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Topic 3. Racial and Ethnic Inequalities in Health

Aging, Migration, and Mortality: Current Status of Research on the Hispanic Paradox

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Objective. We reviewed recent evidence on the apparent Hispanic mortality paradox.

Methods. Recent studies using vital statistics, national community surveys linked to the National Death Index, Medicare data linked to application records for social security cards maintained in the Social Security Administration NUDIMENT file, and mortality follow-up by regional studies are reviewed critically.

Results. Data based on vital statistics show the greatest mortality advantage compared with non-Hispanic Whites for all Hispanics combined. The advantage is greatest among older people. National Community Surveys linked to the National Death Index show a narrowing of the advantage, and one study suggests that the Mexican Origin mortality advantage can be attributed to selective return migration of less healthy immigrants to Mexico. The Medicare–NUDIMENT data that avoid problems of other data sets also show an advantage in mortality among Hispanic elders, although the advantage is considerably lower than is found using the vital statistics method.

Discussion. Although some research has recently begun to question whether indeed all Hispanic groups enjoy a mortality advantage, the majority of the evidence continues to support a mortality advantage at a minimum among Mexican Americans and especially in old age, at least among men, which may provide partial, albeit indirect, support for a selective return migration or "salmon bias" effect. There is a need to further explore the existence of a selective return migration effect with expanded data bases that include more subjects from the various Hispanic origins. To date, the majority of the evidence continues to support the Hispanic paradox at least among people of Mexican origin and calls for additional attention to this interesting and highly important phenomenon.

THE article by Williams (this issue) provides an overview of health disparities involving all major ethnic groups in the United States. This manuscript focuses on one major and increasingly controversial issue in the field of Hispanic health, the suggestion of an existence of a "Hispanic paradox" based on evidence that Hispanics have favorable health and mortality profiles relative to the non-Hispanic White population. This is a paradox because most Hispanics in the United States are socioeconomically disadvantaged vis-à-vis non-Hispanic Whites, and the literature from the United States and elsewhere has shown a consistent association between low socioeconomic status and poor health outcomes. The evidence in support of the advantage has been based on a variety of data sources, including vital statistics, community surveys linked to National Death Index (NDI) data, Medicare data linked to application records for Social Security cards maintained in the Social Security Administration's NUDIMENT file, and mortality follow-ups by individual regional studies. Although the majority of evidence supports a Hispanic advantage in adult mortality, some recent analyses have questioned the existence of a mortality advantage. It is also the case that data on health indicators other than mortality have generally not yielded strong evidence of a Hispanic advantage.

Below we critically evaluate recent evidence in support of and against a Hispanic advantage in adult mortality and offer suggestions on how to best proceed to give more definitive answers regarding the true mortality situation of the various Hispanic populations in the United States. We focus on mortality because Hispanic health advantages have been mostly confined to mortality. However, we occasionally draw on data on other health indicators to help better evaluate mortality data. We pay particular attention to age differences in mortality especially because the Hispanic advantage appears to be greater in old age.

Background of the Hispanic Paradox

The first article to suggest the existence of a paradox in the health of Hispanics was published almost two decades ago (Markides & Coreil, 1986). Markides and Coreil focused on the health of Southwestern Hispanics, mostly Mexican Americans. After critically reviewing the evidence, they proposed an epidemiologic paradox: that the health status of Hispanics in the Southwestern United States was more comparable with the health status of non-Hispanic Whites than with that of African Americans despite the fact that socioeconomically, Hispanics were more similar to African Americans than the more advantaged non-Hispanic Whites. This assertion was based on review of evidence on infant mortality, overall life expectancy, mortality from cardiovascular diseases, mortality from certain major cancers, as well as data on functional health.

