
Ethnic-Immigrant Differentials in Health Behaviors, Morbidity, and Cause-Specific Mortality in the United States: An Analysis of Two National Data Bases

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Abstract This study examines the extent to which various ethnic-immigrant and US-born groups differ in their risks of all-cause and cause-specific mortality, morbidity, and health behaviors. Using data from the National Longitudinal Mortality Study, 1979–1989, we estimated, for major US racial and ethnic groups, mortality risks of immigrants relative to those of the US-born. The Cox regression model was used to adjust mortality differentials by age, sex, marital status, rural/urban residence, education, and family income. Logistic regression was fitted to the National Health Interview Survey data to determine whether health status and behaviors vary among ethnic-immigrant groups and by length of US residence. Compared with US-born whites of equivalent socioeconomic and demographic background, foreign-born blacks, Hispanics, and Asians/Pacific Islanders (APIs), US-born APIs, US-born Hispanics, and foreign-born whites had, respectively, 48%, 45%, 43%, 32%, 26%, and 16% lower mortality risks. While American Indians did not differ significantly from US-born whites, US-born blacks had an 8% higher mortality risk. Black and Hispanic immigrants experienced, respectively, 52% and 26% lower mortality risks than their US-born counterparts. Considerable differentials were also found in mortality for cancer, cardiovascular, respiratory, infectious disease, and injury, and in morbidity and health behaviors, with API and Hispanic immigrants generally experiencing the lowest risks. Consistent with the acculturation hypothesis, immigrants' risks of smoking, obesity, hypertension, and chronic condition, although substantially lower than those for the US-born, increased with increasing length of US residence. Given the substantial nativity differences in health status and mortality, future waves of immigrants of diverse ethnic and cultural backgrounds will likely have a sizeable impact on the overall health, disease, and mortality patterns in the United States.

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Considerable change in the amount and type of immigration to the United States has occurred since the adoption of the 1965 Immigration Act. Prior to 1965, most US immigrants originated from such European countries as the United Kingdom, Germany, Italy, Greece, Portugal, Poland, and Ireland. In the past three decades, however, immigrants have come predominantly from such Asian, Latin American, and Caribbean countries as the Philippines, China, Taiwan, Korea, India, Vietnam, Mexico, Cuba, Colombia, El Salvador, the Dominican Republic, Haiti, Jamaica, and Trinidad and Tobago (Jasso and Rosenzweig 1990; US Bureau of the Census 1993a, 1993b; Schmidley and Gibson 1999; Singh and Siahpush 2001). The size of the US immigrant population has also increased considerably. Between 1980 and 1991, the annual number of immigrants grew more than three-fold (US Bureau of the Census 1993a). Although the rate of immigration since 1991 has slowed somewhat, the annual number of immigrants to the United States still totals around 800,000. The US immigrant population in March 2000 was estimated to be 28.4 million, the largest number ever recorded in US history, representing 10.4% of the total US population (Lollock 2001).

In spite of the rapid and unprecedented rise in the US immigrant population during the past three decades, there have been relatively few national studies on immigrant and US-born differentials in health and mortality patterns. The studies of immigrant mortality patterns that do exist have analyzed both perinatal and adult mortality, showing generally lower mortality rates for immigrants than for the US-born (Singh and Yu 1996; Guendelman et al. 1990; Hummer et al. 1999; Singh and Siahpush 2001; Kestenbaum 1986). In terms of morbidity and other nonmortality health measures, such as self-assessed health, number of restricted activity days, bed disability days and work-loss days, physician visits, and hospitalization rates, immigrants are generally shown to enjoy better health than the comparable US-born population (Hendershot 1988; Thamer et al. 1997).

Although native and foreign-born differentials in adult health and mortality have been examined previously, the extent to which the impact of immigrant status on health status, health behaviors, and cause-specific mortality varies for major racial/ethnic groups in the United States has not been explored comprehensively. The extent to which immigrant selectivity and behavioral, life style, and social support characteristics are responsible for the better health and lower mortality of immigrants compared to the US-born is not known. Information is also lacking on the potentially adverse impact on immigrant health of such social structural factors as ethnic discrimination, social segregation, poverty, lack of health insurance, policies restricting immigrants' access to social services and benefits, and hazardous conditions in country of origin. Moreover, it is not clear what happens to the health and behavioral patterns of immigrants as they reside in the United States for a longer period of time and try to assimilate into the broader US culture. Does their health deteriorate as they adopt the unfavorable behavioral patterns of their US-born counterparts and experience greater social discrimination, lack of health care coverage, and lower levels of social and familial sup-

port? Or does their health improve because of increase in their human capital or better access to high-technology medical care?

In this paper, using two large national health and mortality data bases, we make one of the first attempts to examine variations in mortality, morbidity, and health behaviors among major ethnic-nativity groups in the United States. Although our primary objective is to analyze ethnic-nativity differentials in mortality, we supplement the analysis by examining variations in health behaviors and health status, the factors that are also essential to understanding mortality differentials (Singh et al. 1998; Singh 2000; Hummer et al. 1998). Specifically, using data from a large national prospective mortality data base, we examine the extent to which various ethnic-immigrant and US-born groups differ in their risks of all-cause mortality and mortality from cancer, cardiovascular, respiratory, other chronic and infectious diseases, and injuries, after controlling for several socioeconomic and demographic characteristics. We also examine whether ethnic-nativity differentials in mortality vary across age cohorts and socioeconomic strata (SES). Secondly, we evaluate the extent to which various ethnic-nativity groups in the United States differ with respect to selected socioeconomic, demographic, behavioral, and health characteristics that are known to be associated with mortality. Thirdly, we examine how the immigrants' risks of health behaviors and morbidity vary with increasing length of residence in the United States. For purposes of this study, "US- or native-born" refers to individuals born in the 50 states and the District of Columbia, whereas "immigrants or foreign-born" refers to those born outside the 50 states and the District of Columbia.

Materials and Methods

To examine mortality differentials between immigrants and US-born individuals of various racial/ethnic groups, we analyzed individual-level data from the National Longitudinal Mortality Study (NLMS), which is a longitudinal data set for examining socioeconomic, occupational, and demographic factors associated with all-cause and cause-specific mortality in the United States. The 1979–89 NLMS was conducted by the National Heart, Lung, and Blood Institute in collaboration with the US Bureau of the Census and the National Center for Health Statistics (Rogot et al. 1992; Sorlie 1995). The public-use NLMS file consisted of five Current Population Survey (CPS) cohorts between 1979 and 1981 whose survival (mortality) experiences were studied for nine years (NHLBI 1995). The CPS is a sample household and telephone interview survey of the civilian noninstitutionalized population in the United States and is conducted by the US Bureau of the Census on behalf of the Bureau of Labor Statistics to produce monthly national statistics on unemployment and the labor force. Two of the five CPS cohorts did not include nativity data (Rogot et al. 1992). As a result, 19.2% of the records from the public-use file were excluded. Data from death certificates on the fact of death and cause of death were combined with the socioeco-

nomic and demographic characteristics of the CPS cohorts by means of the National Death Index (NDI). Detailed descriptions of the NLMS have been provided elsewhere (Rogot et al. 1992; Sorlie et al. 1995; NHLBI 1995; Hoyert et al. 1995; Kposowa and Singh 1994).

Behavioral and health status data, derived from the 1993 and 1994 National Health Interview Survey (NHIS) data files, are analyzed for the various ethnic-immigrant groups, since the NLMS does not contain such data (NCHS 1996, 1997). The NHIS is a national sample household survey in which data on socioeconomic, demographic, behavioral (smoking, alcohol use, diet, and physical activity), morbidity, health, and health care characteristics are collected via personal household interviews. The survey uses a multistage probability design and is representative of the civilian noninstitutionalized population of the United States (Adams and Marano 1995). The NHIS, one of the longest running annual federal health surveys, is conducted by the National Center for Health Statistics.

