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Introducing Modern Medicine in a Navajo Community

Physicians and anthropologists are cooperating in this study of changing patterns of culture and disease. The first of two parts.

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Technologic development in the sense of the natural spread of a technique from one part of the world to another is presumably as old as man. Organized attempts to introduce technologies to a people either within or outside of the introducer's own country are likewise not new. Features today that are quite new, however, are the sheer size of the international technologic development movement, the changed sovereignty relationships of many of the recipient peoples, and the recently developed power to make rapid and truly significant changes in the status of their health. As health and agriculture (along with education) are the principal targets of most programs, the impact of technologic development today may be as much biologic as it is economic.

Of necessity, in such a hurriedly expanding international activity, the power to effect such widespread biologic and social changes must be wielded without much of the body of knowledge essential for its proper application. Thus, the activity carries with it the potential for harm as well as good.

The social scientists were quick to perceive this point, and there is now a rapidly expanding research effort being conducted by them on various aspects of the broad question of technologic development (*1*). The social scientists can penetrate only so far, however, into the biologic aspects of the subject, and there has been relatively little research by medically trained investigators on what might be termed the "medical" aspects of technologic development. Indeed, some of the most important questions are of a nature that neither the social scientist nor the medical scientist is properly equipped to study alone. For example, with today's drugs it is possible to place in the hands of a barefoot, nonliterate villager more real power to affect the outcome of a child critically ill with, let us say, meningitis or pneumonia or tuberculosis than could have been exerted by the most highly trained urban physician of twenty-five years ago. This is a "technologic development" with truly great potential for either good or harm. Yet its full implications cannot be appropriately explored by either the social scientist or the medical scientist working alone. Moreover, in the usual course of events, even when the two are working together, as in the case of an operating program in the field, the requests for the physician to provide medical services to the people are usually so great that he is seldom able to participate in research.

In view of the importance of the basic issue, however, it seems wholly proper that attempts be made to subject some of the relevant questions to scientific scrutiny. Accordingly, in 1955 such an attempt was started, to utilize jointly the skills of the medical and the social scientists in a systematic investigation of the broad question of technologic development as it applies to medicine. The opportunity to initiate such a study was provided by the Navajo Tribal Government and the U.S. Public Health Service, which by congressional action had just been assigned responsibility for the health of Indians in the United States. The cultural, geographic, economic, and medical situations of the Navajo in 1955 closely resembled the corresponding factors in many economically underdeveloped areas of the world (*2*). An opportunity was thus provided to do two things: to try to assist our government in its attempt to improve the situation of one of our own minority groups, and to study, from a vantage point not attainable in an operating governmental program, the wide variety of problems in this complex question of technologic aid to economically underdeveloped countries.

In this article, in the interest of brevity, all discussion is omitted of such topics as the many steps involved in the choice of the project area; the negotiations with the Navajo tribal leaders and with the people of the area chosen; the organization of the project; and relationships of the project to the governmental activities in the larger Navajo area. These are all subjects of very considerable importance in the studies, but they will be presented elsewhere in detail. Suffice it to say (i) that the area chosen is representative in terms of both culture and terrain and consists of the 800-square-mile Manyfarms-Rough Rock area, with an estimated population of more than 2000 people; and (ii) that

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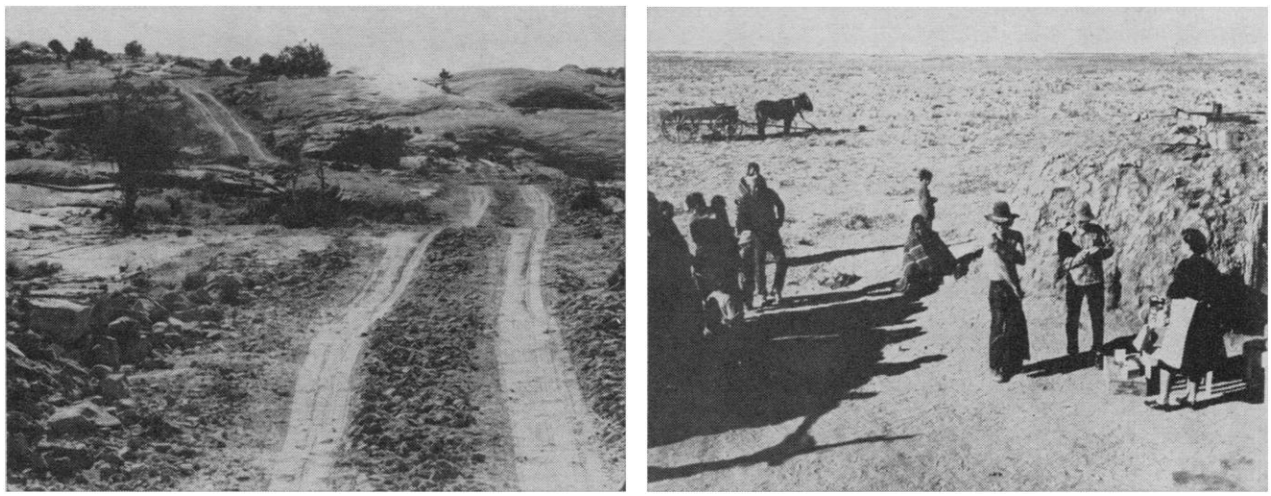


