Stomach Cancer among New Mexico's American Indians, Hispanic Whites, and Non-Hispanic Whites

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ABSTRACT

Stomach cancer incidence rates vary by ethnic group in New Mexico, with American Indians and Hispanic Whites at higher risk than the state's non-Hispanic White population. To further characterize the descriptive epidemiology of this disease in New Mexico, we investigated temporal trends in stomach cancer mortality and incidence rates. Stomach cancer mortality rates declined over a 25-year period (1958–1982) among New Mexico's Hispanic and non-Hispanic Whites. Birth cohort analysis suggests that much of the decline was achieved prior to 1968. Stomach cancer mortality rates did not drop among American Indians during the same period. Stomach cancer incidence rates remained constant for Hispanic Whites, non-Hispanic Whites, and American Indian males over a 13-year period (1969–1982), but more than doubled among American Indian females. Although environmental factors have been implicated in the etiology of stomach cancer, little is currently known about the distribution of such risk factors among the ethnic groups described in this report. The environmental and biological correlates of sex, ethnicity, and socioeconomic status that determine stomach cancer risk merit further investigation in New Mexico.

INTRODUCTION

The occurrence of stomach cancer has shown dramatic geographic and temporal variation (1–3). Stomach cancer incidence rates for males range from 3.7 per 100,000 in Dakar, Senegal, to 100.2 per 100,000 in Nagasaki, Japan (4). Females are at lower risk for the disease than males, but their rates also vary widely worldwide (1–4). Many countries experienced a decline in mortality from stomach cancer during this century (1–3): in the United States males, stomach cancer mortality rates dropped from 37 per 100,000 in 1930 to 9 per 100,000 in 1977 (5). Similarly, the United States experienced a 73% drop in stomach cancer incidence rates during the period 1950–1985 (6).

Within the United States, racial/ethnic differences in the occurrence of stomach cancer are well documented. Incidence and mortality rates for Blacks, Japanese, Chinese, and Native Hawaiians are higher than those reported for Whites (7). Earlier reports have shown that stomach cancer incidence rates vary by ethnic group in New Mexico, with American Indians and Hispanic Whites at higher risk than the state's non-Hispanic White population (7). To further characterize the descriptive epidemiology of this disease in New Mexico, we investigated temporal trends in stomach cancer mortality and incidence rates by examining data from the New Mexico Bureau of Vital Statistics (1958–1982) and the population-based New Mexico Tumor Registry (1969–1982). In this paper, we discuss the differing patterns of change in stomach cancer incidence and mortality rates among the culturally diverse residents of this state.

MATERIALS AND METHODS

Death certificate data for New Mexico residents for the years 1958–1982 were obtained from the New Mexico Bureau of Vital Statistics. Cause of death was coded according to the seventh revision of the ICD for the years 1958–1968 (8), the eighth ICD revision for the years 1969–1978 (9), and the ninth ICD revision for the years 1979–1982 (10). Deaths attributed to stomach cancer were coded as 151.0–151.9 in the seventh, eighth, and ninth ICD revisions.

The New Mexico Bureau of Vital Statistics assigns ethnicity on the basis of information contained on individual death certificates. Hispanic ethnicity is determined on the basis of the decedent's surname, the surnames of the decedent's parents, and from specific statements on the death certificate. American Indians are identified solely on the basis of information cited on the death certificate. Non-Hispanic Whites are those individuals whose race is coded as White and who do not have a Spanish surname or other information to indicate that they are Hispanic.

An enumeration of incident stomach cancer cases diagnosed among New Mexico residents during the period 1969–1982 was obtained from the population-based New Mexico Tumor Registry (7). Cancer primary site and histological type are coded according to the ICD; the ICDO codes for stomach cancer are 151.0–151.9 (11). The Registry determines ethnicity from multiple sources of information. Hispanic Whites are identified through designation in medical records, on the basis of surname, and from statements on death certificates. American Indians are also identified through specific designation on medical records, their coverage by the Indian Health Service, and by residence on Indian lands. Persons designated as White or Caucasian who do not have a Spanish surname are coded non-Hispanic Whites. We limited our analyses to American Indians, Hispanic Whites, and non-Hispanic Whites because of the small number of stomach cancer cases among Blacks, Asians, and other racial/ethnic groups in New Mexico.

