these effects is likely to dominate? One approach would be to look at trends over time. For example, if increased health insurance coverage for Hispanics leads to worse reported health statistics, it would be consistent with insurance leading to heightened awareness and reporting of health problems. Conversely, if increased health insurance coverage for Hispanics leads to improved health statistics, it would imply the Hispanic health paradox is stronger than previously believed.

In this subsection, we discuss patterns of health insurance coverage for Hispanics in the last 15 years or so. In the next subsection, we consider patterns of health care usage for Hispanics. In both discussions, we sketch the fact base in these areas and offer some preliminary thoughts, while emphasizing a need for additional research.

Using data from the American Community Survey via the Integrated Public Use Microdata Series (IPUMS), we can identify recent patterns in health insurance coverage by race, ethnicity, and citizenship. Health insurance coverage among Hispanics increased from 69.1 percent in 2008 to 82.6 percent in 2020. The difference in coverage rates between Hispanics and non-Hispanic Whites has decreased over this same time period from 20.6 to 11.2 percentage points. The improvements in health insurance rates are largely attributable to the Patient Protection and Affordable Care Act of 2010. Both private and public health insurance rates for Hispanics increased by approximately 7 percentage points each. Medicare coverage

Table 2

Percent of Any Health Insurance Coverage by Ancestral Heritage and Citizenship in 2020

	Citizen (percent)	Non-citizen (percent)
Non-Hispanic Whites	93.9	87.9
Hispanics	88.2	57.3
Mexican	86.6	53.9
Puerto Rican	92.0	—
Cuban	90.9	71.4
Central American	88.1	49.0
South American	90.7	70.4
Other	90.3	73.0

Source: Author calculations using the 2020 American Community Survey.
Note: Less than 2 percent of Puerto Ricans report being noncitizens, but since all Puerto Ricans are US citizens, this percentage is not reported in the table.

for Hispanics rose by only 2.3 percentage points, which is the smallest rise among all major race and ethnicity groups.

Table 2 reports the percentage of individuals with any type of health insurance by ancestral heritage and citizenship in 2020. Among Hispanic citizens, the percentage of people with any form of health insurance is comparable to non-Hispanic citizens, ranging from 86.6 percent to 92 percent. However, the range is much wider among noncitizens, with values between 49 percent and 84.4 percent. These values are all lower than the rate of insurance among noncitizen/non-Hispanics, at 86.3 percent.

Disaggregating Hispanics into countries of ancestral heritage, we observe coverage rates ranging from a low of 80.6 percent for those of Mexican heritage and a high of 91.9 percent for those of Puerto Rican heritage in 2020. When we further separate these groups between US citizens and noncitizens, the differences become starker. Hispanic citizens experienced an increase in coverage from 80 percent to 88.2 percent, while Hispanic noncitizens experienced an even larger increase from 39.7 percent to 57.4 percent from 2008 to 2020. Despite the increase in coverage among noncitizens, the average health insurance gap between citizens and non-citizen Hispanics is 30.8 percentage points.

Public insurance coverage for Hispanics decreased from 38.7 percent in 2016 to 36 percent in 2020, with Medicaid coverage falling by 3.7 percentage points. These decreases in public insurance rates appear to be offset by a 4.6 percentage point increase in private insurance coverage. Yue, Rasmussen, and Ponce (2018) find that Medicaid expansion policies in the aftermath of the 2010 Affordable Care Act were relatively weak among Hispanics. Moreover, these Medicaid expansion policies were not found to have a statistically significant effect on health insurance coverage or on health care access measured by having a regular doctor and frequency of flu shots. Even more puzzling is that the health insurance coverage gap between Hispanics

and non-Hispanic White people is larger in states that have expanded Medicaid than in those that have not.