(Left) Sick patients and health service personnel must travel many miles on these "bone-breaking" roads, which constitute a formidable barrier between the ill patient in the hogan and modern medical facilities. (Right) View of the vast sweep of unfenced and apparently uninhabited land, showing the extent to which an individual hogan (right foreground) may blend with its immediate environment. This hogan, with its clay covering, is of an older style than the hogan described in the text. Irrespective of style, however, a hogan is quite difficult to detect. In the Manyfarms area immunizing inoculations such as that being given here by the public health nurse in the foreground are now administered almost entirely by the Navajo "Health Visitors," field auxiliaries of the public health nurses. [Milton Snow, Bureau of Indian Affairs, Window Rock, Ariz.]

the Navajo Tribal Council has annually appropriated $10,000 to $20,000 as its contribution to the research, in addition to the financial support provided by Cornell University, private foundations, industry, and the U.S. Public Health Service (*3*).

In what follows, the research program is presented in brief outline, with the primary aim of describing the complex background, the goals, and the scope of the studies. In addition, the three-year results in a few of the projects are singled out for brief discussion. First, however, it is necessary to describe certain features of Navajo society, especially as they pertain to matters of health (*2, 4*).

Navajo Style of Life

The Navajo tribe of approximately 85,000 members is only one of the more than 200 Indian tribes in the United States, which altogether include some 400,000 people. Unlike many of these tribes, the Navajo live on their own ancestral land, which is located principally in northeastern Arizona, with extensions into Utah in the north and into New Mexico in the east. The Navajo area consists of 23,574 square miles (*5*) and is thus larger than eight of the states. The land is relatively inaccessible, because it is up on a plateau, away from the main stream of travel and transport. This in part explains why the Navajo have managed to remain secluded for so long. The terrain consists of mesas and canyons interspersed with vast sweeps of flat, semiarid, unfenced plain. Because the area has an elevation of from 6000 to 8000 feet above sea level, the climate is rigorous at times, and it can be bitterly cold after sundown in the winter. During most of the year the midday sun is warm.

The Navajo do not live in villages; instead, the individual family units are located several miles from each other, frequently in relatively inaccessible canyons. The 85,000 people scattered over this vast area are linked to each other and to modern health facilities by a network of roads, all but two of them unpaved (*6*), that vary from the merely terrible to the completely impassable. At times the roads go out over sheer naked rock. At other times, a reasonably satisfactory dirt road will be completely severed within a few hours by the flash floods that occur frequently in this mountainous, semiarid plateau.

The usual dwelling unit is the hogan, which is a six- or eight-sided windowless log-and-mud dwelling with a dirt floor and a central smoke hole in the roof. In the interior of the hogan there is usually one bed, and the other members of the family sleep on sheepskins on the dirt floor. The infants are securely laced and carried on cradle boards. The cooking is sometimes done over an open fire, but more often on a stove constructed from a gasoline drum, or on a manufactured stove. Tables and chairs are not generally employed.

The individual dwelling units have no water supply. All water for the entire family must be hauled over the dirt roads by wagon or "pickup" truck for distances of a few to as many as ten miles from the nearest spring, trading post, or livestock tank. There are no privies or latrines. Fecal contamination of the dirt floor of the hogan by the infants is common. The adult practices with respect to the disposal of feces, although "primitive," are relatively sanitary. Defecation is usually done at a considerable distance from the dwelling, and the fecal material is carefully buried. The sand and hot sun serve to render the fecal material relatively harmless.

It should be emphasized that the great majority of adult Navajo and most of the preschool children have no knowledge of the English language. Moreover, the Navajo language is not a written one. A written version has been constructed in recent years by language scholars, but it is used by very few Navajo. Consequently, almost without exception all work in medicine and the other technologies must be carried on through interpreters, who vary greatly in proficiency.

As recently as six years ago there were many thousands of children of school age who had no chance at all to obtain even one year of schooling. Although this situation has been changed considerably, in the 1959–

1960 school year there were still approximately 3000 children of school age who were out of school. There remains, moreover, a large backlog of adolescents and young adults who have received no schooling, or very little.

The Navajo are United States citizens by birth and are completely free to enter or leave their communally owned land without notice to anyone. Relatively few Navajo, however, are able to meet the Arizona literacy requirements for voting in national and state governmental elections; and most members of the tribe are residents of Arizona. The balloting in the tribal elections, which have become quite important in recent years, is done by selection of candidates by picture.

The Navajo earn their living by raising sheep, weaving rugs, working silver, and doing a little dry farming, and through migratory off-reservation employment on the railroad or in harvesting crops. When the man of the family goes off the reservation for railroad employment he usually leaves his family at home, but they may accompany him for crop harvesting. The people are eligible for aid from state and federal welfare programs, just like any other citizens, after meeting the same requirements. In actuality, in the Manyfarms-Rough Rock area, the United States Government program that exerts the greatest influence on the dollar economy appears to be the federal old age and survivors program. This fact has important implications with respect to the position of the elderly in Navajo society.

