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HEALTH AND HEALTH SERVICES AMONG THE NAVAJO INDIANS

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ABSTRACT: The Navajo are the largest Indian tribe in the continental U.S. with a population in 1986 estimated at 171,097. The Navajo Nation (Reservation) is located along the borders where Arizona, New Mexico, Colorado and Utah meet. Social and economic changes have accrued among the Navajo at a rapid rate during this century. At present, revenues are derived from oil, coal and uranium and from federal grants and contracts. High unemployment rates have been a major problem among the Navajo.

This article reviews health, disease and health care among the present day Navajo. Mortality rates from accidents and suicide are disproportionately high and have as their causes longstanding social and behavioral problems. Although there has been a sharp decline in morbidity and mortality from infectious diseases, there are still major environmental health problems.

INTRODUCTION

The World Health Organization (WHO) program, "Health for All by the Year 2000" should be understood primarily as an appeal for improved health and health services in rural areas, in both the rich and the poor world. WHO is well aware of the often incredible maldistribution of health services, favoring urban areas and more or less neglecting extreme rural areas with scattered populations of low density and great distances. Such groups have been called "adversely situated" people. Sometimes nomadic but more often sedentary minorities, these are difficult groups of people to reach for modern education and efficient delivery of health services, for geographical, socio-economical, political,

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The author made study visits to Indian reservations in Arizona in the U.S. in 1974, 1984 and 1985, and had valuable discussions with Catherine Fleshman, M.P.H., B.A. and Kenneth Fleshman, M.D. Both have extensively dealt with health problems among the Navajos and other Native Americans. Dr. Fleshman has practiced clinical medicine and public health with the Indian Health Service for thirty years. Ms. Fleshman is presently conducting health care management implementation studies for a southern Arizona tribe. I am most grateful for their assistance with statistical information and with their unique personal experience.

as well as cultural and linguistic reasons. These issues have been previously discussed in relationship to the developing nations.[1,2,3]

In developed countries, ethnic minorities are often among the most economically disadvantaged and the ones with the least access to the nation's health care resources. However, it must be kept in mind that the provision of health care alone and without economic growth and social advantage will not sustain their general well-being. This paper presents the results of more than 30 years of socio-medical development among an adversely situated population, the Navajo Indians, of the United States. The progress made in physical health measures is clear, but the most instructive component may be the apparent absence of a concurrent internal societal synthesis, providing multi-sector improvements, whereby the people might establish ownership for their continued welfare.

American Minorities-Native Americans

Of the almost 227 million people counted in the 1980 United States Census,[1] ancestry by self-identification provided the following single or mixed ethnic backgrounds: 188 million European, 21 million black, 10 million Hispanic, 7 million Native American, and 4 million Pacific Islander and Asian. Within the total count of Native Americans, a term encompassing the indigenous tribes of Indians as well as the Aleuts and Eskimos of Alaska, almost 2 million claimed Native American single ancestry, a number which is less than one percent of the total U.S. population. Each of the 50 states collects natality and mortality data, categorized as "white," "black" and "other races," which are transmitted to the National Center for Health Statistics. States may choose to elaborate on race/ethnicity and 28 of the 50 States do identify American Indian and Alaskan Native on certificates of vital events.

Because the Native American people are well represented in the national trend to migrate to urban areas for employment, in 1980 less than 1 million lived in regions considered traditional residence and served by federally funded health and education programs specifically organized for Indian and Eskimo people. In addition to some tribal and federal employment in Alaskan Native villages and western U.S. trust lands ("reservations"), cultural identity as well as emotional and spiritual affinity to tribe and place are important factors for those who choose to reside in areas without the usual amenities and resources found in most inhabited regions of the United States. Each of the more than 300 tribes, in fact different groups within a tribe, experience varying

levels of socioeconomic development, but for the most part, the almost 1 million Native Americans residing on federally administered regions represent adversely situated people within an affluent country. Demographically, this portion of the population differs from the total U.S. population in several ways. It is estimated that 40% live below the poverty level. The median age of Native Americans is 22 years, that for all Americans is 30 years. The total fertility rate is almost four times higher for Native Americans. Life expectancy is somewhat lower: 75 years for females and 67 years for males, as compared to 77 years for all U.S. females and 70 years for all U.S. males.[5]

THE NAVAJO TRIBE

The Navajo tribe, the "Dineh" in their own language, constitute the largest Indian tribe north of Mexico, with an estimated population in 1986 of 171,097[6] who reside on and near the Navajo Reservation.

