Mortality in First Generation White Immigrants in California, 1989–1999

Kiumarss Nasseri
Public Health Institute, California Cancer Registry, 3944 State Street, Suite 330, Santa Barbara, CA 93105, USA

Abstract

Objective—To identify mortality differentials in the first generation non-Hispanic White (NHW) immigrants in California for 1989 through 1999.

Methods—First generation NHW immigrants (107,432) were identified in California Death Certificate files by place of birth outside the US and were grouped into Anglo-Saxon dominant, Northern, Western, Eastern, and Southern Europe, former USSR, Arabs and non-Arab Middle Eastern areas. US-born NHW (1,480,347) were used as standard to determine proportional mortality ratios (PMR) for major causes of death including: cancers, coronary heart disease, cerebrovascular accidents, chronic obstructive pulmonary disease (COPD), HIV/AIDS, accidents, diabetes, pneumonia, suicide, and homicide.

Results—All immigrants had significantly higher PMR for suicide and with few exceptions for cardiovascular diseases. Lower PMR was recorded for COPD and homicide. No difference was noticed for pneumonia and accidents. Cancer deaths were generally higher in European immigrants.

Conclusions—Mortality patterns of NHW immigrants reflect the mixed impacts of acculturation, ethnic-specific characteristics, and psychological well being.

Keywords

Introduction

Studies of disease in migrant populations form the basis of attempts to separate the effects of genetic makeup, ethnic characteristics, and environmental exposures. These studies are particularly relevant to chronic diseases with multiple risk factors such as cancers and cardiovascular diseases. The main type of migrant study involves the comparison of various immigrant populations with the natives of the host country that allows for evaluation of the effects of different ethnicity and genetic make up in a similar environment [1]. A major requirement for this kind of study is accurate identification of immigrant populations in the host country. Many countries with large immigrant populations maintain detailed databases that have extensively been used for epidemiological and other public health studies [2–7]. Detailed information maintained in these files has facilitated the extension of migrant studies to include the second generation immigrants born in the host country. These extended studies have helped with better understanding the impacts of acculturation and exposure to environmental factors [8,9].

e-mail: Qnasseri@tccsp.org.

In the US, detailed administrative data on immigrant populations are generally not available for epidemiological and public health research. Place of birth and race/ethnicity are generally collected on self identification with little documentation. Information on place of birth is necessary to identify the first generation immigrants, and although it is uniformly recorded on the paper copy of the death certificate, it is only partially captured in the electronic file that is frequently used for epidemiological studies [10]. This has severely limited the scope and quality of migrant studies in the US. Few reported research in this field either have used a general category of "foreign-born" to collectively identify the first generation immigrants, or are limited to few specific countries like China, Japan, the Philippines, and Korea that are individually identified on the death certificate master file [11]. Another issue with migrant studies in the US is the lack of accurate denominator data that is occasionally estimated for specific research [12].

The population in California is generally grouped into five major categories of non-Hispanic white (NHW), non-Hispanic black, Hispanic, non-Hispanic Asian/Pacific Islander, and non-Hispanic American Indian and Native Alaskan. Hispanics and the non-Hispanic Asian/Pacific Islanders are further classified into subgroups based on their ancestry [13] that has widely been used for reporting cancer incidence and mortality in California [14]. The NHW population is also a heterogeneous mix that includes individuals with ethnic backgrounds extending from Northern Europe to North Africa, and the British Isles to Indian subcontinent. Ethnic and geographic differentials in morbidity and mortality in these populations are well documented and reported [15,16], but have rarely been studied in the US, except for a few reported research that have focused on the Arab-American group [17,18].

The objective of the analysis reported here was to identify the ethnic differentials in mortality for major causes of death in the first generation white immigrants in California for the period 1989 through 1999.

Methods

Sources of Data

The electronic file of the death certificates issued to residents of California for 1989–1999 was used for this study. Information on place of birth on this file was enhanced by linking it with the file of applications for the social security number that is maintained by the Social Security Administration (SSA). The nature and quality of this linkage is reported elsewhere [19]. A total of 107,432 death certificates on NHW individuals born in Europe, Middle East, and North Africa were selected for this study. Utilizing the enhanced information on place of birth, these individuals were grouped into eight geographic/ethnic categories: *Anglo-Saxon ancestry*: Ireland, United Kingdom, Canada, Australia, and New Zealand. *Northern Europe*: Denmark, Finland, Iceland, Netherlands, Norway, and Sweden. *Western Europe:* Austria, Belgium, France, Germany, Luxembourg, Switzerland, and Vatican City. *Southern Europe:* Greece, Italy, Malta, Monaco, Portugal, Spain, and Cyprus. *Eastern Europe:* Albania, Bulgaria, Czechoslovakia, Hungary, Poland, Romania, and Yugoslavia. *Former USSR:* Belarus, Russia, Ukraine, and USSR. To increase the homogeneity of the immigrant groups, particularly those from the Middle East, they are presented as one group and also subdivided into Arabs and non-Arabs. The *non-Arab Middle East:* Armenia, Azerbaijan, Afghanistan, Iran, Israel, and Turkey. *Arab Middle East:* Bahrain, Iraq, Jordan, Kuwait, Lebanon, Oman, Saudi Arabia, Syria, United Arab Emirates, Yemen, Gaza Strip, West Bank, Algeria, Egypt, Libya, Morocco, Sudan, and Tunisia. Also categorized is the *Middle East* that is a combination of the Arabs and no-Arabs.