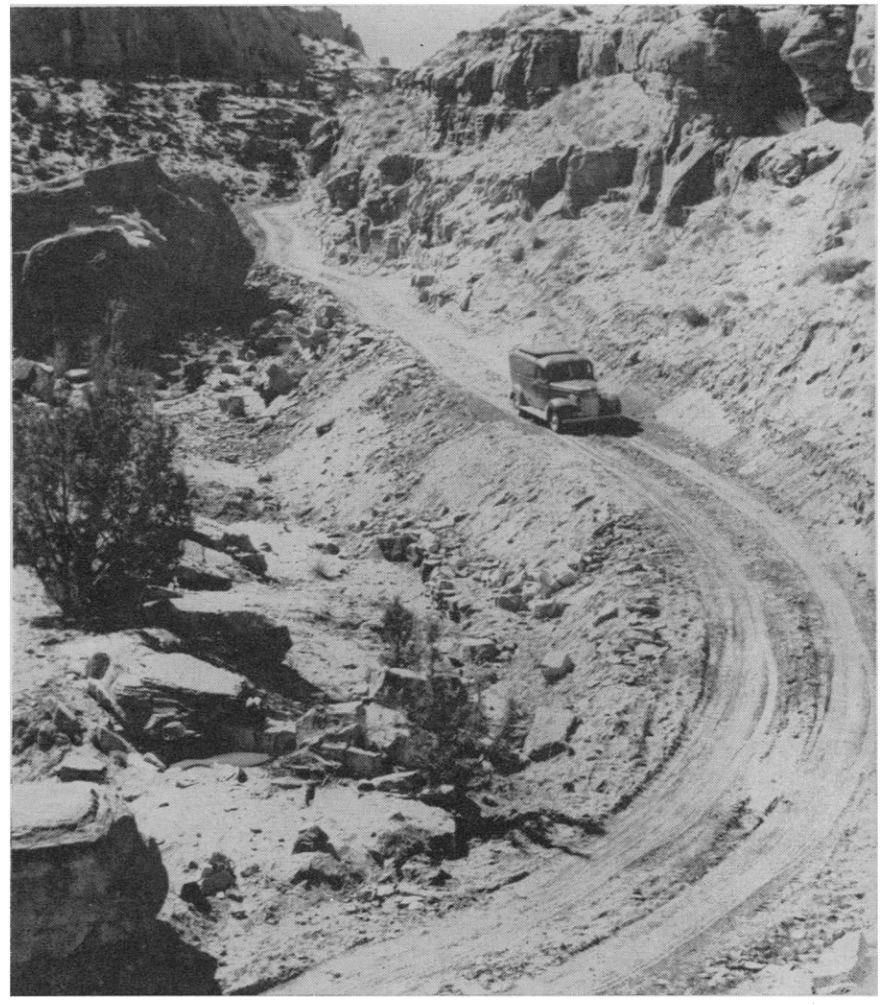
Despite the efforts of Christian missionaries dating back to the 17th century, the Navajo religion is very much a going concern today. Moreover, when considering medical matters it is important to recognize that health occupies a most important position in Navajo religion, and that the healers or medicine men are also the spiritual leaders.

In very elementary terms, all this may be summarized as follows: The Navajo stay on their ancestral land and raise sheep, thus overgrazing the land so that it blows away and is subject to flash floods which make the roads impassable so that the children cannot get to school to learn English. Hence, they cannot successfully compete in the world outside the reservation and must of necessity stay home and raise more sheep.

