

THE EPIDEMIOLOGICAL CONSEQUENCES OF FORCED REMOVAL:

THE NORTHERN CHEYENNE IN INDIAN TERRITORY

by

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ABSTRACT

In August, 1877, approximately 937 Northern Cheyenne were forcibly removed from their northern homeland and transferred to the Southern Cheyenne and Arapaho Agency, Indian Territory. Upon their arrival, they were beset by disease, malnutrition, and cultural alienation. During their residence at the Cheyenne and Arapaho Agency, the Northern Cheyenne experienced malarial infections, measles, and dysentery, resulting in a high degree of morbidity and mortality. Using primary documentation in conjunction with the ethnohistorical record, the epidemiological experience of the Northern Cheyenne in Indian Territory is quantitatively assessed. The impact of these disease episodes on Northern Cheyenne population structure is then examined.

INTRODUCTION

The cultural impact of forced removal among the tribes east of the Mississippi River during the Jacksonian era is well documented in the historical record (Allen 1970; DeRosier 1972; Doran 1975; Gibson 1980; Howard and Allen 1975; Knight 1954). In a more recent article, Thornton (1984, 1987:113-118) examined the ethnohistorical data for the Cherokee with regard to the demographic consequences of removal. After reviewing the evidence, Thornton postulated that Cherokee mortality during their removal to Indian Territory exceeded the 4000 deaths generally acknowledged by contemporary scholars of Cherokee history.

It is his estimation that a total mortality figure of 8000 may not be at all unreasonable (Thornton 1984:298).

No less tragic, was the removal of selected Northern Plains tribes south to Indian Territory. The removal of the Ponca in the mid-1870s, for example, resulted in a four-fold increase in their mortality rate (Commission of Indian Affairs 1877:5-6). The consequences for the Northern Cheyenne removed to Indian Territory were of parallel magnitude.

The forced relocation of a portion of the Northern Cheyenne to Indian Territory in 1877

Gregory R. Campbell

has been the subject of innumerable histories (Berthrong 1976; Dusenberry 1955; Grinnell 1977; Powell 1969; 1981; Stands In Timber and Liberty 1967; Weist 1977). Although it is a well-documented historical event, as is much of Cheyenne history, the epidemiological and demographic effects of removal have never been fully ascertained (Thornton 1987:119-122).

Health and disease are significant measures of the effectiveness by which a population, through combining biological and cultural responses, adapts to their environment (Lieban 1977:13). In this respect, a diseased state, is any organic or psycho-social disturbance that upsets a society's or person's sense of biological and cultural well-being (Dubos 1977:32). Viewed from this perspective an illness is:

...much more than a constellation of symptoms. It is more than the pathology which ensues from parasitic invasion. It is all these things, but it is a system constituting interacting sets of populations and environmental relationships (Hunter 1980:38).

Therefore, analyzing the epidemiological consequences of the Northern Cheyenne's removal requires the consideration of the various cultural and environmental variables which proved detrimental to their health. Under new cultural and environmental circumstances in Indian Territory, the Northern Cheyenne experienced a marked alteration of their health. Through the examination of the available epidemiological and ethnohistorical data, I will evaluate the disease experience of the Northern Cheyenne and explore the demographic implications of forced removal.

PRELUDE TO REMOVAL

Governmental efforts to remove the Northern Cheyenne from their traditional homelands began as early as 1874. The removal of the Northern Cheyenne to Indian Territory was intimately tied to the United State's efforts to disenfranchise them and their Lakota and Dakota allies from the Black Hills. Because the negotiations with the Northern Cheyenne and Sioux failed, the federal government attempted

to coerce the Northern Cheyenne into dissolving their alliance with the Sioux and relocating to Indian Territory by withholding their annuity disbursements from 1874 to 1877 (Covington 1948:14; Powers 1972:73). The Northern Cheyenne response to the United States government's tactics for removal was to abandon the Red Cloud Agency. With continued coercive governmental action, the Northern Cheyenne grew more resistant. Eventually, these tactics culminated in the 1875 through 1877 military confrontations between the United States troops and the Northern Cheyenne.

By April, 1877, the severe winter and United States military winter campaign forced most Northern Cheyenne bands to surrender (Powers 1972:6; Grinnell 1977:399). The demographic consequence of this conflict was the fragmentation of the Northern Cheyenne into four major divisions. A faction led by Two Moons, fled to Fort Keogh, Montana, where many Cheyenne men eventually enlisted as army scouts. These Northern Cheyenne escaped removal and were permitted to remain in the north since they were serving United States military interests. Other Northern Cheyenne traveled to the Wind River Agency. They, too, were not removed and were permitted to reside temporarily near the Northern Arapaho. A number of Northern Cheyenne families, fearing removal was inevitable, voluntarily migrated to Indian Territory, incorporating themselves with their Southern Cheyenne relatives at Darlington Agency. The main body of the Northern Cheyenne, however, chose to return to Red Cloud Agency, located near Fort Robinson, Nebraska (Svingen 1982:23-24). It was this latter division of the Northern Cheyenne tribe that became the target of the United States removal attempts.

Soon after their arrival at the Red Cloud Agency, a council was held with General's McKenzie and Crook. General Crook presented the Northern leaders with a number of options. He demanded that the Northern Cheyenne be relocated to Fort Washakie, Wyoming, or remain at Fort Robinson, Nebraska for one year

Epidemiological Consequences of Forced Removal

and, then be removed with no choice of location; or be removed immediately to the Southern Cheyenne and Arapaho Agency, Indian Territory (Covington 1948:14-15; Powell 1969:195). For the Northern Cheyenne leaders present, none of these was a viable alternative. All of the choices alienated them from their traditional homelands and their Lakota political allies, among whom the Northern Cheyenne were intermarried.

