Published in final edited form as:
Med Care. 2009 February ; 47(2): 138–145. doi:10.1097/MLR.0b013e3181844dba.

Ethnic Differences in In-Hospital Place of Death Among Older Adults in California:

Effects of Individual and Contextual Characteristics and Medical Resource Supply

Nuha A. Lackan, PhD[*], **Karl Eschbach, PhD**[†,‡], **Jim P. Stimpson, PhD**[§], **Jean L. Freeman, PhD**[‡,¶,‖], and **James S. Goodwin, MD**[‡,‖]

[*]Department of Health Management & Policy, School of Public Health, University of North Texas Health Science Center at Fort Worth, Fort Worth

[†]Institute for Demographic and Socioeconomic Research, University of Texas at San Antonio, San Antonio

[‡]Department of Internal Medicine, University of Texas Medical Branch at Galveston, Galveston

[§]Department of Social and Behavioral Sciences, School of Public Health, University of North Texas Health Science Center at Fort Worth, Fort Worth

[¶]Sealy Center on Aging, University of Texas Medical Branch at Galveston, Galveston

[‖]Department of Preventive Medicine and Community Health, University of Texas Medical Branch at Galveston, Galveston, Texas

Abstract

Background—Substantial ethnic differences have been reported in the probability that death will occur in a hospital setting rather than at home, in a hospice, or in a nursing home. To date, no study has investigated the role of both individual characteristics and contextual characteristics, including local health care environments, to explain ethnic differentials in end-of-life care.

Objectives—The study purpose is to examine ethnic differences in the association between death as a hospital in-patient and individual and contextual characteristics, as well as medical resource supply.

Research Design—This study employed a secondary data analysis.

Subjects—We used data from the California Death Statistical Master file for the years 1999–2001, which included 472,382 complete cases. These data were geocoded and linked to data from the US Census Bureau and the American Hospital Association.

Results—Death as an in-patient was most common for Asian (54%) and Hispanic immigrants (49%) and least common for non-Hispanic whites (36%) and US-born Asians (41%). Medical resource supply variables are of considerable importance in accounting for ethnic differentials in

Reprints: Nuha A. Lackan, PhD, Department of Health Management & Policy, School of Public Health, University of North Texas Health Science Center at Fort Worth, 3500 Camp Bowie Blvd, Fort Worth, TX 76107–2699. nlackan@hsc.unt.edu.

the probability of dying in a hospital. Residual differences in in-hospital site of death were largest for immigrant populations.

Conclusions—There are sizeable ethnic differentials in the probability that a death will occur in a hospital in California. These differences are substantially mediated by sociodemographic characteristics of the decedent and local medical care supply. One implication of these findings is that variation exists in the efficiency and quality of end of life care delivered to ethnic minorities.

Keywords

place of death; ethnicity; medical resource supply

Most Americans prefer to die at home,[1–2] yet nearly half of all deaths in the United States occur in hospitals.[3] This incongruity suggests an opportunity for improvement in the quality of care delivered to patients at the end of life. Although rates of in-hospital death are declining,[4] the aforementioned discrepancy has prompted several investigations into which types of patients are actually dying in hospitals and the implications of wide variation in end of life outcomes on the quality and efficiency of end of life care.[5]

In-hospital death varies by social and economic characteristics. Younger age, current marriage, lower socioeconomic status, and male gender have been associated with more frequent in-hospital death.[4,6–7] Substantial ethnic differences have been reported in the probability that a death will occur in a hospital setting rather than at home, in a hospice, or in a nursing home. Specifically, non-white decedents are more likely than non-Hispanic white decedents to die in a hospital setting.[4,6–10] Ethnic differences may result from differences in individual preferences, the communities in which ethnic minorities live, and health care systems with which they are associated. Older non-white persons have been reported to express preferences for more aggressive end-of-life care and to be less likely to use advance directive and do-not-resuscitate orders.[11] These preferences have been related to cultural beliefs, knowledge of care alternatives,[12] and experiences within the health care system, including a greater use of hospital-care settings, less continuity of care, and lack of trust of health care providers.[13–14]

Until recently, results from the Study to Understand Prognoses and Preferences for Outcomes and Risks of Treatments (SUPPORT) were the most conclusive in explaining variation in place of death. SUPPORT's findings suggested that the availability and propensity to use hospital beds was the most important predictor of in-hospital death. Additionally, the availability of alternatives to hospitals for end-of-life care, such as nursing homes and hospices was associated with rates of in-hospital death.[1] In 2007, Gruneir et al[4] conducted a multilevel examination of predictors of both in-hospital and nursing home death using national vital statistics data linked to state and county data. This study reported that individuals who were white, older, and had more education were more likely to die as hospital inpatients, while controlling for area variables. While controlling for individual variables, the same study reported that the likelihood of hospital death was much higher in areas in which African Americans were highly concentrated, marginally higher in areas in which Hispanics were highly concentrated, and was also significantly associated with area measures of educational attainment and income.

