Healthcare Disparity

Leading Causes of Death for Older Asian Americans

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Abstract

Asian Americans are the fastest growing population in US, but data describing their disease burden are limited. For most US health statistics, Asian Americans are grouped into a single race category. We use a unique data file to identify causes of death for persons aged 65 or older in six Asian American ethnic subgroups (Chinese, Indians, Japanese, Koreans, Filipinos, and Vietnamese). Causes of death classified by the International Classification of Diseases, Tenth Revision (ICD–10) are ranked according to the number of deaths assigned to each cause. There are a total of 76,866 death records included in this study. The 10 leading causes of death account for 85% of all deaths for Asian Americans and the top 3 causes (heart disease, cancer, and stroke) account for 68%. The rankings and relative cause-specific mortalities varied significantly across the six Asian ethnic groups. Indians had the highest relative burden of heart disease (41.6% of all deaths), followed by Filipinos (35.6%), then the other four Asian ethnic groups (~30%). Cancer, the second leading cause of death, accounted for about 26% of all deaths for Chinese, Japanese, Koreans and Vietnamese, 21% for Filipinos and 18% for Indians. Influenza and pneumonia, chronic lower respiratory disease, diabetes, accidents (unintentional injuries), and kidney disease also ranked among the top 10 causes, but the specific ranks vary across ethnic populations. Differences in the ranking are also evident by age and sex. Because of significant heterogeneity among Asian American ethnic groups, it is more informative to calculate ethnicity-specific rankings of causes of death.

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Introduction

Although Asian Americans are the fastest growing population in US, data describing their disease burden are limited. For most health statistics, Asian Americans are grouped into a single race category, "Asian/Pacific Islander" or "Asian American". However, the ethnic subgroups that make up the Asian American race category may be too dissimilar to form an aggregate group that can be used meaningfully to track changes in disease occurrence, understand disease burden, or inform health policy.

Ranking causes of death is an effective method of illustrating the relative public health importance of diseases in a population. It informs health policy makers on health resource allocation and researchers on the priorities of research areas. It may also provide insight about disease etiology, although rankings from a proportional mortality study should be interpreted with awareness that the proportions must sum to 100%, so when one cause is decreased others must increase. In this study, we used a nationally representative sample to determine the proportionate mortality and rank the causes of death for adults aged 65 or older in six largest Asian American subgroups: Chinese, Indian, Japanese, Korean, Filipino, and Vietnamese.

Data and Methods

This project uses four data sources: two administrative files at the Social Security Administration (SSA), the 1990-1999 Death Statistical Master file for the state of California, and the National Death Index (NDI). The study design has been previously described in detail,[1,2] and the description of the Asian group identification and database linkages to cause of death information are similar to those previously published.[2] The general strategy was to link the SSA enrollment file, which includes sex, date of birth, and the fact and date of death to a second SSA file containing information that we used to infer Asian ethnic group: race, country of birth (available for most persons), surname, father's surname (for women), and given name. Then using social security numbers and sex, we linked the identified SSA death records of Asian Americans to primary cause of death information

recorded on death certificates, which are available from the California Master Death file and the NDI.

In order to accurately identify and infer Asian ethnicity, we have developed name lists and algorithms specific to each of the six largest Asian American subgroups (Chinese, Asian Indian, Japanese, Korean, Filipino, Vietnamese) using the linked SSA files. An earlier paper describes in detail the derivation and evaluation of *conditional* and *unconditional* surname lists for each of the six Asian populations: *conditional* lists when a person is known to be Asian (e.g., a record has an "Asian or Pacific Islander" race code) and *unconditional* lists when race is not known.[3] Most names on a conditional list are also on the corresponding unconditional list, but some are not. For example, if a person named "Bang" is known to be Asian, then that person is very likely Korean; however, the surname "Bang" is often not Asian. Similarly, persons with Spanish surnames are rarely Asian; however, if someone with a Spanish surname has been identified as Asian, then he is almost certainly Filipino.

