PUBLIC HEALTH REPORTS *in Brief*

Trends in Rates for Mortality from All Causes Among Indians in Minnesota, 1960–79

TIMOTHY H. RINGHAND, MPH
DAVID A. SNOWDON, PhD, MPH
REBECCA A. JOHNSON, MPH

Mr. Ringhand is a Public Health Nurse with the City-County Health Department of Eau Claire, WI. Dr. Snowdon is an Associate Professor at the University of Kentucky Medical Center, Department of Preventive Medicine and Environmental Health, and Sanders-Brown Center on Aging. Ms. Johnson is an Epidemiologist with the Minnesota Department of Health, Chronic Disease and Environmental Epidemiology Section.

Tearsheet requests to Timothy H. Ringhand, City-County Health Dept., 720 Second Ave., Eau Claire, WI 54703.

Synopsis ....

Trends in age- and sex-specific mortality rates for all causes of death for Indians in Minnesota during the years 1960–79 were examined using the Mantel-Haenszel chi-square extension test. Indians younger than 15 years of age were not included in the analysis because of the changes in classification for Indian race in census reports for Indian children and adolescents, known decreases in Indian infant mortality, and the small number of deaths among Indian children and adolescents during the years 1960–79.

Declines in mortality rates were observed for Indian men and women 75 years of age and older, men 65 through 74 years of age, and women 25 through 54 years of age. Overall, only 8 percent of men and 53 percent of women were in age groups that showed declining mortality rates for all causes of death during the years 1960–79. The greatest decline in mortality rates for men and women occurred among those 75 years of age and older.

Mortality rates for Indians in Minnesota declined during the study period for fewer than half of the age groups. Such strategies as risk factor surveillance, public health programs, and medical interventions need to be directed toward these groups that have not experienced the same declines in mortality rates as nearly all age groups of whites, both nationwide and in Minnesota, during the same period.

Although their health has improved substantially during the last 30 years, Indians in the United States have significantly higher mortality rates than the general population (1, 2).

The Public Health Service's Indian Health Service (IHS) provides a comprehensive health services delivery system for American Indians and Alaskan Natives and leads efforts to reduce their mortality rates and to evaluate changes in their health. In Minnesota, up to 45 percent of Indians may live in areas not served by IHS facilities or affiliated clinics (3–5).

We examined age- and sex-specific rates of mortality from all causes for adult Indians in Minnesota during the years 1960–79. Our objective was to identify trends in mortality rates and analyze changes in the health of Indians in Minnesota, both favorable and unfavorable, during that period.

Methods

Deaths during the period were identified from computerized death certificate files maintained by the Minnesota Department of Health. The numbers in each age and sex group during 1960, 1970, and 1980 were obtained from census reports (6–8), and were used to estimate, by straight-line interpolation, the study population in the groups for each year (9).

The mortality data were derived from death certificates, which were completed most often by physicians and morticians. Bureau of the Census data were based upon information obtained from census forms, which were usually completed by an adult, who enumerated and reported the race of members of the household. Once census forms are received by the Bureau, however, it may change the reported race of a child, based on the race of the parents. Different algorithms were used to determine the race for children of mixed racial marriages for each of the 3 census years.

The study population consisted of Indians in Minnesota who were 15 years of age and older. Those younger than 15 were excluded because of the potential for selection bias in census reports from changes in classification of the race of Indian children and adolescents, known decreases in Indian infant mortality, and the small number of deaths among Indian children and adolescents during the period 1960–79 (10).

The definitions of Indian adults used by the Minnesota Department of Health and the Bureau of the

Table 1. Number of deaths of Indians in Minnesota, by age and sex, in 5-year periods, 1960–79

Age (years)	1960–64	1965–69	1970–74	1975–79
Men:				
15–24	29	42	72	64
25–34	24	33	43	66
35–44	35	29	45	54
45–54	33	42	78	66
55–64	57	47	80	78
65–74	51	77	81	74
Older than 75.	83	92	86	100
Women:				
15–24	10	19	31	40
25–34	20	26	38	29
35–44	37	39	42	44
45–54	30	50	37	36
55–64	24	46	39	51
65–74	33	59	52	62
Older than 75.	75	69	83	73

