are made specific for age, sex, race, education, occupation, and relief status, the association between drop in income and high illness-rate is still evident.

A study now being made of the death-rate among families who became unemployed during the depression will throw further light on the question, because it is possible to obtain information on deaths for a number of years prior to the canvass, which is not feasible in a sickness survey. Hence, *trends* in the death-rate from 1929 to the present time can be studied for groups of families that had various types of economic history during the depression. Preliminary results indicate a rise in the death-rate between 1929 and 1933 among families in which the wage-earner became unemployed in this period.

The facts that the excess in illness-rates appears among children as well as adults and that the highest illness-rates are exhibited by families that had dropped from the highest level in 1929 appear to point to a definite causal relation between lowered standard of living and high illness-rate. But whatever the cause, the depression has presented to society for support a group of some 20 million persons in the United States who are now on relief rolls, among whom sickness is probably more prevalent than in the rest of the population. It must be recognized that medical care and preventive services for these persons are a necessity of life as well as food, clothing, and shelter. These necessities must be made available to all if the health of the wage-earning population is to be maintained.

EDGAR SYDENSTRICKER

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VACCINATION AGAINST TUBERCULOSIS

PROBABLY no research in tuberculosis being pursued at the present time is being watched with more interest than the study of the B C G vaccination introduced by Calmette in France. Since the days of Pasteur's great achievements in prophylactic immunization public attention has always been held by this type of medical progress. Also, in spite of the decline in tuberculosis mortality, there is still a substantial number of deaths from the disease among infants and small children, and vaccination holds forth the hope of protection for those living in tuberculous homes.

The bacillus of Calmette and Guerin (B C G) is an attenuated form of the bovine type of tubercle which was isolated originally in 1908 as a normally virulent organism and was subcultured for thirteen years on a bile-glycerine-potato medium before it was used for human vaccination. There has been some doubt as to the wisdom of inoculating human beings with living tubercle bacilli even though attenuated. This has resulted in study of vaccination with heat-killed bacilli. Both of these types of vaccination against tuberculosis have been thoroughly tested by means of animal experimentation in the laboratory. There are in the United States and Canada three outstanding experiments in the use of such vaccination for infants in tuberculous families which are being reported upon from time to time.

Park, Kereszturi, *et al*[1] have administered B C G orally to newborn children and subcutaneously or intradermally to children a few months of age in tuberculous households in New York City. At the present time mortality is the only criterion which can be used in judging the effectiveness of vaccination. The tuberculosis death rate during the first year of life among the 239 newborn children vaccinated orally was 0.8 per 100. The death rate of 3.2 per 100 among the 189 control children was four times as high as the rate among the vaccinated. Unfortunately the death rate from causes other than tuberculosis was so much higher among the vaccinated infants compared with the control group that some doubt is cast upon the validity of what seemed to be positive evidence of the value of B C G. On the other hand, among 150 children who were negative to 10 Mg. of tuberculin when first observed and were vaccinated parenterally a few months after birth, there was no mortality from tuberculosis, contrasted with a mortality of 2.1 per 100 in a group of 424 controls (155 positive initial Mantoux and 269 negative initial Mantoux). The mortality from causes other than tuberculosis was approximately equal for the two groups, vaccinated 3.3 and unvaccinated 3.1 per 100.

Baudouin[2] recently has published a report on vaccination against

[1] Park, William H.; Kereszturi, Camille; Mishulow, Lucy: Effect of Vaccination with B C G on Children from Tuberculous Families. *Journal of American Medical Association,* November 18, 1933, 101, pp. 1619-1625.

Kereszturi, Camille; Park, W. H.; Vogel, P.; Levine, M.: Fate of Children of Tuberculous Families Including Those Treated and Those Not Treated with B C G. *American Journal of Diseases of Children,* September, 1934, 48, pp. 507-516.

[2] Baudouin, J. A.: Vaccination Against Tuberculosis with the B C G Vaccine. *Illinois Health Messenger,* March 1, 1935, vii, No. 5, pp. 22-28.

tuberculosis with B C G vaccine which was submitted to the subcommittee on tuberculosis of the National Research Council of Canada. This particular study deals with 437 vaccinated newborn babies and 631 unvaccinated newborn babies who have been observed from one to six years after vaccination. During the first twelve months of life the death rate from tuberculosis (4.2 per 100) among the unvaccinated infants was four times the rate (1.1) among infants given B C G. The death rate from causes other than tuberculosis was practically the same for both groups, 6.3 and 6.4 per 100. For children who had attained ages from one to six years, the tuberculosis mortality was slightly more than twice as high for the unvaccinated as the vaccinated and the mortality from other causes was slightly less in the control or unvaccinated group.

The difference in the mortality from tuberculosis among the vaccinated and unvaccinated infants during the first year of life was found to be even more striking when only those in contact with positive sputum cases were considered. The death rate of 7 per 100 was slightly less than 6 times the rate of 1.2 among infants given B C G.