Continued segregation in the places in which poor and minority populations live has spurred a growing literature that suggests contextual and health service area differences in patient engagement and provider resources, organization, and practice patterns may be important mediators of racial and ethnic differences in health care outcomes.[15–19] For example, structural variations in medical care systems are associated with the probability of death in a hospital setting, with excess hospital bed-supply, and greater representation of specialist rather than primary-care physicians in an area being associated with higher rates of in-hospital deaths, especially for those conditions that do not typically result in a terminal hospitalization.[1,20]

In this study, we seek to further investigate the association between individual and contextual measures of race and ethnicity and in-hospital death using data from a 3-year pool of death certificates for the state of California for the years 1999 to 2001. Although several studies have reported the correlates of in-hospital death using individual-level death certificates,[6–7,21] our study contributes to the current literature by identifying the individual decedent within 2 different levels of geographic aggregation: the census block group, a small area of approximately 1000 persons, and the hospital service area, as defined by researchers at the Center for the Evaluative Clinical Sciences at the Dartmouth Medical School to describe hospital market areas from Medicare records.[20]

METHODS

Sources of Data

The primary data source was the California Death Statistical Master file for the years 1999 to 2001. There were 509,692 deaths of persons age 65 or older reported in the master files for these years. We used 472,382 cases for which all data were complete, excluding 34,310 cases (6.77%) for which information was incomplete on one or more variables. This file was geocoded by the State of California Department of Health Services by matching the residence address recorded on the death certificate to the address data base maintained by Geographic Data Technology, Inc. Using these geocodes and ARC GIS 9.2 geographic information system software, we link decedents to 3 levels of geographic aggregation for which data about community characteristics are available: census blocks, very small areas averaging less than 100 persons in residential population; census block groups, areas with approximately 1000 persons; and 229 hospital service areas defined by the Dartmouth CECS group. Boundary files and data about medical care resources for hospital service areas are taken from the database released with the 1999 Dartmouth Health Atlas of Healthcare. Additional data about population composition at the hospital service area are aggregated from Census Summary File 3 data for census block groups that were similarly associated with service areas using ARC GIS. Data about socioeconomic and other characteristics were linked from 2000 census summary files 1 and 3.[22,23] Finally, to create a measure of the distance of each decedent's residence to the nearest hospital facility, we used addresses of hospitals in California and adjacent states listed in the AHA Hospital Guide (2003 edition) and geocoded these addresses using web-based Teleatlas geocoding service and then calculated distance between the longitude and latitude of the block centroid for each decedent to the geocoded physical address of hospitals listed in the guide.

Outcome Variable

The outcome measure is death as a hospital in-patient. Other categories reported on the California death certificate are pooled, including death at home, in a nursing home or other institution, death in transport, and death in some other setting.

Independent Variables and Covariates

The independent variables in this study were selected because they are commonly used in investigations of health services utilization[20] and are described below.

Ethnicity—Subjects were classified as Hispanic, white, African American, Asian, or all other, as reported on the death certificate. Each ethnic category other than Hispanic was restricted to non-Hispanic members of the group. We further subdivided Hispanics and Asians by nativity status (born in United States vs. immigrant).

Other Demographic Characteristics—We included measures of age (years), gender, marital status (currently married at time of death vs. all others), and years of schooling, as reported on the death certificate. Interval measures of age and schooling are categorized for descriptive analysis and used in interval form in multivariate regressions.

Underlying Cause of Death—In descriptive analyses, we examined the relationship between specific underlying causes of death at the level of the 3-digit ICD-10 code and in-hospital death. In multivariate models, analyses are adjusted for these selected causes of death.

Nursing Home Residence—Census Proxy—Nursing home residence may be expected to be associated with lower in-hospital death rates insofar as it is associated with a higher rate of do-not-resuscitate orders and advance directives opting against aggressive interventions to prolong life. The US standard death certificate does not include a measure of residence in a nursing home at time of death. Using the geocoded death master file, we created a proxy measure indicating whether the decedent lived in a census block—a small area with on average less than 100 residents—with a nursing home identified by the Census Bureau in the 2000 census.