The lists were derived from the data elements for race and country of birth in an SSA administrative file. A name was included in the conditional list for a particular subpopulation if the name was not rare (that is, occurred at least five times in the source file) and if most persons born in Asia with that name were born in the associated country (for example, Korea, North Korea or South Korea for Korean names). The frequency of the name by race was used to determine whether the name could also be included on the unconditional list. The lists were evaluated with the help of the Census Bureau, using a file which the Census Bureau had created in conjunction with the 1990 post-enumeration survey: ethnic identification by surname was compared with self-identified ethnicity. Because surnames in different Asian countries vary in how ethnically specific they are and also in how many surnames occur in the population (for example, there are far fewer surnames in Korea than India), the lists vary in the proportions of all people in the ethnic group who may be identified by having a distinctive and non-rare name. The Vietnamese and Japanese lists are the most inclusive, and the Indian and Filipino the least inclusive. Given name lists were derived similarly to the surname lists, except that there are separate lists for men and women. The lists are not conditional on Asian identification.

Thus to assign subpopulation, there is a race code and 3 additional items: place of birth (if known), whether the surname/maiden name is on the surname lists (conditional or also unconditional), and whether the given name is on a list. Since none of these items of information is perfectly specific, we developed an algorithm for inferring ethnicity.[1] The algorithm has three branches, according to whether the race code is indicative of Asian ("Asian" or "other"), uninformative (blank) or contra-indicative (all other race codes). For Filipino identification, "other" was considered uninformative rather than indicative, because there are many Hispanic persons in the "other" category. For Asian Indians, both "white" and "American Indian" were considered uninformative rather than contra-indicative, because the racial categorization of Asian Indians is historically complicated: many persons from India pick "white" when faced with the usual U.S. race categories, and recent immigrants may mistakenly endorse "American Indian."

The basic algorithm infers ethnicity from (a) surname – using the conditional list, given name, or place of birth (in that order of precedence) when the race code is indicative of Asian identification, (b) surname – using the unconditional list, given name, or place of birth (in that order of precedence) when the race code is uninformative, or (c) two pieces of information pointing to a particular ethnicity when the race code is contra-indicative. For the third rule, no ethnic assignment was made when surname/maiden name pointed to a different ethnicity than both place of birth and given name.
Only persons enrolled in Medicare Part B at some time during the 1990s were included because death information is highly accurate for Medicare B enrollees. A 10-year period (1990-1999) was chosen to obtain reliable death rates for relatively small populations. There were 135,895 Asian American death records. The assignment of individual records to Asian subgroups and the calculation of death rates were done by a colleague at the SSA because of the confidentiality of SSA records for living persons. SSA death records, however, could be released for linkage to external files.

To determine cause of death, we linked the SSA death records to primary cause of death information recorded on death certificates. Because 40 percent of the SSA death records listed California as the last state of residence and because California makes available to researchers complete files of death certificates with names and social security numbers, we matched SSA death records to the California death master file using social security numbers and sex. There were 57,801 matches. Of persons who last lived in California according to SSA records, 57,367 were matched (89.7%). Of those who last lived outside of California, 434 were matched (0.6%). For matched cases, 96.4% had an exact last name match on the SSA and California files; 76.9% had exact first name match; 99.9% had exact year of death match; and 98% had the same age at death. We examined cases with differences in first name and found that almost all were variant spellings. Therefore, we accepted all matches. We used the primary cause-of-death code from the California death certificates.

To determine cause of death for the rest of the SSA death records, we used the National Death Index. The NDI is a national database of death records maintained by the National Center for Health Statistics and available to researchers on a fee basis per record searched. We drew a sample of 20,000 unmatched SSA records, stratified by ethnic group and nativity, with higher sampling probabilities for the smaller ethnic groups so that cause-specific rate estimates would be similarly precise for smaller and larger ethnic groups. In total, 19,954 matched records were returned from NDI. Multiple matches were generated for some subjects. For each