In this study, the primary dependent variables were the risks of mortality from all causes combined and from cancer, cardiovascular disease (CVD), respiratory and infectious diseases, and injuries. In estimating the mortality risk, all those surviving beyond the nine-year follow-up (i.e., 3,287 days of follow-up) were treated as right-censored observations. The NLMS sample for this study consisted of 240,738 US-born non-Hispanic whites; 13,073 non-Hispanic white immigrants; 25,655 US-born non-Hispanic blacks; 777 non-Hispanic black immigrants; 2,189 US-born Asians and Pacific Islanders; 3,520 Asian and Pacific Islander immigrants; 6,686 US-born Hispanics; 6,177 Hispanic immigrants; and 2,095 American Indians aged 25 years and older at the baseline (see Table 1). The number of deaths among these ethnic-nativity groups during the nine-year follow-up was 27,055; 2,348; 3,318; 40; 124; 173; 393; 326; and 201, respectively. About 84% of the study population was non-Hispanic whites, 9% non-Hispanic blacks, 2% Asians and Pacific Islanders, 0.7% American Indians, and 4.3% Hispanics. Immigrants as a whole accounted for about 8% of the total NLMS population aged ≥ 25 years.

Most of the mortality analyses were conducted separately for men and women and included such covariates as age, race/ethnicity stratified by nativity/immigrant status, marital status, rural/urban residence, education, and family income. Nativity/immigrant status, one of the two primary covariates of interest in this study, was determined on the basis of the place of birth data as reported by each household member in the CPS. Birthplace was recorded as the state of birth if the respondent was born within the United States, or recorded as Puerto Rico, Virgin Islands, Guam, Canada, Cuba, Mexico, or the remainder of the world (Rogot et al. 1992). For the purpose of this study, nativity status was defined by categorizing the birthplace variable into "US-born" for those born in the 50 states and the District of Columbia and "foreign-born" for those born elsewhere.

Race/ethnicity, the other primary covariate, as reported in the NLMS and NHIS, is primarily used as a sociocultural construct rather than a biological variable (Rogot et al. 1992; Adams and Marano 1995; Singh et al. 1996; Singh and

Hoyert 2000; Murphy 2000; NCHS 2000). Blacks consist of those who are identified as black Americans (including African Americans, Nigerian Americans, black Puerto Ricans, Jamaican Americans, West Indian Americans, Haitian Americans) or those having ancestral origins in Africa. White Americans consist of those who are primarily of European origin but also include those from the Middle East. Asian and Pacific Islander (API) Americans are a heterogeneous group and include individuals who identify their country of birth, or cultural, linguistic, or ancestral origins, in any of the Asian or Pacific countries. This aggregate group consists of such major Asian and Pacific Islander American subgroups as Chinese, Japanese, Filipino, Asian Indian, Korean, Vietnamese, Cambodian, Hawaiian, Samoan, and Guamanian. The group "American Indian" is made up mostly of American Indians but also includes Eskimos and Aleuts.

Hispanic Americans are a diverse group who identify their ancestry, nationality, lineage, or cultural origins in any of the Spanish-speaking countries of the Caribbean, Central or South America (e.g., Mexico, Cuba, Puerto Rico, Dominican Republic, Costa Rica, Guatemala, Honduras, Nicaragua, Panama, El Salvador, Colombia, Argentina, Chile, Ecuador, and Peru). Hispanic Americans thus include Mexican Americans, Cuban Americans, Puerto Ricans, Central or South Americans, and other Hispanic Americans. It should be noted that Hispanic Americans can be of any race, and therefore it is possible to cross-classify Hispanic Americans as Hispanic whites, Hispanic blacks, Hispanic Asian Americans, or Hispanic American Indians. Race/ethnicity was cross-classified by nativity/immigrant status, yielding the following ethnic-nativity groups: US-born non-Hispanic whites, non-Hispanic white immigrants, US-born non-Hispanic blacks, non-Hispanic black immigrants, US-born APIs, API immigrants, US-born Hispanics, and Hispanic immigrants. American Indians were retained as a single group since they are considered native-born by definition. All the other covariates in the mortality analysis were measured as categorical variables as shown in Table 2.

The mortality effects of ethnic-nativity status and other sociodemographic covariates were estimated by Cox proportional hazards regression models (Cox 1972; Singh and Kposowa 1994). The parameters in the Cox model were estimated by the maximum likelihood method using the PHREG procedure of SAS (SAS Institute 1999). The results are presented in terms of estimated hazard ratios or relative risks and their 95% confidence intervals. Hazards proportionality assumption of the Cox model was tested and confirmed by inspecting the plots of log-log survivor functions against survival time for various covariate categories, including those for ethnic-nativity status, which were found to be approximately parallel. Interactions of ethnic-nativity status with age and SES factors were examined, which led to the estimation of age cohort- and SES-specific mortality models in Tables 3 and 4. Since family income was unknown for about 7% of the study population, education was used to stratify the population into three SES categories (see Table 4).

Logistic regression models were fitted to the weighted NHIS data to deter-

Table 1. Selected Socioeconomic, Demographic, and Behavioral Characteristics of the US Ethnic and Nativity/Immigrant Groups: National Longitudinal Mortality Study, 1979 through 1989

Characteristic	US-Born		Foreign-Born		US-Born		Foreign-Born		US-Born		Foreign-Born		US-Born		Foreign-Born	
	Non-Hispanic White	Hispanic	Non-Hispanic White	Hispanic	Non-Hispanic Black	Hispanic	Non-Hispanic Black	Hispanic	Non-Hispanic Pacific Islander	Hispanic	Non-Hispanic Asian and Pacific Islander	Hispanic	Non-Hispanic Asian and Pacific Islander	Hispanic	Non-Hispanic American Indian	
Total sample size (N)	240,738	13,073	13,073	25,655	777	2,189	3,520	6,686	6,177	2,095	2,189	3,520	6,686	6,177	2,095	
Male sample size (N)	114,508	5,653	5,653	10,880	369	1,093	1,569	3,182	2,912	985	1,093	1,569	3,182	2,912	985	
Percent of total population	80.00	4.34	4.34	8.53	0.26	0.73	1.17	2.22	2.05	0.70	0.73	1.17	2.22	2.05	0.70	
Percent of male population	81.12	4.00	4.00	7.71	0.26	0.77	1.11	2.25	2.06	0.70	0.77	1.11	2.25	2.06	0.70	
Total number of male deaths	14,666	1,148	1,148	1,761	21	76	105	237	192	109	76	105	237	192	109	
Total number of female deaths	12,389	1,200	1,200	1,557	19	48	68	156	134	92	48	68	156	134	92	
# Male deaths (25–64 age group)	6,116	192	192	946	11	47	35	136	93	68	47	35	136	93	68	
# Female deaths (25–64 age group)	3,750	150	150	701	4	29	30	83	43	49	29	30	83	43	49	
% Age 25–64 years	81.39	63.74	63.74	83.28	89.19	89.31	89.55	91.74	88.96	88.45	89.31	89.55	91.74	88.96	88.45	
% Age 65+ years	18.61	36.26	36.26	16.72	10.81	10.69	10.45	8.26	11.04	11.55	10.69	10.45	8.26	11.04	11.55	
% Living alone	12.49	16.94	16.94	15.21	15.06	8.18	5.91	7.42	6.91	8.54	8.18	5.91	7.42	6.91	8.54	
% Married	73.83	68.31	68.31	50.51	60.36	72.91	79.52	72.90	71.62	65.01	72.91	79.52	72.90	71.62	65.01	
% Single	8.21	7.01	7.01	15.35	17.89	15.26	9.91	9.99	10.68	11.98	15.26	9.91	9.99	10.68	11.98	

