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CENTERS FOR DISEASE CONTROL AND PREVENTION

The National Breast and Cervical Cancer Early Detection Program: A Comprehensive Public Health Response to Two Major Health Issues for Women

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The passage of the Breast and Cervical Cancer Mortality Prevention Act established a nationwide, comprehensive public health program to increase access to breast and cervical cancer screening services for women who are medically underserved. This act created the first opportunity for state health agencies to build a public health infrastructure for cancer control at the state and community levels. The Congress appropriated $30 million in fiscal year 199: for the first year of this program. In the summer of 1991, the Centers for Disease Control and Prevention (CDC) used a competitive application process to fund the first eight states to establish early detection programs. Since then, the National Breast and Cervical Cancer Early Detection Program (NBCCEDP) has become a nationwide program with a budget of $100 million. Thirty-five states and nine American Indian Tribes are supported to implement comprehensive screening programs. Fifteen states, three territories, and the District of Columbia receive planning and infrastructure grants as part of the Capacity Building Program. The NBCCEDP surveillance data through January 31, 1995 shows that 556,003 screening tests have been provided to women who are medically underserved. The success of NBCCEDP has contributed to the growing pressure on state health agencies to focus more attention and resources on chronic disease prevention and control.

Key words: *breast cancer, cervical cancer, early detection, program enactment, public health program, women's health*

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BREAST CANCER IS the most commonly diagnosed cancer and the second leading cause of cancer death among women in the United States. For 1995, the American Cancer Society estimates that breast cancer will be diagnosed in 180,000 women, and 46,000 women will die from the disease.[1] We currently do not know how to prevent breast cancer from occurring. Thus, detecting carcinoma of the breast at an early stage is the key to more treatment options, improved survival, and decreased mortality.[2] Research has shown that the use of mammography can reduce the mortality due to breast cancer among women 50 years and older by 30 percent.[3,4]

The overall incidence of invasive cervical cancer has decreased steadily over the last several decades, but in recent years this rate has increased among women who are less than 50 years old. In 1995, invasive cervical cancer will be diagnosed in approximately 15,800 women, and carcinoma in situ will be diagnosed in about 65,000 women. In this same year, about 4,800 women will die of cervical cancer.[1] The primary goal of cervical cancer screening is to increase detection and treatment of precancerous cervical lesions and thus prevent the occurrence of cervical

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cancer. Although no clinical trials have studied the efficacy of the Papanicolaou (Pap) test in reducing cervical cancer mortality, experts agree that it is an effective technology.[5] Since the introduction of the Pap test in the 1940s, cervical cancer mortality rates have decreased by 75 percent.[5]

Although mammograms and Pap tests are crucial components of a cancer prevention and control strategy, they are routinely underused. In *Healthy People 2000*, the Public Health Service (PHS) established that by the year 2000, 60 percent of women aged 50 years and older should receive a mammogram every two years.[6] However, the baseline data on mammography use from the 1987 National Health Interview Survey (NHIS) showed that only 23 percent of women 50 years and older reported having received a mammogram within the past three years. This proportion was lower for racial and ethnic minority women, for women who had less than a high school education, for women who were over age 75 years, and for women who were living below the poverty level.[7]

In 1991, the PHS established that by the year 2000, 85 percent of women should be receiving a Pap test within the preceding one to three years.[6] Baseline data on the use of the Pap test from the 1987 NHIS indicated that only 65 percent of women aged 18 years and older reported having received a Pap test within the past three years.[7] As with the use of mammography screening, this proportion was lower for racial and ethnic minority women, for women who had less than a high school education, for women who were over age 75 years, and for women who had low incomes.

Studies have consistently shown multiple barriers to the routine use of breast and cervical cancer screening services. These barriers have included the costs associated with the screening tests, lack of physician recommendation for screening, lack of knowledge about the importance of early detection, and fear of learning of a diagnosis of cancer.[8] Studies have also shown that women without health insurance are less likely than those with insurance to seek and obtain clinical preventive services.[9] Kaluzny et al. report that low income and old age translate into low use of cancer screening services.[10] Studies show that these barriers remain consistent, but the extent to which they play a role in the underutilization of these screening tools tends to vary between individuals and communities.

The complex problem of increasing access to cancer screening services cannot be adequately addressed by interventions that target only one barrier at a time. Rather, the design and implementation of carefully coordinated comprehensive programs that use innovative strategies to address multiple barriers are essential if the use of screening services is to be increased. In response to this need, the Centers for Disease Control and Prevention (CDC) established the National Breast and Cervical Cancer Early Detection Program (NBCCEDP) in 1990. This Program forms the foundation for a comprehensive, national effort for the control of breast and cervical cancer.

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Organizational Setting

Founded in 1946, the CDC is an agency within the PHS. It is internationally renowned for its critical work in controlling infectious illnesses, such as malaria, smallpox, polio, and Legionnaires' disease. In the mid-1980s, CDC expanded its activities in chronic disease control and made a strong commitment to reducing morbidity and mortality from chronic illnesses. A review of CDC's chronic disease control functions revealed that many of the activities were located in different organizational settings throughout the agency and lacked a concentrated focus. In 1985, a limited budget of approximately $3 million was provided to teams within CDC to award competitive grants for chronic disease projects. In 1988, the chronic disease functions and activities within the agency were reorganized into the National Center for Chronic Disease Prevention and Health Promotion (NCCDPHP).

The mission of NCCDPHP is to prevent premature death and disability from chronic diseases and to promote healthy personal behaviors. Breast and cervical cancer control was identified as a top priority for the new center. It was the vision of CDC that the same public health strategies used to manage infectious diseases should be used to successfully combat breast and cervical cancer. The control of these cancers should be incorporated into the public health system in much the same way as programs that promote the control of tuberculosis, sexually transmitted diseases, and the acquired immunodeficiency syndrome epidemic.