From this seven years' experience in the study of B C G it is concluded that "vaccination with B C G is an absolutely harmless procedure." It was noted also that the protection following vaccination was evident most strikingly in infants under one year of age and consequently the next step considered important is to determine the extent and duration of the immunity thus developed.

The tuberculosis mortality experience noted in both experiments with B C G, that of Park and Baudouin, is more similar than dissimilar. There is also agreement as to the harmlessness of B C G, but Park's conclusion as to its effectiveness is tentative since he says, "Vaccination apparently decreases the mortality due to tuberculosis. . . . The cases were too few to warrant our considering the results more than suggestive that vaccination with B C G prevents a number of children from dying of tuberculosis." On the other hand Baudouin concludes that "B C G vaccine is an indispensable weapon in any campaign directed against tuberculosis."

If one may venture a criticism of these two studies, the reader is left in ignorance as to how the controls were selected and as to whether or not all factors which might affect mortality, such as segregation, medical care, and nursing service are held constant for both groups.

For humane reasons it is practically impossible to secure an adequate control group for the study of B C G. Nevertheless we should know in what respects the two groups, vaccinated and unvaccinated, are comparable.

Goodwin and Schwentker[3] have reported on method and progress in an investigation of the protection against tuberculosis in infants by the use of heat-killed human tubercle bacilli carried on at the Harriet Lane Home of the Johns Hopkins Hospital in Baltimore. The use of the vaccine was limited to newborn babies or very young infants without previous exposure to tuberculosis whose tuberculin tests were negative. No infants were inoculated unless there were reasonable expectations of their being exposed to active tuberculosis. Intramuscular injection was the only method of vaccination employed. Among the 50 vaccinated children who have been observed more than one year, there was one death from tuberculosis or a rate of 2 per 100. The tuberculosis mortality among 196 unvaccinated infants used as a control group was 4.6 per 100, or slightly more than twice as high as among the vaccinated.

The control group consisted of infants who were brought to the tuberculosis clinic of the Harriet Lane Home because of exposure to tuberculosis. None came to the clinic because of illness. The racial and geographic distribution of the control children was reported as practically identical with the vaccinated group and the two groups were followed over the same period of time and received the same medical and social aid. The authors quite frankly state that the two series of cases, vaccinated and unvaccinated, are not strictly comparable since the babies inoculated in the hospital were kept there for a period of weeks free from contact with tuberculosis, while the others remained in the home during that early period when the chance of infection is so great.

In concluding the authors express the following opinion: "Our work has given us the clinical impression that the inoculated children received some degree of protection from tuberculosis. It remains for us to continue the work for some years to test the validity of this impression. We feel that the method (inoculation with the heat-killed bacilli)

[3] Goodwin, T. Campbell, and Schwentker, Francis F.: Protective Inoculation against Tuberculosis in Infants by the Use of Heat-Killed Human Tubercle Bacilli. The *Journal of Pediatrics,* October, 1934, v, No. 4, p. 475.

is a hopeful one and that it is much less open to criticism than the injection of attenuated living organisms. The use of the vaccine should not be widespread until many more children are inoculated under the most careful supervision."

The public health attitude in the United States has been to withhold any general use of vaccination of infants until experimental data have been sufficient to establish both its harmlessness and its protective value. Pending the accumulation of more data, it seems a sound policy to continue to emphasize the prompt isolation of the infant exposed to contagion in the tuberculous family.

JEAN DOWNES

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MATERNAL MORTALITY IN ROCHDALE

A SUCCESSFUL community effort to reduce the death rate among mothers during childbirth has been reported from Rochdale, a county borough in Lancashire, England. The analysis of the experience in this area which was published[1] in the *British Medical Journal,* February 16, 1935, deserves the careful consideration of public health and medical groups generally. The maternal mortality rate in Rochdale had averaged 8.33 per 1,000 live births for the five years 1925-1929 and was one of the highest in England and Wales. For the three years during which "a deliberate effort to recast the maternity service" has been made, 1932-1934, the maternal death rate was 2.99.

A new local medical officer of health, Dr. Andrew Topping, assumed duty in October, 1930, and is credited by the authors of the report with having initiated the administrative program which has been followed. His successor, Dr. John Innes, has guided the program since 1932. A study of the clinical records for women who had died from puerperal causes led Dr. Topping to the conclusion "that the factors contributing to the fatalities could, in the main, be divided into two groups: (a) those which arose from imperfect supervision of pregnancy, so that women with complications failed to receive treatment sufficiently early to safeguard them against danger; and (b) those which arose from inadequate obstetric care during the course of labour. It was found, for example, in Group *a* that deaths were oc-

[1] Oxley, W. H. F.; Phillips, Miles H., M.D.; and Young, James, M.D.: Maternal Mortality in Rochdale, An Achievement in a Black Area. *British Medical Journal,* February 16, 1935, No. 3867, pp. 304-307.