subject, the first record with highest probability matching score was retained. As a result, 19,072 subjects were matched. However, 7 matched cases had a missing value in the cause of death field and were excluded. In total, 76,866 (56.6%) of the 135,895 SSA death records were matched; 57,801 from the California death master file (57,367 California residents and 434 last resident in other states) and 19,065 from NDI (448 California residents and 18,617 last resident in other states). Essentially, 9 sampling strata were formed, one for California deaths and eight for non-California deaths. Sampling weights were defined as the inverse of the probability of selection and matching. For persons lived in California, the sampling weight was 1.11; for person lived out of California, the sampling weights were 6.07 for foreign-born Chinese, 2.89 for native-born Chinese, 2.19 for Indians, 1.35 for foreign-born Japanese, 7.90 for native-born Japanese, 2.44 for Koreans, 5.38 for Filipinos, and 1.51 for Vietnamese. We calculated sampling weights for each specific ethnic-, sex-, and age-stratum for each cause of death examined. Age was categorized into 5 groups: 65-69, 70-74, 75-79, 80-84, and ≥85 years old. Because of the sampling scheme, sampling weights varied across ethnic groups but were similar across age and sex groups within ethnic group.

The classification code for deaths changed in 1999 from the International Classification of Diseases, Ninth Revision (ICD-9) to Tenth Revision (ICD-10), and we accounted for this change using a method developed by the National Center for Health Statistics.[4,5] By double-coding 1996 death records, the National Center for Health Statistics calculated comparability ratios for 113 selected causes of death that were the number of deaths from a specific cause classified by ICD-10 divided by the number of deaths classified by ICD-9. These ratios allow us to estimate the number of deaths that would have been coded to any of the 113 causes under ICD-10 rules for the years 1990-1998. Specifically, we multiplied these ratios (coded as 1 for deaths in 1999) by sampling weights to estimate the number of death for each specific cause of death.

To rank causes of death and calculate proportionate mortalities, we employed of method developed and used by National Center for Health Statistics.[6] From the ‘‘List of 113 selected causes of death’’, 50 rankable causes were chosen. These are broader categories. For example, lung cancer is not a rankable cause of death though it accounted about 6% of total deaths in this population. Rather, it is subsumed in malignant neoplasms. For comparison, national deaths for Whites were calculated for 1990-1999, based on publicly-available data.[7,8] This study was approved by the Institutional Review Board of the University of Chicago.

Results

The 10 leading causes of death for Asian Americans and Whites are presented in **Table 1**. The top three causes – heart disease, malignant neoplasms (cancer), and cerebrovascular diseases (stroke) – accounted for 68% of all deaths in Asian Americans in 1990s. These three causes accounted for 67% in White in 1990s but the composition was different: the proportional mortality from heart diseases was higher in Whites than in Asian Americans whereas cancer and stroke contributed relatively more deaths in Asian Americans. Influenza and pneumonia ranked fourth, followed by chronic lower respiratory diseases in Asian Americans. In contrast, chronic lower respiratory diseases ranked fourth and Influenza and pneumonia ranked fifth in Whites. Diabetes ranked sixth in both Asian Americans and Whites. Alzheimer’s disease was the 7th leading cause of death in Whites but it ranked only 12th in Asian Americans. Primary hypertension and hypertensive renal disease made into the top 10 causes in Asian Americans but not in Whites.

Table 2 contrasts the leading causes of death across the six Asian American ethnic subgroups. The six ethnic subgroups had eight of the leading causes of death in common but have different relative mortality. Although heart diseases, cancer and stroke ranked as the top three causes in all six ethnic populations, Indians (41.6%) had the highest relative burden of heart disease, followed by Filipinos (35.6%). The other four Asian American populations had relatively lower proportion of heart diseases (~30%) and higher proportion of cancer (~26%) than Indians and Filipinos (see **Figure 1**). Influenza and pneumonia, chronic lower respiratory diseases, diabetes, accidents, and kidney disease also ranked among the 10 leading causes of death for each ethnic subgroup. However, the specific ranks of these five causes are all different across ethnic populations. Some of the leading causes were shared by some ethnic subgroups but not others. Hypertension and hypertensive renal disease ranked 9th for Chinese and Vietnamese and 10th for Koreans and Filipinos, but was not in the leading 10 causes for Japanese and Indians. Septicemia ranked 9th for Indians and 10th for Chinese and Japanese, but was not in the top 10 for the other three subgroups. Aortic aneurysm and dissection made into the top 10 only for Japanese and Filipinos. Chronic liver disease and cirrhosis was among the top 10 causes of death for Koreans, Indians, and Vietnamese, but not for the other three ethnic subgroups.