As the nation's prevention agency, CDC enjoys a strong working relationship with state and local health agencies across the country. Placing state health agencies in a leadership role for the development of intervention programs for cancer control was viewed as a natural progression from their efforts in implementing infectious disease programs. The presence

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> ***The landmark legislation marked important progress in the fight to prevent and control chronic diseases and contributed momentum to the wave of national interest in women's health issues.***

of such programs would recognize the critical role health agencies need to play in the prevention and control of breast and cervical cancer.[9] In 1990, the passage of the Breast and Cervical Cancer Mortality Prevention Act created the first opportunity for state health agencies to build a state and local public health infrastructure for cancer control and broadly for chronic disease prevention and control.[10]

Congress Responds

The passage of the Breast and Cervical Cancer Mortality Prevention Act of 1990 was a product of rapid bipartisan action by the Congress and the Executive Branch.[10] This act, which was authored and introduced by Congressman Henry Waxman in the House of Representatives, established a nationwide, comprehensive public health program to increase access to breast and cervical screening services for women who are medically underserved.

The health care climate at the time was one of increasing public and congressional concern about women's health issues. Through the 1970s and 1980s, many prominent women became active in the fight against breast cancer. In 1989, the Executive and Legislative branches of the federal government became increasingly concerned about the disease burden from breast cancer and missed opportunities to detect and treat premalignant and preinvasive cervical neoplasia. Many policy makers recognized the importance of establishing a nationwide infrastructure to increase the use of mammography and Pap test screenings among all women by implementing early detection programs designed to address multiple barriers to screening. Of special concern to congressional and government leaders was the poor use of these screening tests among women who were uninsured and underinsured and among racial and ethnic minority women.

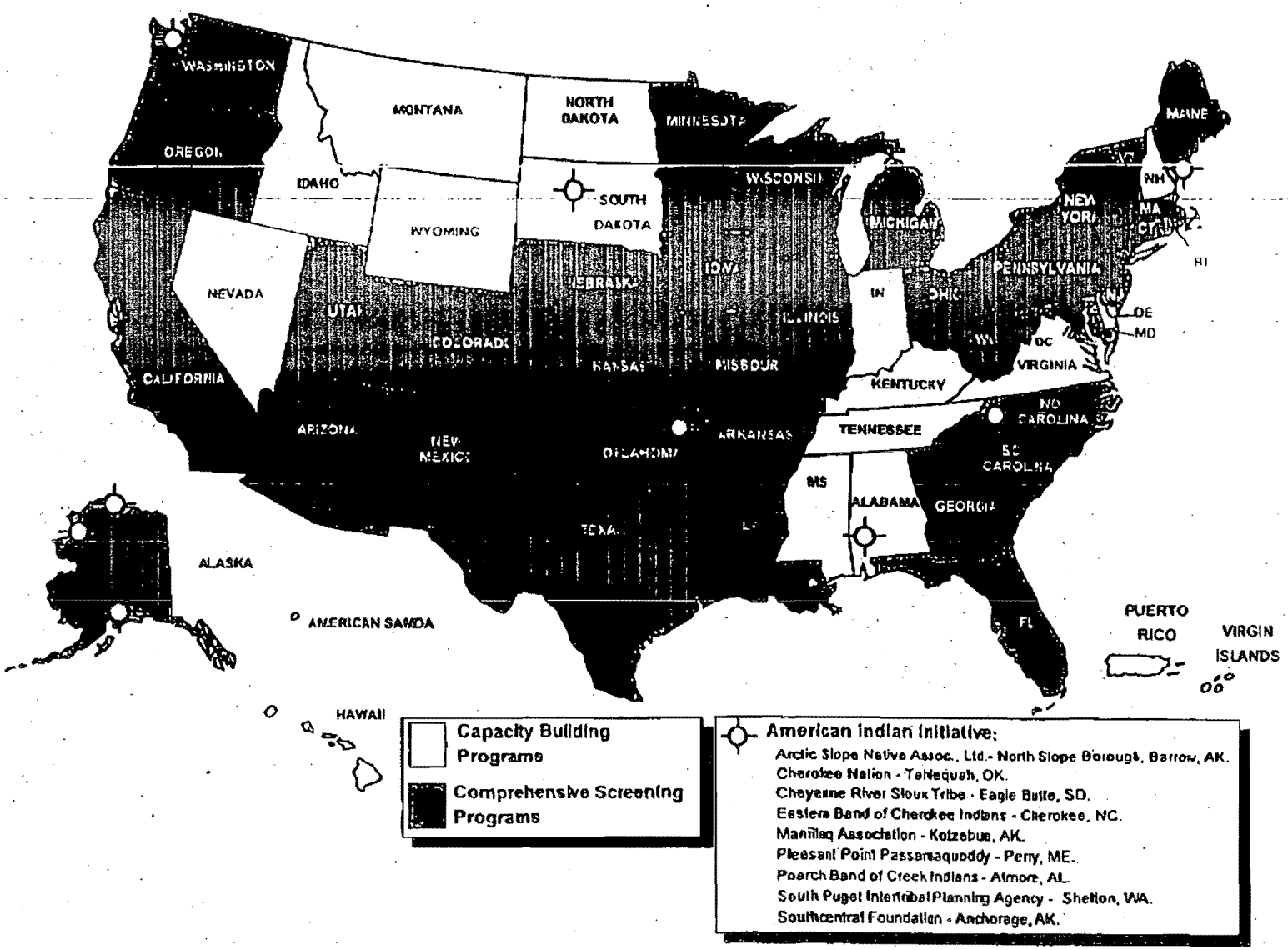
As the Congress moved forward to draft the legislation, the PHS began to lay the foundation for a national early detection effort. In fiscal year (FY) 1990, CDC received appropriations of $5 million to establish partnerships with several state health agencies to design early detection programs for medically underserved women. The CDC awarded grants of approximately $400,000 to $555,000 to four states: Colorado, Minnesota, South Carolina, and West Virginia. These resources were used to establish state breast and cervical cancer activities that would start to build the infrastructure for early detection efforts.

In early 1990, Henry Waxman, Chairman of the Subcommittee on Health and Environment of the House Energy and Commerce Committee, introduced a bill to establish a state-based initiative offering free breast and cervical cancer screening services to women with low incomes. The program, which was to be administered by CDC, also provided for public and professional education, quality assurance, and surveillance and evaluation systems to monitor program activities. Waxman's initiative received bipartisan support and was passed in June of 1990. Senator Barbara Mikulski championed the bill in the Senate and secured passage with a wide majority in August 1990. Marilyn Quayle provided strong support for the program. Once the legislation was passed by Congress, it was signed into law by President George Bush on August 10, 1990. The landmark legislation marked important progress in the fight to prevent and control chronic diseases and contributed momentum to the wave of national interest in women's health issues.