Table 2. Estimated population of Indians in Minnesota, by age and sex, in 5-year periods, 1960–79[1]

Age (years)	1960–64	1965–69	1970–74	1975–79
Men:				
15–24	1,334	1,708	2,363	3,442
25–34	998	1,228	1,612	2,227
35–44	793	850	1,036	1,414
45–54	604	625	737	984
55–64	590	526	546	690
65–74	258	285	352	481
Older than 75.	142	196	233	242
Women:				
15–24	1,455	1,988	3,639	3,739
25–34	881	1,207	1,698	2,439
35–44	730	820	1,258	1,717
45–54	608	677	812	1,046
55–64	626	573	593	723
65–74	258	304	367	455
Older than 75.	107	160	213	267

[1] The estimated number of persons during a 5-year period, such as 1960–64, refers to the Indian population at the mid-year of the period, such as 1962.

Census were the same for the period studied. The number of Indians in Minnesota 15 years of age or older was 8,679 in 1960; 12,405 in 1970; and 23,065 in 1980.

Because of the instability of annual mortality rates, caused by a small number of deaths in single years, age was collapsed into 10-year categories and time into 5-year periods. The number of persons in the mid-year of each 5-year interval was used to estimate the number in each period. Mortality rates were calculated using the following equation.

$$\text{Average number of deaths annually per 10,000 persons} = \frac{\text{Number of deaths during 5-year period}}{(\text{Number of persons at mid-year of 5-year period}) \times 5} \times 10{,}000$$

Least squares regression was used to estimate the aver-

age change in the number of deaths per 10,000 persons during 1 year. The Mantel-Haenszel chi-square extension test was used to test the linear trend in mortality rates (11, 12).

Results

Table 1 shows the number of deaths of Indians in Minnesota by age and sex for 5-year periods during 1960–79. Table 2 shows the estimated number of persons in those groups. Table 3 shows the mortality rates and the average annual change in those rates. Among Indian women, significant declines in mortality were seen for only four of the seven age groups, 25–34, 35–44, 45–54, and 75 and older. Among Indian men, significant declines in mortality appeared in only two of the seven age groups, 65–74 and 75 and older. The largest declines in mortality were observed for those 75 years and older, especially for women.

Discussion

Other studies of mortality rates for all causes of death among Indians have produced similar results (13–15). A potential limitation of our study is whether Indian race is reported accurately on death certificates (that is, the numerator of the mortality rate). In Minnesota, the misclassification of Indian race on death certificates has not been documented, but it may occur, given the other errors that have previously been identified in death certificate data (16).

The major limitation of this study is in the estimation of the size of the adult Indian population (that is, the denominator of the mortality rate). Census reports for 1970 and 1980 have been adjusted because of reported errors in enumeration of Indians (4, 17). If census enumeration of Indians has improved, it would artificially reduce mortality rates. Despite this potential bias, Indians showed a decline in mortality rates during the study period in fewer than half of the age groups.

Data from the Minnesota Department of Health for 1980 indicate that the leading causes of death for all Indians 15 through 44 years of age were injuries, homicide, and suicide. Heart disease, malignant neoplasms, and cerebrovascular disease were the leading causes of death for all Indians 45 years and older (18).

Information from the Minnesota Department of Health regarding the leading causes of death among Indians, together with the results of our analysis, is useful in identifying areas in which intervention may be needed. Rates of mortality from all causes have not changed for most Indians 15 through 44 years of age. Therefore, this age group needs special attention in order to identify risk factors related to death from

Table 3. Average annual mortality rates for Indians in Minnesota, by age and sex, in 5-year periods, 1960–79

Age (in years)	Deaths per 10,000 persons				Average annual change in deaths per 10,000 persons[1]
	1960–64	1965–69	1970–74	1975–79	
Men:					
15–24	43	49	61	37	−0.1
25–34	48	54	53	59	0.6
35–44	88	68	87	76	−0.3
45–54	109	134	212	134	3.1
55–64	193	179	293	226	4.3
65–74	395	540	460	308	[2]−6.8
Older than 75	1,169	939	738	826	[3]−24.6
Women:					
15–24	14	19	23	21	0.5
25–34	45	43	45	24	[2]−1.2
35–44	101	95	67	51	[3]−3.6
45–54	99	148	91	69	[2]−2.9
55–64	77	161	132	141	3.3
65–74	256	388	283	273	−1.1
Older than 75	1,402	863	779	547	[3]−52.9