The standard population of 1,480,347 US-born NHW residents of California was obtained from a different edition of the same death certificate master files that is released by the California Cancer Registry and identifies the NHW as a distinct group [20].

Causes of Death

The underlying cause of death on the death certificates were transferred to the electronic death certificate master file by the California Department of Health Services according to the algorithm suggested by the Center for Health Statistics (NCSH) using international classification of disease (ICD) codes. From 1989 through 1998, the 9th version of the ICD (ICD-9) was used [21]. Beginning with the 1999 death certificates, the 10th ed. (ICD-10) is being used [22]. Codes in ICD-10 are more detailed and begin with a letter. For this analysis the causes of death were grouped into the following categories: *All Cancers* (1400–2390, C009-D489), *Diabetes Mellitus* (2500–2509, E100-E149), *Coronary heart disease* (3900–3989, 4020–4029, 4040–4299, I000-I099, I110-I119, I200-I519), *Cerebrovascular accidents* (4300–4389, I600-I699), *Chronic obstructive pulmonary disease* (COPD) (4900–4969, J400-J479), *AIDS and HIV infections* (0420–0449, B200-B249), *Pneumonia and Influenza* (4800–4879, J100-J189), *Suicide and self inflicted harm* (9500–9599, X600-X849, Y870), *Homicide and legal intervention* (9600–9789, X850-Y099, Y350-Y359, Y871), *Accidents* (8000–9499, V010-X599, Y850-Y869), *Hypertension without heart involvement* (4010–4019, 4030–4039, I100-I109, I120-I129), *Gastric and duodenal ulcers* (5310–5339, K250-K289), *Cirrhosis and chronic liver disease* (5710–5719, K700-K709, K730-K749), *Nephritis and infection of the kidneys* (5800–5899, N000-N079, N170-N199, N250-N279), *and all other causes combined.*

Statistical Analysis

The US-born NHW residents of California were used as the standard population for calculation of the expected numbers. Cause-specific proportional mortality ratios (PMRs) were calculated by the division of the observed deaths by the expected numbers and were age-adjusted, based on 18 five-year categories, as described below [23]. The 95% confidence interval of the PMR was based on Poisson distribution of the observed number and was labeled significant when did not include 1 [24], and all statistical analyses were completed in SAS (Statistical Analysis Software)™.

$$\text{PMR} = \frac{\sum dj}{\sum ej}$$

where

$$ej = dj\left(\frac{d^{\text{nhw}}j}{t^{\text{nhw}}j}\right)$$

dj, number of cause-, area-, and sex-specific death for age group j; ej, number of expected cause-, area-, and sex-specific death for age group j; $d^{\text{nhw}}j$, number of cause-, and sex-specific death in standard population for age group j; $t^{\text{nhw}}j$, total number of sex-specific death in standard population for age group j.

Results

Table 1 presents the distribution of the observed deaths that are used in this analysis by place of birth and sex. Immigrants from the Arabian Middle East were the smallest group, followed by those from the Northern Europe. Immigrants with Anglo-Saxon ancestry are the largest group in this study.

The following tables present the observed and expected numbers of deaths, PMR and its 95% confidence intervals for major causes of deaths by sex and area of birth.

Table 2 presents deaths from the coronary heart disease. It shows that death from this cause in the Angelo-Saxon, Northern, Western, and Southern Europe is generally similar to the standard population of the US-born NHW white residents of California, whereas the PMR for immigrants from Eastern Europe, former USSR, and the Middle East, both Arabs and non-Arabs, it is significantly higher.

Table 3 presents deaths due to all cancers combined. Cancer PMR is generally higher in all immigrants groups except for men from Eastern Europe and the Arabian Middle East. In women, those from Southern Europe and the Middle East, both Arabs and non-Arabs have lower PMR.

Table 4 presents deaths from COPDs. Low PMR for both sexes in all immigrant groups suggests that this cause of death is less frequent among the NHW immigrants when compared to the US-born NHW residents of California.