Table 1. Death Rates for African Americans, Non-Hispanic Whites, and Hispanics, United States, 2000, by Age and Sex (per 100,000)

	African American	Non-Hispanic White	Hispanic	Rate Ratio: Hispanic/Non-Hispanic White
Men				
Under 1 y	1,567.6	658.7	637.1	0.97
1–4 y	54.5	32.4	31.5	0.97
5–14 y	28.2	20.0	17.9	0.90
15–24 y	181.4	103.5	107.7	1.04
25–34 y	261.0	123.0	120.2	0.98
35–44 y	453.0	233.9	211.0	0.90
45–54 y	1,017.7	497.7	439.0	0.88
55–64 y	2,080.1	1,170.9	965.7	0.82
65–74 y	4,253.5	2,930.5	2,287.9	0.78
75–84 y	8,486.0	6,977.8	5,395.3	0.77
85 y and older	16,791.0	17,853.2	13,086.2	0.73
Age-adjusted rate	1,403.5	1,035.4	818.1	0.79
Women				
Under 1 y	1,279.8	530.9	553.6	1.04
1–4 y	45.3	24.4	27.5	1.13
5–14 y	20.0	13.0	13.4	1.03
15–24 y	58.3	42.6	31.7	0.74
25–34 y	121.8	56.8	43.4	0.76
35–44 y	271.9	128.1	100.5	0.78
45–54 y	588.3	285.0	223.8	0.79
55–64 y	1,227.2	742.1	548.4	0.74
65–74 y	2,689.6	1,891.0	1,423.2	0.75
75–84 y	5,696.5	4,819.3	3,624.5	0.75
85 y and older	13,941.3	14,971.7	11,202.8	0.75
Age-adjusted rate	927.6	721.5	546.0	0.76

Note: From National Center for Health Statistics (2003).

On other health indicators such as diabetes and infectious and parasitic diseases, Hispanics were clearly disadvantaged relative to non-Hispanic Whites (see also, Hayes-Bautista, 1992; Vega & Amaro, 1994).

Note that the existence of a paradox was based on the evidence of relatively similar health profiles of Hispanics and non-Hispanic Whites. There was no evidence of a Hispanic advantage in health at that time. Yet similarity in health status was still paradoxical given wide differences in the socioeconomic status of the two populations. Specifically with respect to mortality, Sullivan, Gillespie, Hout, and Rogers (1984) evaluated alternative estimates of life expectancy in Texas and concluded that the life expectancy of Hispanics was probably very similar to that of non-Hispanic Whites. Although some estimates suggested a possible small Hispanic advantage, the authors noted that these estimates were based on Spanish surname numerators (deaths) and Spanish origin denominators (population). As the Spanish origin denominator was thought to contain approximately 10% more people than the Spanish surname numerator, mortality rates based on which life expectancies were calculated were most likely understated (Sullivan et al., 1984). Nevertheless, the relatively favorable mortality situation in Texas as well as California (California Center for Health Statistics, 1984) for 1980 among Hispanics still appeared paradoxical given their lower socioeconomic status. The situation appeared to be due to low death rates from major causes of death and was more evident among men. Markides and Coreil (1986) suggested possible explanations for this epidemiologic paradox, which included certain cultural practices, strong family supports, and selective migration.

By the 1990s, the evidence began showing a mortality advantage among Mexican Americans as well as among other Hispanic populations. The epidemiologic paradox now had commonly come to be called the "Hispanic paradox." (Markides, Rudkin, Angel, & Espino, 1997; Palloni & Morenoff, 2001). Franzini, Ribble, and Keddie (2001) published a comprehensive review of the evidence over a 20-year period and concluded that the paradox was apparent in mortality, especially in the older years, but also among infants. They concluded that the causes of the paradox remain largely unknown. They comment on possible problems in vital statistics data and the hypotheses that the paradox may result from either a healthy immigrant effect, that is, disproportionate migration by persons in good health compared with those in poor health, or a "salmon bias," whereas less healthy Hispanics may return home where they die, thus lowering mortality rates of those who remain in the United States (Abraido-Lanza, Dohrenwend, Ng-Mak, & Turner, 1999). They conclude that three of these causes may contribute to but do not fully explain the paradox (Franzini et al., 2001).

Below we review recent evidence using different data sources beginning with vital statistics, followed by mortality follow-up studies of community surveys and by data from the Social Security Administration's NUDIMENT file.

