

REPORT TO CONGRESS

**CDC Review of the Northern California Cancer Center Report:  
“Status of Breast Cancer Research in the San Francisco Bay Area”**

Centers for Disease Control and Prevention



**U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES**  
Public Health Service



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**Centers for Disease Control and Prevention**

**Department of Health and Human Services**

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**May 1998**

**CDC Review of the Northern California Cancer Center Report:  
“Status of Breast Cancer Research in the San Francisco Bay Area”**

**Executive Summary**

**Centers for Disease Control and Prevention**

**May 1998**

## **Executive Summary**

Due to a history of high breast cancer incidence rates in the San Francisco Bay Area, in September 1997, the House Appropriations Committee of the United States Congress urged the Centers for Disease Control and Prevention (CDC) and the Agency for Toxic Substances and Disease Registry (ATSDR) to:

Collaborate with state and local health departments to review existing cancer registry data on breast cancer incidence and mortality in the [San Francisco] Bay Area to determine what area-based assessments may be necessary and, on the basis of this review, to issue a report on findings and recommendations.

Collaboration between CDC/ATSDR and the State and local health departments resulted in the following findings and recommendations:

### **Finding 1:**

**The incidence of invasive breast cancer in the San Francisco Bay Area has decreased since 1987 and now is comparable to the rate in the other areas of the United States, combined, that participate in the National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) program.**

### **Finding 2:**

**Analysis of breast cancer incidence in the San Francisco Bay Area in the mid-1980s compared with other areas of the United States suggests that the higher rates were due, in part, to the higher use of mammography, i.e., the greater number of women screened, the greater number of breast cancers detected. Higher prevalence of known breast cancer risk factors in the Bay Area may have also contributed to the elevated rates.**

### **Finding 3:**

**Recent cancer surveillance data indicate that the incidence of invasive breast cancer is decreasing in the San Francisco Bay Area. The decrease may be due to several factors or a combination of factors including a mammography screening effect, less complete cancer reporting from outpatient medical facilities, or changes in the demographic profile of the population.**

### **Finding 4:**

**Death rates for breast cancer in the San Francisco Bay Area have decreased since 1991 and are now comparable to the U.S. rates.**

**Finding 5:**

Nearly 40 research studies covering a broad spectrum of topics and approaches are under way in the San Francisco Bay Area to better understand the occurrence of breast cancer.

**Finding 6:**

Cancer surveillance in the San Francisco Bay Area has included very complete case identification and high quality case information.

**Recommendations:**

- 1. Cancer surveillance should be continued to closely monitor the trends in breast cancer incidence and mortality in the San Francisco Bay Area and in the United States as a whole.**
- 2. Data should be analyzed on the prevalence of mammography utilization since 1991 and on trends in the prevalence of known breast cancer risk factors in the San Francisco Bay Area to assist in the interpretation of time trend data for breast cancer incidence and mortality.**
- 3. Due to the multi-factorial nature of the potential causes of breast cancer, broad-based approaches to breast cancer research in the San Francisco Bay Area and in the United States as a whole should be continued. The new directions for research on breast cancer in the Bay Area proposed by NCCC in the Status Report are worthy of consideration through appropriate peer review of full proposals and protocols.**
- 4. CDC's National Program of Cancer Registries should develop, field-test, and implement a Cancer Inquiry Response System (CIRS) for the United States. The CIRS system should consist of a systematic approach to cancer surveillance that refines existing guidelines and develops new approaches to respond to inquires about cancer in communities.**

**CDC Review of the Northern California Cancer Center Report:**  
**“Status of Breast Cancer Research in the San Francisco Bay Area”**

**Full Report**

**Centers for Disease Control and Prevention**

**May 1998**

## **Background**

### **Disease Burden from Breast Cancer**

Breast cancer is the most common nondermatologic cancer among American women and is second only to lung cancer as a cause of cancer-related deaths. An estimated 178,700 new cases of breast cancer among women will be diagnosed and 43,500 women are expected to die of the disease in 1998 (1).

### **Risk Factors for Breast Cancer**

As with most cancers, the risk of developing breast cancer increases with age. Other risk factors include personal or family history of breast cancer, genetic conditions (e.g., BRCA gene mutations), history of nodular densities on mammograms, certain benign breast diseases, early age at menarche, late age at menopause, never giving birth or having a small number of births, late age at first birth, obesity, higher socioeconomic status, and residence in northern, urban areas of the United States (2,3). Less clearly established risk factors include use of oral contraceptives, use of estrogen replacement hormones, above-average height, alcohol consumption, and no history of breast feeding(2).

### **The Potential Role of Environment and Breast Cancer**

A number of factors frequently categorized as “environmental exposures” have been proposed as possible causes of increased risk for breast cancer. These factors include: ionizing radiation (4); organochlorines such as dichloro-diphenyl-trichloro ethane (DDT), 1,1-dichloro-2,2-bis ethylene (DDE), polychlorinated biphenyls (PCBs) (5,6); electromagnetic fields (7-9); polycyclic aromatic hydrocarbons (PAHs) (5,10); lack of solar radiation (11,12); excessive exposure to light (9,13); and hair dyes (4). Only ionizing radiation is generally considered an established risk factor. The other factors have inconclusive evidence from studies completed so far (14).

