

Diabetes in American Indians

An overview

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OBJECTIVE— To review the growth of diabetes as a major health problem for American Indians and Alaska Natives.

RESEARCH DESIGN AND METHODS— Pertinent studies of diabetes in Indians previously published are reviewed and compared with current data.

RESULTS— Although diabetes rates may vary among different Indian tribes, diabetes has become a widespread health problem.

CONCLUSIONS— Our understanding of the natural history of diabetes among Indians has improved, but better strategies to prevent complications and ultimately to prevent diabetes are urgently needed in Indian communities.

Landmark studies of diabetes in the Pima Indians have contributed not only to the current definitions of diabetes, but also to our understanding of the pathophysiological processes underlying NIDDM (1,2). Although most studies of diabetes among Indians have been conducted among the Pima Indians, the "epidemic" of NIDDM has not been limited to the Pimas. This type of diabetes is very widespread in contemporary Indian communities (3). Although rates vary somewhat in different tribes, it is apparent that this disease, once termed *benign*, is exacting a heavy

toll on the Indian community in the U.S. (4).

DIABETES PREVALENCE— Rates of diagnosed diabetes among American Indians in different areas have been estimated for 1987 from the outpatient records of the IHS (this issue, S.V. et al., p. 271–76.) Overall, 8.9% of American Indians aged ≥ 15 yr were seen once in 1987 for diabetes. Age-specific diabetes rates for the $\sim 870,000$ American Indians included in the reporting service areas are shown in Fig. 1. Rates are underestimates of the true diabetes rates, because

all diabetic patients will not be seen in the course of a single year, and undiagnosed cases will remain undetected by this method. Nevertheless, rates for Indians were higher in each age-group than rates for other ethnic groups in the U.S. included in the National Health Interview Survey (6). Comparisons with the NHANES II also confirmed high rates of diabetes in Indians, although the age-groups in the analyses were not exactly the same (7). For ages 20–44 yr, NHANES II found 1.1% of the population with diagnosed diabetes, whereas IHS figures for age 15–44 yr revealed 2.5%. Similarly, in the older age-group, for those 65–74 yr in NHANES II, 9.3% of the population were diagnosed with diabetes. For all Indians > 65 yr, the total was 20.3%. An independent estimate of diabetes rates was available for elderly Indians (8). A survey of housing and health status was conducted on six reservations in 1987 by the National Indian Council on Aging. For people ≥ 60 yr, 20% indicated they were taking insulin or pills for diabetes. In all likelihood, there were also elderly people treated with diet alone, because 23% indicated they had diabetes. Thus, the IHS data indicating that $\sim 20\%$ of patients ≥ 65 yr had diabetes is probably an underestimate of the true prevalence. Although rates generated by using outpatient records are probably underestimates of the true prevalence of diabetes for all ages in

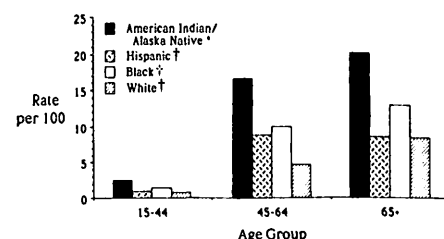


Figure 1—Age-specific prevalence of diagnosed diabetes for American Indians and Alaska Natives compared with different ethnic groups in the U.S. IHS outpatient data, 1987, 1979–1981 National Health Interview Survey.

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NIDDM, NON-INSULIN-DEPENDENT DIABETES MELLITUS; IHS, INDIAN HEALTH SERVICE; NHANES II, NATIONAL HEALTH AND NUTRITIONAL EXAMINATION SURVEY II.