Figure 2 presents the leading five causes of death stratified by ethnicity and gender. Indians had relatively higher burden of heart diseases and relatively lower burden of cancer and stroke in both men and women. Korean men had the highest relative burden of cancer, but Korean women had similar relative burden of cancer compared with other ethnic women. Stroke ranked third in both men and women. Although proportions of deaths due to stroke were similar across ethnicities (except Indians), the relative burden of mortality from this cause is generally higher for women (12%-13%) than men (9%-11%). Diabetes was among the top five for women in each ethnic population, but it was only among the top five for Indian men. In contrast, chronic lower respiratory diseases was among the top five for men in each ethnic population, but was among the top five only for Indian and Korean women. Influenza and pneumonia was a leading five

cause for some ethnic subgroups but not others, for either men or women.

The leading five causes of death stratified by ethnicity and age are illustrated in **Figure 3**. The leading causes of death varied substantially by age. For persons aged 65-74 years, cancer was the number one killer for Chinese, Japanese, Koreans, and Vietnamese, whereas heart disease was the leading cause of death for Indians and Filipinos. For persons aged 75-84 years, heart disease ranked first for each ethnic subgroup and cancer was a close second for Chinese, Japanese, Koreans, and Vietnamese. For persons 85 or older, heart disease was the dominant leading cause of death in each ethnic population. Stroke ranked third for each age and ethnic subgroup, except for Japanese aged 85+, for whom stroke ranked second. The relative burden of mortality from stroke typically increased from the youngest elderly to the oldest elderly. For persons aged 65-74 years, diabetes was a leading five cause for each ethnic subgroup and chronic lower respiratory diseases was among the top five for all ethnic subgroups except for Koreans, for whom chronic lower respiratory diseases was replaced by unintentional injury. For persons aged 75-84 years, chronic lower respiratory diseases, influenza and pneumonia, and diabetes were among the top five causes of death, but none of them made into the top five in all ethnic populations. For persons 85 years or older, influenza and pneumonia ranked fourth for each ethnic subgroup and chronic lower respiratory diseases ranked fifth for all ethnic subgroups except for Japanese, for whom chronic lower respiratory diseases was replaced by Alzheimer's disease.

Discussion

This study presents leading causes of death by ethnicity, sex, and age category for six older Asian American ethnic groups who were enrolled in Medicare at any point from 1990 to 1999. In this report, we demonstrated that there was heterogeneity for the relative burden of cause-specific mortality among the six Asian ethnic groups. Ethnicity-specific health problems may be masked when statistics are reported for an aggregate Asian group. Each of the six Asian ethnic groups had a different rank ordering of leading causes of death and proportionate mortality. If one does need to group the six ethnic groups, because of sample size, our data suggest that two clusters may be reasonably formed: Chinese, Japanese, Koreans and Vietnamese are in the first cluster, characterized with heart disease being the leading cause of death and cancer being a close second; Indians and Filipinos form the second cluster, since for them heart disease as a more dominant leading cause of death.

Age distribution should be considered when comparing rankings across ethnic groups. For the large category of older Asian Americans, there was a minor difference in age distribution among ethnic groups. The mean age was 80.1 years for Japanese, 79.8 for Chinese, 78.9 for Filipinos, 78.8 for Koreans, 78.7 for Vietnamese, and 76.9 for Indians. However, Indians had the highest relative burden of heart diseases and Filipinos had the second highest relative burden of this cause in each age category, suggesting that the ethnic disparity is not due to the confounding effect of age. This finding indicates that the risk factor profile for heart disease may vary across ethnic populations.