### **The Value of Early Detection**

Many established risk factors for breast cancer are not amenable to prevention. Research regarding the association of many behavioral factors or environmental exposures with breast cancer has not consistently demonstrated increased risk. Therefore, the early detection and treatment of breast cancer are key to the control of the disease.

Breast cancer screening by mammography is the most effective method for detecting breast cancer in its earliest and most treatable stage (15). Mammography is a low-dose x-ray procedure that visualizes the internal structure of the breast to detect cancers too small to be felt during a clinical breast examination (CBE). Mammography may detect cancer months or years before a woman can palpate a lump herself. Cancers detected at an early stage of disease are less likely to have spread to regional lymph nodes or distant body sites (15).

The sensitivity of mammography, i.e., the likelihood that when a woman with breast cancer is screened, the mammogram will correctly identify the breast cancer, is 75–94 percent (15,16). This sensitivity level is higher than that for CBE alone (57–70 percent) or breast self-examination (BSE) alone (12–41 percent) (15,16). The specificity of mammography, i.e., the likelihood that it will correctly indicate that a woman being screened does not have breast cancer, ranges from 83 percent to more than 98 percent in different studies (15,17). Widespread use of mammography, alone or with a CBE performed by a trained health care provider, can lower overall mortality from breast cancer (15,16,18).

Mammography has been demonstrated to reduce mortality from breast cancer by identifying breast cancers at earlier stages, thereby improving the opportunity for effective treatment and survival from the disease. Women diagnosed with localized disease can expect a 5-year relative survival rate of 96 percent (19). That is, only 4 percent of these women are likely to die of their breast cancer within 5 years. For women with disease that has spread to body sites beyond regional lymph nodes, the 5-year relative survival rate drops dramatically to 19.8 percent. Treatment at this late stage is not only much less effective but is also more debilitating.

### **Breast Cancer in the San Francisco Bay Area**

In 1992, the International Agency for Research on Cancer reported in Cancer in Five Continents (Volume VI) that breast cancer incidence rates for 1983-87 for white women living in the San Francisco Bay Area was higher than those reported from many registries around the world (20). As a result, there has been widespread interest by the scientific and lay communities about the potential causes for the high rates of breast cancer in the San Francisco Bay Area. In September 1997, the House Appropriations Committee of the United States Congress urged the Centers for Disease Control and Prevention (CDC) and the Agency for Toxic Substances and Disease Registry (ATSDR) to:

Collaborate with state and local health departments to review existing cancer registry data on breast cancer incidence and mortality in the [San Francisco] Bay Area to determine what area-based assessments may be necessary and, on the basis of this review, to issue a report on findings and recommendations (21).

### **Methods**

In October 1997, CDC began collaborating with the California Department of Health Services and the Northern California Cancer Center (NCCC - a participant in the National Cancer Institute's Surveillance, Epidemiology, and End Results [SEER] program) to review breast cancer incidence and mortality rates for women living in the San Francisco Bay Area. In January 1998, the Northern California Cancer Center in conjunction with the California Department of Health Services generated a report entitled "The Status of Breast Cancer Research in the San Francisco Bay Area" (Enclosure 1) (hereafter referred to as the Status Report) which presents recent data regarding trends in breast cancer incidence in the San Francisco Bay Area; highlights recently



completed projects investigating breast cancer occurrence; summarizes a representative sample of the 40 current, individual research projects related to breast cancer in the San Francisco Bay Area; and elaborates on future potential projects that could improve and enhance our understanding of breast cancer. A more detailed description of the Status Report follows under “Findings.”

CDC has reviewed the Status Report prepared by the NCCC, consulted scientific literature on breast cancer and environmental factors, and independently analyzed data on breast cancer incidence rates (age-adjusted to the 1970 U.S. standard population) in the San Francisco Bay Area from 1973-1994.

Data to assess long-term trends in race-specific incidence rates for the San Francisco Bay Area compared to other areas of the United States participating in the SEER program are not available for analysis because SEER race/ethnicity groupings differ substantively from methods used by the State and local authorities in California to define race/ethnic groups. Preliminary data on race- and county-specific incidence rates were provided to CDC by the NCCC for generation of this Report to Congress (22).

For this Report to Congress, CDC has generated updated information on breast cancer mortality in the San Francisco Bay Area. Using codes 174.0-174.9 of the *International Classification of Diseases, Adapted*, Ninth Revision (ICD-9) on public-use files compiled by its National Center for Health Statistics (NCHS), CDC identified deaths from female breast cancer as underlying cause of death for 1973-1994. For calculating mortality rates, data from the SEER program and the U.S. Bureau of the Census were used to derive the denominators from annual estimates of the number of women in the San Francisco Bay Area (Alameda, Contra Costa, Marin, San Mateo, and San Francisco counties) and in the United States as a whole. Mortality rates were directly standardized to the age distribution of the 1970 U.S. population in 5-year age groups, and were analyzed for calendar years 1973 through 1994.

Mortality rates were computed for whites and blacks. Due to statistical fluctuations in annual mortality rates in blacks in the San Francisco Bay Area, average annual, age-adjusted mortality rates were calculated in 5-year groups, 1975-1979, 1980-1984, 1985-1989, and 1990-1994. The differences between the San Francisco Bay Area rate and the total United States rate for whites and blacks were tested for statistical significance as described by SEER (23).