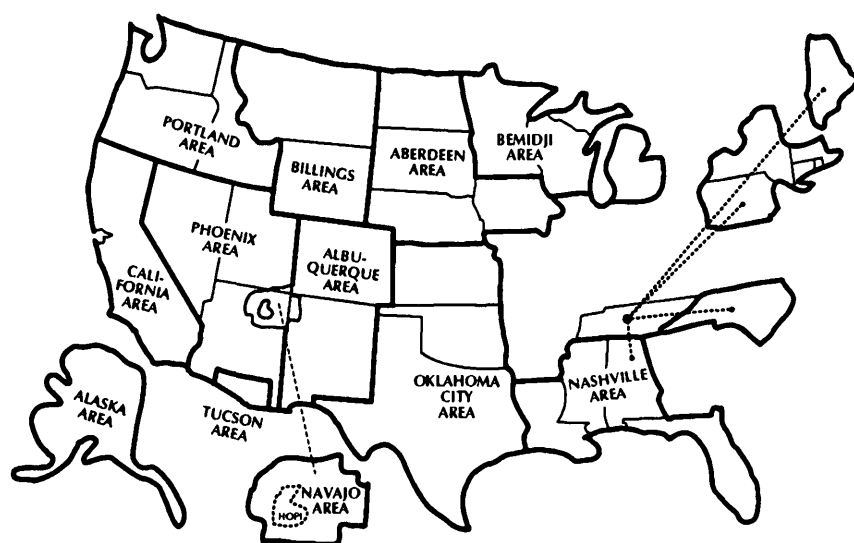


Figure 2—IHS areas, 1987.

these communities, diabetes rates among Indians were higher than comparable figures for other ethnic groups in the U.S.

Regional diabetes rates for Indians ≥ 15 yr of age were estimated for the IHS administrative areas shown in Fig. 2. These rates showed a wide variation between a low of 2% in Alaska to a high of 15.4% in Tucson (Fig. 3). It is clear from the data for Plains Indians who live in the Aberdeen

and Bemidji areas that high rates of diabetes were not limited to the southwest. Although Plains Indians have not been studied extensively, rates of diabetes in these tribes appeared to be high. These findings are similar to the recently published study of diabetes in Canadian Indians using similar methods (9). Note that diabetes rates were two to five times greater than rates among all other Canadians, except in Brit-

ish Columbia, the Yukon, and the Northwest Territories. Recent death rates from diabetes (listed as the underlying cause of death) showed similar regional trends for 1984–1986 (Fig. 4). These data provide another way to compare the impact of diabetes on Indians in different parts of the U.S. Compared with all races in the U.S., the diabetes death rate for Indians was 2.5 times higher when age adjusted to the 1980 U.S. population (10).

Although American Indians are quite diverse, common languages and cultures have provided divisions to group Indians with similar characteristics (11). Athabascan languages are shared by the Navajo and Apache Indians in the Southwest and the Indians of the Interior of Alaska. By grouping facilities that serve primarily one specific tribe, estimates of diabetes rates for particular tribes can be compared. Rates of diabetes were much lower among Athabascan Indians of Alaska than among the Navajo and Apache (Table 1). The reasons for these differences may be attributed to life-style, but what that actually means is not well defined (12).

Diabetes rates for two large tribes of different heritage, the Sioux and the Chippewa, were estimated by grouping reports from several health facilities that serve individuals predominantly from one of these tribes. Although the rates for Sioux and Chippewa aged 15–44 yr ap-

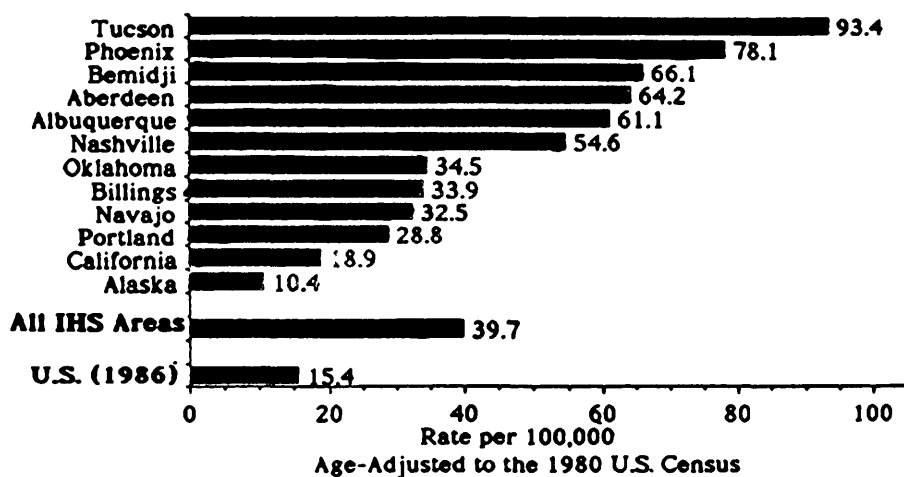


Figure 3—Average annual mortality rates when diabetes was the underlying cause of death, by IHS area, 1984–1986.