One advantage to this study is that it reflects a very large and nationally representative sample of older Asian Americans, since the very great majority of elderly are enrolled in Medicare. The large sample size (about 77 thousand death certificates) makes the estimate of rankings and proportionate mortality highly accurate. Another advantage is that we used a validated Asian ethnicity inference method to ensure accurate ethnic designation. The limitation of this study is that our unique linked data set cannot be readily updated, so the years of observation are limited to the 1990s. However, our somewhat dated database confirms the importance of ethnicity-specific data sources for studies of health and disease among Asian Americans.

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References

1. Lauderdale DS, Kestenbaum B. Mortality rates of elderly Asian American populations based on Medicare and Social Security data. Demography. 2002;39(3):529-540.
2. Lauderdale DS, Huo D. Cancer death rates for older Asian-Americans: classification by race versus ethnicity. Cancer Causes Control. 2008;19(2):135-146.
3. Lauderdale DS, Kestenbaum B. Asian American ethnic identification by surname. Popul Res Policy Rev. 2000;19(1):283-300.
4. Anderson RN, Minino AM, Hoyert DL, et al. Comparability of cause of death between ICD-9 and ICD-10: preliminary estimates. Natl Vital Stat Rep. 2001;49(2):1-32.
5. National Center for Health Statistics. Documentation for the public use multiple cause of death file on comparability between ICD-9 and ICD-10: A double-coded file based on the 1996 data year multiple cause of death file. Hyattsville, MD: National Center for Health Statistics.
6. Heron M. Deaths: leading causes for 2004. Natl Vital Stat Rep. 2007;56(5):1-95.
7. National Center for Health Statistics. Deaths for 113 Selected Causes by 5-Year Age Groups, Race, and Sex: United States, 1979-98. http://www.cdc.gov/nchs/data/statab/hist002_2.pdf. December 12, 2008.
8. National Center for Health Statistics. Death Rates from 113 Selected Causes, United States, Specified Hispanic Origin, Race for Non-Hispanic Population, 1999, 2001, 2002. http://www.cdc.gov/nchs/datawh/statab/unpubd/mortabs/gmwkh210_10.htm. December 12, 2008.

Table 1. Proportional mortality for the 10 leading causes of death for persons 65 years and older, by race.

Cause of death, based on ICD-10	Asian American			White	
	Rank	Deaths	% of total death	Rank	% of total death
Diseases of heart	1	43574	32.4	1	36.1
Malignant neoplasms	2	32804	24.4	2	22.5
Cerebrovascular diseases	3	14919	11.1	3	8.4
Influenza and pneumonia	4	5797	4.3	5	3.2
Chronic lower respiratory diseases	5	5448	4.0	4	5.7
Diabetes mellitus	6	4564	3.4	6	2.4
Accidents (unintentional injuries)	7	2669	2.0	8	1.7
Nephritis, nephrotic syndrome and nephrosis	8	2212	1.6	9	1.4
Hypertension and hypertensive renal disease	9	1401	1.0	15	0.6
Septicemia	10	1349	1.0	10	1.1
Alzheimer's disease	12	972	0.7	7	1.9

Note: Ranks above 10 are provided for informational purposes when a cause is among the top 10 for one of the groups being compared.

Figure 1. Percentage of total deaths for the top five causes of death by ethnicities, 65 years or older. COPD, chronic obstructive pulmonary diseases; CLRD, chronic lower respiratory diseases.