Data to assess long-term trends in mortality rates for other race and ethnic groups in the San Francisco Bay Area compared to the United States as a whole were not available for analysis. NCHS databases do not include population estimates for all race/ethnic groups at the county level. In addition, NCHS race/ethnic groupings differ substantively from methods used by the State and local authorities to define race/ethnic groups. State-derived population estimates for rate calculations are also revised to adjust for census undercounting for certain race/ethnic groups. The U.S. Bureau of the Census does not adjust for undercounting when generating national population estimates. Data on race- and county-specific breast cancer mortality rates

were provided by the California Cancer Registry of the California Department Health Services (24).

## **Findings**

### **Breast Cancer Incidence in the San Francisco Bay Area**

**Finding 1: The incidence of invasive breast cancer in the San Francisco Bay Area has decreased since 1987 and now is comparable to the rate in the other areas of the United States, combined, participating in the National Cancer Institutes's Surveillance, Epidemiology, and End Results (SEER) program.**

CDC has confirmed the trends in breast cancer incidence in the San Francisco Bay Area as presented in the Status Report. Since 1973 the incidence rates of invasive breast cancer (all races) in the San Francisco Bay Area have been higher than the rates of invasive breast cancer in all SEER areas combined. However, the rate of newly diagnosed breast cancers in the Bay Area peaked at 123.4 per hundred thousand population in 1987 and decreased 12.0 percent to 108.6 per hundred thousand by 1994. Since 1991, there has been no statistically significant difference between the incidence rate in the San Francisco Bay Area when compared to the rate in all SEER areas combined or to the rate in all other SEER areas combined (i.e., excluding the San Francisco Bay Area). Breast cancer incidence rates in the United States are higher than in other parts of the world (25).

For the years 1990-1994 combined, the average annual, age-adjusted rates of invasive breast cancer varied by county and by race/ethnic group (Exhibit 1) (22). Incidence rates are not shown for some race/ethnic groups in some counties because there were fewer than 5 breast cancers reported or the race-specific population totaled less than 100,000. In the counties comprising the Bay Area, invasive breast cancer incidence rates were substantially higher for white, non-Hispanic women than for those in the other race/ethnic groups. Incidence rates for Asian, non-Hispanic women in all counties were lower, in general, than for black, non-Hispanic women and were similar to those for Hispanic women in San Francisco and San Mateo counties.

Calculation of the breast cancer incidence rates for all races combined (Exhibit 1) gives the appearance that rates in Marin County are higher than the other counties in the Bay Area. However, the differences in overall incidence rates by county are due to the marked differences in the demographic profiles of the counties and the marked differences in breast cancer incidence rates for race/ethnic groups. Therefore, the most accurate assessment is to compare incidence rates by race-ethnic group between counties. The breast cancer incidence rate for white women in Marin County is similar to the rates for white women in the other counties in the Bay Area.

## Factors Influencing Breast Cancer Incidence in the San Francisco Bay Area

**Finding 2: Analysis of breast cancer incidence in the San Francisco Bay Area in the mid-1980s compared with other areas of the United States suggests that the higher rates were due, in part, to the higher use of mammography, i.e., the greater number of women screened, the greater number of breast cancers detected. Higher prevalence of known breast cancer risk factors in the Bay Area may have also contributed to the elevated rates.**

The Status Report applies an ecological approach, i.e., observation of two events over the same time period, to analyze trends in breast cancer incidence. It contemporaneously compares incidence rates and the rates of self-reported mammography use in the San Francisco Bay Area during the 1980s. The authors conclude that “much of the increase and subsequent decrease of these rates during the 1980s and early 1990s likely is due to the introduction of screening mammography in the early 1980s. In addition, high rates of screening mammography in the Bay Area mean that Bay Area women with breast tumors are more likely to have them detected at an earlier stage of disease, when they are more treatable.”

The use of ecological approaches, such as that used in comparing mammography and incidence rates in the San Francisco Bay Area, is a reasonable and inexpensive method for generating hypotheses in epidemiology and research. The finding of increasing rates of *in situ* breast cancer (most of which cannot be detected without mammography) during the same period of observation strengthens the hypothesis that higher use of mammography in the Bay Area found more cases of breast cancer, resulting in higher incidence rates. However, such studies cannot directly test that hypothesis because data on individual behavior that may influence risk were not collected for the analysis. Therefore, conclusions regarding individual risk for breast cancer based on the group risk must be made cautiously.

The Status Report summarizes the results of two investigations of breast cancer occurrence in the San Francisco Bay Area. In the first investigation, Robbins and colleagues completed an analysis of the relationship between known risk factors and breast cancer incidence in the San Francisco Bay Area for the period 1978-1982 (26). Risk factor information from January 1980 through December 1982 was derived using data from the Cancer and Steroid Hormone Study, a population-based, case-control interview study of women aged 22-54 years who resided in eight SEER regions (including the San Francisco Bay Area). The incidence data were derived from women of all ages living in the San Francisco Bay Area. Two different statistical methods were used to compute the relative risk of breast cancer associated with residence in the Bay Area versus other regions, after adjustment for regional differences in known risk factors. Computer simulations were performed to assess bias that might be introduced by using risk factor data derived only from the young group of controls (aged 22-54). The authors observed that women with breast cancer in the Bay Area had higher prevalence of risk factors compared to the other SEER areas combined and concluded that “...among both white women and black women, the elevated breast cancer incidence rate in the San Francisco Bay Area can be completely accounted for by regional differences in known risk factors” (such as parity, age at first full-term pregnancy,

age at menarche, age at menopause) and that “...no meaningful biases resulted from our use of risk factor data obtained from younger women.”