Recent Evidence

Table 1 presents official death rates for the year 2000 by race/ethnicity, gender, and age that are published by the National Center for Health Statistics (2003). They are based on vital statistics (registered deaths) and population counts from the 2000 U.S. Census. Among men, the overall age-adjusted rate for Hispanics was 818.1 compared with 1,035.4 for non-Hispanic Whites (rate ratio: 0.79). By contrast, the overall rate for African American men was considerably higher at 1,403.5. Similarly, the overall rate for Hispanic women was 546.0 compared with a rate of 721.5 for non-Hispanic White women (rate ratio: 0.76) and 927.6 for African American women. A Hispanic advantage (see the rate ratios Table 1) vis-à-vis non-Hispanic Whites is present at every age among men except ages 15–24 years. It is also present at every age among women except at ages under 5 years and is also somewhat greater among older men (ages 65 years and older). Among women, the advantage is similar for all age groups beginning at ages 15–24 years.

African Americans in all age groups and both genders are clearly disadvantaged relative to non-Hispanic Whites except at age 85 years and older where their mortality rates are somewhat lower. The latter is consistent with the long-noted Black–White mortality cross-over phenomenon, which remains somewhat controversial because of possible data problems on very old African Americans (Manton & Stallard, 1997; Markides & Black, 1995; Preston, Rosenwaike, & Hill, 1996). The 85 years and older rate for both genders is higher than the Hispanic rate at this age.

Similar advantages for older (65 years and older) Hispanics relative to older non-Hispanic Whites for 1999 were discussed by Hummer, Benjamins, and Rogers (2004). The 1999 data

analyzed by Hummer and associates were based on vital statistics (deaths for 1999) and population estimates for that year that were based on 1990 Census counts. These data appeared to show that mortality ratios vis-à-vis non-Hispanic Whites decline from .76 among men aged 65–69 years to .56 at ages 85 years and older. Similarly, among women, mortality ratios decline from .74 to .58. Note that such an increasing Hispanic advantage with age at older ages (after age 65) is not observed in the 2000 data presented in Table 1. What accounts for this discrepancy?

Analysis of the difference between the rate ratios for 1999 and 2000 identified a problem with population estimates that supplied the denominators for the official 1999 death rates. The Census 2000 counts revealed that the older Hispanic population had been overestimated in 1999. As a result, estimated death rates for older Hispanics were artificially low. By contrast, the number of younger Hispanics was underestimated, resulting in artificially high rates for them. Anderson and Arias (2003) adjusted mortality rates using the 2000 population enumeration rates, which resulted in a 13.7% increase in overall age-adjusted mortality rates for Hispanics compared with those using population estimates based on the 1990 Census. Changes in mortality rates for other ethnic origins were negligible. Thus, the increasing advantage of Hispanics by age after age 65 years and over that had appeared in the 1999 data is likely the result of inaccurate population estimates. The revised higher mortality rates based on the 2000 Census reported by Anderson and Arias and also shown in Table 1 reflect a persisting Hispanic advantage. Yet concerns about misclassification of ethnicity on death certificates have led the National Center for Health Statistics to recommend that death rates for Hispanics (as well as for Asian/Pacific Islanders and especially Native Americans) be interpreted with caution because of concerns about the completeness and comparability of coverage in the vital statistics system and the census, which we will discuss in more detail below (Anderson & Arias, 2003; National Center for Health Statistics, 2003).

One recent study offered revised estimates of Hispanic mortality at older ages using vital registration mortality data for the years 1989 through 1991 linked to population denominators taken from the 1990 Census (Elo, Turra, Kestenbaum, & Ferguson, 2004). This study also applied corrections for a presumed 7% underascertainment of Hispanic ethnicity on the death certificate (Rosenberg et al., 1999), as well as reported ethnic differentials in census undercount. Elo and colleagues estimated by this method that the ratio of Hispanic to non-Hispanic White mortality varied between 0.81 and 0.84 for older male age groups and between 0.85 and 0.98 for older women.