Despite their opposition to the alternatives presented by General Crook, and after some deliberation, the Northern Cheyenne delegation chose Standing Elk to speak on their behalf. In contradiction to the majority opinion held by the Northern Cheyenne headmen, Standing Elk announced that the Northern Cheyenne desired to relocate and live at the Southern Cheyenne and Arapaho Agency (Grinnell 1977:400).

On May 17, 1877, the Indian Office received a dispatch from General Sheridan stating that approximately 1400 Northern Cheyenne desired to move South (Powers 1963:30-31). Despite the protests raised by C.H. Morgan, a representative of the Sioux Commission to President Hayes, on May 28, 1877, 937 Northern Cheyenne, under the direction of Lieutenant Lawton, embarked for Cheyenne and Arapaho Agency in Indian Territory (National Archives, RG 75, microfilm 234-122; Powers 1963:31).

According to Powell (1981:1153), the Northern Cheyenne, led by Lieutenant Lawton and his military escort, followed the headwaters of the rivers south. Although the route taken by Lawton permitted the Northern Cheyenne to supplement their rations by hunting, it also exposed the Northern Cheyenne to malaria (Powell 1981:1153; Wooden Leg 1967:310). Upon their arrival at the Cheyenne and Arapaho Agency, Dr. Hodge, the agency physician, assessed their physical condition. In testimony before the Senate Committee investigating the circumstances surrounding the Northern Cheyenne outbreak from Indian Territory, he stated that they "were worn out by their long journey; many of them had to walk [and] many of them were suffering under malarial fever when they arrived here" (Senate Report

1879:96). Hodge's observations concerning the general poor health status of the Northern Cheyenne was confirmed further by an eastern journalist who met the Northern Cheyenne while traveling south. The journalist described them as traveling "quietly and mournfully, for events had forced them to this choice" (Manypenny 1880:335).

From the available ethnohistorical evidence, it appears that the Northern Cheyenne were experiencing a high degree of biological and social stress at the time of their arrival at the Agency. Such conditions were certainly important contributing factors to their susceptibility to disease and the severity of disease episodes in the south.

THE EPIDEMIOLOGY OF REMOVAL

The Northern Cheyenne arrived at the Cheyenne and Arapaho Agency in Indian Territory on 5 August 1877, 70 days after their departure from Fort Robinson. While still under military control, Agent Miles conducted a full census of the new arrivals. The census enumerated 237 males, 313 females, and 378 children (National Archives, RG 75, microfilm 234-122). The mean family size for the Northern Cheyenne was 4.85. Two days after the census was taken, the Cheyenne were officially released by the military to Agent Miles on August 7, 1877 (Powell 1981:1154).

Tragically, the Northern Cheyenne arrived at the Agency during an outbreak of measles. The epidemic had begun in April among the Southern Cheyenne and Arapaho some three months before their arrival. Agent Miles in his *Annual Report to the Commissioner of Indian Affairs* reported that the measles epidemic among the Southern Cheyenne and Arapaho was quite severe. He wrote:

The "Badge of mourning" is worn by the heads of almost every lodge in the two tribes...The Arapahos say they lost 136 children and the Cheyennes 83 during the epidemic (Commissioner of Indian Affairs 1877:85).

Measles is an acute, infectious, and highly communicable disease. Clinically, the disease is

Gregory R. Campbell

characterized by catarrhal symptoms, Koplik's spots, and the typical rash (Top 1968:361). Once infected by measles virus, the incubation period varies from eight to 13 days. The mode of transmission is by droplet infection or direct contact with nasal or throat secretions. Communicability is from slightly before the prodromal period to four days after the appearance of the rash (Benenson 1980:212).

Measle epidemics in previously isolated or infrequently exposed populations are characterized by very high morbidity and mortality (Black, et al. 1979:117). In such severe outbreaks, the disease is known as hemorrhagic measles. Characteristic of hemorrhagic measles is profuse bleeding into the lesion areas producing pools of blood underneath the eruption. Such epidemics are accompanied by a high fatality rate from the primary infection as well as from secondary infections (Morley 1980:121). Measles is particularly fatal to the very young in a population, especially infants and children under the age of three years. In addition, poor nutrition, overcrowding, and poverty are significant factors which predispose children and adults to further complications and death (Top 1968:367-388).

The epidemic had almost subsided, when the Northern Cheyenne arrived on the reservation. Apparently, the Northern Cheyenne had not contacted measles before their arrival in Indian Territory. Subsequently, they were a highly susceptible population and a second outbreak occurred. Like the Southern Cheyenne and Arapaho, the infection particularly affected the Northern Cheyenne children. The high morbidity and mortality was recalled by Wild Hog:

The children died of a disease we never knew anything about before; they broke out in blotches and dots all over, their noses would bleed and their heads would split open (Senate Report 1879:8).

The symptoms described by Wild Hog strongly suggest an outbreak of hemorrhagic measles. Unfortunately, the Agency physician's *Monthly Sanitary Reports* for 1877 have been lost or destroyed, so a quantitative assessment is not possible. Although Whirlwind, a prominent

Southern Cheyenne band leader, told a Senate Committee that "a larger proportion of the Northern Cheyenne died than among the Indians who had always been living in the south" (Senate Report 1879:36).