Distance to Hospital—We calculated the distance from the census block where the decedent lived at the time of death to a hospital facility listed in the AHA Hospital Guide (2003 edition). This was calculated using longitude latitude of the block centroid to the geocoded physical address of hospitals listed in the guide.

Composition of Census Block Group—We use census data at the level of the block group—areas of about 1000 persons and the smallest area for which census socioeconomic characteristics are reported—to measure the percent of the population living in households with income under the federal poverty level, the percent of the population that is non-white, and the percent of the population that changed residence within the past 5 years.

Hospital Service Area Medical Resource Environment—Research associated with the Dartmouth Atlas on Healthcare project identified 229 hospital service areas in California, including several that span boundaries with adjoining states. Market definitions follow patterns of hospital utilization in the Medicare population at the zip code level using Medicare claims data. The methodology is described in CECS 1999.[20] For hospital service areas, we include measures of hospital bed capacity per 1000 persons, physicians per 1000 persons, and the percentage of physicians who are family practitioners. All measures are taken from the 1999 Dartmouth Health Atlas database and pertain to the years 1995/1996. We also include measures of the percentage of hospital service area residents living in households with income under the poverty line, and percentage who are not non-Hispanic white.

Data Analysis

We report descriptive analyses of the percentage of persons in each ethnic group and in categories of each covariate who die as a hospital in-patient. Because these are population data with a large number of cases, χ^2 tests for all comparisons are significant with an α level of 0.05 and are not reported. We also report the distribution of covariates for each ethnic/migration status group.

We then report a 3-level mixed logistic regression model for individuals nested within census block groups within Hospital Service Areas, with random effects for block group and hospital service areas. In estimating this model, we found that the minority and poverty composition measures for block groups and hospital service areas were correlated and apparently redundant. We dropped nonsignificant composition measures from the reported models. We considered interactions both within and between levels and with characteristics of individual decedents. We report and discuss interactions for individual characteristics only if the estimated difference is 5 percentage points or higher for a categorical contrast, or at the midpoints of the high and low quartile of an interval measure. Multivariate analyses are adjusted for selected causes of death.

Because almost all individual level variables are significantly associated with in-hospital site of death, we believe that the substantive size of effects is a more useful measure of the impact of each characteristic on the probability of an in-hospital site of death. We performed additional analyses calculating the predicted percentage point difference in in-hospital death rate and report these in the text for selected variables. A final table shows progression of odds ratios relating ethnic group membership to in-hospital death given various sets of covariates, to identify key covariates that mediate the relationship of ethnicity and in-hospital death.

RESULTS

Associations of Characteristics and In-Hospital Site of Death

Table 1 identifies relationships between individual characteristics and death as a hospital in-patient. Over 3 years, 38% of decedents in California died as a hospital inpatient. Among ethnic populations, death as an in-patient was most common for Asian (54%) and Hispanic

immigrants (49%) and was least common for non-Hispanic whites (36%) and US-born Asians (41%). Death as an in-patient varies widely in relation to many characteristics reported in the table. Cause of death is most important, with 79% of persons who die of hemorrhagic stroke dying in hospital, compared with just 12% who are reported to die of Alzheimer disease. Older age and residence in a nursing home census block were both associated with sharply lower rates of death as an in-patient. The association with female gender, current marital status at time of death, and education was smaller, and there is some reason to suspect that even these effects are partially artifacts of composition: for example, women are more likely to die at older ages and to outlive their spouses. The majority of the education effect appears in the contrast between persons with very low schooling and others. The former group is composed primarily of immigrants and may reflect immigrant ethnic differences more than an effect of education per se.

Table 2 identifies relationships between area characteristics and death as a hospital in-patient. There is also a strong association between area characteristics and in-patient deaths. Among the 133 hospital service areas in California with at least 1000 deaths reported in the study period, the percentage of these deaths that occurred in hospital ranged from 27 to 50. Persons who died in HSAs with a per capita hospital bed rate in the top quartile were 10 percentage points more like to die as a hospital in-patient compared with those in the least bedded quartile. The physician to population ratio was weakly associated with an in-hospital site of death, while the share of physicians who were family practitioners was associated with a lower probability of an in-hospital death. A higher poverty rate and representation of minorities was associated with a higher rate of in-hospital death at both the block group and the hospital service area level.

