

higher occupation than nonadopters of this innovation. The county-wide scope of this natural childbirth study appears to be the first regional research on natural childbirth.

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## The Prevalence of Clinically Treated Diabetes Among Zuni Reservation Residents

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### Introduction

The medical literature contains prevalence data for diabetes mellitus among about 100 population groups throughout the world. Prevalence rates in the United States vary with the population studied, being highest in certain continental Indian tribes (Pimas,<sup>1</sup> Seneca,<sup>2</sup> Cherokee,<sup>3</sup> and Cocopah<sup>4</sup>) and lowest in two Alaskan groups (Athabaskan Indians<sup>5</sup> and Eskimos<sup>6</sup>).

The medical staff of the U.S. Public Health Service Hospital on the Zuni Indian reservation was impressed by

the large number of older Pueblo residents with diabetes mellitus. The recent installation of a diabetes clinic requiring much physician, nursing, and laboratory time raised the question of the number of Zunis who needed to be followed for this disease. In view of the varying published prevalence data among population groups, we designed a project to determine the age specific rate of clinically treated diabetes among residents of the Zuni reservation.

### Method

The Zuni Indians receive their health care at the Zuni Comprehensive Community Health Center, a hospital administered by the United States Public Health Service. The USPHS was able to provide a computer listing of all persons treated at this facility for diabetes mellitus during 1975 and

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**TABLE 1—Per Cent Prevalence of Diabetes by Age in the Zuni Indians and in the General Population**

Age	Zuni Indians						USA***
	N	Male % Diabetic	N	Female* % Diabetic	N	Total** % Diabetic	% Diabetic
0-24	2,151	0.1	2,124	0.1	4,275	0.1	0.1
25-44	554	6.9	718	5.3	1,272	6.0	0.6
45-54	143	20.3	129	27.9	272	23.9	1.8
55-64	134	19.4	100	30.0	234	23.9	3.7
65-over	151	20.5	99	34.3	250	26.0	5.4
TOTAL	3,133	4.1	3,170	4.4	6,303	4.3	1.4

\*Prevalence is greater in Zuni females over age 45 than males ( $p < .001$  by chi square analysis).

\*\*Prevalence is greater in Zunis than in US general population in all age groups over age 25 ( $p < .001$ ).

\*\*\*See reference 7.

1976. This listing consisted of 314 hospital identification numbers that were used for a chart review. Of these, 46 were eliminated from the study.\* The remaining 268 charts were indexed by age and sex. No standardized criteria for the diagnosis of diabetes mellitus were used. We counted as a case any patient whose physician had entered this diagnosis into the hospital or clinic record, regardless of the method of determination. No Pueblo residents are known to be treated for diabetes elsewhere.

The Census Office of the Zuni Tribal Bureau provided the population profile data used in this report (table 1). These figures were compiled in December 1976 and are the most comprehensive listing of the year of birth and sex of all 6,303 Pueblo residents. These data do not include the 565 Zunis known to be living apart from the reservation and who receive health care from other USPHS facilities. The age distribution of residents is skewed toward a young population. This is most likely due to a combination of the high fertility rate in recent years\*\* and the high incidence of alcohol-related disease in adults.

## Results

Table 1 shows the age specific prevalence of diabetes in the Zuni Pueblo residents and in the general population.<sup>7</sup> The prevalence in the Zunis far exceeds that of the general population in all age groups over 25 ( $p < .001$  by chi square analysis). Among reservation residents over the age of 45, there is a rate of about 25 per cent.

Table 1 also shows diabetes to be more common among Zuni females over age 45 than among males over age 45 ( $p < .001$ ).

\*41 were non-Zuni patients (mostly Navajo) and five had ambiguous records.

\*\*The current fertility rate is 148 births/1000 Zuni females aged 15 to 44.