The Northern Cheyenne also experienced a high incidence of malaria. Nespor (this volume) has provided a comprehensive summary of malaria ecology at the Southern Cheyenne and Arapaho Agency. The clinical symptoms of malaria and the particular circumstances surrounding the Northern Cheyennes' susceptibility to the disease need to be discussed as well. Historically, the Southern and Northern Cheyenne resided on the western fringes of the Great Plains. This region was, for the most part, an *Anopheles*-free zone (Contacos and Coatney 1968:356; Nespor this volume). Hence, it was not until the Southern and Northern Cheyenne were confined to the eastern portion of the Southern Cheyenne and Arapaho reservation near to Darlington Agency, that both tribes were fully exposed to malaria-carrying *Anopheles quadrimaculatus* (Berthrong 1972; Grinnell 1977; Nespor this volume).

The most common type of malaria in west-central Oklahoma was *Plasmodium vivax*. *P. vivax* is generally not life-threatening, except among the young, elderly, or in persons with concurrent diseases (Benenson 1980:205). In other words, any member of a population who may be weakened immunologically is at risk for developing severe complications or dying from the disease. Ten to 28 days after exposure to *Plasmodium*, clinical symptoms manifest themselves. Malarial attacks are characterized by headaches, myalgia, fevers peaking at 106° F., profuse sweating, and chills. All clinical and pathological symptoms, especially the paroxysms of fever, are synchronous with the asexual erythrocytic cycle of the disease process (Top 1968:357; T-W-Fiennes 1978:105).

Desowitz (1980:457), in his study of epidemiological-ecological interactions in savanna environments, characteristic of the ecological conditions in which the Northern Cheyenne were forced to camp, noted the correlation between disease seasonality, alternating

Epidemiological Consequences of Forced Removal

wet and dry periods, periodic vector population density, and behavioral interaction with their hosts. For malaria, like many vector-borne transmitted infections, the primary determinant in transmitting the disease to the host population is the intermediate vector (*Anopheles quadrimaculatus*) (Mattingly 1969:22). The *Anopheles* species tend to make a fixed number of bites, independent of the number of primary hosts available to feed on (Anderson and May 1979:II:458). Despite this disease transmission parameter, the Northern Cheyenne were a highly susceptible population in that the tribe had little or no exposure to malaria before their arrival at Cheyenne and Arapaho Agency.

Aside from the Northern Cheyennes' lack of exposure to malaria, a significant factor in the high incidence of malarial infection and other diseases was the geographic location of the Northern Cheyenne encampment (Fig. 28). After their arrival, Agent Miles required the Northern Cheyenne to camp in close proximity to the agency, along the Canadian River. During the late summer, the wooded areas surrounding the

agency were laced with freshwater pools and low-lying swampland. This seasonal micro-environment provided a prime breeding area for malaria-carrying Anopheline mosquitoes (Allen 1975; Nespor 1984:145; this volume). Furthermore, the local ecological conditions that favored Anopheline carrying *Plasmodium vivax* at the Southern Cheyenne and Arapaho reservation, were enhanced by human modification of the environment around the Agency (Desowitz 1980:458; Mattingly 1969:68; Prothero 1965:8). Agricultural furrows, wells, animal water troughs, and sanitary facilities provided increased breeding grounds for the mosquitoes. This human intervention and alteration of ecological conditions, particularly the vegetation patterns, no doubt increased the prevalence of malaria among the tribes (Roundy 1980:18-22). Wild Hog, in commenting on the initial camping locale selected by Miles, testified that the woods were full of mosquitoes which troubled the Northern Cheyenne constantly (Senate Report 1879:4). Thus, a highly susceptible population was fully exposed to the inter-

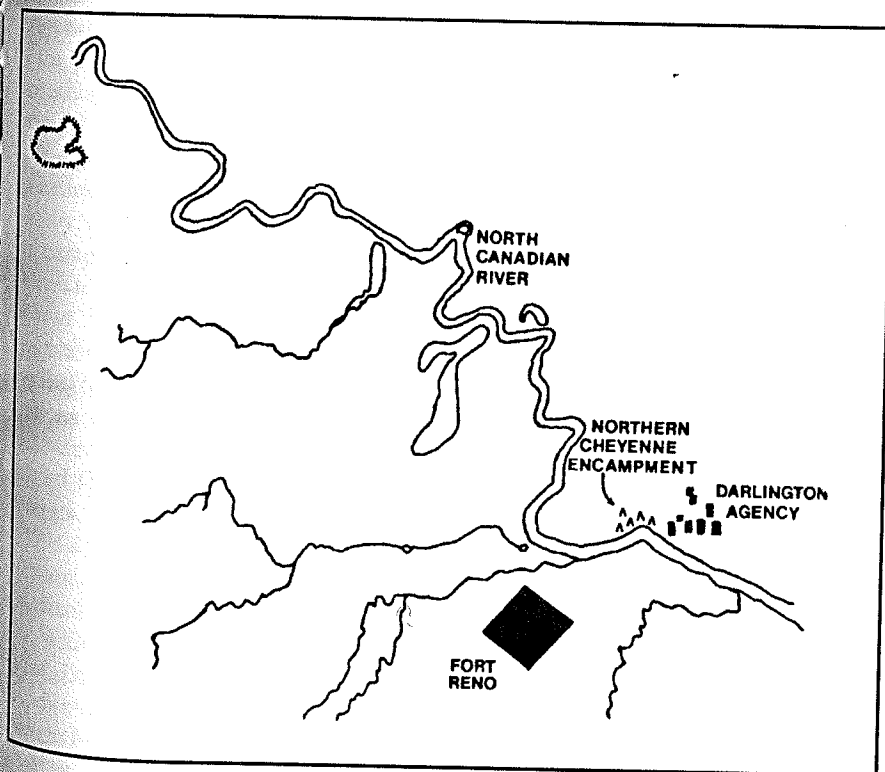


Fig. 28. Map of Darlington Agency.

mediate vector (*Anopheles quadrimaculatus*), resulting in a high prevalence of malarial infection.