The relatively good overall health of the Hispanic population also appears in relatively low infant mortality rates. A recent study found slightly lower infant mortality rates among Cuban, Central and South American, and Mexican American infants than among non-Hispanic white infants. By contrast, rates for Puerto Rican and other Hispanic infants were slightly higher (Frisbie & Song, 2003), whereas rates for African American infants were considerably higher than those of all other ethnic groups. More recent data for 2001 show a slight overall neonatal mortality advantage among all Hispanics combined than among non-Hispanic Whites (Centers for Disease Control, 2004). It should be noted that infant mortality rates are less subject to misclassification of ethnicity than adult mortality rates as the mother's ethnicity is recorded on the birth certificate at the time of birth with the mother present (Hummer et al., 2004, p. 71). Thus, similar if not lower infant mortality rates in some Hispanic populations are evidence of the population's overall relatively good health.

Smith and Bradshaw (in press) raise questions about vital statistics evidence about the Hispanic advantage through analyses of Texas vital statistics data. They begin by reintroducing concerns about vital rates for Hispanics that had been raised by Rosenwaike and Bradshaw (1986) and by Sullivan and colleagues (1984) after the 1980 Census. From 1950 through 1980, Texas and several other southwestern states had reported mortality rates for their Spanish-surname population using numerators and denominators generated by applying Spanish-surname coding programs to vital registration and census, respectively. After the Censuses of 1990 and 2000, however, the practice of identifying a Hispanic surname population using a name coder was replaced by the use of a Hispanic origin item on both the census and on the death certificate.

Smith and Bradshaw (in press) show that the shift in the method used to identify the Hispanic population was accompanied by a one-time sharp reduction in the apparent mortality rates for this population that was not observed for the non-Hispanic White population. The crude death rate for the 65+ Hispanic population dropped from 0.04845 to 0.03955 between 1980 and 1990, whereas that for non-Hispanic Whites increased slightly from 0.04944 to 0.04986. They suggest that the most plausible explanation of this otherwise unlikely change is that self-identification on the Census increased the population count of Hispanics, without a corresponding increase in Hispanic identification on death certificates. Hispanic identification on the death certificate is often made by a funeral director or other individual who may not know the decedent well. Smith and Bradshaw offer re-estimated death rates for Hispanics in Texas under the assumption that mortality rates for Hispanics and non-Hispanic Whites are equal inside and outside of Texas. This analysis points to the need to "transfer" deaths from non-Hispanic Whites to Hispanics or population from Hispanics and non-Hispanic Whites, with the magnitude of the transfers of the same order of magnitude as those that apparently occurred—in the opposite direction—with the shift from surname coding to direct identification of Hispanics between 1980 and 1990. These transfers eliminate the Hispanic mortality advantage and indeed estimate a life expectancy at birth for Hispanic males (73.7 years) that is just over 1 year less than that of non-Hispanic White men (74.8 years) using the 2000 data. They conclude that the Hispanic mortality advantage in vital registration data linked to census denominators is an artifact of inconsistent identification of Hispanics under current practices in the two data systems and advocate a return to Hispanic surname coding to calculate Hispanic mortality rates.

It has been suggested that because of the problems with death rates based on vital statistics and population enumeration data, a potentially more accurate source of mortality data may be large population surveys linked to mortality follow up data using the NDI. These data have the advantage that classification by ethnicity is taken directly from the population survey, eliminating the problem of inconsistent ethnic identification.

The first such analysis (Sorlie, Backlund, Johnson, & Rogat, 1993) used data from the National Longitudinal Mortality Study (NLMS), which linked records for several cohorts of respondents in the Current Population Survey to the NDI. These data supported an overall Hispanic advantage in mortality as well as in mortality from cardiovascular disease and cancer. Advantages were greater for men than women among Puerto Ricans and Mexican Americans, with the largest advantages observed among older Cuban Americans of both genders. Puerto Ricans enjoyed the smallest advantage among the various Hispanic origins.