Denominators for rate calculations in New Mexico were derived from the censuses of 1960, 1970, and 1980 as previously described (12). Estimates of the American Indian population for 1960 were adjusted to account for systematic errors that occurred in data processing, and denominators for the Hispanic population were adjusted to account for changes in enumeration procedures between the censuses of 1960 and 1980.


For reference, nationwide age-specific and age-adjusted stomach cancer mortality rates for United States Whites and Blacks were calculated from National Center for Health Statistics data for the years 1960, 1965, 1970, 1975, and 1980 (13–17). Age-adjusted cancer incidence rates for United States Whites and Blacks were obtained from the Third National Cancer Survey (18) and the Surveillance, Epidemiology, and End Results Program of the National Cancer Institute (7).
RESULTS

To assess the validity of mortality data, we reviewed the death certificate-reported cause of death for all deceased cancer patients who were diagnosed between 1973 and 1982. Stomach cancer was coded as the primary cause of death for 75% of deceased patients with a primary diagnosis of stomach cancer; the percentage was slightly greater (77%) for patients diagnosed with regional and remote stages of the disease. Similar patterns were observed in all three ethnic groups.

Mortality Data. Stomach cancer mortality rates for New Mexico Hispanic and non-Hispanic Whites declined from 1958 to 1982 (Table 1); in contrast, the rates increased among American Indians. Hispanics of both sexes and non-Hispanic White males experienced an approximate 50% reduction in stomach cancer mortality rates during this period; rates for non-Hispanic White females declined by 28%. Non-Hispanic Whites were at slightly lower risk of death from stomach cancer than United States Whites. Rates for New Mexico Hispanics were similar to those for United States Blacks, which were nearly double the rates for Whites nationwide. During the period 1958–1962, the rates for American Indians were comparable to those of non-Hispanic Whites. In the final time period of study, American Indian rates had increased and were similar to those of New Mexico Hispanic Whites and United States Blacks.

Most age-specific mortality rates for Hispanic and non-Hispanic Whites declined from 1958–1982 (Figs. 1–4). Much of the decline was observed between the first and second time periods in the study (1958–1962 to 1963–1967). Age-specific mortality rates for American Indians varied widely and patterns of change could not be readily interpreted due to the small number of deaths (data not shown).

Incidence Data. From 1969–1982, little change occurred in the average annual age-adjusted stomach cancer incidence rates for non-Hispanic Whites, Hispanic Whites, and American Indian males (Table 2). However, rates for American Indian females increased more than 2-fold during this period. Incidence rates were slightly lower for New Mexico non-Hispanic Whites than for United States Whites. New Mexico Hispanic White and American Indian rates were similar to those of United States Blacks, and were higher than those observed in United States Whites (except American Indian females, 1969–1972).

DISCUSSION

These data show that recent temporal changes in stomach cancer mortality rates vary by ethnic group in New Mexico. During the period 1958–1982, New Mexico’s Hispanic and non-Hispanic Whites experienced a decline in stomach cancer mortality similar to that observed among United States Whites and Blacks. Age-specific rates by birth cohort show that much of the decline was achieved prior to 1968 (Figs. 1–4). In contrast, mortality rates increased among American Indians during the same period. Stomach cancer incidence rates from 1969–1982 were stable among non-Hispanic Whites, Hispanic Whites, and American Indian males, but increased among American Indian females.

Although mortality rates for Hispanic Whites declined during the study period, Hispanic Whites were consistently at greater risk of dying from the disease than were non-Hispanic Whites in this state. High rates of stomach cancer have been reported among other Hispanic populations in the United States (19–21), and in Puerto Rico (7), Colombia (4), and Spain (4). Data from other locations also suggest that stomach cancer incidence and mortality may be declining among Hispanics: Savitz (19) reported a 42% decline in stomach cancer incidence rates for Spanish surname males in Denver, Colorado, between the periods 1969–1971 and 1979–1981; comparable rates for Hispanic females increased slightly. In Texas, a small decline in mortality from stomach cancer was observed among Hispanic males and females between the periods 1969–1972 and 1977–1980 (20). Nevertheless, rates for Hispanics remained higher than for non-Hispanics in both Colorado and Texas.