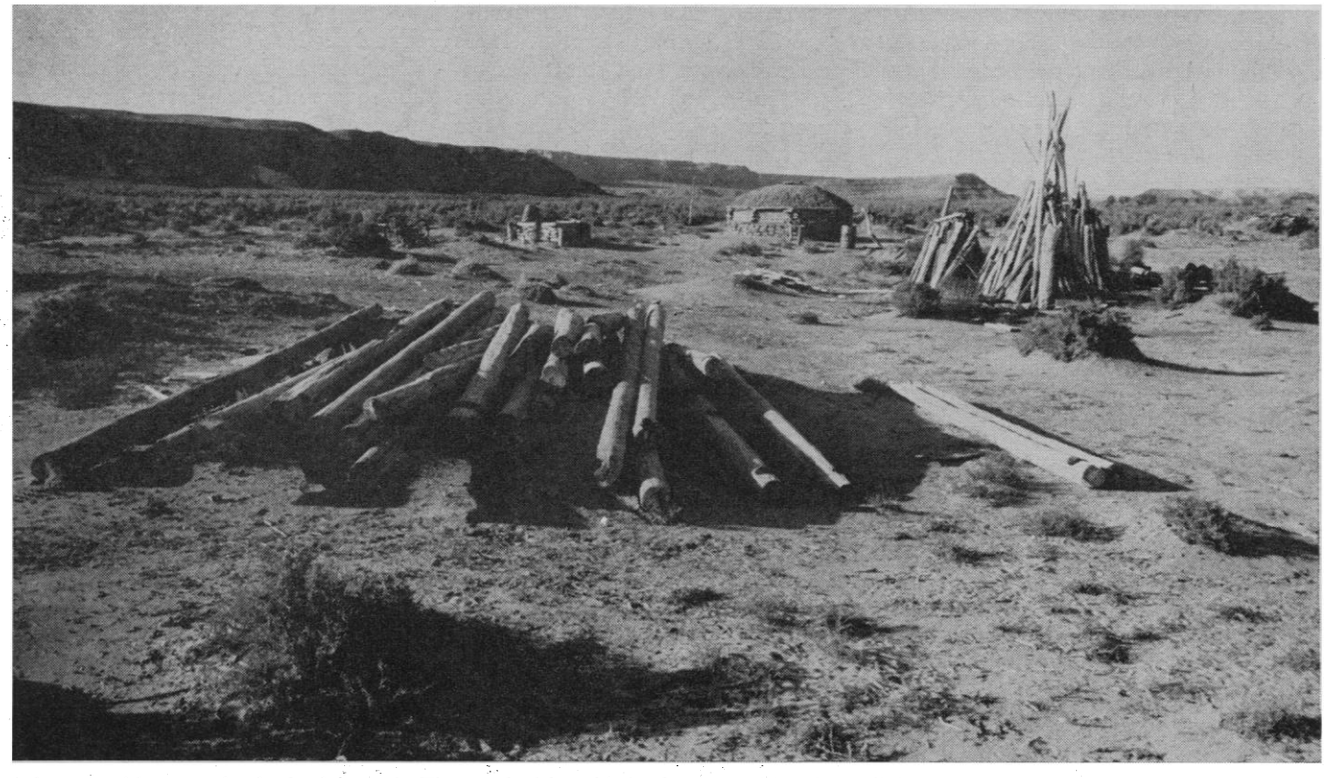
It would be quite misleading, however, to give the impression that the Navajo form a disintegrating society. On the contrary they are a lively, vigorous tribe that has only recently become aware of itself as a tribe. They have excellent tribal leaders who realize that the world has much to offer. These leaders work with (and sometimes belabor) the responsible United States Government officials, and the two groups together are steadily improving the situation. In the past few years the tribal income—that is, the funds available to the tribal government from its own resources (lumber, minerals, oil)—has considerably increased. The tribal leaders have bravely resisted pressures to make a direct per capita "handout" of these funds and have organized a series of integrated tribal programs in such fields as education, health, and the development of water supplies and other natural resources. What can be said today is that in tribal desires and expectations, as in culture and terrain, the situation of the Navajo is a replica in miniature of conditions in many parts of Asia, Africa, and South America.

Scope of the Study

In May 1956 the study under discussion went into actual operation in the 800-square-mile Manyfarms-Rough Rock area in the approximate center of the Navajo territory. There were four avowed purposes: (i) to define the proper concerns of a health program among a people such as the Navajo; (ii) to find ways to adapt concepts of modern medicine for presentation in an acceptable form across formidable cultural and linguistic barriers without compromising essential medical standards in the process; (iii) to study, in so far as possible, the biologic and social consequences of this innovation in terms of the community (and the outside participants); and (iv) to see whether information of importance with respect to environment and disease in our present-day society can be obtained from study of a people who are emerg-



Road through a relatively accessible canyon in which hogans are situated. Although not considered difficult in dry weather, this road can become completely impassable within an hour after a flash flood. [Milton Snow, Bureau of Indian Affairs, Window Rock, Ariz.]



A hogan, with mesas in the background. The notched logs in the foreground are for building a log cabin; firewood is stacked at right. At one time this camp was one of a very few with a well (the low stone structure at left of the hogan), but this is now "sanded in," and hauled water is stored in the gasoline drum in front of the hogan. [American Museum of Natural History]

ing from a relatively primitive society and becoming part of the rural United States of today.

The total program may be considered in terms of three large general studies and a greater number of smaller and more sharply defined studies. To some extent this classification is arbitrary. In reality, the three general studies all tend to merge; conversely, the segmental or categorical studies have a way of developing subcategories once experience is gained in the study of a particular question.

The first of the three general studies consists of a socioeconomic study of the community as a whole, with special reference to factors that might be relevant to a consideration of health and disease. The second study has to do with defining the pattern of disease in the community by performing complete physical examinations and appropriate laboratory studies on the individual members of the community. The third of the general studies is concerned with determining to what extent Navajo men and women with limited schooling can be trained to function as effective field auxiliaries of the public-health nurses.

The use of the word *community* might be questioned when applied to 2000 people scattered over an 800-square-mile area. The term seems justified, however, by the fact that the residents of Manyfarms and Rough Rock avowedly regard these two adjacent areas as "communities" to which they respectively belong, and the two areas together form an electoral district with a single seat on the 74-member Navajo Tribal Council. Representatives from the electoral district as a whole organized the exercises held at the inauguration of the project, at which time the medical facilities were "blessed" in appropriate religious ceremonies by Navajo medicine men. There is similar district-wide representation on the Chapter (*7*) health committee (several medicine men are members), so that this committee, with which the research staff consults, nominally speaks for the residents of the entire 800-square-mile area.