Ethnic Differences in Personal and Area Characteristics

Table 3 reports the characteristics of ethnic populations by ethnicity of decedent. Several important differences emerge that may contribute to ethnic differences in death as a hospital in-patient. Age differences at time of death are most important. Non-Hispanic whites are oldest, while US-born Hispanics are the youngest. In additional analyses (data not shown), the difference in age composition at time of death between groups is substantial: 39% of non-Hispanic white decedents are age 85 or older, compared with just 19% of US-born Hispanics and 23% of US-born Asians/Pacific Islanders. Just 9% of non-Hispanic whites are ages 65–69, compared with 16% of US-born Hispanics and African Americans. Among other characteristics, more than half of Asian/Pacific Islanders were married at time of death, compared with just 31% of African Americans and 39% of whites. Whites were much more likely than other groups to be living in a census block with a nursing home. Whites live a greater average distance from a hospital than do members of the other larger ethnic populations—almost a full mile further than do Asian/Pacific Islanders.

There are also sharp differences in the medical resource environments lived in by members of each ethnic group. Non-Hispanic whites lived in areas with the lowest rates of hospital beds per capita, and where a larger share of the physician workforce is family practitioners. By contrast, the per capita hospital bed rate is highest and the share of family practitioners is lowest for African Americans. Physician supply per capita is highest for Asian/Pacific

Islanders regardless of nativity status and lowest for Hispanics. As expected, there are also differences in the area poverty rate and in ethnic composition between ethnic groups. Non-Hispanic whites live in areas with the lowest poverty rate and minority concentration, while African Americans live in areas with the highest poverty and largest non-white population share. Ethnic contrasts on these variables are similar when considered at the block group or hospital service area level.

Multivariate Correlates of In-Hospital Site of Death

Table 4 reports odds ratios and confidence intervals from a multivariate mixed logistic regression model predicting in-hospital site of death. A few variables emerge as significant predictors of an in-hospital site of death. Age and nursing home residence are most important. A significant interaction term indicates that female gender is not independently associated with hospital site of death at ages between 65 and 70, but that by about age 90, women are somewhat less likely to die in hospital (−7 percentage points) (data not shown). Effects of marital status, education, and distance from a hospital facility, while statistically significant given a large population, are also substantively small, accounting each case for differentials of 3 percentage points or less.

The medical care supply variables as a group have an independent impact on in-hospital site of death. The share of physicians who are family practitioners is negatively associated with in-hospital site of death. These medical care supply variables are inversely correlated with one another and as such divide up some of the larger gross differentials reported in Table 2 for each variable. Hospital service areas with large minority populations are also associated with elevated in-hospital death rates.

Ethnic group differentials are substantially smaller when adjusting for differences in characteristics compared with the unadjusted model. The difference between US-born Asian/Pacific Islanders and non-Hispanic whites is entirely accounted for by the model adjustment, and the difference between US-born Hispanics and whites is sharply reduced. Residual differences to non-Hispanic whites remain larger for immigrant groups. With adjustment for covariates African Americans and whites are equally likely to die in a hospital at age 65. Differences emerge at older ages, and by age 91, African Americans are more likely to die as a hospital inpatient, with a residual effect of about 7 percentage points (data not shown).

Table 5 provides further information about the impact of individual and area covariates on ethnic differentials in in-hospital site of death. It tracks changes in the direct effect of ethnicity/immigrant status on odds of in-hospital death given adjustment for additional covariates. The first column shows the unadjusted difference in-hospital death rate comparing members of each group to non-Hispanic whites. The second model adjusts for individual-level covariates, which account for more than half the differential from whites for US-born Asians, Hispanics, and Others. However, personal characteristics do not seem to contribute to the explanation of differences between African Americans and whites. By contrast, the third model illustrates that medical care supply variables appear to explain the largest share of African American-white differentials. Differences in local area medical care

supply further reduce ethnic differentials for other non-white groups, as shown in the fourth model.

DISCUSSION

Among decedents aged 65 and older in California, ethnicity seems to be strongly associated with the probability of dying in a hospital when we examine the crude bivariate association. Immigrant Asians are 18 percentage points more likely to die in a hospital compared with non-Hispanic whites, and immigrant Hispanics are 13 percentage points more likely than whites to die in a hospital. However, ethnic differentials are substantially explained by other characteristics. For US-born Asians and Hispanics, and other groups, group differences in age, marital status, nursing home residence, and distance to a hospital substantially explain group differences from whites. For African Americans, medical supply variables, especially hospital bed capacity, are most important and account for the majority of difference from whites.