Table 5 presents deaths due to cerebrovascular accidents (CVA). CVA deaths in immigrant men are similar to the US-born NHW, except for higher PMR in men from the Southern and Eastern Europe. In women, CVA deaths are significantly lower in most population groups, similar in those from the Arabian Middle East and Eastern Europe, and slightly higher in those from Southern Europe.

Table 6 presents deaths from pneumonia and influenza. The PMR for this cause of death suggests that pneumonia death in all immigrant populations is uniformly similar to that of the US-born NHW, except for men from Western Europe in whom this cause of death is significantly lower.

Table 7 presents deaths from AIDS and HIV infection. This table reveals noteworthy differences by sex and area of birth. In women, the numbers are too small to generate reliable estimates. In men, those with Anglo-Saxon ancestry, and Western Europe have higher PMR while those from Northern Europe are not any different, and all other groups have significantly lower PMR for this cause.

Table 8 presents the PMR for suicide. Except for women from Southern Europe and Arabian Countries, suicide seem to be significantly higher in all other immigrant men and women in this study.

Table 9 presents deaths due to diabetes. Except for women with Anglo-Saxon ancestry and Northern European men who seem to have lower mortality. Men and women from the Middle East, both Arabs and non-Arabs, and Southern Europe, as well as men from Eastern Europe have significantly higher PMR for this cause of death.

Table 10 presents deaths due to homicide. The PMR for homicide suggest that this cause of death is significantly less common among NHW immigrants in California.

Analysis of the other causes of deaths revealed less clear associations with the place of birth.

Accidents

There were 1,773 deaths in men and 1,018 deaths in women immigrants. None of the PMRs calculated for men and women of immigrant groups showed any statistically significant deviation.

Cirrhosis of The Liver

There were 812 deaths in men and 599 deaths in women. The PMRs in Middle Eastern men and women, both Arabs and non-Arabs, and women from the former USSR are significantly lower. Women with Anglo-Saxon ancestry and those from Western Europe were the only immigrant groups with higher death for this cause.

Hypertensive Diseases

There were 194 deaths in men and 333 deaths in women that were attributed to hypertensive diseases. There was no association with immigration, except for women from the former USSR in whom the PMR was 0.59 and significantly different.

Nephritis

There were 271 deaths in men and 310 deaths in women. No association with immigration was detected except for men and women from the Middle East in whom the PMR was significantly higher.

Stomach and Duodenal Ulcers

There were 157 deaths in men and 214 deaths in women. PMRs for men and women from Southern Europe were significantly low. All other groups were similar.

All other Causes of Deaths

There were 5,474 deaths in men and 7,593 deaths in women. The PMRs for all other causes of death were significantly low in immigrants from Eastern Europe, former USSR, and the Middle East, both Arabs and non-Arabs. For all other immigrant groups, the PMR were not significant.

Discussion

This report presents an analysis of mortality patterns in the first generation NHW immigrants in California in comparison with the US-born NHW residents of California as the standard population. Selection of non-Hispanic records reduced the total number of cases of the first generation immigrants in this study by 1,547 deaths or 1.4%, whereas in the standard population the reduction was 111,478 records or 7.5%. Thus, the standard population for this analysis is the most appropriate comparison and does not include the Hispanic populations who generally have lower mortality rates. Moreover, by expanding the standard population to include all US-born NHW individuals, these results can easily be compared with similar studies in other parts of the US. Few significant mortality patterns are identified by this research. First, there is virtually no difference between the first generation white immigrants and the NHW US-born in risk of dying from acute infectious diseases such as pneumonia and influenza or nephritis with the exception of immigrants from the Middle East. Second, major differences exist in mortality from those causes that relate to behavior and are associated with social environment. Death from suicide is significantly higher in the immigrant population regardless of their sex or origin, while death from homicide is significantly lower. This observation tends to run contrary to results obtained in Canada [25] and the US [26] that indicates lower suicide rate among the first generation immigrants. This discrepancy may be an artifact due to the statistical method, or a reflection of the refinement of the immigrant and comparison groups used in this analysis. In both Canadian and US study, the immigrants were considered as one big group of "foreign born" and there are indications that suicide vary significantly among immigrants from various parts of the world. Third, mortality from chronic diseases that begin early in life and are amenable to early detection and prevention such as diseases of the heart is generally higher in the first generation immigrant populations. Other studies have also shown higher incidence

and deaths due to coronary heart disease in the first generation immigrants in Europe [7], Israel [27], and the US [28]. Fourth, deaths associated with COPD, a significant sequel of long-term smoking, are significantly lower in the first generation white immigrants. This may reflect lower prevalence of smoking among the NHW immigrants.