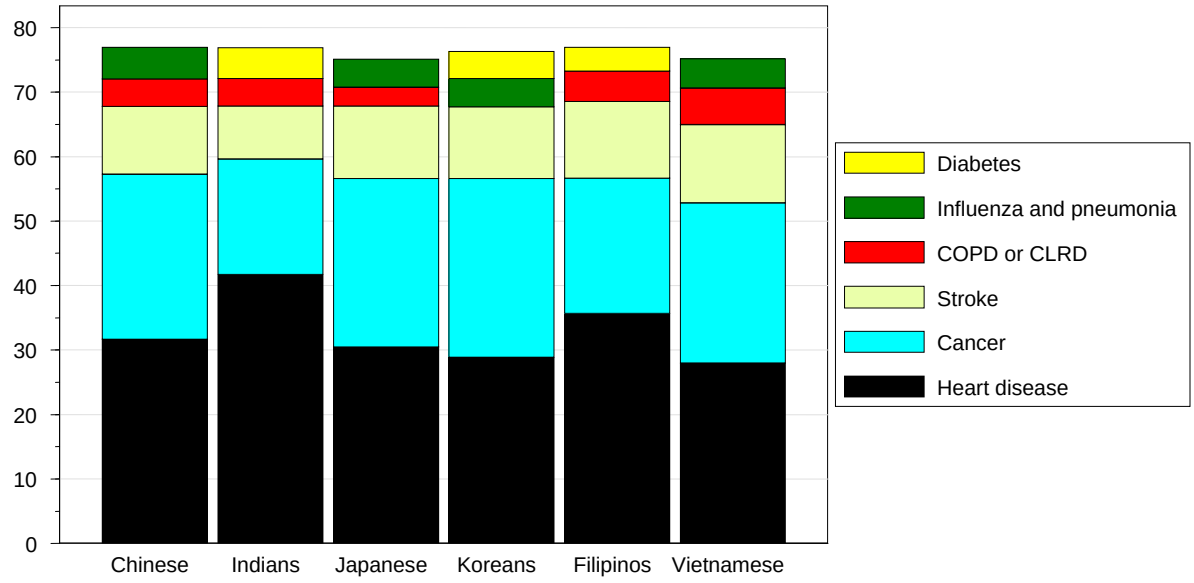

Figure 2. Percentage of deaths for the top five causes of death by ethnicities among men and women, 65 years or older. COPD, chronic obstructive pulmonary diseases; CLRD, chronic lower respiratory diseases.