This and previous investigations provide an ambiguous picture of stomach cancer incidence and mortality in American Indians. Individual studies have placed southwestern American

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**Table 1** Average annual age-adjusted stomach cancer mortality rates* for New Mexico residents, by ethnic group and sex, and for United States Whites and Blacks, 1958–1982

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<tbody>
<tr>
<td>New Mexico non-Hispanic Whites</td>
<td>Males</td>
<td>13.6 (126)</td>
<td>7.8 (91)</td>
<td>6.0 (69)</td>
<td>5.9 (80)</td>
<td>6.2 (103)</td>
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<td></td>
<td>Females</td>
<td>5.3 (61)</td>
<td>3.3 (51)</td>
<td>4.2 (64)</td>
<td>3.8 (67)</td>
<td>3.8 (82)</td>
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<tr>
<td>New Mexico Hispanic Whites</td>
<td>Males</td>
<td>32.6 (185)</td>
<td>21.4 (119)</td>
<td>23.6 (136)</td>
<td>15.3 (98)</td>
<td>16.1 (116)</td>
</tr>
<tr>
<td></td>
<td>Females</td>
<td>17.8 (90)</td>
<td>10.5 (63)</td>
<td>12.7 (76)</td>
<td>9.4 (66)</td>
<td>8.9 (74)</td>
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<tr>
<td>New Mexico American Indians</td>
<td>Males</td>
<td>12.8 (10)</td>
<td>13.9 (13)</td>
<td>16.0 (15)</td>
<td>17.5 (19)</td>
<td>16.1 (20)</td>
</tr>
<tr>
<td></td>
<td>Females</td>
<td>6.1 (5)</td>
<td>5.8 (5)</td>
<td>3.1 (3)</td>
<td>4.1 (4)</td>
<td>9.4 (14)</td>
</tr>
<tr>
<td>United States Whites</td>
<td>Males</td>
<td>16.2 (5)</td>
<td>12.5 (5)</td>
<td>10.4 (3)</td>
<td>8.8 (4)</td>
<td>7.6 (4)</td>
</tr>
<tr>
<td></td>
<td>Females</td>
<td>8.4 (11.6)</td>
<td>6.5 (10.1)</td>
<td>5.1 (7.8)</td>
<td>4.4 (7.1)</td>
<td>3.7 (6.3)</td>
</tr>
<tr>
<td>United States Blacks</td>
<td>Males</td>
<td>26.0 (22.6)</td>
<td>20.0 (17.4)</td>
<td>14.6 (10.7)</td>
<td>7.1 (7.1)</td>
<td></td>
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<tr>
<td></td>
<td>Females</td>
<td>11.6 (10.1)</td>
<td>7.8 (7.1)</td>
<td>6.3 (6.3)</td>
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* Rates per 100,000.

Numbers in parentheses, number of deaths.
Indians at lower (22–23), similar (24), and higher (7, 25) risk of the disease than United States Whites. The findings of the present report suggest that mortality rates for southwestern American Indian tribes have increased since 1958, and that these tribes are now at high risk of disease. Although the increased mortality rates may represent a true increase in the occurrence of stomach cancer, the higher rates may reflect increased access to medical care, improved diagnostic procedures, and increased accuracy in reporting of death certificate data. The contribution of changing medical care cannot be assessed with available data. Nonetheless, there is currently no indication that southwestern American Indians have experienced a decline in the occurrence of stomach cancer similar to that observed among other populations in the United States and in other parts of the world; Creagan and Fraumeni (26) made a similar observation in a nationwide study of American Indian mortality for the period 1950–1967. New Mexico Tumor Registry data are consistent with this trend; stomach cancer incidence rates remained constant among American Indian males for 1969–1982, and increased among American Indian females during the same period.