The legislation, Public Law (PL) 101-354, established a program of grants to states to carry out activities in six key areas:

1. to screen medically underserved women for breast and cervical cancer,
2. to provide appropriate and timely referrals for medical treatment for women with abnormal screening tests and ensure the provision of follow-up services,
3. to develop and disseminate public information and education related to the detection and control of breast and cervical cancer,
4. to improve training of health professionals in the detection and control of breast and cervical cancer,
5. to establish mechanisms for monitoring the quality of screening procedures and the quality of interpretation of such procedures, and
6. to evaluate program activities through the establishment of surveillance systems.[10]

Figure 1. National Breast and Cervical Cancer Early Detection Program–1995.



The act specifies that at least 60 percent of funds received by a state should be expended on screening and referral services.[10] The other 40 percent of funds can be used to support public and provider education, quality assurance, and surveillance and evaluation activities. Only 10 percent of the state funds can be used for administrative expenses. The NBCCEDP is the payer of last resort for screening services. Grant monies cannot be used to pay for services if other coverage is available through any state fund, private health insurance, or other government health benefits program, such as Medicaid and Medicare. States are also required to contribute $1 for every $3 of federal funds. States are allowed to donate personnel and other services as part of their match to the CDC grant.

The issue that has caused the greatest controversy concerns the availability of funds to pay for the treatment of women diagnosed with cancerous or precancerous lesions. Congressman Waxman was concerned that uninsured women who were diagnosed with breast and cervical cancers would be stranded in the health care system with no ability to pay for treatment. Because the use of federal monies to pay for treatment services might rapidly deplete the funds available for screening services, Congress decided that the states would be required to ensure that women with cancerous and precancerous lesions receive timely and appropriate treatment services. However, these services could not be reimbursed through the NBCCEDP funds.

The National Strategic Plan

The enactment of legislation in 1990 coincided with a charge to CDC from the Department of Health and Human Services to lead a planning effort that would result in the development of a National Strategic Plan for the early detection and control of breast and cervical cancers.[9] This charge was issued by the Assistant Secretary for Health of PHS after members of the Association of State and Territorial Health Officials, the National Association of County Health Officials, and the United States Conference of Local Health Officials called on PHS to strengthen the federal emphasis on those cancers that primarily affect women. The process of developing the national plan was coordinated by three PHS agencies: the CDC, the Food and Drug Administration (FDA), and the National Institutes of Health. A series of interactive meetings were initiated by these three agencies to obtain input from the public, private, and voluntary sectors. More than 75 national organizations provided guidance during the process. This guidance resulted in the development and publication of the National Strategic Plan in 1993. The plan addressed cancer control issues in five critical areas: (1) the integration and coordination of screening services, (2) public education, (3) professional education and practice, (4) quality assurance, and (5) surveillance and evaluation. During implementation of the NBCCEDP, the plan was a valuable guide to CDC. Many of the priority issues identified in the plan are now addressed by CDC, state and local health agencies and their partners as they implement breast and cervical cancer early detection programs.

Building State and Tribal Infrastructure

The Congress appropriated $30 million in FY 1991 for the first year of this program.[9] In the summer of 1991, CDC used a competitive application process to fund the first eight states. State health agencies were given grants averaging $3 million to fund comprehensive screening programs in California, Colorado, Michigan, Minnesota, New Mexico, South Carolina, Texas, and West Virginia. In FY 1992, appropriations increased to $50 million, and CDC was able to expand the number of states receiving support for comprehensive screening programs from 8 to 12. In January 1992, CDC added four new states—Maryland, Missouri, Nebraska, and North Carolina.

During the first two years of implementation, CDC recognized that the initial 12 states would have benefited from resources for planning and for developing an infrastructure before the infusion of funds for screening services. In these states, start-up time averaged 15 months before screening actually began. Start-up activities included: (1) recruiting and hiring a cancer control staff, (2) identifying and contracting with provider organizations to deliver screening services, (3) building partnerships with hospitals and community-based organizations to obtain support for diagnostic, treatment, and support services, (4) developing billing and reimbursement systems that are coordinated with other third party payers such as Medicare and Medicaid, (5) designing public education and outreach strategies, and (6) establishing a surveillance system to track and follow women.

To allow time for infrastructure development, CDC established the Capacity Building Program in October 1992. A competitive application process was used to award grants that ranged from $225,000 to $280,000 to 18 additional states to help them prepare for the delivery of screening programs. These capacity building resources enabled states to hire staff, develop cancer plans and coalitions, carry out public and professional education efforts, improve and monitor quality assurance systems, and design and enhance surveillance activities.

The program continued to expand in FY 1993 with appropriations of $72 million. Using a competitive application process, CDC added six more comprehensive states—Massachusetts, New York, Ohio, Pennsylvania, Washington, and Wisconsin. These six states had all been awarded capacity building grants the previous year. In this same year, an additional nine states joined the Capacity Building Program, and by October 1993, the NBCCEDP was active in 45 states.

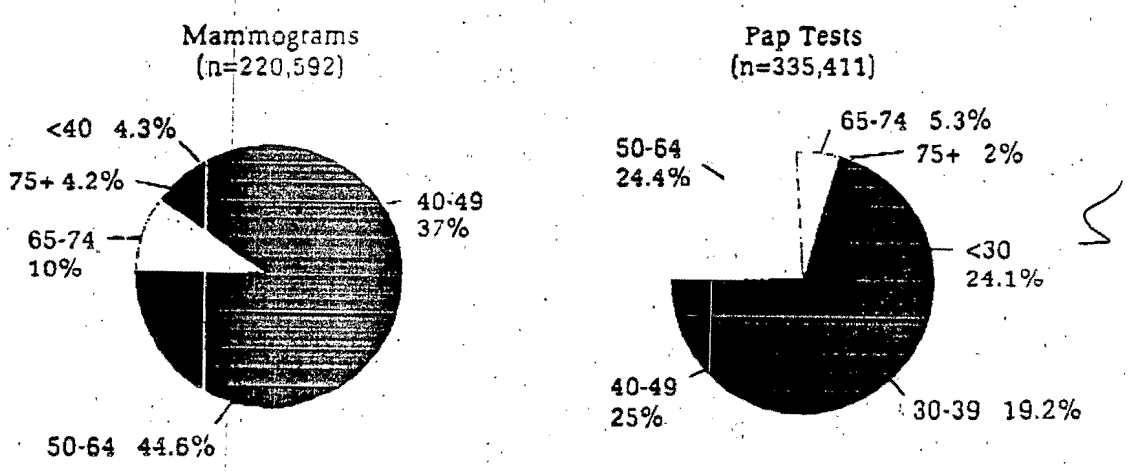
Congressional hearings were also held in 1993 on the activities and accomplishments of the NBCCEDP. Following these hearings, Congress reauthorized PL 101-354, the Breast and Cervical Cancer Mortality Prevention Act and added several key amendments to the legislation. The new legislation, PL 103-183, required CDC to give funding priority to those states with a high disease burden from breast or cervical cancer.[11] Grant funds could only be made available to states that provided coverage for mammograms and Pap tests through their state Medicaid programs. States could pay no more than the Medicare rate for screening and diagnostic procedures.