## Discussion

The study of the true prevalence of diabetes is difficult because of the effort and funding required to screen large numbers of people for a disease that is often asymptomatic. The most inclusive screening study was performed with the Pima Indians of Arizona.<sup>1</sup> Two-hour post-prandial blood sugar measurements were collected from over 2,400 of its 3,000 adults, thereby demonstrating a 50 per cent prevalence of diabetes in the over 45 age group. The largest and best documented study of a predominantly white population examined the residents of Rochester, Minnesota (population 50,000) for the years 1945-70.<sup>8</sup> The over 45 age group had a prevalence of approximately 4.0 per cent, far smaller than the 25 per cent rate for the Zuni Pueblo residents. The rate among Zunis not living on the reservation is unknown. Out migration of healthier Indians could possibly contribute to the high prevalence among remaining Zunis.

The high prevalence of diabetes among certain continental Indian tribes has been attributed to both hereditary and environmental factors. The genetics of diabetes is a controversial subject, for although there is good evidence that genetic factors are important in the pathogenesis of the disease, little is known of the mode of transmission. The Zunis are a relatively inbred group of 6,300, but there is not yet any evidence for the degree to which genetics may be responsible for the diabetes present there. In examining environmental factors, obesity is known to be associated with a high risk of diabetes. A high caloric diet and sedentary life-style are relatively frequent among the Zunis and may result in excess weight, but since exact data regarding the prevalence of obesity are not available, its possible contribution to the rate of diabetes cannot be evaluated.

## Summary

At least one-fourth of the over 45 aged population of the Zuni Indian reservation have diabetes. The true prevalence

may be higher since an unknown number of Zunis had no blood sugar measurements during 1975-76 and therefore no opportunity for diagnosis.

The high prevalence of diabetes among the Zunis has not been previously documented. It is similar to that found in the well-studied Pima Indians and much higher than that in a carefully examined large white population.

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## Monitoring Consumer Satisfaction with the Clinical Services Provided to 'Exceptional' Children

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Children with exceptional health and/or educational needs\* challenge their parents, teachers and other developmental training specialists who must deal with them on a day-to-day basis.<sup>1</sup> Accountability for the progress made by the child with exceptional educational needs is required by law.\*\* However, similar assurance for the same children who receive services from medical-based organizations is not required by law.

Medical services have generally been assumed by consumers to be of high quality, but this assumption has not been tested.<sup>2</sup> Consumers themselves can provide a means of assessing organizational needs, goals, and objectives.<sup>3-5</sup> Once the specific service expected by the consumer has been

defined in relation to services available, it is a routine task to monitor consumer satisfaction. The variance between optimum and actual consumer satisfaction can be obtained. Through an analysis of the observed variance, follow-up modification of documented weaknesses can decrease the difference between optimum and actual consumer satisfaction levels. This report describes the use of a tool to assess clinical services in this way.

#### Methodology

Survey questionnaires were administered in the fall of 1976 to the parents and case coordinators of 130 children (89 boys and 41 girls) with exceptional health and/or educational needs who were seen at the Comprehensive Child Care Center of the Marshfield Clinic between July 1, 1975 and June 30, 1976. Case coordinators are individuals in the child's home community who refer children for medical services or coordinate their learning and other related day activities outside the jurisdiction of the home. The Comprehensive Child Care Center is a unit of the Marshfield Clinic and coordinates its medical services with St. Joseph's Hospital and the Marshfield Medical Foundation for children with exceptional health and educational needs. The Marshfield Clinic, the nation's sixth largest private group practice, is located in Central Wisconsin. Referrals to the Child Care Center come from public schools, private schools, clinics, developmental

\*Physical, crippling or orthopedic disability; developmental disability or mental retardation; emotional disturbance; hearing disability; visual disability; learning disability; or, speech or language disability.

\*\*Both federal and state legislation mandate the delivery of appropriate services to handicapped children, i.e., PL 94-142 for Public Schools and PL 94-103 for Developmental Disability based programs (and similar state legislation throughout most of the United States).

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