Medical resource supply variables are of considerable importance in accounting for ethnic differentials in the probability of dying in a hospital. This is not surprising given the sharp differences in the spatial distribution of different ethnic populations. For example, nearly one-quarter of African American decedents died in the Los Angeles hospital service area, compared with just 2.5% of white decedents. This hospital service area had among the highest hospital bed rates per capita in the state and the lowest representation of family practice physicians. In general, compared with whites, all minority groups except for the small other category lived and died in more centralized metropolitan settings where hospital bed supply was high, family practice physicians were relatively low, and distance to hospital was lower. Our findings suggest that a substantial fraction of the increased death in a hospital setting among minority groups was attributable to this difference in the medical care resource environment.

Our findings demonstrate that despite the relatively small influence of contextual variables on in-hospital death when compared with medical resource supply variables, contextual characteristics are still an important factor in investigating ethnic differentials in in-hospital death. Recent studies suggest that poor and minority neighborhoods may lack the physical and social resources to support the diverse infrastructure needs of the health care system, including formal services for palliative care and residential care facilities.[17] Without alternatives to hospitals for care, residents of these disadvantaged areas may have limited choices in place of death. For example, the location of a nursing home in a neighborhood has been associated with lower in hospital death for patients age 65 and older.[24]

Residual differences in in-hospital site of death were largest for immigrant populations. The reasons for this relationship are not clear. Studies have reported that immigrants have difficulty accessing the health care system.[25,26] Lack of access may be associated with increased use of hospital-based end-of-life care insofar as it reflects a lack of a relationship with a physician to redirect to alternatives for hospital care for conditions for which hospital-based interventions will predictably end in failure and/or delayed presentation at a hospital care setting for terminal conditions. However, 2 points tend to contradict this

explanation. First, as we have already remarked, socioeconomic markers that are likely correlated with lack of access to care are essentially unassociated with death in an in-hospital setting. Second, the Asian immigrant population in California experiences the highest residual differential from non-Hispanic whites; this group is overwhelmingly comprised of legal residents, economically stable, and enrolled in Medicare at a high rate.[27]

Cultural differences in end-of-life preferences may also account for these differences. Studies of Asians of Japanese, Chinese, and Korean descent report that members of these groups are less likely to complete advanced directives[28,29] or use hospice services[30] when compared with non-Hispanic whites. These trends may result in higher use of end of life hospital care; and therefore, increase the likelihood of in-hospital death. It is interesting to note in this regard that if cultural differences in preferences do drive the reported relationships, there is little evidence that culturally-distinctive preferences are passed on to native-born coethnics, as has been described for Japanese Amer-icans.[28] Future investigations of ethnic differentials in end-of-life care for Hispanics and Asians should be sensitive to the importance of nativity status.

LIMITATIONS

This study has several limitations. First, we only included data on residents dying in the state of California. Inference to other populations is uncertain. This may especially be a concern with respect to the African American population, which is smaller, less segregated, and less disadvantaged than African Americans elsewhere in the United States and especially in the south and inner cities in the northeast. Second, the data reflect death certificate reports. Underlying cause of death as coded on the death certificate has been reported to be inaccurate particularly for decedents at the oldest ages that experience failures across multiple organ systems. Cause-of-death as reported may be partly dependent on hospital site of death, either because it reflects a hospital acquired condition such as an infection or surgical misadventure, or because a hospital-site of death implies more intensive diagnostic effort, affecting the condition reported. Ethnic differences in inaccurate reports of age at the oldest ages may contribute to an apparent pattern of higher in-hospital death rates at later ages for members of minority populations. Third, data about medical resources pertain to a period 4 years before the beginning of the study period. For this reason, the impact of medical supply variables may be understated relative to what would be found if these data were more current. Fourth, this study did not include information on characteristics of health care providers.

CONCLUSIONS

There are sizeable ethnic differentials in the probability that a death will occur in a hospital in California. These differences are substantially mediated by sociodemographic characteristics of the decedent and medical care supply in the local area in which the death occurs. Efforts to lower in-hospital death and reduce ethnic differences should focus on medical resource supply and cultural preferences. Ultimately, study findings may have implications for reducing racial and ethnic disparities in the incongruity between patient preferences for end of life care and the care they actually receive. One implication of these

findings is that variation exists in the efficiency and quality of end of life care delivered to racial and ethnic minorities.

Acknowledgments

The authors acknowledge the support of the UTMB Center for Population Health and Health Disparities (P50-CA105631).