Congress also directed CDC to establish a grant program with American Indian tribes and tribal organizations to increase screening services among American Indian women. CDC launched this major initiative in 1993 and began to build important relationships with tribal leaders and American Indian organizations across the country. In October 1994, nine tribes and tribal organizations were funded through a competitive application process to establish comprehensive screening programs.

In FY 1994, with an appropriation of $78 million, CDC provided support to 26 states and 9 tribes and tribal organizations for comprehensive screening programs. Twenty-four states, three territories, and the District of Columbia were funded as Capacity Building Programs. The NBCCEDP was truly nationwide.

In FY 1995, CDC entered its fifth year of this program with an appropriation of $100 million. CDC provided funding to 35 states and 9 tribes and tribal organizations for comprehensive screening programs. Fifteen states, three territories, and the District of Columbia received planning and infrastructure grants as part of the Capacity Building Program (Figure 1).

Figure 2. Includes: Mammograms performed for screening or following an abnormal breast examination.
Source: Minimum Data Elements through 01/31/95.



Percent distribution of mammograms and pap tests, by age group, National Breast and Cervical Cancer Early Detection Program, 1991-1995

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Program Design and Implementation

Removing financial barriers to screening is only the first step towards reducing mortality from breast and cervical cancers, particularly among women who are medically underserved. If the health service delivery system is to reach these women, a comprehensive approach is needed that integrates and coordinates the following critical elements: screening, referral, and follow-up services, public education and outreach, professional education, quality assurance, surveillance, and partnership development.

Screening, Referral, and Follow-up System

The NBCCEDP reimburses states for clinical breast exams, screening mammograms, pelvic exams, Pap tests, and some diagnostic procedures. State health agencies contract with a broad range of provider agencies to deliver screening services. Each state has developed its own delivery system based upon available resources.

In Texas, for example, the state health department contracts with community and migrant health centers, Young Women's Christian Associations (YWCA) of the USA, family planning organizations, community-based organizations, and county health departments. In Nebraska, where a county health department system does not exist and where few community-based organizations are established, the state contracts directly with private physicians. Maryland and Michigan contract primarily with local and county health departments. Contracts with these agencies can include support for screening and diagnostic procedures; public education; coalition activities; and clinical, outreach, and administrative support staff.

When PL 101-354 was passed by Congress, states were concerned about the burden that treatment would place on their health care system given that no federal funds were available to pay for treatment and limited resources were available for diagnostic services. Establishing a network of medical providers who are willing to donate these services is a challenge for many states. States have shown creativity and determination in identifying and securing financial resources for diagnostic and treatment services for women who are served by the NBCCEDP. Resources for these services vary across states and are a reflection of state and local government support, medical provider generosity, and community commitment. Examples include county programs for the underserved, state-funded cancer clinics, and legislative mandates to use cigarette tax revenues for diagnostic or treatment services. In some states, community commitment ranges from local efforts to raise funds for diagnostic and treatment services to the willingness of a national or local foundation to pay for these services for women who lack resources for care. For example, the Susan G. Komen Breast Cancer Foundation has donated resources from its annual Race for the Cure for diagnostic and treatment services in several states. Medical providers and hospitals in communities have been critical partners by donating diagnostic and treatment services. Many states have hired case managers to work with provider organizations to ensure that each woman that requires follow-up receives appropriate and timely diagnostic and treatment services.

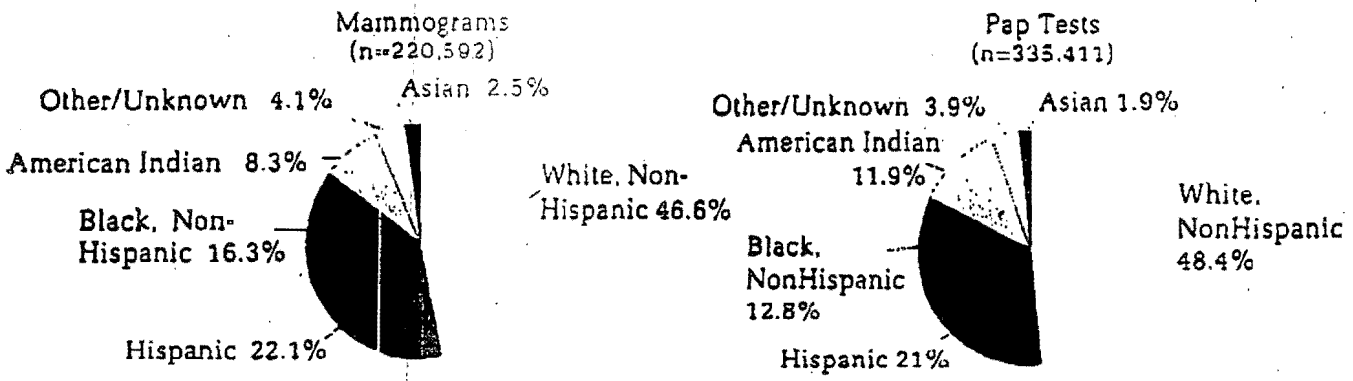
Public Education and Outreach

Public education and outreach has played an important role in the success of the NBCCEDP. Using a variety of intensive community-based efforts, the program has successfully screened medically underserved women. One of the early important lessons learned was that the NBCCEDP could not expect to reach women in need of screening without developing partnerships with those organizations that have for many years served the priority populations CDC wanted to reach. Public education materials and outreach strat-

Professional Organizations

- American Academy of Physician Assistants
- American College of Radiology
- American College of Physicians
- American Medical Women's Association
- American Nurses Association
- Association of Teachers of Preventive Medicine
- National Medical Association

Figure 3. Includes: Mammograms performed for screening or following an abnormal breast examination. Source: Minimum Data Elements through 01/31/95.