For other causes of death, including cancers, the observed patterns are mixed and require further analyses. However a North/South divide is noticed for deaths due to diabetes and HIV/AIDS. Immigrants from Northern and Western Europe have lower deaths due to diabetes, while immigrants from Southern Europe, and the Middle East have higher deaths for this cause. Death from AIDS/HIV infection in men follows a pattern that is opposite to diabetes. It is higher in men and women with Anglo-Saxon ancestry and those from Western and Northern Europe, while it is lower in immigrants from Eastern Europe, former USSR and the Middle East.

This report provides an insight to the ethnic discrepancies in mortality within the NHW population. It suggests significant differences between Middle Eastern immigrants and those from Europe, and between North and South in Europe. It is reported both from the US [12] and Israel [29] that mortality in immigrants can influence the mortality rates of the host country and this needs to be considered in disease control planning. In the currents study, the number of NHW immigrants is not high enough to exert any significant modifying effect, except for immigrants with Anglo-Saxon ancestry who are the largest group and may have some modify effect on the overall mortality statistics in California.

This study has some limitations. First, it is based on the information obtained from the death certificates. Although death certificates are widely used for descriptive epidemiological studies, their accuracy in identification of the underlying cause of death has been questioned. The difference in dying from a disease or dying with a disease seems to be the main source of confusion. A study by the National Heart, Lung, and Blood Institute has concluded that the accuracy of coronary heart disease as an underlying cause of death was only 80% [30]. Such inaccuracies have also been reported for other causes of death, particularly for cancers [31, 32]. However, there is no reason to believe that such errors are limited to the first generation immigrants and could seriously bias the results of this analysis. The second issue with the use of mortality data is the impact of access to proper healthcare for early diagnosis and treatment that is closely associated with immigration status. Many of the first generation immigrants may not have ready access to health insurance and proper care. Thus, it is difficult to determine if the observed patterns are due to inherent ethnic differences in the natural history of these diseases, or are a result of access to healthcare services. The third concern with mortality data in immigrant populations is the concept of "salmon bias" that suggests the return of the first generation immigrants to their home country following the diagnosis of a severe or terminal disease. This bias was first suggested to explain the Hispanic mortality advantage in the US [33], and was later suggested to explain the mortality advantages of the Mediterranean immigrants in Europe [34]. The possible impact of this bias cannot be determined with the current analysis.

Another limitation of this study is that the standard population does include second or third generation NHW immigrants who are born in the US into immigrant ancestry. Although it is known that acculturation to the host country tends to modify the disease patterns in second or third generation immigrants, the presence of individuals with various ancestry reduces the homogeneity of the standard population. In the current study, 40% of the first generation immigrants are from Anglo-Saxon ancestry. It is reasonable to assume that a large segment of the standard population used in this study is also from Anglo-Saxon ancestry. This situation may have a modifying effect on some of the PMRs presented here, particularly for immigrants from Europe. However, the extent of this modification cannot be determined in the present study.

The choice of PMR for statistical analysis in this study is dictated by the lack of denominator population for rate calculations. Although PMR is not as robust as rates, it can detect significant differences among various populations with reasonable accuracy [35] and can provide convincing basis for future research.

Conclusions

This study shows that the NHW cannot be considered a homogeneous group in epidemiological studies. The reported results can be used for developing research questions and hypotheses concerning findings that need further evaluation. This initial analysis provides solid evidence of significant ethnic variations in mortality patterns of the NHW population. It confirms that NHW sufficiently heterogeneous to warrant special studies. It also reveals that infectious, chronic, and social causes of death in the first generation immigrants conform to significantly different patterns that are worthy of further studies.

References

1. Parkin DM, Khlat M. Studies of cancer in migrants: Rationale methodology. Eur J Cancer 1996;32A: 761–71. [PubMed: 9081351]

2. Parkin DM, Steintiz R, Khlat M, Kaldor J, Katz L, Young J. Cancer in Jewish migrants to Israel. Int J Cancer 1990;45:614–21. [PubMed: 1691150]

3. Geddes M, Balzi D, Buiatti E, Khlat M, Parkin DM. Cancer in Italian immigrants. Cancer Causes Control 1991;2:133–40. [PubMed: 1873437]

4. Hemminki K, Li X, Czene K. Cancer risk in first-generation immigrants to Sweden. Int J Cancer 2002;99:218–28. [PubMed: 11979437]

5. Bouchardy C, Khlat M, Mirra AP, Parkin DM. Cancer risk among European migrants in Sao Paulo, Brazil. Eur J Cancer 1993;29A:1418–23. [PubMed: 8398271]

6. McCredie M, Williams S, Coates M. Cancer mortality in migrants from the British Isles and continental Europe to New South Wales, Australia, 1975–1995. Int J Cancer 1999;83:179–85. [PubMed: 10471524]

7. Sundquist J, Johansson SE. The influence of country of birth on mortality from all causes and cardiovascular disease in Sweden 1979–1993. Int J Epidemiol 1997;26:279–87. [PubMed: 9169162]