The Robbins analysis appropriately used breast cancer risk factor data, which coincided well temporally with the breast cancer incidence data for the San Francisco Bay Area obtained for 1978-1982. Screening mammography was not widely used in clinical practice during 1978-1982. Therefore, this study was able to assess the effects of risk factors on differences in breast cancer incidence without being concerned with potential variability in mammography use in different SEER areas. The results of the Robbins study are also strengthened by the fact that the risk factors of the individual women with breast cancer were assessed. The use of different statistical approaches that result in similar conclusions lends credibility to the conclusions.

On the other hand, the computer simulations to analyze potential bias resulting from the use of risk factor data from younger women apparently did not include assessment of differences in the prevalence of risk factors known to vary by age cohort, such as parity, age at first full-term pregnancy, and age of menarche. Analyses for Asian and Hispanic women were not done. However, breast cancer incidence rates for these groups are generally lower than those for black, non-Hispanic women and are substantially lower than rates for white, non-Hispanic women. In addition, direct conclusions from the study about the potential role of the environment on breast cancer in the San Francisco Bay Area are not possible. It was not the purpose of the study nor was it designed to assess individual environmental exposures.

In the second study initiated by the NCCC in 1995, the intent was to determine the extent to which several known reproductive and socioeconomic risk factors for breast cancer influenced the geographic variation in breast cancer incidence by comparing Marin County to 24 other counties in California. The prevalence of breast cancer risk factors (low parity, living in an urban area, and higher socioeconomic status) was derived from aggregate information for census block-groups (27). Breast cancer incidence rates for the communities were adjusted for age and census-risk factors and then compared. The study concluded that “as a group, other California communities with high-risk profiles for breast cancer had breast cancer incidence rates nearly the same, or in some cases higher, than those in Marin. Conversely, block groups that had lower levels of these characteristics than Marin County had consistently lower incidence rates of breast cancer.... Women in communities with high-risk profiles have high rates of breast cancer, whether they live in Marin or other California locales.... Known reproductive and socioeconomic status indicators like lower parity, higher income, and higher education are related to breast cancer incidence in Marin County.”

Conclusions regarding the risk for breast cancer based on the methods used by the NCCC should be viewed cautiously, particularly those related to local environmental factors. The prevalence of breast cancer risk factors was not derived directly from the individual women with breast cancer. Therefore, aggregate group risks may not accurately reflect individual risks. The effects on breast cancer incidence of other important known risk factors (e.g., personal or family history of

breast cancer, certain benign breast diseases, early age at menarche, late age at menopause, late age at first birth, obesity) could not be assessed with the methods used.

The authors appropriately state that “possible environmental causes of breast cancer could be contributing to breast cancer incidence rates in all geographic locations, an issue this study does not address.” Higher socioeconomic status as a risk factor theoretically could be acting as a proxy for indicators of potential environmental exposures unique to or more highly associated with higher socioeconomic groups. However, studies have suggested that potential exposures to hypothesized environmental toxins are more common in lower socioeconomic groups (28).

### **Trends in Breast Cancer Incidence in the San Francisco Bay Area**

**Finding 3: Recent cancer surveillance data indicate that the incidence of invasive breast cancer is decreasing in the San Francisco Bay Area. The decrease may be due to several factors or a combination of factors including a mammography screening effect, less complete cancer reporting from outpatient medical facilities, or changes in the demographic profile of the population.**

The findings of higher breast cancer incidence rates in the mid-1980s followed by recent declines in the Bay Area (in the face of sustained mammography use) would be consistent with a pattern seen in other communities when a screening test is introduced into a population (29,30). Initial increases result from dissemination of the technology into the community resulting in diagnosis of previously undetected, prevalent, and smaller tumors that would have otherwise been detected symptomatically in later years. Once the prevalent cancers in the population have been identified through screening, the incidence rates fall toward an eventual equilibrium reflecting new incident cases in the population.

Rates of *in situ* disease in the Bay area are continuing to increase in the 1990s, suggesting perhaps that the benefits of early detection, through sustained levels of mammography utilization, are continuing. More recent data to verify sustained levels of mammography use among Bay Area women would be reassuring but were not available for analysis within the time constraints imposed for this report. The California Department of Health Services is pursuing additional analyses.

The observations of high use of mammography compared with other areas of the United States and the increasing diagnosis of *in situ* breast cancer in the Bay Area lend support to the hypothesis that the high incidence rates of breast cancer during the mid-1980s may have been due, at least in part, to the greater use of mammography. Alternatively, the conclusions of Robbins et al. that elevated incidence rates in the Bay Area were explainable on the basis of a high prevalence of known risk factors are based on studies using accepted epidemiologic methods.

However, if high rates of breast cancer incidence in the Bay Area had been entirely due to known risk factors such as low parity, late age at first full-term pregnancy, fewer months of breast feeding, early age at menarche, late age at menopause, or alcohol consumption, then the prevalence of those risk factors in the population would have had to substantially change in the Bay Area since 1982 to account for a 17.4 percent decrease in the incidence of invasive breast cancer. Large changes in the prevalence of these risk factors in the Bay Area have not been reported. More recent data to assess the prevalence of known breast cancer risk factors in the Bay Area that would assist in the interpretation of the trends in breast cancer incidence were not available for analysis within the time constraints related to preparation of this Congressional report.