Percent Distribution of Mammograms and Pap Tests, By Race and Ethnicity, National Breast and Cervical Cancer Early Detection Program, 1991-1995

egies needed to be sensitive to the groups targeted by the state programs with regard to culture, language, and literacy.[12] Examples of innovative community-based strategies have included the following interventions and activities:

- The Texas Department of Health funds the YWCA in Abilene to provide screening services. The YWCA recruits women in this predominantly rural area through churches, clinics, senior centers, and programs affiliated with the YWCA. To facilitate access to screening services, the YWCA provides transportation to the clinic sites. The YWCA also ensures that women with abnormal tests receive appropriate and timely follow-up and identifies financial resources for diagnostic and treatment services.
- In Maryland, the state health department has placed state funded outreach workers at each of the county health departments throughout the state to enhance the program's intervention efforts. The women hired for these positions come from the community and are primarily older minority women. The outreach workers recruit women who are in need of screening services from various sites including senior citizen centers, low-income housing, factories, homemaker clubs, thrift shops, churches, influenza vaccination clinics, and nursing homes.
- In Massachusetts, the program has developed printed materials for women whose primary language is not English or whose reading ability is limited. Focus groups were held with women who were 60 years and older to test concepts and educational materials. Public education materials are provided to program participants in Haitian-Creole, English, French, and Spanish.
- In New York, the state health department established the concept of Breast Health Partnerships as a unique method of delivering screening services throughout the state. The Breast Health Partnerships work to bring the resources of all the partners in a community together to address and overcome barriers to screening. For example, the Batavia community in Genesee County established a Breast Health Partnership with participation from more than 30 agencies. The Saint Jerome's Hospital Healthy Living Unit functions as the coordinating agency and the data management center. The YWCA of Genesee County manages the reimbursement of screening services for the partnership. Some of the participating agencies include the ACS, Office for Aging, United Way, the Tonawanda Tribe, Genesee Memorial Hospital, and Planned Parenthood.

Professional Education

Several studies have shown that women are significantly more likely to seek screening if they have a physician's recommendation.[13,14] The National Strategic Plan suggests that each encounter—with an emergency room physician, an obstetrician or gynecologist, an internist, a dentist, or a nurse—is an

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> ***The ability to implement a national strategic effort to control breast and cervical cancers depends largely on the assistance provided by partners in both the public and private sectors.***

opportunity for a health care provider to educate women about screening for breast and cervical cancers.

In launching the NBCCEDP, CDC established important relationships with major professional organizations across the country. The CDC has provided resources to these organizations for the development of training materials, physician reminder systems, and educational curricula to improve skills in the areas of screening, quality assurance, communication, and counseling.

State health agencies have targeted many of their professional education efforts to family practitioners, internists, obstetricians and gynecologists, nurses, physicians' assistants, and other allied health professionals. The focus of the training has been on detection and diagnostic procedures, communication skills, guidelines for screening, data collection and reporting requirements, and the strengthening of clinical skills.

Quality Assurance

The National Strategic Plan suggests that an effective quality assurance system for a breast cancer screening program provides confidence that a technically satisfactory mammogram was performed, that the results were interpreted properly, and that the results were reported to the referring clinician and the woman in a timely manner.[9]

Quality assurance strategies for cervical cancer screening have focused on both improved specimen collection by the primary care practitioner and on interpretation by the laboratory.[9] The Clinical Laboratory Improvements Act of 1988 (CLIA 88) has increased the federal role in evaluation and oversight of laboratory performance.[15] Quality control measures and proficiency testing are being developed and implemented to improve diagnostic accuracy.

With the passage of PL 101-354 in 1990, Congress recognized the importance of improving the quality of mammography and cytological services nationwide.[10] CDC developed technical guidelines for mammography and cytology services for facilities participating in the NBCCEDP. To ensure high-quality screening tests, all mammography facilities are required to meet standards of the American College of Radiology and all cytology laboratories are required to meet CLIA 88 standards. In 1993, the reauthorization required the state programs to adhere to the new standards for mammography quality assurance developed by FDA.

State health agencies have taken several important steps to develop and improve quality assurance programs for mammography and cytological services. Medical advisory committees have been organized in states to provide technical guidance, assist with training activities, review and develop clinical protocols, and develop guidelines and systems to ensure that the breast and cervical cancer screening process is carried out in a safe and effective manner. Training and education activities have been provided to radiologists, radiologic technologists, and cytotechnologists. Additional staff have been hired in some states to monitor the compliance of mammography facilities and cytopathology laboratories with state and federal quality assurance standards and requirements.

Surveillance

Surveillance activities are necessary to effectively evaluate the program's progress in meeting established goals and objectives. When the NBCCEDP was implemented in 1991, CDC, in collaboration with its state partners, developed a set of minimum data elements to monitor the program's screening, diagnostic, and treatment activities.

For each woman receiving screening services, the states collect and report to CDC information on screening location, demographic characteristics, screening results, diagnostic procedures and outcomes, and initial treatment. The tracking and follow-up of women with abnormal test results has been a labor intensive activity for states. Tracking and reminder systems have been implemented in clinics to ensure timely follow-up of all women with abnormal findings and treatment of all women with cancer or precancerous conditions. Reminder systems have also been implemented to encourage all women with normal screening exams to return for rescreening at the appropriate interval. Many states have a surveillance team that consists of epidemiologic and data management staff to manage the surveillance component of the program.

These data are used to help state health agencies implement, monitor, and evaluate their screening programs: provide Congress and CDC partners with data on the progress and accomplishments of the NBCCEDP; and direct and evaluate CDC's breast and cervical cancer control efforts.

