Underestimation of Cardiovascular Disease Mortality Among Maine American Indians: The Role of Procedural and Data Errors

Judith M. Graber, MS, Brenda E. Corkum, BA, Nancy Sonnenfeld, PhD, and Paul L. Kuehnert, RN, MS

We collaborated with Maine American Indian tribes to evaluate racial coding on death certificates and the effects of coding errors on estimation of cardiovascular disease (CVD) mortality. Lists of tribal decedents were matched to death certificates; 38.5% were misclassified (17.8% coding errors; 20.7% data entry errors). After errors were corrected, CVD mortality trends were similar between American Indians and all Maine residents. Racial misclassification occurred during a period when budget cuts had prompted procedural changes. (Am J Public Health. 2005;95:827–830. doi:10.2105/AJPH.2004.053751)

Misclassification of American Indian race on death certificates has been well documented and has contributed to underestimation of health disparities in this population. To support tribal prevention efforts to reduce mortality related to cardiovascular disease (CVD), we collaborated with Maine American Indian tribes and bands to evaluate declines in CVD-related mortality over a 20-year period and to address the hypothesis that CVD-related mortality among American Indians might be underestimated. Our investigation revealed a previously unreported source of race misclassification and a potential link between misclassification and changes in quality control procedures with regard to vital record processing in Maine as a result of budget reductions.
METHODS

Federally recognized Maine American Indian tribes provided a list of members removed from their tribal registries (i.e., members known to have died) from 1978 to 1997. The name, sex, birth date, and death date of the deceased were provided. We linked the data with Maine death certificate files by means of a deterministic matching methodology. We searched the National Death Index for out-of-state deaths; only Maine residents were included in analyses.

For matched records, we examined the race field in the electronic file to identify any record coded as other than American Indian. Hard-copy death certificates and electronic records were visually compared to distinguish data entry errors from misreporting of race on the death certificate. Overall error rates and error-specific rates were calculated for 5-year intervals.

Age-adjusted CVD-related mortality rates for immediate cause of death and any mention in cause of death were calculated for each 5-year interval before and after all errors were corrected. Numerator data were defined by an International Classification of Diseases, Ninth Revision, code of 390 to 448; the category American Indian included matched records and all other death certificate records that were previously coded as American Indian. The Maine Bureau of Health updates US Census population estimates; these updated estimates were used for the denominator for the “all races” strata. US Census Bureau estimates were used for the denominator for the American Indian strata.

RESULTS

Participation and Error Rates

Four of 5 tribes participated, reporting 322 decedents from 1978 through 1997. Of these, 84 were excluded (51 nonresidents, 33 not located); percentages of matches decreased over time. Rates of misclassification are presented in Table 1. Error rates increased over time; the first data entry errors were reported in 1988. In all cases erroneous race was entered as White.

<p>| TABLE 1—Coding and Data Entry Errors With Regard to American Indian Race on Maine Death Certificates, by Year |
|-------------------------------|-------------------------------|-------------------------------|-------------------------------|</p>
<table>
<thead>
<tr>
<th>Years</th>
<th>Deaths From Tribal Registers, No.</th>
<th>Matches With Tribal Registers, No. (%)</th>
<th>Errors, No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1978–1982</td>
<td>31</td>
<td>29 (93.5)</td>
<td>1 (3.4)</td>
</tr>
<tr>
<td>1983–1987</td>
<td>57</td>
<td>48 (84.2)</td>
<td>8 (16.7)</td>
</tr>
<tr>
<td>1988–1992</td>
<td>60</td>
<td>34 (56.7)</td>
<td>8 (23.5)</td>
</tr>
<tr>
<td>1993–1997</td>
<td>90</td>
<td>58 (64.4)</td>
<td>13 (22.4)</td>
</tr>
<tr>
<td>Total</td>
<td>238</td>
<td>169 (71.0)</td>
<td>30 (17.8)</td>
</tr>
</tbody>
</table>

Contribution of Race Error to Estimation of CVD-Related Mortality

A total of 136 American Indian deaths were included in calculations for CVD as immediate cause of death; 342 American Indian deaths were included in calculations of deaths for which any mention was made of CVD. Before correction for racial miscoding, there was a statistically significant linear decline in CVD-related mortality for all Maine residents and for American Indians. The decline was greater among American Indians (59.1%) than among all races (34.9%). While the decline was distributed evenly throughout the 20-year period for all Maine residents, the majority of the decline among American Indians occurred in the first 5-year interval and reversed during the last interval. After all corrections, there was still a statistically significant linear decline of CVD-related mortality for both populations; the magnitude of the decline was less disparate between the 2 groups (American Indians, 48.1%; all races, 34.9%). The reversal in the decline was more apparent among American Indians. Trends in CVD-related mortality are shown in Figure 1.

DISCUSSION

Our findings demonstrate that multiple types of data-quality errors may contribute to the disproportionate underestimation of cause-specific mortality rates for American Indians. Previous reports of misclassification of American Indian race have focused on incorrect recording of race on the death certificate,1–6 but errors that contribute to misclassification also may occur during data coding, entry, or analysis.

From 1979 to the late 1980s, demographic data from Maine death certificates were entered and processed with standardized procedures, including double data entry and automated edit checking, to ensure high data quality. Death certificate data processing was then restructured owing to reductions in federal funding for health planning,13 and further personnel reductions occurred in the early 1990s owing to reductions in the Maine State General Fund. As a result, some standardized procedures, including double data entry, were discontinued (Donald Lemieux, director, Maine Bureau of Health, Office of Data, Research, and Vital Statistics; written communication, November 24, 2004).

Notably, the data entry errors were not detected through National Center for Health Statistics quality control procedures, likely reflecting the small proportion of American Indians (0.6%)14 in Maine’s population. Previous reports of misclassification of American Indian race are from states with larger relative and absolute numbers of American Indians.3,5–10 The small size of the American Indian population in many states, like Maine, may present unique barriers and opportunities. State health departments should consider collaborative approaches to developing standardized data quality control procedures to evaluate the quality of race-specific data that include American Indian tribal health departments in the management of their own vital records. Collaboration presents an ongoing opportunity for quality assurance and promotes the use of public health data by American Indian tribes.15 Our findings suggest that all states with measurable American Indian populations should examine their resource commitment to accurate collection and analysis of American Indian race and make adjustments as needed to accurately identify health disparities.
The follow-up study described in this report was supported in part by a grant from the Office of Minority Health, US Department of Health and Human Services (DHHS). Janet Scott-Harris of DHHS Region 1 was critical to obtaining this support.

Acknowledgments

The follow-up study described in this report was supported in part by a grant from the Office of Minority Health, US Department of Health and Human Services (DHHS). Janet Scott-Harris of DHHS Region 1 was critical to obtaining this support.

The follow-up study was performed with the permission of the tribal councils of the Aroostook Band of Micmac Indians, the Houlton Band of Maliseet Indians, the Passamaquoddy Tribe at Indian Township, and the Penobscot Nation. These same tribal councils reviewed this article and gave permission for publication in a peer-reviewed journal. The authors gratefully acknowledge these Maine tribal leaders for their support in making the study a reality and for their willingness to share the results with the broader statewide and national communities. We also thank Lorraine Wilson, Maine Bureau of Health (BOH), for technical assistance, manuscript review, and support throughout the project, as well as Ralph Bryan, CDC, and Cindy Mervis, MPH, University of Southern Maine/BOH, for their thoughtful review of this article.

Human Participation Protection

The Maine Bureau of Health institutional review board ruled that this project was public health practice and therefore exempt from institutional review board review.

References