8. Hemminki K, Li X. Cancer risks in second-generation immigrants to Sweden. Int J Cancer 2002;99:229–37. [PubMed: 11979438]

9. Hemminki K, Li X. Cancer risks in childhood and adolescent among the offspring of immigrants to Sweden. Br J Cancer 2002;86:1414–18. [PubMed: 11986773]

10. Nasseri, K. Reengineering vital registration and statistics system [letter to the editor]. Prev Chronic Dis. [serial online] 2005;2(1), http://www.cdc.gov/pcd/issues/2005/jan/04_0108,htm

11. Stellman SD. Proportional mortality ratios among Korean immigrants to New York City, 1986–1990. Yonsei Med J 1996;31:31–7. [PubMed: 8967107]

12. Seeff LC, McKenna MT. Cervical cancer mortality among foreign-born women living in the United States, 1985–1996. Cancer Detect Prev 2003;27:203–8. [PubMed: 12787727]

13. California Cancer Registry. Cancer Reporting in California: Abstracting and Coding Procedures for Hospitals, California Cancer Reporting System Standards. 7. I. Sacramento, CA: Revised January 2006

14. Cockburn, M.; Deapen, D., editors. Cancer Incidence and Mortality in California: Trends by Race/ Ethnicity, 1988–2001. Los Angeles Cancer Surveillance Program; University of Southern California: 2004.

15. Parkin, DM.; Whelan, SL.; Ferlay, J.; Teppo, L.; Thomas, DB., editors. Cancer incidence in five continents. VIII. IARC Scientific Publications No. 155; Lyon, France: 2002.

16. Thom, TJ.; Epstein, FH.; Feldman, JJ.; Leaverton, PE.; Wolz, M. Total mortality and mortality from heart disease, cancer, and stroke from 1950 to 1987 in 27 countries. NIH Publication No. 92-3088. Sep. 1992

17. Schwartz K, Kulwicki A, Weiss LK, Sakr W, Kau G, Severson RK. Cancer among Arab Americans in the metropolitan detroit area. Ethnic Dis 2004;14:141–4.

18. Sawaf H, Lorenzana A, Dombi G, Hamre M, Schwartz K. Childhood cancer among Arab Americans in southeast Michigan. Ethnic Dis 2005;15(S1):13–4.

19. Nasseri K. Enhancement of birthplace data in the death certificate master file: reclaiming missed data. J Registry Manage 2005;32:32–8.

20. California all cause mortality 1988–2000, DHS Center for Health Statistics Death Master Files, DOF population estimates, 1988–2000, 7/10/2002.

21. International Classification of Diseases, 9th Revision, Clinical Modification, ICD-9-CM, 2nd ed., September 1980. US Department of Health and Human services, Public Health Service, Health Care Financing Administration.

22. World Health Organization. International Statistical Classification of Diseases and Related Health Problems. 10th Revision, Version for 2003. Accessible at: http://www3.who.int/icd/vol1htm2003/fr-icd.htm

23. Breslow, NE.; Day, NE. Statistical methods in cancer research. Lyon: International Agency for Research on Cancer; 1987. p. 76-9.

24. Gahlinger, PM.; Abramson, JH. Computer Programs for Epidemiologic Analysis: PEPI Version 2. Stone Mountain, Georgia; USD Inc: 1995.

25. Strachan J, Johansen H, Nair C, Nrgundkar M. Canadian suicide mortality rates: first-generation immigrants versus Canadian-born. Health Rep 1990;2:327–41. [PubMed: 1713798]

26. Singh GK, Siahpush M. All-cause and cause-specific mortality in immigrants and native born in the United States. Am J Public Health 2001;91:392–99. [PubMed: 11236403]

27. Gad R, Nurit I, Ada T, Ytzhak P. Chronic disease prevalence in immigrants to Israel from the former USSR. J Immigr Health 2002;4:29–33. [PubMed: 16228752]

28. Enas EA, Garg A, Davidson MA, Nair VM, Huet BA, Yusuf S. Coronary heart disease and its risk factors in first-generation immigrant Asian Indians to the United States of America. Indian Heart J 1996;48:343–53. [PubMed: 8908818]

29. Rennert G. Implications of Russian immigration on mortality patterns in Israel. Int J Epidemiol 1994;23:751–6. [PubMed: 8002189]

30. Lloyd-Jones DM, Martin DO, Larson MG, Levy D. Accuracy of death certificates for coding heart disease as the cause of death. Ann Intern Med 1998;129:1020–6. [PubMed: 9867756]

31. Percy C, Stanek E 3rd, Gloeckler L. Accuracy of cancer death certificates and its effect on cancer mortality statistics. Am J Public Health 1981;71:242–50. [PubMed: 7468855]

