Trends in Cancer Mortality Rates, Bergen County, New Jersey, 1962-75

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BERGEN COUNTY, like much of the rest of New Jersey, experienced cancer mortality rates significantly higher than those recorded for the U.S. population as a whole during the period 1950–69 (*1, 2*). This finding has created intense local concern that industrial pollutants or occupational exposures to toxic substances may be causing excess cancer deaths. Adding to this concern is the possibility that because of the long latency period between exposure and clinical disease common to many cancers, the excess cancer deaths observed in the past may be only a precursor of further increases in cancer mortality.

The report which precipitated increased concern for cancer mortality in Bergen County, the "Atlas of Cancer Mortality for U.S. Counties, 1950–1969" (*1*), mapped average mortality rates for a 20-year period ending in 1969. No information on temporal trends within the 20-year period was provided. As we worked with the Bergen County commissioner of health and environmental protection, formulating research and educational activities in response to the Atlas findings, the need for temporal information including data more recent than 1969 became obvious to us.

Bergen County covers an area of 239 square miles in northeastern New Jersey. In 1975 it had an estimated population of 879,845 and an average population density of 3,744 persons per square mile (*3*). The mean family income in 1970 was $15,852. Although Bergen County functions in part as a "bedroom community" for New York City, it also contains substantial industry. Of the 300,969 jobs located in the county in 1975, 106,200 were in manufacturing industries (*4*). The primary industries in 1975 were chemical and allied products (13,149 employees), printing and publishing (12,561 employees), machinery (9,273 employees), fabricated metal products (8,961), and instruments and clocks (8,929 employees).

In this paper, we compare trends in cancer mortality rates in Bergen County with those in the United States during the period 1962–75.

Methods and Materials

The New Jersey State Department of Health supplied computer-readable abstracts of death certificates for Bergen County residents who died in the period 1962–75. Computerized data were not available for