The camping locale also exposed the Northern Cheyenne to other water-borne infections. The location of the Agency was below the point where Fort Reno dumped its raw sewage into the Canadian River (Allen 1977:230). The contaminated water was then carried downstream and used by Agency employees, the Northern Cheyenne, and other Indians encamped nearby. While confined to this area, it is reported that many Northern Cheyenne contracted dysentery and other water-borne enteric bacterial infections (Allen 1975).

The severity and impact of these infectious diseases are reflected in the specific mortality rates for the Northern Cheyenne. For the first four months after their arrival, Northern Cheyenne sex-specific mortality rates were 6.75 per 1000 for adult males and 8.30 per 1000 for adult females. The mortality rate for Northern Cheyenne children, 11.36 per 1000, was particularly high. The Northern Cheyenne crude death rate during their tenure at the Southern

Cheyenne and Arapaho Agency was 9.17 per 1000. These rates testify to the susceptibility and rapid depopulation of the Northern Cheyenne.

As new susceptibles, the Northern Cheyenne experienced not only severe illnesses, but high mortality among all age groups of the population, although there was a tendency for morbidity and mortality to concentrate among the young and elderly, which represent the most vulnerable segments of their population (Leamonth 1977:69).

The Northern Cheyenne were eventually permitted by Miles to relocate away from the proximity of the agency. Despite their movement out of the Canadian River floodplains, in 1878, they were again besieged by malarial infections because of unusually wet conditions. Figure 29 presents the period prevalence rates for malaria. These rates measure the proportion of people who have a disease at a specified point in time, including all new cases that occurred during the period (Lilienfield 1976:118; Mausner and Bahn 1974:127-28). The epidemic curve derived from these rates illustrates the

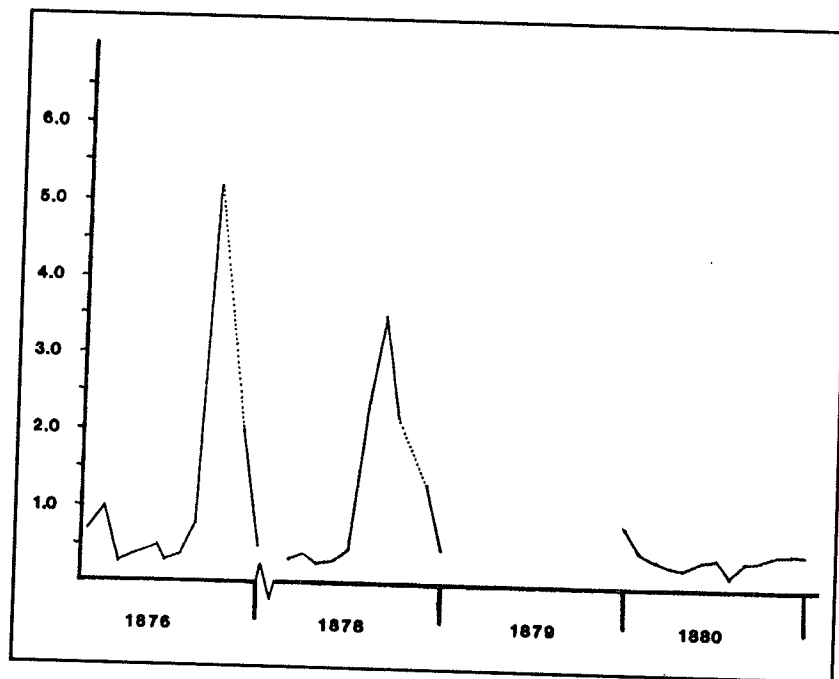


Fig. 29. Cheyenne and Arapaho period prevalence rates for malarial fevers: 1876-1880.

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Epidemiological Consequences of Forced Removal

seasonality and high morbidity of the Cheyenne and Arapaho population from 1876-1880.

Although the 1876 prevalence rate in the curve may be artificially heightened because of a small denominator, the curve indicates the severity of malarial fever at the Cheyenne and Arapaho Agency. The severity of the malarial epidemic episodes from 1876-1878 is qualitatively supported by the available ethnohistorical data. In 1877, Dr. Hodge, the Agency physician, reported to Agent Miles that he had treated about 3000 patients during 1878. Of the 3000 who sought treatment, Dr. Hodge estimated that approximately 2000 patients were afflicted with malarial fever (Commissioner of Indian Affairs 1877:292; Crockett 1958). Northern Cheyenne mortality for these years was unusually high. The crude death rate for all the Cheyenne in 1878 was 29.28 per 1000, of which a large proportion were Northern Cheyenne.