32. Percy C, Ries LG, Van Holten VD. The accuracy of liver cancer as the underlying cause of death on death certificates. Public Health Rep 1990;105:361–7. [PubMed: 2116637]

33. Franzini L, Ribble JC, Kaddie AM. Understanding the Hispanic paradox. Ethnic Dis 2001;11:496–518.

34. Khlat M, Darmon N. Is there a Mediterranean migrants mortality paradox in Europe? Int J Epidemiol 2003;32:1115–8. [PubMed: 14681289]

35. Aveyard P. A fresh look at proportional mortality ratio. Public Health 1998;112:77–80. [PubMed: 9581448]

Table 1

Distribution of deaths by sex and place of birth, NHW residents, California, 1989–1999

Place of birth	Male	Female	Total
NHW US-born	769,405	710,942	1,480,347
Anglo-Saxon	19,753	23,644	43,397
Northern Europe	2,543	2,685	5,228
Western Europe	5,840	8,135	13,975
Southern Europe	5,109	5,879	10,988
Eastern Europe	5,305	5,283	10,588
Former USSR	4,072	5,595	9,667
Middle East	7,755	5,834	13,589
Arab Middle East	2,801	1,796	4,597
Non-Arab Middle East	4,954	4,038	8,992
Total	827,537	773,831	1,601,368

Table 2

Proportionate mortality ratio in first generation NHW immigrants, selected area of birth, California, 1989–1999

Coronary heart disease	Male				Female			
Place of birth	OBS	EXP	PMR (95% CI)		OBS	EXP	PMR (95% CI)	
NHW US-born	241,743	–	–		234,780	–	–	
Anglo-Saxon	6,571	6628.1	0.99 (0.97–1.02)		7,960	8039.6	0.99 (0.97–1.01)	
Northern Europe	775	841.1	0.92 (0.86–0.99)		886	920.08	0.96 (0.90–1.03)	
Western Europe	1,870	1790.7	1.04 (1.00–1.09)		2,524	2595.3	0.97 (0.93–1.01)	
Southern Europe	1,673	1691.2	0.99 (0.94–1.04)		2,257	2167.7	1.04(1.00–1.09)	
Eastern Europe	1,957	1762.5	1.11 (1.06–1.16)		1,964	1835.9	1.07 (1.02–1.12)	
Former USSR	1,556	1353.3	1.15 (1.09–1.21)		2,314	2008.8	1.15 (1.11–1.20)	
Middle East	2,883	2414.2	1.19 (1.15–1.24)		2,275	1827.2	1.25 (1.19–1.30)	
Arab Middle East	1,051	823.41	1.28 (1.20–1.36)		642	487.31	1.32 (1.22–1.42)	
Non-Arab Middle East	1,832	1590.8	1.15 (1.10–1.21)		1,633	1339.9	1.22 (1.16–1.28)	

Table 3

Proportionate mortality ratio in first generation NHW immigrants, selected area of birth, California, 1989–1999

All cancers	Male			Female		
Place of birth	OBS	EXP	PMR (95% CI)	OBS	EXP	PMR (95% CI)
NHW US-born	189,613	–	–	168,336	–	–
Anglo-Saxon	5,207	5,032.6	1.03 (1.01–1.06)	5,960	5,558.4	1.07 (1.05–1.10)
Northern Europe	791	693.66	1.14 (1.06–1.22)	753	621.27	1.21 (1.13–1.30)
Western Europe	1,600	1,516.4	1.06 (1.00–1.11)	2,442	2,128	1.15 (1.10–1.19)
Southern Europe	1,529	1,336.9	1.14 (1.09–1.20)	1,183	1,155.7	1.02 (0.97–1.08)
Eastern Europe	1,470	1,423.9	1.03 (0.98–1.09)	1,295	1,190.2	1.09 (1.03–1.15)
Former USSR	1,117	1,002	1.11 (1.05–1.18)	1,338	1,154.6	1.16 (1.10–1.22)
Middle East	2,014	1,947.9	1.03 (0.99–1.08)	1,494	1,500.8	1.00 (0.95–1.05)
Arab Middle East	720	746.62	0.96 (0.90–1.04)	534	560.09	0.95 (0.87–1.04)
Non-Arab Middle East	1,294	1,201.3	1.08 (1.02–1.14)	960	940.69	1.02 (0.96–1.09)

Table 4

Proportionate mortality ratio in first generation NHW immigrants, selected area of birth, California, 1989–1999

