

# RHEUMATIC HEART DISEASE AMONG AMERICAN INDIAN SCHOOL CHILDREN IN DIFFERENT CLIMATES<sup>1</sup>

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THE relationship of the prevalence of human disease to a given environment is a subject much discussed of late, but difficult to define. High lights of such a relationship are of course obvious. Tropical diseases are found in the tropics more frequently than elsewhere. Diseases which are spread by crowding within doors are generally more prevalent in cities during the winter, than among rural populations during the summer. But the whole subject is still so complex and the number and types of factors involved are so ill-defined, that one cannot generalize about environmental aspects of disease with much safety. On the other hand, any careful measurement dealing with this subject may well deserve attention, particularly if it concerns a disease with a somewhat obscure method of spread, and so it has been with this object in view that the following work has been planned. The disease selected, namely rheumatic heart disease, fulfills the requirements because it is one which is common and of somewhat obscure pathogenesis. It further lends itself to this type of study because there is considerable evidence that its prevalence is influenced by climatic conditions. Accurate measurements of its geographical or climatological distribution are, however, few in number and so it has been the major object of this work to make such measurements under controlled conditions.

Among these controlled conditions, the choice of one or more populations suitable for such a survey has seemed to be important. One of the reasons that American Indian children are satisfactory in this respect is that, irrespective of their geographical locality,

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<sup>2</sup> From The Desert Sanatorium, Tucson, Arizona.

certain Indian tribes are apt to be somewhat more homogeneous from a racial standpoint than are most American populations. Another reason is that living (*i. e.* housing) conditions do not vary much on many of the different Indian Reservations. And a third is that within certain Reservations many of the adults, and almost all of the younger children have spent their lives within a few miles of the place of their birth. Their illnesses, therefore, should be truly representative of local living and climatic conditions. For at least three reasons, therefore, several such groups of Indians may furnish more valuable information about the geography of disease than do most school populations of this country.

The actual method of measuring the prevalence of rheumatic heart disease used in this survey has consisted in determining the various rates with which this condition could be found among the Indian school children living in certain widely separated locations. In the performance of the examinations necessary for the determination of these rates, a section of the West was first outlined and certain of the more suitable Indian Reservations within this section were tentatively chosen. Permission was then obtained from the United States Office of Indian Affairs, Department of the Interior, for proceeding with the work.<sup>3</sup> Eventually from this section, three groups or divisions of Indian Reservations were selected; a northern one in Wyoming and Montana; a middle one in northern New Mexico and Arizona, and a southern one in southern Arizona. Although widely separated from a geographical and climatological standpoint these three different groups were fairly similar in other respects, in that they were composed of children who were either full-blooded American Indians, or at least possessed of a certain amount of Indian blood. The northern groups consisted of Shoshone, Arapahoe, and Crow Indians, of which about 40 per cent

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were listed as being of full-blood. The middle group consisted almost entirely of full-blooded Navajo Indians, and the southern groups of full-blooded Pima and Papago Indians. It was our object to examine about 1,000 children of approximately the same age from each of the three (northern, middle, and southern) divisions. All of the physical examinations were made by the author and one assistant so that the same diagnostic criteria could be used in the different localities.

Results obtained from this study appear in Table 1. To evaluate them, they should be first compared with those obtained from white school children from other sections of this and other countries. Unfortunately, however, there are few comparable surveys in which the same diagnostic criteria and the same methods have been used. Nevertheless one comparable rate has been determined in and about the City of New Haven, Connecticut, (latitude about 41° north) where the rheumatic heart disease rate among 2,624 urban and rural school children was found to be 2.2 per cent.<sup>4</sup> The Indian rates which appear in Table 1 have been derived from rural populations alone and are probably influenced by a number of factors which will be discussed in a subsequent and more extensive report of this work.<sup>5</sup> Regardless of these factors, however, the rate found in the north shows that a high prevalence of rheumatic fever and its most serious manifestation, rheumatic heart disease, exists among some tribes of Indians who live in the cold, though relatively dry, climate of Montana and Wyoming. This is of some interest because the element of cold coupled with dampness (as opposed to dryness) has long been incriminated as one of the primary conditions responsible for a high prevalence of rheumatic fever; furthermore the influence of city life (as opposed to country life) has also

<sup>4</sup> The work in New Haven was also supported by the Milbank Memorial Fund, viz: Paul, J. R.; Harrison, E. R.; Salinger, R.; and De Forest, G. K.: *The Social Incidence of Rheumatic Heart Disease. American Journal of Medical Sciences*, September, 1934, clxxxviii, No. 3, p. 301.

<sup>5</sup> Paul, J. R. and Dixon, G. L.: *Climate and Rheumatic Heart Disease Among Indian School Children* (to be published).

LOCATION OF RESERVATIONS	LATITUDE NORTH	CLIMATIC CONDITIONS		NUMBER OF INDIAN CHILDREN EXAMINED	NUMBER WITH DEFINITE RHEUMATIC HEART DISEASE	PER CENT WITH RHEUMATIC HEART DISEASE
		Temperature <sup>1</sup>	Precipitation <sup>2</sup>			
North	44°-46°	42.5°	10-15	688	31	4.5
Middle	36°-37°	47.5°	7-10	1,106	21	1.9
South	32°-33°	67.5°	3-10	1,019	5	0.5

<sup>1</sup>Approximate average normal temperature for the year in degrees F.

<sup>2</sup>Normal annual precipitation in inches.

Table 1. Rheumatic heart disease rates in three different locations.

been incriminated as an important predisposing condition. Consequently, it has been remarkable to find a higher prevalence in relatively dry Montana and Wyoming (normal annual precipitation ten to fifteen inches) among rural Indian children, than that found in the vicinity of New York City (normal annual precipitation forty-five inches) among urban children. This suggests that either a high susceptibility exists for the disease on the part of at least some Indians, or that something may be present in their living conditions particularly conducive to the spread of disease.

It is also evident from Table 1 that a striking drop in the rheumatic heart disease rate occurs among the groups of Indians examined as one proceeds from the Canadian to the Mexican border. Some of the factors or variables which may influence this finding will be discussed in a future report.<sup>5</sup> But regardless of the nature of these variables the difference in prevalence in these different regions is sufficiently marked to demonstrate quite clearly that at least some populations of Indian children are a favorable group from which much may be learned about the geography of rheumatic heart disease.