% Divorced/separated	8.36	6.32	20.62	14.67	6.85	3.81	11.83	11.62	14.13
% Widowed	8.75	17.53	12.65	6.05	4.93	6.62	5.16	5.97	8.88
% Urban	61.83	80.82	82.77	94.85	76.20	85.80	78.36	89.75	35.18
% <High school education	26.71	39.88	48.41	30.24	20.10	28.95	46.31	64.24	49.26
% 16+ Years of education	18.11	16.32	8.13	18.02	22.20	32.61	7.42	7.45	4.63
% Family income <\$10,000	22.11	28.73	45.78	35.91	12.33	23.18	32.07	40.44	45.82
% Family income >=\$50,000	4.34	4.74	0.92	1.42	5.39	5.82	1.72	1.30	2.00
% Current smokers ^a	29.16	27.91	29.32	10.43	23.82	14.91	23.98	18.54	45.14
% Overweight ^a	26.09	22.43	38.39	25.17	16.54	7.99	31.57	28.80	36.57
Mean BMI score	25.32	24.90	27.14	25.58	23.77	22.71	26.17	25.73	26.52
% Hypertensive/high blood pressure ^a	17.53	15.39	25.45	16.75	19.93	8.89	14.57	11.65	25.43
% With activity limitation ^a	14.66	13.01	17.78	6.74	8.59	7.46	13.03	11.03	21.56
% With chronic condition ^a	43.71	37.75	41.82	28.47	33.65	26.17	38.24	28.95	47.56
% Without health insurance ^a	22.93	25.87	34.53	40.15	20.67	35.71	35.77	53.86	27.23

a. Smoking, overweight, BMI, hypertension, activity limitation, chronic condition, and health insurance, weighted estimates for the population aged 18–64 years, are derived from the 1993–1994 National Health Interview Survey data files.

Table 2. Adjusted Mortality Differentials (Derived from Multivariate Hazards Regression Models) by Ethnic-Nativity/Immigrant Status and Sociodemographic Variables for US Men and Women Aged 25 Years or Older: National Longitudinal Mortality Study, 1979 through 1989

Covariate	Both Sexes (n = 300,910)		Men (n = 141,151)		Women (n = 159,759)	
	RR	95% CI	RR	95% CI	RR	95% CI
Age (years)	1.08***	1.08, 1.08	1.08***	1.08, 1.08	1.08***	1.08, 1.08
Ethnic-Nativity Group						
US-born non-Hispanic white	1.00	Reference	1.00	Reference	1.00	Reference
Foreign-born non-Hispanic white	0.84***	0.81, 0.88	0.80***	0.75, 0.85	0.89***	0.83, 0.94
US-born black	1.08***	1.04, 1.12	1.04	0.99, 1.10	1.13***	1.07, 1.19
Foreign-born black	0.52***	0.38, 0.71	0.47***	0.31, 0.72	0.58***	0.37, 0.92
US-born Asian & Pacific Islander	0.68***	0.57, 0.81	0.67***	0.54, 0.85	0.69***	0.52, 0.92
Foreign-born Asian/Pacific Islander	0.57***	0.49, 0.66	0.54***	0.44, 0.65	0.60***	0.47, 0.76
US-born Hispanic	0.74***	0.67, 0.82	0.71***	0.62, 0.80	0.79***	0.67, 0.92
Foreign-born Hispanic	0.55***	0.49, 0.61	0.54***	0.47, 0.63	0.55***	0.46, 0.65
American Indian	1.10	0.95, 1.26	1.02	0.85, 1.24	1.18	0.96, 1.45
Sex						
Men	1.88***	1.83, 1.92				
Women	1.00	Reference				
Marital status						
Married	1.00	Reference	1.00	Reference	1.00	Reference
Single	1.25***	1.19, 1.31	1.26***	1.18, 1.33	1.21***	1.13, 1.30
Divorced/separated	1.34***	1.28, 1.40	1.38***	1.30, 1.46	1.31***	1.22, 1.39
Widowed	1.11***	1.07, 1.14	1.03	0.98, 1.08	1.14***	1.09, 1.18
Place of residence						
Rural	1.00	Reference	1.00	Reference	1.00	Reference
Urban	1.12***	1.09, 1.14	1.15***	1.11, 1.18	1.09***	1.05, 1.13

Education, years						
0-8	1.38***	1.32, 1.44	1.39***	1.31, 1.47	1.31***	1.22, 1.40
9-11	1.38***	1.32, 1.45	1.43***	1.35, 1.52	1.28***	1.19, 1.38
12	1.24***	1.18, 1.29	1.28***	1.21, 1.36	1.14***	1.07, 1.22
13-15	1.16***	1.10, 1.22	1.23***	1.15, 1.31	1.05	0.97, 1.14
16+	1.00	Reference	1.00	Reference	1.00	Reference
Family income, \$						
<5000	1.51***	1.39, 1.64	1.81***	1.62, 2.01	1.21***	1.06, 1.37
5000-9999	1.46***	1.34, 1.58	1.67***	1.51, 1.86	1.20***	1.06, 1.36
10000-14999	1.35***	1.25, 1.46	1.50***	1.35, 1.67	1.14***	1.01, 1.30
15000-19999	1.22***	1.12, 1.33	1.29***	1.16, 1.44	1.10	0.96, 1.26
20000-24999	1.10**	1.01, 1.20	1.16***	1.04, 1.30	1.00	0.88, 1.15
25000-49999	1.06	0.97, 1.15	1.10*	0.99, 1.22	0.99	0.88, 1.13
50,000+	1.00	Reference	1.00	Reference	1.00	Reference
Unknown	1.23***	1.13, 1.34	1.33***	1.19, 1.49	1.07	0.93, 1.22
Model Chi-Square	60,946***		31,275***		29,003***	
df	25		24		24	

Notes: RR = estimated relative risk (hazard ratio); CI = confidence interval; * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Table 3. Adjusted^a Mortality Differentials (Derived from Multivariate Hazards Regression Models) among Ethnic-Immigrant Groups in Age Groups 25–64 and 65+ Years: National Longitudinal Mortality Study, 1979 through 1989

Covariate	Both Sexes		Men		Women	
	RR	95% CI	RR	95% CI	RR	95% CI
Age 25–64 Years						
Ethnic-Nativity Group		Reference	1.00	Reference	1.00	Reference
US-born non-Hispanic white	1.00		0.72***	0.63, 0.83	0.76***	0.65, 0.90
Foreign-born non-Hispanic white	0.74***	0.67, 0.83	1.25***	1.16, 1.34	1.26***	1.15, 1.37
US-born black	1.25***	1.18, 1.32	0.66	0.37, 1.20	0.32***	0.12, 0.86
Foreign-born black	0.52***	0.31, 0.86	0.75**	0.56, 0.99	0.81	0.56, 1.16
US-born Asian & Pacific Islander	0.77**	0.62, 0.97	0.51***	0.36, 0.71	0.61***	0.43, 0.88
Foreign-born Asian & Pacific Islander	0.55***	0.43, 0.71	0.75***	0.63, 0.89	0.71***	0.57, 0.89
US-born Hispanic	0.73***	0.64, 0.84	0.55***	0.45, 0.68	0.38***	0.28, 0.52
Foreign-born Hispanic	0.48***	0.41, 0.57	1.16	0.91, 1.48	1.48***	1.11, 1.96
American Indian	1.28***	1.07, 1.54				
Sample Size	244,925		117,796		127,129	
Age 65+ Years						
Ethnic-Nativity Group		Reference	1.00	Reference	1.00	Reference
US-born non-Hispanic white	1.00		0.84***	0.78, 0.90	0.91***	0.85, 0.97
Foreign-born non-Hispanic white	0.87***	0.83, 0.92	0.85***	0.79, 0.92	0.99	0.92, 1.07
US-born black	0.92***	0.88, 0.97	0.41***	0.22, 0.76	0.74	0.45, 1.23
Foreign-born black	0.55***	0.37, 0.82	0.55***	0.38, 0.79	0.55***	0.35, 0.87
US-born Asian & Pacific Islander	0.55***	0.41, 0.73	0.57***	0.45, 0.72	0.56***	0.41, 0.77
Foreign-born Asian & Pacific Islander	0.57***	0.47, 0.69	0.67***	0.55, 0.81	0.83	0.66, 1.04
US-born Hispanic	0.73***	0.63, 0.85	0.54***	0.44, 0.66	0.65***	0.53, 0.80
Foreign-born Hispanic	0.59***	0.51, 0.68	0.80	0.59, 1.09	0.91	0.68, 1.23
American Indian	0.87	0.70, 1.08				
Sample Size	55,985		23,355		32,630	

Notes: RR = estimated relative risk (hazard ratio); CI = confidence interval; ** $p < 0.05$; *** $p < 0.01$.
 a. Adjusted for age, sex, marital status, place of residence, education, and family income.