Another analysis used the National Health Interview Survey–Multiple Cause of Death (NHIS-MCD) data set, which linked records of several cohorts of NHIS subjects to the NDI to investigate the influence of race/ethnicity and nativity on mortality. In all major ethnic groups (Hispanics, African Americans, and persons of Asian origin), foreign-born persons exhibited consistently lower death rates than native-born persons. Interestingly, the lowest odds of death were among foreign-born African Americans as well as persons of Asian origin (Hummer, Rogers, Nam, & Le Clere, 1999). Similar results were obtained for other health indicators by Stephen, Foote, Hendershot, and Schoenborn (1994). This study showed that foreign-born persons from all major ethnic origins of both genders and all ages reported better health than native-born persons. Similar results were also found for Australia by Donovan, Espainget, Merton, and Van Ommeren (1992) and for Canada by Chen, Ng, and Wilkins (1996). These and other studies suggest that immigrants to Western countries tend to be selected for good health. In addition, Western countries require health screenings of prospective immigrants and, because most people immigrate for occupational reasons, they tend to be in good health. Finally, people who immigrate tend to have a positive outlook on their futures and are typically people who want to improve their lives, factors that are consistent with good health (Markides, 2001).

Another longitudinal analysis used the NHIS-MCD-linked data set for 1986–1995 to examine mortality rates of persons with various Hispanic origins (Hummer, Rogers, Amir, Forbes, & Frisbie, 2000). With a few exceptions, and after controlling for relevant risk factors, this analysis yielded lower mortality rates for the various Hispanic populations than for non-Hispanic Whites with the advantage being the most marked among Mexican Americans. These findings, like those reported from the NLMS, appeared to confirm the Hispanic paradox of favorable mortality outcomes despite a relative high socio-demographic risk profile. A more recent analysis of the NHIS-MCD data set concluded that older Hispanics enjoy a mortality advantage over older non-Hispanic Whites, but that the advantage is considerably lower than that based on vital statistics (Hummer et al., 2004).

One limitation of studies based on the linkage of survey records to the NDI is that they may miss a significant number of deaths in certain immigrant populations and thus may still underestimate mortality rates of Hispanics. This is the case because some immigrants may return to and subsequently die in their country of origin. One study of such a "salmon bias" using the NLMS did not find it to explain the relatively low mortality rates of Cubans for whom return migration was improbable, U.S.-born Hispanics, who had no foreign birthplace to which to return, and Puerto Ricans, for whom return migration is to a territory within the vital statistics system of the United States (Abraido-Lanza et al., 1999). By contrast, Palloni and Arias's (2004) more recent analysis of the NHIS-MCD, which we also evaluate below, found support for a salmon bias among foreign-born Mexican Americans but not among persons of other Hispanic origins.

The NHIS-MCD data set has also been one of the data sets used to investigate cultural explanations of the paradox. The logic underlying these investigations begins with the observation that the residential isolation of ethnic populations is a well-established correlate of cultural maintenance (e.g., Gordon, 1964). If the unique social and behavioral characteristics of Hispanic (or Hispanic subgroup) cultures explain their mortality advantage, one would also expect that these effects would be largest in those social settings where the maintenance of distinct Hispanic cultural patterns is the strongest. For example, using data from the Hispanic Established Population for Epidemiologic Studies of the Elderly, Eschbach, Ostir, Patel, Markides, and Goodwin (2004) report an apparent "barrio advantage" of lower all-cause mortality with increasing ethnic concentration at the census tract level for older Mexican Americans. In their study using the NHIS-MCD, LeClere, Rogers, and Peters (1997) also report an association between area concentration of Hispanics and lower all-cause mortality, though Bond Huie, Hummer, and Rogers (2002) reanalyze these data and report that the effect appears to pertain to immigrant rather than ethnic concentration, and Krueger, Huie, Rogers, and Hummer (2004) identify immigrant rather than ethnic concentration as a correlate of low homicide mortality in this data set. Immigrant concentration is a more ambiguous indicator than ethnic concentration of cultural advantages as a mechanism producing the Hispanic mortality advantage. While immigrant concentration may—like ethnic concentration—create and indicate environments in which Hispanic cultural practices are strong and persistent, associations with mortality advantages in these areas may simply reflect the impact of selective migration. Palloni and Arias (2004) also report lower all cause mortality as a function of Hispanic concentration at the county level using the NHS-MCD file, but demur that the effect is relatively weak and does not account for the mortality advantage in contrast to non-Hispanic Whites. To date, studies of ethnic concentration effects have also not identified specific cultural mechanisms that might account for it.