References

1. Pritchard RS, Fisher ES, Teno JM, et al. Influence of patient preferences and local health system characteristics on the place of death. SUPPORT investigators. Study to Understand Prognoses and Preferences for Risks and Outcomes of Treatment. J Am Geriatr Soc. 1998; 46:1242–1250. [PubMed: 9777906]
2. Hays JC, Galanos AN, Palmer TA, et al. Preference for place of death in a continuing care retirement community. Gerontologist. 2001; 41:123–128. [PubMed: 11220809]
3. CDC/NCHS. National Vital Statistics System, Mortality Worktable 307. Deaths from 39 selected causes by place of death, status of decedent when death occurred in hospital or medical center, and age. United States: 2003. Available at: http://www.cdc.gov/nchs/data/dvs/MortFinal2003_WorkTable307.pdf
4. Gruneir A, Mor V, Weitzen S, et al. Where people die: a multilevel approach to understanding influences on site of death in America. Med Care Res Rev. 2007; 64:351–378. [PubMed: 17684107]
5. Wennberg JE, Fisher ES, Baker L, et al. Evaluating the efficiency of California providers in caring for patients with chronic illnesses. Health Aff (Millwood). 2005:W5-526–W5-543. Suppl web exclusives. [PubMed: 16291779]
6. Flory J, Yinong YX, Gurol I, et al. Place of death: U. S. trends since 1980. Health Aff (Millwood). 2004; 23:194–200. [PubMed: 15160817]
7. Hansen SM, Tolle SW, Martin DP. Factors associated with lower rates of in-hospital death. J Palliat Med. 2002; 5:677–685. [PubMed: 12572966]
8. Johnson KS, Kuchibhatala M, Sloane RJ, et al. Ethnic differences in the place of death of elderly hospice enrollees. J Am Geriatr Soc. 2005; 53:2209–2215. [PubMed: 16398911]
9. Kwak J, Haley WE, Chiriboga DA. Racial differences in hospice use and in-hospital death among Medicare and Medicaid dual-eligible nursing home residents. Gerontologist. 2008; 48:32–41. [PubMed: 18381830]
10. Weitzen S, Teno JM, Fennell ML, et al. Factors associated with site of death. A national study of where people die. Med Care. 2003; 41:323–335. [PubMed: 12555059]
11. Hopp FP, Duffy SA. Racial variations in end-of-life care. J Am Geriatr Soc. 2000; 48:658–663. [PubMed: 10855602]
12. Kwak J, Haley WE. Current research findings on end-of-life decision making among racially or ethnically diverse groups. Gerontologist. 2005; 45:634– 641. [PubMed: 16199398]
13. Krakauer EL, Crenner C, Fox K. Barriers to optimum end-of-life care for minority patients. J Am Geriatr Soc. 2002; 50:182–190. [PubMed: 12028266]
14. Blackhall LJ, Frank G, Murphy ST, et al. Ethnicity and attitudes towards life sustaining technology. Soc Sci Med. 1999; 48:1779–1789. [PubMed: 10405016]
15. Chandra, A.; Skinner, JS. Geography and racial disparities. In: Anderson, NB.; Bulatao, RA.; Cohen, B., editors. Critical Perspectives on Racial and Ethnic Differences in Health in Late Life. Washington, DC: National Academies Press; 2004. p. 604-640.
16. Kirby JB, Taliaferro G, Zuvekas SH. Explaining racial and ethnic disparities in health care. Med Care. 2006; 44(5 Suppl):I64–I72. [PubMed: 16625066]
17. Kirby JB, Kaneda T. Neighborhood socioeconomic disadvantage and access to health care. J Health Soc Behav. 2005; 46:15–31. [PubMed: 15869118]
18. Taylor CB, Ahn D, Winkleby MA. Neighborhood and individual socioeconomic determinants of hospitalization. Am J Prev Med. 2006; 31:127–134. [PubMed: 16829329]