Demographic Studies

The socioeconomic studies have revealed information about the Manyfarms-Rough Rock community of the same general sort as that presented above in the general description of Navajo society. The demographic data are of particular interest, however, because they are believed to represent the first reliable measurement of a Navajo birth rate. Formidable difficulties exist with respect to obtaining such information when an unknown proportion of births occur in remotely situated hogans. It was necessary, therefore, to expend a far greater effort in obtaining these data on births and deaths than would ordinarily be feasible except as a part of a research project.

The number of live births was 94 in 1956, 98 in 1957, and 94 in 1958 in a population that totalled 2048 on 1 January 1959. Thus, the average anuual birth rate over the three-year period was 48.7 per 1000 persons. This extraordinarily high birth rate was associated with a high fertility rate—that is, the number of live births per 1000 women aged 15 to 44. At the census point (1 January 1959) there were 436 women in this age group in the community. With a total of 286 live births (annual average, 95.3) during the preceding three years, the fertility rate was approximately 220 (*8*). Of this total of 286 live births, 48 percent occurred outside the hospital.

During the same three-year period

(1956–1958) there were 47 deaths, or an average of 16 deaths per year in the community. This represents a death rate of 7.3 per 1000 of the Navajo population. The infant mortality rate (deaths during the first year of life per 1000 live births) was 73.1.

The information on deaths among the Navajo was even more difficult to validate than the data on births. In general, the major portion of a death rate is made up of deaths in the early years, especially in the early months, of life. It is this segment of the death rate that was so difficult to obtain. For in the Navajo country when a birth has occurred at home without medical or nursing supervision and the infant dies in the first few weeks of life, it is not at all unusual for the family to make no report of the event to the governmental authorities. There seems to be nothing particularly surreptitious about this. It is simply that members of the family appear to regard the death of their infant wholly in personal terms and hence as something of no conceivable interest to health authorities.

Accurate information on the rate of population increase is obviously of vital importance in technologic development programs, particularly in the planning for facilities in education and health. It is of considerable interest, therefore, that the concentrated study made on a continued basis in the 800-square-mile sample area revealed a birth rate so much higher than the official Navajo birth rate recorded for the tribe as a whole on the basis of routine reporting. For 1956, the official recorded birth rate for the tribe as a whole was 36.3 per 1000 (*5*), in contrast to the rate of 49.6 for that same year in the sample area. Moreover, the annual rate of population increase during the three-year period in the sample area (4.0 per-

The interior of a hogan. The grandmother is teaching a granddaughter to make Navajo bread (which may be fried in deep fat), while her daughter and other granddaughters watch over the youngest child. The pounded dirt floor serves as the "kitchen table." The floor, partially covered with an oilcloth, also serves as the table at mealtime, and at night serves as a bed when covered with sheepskins. The bed in the background is the main article of furniture. Ventilation in this one-room, windowless dwelling is provided by the cracks around the door and by a central 2- by 2-foot smoke hole in the roof, toward which the chimney of the gasoline-drum stove is directed. The interior diameter of the dwelling is approximately 20 feet. [Milton Snow, Bureau of Indian Affairs, Window Rock, Ariz.]

An infant securely laced on a cradleboard. This practice has certain definite advantages, including ease of transportation and management when the mother and child go away from home—for example, to the trading post. The position in which the infant is placed, however, with the legs fully extended, is one that would aggravate, and perhaps even favor the occurrence of "congenital" dislocation of the hip. Where there is any tendency to hip dislocation, a froglike position, with the thighs separated, helps keep the thigh bone in its pelvic socket. To lace babies on a cradleboard in this position would obviously require modification of a long-established cultural pattern. [American Museum of Natural History]

cent) is almost twice the higher of the two rates (2.25 and 2.3) that form the present basis for government planning (*5*). Both the Manyfarms data and the official data recorded for the Navajo area as a whole show a year-to-year consistency.

The question immediately arises as to whether this difference between 36.3 and 49.6 live births per 1000 merely indicates that the 800-square-mile area at Manyfarms is not a representative sample of the much larger total Navajo area. In a sense, no arbitrarily selected region of a larger area can be truly representative of the area as a whole. What can be said about the Manyfarms area, however, is that in its chief socioeconomic characteristics it seems in no way atypical, and that in the opinion of long-time students of the Navajo scene it is not atypical. In this community of approximately 2000 persons, the net gain in population (excess of births over deaths) in a three-year period was 239 persons. This represents a population expansion of "explosive" proportions.