History and Geography

The Navajo belong to the Athabascan language group which includes Apaches and some tribes of Alaska and Western Canada. They migrated away from the northern Athabascans into the south-western United States between 1000 and 1400 AD. The Spanish explorers documented their encounters with the Navajo in the early seventeenth century. The dispersed settlements and migratory ways of the Navajo were well suited to the needs of the horses, sheep, and cattle which the Spanish brought to the semi-arid environment, and it was from the Spanish and Pueblo Indians that the Navajo learned silversmithing and vertical loom weaving of wool. Close contact, including intermarriage with the Pueblos led to the adoption of additional religious ceremonies, crops, ritual attire, and perhaps the matrilineal-matrilocal social organization which is still practiced to some extent.

In 1848, after acquiring additional land from Mexico, various Indian tribes, including some 18,000 Navajos, were forcibly settled. Broken treaties and continued warfare led to the incarceration of the Navajos in a military installation (Fort Sumner) in 1864. Their numbers dropped to 6,447. Upon their release in 1868, a new treaty established the present Navajo Nation. The Nation, or Reservation, now consists of 63,000 square kilometers, which is about the size of present-day Hungary. It is located in northwestern New Mexico, northeastern Arizona and in

small portions of southern Utah and Colorado. The land is high semi-desert, at an average altitude of 2,000 meters, with forested mountains and large areas of eroded steppe interrupted by dramatic red sandstone and canyons. The average annual precipitation is between 125 and 625 millimeters, making some areas a real desert.

Economy and Tribal Government

Due to low rainfall and poor soil conditions, most of the Navajo land is unfit for stable cultivation and with rapid population growth, the 300 year old pastoral livelihood has been impossible for the majority of families since the 1920's. At that time the marginal land was overgrazed, resulting in desertification. A very unpopular livestock reduction program was implemented by the federal government. Total management of the limited grazing and most other land use is now within the tribal government's own jurisdiction.

For the past 50 years the Navajo tribe has administered increasingly more of its own affairs under leadership of an elected tribal chairman and about 100 elected council members representing geographic constituencies which form the smallest unit of government structure. Of a $158 million operating tribal budget in 1983, two-thirds were derived from the federal government in grants and contracts, and one-third from earned revenues, mostly oil, coal, and uranium mining leases to private corporations. Allocations of this budget included: 26% to social welfare, 22% to locally operated health programs, nine percent to tribally operated school programs, and seven percent to early childhood development.[7]

Across the reservation, social and economic change has been uneven and generalizations can be rather inaccurate. A general description of the smaller economic picture reveals a 1980 per capita income of $2,300 when the national amount was almost $10,000. Unemployment is very high (about 40%), with the tribal and federal governments providing the majority of salaried jobs. Wool production, rug weaving and silver-smithing still figure in local finances, as relatively small sources of income. A Ford Foundation study released in 1986 found that McKinley County New Mexico and Apache County in Arizona, both predominantly Navajo, contained the first and second highest numbers of rural poor among all counties in the United States.[8]

During a mid-1970 household survey, it was found that half of the adults had attended less than four years of school, while seven percent had attended college.[9] The majority of Navajos under 40 speak

English either as a primary or secondary language. Older people mostly speak Navajo. Basic schooling is compulsory but the dropout rate is high. In 1980, 35% of Navajo youth graduated from the 12th grade of high school.[9] On the other hand, many of these graduates excel. In 1985, 9 of 12 fully credentialed Navajo medical doctors formed the "Council of Navajo Physicians" to serve as an advisory group to the tribal government and the Navajo Area Indian Health Service.