Table 4. Adjusted^a Mortality Differentials (Derived from Multivariate Hazards Regression Models) among US Ethnic-Immigrant Groups across Socioeconomic (Educational Attainment) Strata: National Longitudinal Mortality Study, 1979 through 1989

Covariate	Low Socioeconomic Status Less than High School Education		Middle Socioeconomic Status High School Education		High Socioeconomic Status College Education	
	RR	95% CI	RR	95% CI	RR	95% CI
Ethnic-Nativity Group						
US-born non-Hispanic white	1.00	Reference	1.00	Reference	1.00	Reference
Foreign-born non-Hispanic white	0.81***	0.77, 0.86	0.88***	0.81, 0.97	0.95	0.85, 1.06
US-born black	1.08***	1.03, 1.13	1.31***	1.20, 1.43	1.17**	1.03, 1.32
Foreign-born black	0.53***	0.36, 0.78	0.64	0.35, 1.15	0.48	0.18, 1.28
US-born Asian & Pacific Islander	0.55**	0.42, 0.72	0.81	0.61, 1.07	0.68*	0.44, 1.06
Foreign-born Asian & Pacific Islander	0.54***	0.44, 0.65	0.46***	0.31, 0.68	0.75*	0.55, 1.01
US-born Hispanic	0.73***	0.65, 0.82	0.82*	0.65, 1.04	0.75	0.51, 1.09
Foreign-born Hispanic	0.54***	0.48, 0.61	0.58***	0.42, 0.78	0.55***	0.36, 0.84
American Indian	1.03	0.87, 1.21	1.28	0.92, 1.76	1.67**	1.06, 2.62
Sample Size	91,730		110,871		96,466	

Notes: RR = estimated relative risk (hazard ratio); CI = confidence interval; * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.
 a. Adjusted for age, sex, marital status, and place of residence.

mine the extent to which risks of cigarette smoking, obesity, hypertension, or chronic medical condition vary among major ethnic-nativity groups and by length of residence among the first-generation immigrants to the United States, after controlling for age, sex, detailed race and ethnicity, marital status, family size, place and region of residence, education, employment status, and family income. Cigarette smoking and obesity were the two health behavior measures, while the prevalence of self-reported hypertension and chronic conditions were considered as two health status or morbidity measures. The obesity rate was derived on the basis of Body Mass Index (BMI), which is defined as weight in kilograms divided by height in meters squared (kg/m^2). A BMI of ≥ 27.8 for men and ≥ 27.3 for women is considered overweight (Powell-Griner et al. 1997).

Results

Descriptive Socioeconomic, Behavioral, and Health Characteristics. Table 1 presents selected sociodemographic, behavioral, and health status characteristics of the various ethnic-immigrant groups. Except for foreign-born whites, immigrants generally tend to be younger than the US-born. White immigrants have the highest proportion of elderly population, while US-born Hispanics and foreign-born Asians have the lowest proportions of those aged ≥ 65 years. As for living arrangements, the percentage living alone is lowest among API and Hispanic immigrants and highest among whites and blacks regardless of nativity. Marital disruption is generally much lower among immigrants, with API and white immigrants having the lowest rates (4% and 6%, respectively) and US-born blacks having the highest rate (21%). Immigrants are much more likely than their US-born counterparts to reside in urban areas. More than 80% of immigrants are urban residents, whereas only 35% of the American Indians reside in urban areas.

Except for white and Hispanic Americans, immigrants tend to be more educated than their US-born counterparts. About one-third of API immigrants, who have the highest level of educational attainment of any group, have at least a college degree, compared with 22% of the US-born APIs. Black immigrants are more than twice as likely to be college educated as their US-born counterparts. American Indians and Hispanics have the lowest levels of educational attainment. A higher proportion of immigrants than US-born live in poverty, as measured by the percentage of families with incomes less than \$10,000. US-born APIs have the lowest level of poverty, whereas American Indians and Hispanics have the highest poverty levels. US- and foreign-born APIs and whites are more likely than the other groups to have high family incomes ($> \$50,000$).

Immigrants tend to have more favorable health-enhancing behavioral profiles than their US-born counterparts. US-born blacks aged 18–64 years are almost three times more likely than their immigrant counterparts to report smoking cigarettes (29% vs. 10%). API and Hispanic immigrants have the lowest smoking rates and American Indians have the highest rate (45%). US-born APIs aged 18–64 are

twice as likely to be overweight as their immigrant counterparts, who have the lowest obesity rate (8%) of any group. Black immigrants are 34% less likely to be overweight than US-born blacks, who, along with American Indians, have the highest obesity rates (38% and 37% respectively). Similar ethnic-nativity patterns in the mean BMI score can be noted, with immigrants in each racial/ethnic group reporting significantly lower mean BMI score than their US-born counterparts.

Rates of hypertension (high blood pressure) among immigrants are substantially lower than those among the US-born. About 9% and 12%, respectively, of API and Hispanic immigrants aged 18–64 are hypertensive, whereas over one-fourth of all American Indians and US-born blacks aged 18–64 report having high blood pressure. Rates of activity limitation due to chronic disease or health impairment vary widely between the ethnic-immigrant groups, with immigrants reporting significantly lower rates than the US-born. Approximately 7% of black and API immigrants aged 18–64 report being unable to carry on, or being limited in, their usual daily activities, whereas 22% of American Indians and 18% of US-born blacks aged 18–64 report being limited in activity. Immigrants also report a lower prevalence of chronic medical conditions compared with their US-born counterparts. More than 41% of American Indians and US-born whites and blacks aged 18–64 years report having at least one chronic condition, compared with 26% of API immigrants, 28% of black immigrants, and 29% of Hispanic immigrants. Immigrants are, however, substantially more likely to be without health care coverage than their US-born counterparts. About 54% of Hispanic immigrants, 40% of black immigrants, and 36% of API immigrants aged 18–64 years do not have any health insurance, compared with 21% of US-born APIs and 23% of US-born whites.

Ethnic-Nativity Differentials in All-Cause Mortality. Since ethnic-nativity groups differ significantly with respect to age composition, marital status, urban residence, educational attainment, and family income, we begin by interpreting mortality differentials that control for these characteristics, as shown in the multivariate models of Table 2. US-born non-Hispanic whites were selected as the reference group because of their relatively large population size and their dominant majority status in American society. Ethnic-nativity differentials in mortality differed slightly for men and women. After controlling for socioeconomic and demographic characteristics, black immigrants aged ≥ 25 years had the lowest overall male mortality, followed by API and Hispanic immigrants, US-born APIs and Hispanics, white immigrants, and US-born whites. More specifically, compared with US-born white men of equivalent socioeconomic and demographic background, foreign-born black men, foreign-born API men, foreign-born Hispanic men, US-born API men, US-born Hispanic men, and foreign-born white men had, respectively, 53%, 46%, 46%, 33%, 29%, and 20% lower mortality risks. Although American Indian men and US-born black men had significantly higher observed (age-adjusted) mortality risks than US-born white men, controlling for the socioeconomic factors accounted for their excess mortality risk.