19. Winkleby MA, Cubbin C. Influence of individual and neighbourhood socioeconomic status on mortality among black, Mexican-American, and white women and men in the United States. J Epidemiol Community Health. 2003; 57:444–452. [PubMed: 12775792]
20. Center for Evaluative and Clinical Sciences. Dartmouth Atlas of Health Care 1999. Chicago, IL: American Hospital Association Press; 1999.
21. Cohen J, Bilsen J, Hooft P, et al. Dying at home or in an institution using death certificates to explore the factors associated with place of death. Health Policy. 2006; 78:319–329. [PubMed: 16343687]
22. US Census Bureau. 2000 Census of Population and Housing: Summary File 1. Washington, DC: US Census Bureau; 2001.
23. US Census Bureau. 2000 Census of Population and Housing: Summary File 3. Washington, DC: US Census Bureau; 2002.
24. Van Rensbergen G, Nawrot TS, Van Hecke E, et al. Where do the elderly die? The impact of nursing home utilisation on the place of death. Observations from a mortality cohort study in Flanders. BMC Public Health. 2006; 6:178. [PubMed: 16824222]
25. Echeverria SE, Carrasquillo O. The roles of citizenship status, acculturation, and health insurance in breast and cervical cancer screening among immigrant women. Med Care. 2006; 44:788–792. [PubMed: 16862042]
26. De Alba I, Hubbell FA, McMullin JM, et al. Impact of U.S. citizenship status on cancer screening among immigrant women. J Gen Intern Med. 2005; 20:290–296. [PubMed: 15836535]
27. Holtby, S.; Zahnd, E.; Lordi, N., et al. [Accessed November 1, 2007] Health of California's Adults, Adolescents and Children: Findings from the CHIS 2003 and CHIS 2001 [UCLA Center for Health Policy Research web site]. Jun. 2006 Available at: http://www.healthpolicy.ucla.edu/pubs/publication.asp?pubID=176
28. Braun KL, Nichols R. Cultural issues in death and dying. Hawaii Med J. 1996; 55:260–264. [PubMed: 9009454]
29. Murphy ED, Garrett JM, Evans AT, et al. Ethnicity and advance directives. J Law Med Ethics. 1996; 24:106–117.
30. Ngo-Metzger Q, McCarthy EP, Burns RB, et al. Older Asian Americans and Pacific Islanders dying of cancer use hospice less frequently than older white patients. Am J Med. 2003; 115:47–53. [PubMed: 12867234]

TABLE 1

Individual Characteristics of Adults Age 65 and Over Dying in California From 1999 to 2001 With Percent Dying as Hospital In-Patient (N = 472,382)

Individual Characteristics	Cases	% Dying in Hospital
Ethnicity		
White	370,202	36
African American	27,721	45
Foreign-born Hispanic	22,743	49
US-born Hispanic	20,598	45
Foreign-born Asian	24,503	54
US-born Asian	5351	41
Other	1264	40
Age, yrs		
65–74	112,223	44
75–84	186,942	41
85 or older	173,217	32
Gender		
Male	213,913	41
Female	258,469	36
Marital status		
Married	185,409	42
Not married	286,973	36
Education		
<7 yrs schooling	42,309	46
7–12 yrs schooling	271,829	38
More than high school	158,244	37
Selected cause of death		
Hemorrhagic stroke	6417	79
Infectious and parasitic	4393	70
Digestive system	14,222	70
Falls	2534	69
Pneumonia	20,482	61
Acute MI	38,999	46
Chronic low respiratory	31,508	46
Diabetes mellitus	12,699	41
Circulatory, nec	157,845	35
Neoplasms, not leukemia	103,739	29
ASCVD	18,537	17
Alzheimer	12,319	12

TABLE 2

Area Characteristics of Adults Age 65 and Over Dying in California From 1999 to 2001 With Percent Dying as Hospital In-Patient (N = 472,382)

Area Characteristics	Cases	% Dying in Hospital
Census block group level*		
Block group % poor		
<5	106,401	36
5 < 20	255,917	38
20+	110,064	41
Block group % non-white		
<20	116,848	34
20 < 65	234,362	37
65+	121,172	45
Miles from hospital		
<5 mile	416,095	39
5+ miles	56,287	35
Nursing home census block residence		
No	435,444	39
Yes	36,938	26
Hospital service area†		
HSA beds/1000 person		
<1.85	119,095	33
1.85 < 2.55	235,193	38
2.55+	118,094	43
HSA physicians/100,000		
<160	122,897	39
160 < 230	234,000	39
230+	115,485	36
HSA % physicians in family practice		
<12	122,349	42
12 < 17	233,275	38
17 < 38	116,758	35
HSA % non-white		
<30	98,799	32
30 < 65	257,351	38
65+	116,232	44
HSA % in poverty		
<10	158,336	36
10 < 20	231,582	38
20 < 35	82,464	44
Selected large HSA		
Los Angeles	22,849	50

Area Characteristics	Cases	% Dying in Hospital
San Francisco	13,402	45
Sacramento	13,697	36
San Diego	12,865	34
Oceanside	6569	27

* A census block group is an area of approximately 1000 persons and the smallest area for which census socioeconomic characteristics are reported.