Table 1—Diabetes prevalence for Athabascan Indians (aged ≥ 15 yr)

ATHABASCAN	RATE/1000
APACHE	100.9
NAVAJO	72.4
ALASKA	16.3
ALL ATHABASCAN	72.7

Age adjusted to U.S. 1980 IHS Outpatient Data (1987) from the following IHS Service Units: Apache Service Units—Mescalero, White River, and San Carlos; Navajo Service Units—Tuba City, Gallup, Chinle, Fort Defiance, Kayenta, Winslow, Shiprock, and Crownpoint; and Alaska Service Unit—interior.

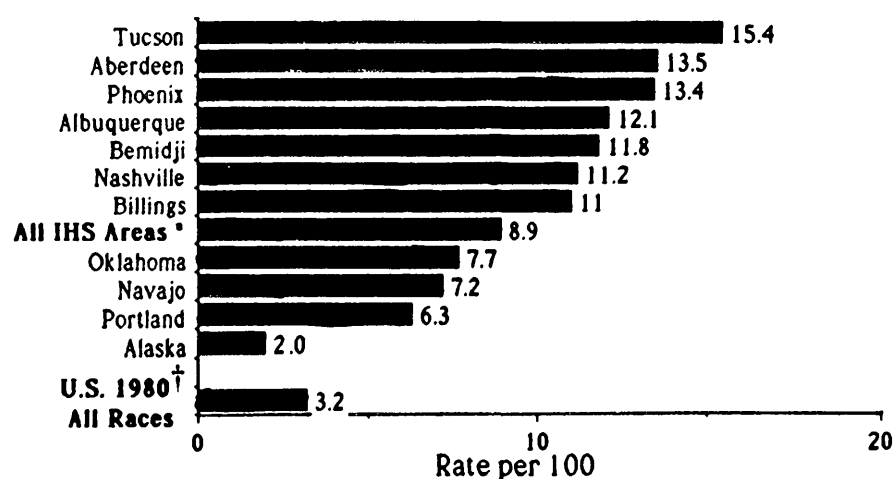


Figure 4—Age-adjusted prevalence of diagnosed diabetes in people ≥ 15 yr by IHS area. IHS outpatient data, 1987, 1979–1981 National Health Interview Survey.

peared to be quite similar, the rates in the older individuals were different (Table 2). Similar variation in age-specific rates were found comparing several southwestern tribes: Ute, Apache, and Navajo (Table 3). One could postulate that lower rates in older age-groups indicate that these individuals were less westernized in their younger years than neighboring tribes and thus did not develop diabetes (12).

COMPLICATIONS— The health burden from NIDDM comes primarily from

Table 2—Diabetes prevalence for neighboring tribes in the midwest (aged ≥ 15 yr)

AGE-GROUP (YR)	CHIPPEWA (RATE/1000)	SIoux (RATE/1000)
15–44	29.8	29.7
45–64	279.3	236.1
≥ 65	378.1	267.9
TOTAL (≥ 15 YR)*	144.1	116.9

*Age adjusted to U.S. 1980 IHS Outpatient Data (1987) from the following IHS Service Units: Chippewa Service Units—Red Lake, White Earth, Turtle Mountain, Nett Lake, Mille Lacs, Leech Lake, and Fond du Lac; and Sioux Service Units—Cheyenne River, Pine Ridge, Pierre, Sisseton-Wahpeton, Rosebud, Standing Rock, and Yankton.