National Partnerships

The ability to implement a national strategic effort to control breast and cervical cancers depends largely on the assistance provided by partners in both the public and private sectors. CDC relies heavily on its partnerships with national, voluntary, and private organizations to build the necessary infrastructure at the community level to provide screening services for all women who need them. These partners have played a critical role in assisting state health agencies in reaching priority populations, such as women with low incomes, racial and ethnic minorities, women with low literacy skills, older women, and lesbians.

At the national and state level, the CDC and its state partners have established a strong working relationship with the ACS. Through its national office and local divisions, ACS assists in the development and delivery of CDC-directed programs. Local ACS divisions serve as active partners with state health agencies to increase access to screening services among women who are medically underserved. CDC collaborates with ACS staff in all programmatic areas, including the implementation of early detection programs, public and provider education, and cosponsorship of conferences.

In 1993, CDC entered into a unique partnership with Avon Products, Inc., YWCA of the USA, The National Alliance of Breast Cancer Organizations (NABCO), and the National Cancer Institute (NCI) to improve access to early detection services. Avon created the Avon Breast Access Fund and raised $10 million to support community-based efforts through the sale of its Breast Cancer Awareness pin and key ring. Avon has funded more than 125 programs through the YWCA of the USA and NABCO. These organizations work closely with state health agencies to provide breast health education, recruitment and outreach, and support services for women.

In 1994, CDC expanded its collaborative network by funding 12 organizations to develop educational strategies and interventions to improve its capacity to reach racial and ethnic minorities, older women, lesbians, and women with low literacy skills (see box entitled National Organizations).

National Organizations

- American Association of Retired Persons
- American Federation of Teachers
- American Indian Health Care Association
- National Caucus and Center for Black Aged, Inc.
- National Coalition of Hispanic Health and Human Services Organizations
- National Education Association
- National Hispanic Council on Aging
- National Migrant Resource Program
- Mayo Foundation
- Susan G. Komen Breast Cancer Foundation
- World Education, Inc.
- Young Women's Christian Association of the USA

Program Impact

At the state and local level, the NBCCEDP has made remarkable progress in establishing breast and cervical cancer early detection programs. The NBCCEDP surveillance data through January 31, 1995 shows that 556,003 screening tests have been provided to women who are medically underserved. As of this date, the program had provided 220,592 mammograms in 18 states. Of the women who received mammograms, 1,005 were diagnosed with breast cancer. During the same period, 335,411 Pap tests were performed and a total of 14,605 women were diagnosed with cervical intraepithelial neoplasia, a precursor of cervical cancer that can be successfully treated. Invasive cervical cancer was diagnosed in 120 women.

The most important risk factors for breast cancer are being female and older age.[1] The NBCCEDP's guidelines place a high priority on screening women 50 years and older. As of January 31, 1995, 59 percent of the mammograms were provided to women 50 years and older (Figure 2).

Although the incidence of cervical cancer does not rise appreciably with age, mortality from this disease is higher among older women.[16] Furthermore, older women are less likely to receive Pap tests on a regular basis.[5] As of January 31, 1995, 57 percent of the Pap tests were provided to women 40 years and older (Figure 2).

Reaching racial and ethnic minority women with screening services is a high priority for the program.

A review of the NBCCEDP's racial and ethnic breakdown reveals that 49 percent of the mammograms were provided to minority women and that 48 percent of all Pap tests were provided to minority women (Figure 3).

The NBCCEDP was established early on in states that had a high proportion of Hispanic women. Thus, 22 percent of the mammograms and 21 percent of Pap tests were provided to Hispanic women. With the implementation of the American Indian Initiative in 1994, the NBCCEDP has improved its capacity to reach American Indian women. The NBCCEDP will enhance its capacity to screen black women with the recent implementation of comprehensive screening programs in states with a high proportion of black women.

Discussion

The Breast and Cervical Cancer Mortality Prevention Act of 1990 laid an important foundation for the development of a public health focus for cancer control in the United States. The CDC's NBCCEDP is one of the largest efforts in chronic disease prevention and control ever undertaken by an agency of the federal government. The legislation provided the first opportunity for the federal and state governments together to address the control of breast and cervical cancer in a concerted and deliberate manner. At the state and community levels, the development of early detection programs has resulted in new organizational capacity and infrastructure for cancer control, increased staff resources and expertise, multiple collaborative partnerships in the private and public sectors, state and community coalitions, and a greater understanding of the challenges in delivering preventive health services to women who are medically underserved. The NBCCEDP's comprehensive approach to breast and cervical cancer control ensures that not only medically underserved women benefit from this early detection effort but that all women gain from the educational activities, public and private partnerships, and quality assurance standards implemented in the states.

The success of NBCCEDP has contributed to the growing pressure on state health agencies to focus more attention and resources on chronic disease prevention and control. This public health foundation for breast and cervical cancer control could significantly benefit efforts of states in developing a comprehensive cancer prevention and control program that would address other cancer sites such as skin, lung, colon, rectum, and prostate.

One of the greatest challenges for the future is to sustain the momentum and commitment of federal and state governments to implement a comprehensive screening program in the remaining 15 states, the District of Columbia, and U.S. territories, and to expand screening coverage in currently funded states and American Indian tribes and tribal organizations. A comprehensive, nationwide program such as the NBCCEDP provides an unique opportunity to improve the use of breast and cervical cancer screening tests among all women. This national effort has allowed the United States to make strides toward the achievement of the Healthy People 2000 objectives for breast and cervical cancer control, particularly among women who are medically underserved.

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ROUGH DRAFT

CDC'S CERVICAL CANCER PREVENTION EFFORTS

Passed by Congress in 1990, the Breast and cervical Cancer Mortality Prevention Act, authorized CDC to implement a national program to ensure that women receive appropriate high-quality cervical cancer screening and follow-up. The legislation provides for grants to be allocated to states for activities in six areas:

1) Screening medically underserved women for breast and cervical cancer.
2) Providing treatment referrals and follow up services for women with abnormal screening results.
3) Creating and disseminating public information and education about cervical and breast cancer screening and control.
4) Improving health professionals' training.
5) Implementing programs to monitor screening and analysis procedures.
6) Evaluating program activities through surveillance systems.

