

Changing Patterns of Breast Cancer among American Women

WILLIAM J. BLOT, PHD

Abstract: Although overall mortality from breast cancer has changed little over time in the United States, age-specific rates showed distinctive patterns during 1950-75, with declines among premenopausal women, a rise then fall among perimenopausal women, and level then increasing rates among postmenopausal women. The trends appear related to the changing patterns of childbearing among young adult women over the first two-thirds of this century. The national mortality and birth data presented are consistent with existing analytic evidence of a protective influence upon breast cancer of early first birth, and suggest that the protection may be expressed at all ages above 30. (*Am J Public Health* 1980; 70:833-836.)

Introduction

A number of epidemiologic investigations have established that factors associated with full-term pregnancy at young ages have an important protective influence on the development of breast cancer, the risk of this tumor increasing nearly linearly with increasing age at delivery of the first child.^{1,2} Total mortality rates (age-adjusted) from breast cancer in the United States, however, have differed little over time despite considerable changes in the childbearing practices of American women.³⁻⁵ To determine whether an association might exist for certain age groups, this paper examines changes in age-specific national rates of mortality from breast cancer in the U.S. White female population over the past 25 years in relation to changing patterns of child-birth among young adult women during 1910-65.

Methods

Age-specific rates of mortality from cancer of the breast (6th and 7th Revision ICD codes 170; 8th Revision ICD code 174) among White females in the continental United States for the five-year groups 0-4, 5-9, etc., 85+ were calculated for each of the calendar intervals 1950-54, 1955-59, 1960-64, 1965-69, and 1970-75. The numbers of deaths in each age-time group were obtained from National Center for Health

Statistics computer listings; the populations at risk were obtained from computer tapes of the decennial censuses of 1950, 1960, and 1970 and Census Bureau estimates for 1975, using linear interpolation to estimate intercensal populations. The data for the final calendar interval 1970-75 exclude deaths (and populations) for 1972 since not all death certificates for this year were recorded at the national level.

Changes in birth patterns among young women in the U.S. were measured by comparing the percentages, at successive five-year calendar intervals, of childless women among the white female population aged 20-24. This index was chosen because of its historical availability and its suitability as a measure in estimating population differences in age-at-first-birth. The statistics on nulliparity were available from 1910,^{4,5} and were plotted to display temporal changes through 1965.

To exhibit changes in age-specific breast cancer mortality during 1950-75 in relation to birth patterns in young adulthood, relative breast cancer rates for five-year age groups, beginning with ages 30-34 and extending through ages 65-69, were plotted and appropriately juxtaposed on the 1910-65 nulliparity graph: the cancer rates among women aged 30-34 during 1950-75 were positioned beneath the 1940-65 segment of the birth curve, the time when these women were aged 20-24; the cancer rates for ages 35-39 were positioned beneath the 1935-60 segment; and so on. In this way breast cancer mortality for women at specific pre-, peri-, and postmenopausal ages could be inspected for concordance or discordance with their birth patterns in young adulthood.

Results

Mortality from breast cancer varied over the 25 years 1950-75, but the magnitude and direction of change differed according to age group (Figure 1). Mortality during the period tended to decline among younger women, increase then become level or fall for menopausal ages, and be level then increasing among older women. The changes were generally not large (the maximum differences were about 20 per cent); however, because the rates were based on large numbers of deaths, the trends tended to be stable and consistent, with differences between time periods often statistically significant by standard tests for binomial variables. In total over 575,000 breast cancer deaths among White females were recorded in the U.S. during 1950-75, with at least 1,000 occurring in each five-year time period for each age group except those below age 30. The U.S. breast cancer mortality rates by age and calendar interval are given in Table 1.

Changes over the period 1910-65 in the percentage of White females aged 20-24 who had not borne children are

Address reprint requests to William J. Blot, PhD, Head, Analytical Studies Section, Environmental Epidemiology Branch, National Cancer Institute, Bethesda, MD 20205. This paper, submitted to the *Journal* November 26, 1979, was revised and accepted for publication April 16, 1980.