† A hospital service area is a local health care markets for hospital care and is an aggregation of zip codes whose residents receive most of their hospitalizations from the hospitals in that area.[20]

TABLE 3

Distribution of Individual and Area Characteristics by Ethnic Group of Decedents for Adults Age 65 and Over Dying in California From 1999 to 2001 (N = 472,382)

			Hispanic		Asian/Pacific Islander		
Characteristic	**White**	**African American**	**Immigrant**	**US-Born**	**Immigrant**	**US-Born**	**Other**
Individual							
Age	81.7	79.1	80.7	77.4	80.2	79.1	78.3
Female	55.4	55.5	55.0	49.7	49.1	43.8	55.5
Married	38.6	30.7	40.3	44.6	50.3	51.7	33.0
Years of schooling	12.4	11.1	7.0	9.4	10.3	12.5	10.6
Miles from nearest hospital	2.8	2.1	2.3	2.5	1.9	1.9	3.9
% in nursing home block	8.8	4.6	4.1	4.1	4.0	5.5	5.8
Block group							
% Non-white	37.0	80.8	72.9	66.5	67.0	58.0	48.7
% Poor	10.9	22.1	19.0	17.2	13.8	11.9	16.6
Hospital service area							
Hospital Beds/1000	2.2	2.7	2.4	2.3	2.3	2.4	2.3
Physicians/100,000	201.8	201.9	181.4	177.0	205.5	213.0	185.6
% Physicians in family practice	15.1	12.4	14.3	15.1	12.7	12.9	16.7
% Non-white	46.3	68.2	65.1	61.4	61.7	59.1	46.2
% Poor	12.8	19.2	16.3	15.2	13.8	14.1	14.7

TABLE 4

Odds Ratios and 95% Confidence Intervals From Multivariate Multilevel Model Predicting Death as an Inpatient, for Individual Decedents in Block Groups and Hospital Service Areas for Adults Age 65 and Over Dying in California From 1999 to 2001 (N = 472,382)

Individual Characteristic	Odds Ratio	Confidence Interval
Ethnicity		
African American (vs. white)	1.045	(0.985–1.109)
Age* African American	1.009	(1.006–1.013)
Hispanic immigrant (vs. white)	1.351	(1.287–1.419)
Hispanic native (vs. white)	1.122	(1.081–1.165)
Asian immigrant (vs. white)	1.620	(1.516–1.731)
Asian native (vs. white)	0.977	(0.914–1.044)
Other (vs. white)	1.091	(0.970–1.226)
Other sociodemographic		
Age	0.983	(0.981–0.984)
Female (vs. male)	1.117	(1.087–1.149)
Age* female	0.985	(0.983–0.987)
Married (vs. unmarried)	1.125	(1.106–1.144)
Years of schooling	0.994	(0.992–0.996)
Resides in nursing home block (vs. does not reside in nursing home block)	0.650	(0.619–0.683)
Miles from home to hospital	0.992	(0.990–0.995)
Block group characteristics		
% poor	1.002	(1.001–1.003)
HSA characteristics		
Beds per 1000 persons	1.191	(1.107–1.281)
Beds* age	1.004	(1.002–1.007)
Physicians per 1000 persons	1.000	(0.999–1.001)
% of physicians in family practice	0.988	(0.980–0.995)
% population non-white	1.004	(1.003–1.006)

*Analyses adjusted for selected causes of death.

TABLE 5

Progression of Odds Ratios for In-Hospital Death for Ethnic Groups With Adjustment for Individual and Area Characteristics of Adults Age 65 and Over Dying in California From 1999 to 2001 (N = 472,382)

		Adjusted for Individual Characteristics Adjusted for HSA Characteristics and Random Effects		
Ethnic Group	**Unadjusted**			**Adjusted for Block Group Characteristics and Random Effects**
Non-Hispanic white (reference)	1.00	1.00	1.00	1.00
African American	1.50	1.46	1.21	1.18
Hispanic immigrant	1.73	1.57	1.36	1.34
Hispanic US-born	1.48	1.23	1.13	1.12
Asian/Pacific Islander immigrant	2.10	1.90	1.63	1.61
Asian/Pacific Islander US-born	1.27	1.12	0.98	0.98
Other	1.21	1.05	1.11	1.10