Among women, Hispanic and black immigrants had the lowest overall mortality risks, followed by API immigrants, US-born APIs, US-born Hispanics, white immigrants, and US-born blacks. More specifically, compared with US-born white women of equivalent socioeconomic and demographic background, foreign-born Hispanic women, foreign-born black women, foreign-born API women, US-born API women, US-born Hispanic women, and foreign-born white women had, respectively, 45%, 42%, 40%, 31%, 21%, and 11% lower mortality risks. Compared to US-born white women, American Indian women, net of socioeconomic factors, did not differ significantly, but US-born black women had a 13% higher mortality risk.

While immigrants had significantly lower mortality than the US-born, the US- and foreign-born differential was greatest for blacks. US-born blacks had twice the mortality risk of their immigrant counterparts. US-born Hispanics had 35% higher mortality, and US-born whites and US-born APIs 19% higher mortality than their immigrant counterparts.

As expected, age was strongly related to mortality. Each additional year of increase in age beyond 25 years was associated with an 8% increase in mortality risk for both men and women. Even after adjusting for socioeconomic and marital status differences, men had almost twice the mortality risk of women. Compared with their rural counterparts, men and women residing in urban areas had 15% and 9% higher mortality risks, respectively. Marital status was significantly associated with mortality. Compared to the currently married, men and women experiencing marital disruption (divorce or separation) had, respectively, 38% and 31% higher mortality risks. Men and women who never married also had, respectively, 26% and 21% higher mortality risks than their married counterparts. While widowed men did not differ significantly from married men in their mortality risk, widowed women had a 14% higher mortality risk than married women.

Educational attainment and family income were both inversely and independently related to all-cause mortality. Moreover, there was a fairly consistent gradient in mortality for both education and family income. Men with ≤ 8 years of education had a 39% higher mortality risk and women a 31% higher risk than their counterparts with a college degree. Men and women with a high school diploma had, respectively, 28% and 14% higher mortality risks than their counterparts with a college degree. Men with annual family incomes $< \$5,000$ had 81% higher mortality and women 21% higher mortality than their respective counterparts with family incomes $\geq \$50,000$. Men and women with family incomes in the range of $\$10,000$ – $14,999$ had, respectively, 50% and 14% higher mortality risks than their respective counterparts with family incomes $\geq \$50,000$. The education and income gradients in mortality were somewhat steeper for men than for women.

Ethnic-Nativity Differentials in All-Cause Mortality Across Age Cohorts and Socioeconomic Strata. The ethnic-immigrant differentials in overall mortality were somewhat larger for the age cohort 25–64 years than for those aged ≥ 65 years, after adjusting for the effects of the other sociodemographic covariates (see

Table 3). Compared to their US-born white counterparts, Hispanic and white immigrants aged 25–64 years had, respectively, 52% and 26% lower mortality, whereas Hispanic and white immigrants aged ≥ 65 years had, respectively, 41% and 13% lower mortality. Compared to their US-born white counterparts, US-born blacks and American Indians aged 25–64 years had, respectively, 25% and 28% higher risks of death, while US-born blacks aged ≥ 65 years had 8% lower risk of death. American Indians aged ≥ 65 did not differ significantly from their US-born white counterparts.

Table 4 shows ethnic-nativity differentials in mortality stratified by three education categories: less than high school (low SES), high school (middle SES), and college education (high SES). The ethnic-nativity differentials differed across the three SES categories; the differential for whites, for example, was larger in the low than in the high SES category. White immigrants in the low SES stratum had 19% lower mortality than their US-born counterparts, whereas white immigrants in the middle SES stratum had 12% lower mortality; those in the high SES stratum did not differ significantly in their mortality risk. However, the differentials for American Indians and US-born blacks were larger for the higher SES categories. Compared to US-born whites, US-born blacks had 8% higher mortality in the low SES stratum but 31% and 17% higher mortality in the higher SES categories. American Indians did not differ from US-born whites in the low and middle SES categories, but had 67% higher mortality in the high SES category.

Ethnic-Nativity Differentials in Cause-Specific Mortality. Table 5 presents cause-specific mortality differentials among various ethnic-immigrant groups after adjusting for socioeconomic and demographic characteristics. Compared to their US-born counterparts, non-Hispanic white immigrants had 36%, 17%, and 16% lower mortality from, respectively, respiratory disease, cancer, and CVD. While black immigrants had 86%, 44%, and 55% lower mortality from, respectively, respiratory disease, cancer, and CVD than US-born whites; US-born blacks had 16% higher cancer mortality and 43% higher “other chronic disease” mortality, but 27% lower respiratory disease mortality than US-born whites. US- and foreign-born APIs showed, respectively, 29% and 58% lower CVD mortality and 57% and 48% lower “other chronic disease” mortality than US-born whites. Also, API immigrants showed 31% lower cancer mortality and US-born APIs 55% lower respiratory disease mortality than US-born whites. Of all ethnic-nativity groups, API, black, and Hispanic immigrants had the lowest CVD mortality; Hispanic and black immigrants and US-born Hispanics had the lowest cancer mortality; and black immigrants, US-born APIs, and Hispanic immigrants had the lowest respiratory disease mortality.

The ethnic-nativity patterns in infectious disease and injury mortality were different from those in chronic and respiratory disease mortality. Compared to US-born whites, US-born blacks experienced 84% and 18% higher infectious disease and injury mortality, Hispanic immigrants experienced 63% lower infectious disease mortality, and American Indians experienced 69% higher injury mortality.

Table 5. Adjusted^a Cause-Specific Mortality Differentials (Derived from Multivariate Hazards Regression Models) among US Ethnic-Immigrant Groups: National Longitudinal Mortality Study, 1979 through 1989 (*n* = 300,910)

<i>Ethnic-Nativity Group</i>	<i>RR</i>	<i>95% CI</i>	<i>RR</i>	<i>95% CI</i>	<i>RR</i>	<i>95% CI</i>
	Cardiovascular Disease (CVD) (ICD-9 Codes 390–448)			Respiratory Diseases^b (ICD-9 Codes 460–519)		
US-born non-Hispanic white	1.00	Reference	1.00	Reference	1.00	Reference
Foreign-born Non-Hispanic white	0.84***	0.79, 0.89	0.83***	0.75, 0.91	0.64***	0.55, 0.76
US-born black	0.97	0.92, 1.03	1.16***	1.08, 1.25	0.73**	0.62, 0.85
Foreign-born black	0.45***	0.28, 0.72	0.56*	0.30, 1.04	0.14*	0.02, 1.02
US-born Asian & Pacific Islander	0.71***	0.55, 0.91	0.82	0.61, 1.12	0.45**	0.20, 0.99
Foreign-born Asian & Pacific Islander	0.42***	0.33, 0.54	0.69***	0.52, 0.91	0.69	0.43, 1.11
US-born Hispanic	0.62***	0.53, 0.73	0.63***	0.51, 0.78	0.67***	0.47, 0.97
Foreign-born Hispanic	0.48***	0.41, 0.57	0.44***	0.35, 0.57	0.58***	0.40, 0.84
American Indian	0.95	0.76, 1.18	0.98	0.73, 1.32	0.61	0.32, 1.18
Number of deaths	16,583		8,602		2,605	
	All Other Chronic Diseases^c (Residual)			Infectious Diseases (ICD-9 Codes 001–139)		
US-born non-Hispanic white	1.00	Reference	1.00	Reference	1.00	Reference
Foreign-born non-Hispanic white	0.81***	0.71, 0.92	1.28	0.91, 1.81	0.92	0.72, 1.18
US-born black	1.43***	1.30, 1.58	1.84***	1.41, 2.41	1.18*	1.00, 1.39
Foreign-born black	1.05	0.56, 1.95	---	---	0.24	0.03, 1.71
US-born Asian & Pacific Islander	0.43**	0.22, 0.82	---	---	0.78	0.39, 1.57
Foreign-born Asian & Pacific Islander	0.52***	0.33, 0.81	1.82	0.85, 3.89	0.72	0.40, 1.31
US-born Hispanic	1.30**	1.05, 1.62	1.27	0.65, 2.48	0.81	0.56, 1.19
Foreign-born Hispanic	0.78*	0.60, 1.01	0.37*	0.12, 1.17	0.92	0.64, 1.33
American Indian	1.82***	1.33, 2.48	0.91	0.22, 3.66	1.69**	1.09, 2.61
Number of deaths	4,187		453		1,548	