Characteristics of the stomach cancer experience in New Mexico are consistent with observations described in previous reports, including predominance of the disease in males and an inverse correlation with socioeconomic status. Rates of stomach cancer are higher for males than for females in each geographic area that has reported such data (1–3), and New Mexico is no exception (Tables 1 and 2). The male:female ratio of age-adjusted mortality rates for non-Hispanic Whites declined from 2.6 in 1958–1962 to 1.6 in 1978–1982 (Table 1). Although the ratio of male:female rates in American Indians dropped from 2.1 in 1958–1962 to 1.7 in 1978–1982, the ratio reached 5.2 in 1968–1972 and 4.3 in 1973–1977. Little change was observed...
in the ratio of male:female rates for Hispanic Whites from 1958 to 1982. Lauren proposed two major histological classifications of stomach cancer that together account for approximately 80% of all cases of the disease. The male:female ratio for the “intestinal” type of stomach cancer is higher than that of the “diffuse” type, and some studies suggest that observed declines in stomach cancer incidence and mortality may be largely due to a decrease in the intestinal type of stomach cancer (1–3). We speculate that the intestinal type of stomach cancer may have declined among non-Hispanic Whites, while remaining high in Hispanic Whites and American Indians, although the appropriate histological review and analysis have not yet been done.

Socioeconomic status has been inversely correlated with the occurrence of stomach cancer (2–3). Ecological comparisons of census data with stomach cancer incidence and mortality rates from New Mexico are consistent with these observations. The percentage of New Mexico families living below the poverty level in 1979 was 37.9 for American Indians, 20.7 for Hispanics, and 7.1 for non-Hispanic Whites (27), a pattern that follows the relative ranking of incidence in the three groups (Table 2). The biological correlates of sex, ethnicity, and socioeconomic status in New Mexico that determine stomach cancer risk merit further investigation.

Our investigation suggests that the divergent trends in racial and ethnic groups described in the present report are not due to problems with cause-of-death assignment, ethnic misclassification, or choice of denominators for rate calculation. Concerns about the validity of death certificate cause-of-death statements are well documented (28–29); however, death certificate data for stomach cancer may provide a reasonably valid measure of disease occurrence (29). Seventy-five % of deceased stomach cancer patients in New Mexico who were diagnosed during 1973–1982 had stomach cancer listed as the cause of death on their death certificate. Because these observations were consistent among all three ethnic groups, it is unlikely that the ethnic differences observed in this study are due to inconsistencies in death certificate coding.

Ethnic misclassification was probably not a major source of bias in this study. Race and ethnicity were assigned by the New Mexico Tumor Registry and the New Mexico Bureau of Vital Statistics with procedures that were constant over the study period. The designation of American Indians by stated race in medical records and on death certificates should closely parallel the self-identification of race used by the Census Bureau. Intermarriage between Hispanic and non-Hispanic Whites may reduce the validity of the approach used by the Registry and the Bureau of Vital Statistics to classify Hispanic ethnicity (30). However, among participants in a statewide case-control study of lung cancer, we found a high level of concordance (96%) between self-reported ethnicity and ethnicity as assigned by the Bureau of Vital Statistics on the death certificates of those respondents who subsequently died (12).

Our selection of denominators for rate calculations was guided by well-documented inconsistencies in census data (31). We upwardly adjusted Census Bureau estimates of the Hispanic population for 1960 to minimize the effect of differences in enumeration procedures between the censuses of 1960 and 1980. The resulting adjustments to the data were not large enough to have caused the observed rate differences between Hispanic and non-Hispanic Whites. The Census Bureau underestimated the size of the American Indian population in the 1970 United States census (32), and similar problems may exist in census data from 1960 and 1980. Rate calculations based on low population estimates would overstate the incidence and mortality rates for stomach cancer; therefore, the actual rate of stomach cancer for American Indians may be lower than reported in this study.

Recent declines in stomach cancer mortality rates for New Mexico Hispanic and non-Hispanic Whites are consistent with those observed in the United States and other countries, although the risk of the disease remains higher for Hispanics than for non-Hispanics. The high rates of stomach cancer as a recent phenomenon among American Indians may be partially explained by improved access to medical care and better death certification. Although environmental factors, notably diet, have been implicated in the etiology of the disease (1–3), little is currently known about the distribution of such risk factors among the ethnic groups described in this report. New Mexico may be an appropriate location in which to further characterize the risk factors for stomach cancer.

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REFERENCES

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