There are two potential reasons for these puzzling results. First, large Hispanic populations in Florida and Texas—states that did not expand Medicaid coverage—decrease the potential benefit of Medicaid expansion to Hispanics. Approximately 35 percent of the Hispanic population lives in non-Medicaid expansion states. Second, increased immigration enforcement may have caused a "chilling effect" on healthcare usage in states with more Immigration and Customs Enforcement (ICE) activity. One (admittedly imperfect) proxy for the intensity of immigration enforcement is I-247 "detainer requests." An I-247 request is a notice from ICE to local law enforcement that ICE intends to assume custody of an individual currently being held by local law enforcement. Watson (2014) finds an 8.7 percent decline in Medicaid participation among children of noncitizen parents after a 1 percent increase in I-247 detainer requests. Friedman and Venkataramani (2021) find that health care usage among Hispanics decreases after a one standard deviation increase in I-247 requests per capita, even for patients with chronic conditions such as diabetes, but there is no difference for the non-Hispanic White population.

Economists can explore if changes to health insurance access—through policies such as the Patient Protection and Affordable Care Act of 2010 or through Medicaid expansion—affect the Hispanic health paradox.[9] The accessibility of affordable health insurance could explain some of the perceived advantages of noncitizen Hispanics over citizen Hispanics. A lack of health insurance could imply fewer visits to the doctor's office. These fewer visits could mean that important information about health may never be recorded. Disease prevalence rates are likely measured with error in the uninsured community as only those with severe cases will seek care. Less severe cases are more likely to go undocumented. Given the large gap in insurance coverage between citizens and noncitizens for some Hispanic groups, we would expect larger changes in healthcare usage among Central American and Mexicans relative to Cubans, Puerto Ricans, and South Americans, who have a smaller gap.

Health Care Usage

The presence of a diagnosis, disease awareness, and the usage of health care are intertwined. Using data from the National Health Interview Survey, we calculate two measures of health care usage intent: whether one has a usual place of care and whether the usual place of care is an emergency service. We measure actual health care usage by responses to having visited the doctor in the past two years and having visited an emergency room in the past twelve months.

[9] The Deferred Action for Childhood Arrivals (DACA) provisions of US immigration policy have allowed some individuals who arrived in the United States as children and without legal authorization to participate in the state-run health insurance exchanges set up under the Patient Protection and Affordable Care Act of 2010, but they are not eligible for the subsidies provided to US citizens.

We compare health care usage differences between Hispanic groups and non-Hispanic Whites, controlling for age, sex, and survey year variations.[10] We find that 56 percent of Hispanics overall have no usual place of care. However, Hispanics as a group are 7 percentage points more likely to lack a usual place of care than non-Hispanic Whites. The lack of a usual place of care among all the Hispanic groups suggests the possibility that a large proportion of this population is missing preventive care, either because of limited access to quality health care or overall barriers to access to care. In particular, Mexicans, regardless of place of birth, are more likely to lack a usual place of care, which may reflect a lack of access to healthcare, especially primary care, in the areas where these populations traditionally reside.

On average, Hispanics are more likely than non-Hispanic Whites to identify emergency rooms as their usual place of care (6 percent versus 4 percent, respectively). Foreign/island-born Hispanics have double the rate of non-Hispanic Whites. The differential rates across Hispanic subgroups compared to non-Hispanic Whites vary significantly across nativity and ancestry. For Cubans and Mexican immigrants, the differential rates are higher than their native counterparts, but for Puerto Ricans, the differential rate is only significant and positive among those born on the mainland. Foreign-born Mexicans are 2 percentage points more likely to use the emergency room as a usual place of care compared to US-born Mexicans. However, island-born Puerto Ricans are 9 percentage points less likely compared to Puerto Ricans born on the mainland. The inefficient use of emergency services relative to a traditional doctor's office are well known, including higher medical expenses in health care and higher out-of-pocket expenses for patients, and the possibility that ailments may worsen before treatment (DuBard and Massing 2007; Tarraf, Vega, and González 2014; Basu Roy, Olsen, and Tseng 2020; Zhao and Nianogo 2022).