Notes: RR = estimated relative risk (hazard ratio); CI = confidence interval; **p* < 0.10, ***p* < 0.05; ****p* < 0.01.

a. Adjusted for age, sex, marital status, place of residence, education, and family income.

b. This category includes pneumonia and influenza and chronic obstructive pulmonary diseases (COPD).

c. This category includes diabetes, chronic liver disease and cirrhosis, kidney diseases, and other chronic diseases.

ty. The other ethnic-nativity groups did not differ significantly from US-born whites in infectious disease and injury mortality.

Differentials in Smoking, Obesity, Hypertension, and Chronic Condition by Race/Ethnicity and Length of Residence in the United States. Table 6 presents ethnic-nativity differentials in cigarette smoking, obesity, hypertension, and chronic medical condition after adjusting for differences in age, sex, marital status, family size, place and region of residence, education, income, and employment status. When adjusted for age and sex only, US-born blacks were not significantly different in smoking risks from their white counterparts, but after additional adjustment for the other socioeconomic and demographic characteristics, US-born blacks were 22% less likely to smoke than US-born whites. *Ceteris paribus*, compared to US-born whites, black immigrants were least likely to smoke, followed by Hispanic immigrants, API immigrants, US-born Hispanics, and US-born blacks. US-born APIs and white immigrants did not significantly differ from US-born whites, while American Indians had a 40% higher risk of smoking.

US-born blacks, American Indians, and US-born Hispanics had the highest risks of obesity—87%, 66%, and 44% higher risks than US-born whites of similar socioeconomic and demographic background. While black immigrants did not differ from US-born whites, US-born APIs, foreign-born APIs, and white immigrants were, respectively, 34%, 72%, and 15% less likely to be overweight than US-born whites. American Indians, US- and foreign-born blacks, and US-born APIs had, respectively, 86%, 82%, 38%, and 53% higher risks of hypertension than US-born whites, whereas API, Hispanic, and white immigrants had 38%, 22%, and 16% lower risks of hypertension than US-born whites.

American Indians did not differ from US-born whites in the prevalence of chronic medical conditions after controlling for socioeconomic and demographic characteristics. However, all other ethnic-nativity groups reported substantially lower risks. Compared to their US-born white counterparts, API immigrants, Hispanic immigrants, black immigrants, white immigrants, US-born APIs, US-born Hispanics, and US-born blacks were, respectively, 56%, 53%, 48%, 27%, 27%, 20%, and 16% less likely to report a chronic condition.

Table 6 also shows the extent to which health behaviors and health status of first-generation immigrants tend to converge toward those of the US-born as their length of residence in the United States increases. After adjusting for the effects of a number of socioeconomic and demographic factors, immigrants who arrived in the United States within the past year were 52% less likely to smoke cigarettes than the US-born. Those who immigrated to the United States 10–15 years ago and those who had been in the country longer than 15 years were, respectively, 32% and 18% less likely to smoke than their US-born counterparts. The risk of obesity and hypertension increased consistently with increasing duration of residence in the United States. Compared to the US-born, those immigrating in the past year, 1–5 years ago, 5–10 years ago, 10–15 years ago, and more than 15

Table 6. Multivariate Logistic Regressions Showing Adjusted Relative Risks^a of Cigarette Smoking, Obesity, Hypertension, and Chronic Condition among Those Aged 18 Years or Older, by Ethnicity-Nativity and Length of Immigration: United States, 1993–1994

Covariate	Cigarette Smoking		Obesity		Hypertension		Chronic Condition	
	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI
Ethnic-Nativity Group								
US-born non-Hispanic white	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference
Foreign-born non-Hispanic white	0.96	0.84, 1.10	0.85***	0.79, 0.91	0.84**	0.73, 0.97	0.73***	0.69, 0.77
US-born black	0.78***	0.72, 0.84	1.87***	1.80, 1.94	1.82***	1.67, 1.98	0.84***	0.81, 0.87
Foreign-born black	0.25***	0.17, 0.36	1.07	0.93, 1.22	1.38**	1.02, 1.85	0.52***	0.45, 0.59
US-born Asian & Pacific Islander	0.89	0.65, 1.21	0.66***	0.56, 0.78	1.53***	1.12, 2.10	0.73***	0.64, 0.83
Foreign-born Asian & Pacific Islander	0.54***	0.45, 0.65	0.28***	0.25, 0.32	0.62***	0.50, 0.77	0.44***	0.41, 0.48
US-born Hispanic	0.59***	0.52, 0.67	1.44***	1.36, 1.53	1.10	0.95, 1.28	0.80***	0.76, 0.85
Foreign-born Hispanic	0.37***	0.32, 0.43	1.11***	1.05, 1.18	0.78***	0.67, 0.91	0.47***	0.45, 0.50
American Indian	1.40***	1.10, 1.77	1.66***	1.47, 1.87	1.86***	1.43, 2.43	1.04	0.92, 1.17
Duration of Residence since the Time of Immigration to the US								
< 1 year	0.48***	0.30, 0.79	0.39***	0.29, 0.52	0.34***	0.15, 0.75	0.44***	0.36, 0.55
1–5 years	0.67***	0.53, 0.84	0.62***	0.55, 0.69	0.67***	0.50, 0.91	0.48***	0.44, 0.53
5–10 years	0.68***	0.55, 0.83	0.65***	0.59, 0.72	0.65***	0.50, 0.85	0.52***	0.47, 0.57
10–15 years	0.64***	0.52, 0.80	0.72***	0.65, 0.79	0.75**	0.59, 0.97	0.61***	0.56, 0.67
15+ years	0.82***	0.72, 0.92	0.87***	0.83, 0.92	0.81***	0.71, 0.91	0.76***	0.72, 0.79
US-born	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference
Sample Size	40,373		161,134		40,279		162,516	

Source: Derived from the National Health Interview Survey, 1993–1994.

Notes: CI = confidence interval; ** $p < 0.05$; *** $p < 0.01$.

a. Adjusted for age, sex, race/ethnicity, nativity, marital status, family size, place and region of residence, education, employment status, and family income.

years ago were, respectively, 61%, 38%, 35%, 28%, and 13% less likely to be overweight. Those immigrating in the past year, 1–5 years ago, 5–10 years ago, 10–15 years ago, and more than 15 years ago were, respectively, 66%, 33%, 35%, 25%, and 19% less likely to report having high blood pressure than their US-born counterparts. The longer the US residence, the greater the prevalence of chronic medical conditions. While the most recent immigrants (i.e., those immigrating in the past 5 years) were at least 52% less likely to report a chronic condition than the US-born, immigrants who arrived more than 15 years ago reported only a 24% lower risk of chronic condition than the US-born.