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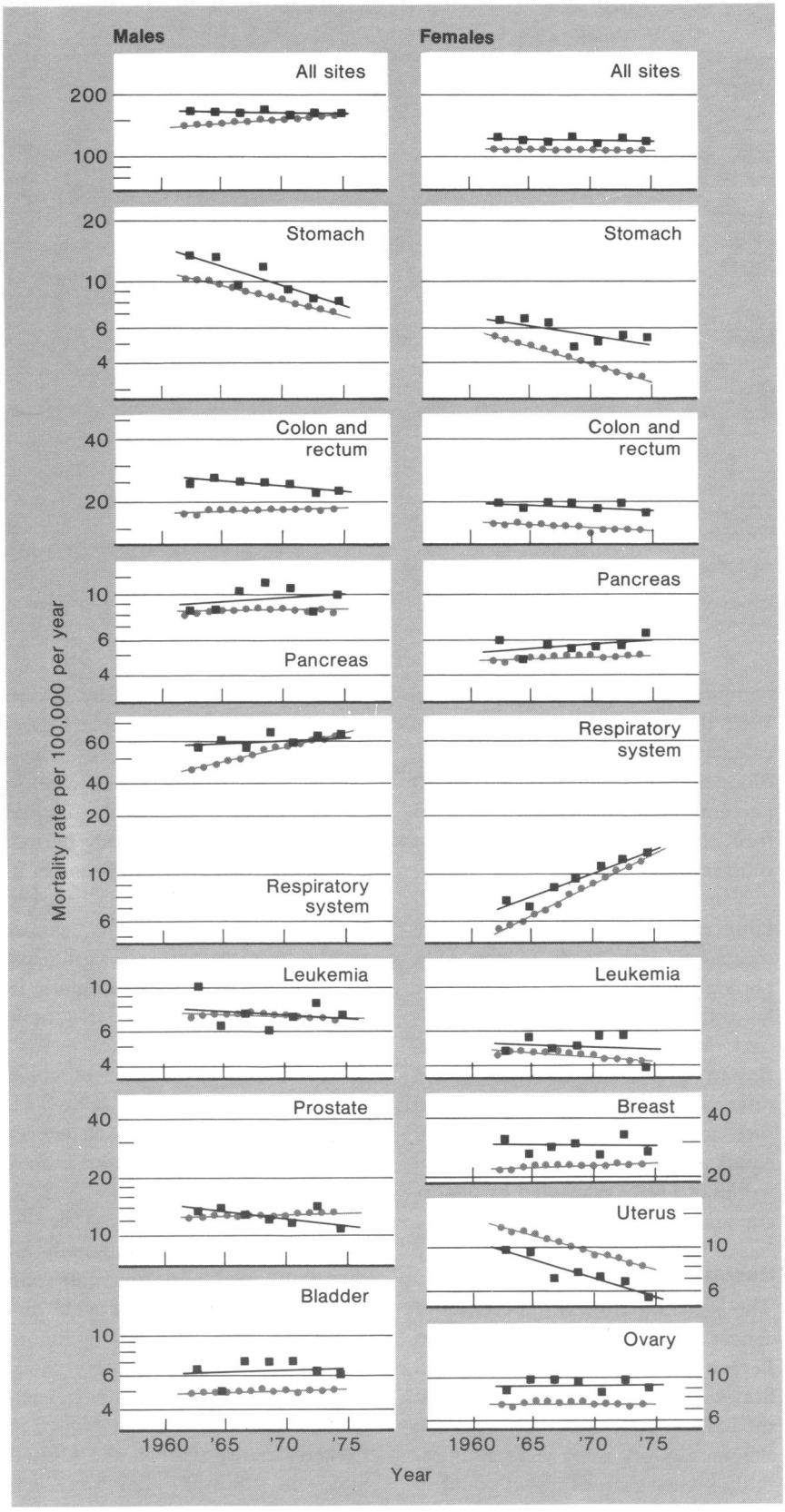
years before 1962. Population denominators, used to calculate age-specific rates, were derived from the 1960 and 1970 censuses (*5, 6*). Populations for intercensal years (1961–69) by age and sex were estimated by linear interpolation from 1960 and 1970 populations. For the period 1971–75, population denominators were calculated from known births and deaths starting from the population of 1970. Out-migration during this period (*3*) was assumed to have occurred evenly over all ages and both sexes. Age-specific mortality rates for each sex by 5-year age groups and by 2-year periods (for example, deaths at age 0–4 years in 1962–63) were then calculated for 10 major cancers (stomach, colon and rectum combined, pancreas, respiratory, breast, uterus including cervix, ovary, prostate, bladder, and leukemia) and for all sites combined. Age-standardized rates were computed by the direct method (*7*); the 1940 U.S. population was used as a standard. Because race was not computer-coded in New Jersey from 1962 through 1967, the rates were calculated for all races combined. Since the county population was 95 percent white in 1970 (*3*), errors from this source probably were not substantial.

Temporal changes in cancer mortality rates in Bergen County were compared with those of the U.S. population for all races combined by log-transforming the age-standardized rates for each population, fitting straight lines to the transformed rates using linear regression, and then testing the null hypothesis of equal slopes by a t test. Critical values of t were estimated by Snedecor and Cochran's method (*8*).

Results

The age-standardized time trends of cancer mortality by sex and site in Bergen County and in the United States are shown in the chart. In the earlier years of the study period, Bergen County rates were substantially higher than or about equal to U.S. rates, as also found by Mason and McKay (*2*). The sole exception was cancer of the uterus, which had a substantially lower rate in Bergen County than in the United States throughout the study period. Statistical tests of the differences in rates of change with time between U.S. and Bergen County cancer mortality rates showed significant differences for all sites combined in males ($t = -4.25, P < 0.01$), male respiratory cancer ($t = -4.07, P < 0.01$), male cancer of colon and rectum combined ($t = -3.34, P < 0.01$), female stomach cancer ($t = 6.82, P < 0.001$), and female respiratory cancer ($t = -2.32, P < 0.05$). Three of these significant differences, those for male all sites combined and for male and female respiratory cancer were due to U.S. rates increasing more quickly than Bergen County rates. Although the mortality rates in each of these cases were much higher in Bergen County than in the United States in 1962–63, they were ap-

Age-adjusted cancer mortality rates and linear fits, by sex for all sites combined and selected sites, in Bergen County, N.J. (■), and the United States (•), 1962–75



proximately equal to U.S. rates in 1974–75. The significant difference for male cancer of the colon and rectum combined was due to a decline in the Bergen County rate, while that for female stomach cancer was due to a slower rate of decrease in the Bergen County rate than in the U.S. rate.