During these epidemic periods, important contributing factors to the high level of morbidity and mortality among the Northern Cheyenne were the inadequate supply of medicine and their geographic distance from the Agency. Initially, the Northern Cheyenne camped about two miles from the Agency. Gradually, a portion of the Northern Cheyenne moved approximately twelve miles northwest of the Agency (Senate Report: 1879:52, 96). The remainder of the removed Northern Cheyenne, led by Standing Elk and Living Bear, continued to camp near the Agency, associating themselves more closely with the Southern Cheyenne. These Northern Cheyenne were intermarried with the Southern Cheyenne, and were more willing to accept the political and economic conditions of the reservation. Despite Northern Cheyenne claims to the contrary, Dr. Hodge stated that he visited the Northern Cheyenne camps on a weekly basis (Senate Report 1879:96). Thus, it seems that the more resistant faction of the Northern Cheyenne were denied medical treatment.

With regard to the shortage of medical supplies, Dr. Hodge (Oklahoma Historical Society Archives 1877) wrote in his *Monthly Sanitary Report* for August of 1877 that "...the increase of

the death rate this month was owing to a lack of proper and sufficient medicine. Over one thousand for medicine [sic] ...were discharged from the office without relief." This lack of quinine continued into 1878. Agent Miles reported in his *Annual Report to the Commissioner of Indian Affairs* that:

...it is no exaggerated estimate when the number of sick people on the reservation is placed at 2,000. Many deaths have occurred which might have been obviated had there been a proper supply of anti-malarial remedies at hand. Ninety-five ounces of quinine were received in advance of the annual supply and consumed in less than ten days. The success of the agency physician has been gratifying, and the only cause of ill-success has been due to the lack of medicines. Hundreds applying for treatment have been refused medicine, and the result has been a resort to their native medicine and the perpetuation of superstitious rites (Commissioner of Indian Affairs 1878:56).

In spite of Dr. Hodge's repeated pleas for more quinine, adequate amounts were not delivered until January of 1879, approximately four months after most of the Northern Cheyenne left for their northern homeland (National Archives, RG 75, microfilm 234-123).

Another factor affecting Northern Cheyenne health status was malnutrition. From the time of their first arrival until a portion of the Northern Cheyenne departed, their population existed on "short rations." Inadequate annuities resulted in a malnourished state and were a contributing factor in Northern Cheyenne continued susceptibility to infectious disease (Powers 1971). At Darlington Agency, the Northern Cheyenne were issued annuities of poor quality and about one-third the amount stipulated by treaty (Senate Report 1879:XIV). Wooden Leg, whose family opted to remain in Indian Territory with the Southern Cheyenne until the eventual relocation of Little Chief's Northern Cheyenne band, recalled that:

...there was no game here. We were not allowed to go off the reservation for hunting, and we were not given food as it has been promised (Wooden Leg 1967:320).

Gregory R. Campbell

Similarly, Whirlwind, a prominent Southern Cheyenne leader, supported the Northern Cheyennes' allegations of the ration shortage:

There was seldom a time but something or other was missing from the rations; they were out of flour part of the time; a part of the time they were out of bacon; they were always out of something that was to have been issued (Powell 1981:1155).

The severity of an infectious agent is often related to the nutritional status of the host population. Generally, "...malnourished hosts have lowered immunological competence, and are less able to withstand the onslaught of infection" (Anderson and May 1979:II:460). In terms of the etiology of malaria, a malnourished state may have actually functioned to lessen Northern Cheyenne mortality among adults, while increasing the mortality levels in the young and elderly (Newman 1962). The increased infant and child mortality was remembered by Wild Hog's wife. She testified before a Senate Subcommittee that:

The main thing I complained of was that we didn't have enough to eat; my children nearly starved to death; then sickness came and there was nothing good for them to eat; for a long time the most they had to eat was corn meal and salt. Three or four children died every day for a while and that frightened us (Senate Report 1879:33).

Malarial parasites cannot thrive in human systems when hemoglobin levels are suppressed because of grossly inadequate iron intake. Yet, even with a low parasite count, malnourished hosts can have active clinical or sub-clinical infections (Newman 1962:23).

Figure 30 summarizes the mortality trends of the Northern Cheyenne. The initial high crude death rate points to the epidemiological impact of the 1877 measles and malaria epidemic episodes. The continued downward trend represents the process of immunological acclimation as well as the departure of 353 Northern Cheyenne during a peak month in the malarial season (Covington 1948; Grinnell 1977; Powers 1963). By 1881, Agent Miles proclaimed that:

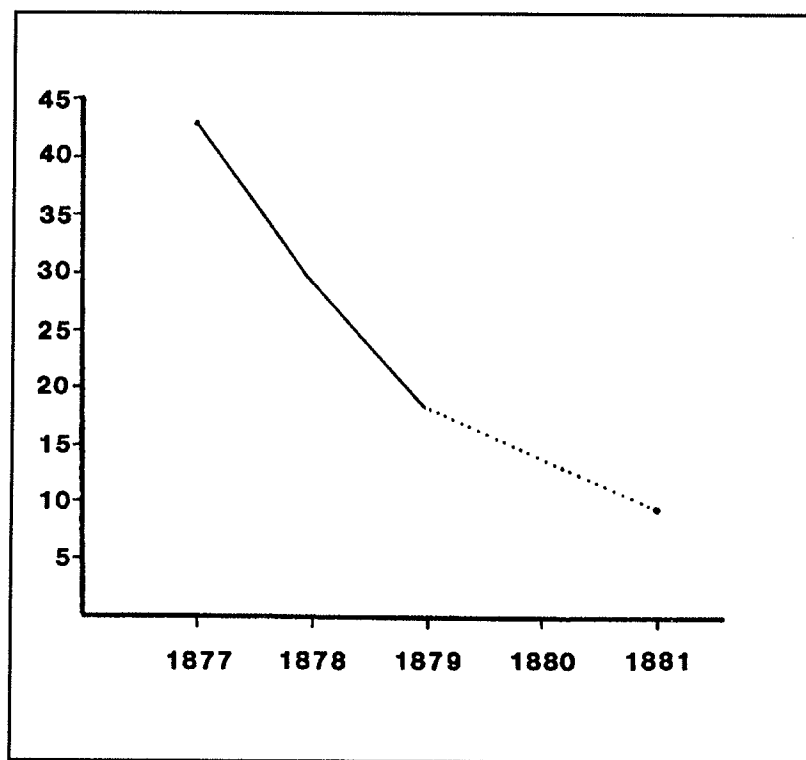


Fig. 30. Northern Cheyenne crude death rates: 1877-1881.

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Epidemiological Consequences of Forced Removal

[T]here has been an increase in numbers during the past year, which can be accounted for in the fact that the year just past has been one of unusual good health and but few deaths reported. That portion of the Cheyennes included in the above who came from the North, having become quite acclimated, have suffered no more from malarious disease than those who have lived here for years. The dryness of the season has so completely dried up all the ponds and stagnant water as to prevent all unhealthy influence from that source (Commission of Indian Affairs 1881:66-67).

Aside from drier climatic conditions, a significant contributing factor in the decline of malaria incidence was the population dispersion of the Cheyenne and Arapaho away from the Agency into Anopheles-free zones between 1879 and 1881 (Nespor, this volume).

Epidemiologically, the Northern Cheyenne in Indian Territory experienced a significant deterioration in their health status. An important contributing risk factor in the change of Northern Cheyenne health was the acute social stress and cultural alienation engendered by removal (Allen 1977:44). Those Northern Cheyenne who did not incorporate themselves into the Southern Cheyenne encampments became the object of open resentment among their Cheyenne relatives and the Agency administration. Prior to the removal south, the Northern and Southern Cheyenne lived in growing isolation from each other. The increase of emigrants across the Plains, the settlement of the Plains region itself, and the construction of the continental railroad provided effective barriers against continuous cultural interaction between the two tribal divisions. The geographic isolation between the Southern and Northern Cheyenne, in conjunction with the close alliance the Northerners had forged with the Oglala and Brule, had created distinct cultural differences between the two tribal divisions. According to George Bent (Hyde 1968:197), the Northern Cheyenne were more Sioux-like in language, habits, and appearances, prompting the Southern Cheyenne to insult them by calling them Sioux-Cheyenne (Powell 1981:1155). Similarly, those Northern Cheyenne under Standing Elk and Living Bear, who incorporated

themselves with their Southern Cheyenne relatives, charged that the Northern Cheyenne who intended to go north had thrown them away to the Southern Cheyenne (Senate Report 1879:20). Thus, from the time of their arrival to their eventual departure, Dull Knife's and Little Wolf's bands were considered aliens by their own people.

The hostility directed toward Dull Knife's and Little Wolf's people was partially brought about by their open dissatisfaction with the Agency and the living conditions. Viewing their stay on the Cheyenne and Arapaho reservation as temporary, many Northern Cheyenne refused to cooperate with Agent Miles or his policies. They would not place their children in school, attempt to farm, or be again enumerated (Powers 1971:76-80). Miles reacted to their open defiance with increasingly repressive policies and military observation. In May, 1878, for example, Agent Miles withheld sugar, coffee, and tobacco from their already short rations in an effort to force them into compliance (Powers 1971:76). Such stressful conditions were detrimental to the Northern Cheyenne's social and physical well-being (Allen 1975:156).

In sum, the epidemiological history of the Northern Cheyenne who were subjected to removal was aptly summarized by Wooden Leg, who told Marquis:

There was much sickness among the Northern Cheyennes. To us it was a new kind of sickness. Chills and fevers and aching bones dragged down most of us to thin and weak bodies. Our people, died, died, died, kept following one another out of this world (Wooden Leg 1967:320).

Patterns of health and disease are integral components of population change (Omran 1971:509). The relationship between severe mortality occurring during epidemic episodes and changes in population structure are intimately connected to the epidemiological experience of the Northern Cheyenne. The interrelationship between demographic processes and population epidemiology lies in the rate at which new susceptibles enter into the host population. These conditions held serious

Gregory R. Campbell

demographic consequences for the Northern Cheyenne while they resided in Indian Territory.

DEMOGRAPHIC CONSEQUENCES

Since there is no inherited immunity to measles or malaria, susceptibility at birth is universal. Therefore, there is a general correlation between endemicity, host population size, and the host population's birth rate (Anderson and May 1971:366). Under such epidemiological conditions, the Northern Cheyenne experienced a marked suppression of fertility coupled with a high mortality rate (Fig. 31). The relationship between the crude death rates and crude birth rates illustrates the degree of initial population loss resulting from disease.

In 1877, the high mortality was coupled with a marked suppression in fertility. The suppression of fertility rates during periods of epidemics is dependent upon the natural environment to which the fetus is to be born. Under conditions of poor nutrition, contagious diseases, and social stress, both the mother, fetus, and newborn

are at risk for increased mortality (Kusukawa 1963). The high infant mortality among the Northern Cheyenne was qualitatively assessed by Agent Miles in a letter to Commissioner E. Hoyt. Agent Miles wrote that "most of the Children [sic] who died were born here, and died very shortly after birth" (National Archives, RG 75, microfilm 234-125).