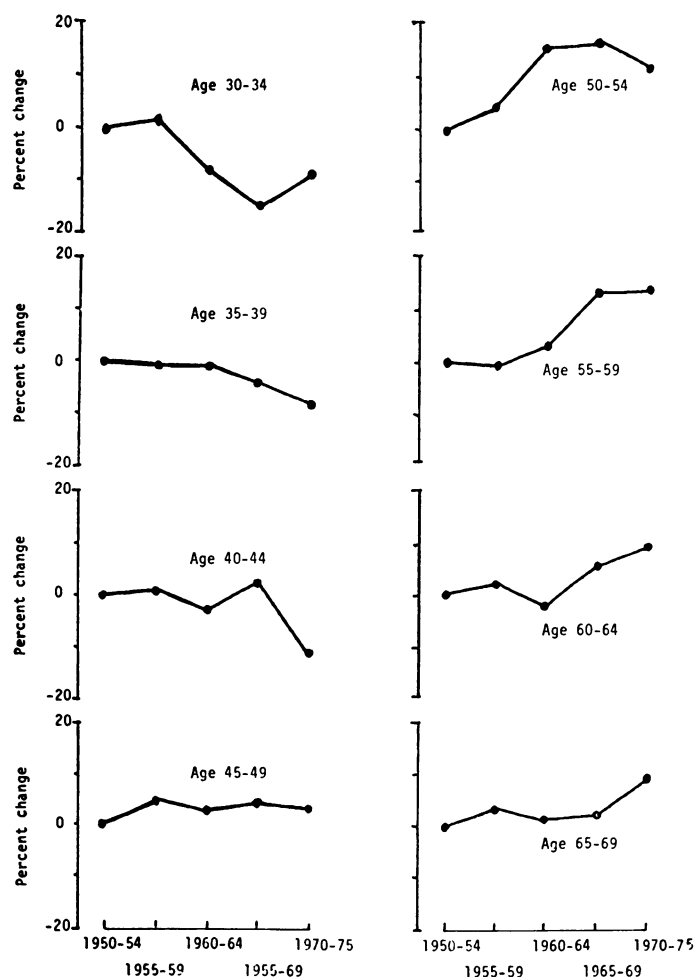


FIGURE 1—Proportional Changes in Breast Cancer Mortality in 1955-59, 1960-64, 1965-69, and 1970-75 Relative to Mortality Rates in 1950-54 for Five-Year Age Groups among U.S. White Females

displayed in Figure 2. The percentage of nulliparous women was fairly constant at about 65 per cent from 1910 to 1930, then rose to about 70 per cent and remained higher during the depression and war years, then fell sharply after World War II as fertility rates increased. The nulliparity percentages leveled off in the late 1950s at about 50 per cent and then began to increase again in the 1960s.

Figure 2 also shows the relative changes during 1950-75 in age-specific breast cancer mortality rates for successive five-year age groups, positioned opposite the time periods when the women in that group were aged 20-24. The curves illustrate that the recent decline in mortality among premenopausal women was coincident with the increase in fertility among those women following World War II. Breast cancer rates at perimenopausal ages tended to parallel the increase, plateau and decline in nulliparity at ages 20-24 in the corresponding cohorts. Mortality changes at postmenopausal ages were concordant with the relatively stable fertility of the 1910-25 period and decrease in the 1930s. Thus changes in breast cancer mortality were similar in direction to changes in nulliparity in each of the eight age groups which could be overlapped in the appropriate time frame.

Discussion

Although several risk factors have been identified, age-at-first-birth seems to exert the strongest influence on subsequent breast cancer risk, with women having their first child prior to age 18 at one-third the risk of women first delivering after age 35.¹ However, except for one study in Canada,⁶ its effect upon population-based cancer rates has not been evident.⁷⁻⁹ This analysis shows that the agreement between the changes in age-specific rates of breast cancer mortality among U.S. women and certain birth patterns in early

TABLE 1—Age-specific Breast Cancer Mortality Rates (deaths/yr/10⁵) among U.S. White Females, by 5-year Calendar Interval during 1950-75

| Age | 1950-54 | 1955-59 | 1960-64 | 1965-69 | 1970-75 |
|-------|---------|---------|---------|---------|---------|
| 0-4 | 0.0 | 0.0 | 0.1 | 0.1 | 0.0 |
| 5-9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 10-14 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 15-19 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 |
| 20-24 | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 |
| 25-29 | 1.5 | 1.6 | 1.5 | 1.5 | 1.6 |
| 30-34 | 6.0 | 6.0 | 5.6 | 5.3 | 5.5 |
| 35-39 | 13.7 | 13.6 | 13.6 | 13.2 | 12.7 |
| 40-44 | 27.1 | 27.2 | 26.4 | 27.7 | 24.5 |
| 45-49 | 42.0 | 44.0 | 43.2 | 43.9 | 43.4 |
| 50-54 | 53.2 | 55.5 | 61.5 | 62.3 | 59.9 |
| 55-59 | 66.3 | 65.8 | 68.3 | 75.2 | 76.0 |
| 60-64 | 77.6 | 79.0 | 76.0 | 81.5 | 84.9 |
| 65-69 | 86.1 | 88.4 | 86.9 | 87.7 | 93.9 |
| 70-74 | 108 | 103 | 101 | 103 | 104 |
| 75-84 | 142 | 137 | 129 | 128 | 130 |
| 85+ | 203 | 200 | 184 | 165 | 170 |