Another finding in this general study of the community was that it was necessary to devise a wholly new system for such a mundane operation as medical record-keeping in order to fit the pattern of the society. It is not always realized that, as modern medicine was developed within the European culture, all medical record systems the world over are essentially the same. They are based on the "facts of life" of Western society and are simply "imposed" on everyone else. With the Navajo it was found that recording of kinship relationships was of considerable importance because two persons within the same immediate family may have different names. In order to recognize that two patients with a communicable disease seen at different times at the field clinic were in fact living together in the same hogan or camp, it was necessary to organize all of the individual charts of the patients by clan and by the composition of the extended and immediate (that is, nuclear) families. This was also of importance because, especially in the past, the Navajos, like many other peoples living in tribal societies throughout the world, have tended to pay little attention to the "Western" naming systems and have continued to depend on kin and clan designations. Consequently, an individual may be recorded by several completely different names in any set of records.

Defining the Pattern of Disease

The second general study merely represents the medical aspects of the first study and has to do with defining the pattern of disease in the community. A systematic attempt was made to obtain detailed and complete physical examinations and appropriate labora-

Filling the camp water barrel by hose from a protected spring. The water may have to be hauled from 2 to 10 miles to the individual homes. The water is uncontaminated at its source but may easily become contaminated by necessary handling and the use of a communal dipper in the hogan. An extensive community program has been started, with tribal funds, to erect structures to protect the springs, such as that seen here, and to restore "sanded" wells. The unbroken colt is simply accompanying its mother while she works and is one more feeder on the overgrazed range. [James Bosch, Window Rock, Ariz.]

tory studies on every member of the community with whom the staff had any medical relationships.

The disease pattern found in the first 1600 persons examined was exactly what one would have expected from the nature of the society. Approximately three-quarters of the disease (76 percent) was either microbial disease or the preventable consequences of microbial disease (Table 1). An example of the latter is the permanent impairment of hearing that may result from an untreated streptococcal infection of the inner ear. Only two components of the disease pattern would seem exotic to a physician trained in the United States: the presence of trachoma and the extraordinarily high prevalence of "congenital" dislocation of the hip. Both of these diseases have long been recognized as prevalent among the Navajo (*9*).

The prevalence of tuberculosis was found to be high, but the incidence (the number of new infections per unit of time) has fallen substantially during the three-year period. In 1957 an intensive roentgenographic and tuberculin survey was made of one half of the population in the project area (in Manyfarms but not in Rough Rock). The prevalence of tuberculosis of all forms was 9.0 percent. Pulmonary tuberculosis, not including primary tuberculosis, was present in 7.0 percent of the approximately one thousand people. In 2.1 percent of the group, the pulmonary lesions were active or presumably active. Evidence that the incidence of tuberculous infection is falling was obtained from the steady fall in positive cutaneous reactions to tuberculin among the school children, almost all of whom were between five and ten years of age. In May 1956 the prevalence of individuals who reacted positively to tuberculin was 33.3 percent among 168 children (*10*). In October 1956 it was 29.4 percent, and in October 1957 the figure was 26.4 percent. A much more dramatic indication of what is going on is provided by the prevalence of positive tuberculin reactors among the 49 five-year-olds who formed the "beginners" class in the fall of 1958. Of the 49, only eight (16.3 percent) reacted positively to tuberculin, and in all but two instances the fact that the child did react positively was already known.

It is believed that this impressive fall may be in part a consequence of the Manyfarms-Rough Rock chemotherapy and chemoprophylaxis program but that it is in greater part the result of two innovations made in 1952. These were the Navajo-Cornell studies in tuberculosis chemotherapy at Tuba City and Fort Defiance and the off-reservation sanatorium program organized through the Fort Defiance facility by the Bureau of Indian Affairs (*11*). Certain of the problems involved in the ambulatory chemotherapy program are considered below, in the presentation of the segmental programs.

Respiratory disease caused by microbes other than *Mycobacterium tuberculosis* was also found to be common. Most of these respiratory infections are either definitely or presumably viral in origin. They consist of the familiar influenza-like illnesses, the respiratory complications of measles and chicken pox, and the numerous forms of "colds and bronchitis" that may afflict adults but are especially prevalent among young children. As for the *occurrence* of these illnesses, the situation among the Navajo is not particularly different from that elsewhere in the United States. Wherever infants and children are raised, families go through periods in which there seems to be simply one respiratory infection after another. The difference in the situation in an economically underdeveloped area such as the Navajo reservation lies not in the occurrence of these illnesses but in the fact that preventable serious secondary complications are much more likely to occur.