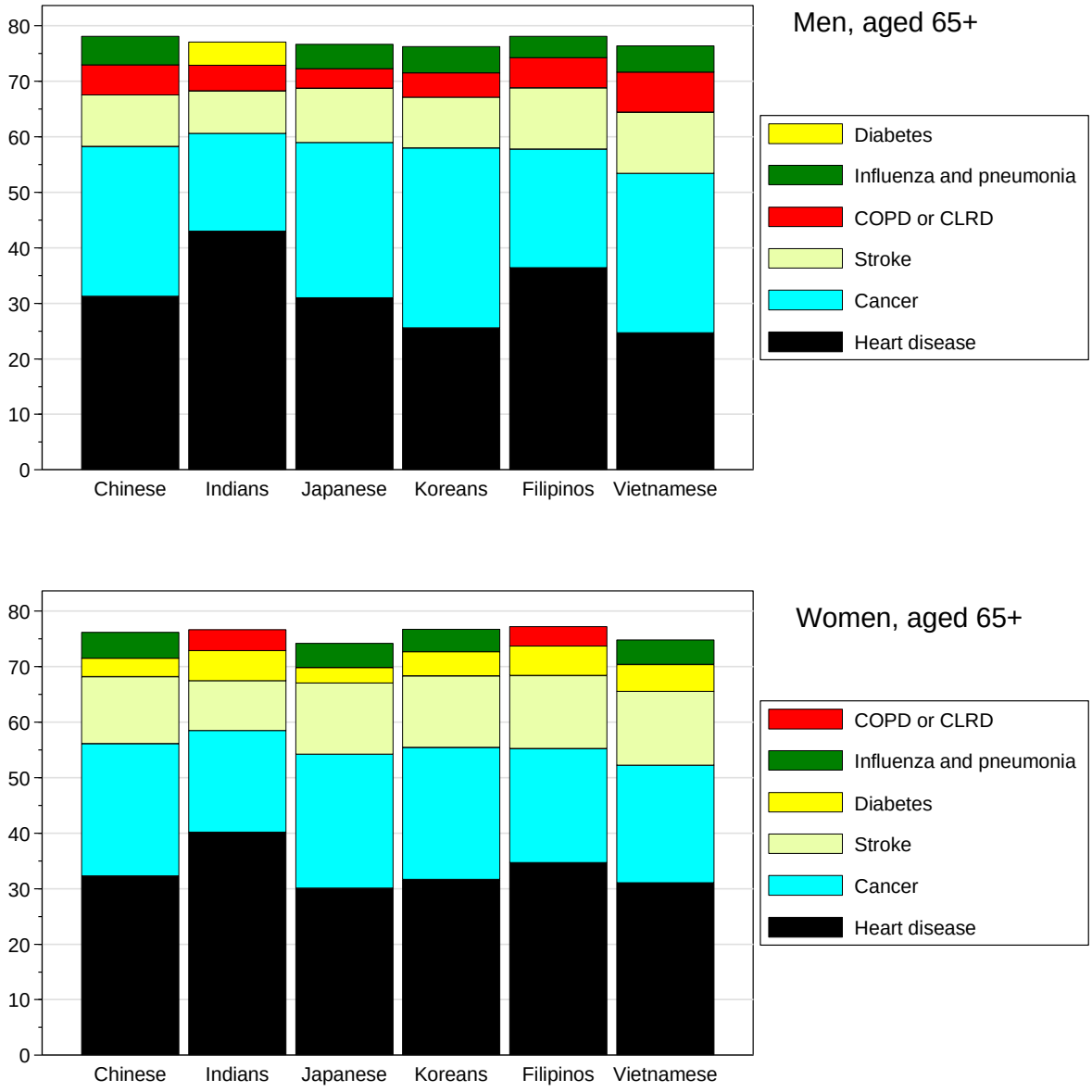

Figure 3. Percentage of deaths for the top five causes of death, by ethnicities, by age groups. COPD, chronic obstructive pulmonary diseases; CLRD, chronic lower respiratory diseases.