Some proportion of the observed decrease in breast cancer incidence in the San Francisco Bay Area may be due to other factors. An increasing proportion of diagnoses and treatment for breast cancer are occurring in outpatient or non-hospital settings from which cancer reporting and registration may be less complete or delayed. Decrease in overall invasive breast cancer incidence rates (i.e., for all races combined) may be due, in part, to changing demographic profiles of the San Francisco Bay Area population over time with increasing proportions of women in the community being from racial/ethnic groups with lower breast cancer incidence rates.

### **Trends in Breast Cancer Survival Among Bay Area Women**

The Status Report presents data on survival of women in the San Francisco Bay Area with breast cancer diagnosed between 1974 and 1990 that demonstrate that women in the Bay Area were slightly more likely to survive 5 years after diagnosis than women in other SEER areas. However, black and Filipino women continued to be diagnosed at a later stage than other women and had poorer survival rates than other women with the same stage of disease at diagnosis.

### **Trends in Breast Cancer Mortality in the San Francisco Bay Area**

**Finding 4: Death rates for breast cancer in the San Francisco Bay Area have decreased since 1991 and are now comparable to the U.S. rates.**

Exhibit 2 shows the trends in breast cancer death rates for all race/ethnicity groups combined in the San Francisco Bay Area and in the United States as a whole from 1973 to 1994. Death rates in the Bay Area began a sustained decline in 1991 from 28.4 per hundred thousand population and had dropped 18.7 percent to 23.1 per hundred thousand by 1994. The trend of a sustained decline in breast cancer death rates in the Bay Area compares favorably with rates in the United States as a whole. U.S. rates began to drop in 1989 from 27.5 per hundred thousand to 25.5 per hundred thousand by 1994, representing a 7.3 percent decrease nationwide.

Exhibit 3 shows trends in breast cancer death rates for whites and for blacks. Since 1991, death rates for breast cancer among white women in the Bay Area have started to decline and approach the rate for white women in the United States as a whole. Data for black women in the Bay Area

fluctuated because of the statistically small numbers but appear to follow a trend similar to that of black women in the United States as a whole. Breast cancer mortality rates for black women in the United States have not shown a sustained decline. Data about long-term trends in breast cancer mortality rates for other racial/ethnic groups in the San Francisco Bay Area compared to the United States as a whole were not available for analysis due to substantive differences in methods used by State/local and national authorities in deriving databases.

For the years 1988-1992 combined, the average annual, age-adjusted breast cancer mortality rates (per hundred thousand females) varied by race and by county (Exhibit 4) (22). Rates based on fewer than 15 deaths or from counties with five-year race-specific population totals less than 200,000 are not shown.

In general, black, non-Hispanic \* women had slightly higher breast cancer mortality rates than did white, non-Hispanic women in the counties comprising the Bay Area. Mortality rates for Asian, non-Hispanic women and for Hispanic women were substantially lower than for white, non-Hispanic women and black, non-Hispanic women in the Bay Area. In the Bay Area, only breast cancer mortality rates for white, non-Hispanic women in San Francisco County were statistically significantly higher than for white, non-Hispanic women in California as a whole. Similarly, mortality rates for Asian, non-Hispanic women in San Mateo County were statistically significantly higher than for Asian, non-Hispanic women in California as a whole. Breast cancer mortality rates for the other racial/ethnic groups in the other Bay Area counties were not statistically significantly different from their racial/ethnic group counterparts in California as a whole.

## **Research Projects on Breast Cancer in the San Francisco Bay Area**

**Finding 5: Nearly 40 research studies covering a broad spectrum of topics and approaches are under way in the San Francisco Bay Area to better understand the occurrence of breast cancer.**

As of August 1996, there were nearly 40 breast cancer research studies being conducted in the San Francisco Bay Area. These studies explore a wide range of topics including, but not limited to, racial/ethnic differences in breast cancer risk, family history and gene-environment interactions, and the effect of diet (e.g., phytoestrogens) in breast cancer, barriers to early detection, and the potential influence of environmental factors (e.g., low sunlight exposure, electromagnetic fields, dioxin, and organochlorines) on breast cancer occurrence.

The Status Report identifies three additional studies under consideration: (1) geographic differences in breast cancer in California; (2) a comparison of breast cancer incidence rates between San Francisco and Los Angeles; (3) and, new directions for a study of breast cancer in

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\* The California Cancer Registry and the NCCC do not group or analyze data using Federal Office of Management and Budget guidelines.

California teachers.

## **The Status of Cancer Surveillance in the San Francisco Bay Area**

### **Finding 6: Cancer surveillance in the San Francisco Bay Area has included very complete case identification and high quality case information.**

Since 1973, the NCCC has been collecting cancer incidence data for the San Francisco Bay Area as part of the NCI's SEER program. The data collection efforts of the SEER program have served as a model for cancer registration nationally and internationally for two decades. The cancer surveillance data are routinely very complete and of high quality with great attention given to quality control and accuracy.