Discussion

The present analysis shows that some of the relationships between Bergen County and U.S. cancer mortality rates that existed in 1950–69 were no longer true in more recent years. For example, the Atlas showed that Bergen County had a mortality rate for cancer of all sites combined among white males that was both significantly higher than the rate in the United States as a whole and in the highest decile of all county rates in the period 1950–69. Similar excesses were shown for male and female respiratory cancer mortality rates. When more recent temporal data were considered, however, it was clear that the differences between Bergen County and the United States for each of these sites have consistently diminished until, in 1974–75, the differences between the two populations were negligible.

An explanation for Bergen County's high cancer mortality rates for all sites combined in males and for respiratory cancer in males and females during the early years of our study period cannot be found in the type of analysis done here. Mortality rates are a composite of many underlying factors which themselves can exhibit strong time trends. These underlying factors include cancer incidence rates, which can be influenced by environmental levels of carcinogens and diagnostic services in a particular area, and by cancer survival patterns that in turn can be affected by the adequacy of health services in an area. From the

fact that certain cancer rates are now equal in the United States and Bergen County, we can speculate that whatever caused rates in Bergen County to be high in earlier years is now acting just as strongly in the rest of the country. Perhaps, for example, smoking rates were heavier at one time in Bergen County than in the United States and have now become homogeneous across the country.

The pragmatic implications of the present research are in the area of county health priorities. We have shown that Bergen County and U.S. mortality rates for male and female respiratory cancer were not substantially different in 1974–75. At the county level, this means that expenditures for research or education based on differences that existed for respiratory cancer on the average during the period 1950–69 are no longer justified. On the other hand, further investigation of bladder cancer appears to be warranted because of its continued high rate among Bergen County males and its known associations with occupational exposures.

Although the relationships between Bergen County and U.S. mortality demonstrated in the Atlas continued to hold true for some of the sites investigated, it is clear that recent, time-specific rates, such as those presented here, must be studied to obtain an accurate picture of local as compared to national disease patterns. To facilitate such comparisons, we suggest that national or State health agencies provide county health departments with more current year-, sex-, and disease-specific mortality rates than now seems to be the practice. Such data would provide a better picture of local health trends than can be obtained from research reports like the Atlas. County health departments might in turn consider employing persons with capabilities in descriptive and analytic epidemiology to permit local studies of disease trends and suspected risk factors.

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SYNOPSIS

MARMOR, MICHAEL (New York University Medical Center), SADOW, MARK, GREEN, KENDALL, and LEVINE, LYNN SAMILOW: *Trends in cancer mortality rates, Bergen County, New Jersey, 1962–75. Public Health Reports, Vol. 96, January-February 1981, pp. 80–83.*

Publication of the "Atlas of Cancer Mortality for U.S. Counties, 1950–1969" caused a great deal of concern in counties shown in the Atlas to have had high cancer mortality rates in relation to the United States as a whole. An analysis was made of temporal trends of cancer mortality in Bergen County, a "high-rate county" in northeastern New Jersey, by calculating age-adjusted cancer mortality rates by sex and site for Bergen County residents for the period 1962–75. Mortality rates and time rates of change in mortality rates were compared to those in the United States as a whole. Male and female rates for respiratory cancer and male rates for all cancer sites combined increased significantly more quickly in the United States than in Bergen County during the study period. The authors discuss these trends and recommend that recent time-specific mortality rates be furnished to county health commissions on a regular basis.