Palloni and Arias (2004) report this finding as part of a major reanalysis of the NHIS-MCD link file, to which we have already alluded. This study attempted to draw stronger conclusions than previous studies about explanations of the Hispanic mortality advantage by paying closer attention to the specific occurrence of the advantage with respect to age, gender, nativity, national origin, and place of residence. Palloni and Arias identify two primary patterns of the Hispanic mortality advantage that they then seek to explain. First, the advantage is specific to "Other Hispanics" and Mexican Americans and does not pertain to Cubans or Puerto Ricans. Second, the advantage is strongest for foreign-born Mexican Americans and Other Hispanics compared with U.S.-born members of those same groups. They also note that the Mexican American immigrant advantage is strongest with respect to older members of those groups.

As we have seen, several persistent explanations have run through the debate about the causes of the Hispanic mortality paradox. Palloni and Arias (2004) identify and offer partial tests of four primary classes of explanations: (a) poor data quality with respect to ethnic classification, age report, or mortality ascertainment; and (b) hypotheses that aspects of Hispanic culture (e.g., increased social support or superior health-related behaviors) reduce mortality risks; (c) health selective in-migration (i.e., the "healthy migrant effect"; (d) health selective return migration, that is, the "the salmon bias hypothesis."

To summarize briefly, Palloni and Arias (2004) find little support for the data quality, cultural, and healthy migrant hypotheses. They find suggestive indirect evidence that the salmon bias hypothesis may explain the Mexican American advantage. Data quality explanations are rejected because they are irrelevant given the data source (ethnic classification), do not explain age patterns of mortality, or require implausible mismatch rates in subpopulations. As we have already noted, cultural explanations receive little support because protective effects of ethnic isolation do not reduce the estimate of the remaining mortality advantage for other Hispanics and Mexican Americans. The healthy migrant effect receives only marginal support as an explanation of the mortality advantage of the foreign-born. The healthy migrant effect would be expected to attenuate with duration of residence in the United States, as settled migrants assimilate behaviorally and become less selected. This pattern is not found in the data. The "healthy migrant" model would also predict an increased Mexican American mortality advantage at greater distances from the border, because longer distance migration is presumed to be more strongly selected. As was the case for the cultural hypothesis, this pattern is found in the data but did not account for the Mexican American advantage.

By contrast, the final hypothesis—selective out-migration by the unhealthy—does receive some support, both because it is consistent with the pattern of increased mortality advantage for older foreign-born Mexican Americans for whom the hypothesis of illness induced return migration is most plausible and because the same effect does not appear for older Other Hispanics, for whom late life return migration to more remote points of origin is less expected.

Despite the provocative connotations of its title ("Paradox Lost"), it is clear that this article does not definitively explain the Hispanic mortality paradox. The findings are strongest for Mexican Americans, for whom Palloni and Arias (2004) suggest that health selective out-migration can account for the observed advantage. They also conclude that the mortality advantage of "Other Hispanics" is both real and unexplained in this data set by any of the proposed mechanisms. Unfortunately, this population is of unknown provenance, because the NHIS does not collect specific country of origin data. Census data suggest that "Other Hispanics" is a heterogeneous mix of Central and South Americans, Dominicans, Spaniards, and perhaps some Filipinos. It may also include more than a few Mexicans Americans, Puerto Ricans, and Cubans and persons with mixed ancestry who failed to identify a specific national origin in NHIS responses. Palloni and Arias also acknowledge that model selection criteria that underlie the reported results are not definitive given limitations of the NHIS sample. Replication and extension of this study in recently released enlargements of the NHIS-MCD link file and in the NLMS may be able to address some of these limitations.

Another approach to estimating mortality rates for older people bases these rates on the experience of Medicare beneficiaries using data from the Social Security Administration's Master Beneficiary Record and the NUDIMENT file, which contains information from the application for Social Security. Like studies based on linkage of surveys to the NDI, the ethnicity for both the population and the mortality data comes from the same source, thus avoiding inconsistencies found in the vital statistics method. Elo and colleagues (2004) used the Medicare–NUDIMENT data to compute mortality rates for Hispanics and non-Hispanic Whites aged 65 years and older. These estimates were compared with estimates based on population and vital statistics that were adjusted for the underreporting of Hispanic ethnicity on death certificates as well as undercount of Hispanics in the U.S. Census. They found that death rates based on the Medicare–NUDIMENT file are higher at every age from 65 years and up than rates based on vital statistics and the Census except at ages 90 years and above among women. The presumably superior Medicare–NUDIMENT data continue to show a mortality advantage for older Hispanics, giving further support to the Hispanic paradox. A similar narrowing of the mortality advantage of Asian Americans was also shown using the same data, but again older Asian Americans continued to show a wide advantage relative to older non-Hispanic Whites (Lauderdale & Kestenbaum, 2002).