Complete, timely, and high quality cancer surveillance is the irreplaceable cornerstone of any cancer control efforts. An increasing proportion of diagnoses and treatment for breast cancer are occurring in outpatient or non-hospital settings from which cancer reporting and registration may be less complete or delayed. Therefore, CDC, the SEER program, and the North American Association of Central Cancer Registries are collaborating to develop methods to assess the completeness and quality of cancer data reporting from outpatient, non-hospital facilities to central cancer registries in the United States.

Historically, cancer registries have played key roles in answering questions from the public and from policymakers about the occurrence of cancer in their communities. With the advent of CDC's National Program of Cancer Registries, States not a part of NCI's SEER Program are rapidly improving the completeness and quality of cancer data that are used as a fundamental tool in investigating cancer clusters. However, as yet, few States have adequate resources or technical capacity to respond quickly or definitively to reports by communities of possible clusters of cancer.

Currently, results of cancer cluster investigations are often not satisfactorily conclusive either to the community reporting a possible increase in cancer or to the State health department responding to the report. Rarely does a report of increased occurrence lead to new information about carcinogenic exposures or causes of cancer, and the follow-up of a report is costly. Concerned citizens may interpret the findings of no association of the reported cancer to a clear cause or possible exposure as due to incomplete data or to an attempt to cover up known risks.

In a 1997 workshop supported by CDC, the States identified critical areas of need in their health departments regarding cancer investigations including: additional knowledge and training; the need for databases complimentary to the cancer registry; appropriate software applications; public and provider information about cancer clusters; model response protocols; and, organizational infrastructures. No established model of a cancer inquiry response system that States can adopt or implement to respond to cancer inquiries currently exists.



With additional resources, CDC's National Program of Cancer Registries could develop, field test, and implement a systematic approach to cancer surveillance that refines and develops new approaches to respond to inquiries about cancer in communities. The Nation would be well served by having levels of complete, high quality cancer surveillance efforts, similar to those in the San Francisco Bay Area, for all communities to better meet the information needs of the public and of policymakers about the occurrence of cancer.

### **Recommendations**

- 1. Cancer surveillance should be continued to closely monitor the trends in breast cancer incidence and mortality in the San Francisco Bay Area and in the United States as a whole.**
- 2. Data should be analyzed on the prevalence of mammography utilization since 1991 and on trends in the prevalence of known breast cancer risk factors in the San Francisco Bay Area, to assist in the interpretation of time trend data for breast cancer incidence and mortality.**
- 3. Due to the multi-factorial nature of the potential causes of breast cancer, broad-based approaches to breast cancer research in the San Francisco Bay Area and in the United States as a whole should be continued. The new directions for research on breast cancer in the Bay Area proposed by NCCC in the Status Report are worthy of consideration through appropriate peer review of full proposals and protocols.**
- 4. CDC's National Program of Cancer Registries should develop, field-test, and implement a Cancer Inquiry Response System (CIRS) for the United States. The CIRS system should consist of a systematic approach to cancer surveillance that refines existing guidelines and develops new approaches for cancer cluster investigations.**

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**EXHIBIT 1. Female Breast Cancer (Invasive). Average Annual Age-Adjusted Incidence Rates per 100,000 Population,\* and 95% Confidence Intervals (CI), by County and Race/Ethnicity, 1990-1994, San Francisco Bay Area\*\***

<b>County</b>	<b>Rate</b>	<b>95% CI</b>
<b>ALL RACES</b>		
<b>Alameda</b>	<b>106.5</b>	<b>103.2-109.9</b>
<b>Contra Costa</b>	<b>118.8</b>	<b>114.6-123.1</b>
<b>Marin</b>	<b>133.2</b>	<b>125.4-141.4</b>
<b>San Francisco</b>	<b>100.5</b>	<b>96.7-104.5</b>
<b>San Mateo</b>	<b>109.8</b>	<b>105.5-114.4</b>
<b>WHITE (non-Hispanic)</b>		
<b>Alameda</b>	<b>120.2</b>	<b>115.7-124.8</b>
<b>Contra Costa</b>	<b>125.3</b>	<b>120.4-130.3</b>
<b>Marin</b>	<b>135.5</b>	<b>127.3-144.2</b>
<b>San Francisco</b>	<b>129.9</b>	<b>123.6-136.4</b>
<b>San Mateo</b>	<b>125.4</b>	<b>119.9-131.2</b>
<b>BLACK (non-Hispanic)</b>		
<b>Alameda</b>	<b>94.7</b>	<b>87.2-102.8</b>
<b>Contra Costa</b>	<b>103.4</b>	<b>89.9-119.0</b>
<b>Marin</b>	<b>---</b>	<b>---</b>
<b>San Francisco</b>	<b>105.7</b>	<b>93.2-119.9</b>
<b>San Mateo</b>	<b>---</b>	<b>---</b>
<b>HISPANIC</b>		
<b>Alameda</b>	<b>86.4</b>	<b>77.2-96.7</b>
<b>Contra Costa</b>	<b>97.0</b>	<b>83.4-112.7</b>
<b>Marin</b>	<b>---</b>	<b>---</b>
<b>San Francisco</b>	<b>69.5</b>	<b>60.1-80.4</b>
<b>San Mateo</b>	<b>68.7</b>	<b>58.5-80.7</b>

