

in rural areas population increases tend to lower the physician-population ratio substantially, whereas in metropolitan areas these ratios would be little affected and in adjacent areas they would increase.

The extent to which the average income level in 1950 is associated with the increase in the number of physicians is shown in column (c) of Table 3. The variations between areas are again very great and this time rather unsystematic. In isolated rural areas, a \$100 higher per capita income in 1950 is associated with a 2 per cent increase in the number of physicians over the 1950-1959 period. On the other hand, in isolated semi-rural areas, a \$100 higher income is associated with a 40 per cent increase in physicians, and in adjacent areas with a 50 per cent decrease. These erratic results raise questions about the significance of the observed association, which will be explored below. With respect to the 19 standard metropolitan areas, the observed relationship indicates a 1 per cent increase in the number of physicians over 1950-1959 for a \$100 higher level of physician income in 1949.

Column (d) of Table 3 describes the associations between increases in physicians and increases in regional per capita income over 1950-1959. In the 19 standard metropolitan areas a systematic relationship is for practical purposes nonexistent. But it is interesting that in the other areas the association becomes constantly closer with higher degrees of urbanization. In isolated rural areas a 1 per cent increase in income is associated with only a .03 per cent increase in the number of physicians, whereas in greater metropolitan areas it is associated with a .61 per cent increase in physicians.

We have now measured the relationships between changes in selected variables and corresponding changes in the number of physicians. But it must be remembered that all these changes are averages and that their significance depends on the scatter of the original values about the regression line. An indication of this significance is presented in Table 4, which contains the correlation coefficients for the population and income variables. On the whole the correlations are highest in the 19 standard metropolitan areas and the lowest in the isolated rural areas. As a matter of fact, the variables considered in this study, other than the changes in population, are of little use in explaining changes in the number of physicians in isolated rural areas because the simple correlation coefficients do not appear to be statistically significant. In isolated semi-rural and in greater metropolitan areas the situation is slightly better. The index of total correlation $R_{1.234}$ for the semi-rural areas is .63, which makes the index of total determination $R^2_{1.234} = .40$. In other words, 40 per cent of the observed change in the number of physicians in the semi-rural areas over the nine years is "explained" by population change, the initial income level, and the change in income. In greater metropolitan areas 45 per cent of the change is explained by these variables. However, in adjacent, lesser metropolitan, and the 19 standard metropolitan areas, the corresponding percentages are 66, 86, and 90, respectively.

Among the variables examined, population change is the one most closely correlated with change in the number of physicians. Total correlation is generally