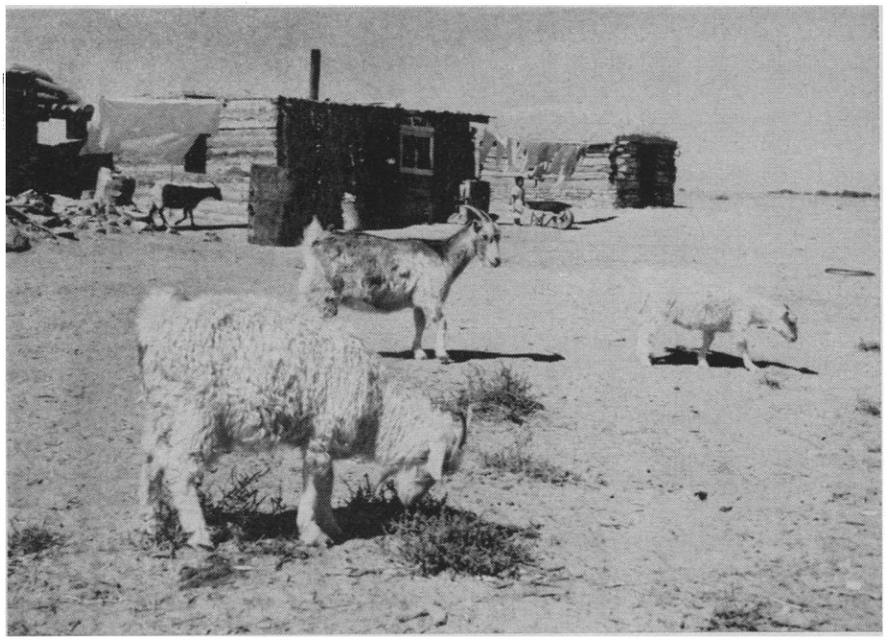
Table 1. Pattern of disease in the first 1600 persons examined in three years at Manyfarms.

Diagnosis	Percentage of total disease
Almost entirely microbial (76.3%)	
Respiratory diseases (pneumonia, influenza, and tuberculosis)	26.8
Other microbial diseases (exclusive of tuberculosis and infant diarrhea)	19.0
Sensory organs and nervous system (principally meningitis, deafness, and eye diseases, all resulting from infection)	15.5
Diseases of digestive system (principally infant diarrhea and gallbladder disease)	8.6
Disease of skin (principally infection)	6.4
Anemia, congenital hip disease, accidents (11.3%)	
Accidents	5.1
Anemia and other blood disorders	3.4
Diseases of bone (includes congenital disease of hip)	2.8
Diseases common in U.S. society (4.0%)	
Diseases of circulatory system (includes diseases of heart and vessels, principally rheumatic fever)	2.2
Allergic and endocrine and metabolic diseases (includes asthma and hyperthyroidism)	1.1
Cancer	0.2
Mental diseases	0.5
Miscellaneous (8.4%)	
Pregnancy, genitourinary diseases, congenital malformations, and so on	8.4
Total	100.0

Secondary Complications Are Serious

For example, it is well recognized that measles is generally not too serious an illness in early life, in contrast to the serious nature of the disease among adults. Yet in the late winter of 1957–1958, measles was widely prevalent in the Manyfarms-Rough Rock area, and 130 children of preschool age were seen. In approximately one-half of these children a pneumonia developed, and the pneumonia was of a type not readily controllable by present-day antimicrobial drugs. Although precise data on this point from elsewhere in the United States are now difficult to obtain, consultation with a number of eminent pediatricians revealed agreement that this was a considerably higher incidence of postmeasles pneumonia than they ordinarily found in the cities of the United States. The point was made, however, that in the first quarter of this century it was part of the medical folklore that whereas measles was generally mild, with a low incidence of pneumonia in "middle class" urban dwellers, the disease was considerably more severe, with a higher incidence of pneumonia, in slum dwellers. In effect, therefore, a viral disease widely prevalent in our society and virtually inescapable in youth is not too serious under present-day general living conditions of the United States but becomes a considerably more serious medical problem in young children living in the hogans. It should be noted that there is no evidence at all that the measles per se is any more virulent among the Indian than among the non-Indian population. Indeed, despite the high incidence of pneumonia in this 1958 epidemic, no deaths occurred among the 130 children.

Another example of disease common in non-Indian society that is more serious when it occurs among the Navajo is streptococcal infections. These are the infections that produce sore throats and that, in children, sometimes involve the ear. With modern medical care in the non-Indian United States, serious ear complications



A camp with a six-sided hogan and a rectangular slab cabin, a combination seen not infrequently in localities far from the supply of heavy logs. An apparent "improvement," the slab cabin actually is less desirable than a hogan. The cabin has a pine plank floor which, with knotholes and shrinkage, becomes less easy to keep clean than a hardened earthen floor. The cabin windows cannot be opened, and the chimney pipe is made to fit snugly; this makes a considerably warmer but a far less well ventilated room than that of the hogan, with its air intake under the door and its smoke hole in the roof. The camp water supply is stored in the gasoline drum at the corner of the cabin. A few goats may serve a useful purpose as "forage leaders" for the sheep and as an alternative source of meat. They are only a minor source of milk, however, and despite intensive efforts by government conservationists, they are frequently allowed to multiply and surpass the sheep in competition for food on the overgrazed range. [American Museum of Natural History]

of this common infection have been reduced to a negligible level. With the Navajo, however, inflammation of the middle ear of infants and children is commonplace and, indeed, is an important cause of deafness.

As a part of the Manyfarms study, an examination of hearing loss in some 270 school children aged six to ten in the project area was made. It was found that 16 percent of this group of children showed some significant loss in hearing. When a partial loss of hearing is added to the problem of attempting to receive an education in an alien language, the implications of these streptococcal infections are very great.