With regard to the impact of malaria on fertility, Leamonth, in his study of malaria ecology observed that:

During epidemic seasons there will be a temporary increase in abortions, a reduction in conceptions and a consequential reduction in birth rates. Birth rates will recover between epidemics, probably quite rapidly, while community immunity will fall (Leamonth 1977:71).

The Northern Cheyenne demographic experience can be attributed to this 'herd' immunological process. Herd immunity indicates the decreased probability of a population developing an epidemic upon the introduction of an infectious agent. Yet, there will always be a number of individuals in a population who will

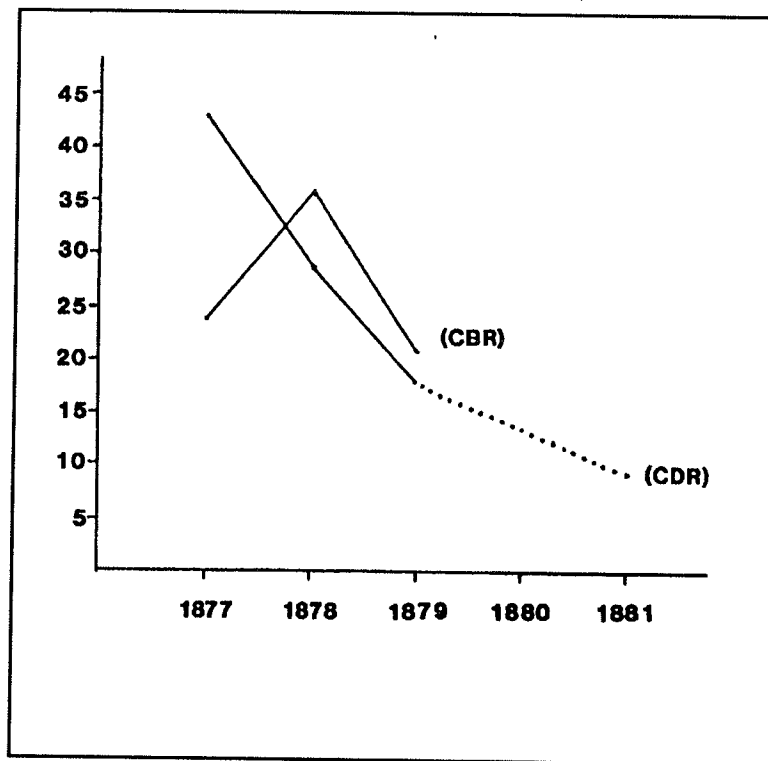


Fig. 31. Northern Cheyenne crude death rates and crude birth rates: 1877-1881.

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Epidemiological Consequences of Forced Removal

remain susceptible to the infectious agent (Lilienfield 1976:48). With the transition from a highly susceptible population to a more endemic infectious state, the crude birth rate, in 1878, rose above the declining crude death rate, producing high morbidity.

Although the crude death rate continued to decline, most deaths that occurred were among infants and probably females. The rapid decline in the crude birth rate and the statement by Agent Miles cited above, provide sufficient evidence that these two segments of the population were most severely affected by disease.

The depopulation trend among Northern Cheyenne in the transition to a more endemic infectious state is demonstrated in declining family size. Just after their arrival in Indian Territory, on August 7, 1877, the average Northern Cheyenne family size was 4.85. Only four months later, the mean family size fell to 4.10 persons. In real terms, each Northern Cheyenne family lost at least one member.

A variable which certainly influenced fertility levels was nutrition. In general, a cross-cultural survey of non-contraceptive societies indicated a birth interval in excess of 30 months is considered a subfecund state (Marcy 1981:320). An inadequate diet may result in amenorrhea, and in some cases, sterility (Newman 1962:26). According to the 1900 United States census, 7.2 percent of the Northern Cheyenne females who had completed their reproductive careers were reported as sterile, indicating a marked suppression of their fertility.

Such epidemiological and bio-social trauma in Indian Territory had long-term demographic effects for the Northern Cheyenne. The result of their experiences at the Cheyenne and Arapaho Agency are exemplified in the age-sex pyramids for 1886 (Fig. 32). The Tongue River band's age-sex structure represents those Northern Cheyenne who were removed. The Two Moons' age-sex pyramid are those Northern Cheyenne who avoided removal to Indian Territory by enlisting as scouts at Fort Keogh, Montana. By comparing the Tongue River Cheyenne's pyramid with the Two Moons' pyramid, the dif-

ferential mortality between the two bands is reflected. Two Moons' band resembles a young, growing population. The zero through nine age cohort demonstrates that fertility in this group remained fairly high. The relatively normal age-sex distribution, implies that mortality remained fairly stable. Their demographic profile is confirmed by the ethnohistorical record. The Northern Cheyenne scouts and their families were provided with adequate food, shelter, and medical care at Fort Keogh (Stands in Timber and Liberty 1967:229-230).

In contrast, the Tongue River pyramid can be described as a gashed age-sex structure (Hollingsworth 1969). The constricted base of the population pyramid and skewed maleness in terms of survivorship, demonstrates the general sex-specific mortality levels cited earlier in the paper. The gashed age structure represents not only mortality from infectious agents in Indian Territory, but their mortality experience resulting from the attempted escape of Dull Knife's and Wild Hog's bands from Fort Robinson, Nebraska. The demographic trauma after the Fort Robinson massacre is again indicated by average family size. The mean family size of those Northern Cheyenne which were removed dropped to 3.74 persons.