The act stipulates that at least 60% of funds given to states must be spent on screening and referral services, and the other 40% may be used for provider and public education, quality monitoring and surveillance activities. Only 10% of state funding may be used for administrative purposes. States are required to ensure that women with precancerous lesions receive necessary treatment although such services cannot be paid for by money authorized by the Act.

To achieve these goals, CDC developed the National Breast and Cervical Cancer Early Detection Program (NBCCEDP). Through this program, CDC reimburses states for clinical breast exams, screening mammograms, pelvic exams, Pap tests and some diagnostic procedures. State health agencies contract with various provider agencies including the YWCA, family planning organizations, community organizations, county health departments, and private physicians. Fifty states, five territories, the District of Columbia and 13 American Indian/Alaska Native organizations currently participate in the program.

Components of the NBCCEDP

I) Screening and Education/Outreach Programs

CDC works with a number of state, local, national, consumer and voluntary organizations to provide screening services for traditionally underserved populations of women. Examples of such programs include:

* A program to enable Alaska Natives close to populations of Alaska Native women to create culturally appropriate outreach strategies and education materials.

* A collaborative program between the Breast and Cervical Cancer Early Detection Program in the California Department of Health, the YWCA of Glendale, the Mission City Clinic, University of California Los Angeles and other community organizations to improve and expand screening services and outreach efforts.

* The Nebraska Breast and Cervical Cancer Early Detection Program which manages culturally sensitive outreach programs aimed at Vietnamese women (a population with a high rate of cervical cancer). Through this program, letters in Vietnamese are mailed to all women over the age of 18 which invite the women to the YWCA to learn about screening services.

* A program run through the Texas Department of Health which uses funds to pay the YWCA to recruit women through churches, clinics, senior centers and YWCA programs to gain treatment services.

* A Maryland state health department program which places funded outreach workers at county health departments throughout the state; workers come from the community and are mainly older minority women.

* An educational program in Massachusetts which provides printed educational materials in languages other than English, including Haitian-Creole, French and Spanish.

* Collaborative programs with the American Cancer Society, Avon Products Inc., YWCA, National Alliance of Breast Cancer Organizations, National Cancer Institute, National Center for Farmworker Health Inc., and other organizations to sponsor education and outreach efforts.

Through September 1996, 690,560 Pap tests were provided by NBCCDEP. 21,257 cases of cervical intraepithelial neoplasia (CIN, the precursor to cervical cancer which can be detected by Pap testing) and 258 cases of invasive cervical cancer were discovered. As of January 31, 1995, 48% of Pap tests were provided to minority women.

II) Professional Education Programs:
The CDC established a number of professional education programs for program managers, health care professionals, health educators, administrative staff and outreach workers. The programs have focused on detection and diagnostic procedures, guidelines for screening, communication skills, data collection, reporting requirements and strengthening clinical skills.

III) Quality Assurance:
The CDC has created screening guidelines and helped the FDA to conduct quality assurance training programs. Programs have focused on improving specimen collection by the primary care practitioner and specimen interpretation by the laboratory.

IV) Surveillance Programs:
When the NBCCEDP was created in 1991, the CDC created a program to monitor screening, diagnostic and treatment activities. States collect and report to CDC information on screening location, demographic characteristics of those screened, screening results, diagnostic procedures

and outcomes, and initial treatment. Reminder systems have also been implemented to encourage women to return for rescreening.

V) Treatment:

The legislation which authorized CDC to enact NBCCDEP does not allow CDC to use funds for treatment. However, many women manage to obtain treatment through state and local government support, donated medical services and community programs. State-funded cancer clinics and legislative mandates to use cigarette tax revenues for diagnostic or treatment services both help to provide treatment.

Monetary Allocations for NBCCEDP:

In fiscal year 1993, $72 billion was appropriated for NBCCEDP; in FY 1994, $78 billion was appropriated; and in 1997, $140 million was appropriated.

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

CDC

CENTERS FOR DISEASE CONTROL AND PREVENTION

"The Nation's Prevention Agency"

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AND PREVENTION
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FAX 202-690-7519

DATE 8/4/97 PAGES 1 + Cover

TO Sarah Herwitz

Phone:

Fax: 456-7431

FROM Kay Stone

Phone:

COMMENTS/NOTES As requested

Centers for Disease Control and Prevention (CDC)

National Breast and Cervical Cancer Early Detection Program

Q. The legislation authorizing the CDC National Breast and Cervical Cancer Early Detection Program (Public Law 101-354) provides states with funds to provide breast and cervical cancer screening services to women of low-income. What mechanisms are in place to provide treatment to women who need it?

A. The states funded for the National Breast and Cervical Cancer Early Detection Program have demonstrated creativity and determination in identifying and securing treatment services for women who are diagnosed with breast or cervical cancer. Traditional sources of treatment in all states include Medicare and Medicaid for women who qualify for these programs and private health insurance for those who have it. However, the eligibility and coverage vary substantially by state and situation.

Other sources of treatment are more varied between and within states and are a reflection of the extent of state/local government support, medical provider generosity and community commitment, as well as the state/local health department's commitment to finding treatment for women who need it. Examples include county indigent/ uncompensated care programs, state aid cancer clinics, and state legislature mandates to use cigarette tax revenues for treatment.

Medical providers and hospitals in communities have also donated treatment services. Creative approaches have been shown to be effective in winning the cooperation of providers including: 1) using the influence of medical advisory committees to advocate for provider cooperation; 2) negotiation to distribute treatment costs among many providers and hospitals in a community; 3) negotiation to have providers and hospitals donate a specific dollar amount for treatment or target a specific number of women to treat free annually; 4) the utilization of teaching hospitals with residency programs; and 5) frequent personal communication with providers.

Examples of community commitment range from community efforts to raise funds for treatment to the willingness of a local foundation to "write a check" if no other sources of treatment could be found. Additionally, some states are beginning to explore partnerships with industry to support treatment costs such as the donation of free medication including chemotherapy by drug companies.

Fundamental problems include the insufficient availability of uncompensated care for women who are uninsured or underinsured and the massive complexity of the health care system in the United States. Additionally, some providers do not accept Medicaid and/or Medicare patients because of low reimbursement rates, excess documentation requirements and/or complex payment systems. This is particularly a problem in rural areas of a state where the situation is compounded by the lack of qualified medical providers.