COPD[*]	Male				Female			
Place of birth	OBS	EXP	PMR (95% CI)		OBS	EXP	PMR (95% CI)	
NHW US-born	43,590	–	–		43,964	–	–	
Anglo-Saxon	1,097	1,239	0.89 (0.83–0.94)		1,441	1,534.6	0.94 (0.89–0.99)	
Northern Europe	106	158.82	0.67 (0.55–0.81)		96	163.44	0.59 (0.48–0.72)	
Western Europe	164	322.76	0.51 (0.43–0.59)		310	515.03	0.60 (0.54–0.67)	
Southern Europe	186	311.31	0.60 (0.51–0.69)		146	336.12	0.43 (0.37–0.51)	
Eastern Europe	146	330.93	0.44 (0.37–0.52)		142	330.92	0.43 (0.36–0.51)	
Former USSR	101	246.25	0.41 (0.33–0.50)		132	335.55	0.39 (0.33–0.47)	
Middle East	269	424.41	0.63 (0.56–0.71)		135	367.42	0.37 (0.31–0.43)	
Arab Middle East	89	143.07	0.62 (0.50–0.77)		28	119.35	0.23 (0.16–0.34)	
Non-Arab Middle East	180	281.34	0.64 (0.55–0.74)		107	248.06	0.43 (0.35–0.52)	

[*] Chronic obstructive pulmonary disease

Table 5

Proportionate mortality ratio in first generation NHW immigrants, selected area of birth, California, 1989–1999

Cerebrovascular accidents	Male				Female			
Place of birth	OBS	EXP	PMR (95% CI)		OBS	EXP	PMR (95% CI)	
NHW US-born	41,050	–	–		62,443	–	–	
Anglo-Saxon	1,192	1,196.4	1.00 (0.94–1.05)		2,074	2,217.6	0.94 (0.90–0.98)	
Northern Europe	142	141.97	1.00 (0.84–1.18)		207	253.49	0.82 (0.71–0.94)	
Western Europe	277	291.3	0.95 (0.84–1.07)		634	700.55	0.91 (0.84–0.98)	
Eastern Europe	343	302.58	1.13 (1.02–1.26)		501	506.65	0.99 (0.90–1.08)	
Southern Europe	352	293.38	1.20 (1.08–1.33)		659	604.12	1.09 (1.01–1.18)	
Former USSR	250	246.54	1.01 (0.89–1.15)		510	560.22	0.91 (0.83–0.99)	
Middle East	397	406.2	0.98 (0.88–1.08)		444	499.36	0.89 (0.81–0.98)	
Arab Middle East	125	123.06	1.02 (0.85–1.21)		127	127.99	0.99 (0.83–1.18)	
Non-Arab Middle East	272	283.13	0.96 (0.85–1.08)		317	371.36	0.85 (0.76–0.95)	

Table 6

Proportionate mortality ratio in first generation NHW immigrants, selected area of birth, California, 1989–1999

Pneumonia/influenza	Male				Female			
Place of birth	OBS	EXP	PMR (95% CI)		OBS	EXP	PMR (95% CI)	
NHW US-born	33,417	–	–		40,822	–	–	
Anglo-Saxon	941	936.97	1.00 (0.94–1.07)		1,394	1,387.6	1.00 (0.95–1.06)	
Northern Europe	105	105.98	0.99 (0.81–1.20)		172	161.58	1.06 (0.91–1.24)	
Western Europe	170	215.76	0.79 (0.67–0.92)		403	437.68	0.92 (0.83–1.02)	
Eastern Europe	231	228.35	1.01 (0.89–1.15)		323	322.06	1.00 (0.90–1.12)	
Southern Europe	206	225.82	0.91 (0.79–1.05)		369	396.26	0.93 (0.84–1.03)	
Former USSR	185	198.03	0.93 (0.80–1.08)		326	361.35	0.90 (0.81–1.01)	
Middle East	294	312.69	0.94 (0.84–1.05)		291	309.34	0.94 (0.84–1.06)	
Arab Middle East	84	86.56	0.97 (0.77–1.20)		61	75.26	0.81 (0.62–1.04)	
Non-Arab Middle East	210	226.13	0.93 (0.81–1.06)		230	234.09	0.98 (0.86–1.12)	

Table 7

Proportionate mortality ratio in first generation NHW immigrants, selected area of birth, California, 1989–1999

HIV/AIDS	Male				Female			
Place of birth	OBS	EXP	PMR (95% CI)		OBS	EXP	PMR (95% CI)	
NHW US-born	26,940	–	–		983	–	–	
Anglo-Saxon	465	410.01	1.13 (1.03–1.24)		15	17.834	0.84 (0.47–1.39)	
Northern Europe	60	50.92	1.18 (0.90–1.52)		7	2.315	3.02 (1.21–6.20)	
Western Europe	285	243.59	1.17 (1.04–1.31)		13	10.881	1.19 (0.64–2.04)	
Southern Europe	90	117.41	0.77 (0.62–0.94)		1	3.302	0.30 (0.00–1.53)	
Eastern Europe	49	105.99	0.46 (0.34–0.61)		2	3.84	0.52 (0.06–1.82)	
Former USSR	12	88.64	0.14 (0.07–0.24)		0	4.143	–	
Middle East	122	298.09	0.41 (0.34–0.49)		6	10.698	0.56 (0.20–1.21)	
Arab Middle East	70	137.7	0.51 (0.40–0.64)		4	4.837	0.83 (0.22–2.09)	
Non-Arab Middle East	52	160.39	0.32 (0.24–0.43)		2	5.86	0.34 (0.04–1.19)	