adulthood is quite close, even though the magnitude of the changes was relatively small. The findings on their own are obviously limited; however they supplement a large compendium of existing analytic evidence in suggesting that societal customs concerning childbearing play a major role in determining risk from breast cancer. Thus the recent decline in mortality at premenopausal ages seems related to the increased fertility of young American women after World War II. It could be argued that the downward slope in mortality is due to improvements in survival.^{10*} However, the fact that the declines were seen only for certain age groups and at different times (treatment effects might have been anticipated to occur at about the same time over all age groups), together with the surprisingly close correspondence between the timing of the mortality and nulliparity changes at all ages, weighs more in favor of an association with fertility than survival. The rise and fall of breast cancer rates during 1950-75

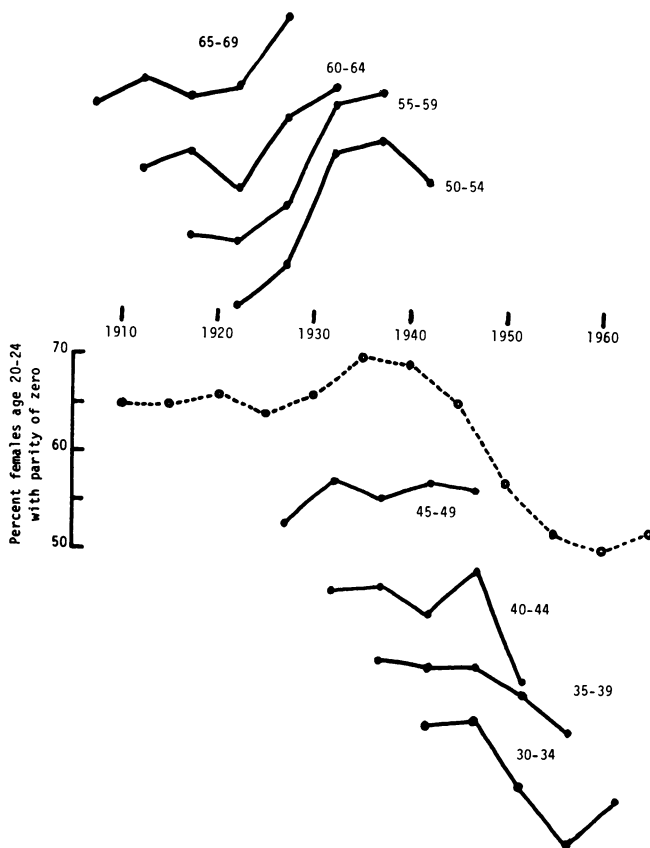


FIGURE 2—Relative Breast Cancer Mortality Rates among U.S. White Females, 1970-75, for Five-Year Age Groups Lagged in Relation to the Percentage of 20-24 Year Old White Women without Children during the Years Each Age Cohort was Aged 20-24**

*There are some inconsistencies in the available incidence data. Decreases in the incidence of breast cancer at premenopausal ages have been recorded by the large-scale 2nd and 3rd National Cancer Surveys,^{11, 12} although comparisons may be affected by differing geographic areas covered, while some cancer registries (e.g., New York State) show increases.¹³⁻¹⁵

**The breast cancer graphs show the percentage change in mortality for the five-year age groups in 1955-59, 1960-64, 1965-69, and 1970-75 relative to the rate in 1950-54. See Table 1 for data.

among perimenopausal women, and the stable then rising trend in mortality among women aged 55-69, appear to be linked to the similar trends in nulliparity of these women in their early twenties. Thus the U.S. data suggest that the protection afforded by early first birth may exist for all ages above 30, in contrast to recent reports suggesting that the effect may be primarily limited to premenopausal¹⁶⁻¹⁷ or postmenopausal¹⁸ ages.

There exist severe limits on the inferences that can be made from a simple correlation analysis such as this linking national mortality with a single index of national fertility. The characteristics of the individuals who died of breast cancer were not known, nor were historical national data available on other cancer risk factors. Nevertheless the observations were concordant with evidence obtained from more sensitive epidemiologic studies and may have some predictive value. Thus the data, considered in conjunction with existing concepts on the origins of breast tumors, suggest that the decline in breast cancer among perimenopausal women may continue over the next decade, with rates at postmenopausal ages beginning to drop by the late 1980s as the cohorts of American women who reached childbearing age during the 1940s and 1950s mature. Furthermore, if the association seen to date continues to hold, the decline in rates among premenopausal women seems likely to end shortly with an increased risk anticipated consequent to the decreasing fertility trends of the late 1960s and 1970s.

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