Spirituality & Cultural Practices

Beginning with the Spanish exploration and current today, numerous Christian missionary endeavors have been active on the Navajo reservation. This had usually resulted in a "partial conversion" and more recently, a resurgence of pride in traditional spiritual belief and practice has taken place. The result is a variable adherence to traditional practices which transcend "religion" and are more of a life-view which has actually bridged the gap between the old ceremonial ways and new patterns of thought responding to the demand of the modern world. Membership in the Native American Church is high both among those who belong to a Christian denomination as among those who do not. The Native American Church has restored self-esteem in its distinctly Indian group process. It is a blend of the ancient Mexican Indian rites utilizing the hallucinogenic cactus, peyote, all-night ceremonies with some "fundamentalist Christian elements, and pan-Indian moral principles."[10]

Coexisting with this Christian influence are traditional Navajo rituals, most of which are curing ceremonies accompanied by group social functions. Diseases and injury are ultimately traced to the breaking of taboos and the individuals who understand this causal relationship are shamans or medicine men (or women) who include singers, curers, prayer makers, and diagnosticians. Relief from illness may require hiring several of specialists which may become very expensive. Traditional and western medicine now frequently complement each other. In Chinle, in the center of the reservation, the new hospital which opened in 1983 has a specially constructed room for traditional healing ceremonies.

Demography and Health

Broudy and May[11] view the Navajo population as being in the second stage of a demographic transition. While mortality has declined, fertility remains high, yielding a 1978 growth rate of 2.7%. This means a doubling of the population in 23 years. With half of its people under

the age of 22, the Navajo population graph depicts the classical pyramid shape of a developing nation. Although the birth rate has declined, in 1978 Navajo women gave birth to a total average of 4.4 children while all U.S. women gave birth to a total average of 1.8 children.

Data on migration patterns to and from the reservation are not readily available. This is partly due to the unwieldy sociopolitical structure of the reservation. The smallest geographic unit is the "chapter" of which there are about 100, forming the basis for tribal government representation. People are registered to vote in the chapter from which their family traditionally came, even though they may not currently live there. The limited availability of on-reservation jobs has created clusters of residences in unincorporated and otherwise unorganized settlements, while those who are ranchers, unemployed, or elderly tend to live in the most remote areas. Generally the people are scattered in the vast area with an average population density of only 2.6 per square kilometer.

THE INDIAN HEALTH SERVICE (IHS)

The United States has no organized national health system. There is however, a comprehensive federal health program for Native Americans. The origins of this program go variously back to treaties made with Indian tribes, the purchase agreement for Alaska, and the national government's legal trust responsibility. In 1955, the Congress responded to documentation of poor health care, demonstrated by a raging tuberculosis epidemic in Alaska and infant mortality rates of 80 to 100 per 1000 throughout Indian areas, by establishing the "Indian Health Service." It was administratively placed within the U.S. Public Health Service.

The program is supplemental to other health services which Native people might be entitled to by virtue of their U.S. citizenship and local residence. The operating funds available to the IHS are not based on any legally required capitation formula nor any documented benefit package of health services. The beneficiary population is likewise not fixed nor clearly defined and could potentially include all those descended from Indian people. Currently services are provided to, and utilized by, about 900,000 persons predominantly residing on Reservation Lands. This financing arrangement has required the IHS, over the years, to prioritize its services, to form an efficient operational program linking community and environmental health with primary care and to a referral system for specialty services.

Recruitment and retention of medical staff for the often remote

and isolated sites of the IHS program has been a challenge. Initially, duty to the military service could be fulfilled in the U.S. Public Health Service, (assigned to the Indian program) and was an effective incentive. With cancellation of the military draft in the U.S., forgiveness of Medical school loans for work in the Indian Health Service has attracted an adequate number of new physicians. Retention is a problem as the living situation is often too culturally isolated for the family and schooling inadequate for older children. Medical specialists, in particular, feel professionally isolated and earn significantly less than they would in an urban private practice. Nevertheless, having once experienced the challenges and rewards of caring for the medically underserved, and learning to love the natural beauty of many of the reservation sites, a considerable number of young physicians are choosing the IHS for a career.

The general shortage of nurses in the US is particularly felt in all rural and remote areas and may yet be the most difficult health care manpower issue to deal with.

By 1985, the IHS had grown to encompass 12 administrative "Areas," (Table 1) containing 48 hospitals and 72 health centers. Primary medical services consume the major share of the approximately $900 million annual budget, but there are also programs in environmental health, community health nursing, dental care, mental health and alcoholism treatment. All of this is now carried out with the maximum management input and employment of Native American people. Since 1975, the Tribal organizations have had the opportunity to take over from the Federal Government the management of their own programs. As Native American people have gained training and experience in health care administration and delivery, partial or complete take-over has occurred in 47 tribes.