The same viral respiratory infections that attack the Navajo children in some cases attack the adults, and here, too, serious complication may result. For example, various potentially serious forms of nonviral pneumonia and meningitis may develop, and to a considerable extent the occurrence of these illnesses is facilitated by a preceding viral respiratory infection. In the case of the adults, however, the relatively few serious complications that arise could be readily managed in the hospitals, as they are in the United States in general, provided it is possible to get the Navajo patient to the hospital in proper time.

Demography in the field. The recent birth of a baby in this earthen-floored hogan is recorded by a Manyfarms Health Visitor as part of a routine visit. On the right may be seen the legs of a sewing machine which is covered by a manufactured blanket similar to the one hanging on the wall. Navajo women customarily wear these blankets as shawls while concentrating in their own weaving on the creation of rugs for sale. [American Museum of Natural History]

Infant Diarrhea

Diarrheal disease, likewise, is not really a problem among the Navajo adults or school children, despite the fact that the home sanitary practices with respect to drinking water, food preparation, and the disposal of feces are relatively unsatisfactory. Yet diarrheal disease is an exceedingly important problem among the infants and preschool children.

A total of 506 diarrheal episodes were observed in the clinic in a 27-month period at Manyfarms. Of the 506 episodes, 484 were observed by a physician, and 22 were not. In 23 cases it was necessary to send the

patient to the hospital. The age distribution of these 506 diarrheal episodes was quite sharp, with 75 percent of the illnesses occurring in infants or in preschool children. From the epidemiologic pattern of this illness in the Manyfarms studies, and from recent studies in virology, the suspicion is growing that the major portion of this diarrheal illness represents a viral or a combined viral-bacterial infection.

The pattern of illness fits this concept extremely well, and it appears that the infection is something that first occurs soon after the early months of life, at a time when (i) breast feedings are first supplemented with other food; (ii) the child starts crawling around on its own; and (iii) the effects of any immunity that might have been transmitted by the mother at birth would have begun to wear off. This suggests that when sanitary conditions are poor the infection is probably universal, and that a significant immunity to it develops from infection in infancy or early childhood. In most circumstances the disease is not particularly severe, but if the child remains untreated the disease may progress, and it is not infrequently fatal. The emphasis on this entity of infant diarrhea does not mean that isolated outbreaks of other forms of diarrhea in all age groups do not occur as a result of lapses in sanitation. In general, however, such outbreaks are clearly bacterial in origin, are confined to only one or two persons in a single camp, and do not represent numerically the serious health problem presented by the diarrheal disease of infants and young children.

Trachoma

Trachoma in an active stage was found to be present in 2.9 percent of the Manyfarms-Rough Rock school children less than ten years of age. This prevalence of active disease among the children was considerably less than was found at about the same time among adolescents (14 to 16 years of age) assembled from various parts of the reservation at a school for special training in Utah. In 1957 and 1958, at the fall opening of this school, the prevalence of active trachoma was 15.8 and 19.6 percent, repectively. It is evident that these considerable differences in prevalence are not explainable by differences in diagnostic criteria, for an appropriately chosen sample of the Manyfarms-Rough Rock community was reexamined in early 1959 by the same consultants (*12*) who had made the examinations in Utah, and the 2.9 percent prevalence of active trachoma among the young school children at Manyfarms was confirmed. The possibility that Manyfarms was in some way atypical with respect to trachoma seems unlikely in view of the fact that the prevalence of *inactive* trachoma found there was 16.8 percent, whereas more than 40 percent of persons more than 25 years of age showed evidences of previous disease.

It is generally accepted that the "natural" pathway for the spread of trachoma is from mother to infant. In the present situation, however, it appears that some additional factor is operating and that it favors a considerable spreading of the disease among children more than ten years of age. A factor that could operate in this way would be a lapse in accepted practices of sanitation in the reservation boarding schools.

In actuality, such lapses are known to have occurred due to water shortages or the use of communal towels, and at least two localized epidemics of trachoma have recently been observed soon after the children started living together, at the beginning of the school year. It is believed, therefore, that the situation described for trachoma represents merely one more example of the phenomenon familiar in social development, wherein a particular step from Arcadia to urban-type living may upset the balance between a people and its diseases.

Nonmicrobial Diseases

Of the nonmicrobial diseases, cholelithiasis was relatively common, with 45 instances among the 1600 persons of all ages who were examined. Neoplastic disease was quite rare, presumably not because of ethnic factors but because of the predominant youth of the population and its relative lack of exposure to such environmental factors as cigarette smoking and atmospheric pollution. Certain diseases relatively prominent in non-Indian society in the United States, such as Graves' disease (hyperthyroidism), paralytic poliomyelitis, asthma, peptic ulcer, and hypertension, were either quite rare or were not encountered at all.

References and Notes

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12. The consultants were C. Dawson, senior investigator of the Epidemic Intelligence Service, U.S. Public Health Service, and representatives of the Hooper Foundation, University of California Medical School, San Francisco.