Elo and colleagues' (2004) use of internal Social Security and Medicare records for mortality ascertainment ostensibly provides important corroborating evidence to the studies based on the NHIS-MCD and on the NLMS. In those studies, as we have noted, mortality ascertainment is based on linkage to the NDI, for which the existence of ethnic differentials in linkage rates for Hispanic populations has been neither ascertained nor excluded. It seems likely that such differentials, if they exist, are smaller in administrative records, because mortality follow-up is an inherent function of the agencies as part of program administration.

One acknowledged limitation of the study of Elo and colleagues (2004) is that persons for whom foreign residence is known are excluded from the study given the probability that mortality follow-up is less complete among Medicare beneficiaries outside of the United States. One consequence is that no estimate is provided of the possible impact of health selective out-migration on the Hispanic mortality advantage in the United States. Similarly, there is no estimate in the study of the size of mortality underascertainment because of unobserved return migration, though it seems implausible that this latter effect could approach the magnitude of the reported mortality advantage.

Discussion

For about 20 years, the Hispanic paradox of relatively good health despite high risk profiles has dominated the literature on Hispanic health. Even though some recent research has begun to question whether, indeed, all Hispanic groups enjoy a mortality or health advantage (Hunt, Williams, Resendez, Hazuda, & Stern, 2002; Palloni & Arias, 2004), the majority

of the evidence continues to support a mortality advantage, at a minimum for Mexican Americans, by far the largest component of the Hispanic American population. The evidence suggests that the greatest mortality advantage is among older Mexican Americans, at least among men.

A secondary question to the existence of Hispanic mortality advantage is the question of the size of the advantage. There appears to be underlying agreement that vital statistics death counts linked to census denominators are the least useful source of data to make this estimate, because of the inherent uncertainty about the consistency of ethnic classifications in these two sources—a point that Smith and Bradshaw's (in press) recent analysis of Texas vital rates drive home. Their strong conclusions—supported also by studies that find no evidence of lower death rates for smaller regional cohorts with active follow-up rather than after-the-fact record linkage (Hunt et al., 2002; Pandey, Labarthe, Goff, Chan, & Nichaman, 2001)—seem to be contradicted by evidence from Elo and colleagues' (2004) use of Medicare–NUMIDENT data that is hard to explain on the basis of poor record linkage. While questions persist about differential linkage rates for NDI-based studies, Palloni and Arias (2004) raise significant questions about whether differential linkage rates alone can explain the pattern of mortality advantage in these data sets.

Recent enlargements of the two principal NDI link studies—the NLMS and the NHIS-NDI—and lengthening of the period of follow-up should shed some light on this question by permitting the analysis of ethnic differences in very old cohorts that are now certainly deceased. Smith and Bradshaw's (in press) provocative suggestion to return to surname coding of death records and census data to determine Hispanic vital rates cuts against the grain of current valuation of self-identification in Office of Management and the Budget directives on ethnic classification. From a scientific point of view, the suggestion may, if implemented, bring additional evidence to bear on some of the questions that have been posed about data quality.

Despite the consistency in the mortality data, studies of self-reports of health status do not support a health advantage for Hispanics. For example, older Mexican Americans have been found to report their health as poorer than non-Hispanic Whites (Hummer et al., 2004; Markides et al., 1997). Older Hispanics are more likely to report activity limitations in national studies, like the Health Interview Surveys, than older non-Hispanic Whites and Asian and Pacific Islanders (Hummer et al., 2004). Data from the Hispanic Established Population for the Epidemiological Study of the Elderly (EPESE) show that older Mexican Americans report greater activities of daily living and instrumental activities of daily living disability rates than older non-Hispanic Whites (Rudkin, Markides, & Espino, 1997). For similar evidence in a number of other studies, see Angel and Guarnaccia (1989), Cho, Frisbie, Hummer, and Rogers (2004), and Markides and Martin (1983).