Navajo Area Indian Health Service

The Navajo Area Indian Health Service (NAIHS) is one of the 12 administrative regions of the Indian Health Service. The Navajo Area is divided into eight Service Units for the local organization and delivery of health care. Six of these have hospitals, while two offer ambulatory care only. Today, a system of paved main roads, telephone communication, and air travel link them all together. In a typical Service Unit, community and home health services are provided by public health nurses, assisted by a Navajo driver/interpreter. Travel to homes is difficult, on unmarked dirt roads which are often extremely rough, and communication is hampered by lack of telephones. The drivers, through

TABLE 1

Indian Health Service Administrative Areas
1986 Service Populations

IHS Area Name	*Major Location*	*Population*	*% of Total*
Aberdeen	North & South Dakota	74,781	7.5
Alaska	All of Alaska	75,461	7.6
Albuquerque	Part of New Mexico & Colorado	53,771	5.4
Bemidji	Minnesota, Wisconsin, Michigan	49,550	5.0
Billings	Montana & Wyoming	42,594	4.3
Navajo	Parts of Arizona, New Mexico, Utah	171,097	17.3
Oklahoma	Oklahoma & Kansas	200,488	20.3
Phoenix	Parts of Arizona, Utah, California & Nevada	86,826	8.8
Portland	Washington & Idaho	101,275	10.3
California	Part of California	75,306	7.7
Tucson	Part of Arizona	18,843	1.9
Nashville	Maine, New York, Florida, Mississippi, No. Carolina	37,025	3.9
	TOTAL	987,017	100%

Data compiled from USPHS, Indian Health Service, Rockville, Maryland, 1986 Chart Series.

years of translating and observing, have actually become unofficial medical auxiliaries. Emphasis is on maternal and child health as well as care of the elderly.

As roads improved and standards of medical care increased, the surgical and other specialty components have tended to become centralized at a few sites. The Gallup Indian Medical Center, situated just at the eastern reservation boundary, provides primary care to its surrounding Service Unit of 30,000 people, and referral care in surgery, otolaryngology, ophthalmology, orthopedics, obstetrics, intensive neonatal care, radiology, and specialized laboratory services to the entire reservation health system. Patients requiring a tertiary level of care are

transported usually by air, to a University affiliated hospital in Albuquerque, New Mexico or Phoenix or Tucson, Arizona.

Morbidity/Mortality Patterns

Crude death rates for Navajos have declined to levels below the general U.S. population. When the effect of the younger population is removed by age-adjusting, mortality rates show that the Navajo mortality is actually 1.2 times greater than that of the total U.S. Table 2 indicates that accidents are the chief cause of death, followed by heart disease, malignant neoplasms, influenza and pneumonia. Deaths from tuberculosis are all in older age groups indicating residual problem. Eight to ten percent of infant deaths are due to diarrheal disease (a Total of five or six cases per year). Unlike the situation in many developing countries, malnutrition does not appear to be a contributing factor to the infectious disease death. Immunization rates of over 90% account for the absence of measles, polio, diphtheria and pertussis. Approximately 40% of Navajo deaths are the result of social and environmental pathologies

TABLE 2

Age-Adjusted Mortality Rates, Rank Ordered for Navajo, 1980–82, Compared to Total IHS Population and Total U.S. 1981*
(rates per 100,000 population)

Cause	*Navajo Rate*	*Total IHS Rate*	*Total US Rate*	*Navajo/US Ratio*
Accidents/Injuries	165.7	136.3	39.8	4.2
Heart Diseases	77.3	166.7	195.0	0.4
Malignant Neoplasms	76.6	98.5	131.6	0.6
Pneumonia/Influenza	28.6	26.6	12.3	2.3
Liver Disease/Cirrhosis	21.4	48.1	11.4	1.9
Cerebrovascular Disease	17.1	33.8	38.1	0.5
Homicide & Legal Intervention	15.1	21.2	10.4	1.4
All Causes	656.3	778.3	568.2	1.2

*Adapted from: Congress of the United States, Office of Technology Assessment, *Indian Health Care*, p. 94, Washington D.C., April 1986. Data originally from U.S. Public Health Service, National Center for Health Statistics and Indian Health Service computer tapes.

(in categories of mental illness accidents, suicide and homicide). Fifty percent of male deaths and 27% of female deaths were overtly social or behavior-related.[1] The reported Navajo age-adjusted alcoholism death rate is 20 times that of the total U.S. rate.