The average rate of visiting a doctor in the last two years for the entire population is 86 percent. All Hispanic groups are less likely to have visited the doctor in the last two years. The foreign-born Mexicans, Cubans, and other Hispanics lead the estimated differences by –8 percentage points, –3 percentage points, and –4 percentage points, respectively, compared to non-Hispanic Whites.

The average rate of emergency room visits for the entire population is 20 percent. The results do not indicate high use of emergency room services by most Hispanic groups. Despite a plausible intuition that this group might overuse emergency care rooms due to a lack of preventive care, all Hispanic immigrant groups have a lower probability of visiting emergency rooms than non-Hispanic Whites.

As we alluded to before, health insurance has a significant effect on health usage behavior. Simply controlling for health insurance reduces the gap between Hispanics and non-Hispanic Whites by about half across all categories, except for emergency room visits. Additionally, we consider the within-group differences in health care usage conditional on having health insurance. We see the greatest differences among Cubans, where the difference in having a normal place of care is

[10] See Appendix for detailed results (Figures A6-A7).

13 percentage points higher for Cuban Americans and 27 percentage points higher for immigrant Cubans.[11]

There are several takeaways from the differences between health care usage and mortality. First, the low rate of infant mortality among Hispanics is even more impressive given the lack of health care usage. Second, the lack of health care usage, particularly preventive care, could explain the higher morbidity rates of hypertension, diabetes, and liver diseases. Additionally, the lack of health care not only affects improvements in health, but also prevents disease awareness.

We have demonstrated throughout this essay that using Hispanics as an aggregate monolithic group hides variations in health outcomes by subgroup ancestry. We have shown that nativity can play a role in the paradox, both through ethnic attrition and assimilation, to explain why the healthy immigrant effect diminishes in future generations. We have provided evidence throughout this essay that "salmon bias" could be contributing to the perceived advantages in Hispanic mortality by comparing unadjusted and age-adjusted death rates. We have explained that access to health insurance access and health care not only affects the health of individuals directly, but ultimately affects how and if the measures we use to account for the paradox are ever recorded.

Concluding Remarks

The Hispanic health paradox remains a ripe subject for further research and probably does not have a single unique cause. Instead, these pieces of the puzzle may affect Hispanic subgroups differently according to their birthplace, place of ancestry, status as documented or undocumented immigrants, length of time residing in the country, geographic residential location in the United States, and age/gender/socioeconomic compositions. Broad statements about Hispanics as a group often do not translate into better comparable health outcomes among all Hispanics (Jerant, Arellanes, and Franks 2008). Hispanics' mortality rates heterogeneity is expected to reflect the differences in health outcomes as well as access and usage of healthcare, which are further accentuated when foreign-born/island status is considered (Borrell and Crawford 2009). Moreover, the composition of Hispanics has changed dramatically in recent decades: it was an immigrant-dominated group prior to 1990, but has been a citizen-dominated group since 2010. Therefore, the membership in this group is not time-invariant.

In the context of health disparities, the fact that the Hispanic subgroups do not have consistent patterns calls for more research. In the discussion of the paradox, it is necessary to identify the potential mechanisms behind lower health care usage, differential health outcomes, and preventable costs, especially among elderly Hispanics and those suffering chronic diseases. As this research continues,

[11] See Appendix for full results (Table A.3).

we suspect that three factors will play an important role. One is understanding the interaction of health insurance, health care usage, and preventive care, especially regarding the effects among elderly Hispanics and those suffering from chronic diseases. Next, when analyzing health care usage and costs for Hispanics, it will be important to disaggregate Hispanic subgroups by place of birth and age profile. Third, measurement error is likely playing a larger role than previously suspected. Economists could develop behavioral/empirical models to address external barriers to care (including living in rural areas), self-selection when seeking health care, and the presence of measurement error in health data.

Ultimately, the Hispanic health paradox offers a starting point for a deeper examination of what leads to differences in health outcomes—and thus a fuller understanding of how to address the underlying health issues more directly and how these issues would worsen after the disparate effects of the COVID-19 pandemic.

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