**EXHIBIT 1 (continued). Female Breast Cancer (Invasive). Average Annual Age-Adjusted Incidence Rates per 100,000 Population,\* and 95% Confidence Intervals (CI), by County and Race/Ethnicity, 1990-1994, San Francisco Bay Area.\*\***

<b>ASIAN/OTHER (non-Hispanic)</b>		
<b>Alameda</b>	<b>67.5</b>	<b>60.8-75.0</b>
<b>Contra Costa</b>	<b>75.4</b>	<b>64.9-87.6</b>
<b>Marin</b>	<b>---</b>	<b>---</b>
<b>San Francisco</b>	<b>63.8</b>	<b>58.3-69.9</b>
<b>San Mateo</b>	<b>65.4</b>	<b>57.0-75.0</b>

**SOURCE:** Northern California Cancer Center

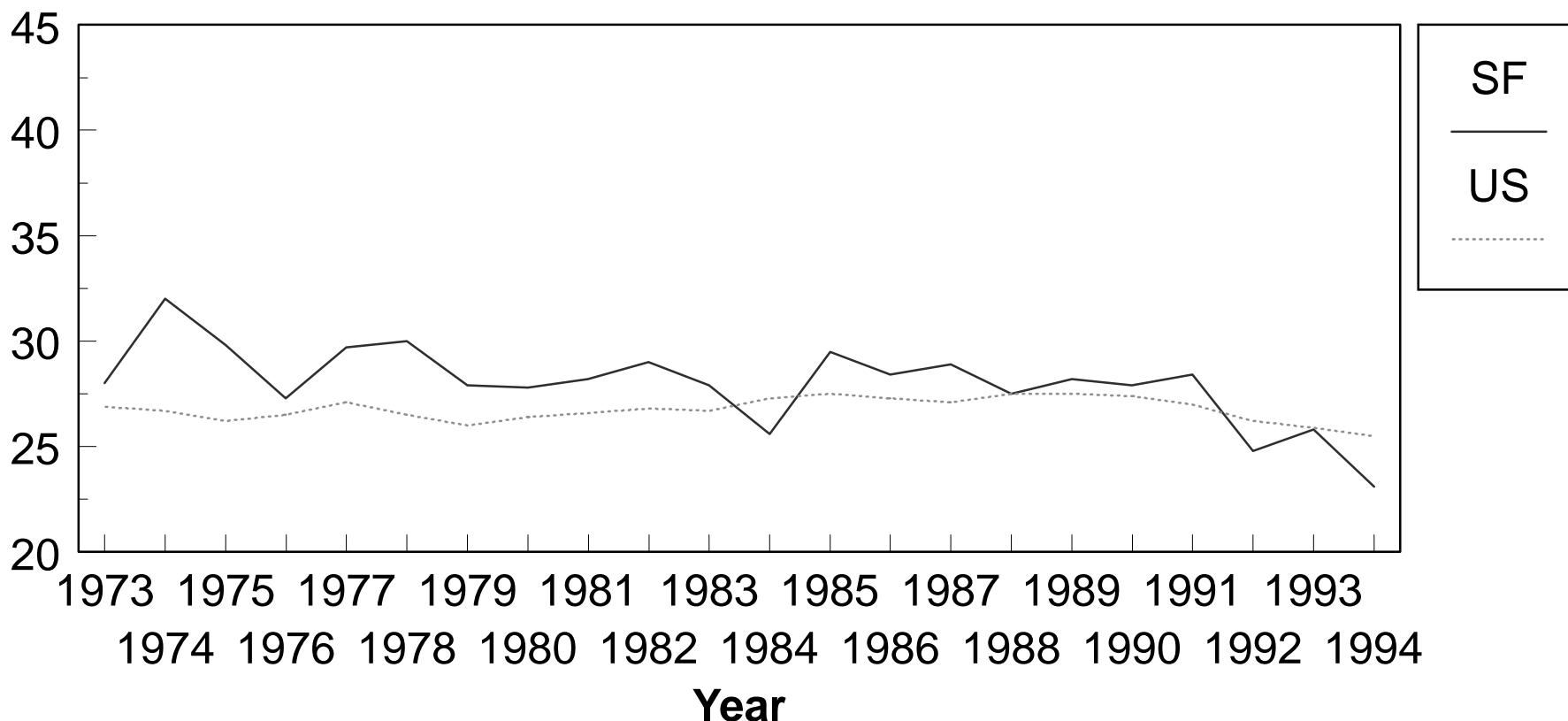
**\* Age-adjusted to the 1970 U.S. Population. Data are not shown for rates based on fewer than 5 cases or for counties with race-specific population totals less than 100,000.**

**\*\* All rates are based on cases reported as of March 15, 1997 (ascertainment estimated 94% complete) and preliminary population data.**

