

tality in the same group of unemployed families before and during the depression. The first series of health and depression studies in ten cities showed a much higher mortality during the period 1929-1932 in the unemployed families than in the employed families but the number of deaths in the 12,000 families surveyed were not sufficient to permit of detailed statistical analysis. The California study is now in the process of tabulation.

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THE SPREAD OF TUBERCULOSIS IN FAMILIES

FROM the Henry Phipps Institute in Philadelphia during the past ten years have come studies of the spread of tuberculosis in families which have made important contributions to knowledge of the epidemiology of the disease. In a recent issue of the *American Journal of Hygiene* a summation of certain phases of these studies has appeared in a series of three articles.¹

In the first article dealing with the organization of an out-patient tuberculosis clinic for epidemiological investigation, the authors conclude that "an out-patient clinic or dispensary that limits its service to a district in which it maintains visiting nurses may be effectively organized for investigation of the character and mode of spread of tuberculosis, provided that observations be continued over a period of years corresponding in duration with the chronic course of the disease." They point out also that investigation of the epidemiology of tuberculosis must include infection demonstrable by the tuberculin test and X-ray examination as well as clinically manifest disease and must determine the relation of one to the other.

In the second study dealing with the spread of tuberculosis in families, it was concluded that the spread of tuberculosis occurs in large part by long drawn out family or household epidemics in which the disease is slowly transmitted from one generation to the next. The study showed

¹ Opie, Eugene L. and McPhedran, F. Maurice: The Organization of an Out-Patient Tuberculosis Clinic for Epidemiological Investigation.

McPhedran, F. Maurice and Opie, Eugene L.: The Spread of Tuberculosis in Families.

Opie, Eugene L., McPhedran, F. Maurice, and Putnam. Persis: The Fate of Persons in Contact with Tuberculosis: The Exogenous Infection of Children and Adults.

The American Journal of Hygiene, November, 1935, xxii, No. 3.

very clearly that the family contacts in greatest danger of contracting tuberculosis were those in families where there was a case with discoverable tubercle bacilli in the sputum. Not only was the infection rate as revealed by the tuberculin test higher at an earlier age among contacts of positive sputum cases but also a much higher proportion was found to have lesions (both primary infection and reinfection type) demonstrable by X-ray than was observed among contacts in tuberculous families where there was no known dissemination of tubercle bacilli.

Approximately one-third of the children exposed to open tuberculosis acquired calcified nodules of lungs or lymph nodes. Infiltrating lesions of first infection were found to be numerous in children from birth up to 5 years of age; after 15 years of age infiltrating lesions of first infection were noted to be "strand-like" and evidently healed or in the process of healing. Lesions of adult or reinfection type first appeared in the age period 10-14.

The third article is a study of the fate of persons in contact with tuberculosis and the exogenous infection of children and adults. The data of the study consist of records for 1,000 families under observation in the Out-Patient Clinic of the Henry Phipps Institute. Most of the persons included belonged to families of which some member had tuberculosis.

From the analysis of the data it was found that among white persons first exposed between birth and 9 years of age to tuberculosis with known positive sputum, 9.92 per cent of those living from 12 to 14 years after the beginning of exposure had acquired manifest tuberculosis. Among those exposed to tuberculosis with no tubercle bacilli found in the sputum, after a comparable period of time, only 1.97 per cent had acquired tuberculosis. Among persons first exposed between 10 to 14 years of age to tuberculosis with tubercle bacilli in the sputum, 20 per cent of those living 10 to 14 years after the beginning of exposure were found to have tuberculosis.

Among persons first exposed to familial tuberculosis with positive sputum after 15 years of age, 9.68 per cent of those living from 10 to 14 years after exposure had tuberculosis. Persons in the same age group living from 10 to 14 years after exposure to familial tuberculosis with no tubercle bacilli in the sputum had a tuberculosis rate of 6.86 per cent.

It seems appropriate to comment on these results. The difference in

the rate of tuberculosis among persons first exposed at ages 0-9 to tuberculosis with positive sputum in the family contrasted with the rate among those in tuberculous families where no tubercle bacilli were found in the sputum certainly may be considered significant. Apparently, for persons in this age group a decisive factor in the production of tuberculosis among those surviving 12 to 14 years after exposure was living in a family where there was dissemination of tubercle bacilli.

On the other hand, for persons first exposed to tuberculosis in the family after 15 years of age the difference in the rates was not striking for those in the two family groups living 10 to 14 years after exposure (1) with tubercle bacilli in the sputum and (2) those with no demonstrated bacilli in the sputum), even when proper consideration is given to the average death rate from tuberculosis within the 14 years for each of the two groups. This fact suggests that for persons exposed to familial tuberculosis for the first time after 15 years of age has been reached, some factor or factors other than exposure to known tubercle bacilli in the family must also be operating to produce morbidity from the disease.

Within the first two years after exposure to familial tuberculosis the prevalence of latent lesions was found to be very much greater among persons first exposed after 15 years of age or in adult life than for those first exposed at the earlier ages. This might be interpreted as an indication that a considerable proportion of the individuals in this age group had acquired some tuberculous disease demonstrable by X-ray before a primary case of manifest tuberculosis occurred in the family. To the public health worker it would be of interest to know to what extent the possession of tuberculous infection demonstrable by X-ray in this age group modifies the results of exposure to manifest tuberculosis in the family.

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