complications. As the epidemic of diabetes spread across Indian communities in the 1950s and 1960s, investigators described diabetes as benign, and both providers and patients came to believe that “Indian diabetes” was somehow different from diabetes in the population at large (4,13). Yet, as Indian diabetic patients have been followed longitudinally, as in the Pima and Navajo, it has become obvious that all the chronic complications of diabetes occur among Indians, and, in fact, occur at very high rates (2,14). In all probability, reports on the benign nature of diabetes in American Indians were based on cross-sectional observations of cohorts of Indian pa-

tients with diabetes of relatively short duration (4,13). Rates of diabetic retinopathy increased with increasing duration of diabetes in Hopi, Pima, and Navajo Indians in a manner similar to the rates among diabetic patients from Japan and Sweden (15). Between 1983 and 1986, diabetic nephropathy resulting in end-stage renal disease occurred in Indians at almost six times the rate seen among U.S. whites (16). Over 85% of 1864 IHS hospitalizations for lower-extremity amputations between 1982 and 1987 carried a diabetes code. Records from 4% of the $\sim 17,000$ deliveries performed in IHS or contract hospitals during fiscal year 1988 indicated that the mother had either preexisting diabetes or gestational diabetes. Thus, the chronic complications of diabetes are causing significant morbidity in Indian communities.

The relationship of diabetes and heart disease is complex (17). Although many Indian tribes have been considered relatively free from heart disease, the rates of heart disease are increasing in specific tribes (18–20). Table 4 shows the 10 leading causes of death for American Indians and Alaska Natives (this issue, S.V. et al., p. 271–76). Heart disease has become the leading cause of death among American Indians in recent years (this issue, S.V. et al., p. 271–76). In a study of myocardial infarction in the Navajo, $\sim 50\%$ the individuals hospitalized for that diagnosis between 1983 and

Table 3—Diabetes prevalence for neighboring tribes in the southwest (aged ≥ 15 yr)

AGE-GROUP (YR)	NAVAJO (RATE/1000)	APACHE (RATE/1000)	UTE (RATE/1000)
15–44	16.3	28.8	31.7
45–64	153.5	231.5	211.0
≥ 65	162.2	107.3	351.3
TOTAL (≥ 15 YR)*	72.4	100.9	123.9

*Age adjusted to 1980 IHS Outpatient Data (1987) from the following IHS Service Units: Navajo Service Units—Tuba City, Gallup, Chinle, Fort Defiance, Kayenta, Winslow, Shiprock, and Crownpoint; Apache Service Units—Mescalero, White River, and San Carlos; and Ute Service Units—Uintah and Ouray, and Southern Colorado Ute.

Table 4—The 10 leading causes of death for descendants of all ages (American Indians and Alaska Natives, 1984–1986)

CAUSE OF DEATH	N	RATE/100,000 POPULATION	RATIO OF INDIAN TO ALL U.S. RACES*
ALL CAUSES	20,561	472.4	1.0
HEART DISEASE	4791	110.1	0.8
ACCIDENTS	3338	76.1	2.4
MOTOR VEHICLE	1851	42.5	2.5
OTHER ACCIDENTS	1487	34.2	2.3
MALIGNANT NEOPLASMS	2814	64.7	0.6
CEREBROVASCULAR DISEASES	961	22.1	0.8
CHRONIC LIVER DISEASE AND CIRRHOSIS	917	21.1	2.9
DIABETES MELLITUS	695	16.0	2.1
PNEUMONIA AND INFLUENZA	692	15.9	1.1
HOMICIDE	620	14.2	1.8
SUICIDE	596	13.7	1.3
CHRONIC OBSTRUCTIVE PULMONARY DISEASES	406	9.3	0.5
ALL OTHER CAUSES	4731		

Crude rates compiled by IHS Program Statistics from data obtained through the National Center for Health Statistics.

*Ratio of Indian to all U.S. races based on rates for both populations, age adjusted to the U.S. 1940 population. (Source: IHS, *Trends in Indian Health* 1989.)

1986 also carried a diagnosis of diabetes (20). Diabetes undoubtedly contributes to the death rate from coronary disease among Indians and also to other causes of death. Although diabetes itself ranks sixth as the underlying cause of death, it can contribute to mortality from several of the leading causes of death, including heart disease and cerebrovascular disease, in addition to pneumonia and influenza.

In summary, diabetes has become a major disease in many American Indian communities and is increasing among Alaska Natives (20). Although our understanding of the disease as it affects Indians is based largely on data from the Pima Indians, the problem is by no means limited to a single tribe in Arizona. Although rates may vary in different regions, diabetes with chronic complications is an important public health problem in American Indian communities. Better strategies to prevent the complications and ultimately to prevent the disease are urgently needed.

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