Hospitalization morbidity data are presented in Table 3. Although this is proportionate data, some trends are evident. Infectious diseases have declined while the proportion of hospitalizations for injuries has remained constant. Childbirth constitutes about one-third of all discharges. The need for inpatient medical services has declined and ambulatory care has expanded. In such a young and remotely situated population, pediatric care remains a most important service. With the decline in

TABLE 3

Selected Discharge Diagnoses; Percent of all Discharges, Navajo Area Indian Health Service Hospitals*

*Principal Diagnosis & ICD-9CM Codes***	*1959*	*1968*	*1977*	*1982*
Pregnancy & Childbirth 630-676 and V27	n/a	22.2	n/a	32.0
Accidents, Injuries, & Violence 800-999	15.4	18.4	18.3	16.5
Gastrointestinal 520-579	13.7	12.8	7.8	13.6
Respiratory 460-519	19.0	16.3	10.0	10.2
Infective & Parasitic 001-139	5.2	4.8	8.7	3.0
Neoplasms 140-239	1.5	1.6	2.7	2.5
				77.8% in 1982

*Adapted from Kunitz & Temkin-Greener; *Changing Patterns of Mortality and Hospitalized Morbidity on the Navajo Indian Reservation*, Rochester, NY, University of Rochester, 1980 and data from Navajo Area Indian Health Service Statistics Branch, 1984.

***ICD-9-CM. International Classification of Diseases*, 9th Edition. Vols I & II. Ann Arbor, Michigan, Commission on Professional and Hospital Activities, 1978.

Note: for comparison purposes, In 1984, the Navajo IHS Four Leading Discharge Rates per 10,000 population (compared to U.S. short term care hospitals in parentheses) were; 391 (206) for Pregnancy & Childbirth, 143 (148) for Accidents, Injuries, & Violence, 117 (184) for Gastrointestinal, and 100 (144) for Respiratory. Data from U.S. Congress, Office of Technology Assessment, *Indian Health Care*, p 107, Washington D.C., April 1986.

early childhood diseases, a high immunization rate and improved medical coverage, pediatrics too has become mainly an out-patient activity. The proportion of hospitalized patients below ten years of age (excluding newborns) has declined from 33% in 1959 to 19% in 1982.[9]

The Navajo Area perinatal program illustrates the type of organized network that has been possible within the Indian Health Service. Written guidelines for standards of perinatal care and policies and procedures have been agreed to by all the health care providers, (a "standardization" which is not common in the predominantly private U.S. medical practice). Referral patterns are planned *a priori* for various "high risk" conditions and specialists are on stand-by at the medical centers for consultation and service. Results are gratifying with a premature (less than 2500 grams) birth rate of five percent, a neonatal mortality rate of 4.5% and a maternal mortality of zero. All of these perinatal statistics are better than the U.S. total rates.[12]

Table 4 shows the steady decline in the Infant Mortality rate. It remains slightly higher than the U.S. rate, due to increased deaths in the post-neonatal period. These excess deaths are generally linked to social and environmental factors.

As community development proceeeds, the IHS environmental health staff aims at assuring safe water and waste disposal. In the Navajo Area the task is monumental and 40% of households are still without piped water supply. Rodent control is important as plague is endemic in the wild population.

TABLE 4

Navajo & Total U.S. Infant Mortality Rates
(Deaths below 1 Year, per 1,000 Live Births)

Year	*Navajo Rate**	*U.S. Rate***
1965	46.2	26.0
1970	31.2	20.0
1975	27.8	16.1
1978	15.2	14.0
1980	13.0	12.5
1984	11.8	10.8

*Navajo Area IHS Vital Statistics Reports.
**National Center for Health Statistics.

FUTURE PROSPECTS

As far back as 30 years ago, a few Navajo community leaders began to encourage Navajo citizens to participate in modern health care efforts, in particular with the Tuberculosis control program of that time. This "unofficial" work expanded into an organized Tribal Health Department, with efforts concentrated in the areas of prevention and health education. The tribal government has allocated some of its health budget to employ Community Health Representatives, lay workers who collaborate with the public health nurses, sanitarians and clinics. They form vital links with the families and communities and interpret their health needs and demands back to the Navajo Indian Health Service program. A group of concerned Navajo people formed a family planning association and have been teaching the values of child spacing.