The basic demographic data presented here, illustrate the impact of removal on the Northern Cheyenne population. The severe disruption of their population structure was a direct result of their deterioration of health. Plagued by a constant onslaught of diseases, in combination with poor nutrition and overt cultural oppression, the Northern Cheyenne experienced a marked increase in mortality and a suppression of fertility. These demographic events had long-term consequences for Northern Cheyenne population structure and social relations. Demographically, the removed Northern Cheyenne population experienced a decline in band and family size through mortality. The demographic fragmentation of the most elementary structures of Northern Cheyenne social relations, in turn, adversely affected their health status, fertility, and kin relations. Many of these problems were still prevalent after they were resettled in Mon-

Epidemiological Consequences of Forced Removal

Biologically, the removal of the Northern Cheyenne had profound health consequences. For example, Dr. Pettys, the post physician at Fort Robinson, examined Dull Knife's band after they were captured and observed a high incidence of ague and chills until the band broke out (Grange 1964:275). In Indian Territory, the Northern Cheyenne also began the epidemiological transition from the devastating effects of infectious pathogens to more sustained chronic diseases. During their brief tenure in the south, the Northern Cheyenne were apparently exposed to pulmonary tuberculosis which was prevalent among the Southern Cheyenne (Senate Report 1879:97). As a result, by 1898, the adult Northern Cheyenne population were reported as having a high incidence of consumption (Commissioner of Indian Affairs 1898:198).

Removal to Indian Territory severely disrupted their political, economic, and social rela-

tions. Families were permanently separated and, with depopulation, new social contradictions arose which required alterations in their kinship system in order to achieve reproduction of that system (Moore 1983; Godelier 1975). Clearly, the examination of the health conditions and demographic processes of specific Native American tribes such as the Northern Cheyenne provide valuable insights into the biological and cultural ramifications of colonialism.

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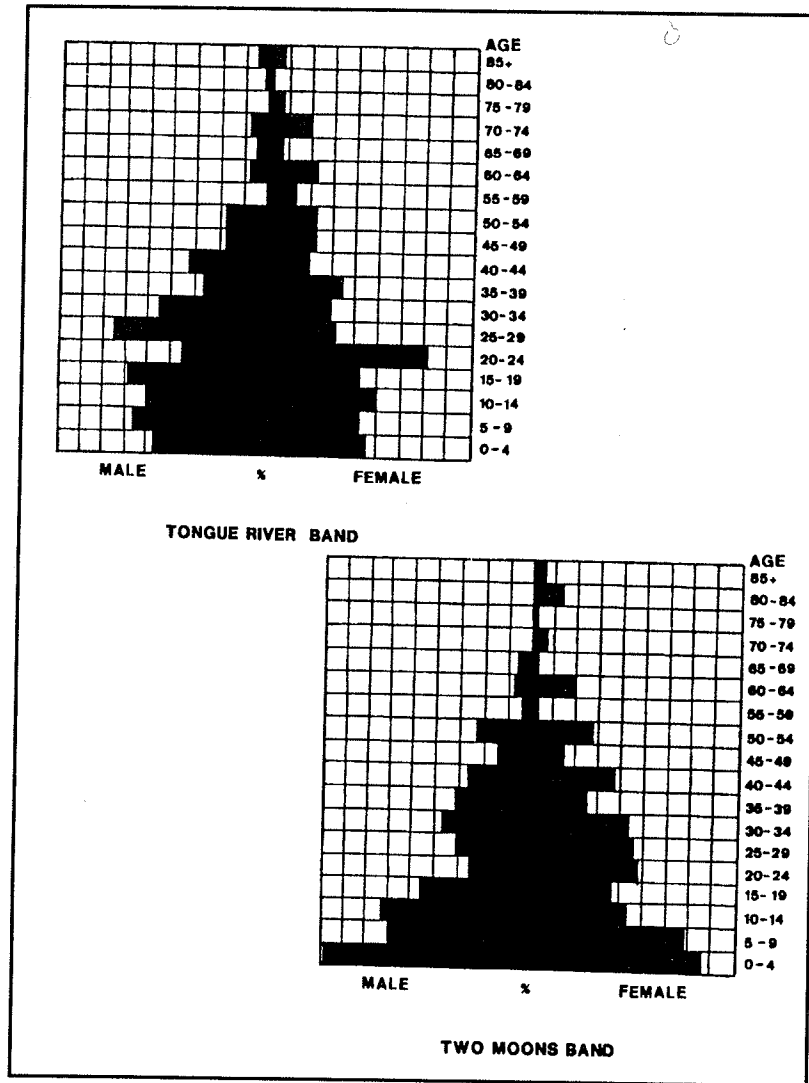


Fig. 32. Northern Cheyenne age-sex structures, by bands, 1886.

tana on the Tongue River Reservation in 1884 (Campbell 1988a).

CONCLUSION

The extent of the epidemiological and demographic trauma of removal of Northern Plains tribes has received little attention. Like the Pawnee and Ponca, the decision by the United States government to remove the Northern Cheyenne to Indian Territory had dire ramifications for their health and population change.

The impact of governmental policies on the health and demography of Plains Indians was certainly a powerful force. "Political and social forces," as Wood (1983:84) noted, "within any given society may be critical, and for many, the least controllable factors, shaping the health conditions under which a given population will spend its lifetime." For the Northern Cheyenne who were forced to relocate to Indian Territory, it proved both biologically and sociologically crippling.

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