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

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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

the potential increase or decrease of a population under conditions of the age-specific birth rates and death rates prevailing at the time under consideration. Thus, if—as in the data from the Census release—the rate is expressed in terms of the average number of daughters that would ever be born per 100 female infants starting life together, a rate of 100 would signify a potentially stationary population; a rate of 75, a potentially declining population at the rate of 25 per cent per generation; and a rate of 125, a potentially increasing population at the rate of 25 per cent per generation. It should be emphasized that the net reproduction rates are based on the assumption that as the cohort of 100 newly born females pass through life they will be affected by the age-specific fertilities and mortalities prevailing at the time under consideration. In considering the meaning of net reproduction rates in terms of potential increase or decrease of the population, it should also be borne in mind that these rates assume no population changes resulting from migration. They are designed simply to afford a measure of the permanent self-replacement potentialities of a population under existing birth and death rates at specific ages.

The rates for 1940 and 1930 are presented on page 201 for the total population and for subdivisions by color and residence.[2] The 1940 data are estimates based upon a 5 per cent random sample of the 1940 census returns, so the final figures may be somewhat different.

Several points of interest stand out. Regarding the figures for 1940, it will be noted that the estimated net rate of reproduction for the total country was 96, or 4 per cent below the level required for permanent replacement of population under existing age schedules of fertility and mortality. Of most striking interest, however, is the contrast between the urban and rural rates. The estimated net reproduction rate for the total urban population in 1940 was 76, meaning that with continuation of existing age-specific fertility and mortality rates the urban population

United States (Preliminary): 1940. United States Department of Commerce, Bureau of the Census, Series P-5, No. 2. Released for use of morning papers on January 31, 1941.

Future Population Growth in the United States by Color and Urban-Rural Residence as Measured by the Net Reproduction Rate (Preliminary): 1940. United States Department of Commerce, Bureau of the Census, Series P-5, No. 4; February 21, 1941.

[2] As explained in the preliminary release of February 21, 1941 (Series P-5, No. 4), the net reproduction rates "were computed by the so-called 'indirect method' from the age structure of the population in 1940 and in 1930. The number of births was estimated from the number of children under 5 years of age. Since these children were the survivors of births in 1935-1939 and 1925-1929, respectively, the reproduction rates do not strictly apply to the census dates."

would ultimately decline at the rate of 24 per cent per generation, if there were no increments from migration. On the other hand, the fertility and mortality conditions in the total rural-nonfarm population were such that this group would ultimately increase at the rate of 16 per cent per generation and the total rural-farm population at the rate of 36 per cent per generation, if the estimated conditions of 1940 continued, and if there were no exodus to cities. Stated in another manner, the urban net reproduction rate was about 34 per cent lower than that for rural-nonfarm population and 44 per cent lower than that for the rural-farm population.

In the classification by color, the estimated net reproduction rates for 1940 for the total white population (including Mexicans) was 95, whereas that for the nonwhites was 107. The higher rate for the nonwhites accrued entirely from the difference by color in the rural-farm population, where the rates were 132 for whites and 154 for nonwhites. Within the urban and rural-nonfarm populations the rates by color were virtually the same.

According to these preliminary figures, the net reproduction rate for the total population was 13.5 per cent lower in 1940 than in 1930. This apparent decline did not differ much by type of residence, being 13.6 for urban, 12.1 for rural-nonfarm, and 14.5 for rural-farm. It will be noted, however, that the apparent decline of net reproduction rates from 1930 to 1940 was due mainly to whites. For the total whites, the estimated rate in 1940 was 14.4 per cent lower than the rate for 1930, whereas for the total nonwhites it was only 2.7 per cent lower. Differences of essentially

Net reproduction rates by color and urban, rural-nonfarm, and rural-farm residence, United States, 1940 and 1930.[a]

(1940 data are estimates based on a 5 per cent cross-section of the 1940 census returns. Figures for white population in 1930 have been revised to include Mexicans.)

Color and Census Year	Total	Urban	Rural-Nonfarm	Rural-Farm
All Classes				
1940	96	76	116	136
1930	111	88	132	159
White				
1940	95	76	116	132
1930	111	90	133	159
Nonwhite				
1940	107	76	115	154
1930	110	75	119	156

a Taken from preliminary release from the Bureau of the Census, Series P-5, No. 4, February 21, 1941.

this character held true within urban, rural-nonfarm, and rural-farm populations considered separately.

The broad significance of the urban-rural differentials in net reproduction rates has been emphasized by many students. In a real sense, rural areas are our population nurseries because cities must depend upon them for population renewals. The main problem in this situation is that the most prolific populations are those in poor rural communities where facilities for health and education are least adequate. This problem transcends local concern because many of the surplus youth in such areas eventually migrate to cities in search of a more satisfactory life and livelihood.

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