It could be argued that self-reports are subjective and do not represent the true health status of the population. One recent study has found that self-ratings of health are not as predictive of mortality among Hispanic immigrants than U.S.-born Hispanics and non-Hispanic Whites (Finch, Hummer, Reindl, & Vega, 2002). It has also been suggested that older Mexican Americans are more "health pessimistic" than older non-Hispanic Whites and may thus define their health as poorer than it actually is. However, such self-reports have been argued to be "realistic" because poor health is more likely to have negative consequences on the lives of people from poorer socioeconomic backgrounds (Markides et al., 1997).

Another possibility is that older Mexican Americans live longer than older non-Hispanic Whites, but do so with more disability and in poorer health. High disability rates in older Mexican Americans have been attributed to high rates of obesity and diabetes and low rates of physical activity (Markides et al., 1997; Rudkin et al., 1997; Wu, Haan, & Liang, 2003), as well as high rates of cognitive impairment (Black et al., 1999). So, what may be going on is that recent increases in life expectancy have been accompanied by increases in disability and generally poor health, a situation that was observed for the general population during the 1970s. More recent evidence suggests that disability rates in the general population of older people have been declining since the early 1980s (Manton & Wu, 2001). Unfortunately, such data on trends in the health and disability of older Mexican Americans and other Hispanics are not currently available.

The biggest challenge to the Hispanic paradox has been Palloni and Arias's (2004) recent analysis that suggests that health-selective return migration may account for the mortality advantage of foreign-born Mexican Americans, especially older people. Clearly, more evidence with larger samples of the various Hispanic subpopulations is needed to give us more definitive answers. Again, the recently released enlargements of the NHIS-MCD file and the NLMS should offer a significant enhancement of our ability to address these questions.

The suggestion of a salmon bias for older Hispanics, particularly Mexican Americans, is in need of further analysis. Data quality issues aside, the monotonic increase in the Hispanic mortality advantage from age 65 to ages 85 and older in the 1999 data reviewed earlier is certainly suggestive or at least consistent with a selective return effect (Palloni & Arias, 2004). Yet the 1999 data (Hummer et al., 2004) are probably biased because of poor population projections, as discussed earlier. The presumably more accurate 2000 mortality data do not show such a monotonic increase, although the Hispanic mortality advantage, at least among men, may be consistent with a return migration effect. We noted earlier that an increase with age in the mortality advantage of older Asian/Pacific Islander Americans (see also Elo et al., 2004) is not observed and is consistent with the absence of selective return migration in this group where return migration to the countries of origin is less likely.

Finally, two points may bear some thought concerning why the question of the existence of a Hispanic paradox is interesting and how it should be framed. First, we and most others typically pose the question with respect to a comparison to mortality rates for Hispanics to those of non-Hispanic Whites. Yet, as the initial framing of the paradox suggested (Markides & Coreil, 1986), the more appropriate comparison is with the mortality experiences of African Americans, for whom the differences in mortality outcomes from Hispanics are stark while socioeconomic differences are narrow. The more important question for research should perhaps be to understand why the usual socioeconomic suspects in explaining African American health disadvantages do not seem to operate in the same way and to the same degree for Hispanics, as Williams's article in this special issue documents. Such a focus

might help to shed light on the social forces that produce health disparities for both of these disadvantaged populations.

A second and related point is that some of the scholarly animus expressed by some against the notion that there is a Hispanic mortality advantage may come from a concern that if Hispanics are perceived as advantaged in health, the documented health disparities of this population may receive diminished attention from policymakers. These concerns do have considerable substance. Surely, it would be unfortunate if public health policy overlooked the presence of clear and remediable disparities in health care access and the burden of infectious diseases, diabetes, and disability that clearly do disadvantage Hispanics, even should it prove that some compensating factors create offsetting advantages in other morbidity and mortality processes. The need to address observed health disparities concerning Hispanics does not turn on how the Hispanic paradox is finally explained.

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