# Exhibit 2:

## Female Breast Cancer Mortality Rates, San Francisco-Bay Area, and United States, All Races, 1973-1994

Rate per 100,000\*



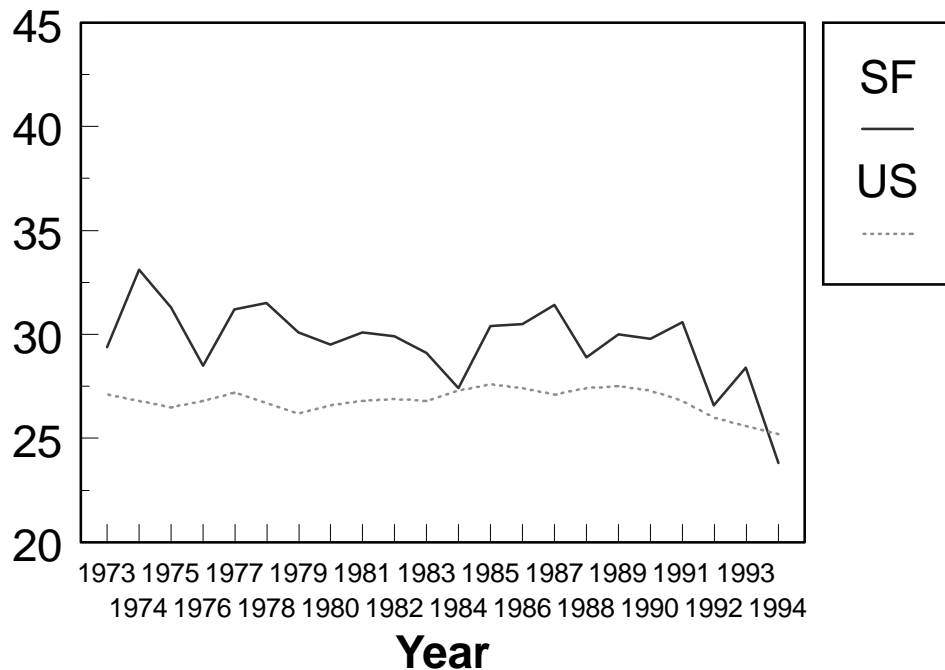
\*Rates are age-adjusted to 1970 US population.

Source: National Center for Health Statistics.

# Female Breast Cancer Mortality Rates, San Francisco-Bay Area, and United States, Whites and Blacks, 1973-1994

**White Race**

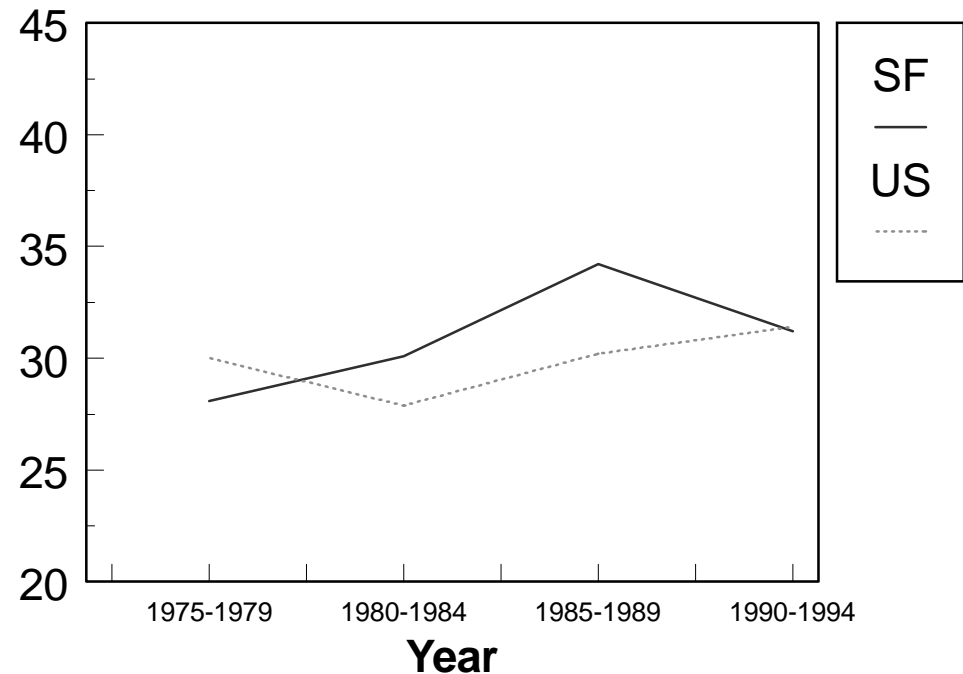
Rate per 100,000\*



\*Rates are age-adjusted to 1970 US population.  
Source: National Center for Health Statistics.

**Black Race**

Rate per 100,000\*



\*Rates are average annual and age-adjusted to 1970 US population.  
Source: National Center for Health Statistics.



**EXHIBIT 4. Female Breast Cancer (Invasive). Average Annual Age-Adjusted Mortality Rates per 100,000 Population\*, by County and Race/Ethnicity, 1988-1992, San Francisco Bay Area.**

County	Race			
	White (non-Hispanic)	Black (non-Hispanic)	Asian (non-Hispanic)	Hispanic
Alameda	28.7	30.7	16.1	23.3
Contra Costa	28.5	34.3	13.5	19.3
Marin	31.1	---	---	---
San Francisco	32.7**	41.7	12.3	16.8
San Mateo	30.0	---	19.1**	18.6
California	28.0	33.1	12.6	17.8

**SOURCE: California Department of Health Services, California Cancer Registry.**

**\*Age-adjusted to the 1970 U.S. Standard. Rates based on fewer than 15 deaths or from counties with five-year race-specific population totals less than 200,000 are not shown.**

**\*\*Rate is significantly higher than race-specific, sex-specific statewide rate (p<0.05).**

date: 4/14/98