However, as can readily be seen in the tables, the now dominant socio-medical problems are not as easily influenced by either the tribal or federal health care programs. The problems are the products of behavioral factors—in turn, largely a result of changes.[1]

The rapid changes in mortality due to infectious causes, reduction of infant mortality as well as extension of life expectancy among the Navajos has all been accomplished mainly through the provision of public health interventions such as immunizations and sanitary engineering, and an organized system of clinical care provided with funding through the U.S. Public Health Service. At the same time the Navajo have experienced improvements in transportation, communication, housing and education which all contribute to health maintenance—*but* not without some cost to previously held values and lifestyles. While several Native American tribes or corporations, most notably in Alaska and Oklahoma, have exercised their prerogative to manage their health care systems themselves by developing government contracts, the Navajo health care administrators have for the most part joined the federal Indian Health Service. It appears that this is mostly due to the huge geographic expanse, making potential tribal centralization of health care delivery and policy more difficult than in the smaller Alaskan and Oklahoman service areas.

The current behaviorally influenced morbidity and mortality patterns will be the greatest challenge to future health programs among the Navajos. Further improvements in these patterns will require significant changes in lifestyle and behavior, and will extensively depend upon internal tribal interest and activities. It is expected that the Navajos themselves will increasingly manage more of health programs in the

concerned fields—although continuing to rely on the U.S. Government to provide significant funding.

The Navajo people are scattered within their reservation. Their disinclination to develop a community infrastructure—and even conglomerations of a few families even in those places where new housing has been constructed to accommodate for the job market, seems likely to counteract favorable development. It also adversely affects the now dominating health problems, and their taking of greater responsibility for public health and preventive peripheral services. As has been experienced in other places such as Alaska, a decisive participation in and the running of small village health units or community health aid stations seems to constitute a *sine qua non* for development in the direction of full health. Intensive local contributions from native communities and individuals are a necessity, particularly for control of socio-mental and behaviorally influenced disorders.

The present situation among the Navajo and other reservations in the field of environmental sanitation including "aesthetic sanitation," which is under the Navajos own control, does not indicate sufficient local interest or initiatives.

The very idea of "reservation" may constitute an obstacle to both an intensified cooperation in health services and a changed way of life. It is difficult to see how the existing socio-mental health problems could be solved in the future without a more active integration of Indian Natives with other Americans.

REFERENCES

1. Haraldson, SSR: *Health planning in sparsely populated areas.* Dissertation. University of Gothenburg, Sweden, 1975
2. Haraldson, SSR: *Role of education in preserving of traditional cultures and as development factor.* Amsterdam. Elsevier Science Publishers. Health Policy and Education,3,1983 (pp 289-305)
3. Haraldson SSR: What expectations do we have in respect of front-line health services for adversely situated populations. *Circumpolar Health 84 Proceedings of the Sixth International Council on Circumpolar Health*, edited by R. Fortuine, Seattle, University of Washington Press, 1985. (pp 17-21)
4. U.S. Department of Commerce, Bureau of Census: *1980 Census of Population Ancestry of the Population by State*; Pub #PC80-S1-10; U.S. Government Printing Office, Washington, D.C. 20402
5. U.S. Department of Health & Human Services, Public Health Service; *HHS News*, July 3, 1984, Rockville, Maryland
6. U.S. Department of Health & Human Services, Public Health Service, Program Statistics Branch, *Indian Health Service Chart Series Book, April, 1986.* Rockville, Maryland, 1986
7. Tribal Council Compromises, *Gallup Independent Newspaper.* Gallup, New Mexico, September 22, 1983, p.1
8. Apache County 2nd-poorest in U.S., *The Arizona Daily Star*, Tucson, Arizona, March 26, 1986

9. Fischler, R. and Fleshman, C.: Comprehensive Health Services for Developmentally Disabled Navajo Children; *Journal of Developmental and Behavioral Pediatrics*, 1985, 6:1-14
10. Dutton, Bertha: *Navajos and Apaches: The Athabascan Peoples*, Englewood Cliffs, N.J. Prentice-Hall Publishers, 1975
11. Broudy, D. and May, P.: Demographic and Epidemiologic Transition Among the Navajo Indians, *Social Biology*: 1984; 30:1-15
12. Wegman, M.: Annual Summary of Vital Statistics—1984, *Pediatrics*, 1985; 76:861-871