every reader and user of mortality and morbidity data. The chapter on life tables has been enlarged and its value enhanced by the inclusion of detailed instructions for the construction of abridged life tables by the method developed by Reed and Merrell.

The latter half of the book deals with the theory of probability, the measurement of variation, correlation, and simple curve fitting. In a new chapter on the measurement of variation, Dr. Pearl has included several topics not usual to textbooks on statistical methods; for example, the use of deciles as class limits for frequency distributions, and a description of coefficients of racial likeness and group divergence. On the other hand, methods are omitted which are now widely used by statisticians. It seems unfortunate that space was not made for at least a brief reference to the t-test which is being used more and more frequently in dealing with small samples, since readers of statistical studies will inevitably meet this expression. The choice of material to be included in an elementary text is difficult, and the detailed exposition of topics included has produced a large book of exceptional usefulness, not only for beginners but also for research workers who have not specialized in the mathematical bases of statistical methods.

DOROTHY G. WIEHL

● ● ●

## TUBERCULOSIS AMONG MASSACHUSETTS SCHOOL CHILDREN

IN the first of a series of articles of which the purpose is to discuss certain epidemiological characteristics of tuberculous infection and disease, as revealed by the data from the school clinics of the Massachusetts Ten-Year Program, Dr. E. P. Hutchinson and Dr. Alton S. Pope[1] have outlined the procedure in the clinics and analyzed the incidence of infection, as shown by reactions to the von Pirquet tuberculin test, in the school population of twelve Massachusetts cities and a large group of smaller communities.

The survey period, 1924-1934, was divided into three parts with a different procedure in each. The study of incidence of infection is restricted

[1] Hutchinson, E. P. and Pope, Alton S.: Tuberculosis among Massachusetts School Children. A Report on the Massachusetts Ten-Year Program. Part I. The Incidence of Infection. *The American Journal of Hygiene*, March, 1940, 31, No. 2.

to the last two periods, since the children examined during the first period, 1924-1927, included only those in three groups considered particularly liable to tuberculosis and were not representative of the school population. In the second and third periods, 1927-1929 and 1929-1934, all children, subject to parental consent, were included in the examinations. They were given a von Pirquet tuberculin test and the positive reactors were x-rayed. In addition, in the second period, each child was given a physical examination, but during the last period, in order to include a larger number, no physical examinations were made of non-reactors and children with normal films.

Reasons for using the von Pirquet test in such a survey are discussed. Its advantages were that it was more acceptable to the public than a test which required the use of a "needle," and that only a single test was required. Since the object of the test was not the exclusion of the presence of tuberculosis, but the mass screening of school children, and since parental consent was essential, it was felt that the acceptability of the test was important, that a larger number of reactors would be found by using a less accurate test on a large number of children than by using a more accurate test on a smaller group. Results of studies comparing the accuracy of the von Pirquet and intracutaneous tests are quoted to show that the von Pirquet test, although less accurate, may be considered adequate for certain purposes.

In considering the results of the survey the authors point out that tuberculosis mortality rates by age and sex, upon which most of our knowledge of the relative frequency of tuberculosis has been based, are not reliable indices of the distribution of either infection or active disease, since "the mortality rate can be looked upon as the product of at least three components: the infection rate in the total population, the morbidity rate of the infected, and the case fatality rate." Because of the difficulty of estimating susceptibility from mortality data, the present series of articles was designed to show the distribution of infection and disease among Massachusetts school children for comparison with mortality rates over the school range of years.

In the total group of 117,000 children tested in eighty-nine Massachusetts cities and towns, the reaction rates of males and females were found to be practically identical. In the individual towns the correspondence was less close, but the variations occurred as often in one direction as another. When the reaction rates of the two sexes in a random series of

towns were adjusted to a standard age distribution, the rates remained approximately equal. The paired rates of males and females computed by single years of age in each of the twelve largest cities showed a marked tendency to equality, clearly indicated by a graph in which the male reaction rate was measured on one coordinate and the female reaction rate on the other. The points clustered around the diagonal representing equality between the paired rates.

As might be expected, the relative positions of the rates of the two sexes were not affected by removal of contact cases before computing reaction rates. This correction reduced the rates of both males and females about equally.

The reaction rates by age and sex plotted for twelve cities and four groups of smaller towns all showed an upward trend with age and a generally close agreement between the curves for males and females. However, local differences in the frequency of reaction and in the shape of the age curve were observed in the Massachusetts survey, which could not be explained as results of variation in method. Although it is stated that "in a general way, local differences in reaction level and in the steepness of the upward trend with age presumably reflect different degrees of prevalence of opportunity for infection, different rates from year to year at which the diminishing number of non-reactors acquire sensitization," the statment is also made that no consistent relationship between the percentages of reactors and the case rates in the various cities could be demonstrated. The authors emphasize also that reaction rates are not an indication of relative susceptibility.

It will be of interest to relate the findings described in this article to the later articles of the series which "will deal with the incidence of clinical disease, and with contact cases as a separate group."

MARY E. DALTON

• • •

## NET REPRODUCTION RATES, 1930-1940

RECENT preliminary releases from the Bureau of the Census afford some interesting estimates of net reproduction rates for 1940, with comparable figures for 1930.[1] The net reproduction rate affords a measure of

[1] The Net Reproduction Rate—The Measure of Future Population Growth in the