[1] Two-tailed P values were used to test the linear trend in rates of mortality across the 4 time periods.　　[2] $P \leq 0.05$.　[3] $P \leq 0.001$.

injury, violence, and suicide. Public health education programs for this group are needed to help prevent mortality from those causes.

IHS health care providers already offer some of these services, which need to be expanded. Because of the number of Indians in Minnesota not served by IHS, local community health service programs that serve Indians need to implement culturally appropriate risk factor surveillance and prevention programs.

There was a lack of change in mortality from all causes of death for most Indians ages 45 through 74. Chronic diseases are major contributors to mortality in this age group. Thus, risk factor surveillance and prevention programs for heart disease, malignant neoplasms, and cerebrovascular disease should be implemented as well.

Research analyzing specific causes of mortality over extended periods would help explain the trends in rates of mortality from all causes among Indians in Minnesota. Such analysis was not possible in this study because of the lack of sufficient numbers of persons within specific disease categories.

Conclusion

The general population of Minnesota, which is 96 percent white, has had declining rates of mortality from all causes in all age groups, except those 15 through 24 years of age during the period studied (10, 19). Yet, in Minnesota, where a high level of health is the norm, only 8 percent of Indian adult men and 53 percent of women were in age groups that showed declines in rates of mortality from all causes.

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Networking in a Rural Community Focuses on At-Risk Children

MYRNA RAE EPSTEIN, PHN, MPH

Ms. Epstein is a Senior Public Health Nurse and Nurse Practitioner, Humboldt-Del Norte County Health Department. Tearsheet requests to her, Box 742, Willow Creek, CA 95573.

Synopsis ....

The need to integrate social and medical services to deal with the issues of child abuse prevention and treatment has been documented frequently. In rural areas, referral to the various programs developed to reach the at-risk child is hampered by lack of communication, personal contact, and understanding of the roles and functions among the staffs of the agencies involved. Networking provides an interdisciplinary team approach to foster communication and coordination among the agencies' staffs and increase the effectiveness of their efforts. A model for developing an interagency network in a rural area is presented, eliciting key liaison persons as coordinators.

One of the most pressing health care issues to be targeted by many agencies is identification of at-risk children—those who are abused or neglected, growing up in alcohol and other drug addicted families, and floundering in foster care as victims of dysfunctional families—and prevention of abuse of these children. The need for multifaceted and coordinated social and medical services to deal with these issues has been frequently documented (*1–3*).

In rural areas, the problems of identifying and providing adequate intervention for these children are made more difficult by distances and lack of resources (*4*). Most child welfare professionals travel infrequently to these outreach locations. Specific services to deal with immediate crisis intervention, counseling for abuse or molestation, and the prevention of juvenile delinquency are located in the larger communities.

Contacts between county child welfare and justice agencies and the local providers such as physicians, nurses, and school personnel are infrequent and brief. Referral and consultation among staff of the various county and community programs developed to reach the at-risk children are often hampered by lack of communication, personal contact, and understanding of the roles and functions among the staffs of the involved agencies (*5*). Each provider of services becomes familiar with a small circle of resource people, but the broad range of agencies available to the rural community are often under-used, and their roles not clearly defined.

Setting

The Klamath-Trinity basin of California consists of 1,000 square miles of mountainous terrain and encompasses a population of approximately 6,000 people. The average town has 1,500 people, a population that swells during the tourist season in the summer and early fall. According to the 1980 census, 22 percent of the families living in this district of Humboldt-Del Norte County had incomes below the poverty level. The poverty rate was strongly influenced by the isolation and the decline of its two major industries, fishing and logging. The Hoopa Indian Reservation, one of the largest Indian reservations in California, is located in the valley of this mountain region.

Local service providers include resident family prac-