Table 8

Proportionate mortality ratio in first generation NHW immigrants, selected area of birth, California, 1989–1999

Suicide	Male				Female			
Place of birth	OBS	EXP	PMR (95% CI)		OBS	EXP	PMR (95% CI)
NHW US-born	20,441	–	–		5,483	–	–
Anglo-Saxon	426	75.42	5.65 (5.12–6.21)		145	33.97	4.27 (3.60–5.02)
Northern Europe	61	9.75	6.25 (4.78–8.03)		20	4.16	4.81 (2.94–7.43)
Western Europe	236	42.85	5.51 (4.83–6.26)		106	18.84	5.63 (4.61–6.80)
Southern Europe	82	21.51	3.81 (3.03–4.73)		11	7.07	1.56 (0.78–2.78)
Eastern Europe	143	20.31	7.04 (5.93–8.29)		43	7.51	5.73 (4.15–7.72)
Former USSR	95	21.48	4.42 (3.58–5.41)		28	8.68	3.23 (2.14–4.66)
Middle East	143	58.5	2.44 (2.06–2.88)		38	21.11	1.80 (1.27–2.47)
Arab Middle East	50	25.46	1.96 (1.46–2.59)		13	8.53	1.52 (0.81–2.60)
Non-Arab Middle East	93	33.04	2.81 (2.27–3.45)		25	12.58	1.99 (1.29–2.93)

Table 9

Proportionate mortality ratio in first generation NHW immigrants, selected area of birth, California, 1989–1999

Diabetes	Male				Female			
Place of birth	OBS	EXP	PMR (95% CI)		OBS	EXP	PMR (95% CI)	
NHW US-born	12,057	–	–		12,344	–	–	
Anglo-Saxon	280	314.72	0.89 (0.79–1.00)		318	405.81	0.78 (0.70–0.87)	
Northern Europe	28	42.1	0.67 (0.44–0.96)		33	44.96	0.73 (0.51–1.03)	
Western Europe	81	93.93	0.86 (0.68–1.07)		139	145.41	0.96 (0.80–1.13)	
Southern Europe	107	82.34	1.30 (1.06–1.57)		174	90.47	1.92 (1.65–2.23)	
Eastern Europe	106	86.98	1.22 (1.00–1.47)		103	88.05	1.17 (0.95–1.42)	
Former USSR	75	62.78	1.19 (0.94–1.50)		101	89.2	1.13 (0.92–1.38)	
Middle East	195	121.38	1.61 (1.39–1.85)		190	104.33	1.82(1.57–2.10)	
Arab Middle East	86	45.48	1.89 (1.51–2.34)		73	35.74	2.04 (1.60–2.57)	
Non-Arab Middle East	109	75.9	1.44 (1.18–1.73)		117	68.58	1.71 (1.41–2.04)	

Table 10

Proportionate mortality ratio in first generation NHW immigrants, selected area of birth, California, 1989–1999

Homicide	Male			Female		
Place of birth	OBS	EXP	PMR (95% CI)	OBS	EXP	PMR (95% CI)
NHW US-born	5,519	–	–	1,971	–	–
Anglo-Saxon	60	375.35	0.16 (0.12–0.21)	43	126.05	0.34 (0.25–0.46)
Northern Europe	5	49.8	0.10 (0.03–0.23)	2	16.17	0.12 (0.01–0.43)
Western Europe	57	170.49	0.33 (0.25–0.43)	31	65.84	0.47 (0.32–0.67)
Southern Europe	25	104.56	0.24 (0.15–0.35)	10	24.93	0.40 (0.19–0.74)
Eastern Europe	30	103.18	0.29 (0.20–0.41)	13	27.29	0.48 (0.25–0.81)
USSR	54	88.1	0.61 (0.46–0.80)	7	27.73	0.25 (0.10–0.52)
Middle East	157	224.91	0.70(0.59–0.82)	35	58.95	0.59 (0.41–0.83)
Arab Middle East	83	96.13	0.86 (0.69–1.07)	12	25.05	0.48 (0.25–0.84)
Non-Arab Middle East	74	128.78	0.57 (0.45–0.72)	23	33.9	0.68 (0.43–1.02)