Discussion

Using two large nationally representative health and mortality data bases, we have analyzed how nativity differentials in health behaviors, morbidity, and especially mortality vary for four major broad racial/ethnic groups in the United States: non-Hispanic whites, blacks, Asians/Pacific Islanders, and Hispanics. Although substantial racial and ethnic differentials in US health and mortality have been well documented (Singh et al. 1996; Murphy 2000; NCHS 2000), nativity/immigrant status as a source of ethnic variations in health has received relatively less attention. No previous study, to our knowledge, has looked at ethnic-nativity differentials in health behaviors, morbidity, and cause-specific mortality in the same context. Furthermore, ethnic-nativity differentials in US mortality by major causes of death have not been previously analyzed. Although the primary focus of our study has been the analysis of all-cause and cause-specific mortality data from the NLMS, we have supplemented the mortality analysis by providing additional analyses of the NHIS data on health behaviors and morbidity.

This study shows considerable variations in mortality patterns for immigrants and those born in the United States, with immigrants in each major racial/ethnic group showing a significantly lower risk of mortality than their native-born counterparts, even after controlling for a number of socioeconomic and demographic factors. Mortality differentials between immigrants and the US-born are largest for blacks and Hispanics. Although blacks have been shown to have twice the mortality level (before adjusting for socioeconomic differences) of whites (Singh et al. 1996; Murphy 2000; NCHS 2000), when blacks are stratified by nativity status, a very different pattern emerges. Indeed, black immigrants have the lowest mortality of all ethnic-nativity groups—a mortality risk half of that for US-born whites. US-born black women but not men retain a significantly higher mortality risk than their comparable US-born white counterparts. Both APIs and Hispanics have previously been shown to have lower mortality rates than whites (Murphy 2000; NCHS 2000). This study further confirms their substantially lower mortality risks even when APIs and Hispanics are stratified into immigrant and US-born groups. The mortality advantage of ethnic immigrant groups appears to be even greater among those of working age.

Ethnic-nativity differentials in overall mortality tended to be somewhat larger for men than for women, especially among the elderly. For example, while US- and foreign-born black men aged ≥ 65 years had substantially lower mortality risks than US-born elderly white men, US- and foreign-born black women aged ≥ 65 did not differ significantly from their US-born white counterparts. The lower mortality risk of US-born black men compared to that of US-born white men is consistent with the mortality-crossover hypothesis, according to which healthiest blacks who survive discrimination and other life hazards into old age are more resistant to disease and mortality (Corti et al. 1999; Nam 1995). For the working age population, the ethnic-nativity patterns also vary by sex; most notably, foreign-born black women but not men had significantly lower mortality risks than their US-born counterparts.

Ethnic-nativity differentials in mortality varied by cause of death, with the patterns in CVD, cancer, and respiratory disease mortality generally similar to those for the overall mortality. Cardiovascular diseases and cancers account, respectively, for 40% and 23% of all deaths in the United States, and the ethnic-nativity patterns in these chronic diseases, not surprisingly, approximate those in total mortality (Murphy 2000). Hispanic, API, and black immigrants exhibited the lowest CVD and cancer mortality risks. Diabetes and liver cirrhosis account for most of the deaths in the residual "other chronic disease" mortality category, and US-born Hispanics and American Indians, who have substantially higher rates of obesity and heavy alcohol consumption than many other groups, showed excess mortality from this class of diseases (Singh and Hoyert 2000; Hummer et al. 1999). The ethnic-nativity patterns differed substantially for infectious disease and injury mortality, with US-born blacks experiencing higher infectious disease and injury mortality, Hispanic immigrants lower infectious disease mortality, and American Indians substantially higher injury mortality than US-born whites. Injuries consist of both unintentional (including motor vehicle crashes) and intentional (suicide and homicide) deaths. Racial/ethnic patterns differ widely in suicide, homicide, and motor vehicle injury mortality; if mortality differentials were analyzed separately for these injury groups, important ethnic-nativity patterns may also have emerged (Murphy 2000; NCHS 2000; Singh and Siahpush 2001).

Ethnic-nativity patterns in smoking, perhaps the most damaging health-risk behavior, were quite consistent with those observed for chronic medical condition and overall mortality. However, the patterns in obesity and hypertension were somewhat different, although immigrants in each racial/ethnic group had lower risks than their US-born counterparts. Among the most intriguing patterns were the significantly increased risks of obesity for US- and foreign-born Hispanics and a substantially higher risk of hypertension for US-born APIs compared to US-born whites. Another interesting pattern related to the significantly lower risks of cigarette smoking among US-born blacks compared to their white counterparts of similar socioeconomic characteristics. Our study showed a threefold greater risk of cigarette smoking among US-born blacks than among black immigrants, which is consistent with the finding of King et al. (1999).

Our study findings on all-cause mortality are remarkably consistent with the 1999 Hummer et al. study that was based on the NHIS-NDI national data base, which showed similar ethnic-nativity patterns in all-cause mortality, especially for non-Hispanic whites and blacks. However, there are some important differences in the results for the other ethnic groups. For example, in our study, US-born Hispanics had 26% lower mortality than their non-Hispanic white counterparts, whereas in the Hummer et al. study, US-born Mexicans and other Hispanics did not have significantly different mortality risks. In our study, Asian immigrants had 43% lower mortality than US-born whites and 16% lower mortality than US-born APIs. In the Hummer et al. study, US- and foreign-born Asians had similar mortality risks. Unlike the Hummer et al. study, our study also presents ethnic-nativity analyses for the overall population and for men and women separately. Additionally, our study analyzes ethnic-nativity patterns in mortality from major causes of death, which the Hummer et al. study does not.

The results of our national study are also consistent with those of the 1986 Kestenbaum study, which was based on vital statistics data (with no statistical adjustment for socioeconomic factors) and which showed 18% lower mortality among immigrants than the US-born (Kestenbaum 1986). According to the 1960 Matched Records Study, white immigrant men and women aged 35–64 years experienced 13% and 2% lower mortality than their respective US-born counterparts, as opposed to 28% and 24% lower mortality risks among white immigrant men and women aged 25–64 years in our study. Nativity differentials for white women aged ≥ 65 years were similar in the two studies, but those for elderly white men were greater in our study (Kitagawa and Hauser 1973). In a recent study, Caribbean-born blacks in New York City had substantially lower mortality rates during 1988–1992 than blacks born in the southern and northeastern United States (Fang et al. 1996). A similar vital statistics–based study that did not adjust for group differences in socioeconomic characteristics found 20%–23% lower mortality among white immigrants than among US-born whites and 46%–51% lower mortality among black immigrants compared to US-born blacks in New York City—a finding also consistent with the results of our national study (Fang et al. 1997).

The results of this study suggest that such socioeconomic and demographic variables as education, income, employment status, marital status, and place of residence do not contribute greatly to the observed ethnic-nativity differentials in all-cause and cause-specific mortality and morbidity. The lower mortality and morbidity risks for immigrants may partly reflect positive immigrant selectivity. Those migrating to the United States are a much healthier, more driven, physically fitter group than those who remain in their countries of origin. Given the US immigration laws of the past four decades, most immigrants are chosen (rather than randomly self-selected) based primarily on their skill criteria. Immigrants, particularly those from Asia, are a highly selective, highly educated, professional group (Jasso and Roenzweig 1990; Singh and Kposowa 1996).

Better health of immigrants may also reflect nativity differences in a host of

behavioral, life style, cultural, psychosocial, and environmental characteristics (e.g., smoking, alcohol and drug use, physical activity, dietary habits, nutrition, social and familial support, and social integration) known to influence health status, morbidity, and mortality (King et al. 1999; Singh and Yu 1996; Fang et al. 1996, 1997; Kliewer and Smith 1995a, 1995b; Bennett 1993; Ortho-Gomer and Johnson 1987; Rael et al. 1995; Blane 1995; Hummer et al. 1999; Singh 2000). Several studies, including our analysis of the NHIS data in Tables 1 and 6, report substantial nativity differences in smoking, alcohol use, obesity, dietary patterns, social and familial support (King et al. 1999; Singh and Yu 1996; Guendelman et al. 1990; Kliewer and Smith 1995a, 1995b; Bennett 1993; Hummer et al. 1999). Compared to those born in the US, immigrants, despite having higher poverty rates and lower rates of health insurance coverage, tend to have more favorable behavioral and social support characteristics—which may partly explain their better health and mortality outcomes.