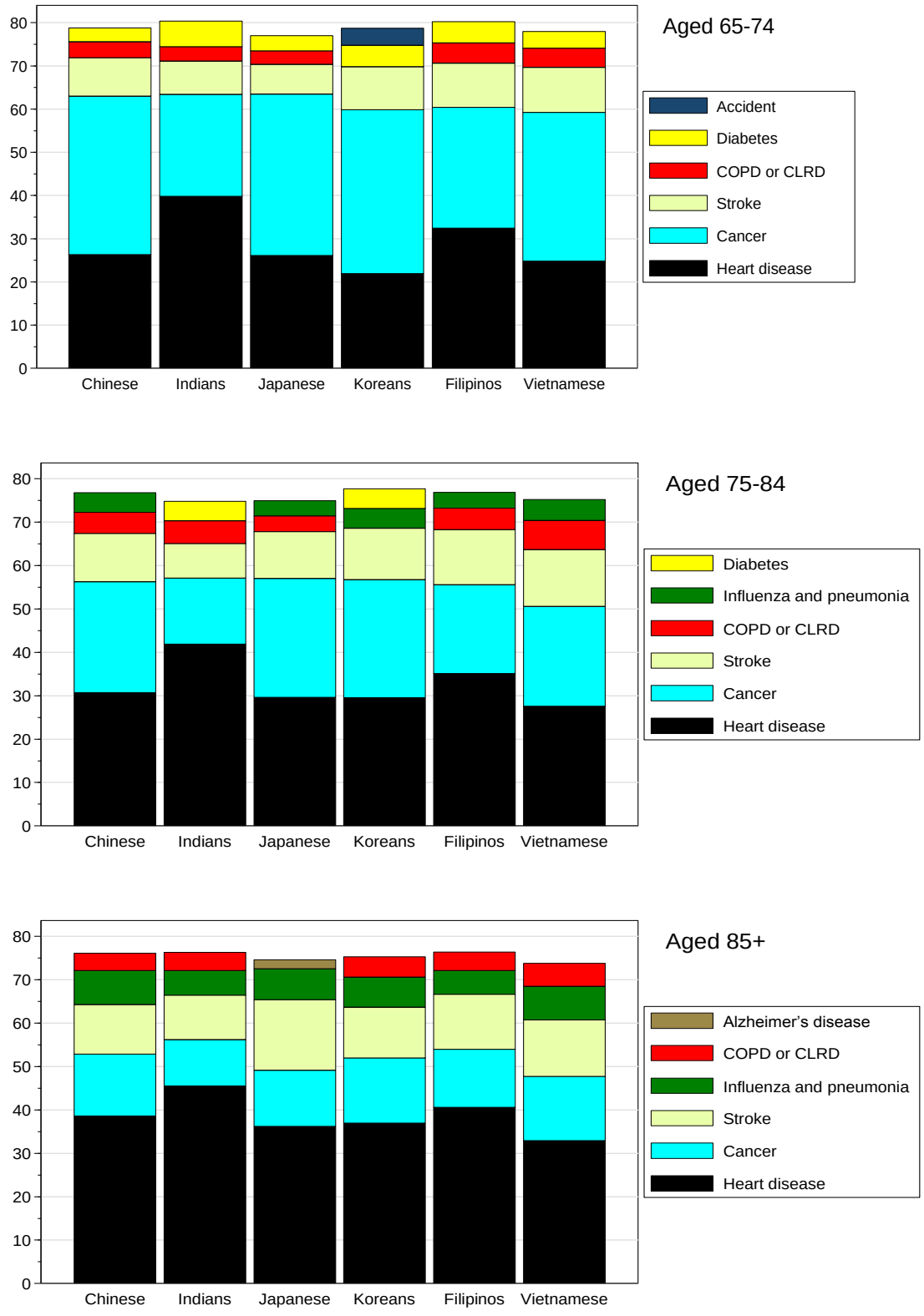

Table 2. Proportional mortality for the 10 leading causes of death for persons 65 years and older, by ethnicity.

Cause of death, based on ICD-10	Chinese (N=41677)		Indians (N=7391)		Japanese (N=34840)		Koreans (N=10921)		Filipinos (N=31144)		Vietnamese (N=8667)	
	Rank	% of total death	Rank	% of total death	Rank	% of total death	Rank	% of total death	Rank	% of total death	Rank	% of total death
Diseases of heart	1	31.7	1	41.6	1	30.5	1	28.8	1	35.6	1	27.9
Malignant neoplasms	2	25.5	2	18.0	2	26.1	2	27.7	2	21.0	2	24.9
Cerebrovascular diseases	3	10.6	3	8.2	3	11.3	3	11.2	3	11.9	3	12.1
Influenza and pneumonia	4	4.9	6	3.4	4	4.4	4	4.4	6	3.5	5	4.6
Chronic lower respiratory diseases	5	4.2	5	4.3	5	2.9	6	3.8	4	4.7	4	5.6
Diabetes mellitus	6	3.2	4	4.7	6	2.7	5	4.2	5	3.7	6	3.9
Accidents (unintentional injuries)	7	1.9	8	1.7	7	2.0	7	3.2	8	1.7	8	1.6
Nephritis, nephrotic syndrome and nephrosis	8	1.8	7	1.8	9	1.2	8	1.2	7	1.8	7	2.1
Hypertension and hypertensive renal disease	9	1.1	11	0.9	12	0.9	10	1.0	10	1.1	9	1.4
Septicemia	10	1.0	9	1.2	10	1.1	13	0.7	11	1.0	12	0.8
Aortic aneurysm and dissection	11	0.9	17	0.3	8	1.3	14	0.6	9	1.3	20	0.4
Chronic liver disease and cirrhosis	17	0.6	10	1.0	15	0.7	9	1.0	14	0.5	10	1.1

Note: order of causes of death is based on rank in all Asian Americans. Ranks above 10 are provided for informational purposes when a cause is among the top 10 for one of the groups being compared.