In addition to social, behavioral, cultural, and psychosocial characteristics, macrolevel factors, such as racial/ethnic discrimination, may also play a part, especially in terms of explaining the relatively higher mortality, poorer health status, and socially disadvantaged position of US-born blacks vis-à-vis other groups. Very few groups, if any, have experienced the kind and degree of racial discrimination, social segregation, and labor market discrimination that US-born blacks have faced historically (Singh and Yu 1996; Singh and Kposowa 1996; James 1993). Foreign-born blacks in the US have not had similar long-term exposure to socioeconomic and structural discrimination, but as they stay in the United States for a longer period of time, such discrimination is likely to have a greater effect on their health and mortality.

It is important to mention the major limitations of our study. As shown in this and several other studies, the magnitude of US- and foreign-born health and mortality differentials varies greatly for the members of different racial/ethnic groups (Hendershot 1988; Hummer et al. 1999; Singh and Siahpush 2001; Singh and Yu 1996; Fang et al. 1996, 1997). In the present study, US- and foreign-born differences were especially pronounced for blacks, APIs, and Hispanics. As mentioned earlier, Hispanics and APIs are extremely heterogeneous groups, but because of the small number of deaths and unavailability of mortality data we were not able to look at specific Hispanic and API subgroups in the NLMS. Although in the NHIS it is possible to disaggregate APIs and Hispanics into specific subgroups (e.g., Chinese, Filipino, Asian Indian, Japanese, Korean, Vietnamese, Hawaiian, Samoan, Mexican, Cuban, Puerto Rican), we used the broad API and Hispanic categories to make the health behavior, morbidity, and mortality analyses consistent. The NLMS expansion, which consists of extending the mortality follow-up from 1979 through 1998 and detailed information on specific API and Hispanic subgroups, is currently under way. This will enable us to examine nativity differentials among a number of specific API and Hispanic subgroups.

Ethnic-nativity differentials in mortality are likely to vary for specific underlying causes of death, but the small numbers of deaths in the NLMS did not

permit more detailed cause-specific analyses (e.g., heart disease, stroke, atherosclerosis, diabetes, nephritis, liver cirrhosis, HIV/AIDS, Alzheimer's disease; cancers of the lung, prostate, breast, colon/rectum, cervix; motor vehicle accidents, suicide, and homicide) than are presented here. Mortality is often considered a biological process, and specific causes of death represent biological variables "through which all social and environmental influences must necessarily operate. These causes manifest among themselves important differences in etiology and in implications for population structure, so that a recognition of the role of the causes moves us one step closer to a thorough understanding of determinants and consequences of mortality structure in human population" (Preston 1973, 2). Future studies may benefit from a more detailed examination of ethnic-immigrant differentials in cause-specific mortality and the biological pathways through which ethnicity, nativity, sociocultural, and behavioral factors influence mortality. Just as in the case of all-cause mortality, ethnic-nativity patterns in cause-specific mortality are also likely to vary for men and women and by age cohorts. It would be useful to examine ethnic-nativity patterns in specific causes of death separately for men and women and for different age segments of the population in future research.

The other limitations of the study include the time-fixed nature of the covariates over the nine-year mortality follow-up, the exclusion of the institutionalized population in both the NLMS and NHIS (which perhaps underestimates the reported nativity differentials), and the lack of behavioral, psychosocial, health status, and health care factors known to influence mortality. Nativity/immigrant status was derived from the birthplace data as collected in three different CPS cohorts and in the NHIS. However, the percentage of the immigrant population in the NLMS based on the three CPS cohorts was 6.3, similar to the 1980 census figure of 6.2 (Jasso and Rosenzweig 1990; Schmidley and Gibson 1999; Singh and Kposowa 1996). Excluding the two CPS cohorts may not have produced any systematic bias, since the three CPS cohorts that provided the data for our mortality analysis were nationally representative samples. However, if there was a tendency on the part of some immigrants to randomly report themselves as US-born in the CPS and NHIS, the mortality and health differentials presented here may be understated.

Although the terms "immigrant" and "foreign-born" are used interchangeably in this study, data on the immigrant population, as recorded in the CPS, NHIS, census, and vital statistics, do not distinguish between naturalized immigrants, permanent residents, nonimmigrants (e.g., temporary workers, students, and visitors), and illegal immigrants (Jasso and Rosenzweig 1990; Singh and Siahpush 2001). Since socioeconomic attainment patterns and health care access and utilization can vary greatly by naturalization and/or legal status, health status and mortality are also expected to differ significantly within the immigrant population by these characteristics (Thamer et al. 1997; Singh and Kposowa 1996; Singh and Siahpush 2001). Furthermore, due to lack of data, length of residence in the host country (i.e., duration of US residence since the time of immigration),

an important variable in migrant health studies, was not considered in the mortality analysis. Health, morbidity, and mortality patterns vary substantially not only with respect to generational status (first versus second generation), but also by length of residence among the first-generation immigrants in the destination country. Several studies, including the data in Table 6, show that, as the length of residence in the destination country increases, health status, mortality patterns, and health behaviors of immigrants tend to converge toward those of the native-born (Thamer et al. 1997; Kliewer and Smith 1995a, 1995b; Guendelman and English 1995). This occurs largely as a result of the acculturation and social assimilation process by which immigrants adopt the values, attitudes, beliefs, practices, and life style characteristics of the native-born or the dominant majority group in the host society, although the degree of assimilation could vary according to country of birth or ethnic origin (Guendelman et al. 1990; Guendelman and English 1995; Kliewer and Smith 1995a, 1995b; Singh and Kposowa 1996). Acculturation into the United States may have undesirable effects on the health of many immigrant groups, because life style factors such as smoking, drinking, drug use, unhealthy diet, and obesity may account for a greater burden of disease than they would in their respective countries of origin (Murray and Lopez 1996; World Health Organization 1999). Depending upon the degree of such acculturation, the health and mortality advantages for some of the ethnic-immigrant groups may diminish over time.

It is important to mention that duration of US residence was used only as an indirect or proxy measure of acculturation. To test the acculturation hypothesis directly, we need more direct and proximate measures of acculturation, such as the extent to which one identifies with one's own culture, uses one's own language, celebrates one's own holidays or cultural events, eats one's own ethnic foods, participates in one's own ethnic-cultural networks, and is accepted by members (friends, relatives, or coworkers) of one's own ethnic group or the majority group (Arcia et al. 2001).

In conclusion, this study emphasizes the need for considering a variety of factors, such as smoking, diet, social support, health care access, acculturation, naturalization and legal status, ethnic discrimination, length of residence, detailed ethnic origin, country of birth, and immigrant selectivity, in order to explain more fully the mortality and health differentials between ethnic-immigrant and US-born populations. Immigration has been a major component of population growth in the United States, and, given the current rates of natural increase (birth rate–death rate), there is every indication that much of any future US population increase will occur due to immigration unless, of course, there is a radical change in US immigration policy restricting immigration levels. Recent welfare reforms (including the 1996 Temporary Assistance for Needy Families [TANF] program) that exclude even legal immigrants' access to public services and benefits could have a substantial adverse effect on the health and well-being of immigrants who, on the whole, tend to have higher poverty and welfare use rates than the native-born (O'Campo and Rojas-Smith 1998; Ladenheim 1997; Thamer and Rinehart

1998; Camarota 1999). A better understanding of the health of the immigrant population is important because to the extent that immigrants have and maintain differential (more favorable) health and mortality patterns compared to those of the US-born population, as shown in this study, future waves of immigrants of diverse ethnic and cultural backgrounds will likely have a sizable impact on the overall health, disease, and mortality patterns in the United States.

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