The National Breast and Cervical Cancer Early Detection Program

AT-A-GLANCE

1997

"As we move into the 21st century, public health organizations, private agencies, and professional and voluntary organizations must form partnerships to support and enrich services to the public."

David Satcher, MD, PhD, Director
Centers for Disease Control and Prevention

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

Breast and Cervical Cancers

An estimated 2 million American women will be diagnosed with breast or cervical cancer in the 1990s, and half a million will lose their lives. A disproportionate number of deaths will be among minorities and women of low income.

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 180,200 new cases of breast cancer among women will be diagnosed in 1997, and 43,900 women will die from the disease.

The incidence of invasive cervical cancer has decreased significantly over the last 40 years, due in large part to early detection efforts. Still, an estimated 14,500 new cases of invasive cervical cancer will be diagnosed in 1997, and 4,800 women will die from the disease. Virtually all of these deaths can be prevented by making these lifesaving screening services available to all women at risk.

690-7637 Call Rich

The Program

The Breast and Cervical Cancer Mortality Prevention Act of 1990 authorized the CDC to implement a national program to ensure that every woman for whom it is deemed appropriate receives regular screening for breast and cervical cancers, prompt follow-up if necessary, and assurance that the tests are performed in accordance with current recommendations for quality assurance. CDC implements many of these activities through partnerships with state and territorial health agencies, American Indian/Alaska Native organizations, and other national organizations. In Fiscal Year 1997, CDC entered into the seventh year of this landmark national program that brings critical breast and cervical cancer screening services to underserved women, including older women, women with low income, uninsured or underinsured women, or women of racial/ethnic minority groups.

Appropriations of $140 million in 1997 enable CDC to establish greater access to screening and follow-up services, increased education and outreach programs for women and health care providers, and improved quality assurance measures for mammography and cervical cytology.

Fifty states, five territories, the District of Columbia, and 13 American Indian/Alaska Native organizations now participate in the National Breast and Cervical Cancer Early Detection Program (NBCCEDP). CDC provides national program leadership in collaboration with other federal agencies and professional, national, voluntary, and consumer organizations.

The National Breast and Cervical Cancer Early Detection Program

Comprehensive Screening Programs

All 50 States
District of Columbia
Northern Mariana Islands
Republic of Palau
U.S. Virgin Islands

American Indian/Alaska Native organizations
- Arctic Slope Native Association, AK
- Cherokee Nation, OK
- Cheyenne River Sioux Tribe, SD
- Eastern Band of Cherokee Indians, NC
- Hopi Tribe, AZ
- Indian Community Health Service, AZ
- Manilaq Association, AK
- Navajo Nation, NM & AZ
- Native American Rehabilitation Association of the Northwest, OR
- Pleasant Point Passamaquoddy Tribe, ME
- Poarch Band of Creek Indians, AL
- Southcentral Foundation, AK
- South Puget Intertribal Planning Agency, WA

Capacity-Building Programs

American Samoa
Puerto Rico

"This initiative will remove many of the financial barriers women face in getting timely mammograms and Pap tests."

—Donna E. Shalala, Secretary
U.S. Department of Health and Human Services

Screening and Follow-up Services

Why Get Screened?

Breast cancer screening by mammography is the most effective method of detecting breast cancer in its earliest, most treatable stage. Mammography detects cancer an average of 1.7 years before the woman can feel the lump herself and locates cancers too small to be felt during a breast examination. Generally, survival has an inverse relationship with the stage of breast cancer at detection — the more advanced the cancer stage, the lower the survival rate. When breast cancer is diagnosed at a local stage, the 5-year survival rate is 97%. When breast cancer is diagnosed at a distant stage (metastasized), the 5-year survival rate decreases to 20%.

The intended outcome of cervical cancer screening differs from that of breast cancer screening: the primary goal is not to find cancer, but to find precancerous lesions. Detection and treatment of precancerous cervical lesions (dysplasia) identified by Papanicolaou (Pap) screening can actually prevent cervical cancer. Additionally, if cervical cancer is detected while in its earliest in situ stage, the likelihood of survival is almost 100 percent with timely and appropriate treatment and follow-up.

Common Barriers to Screening

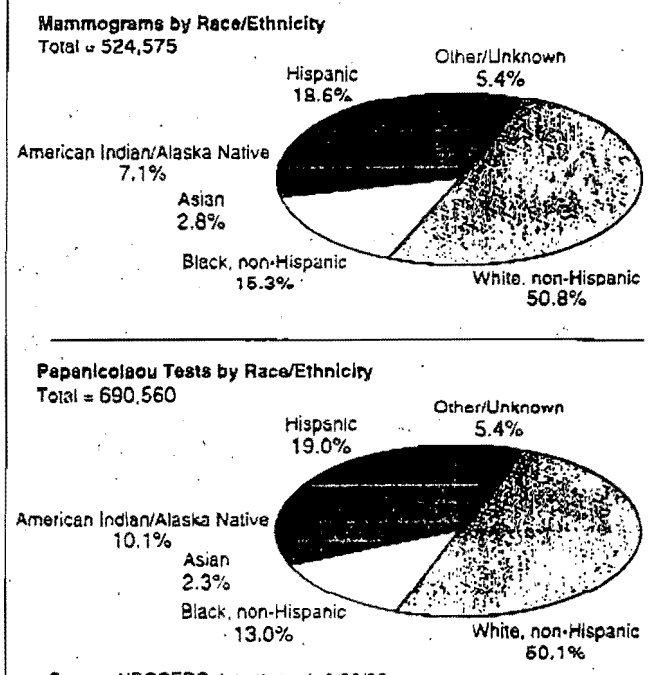
- **Fear.** Women do not want to discover that they have cancer.
- **Cost.** Many women cite cost as the reason they do not use early detection programs. Many are not aware of the availability of low-cost programs.
- **Transportation.** Because many women lack transportation, the location of screening facilities is important.
- **Communication Barriers.** Communication styles and methods are sometimes inappropriate to the needs of the women seeking services.
- **Lack of Physician Referral.** Studies have shown that women are more likely to be screened if their physician recommends screening.
- **Lack of Child Care.** Some women need assistance with arranging child care to be able to use screening.

Treatment

The NBCCEDP legislative mandate does not permit payment for treatment with CDC funds. However, funded programs have shown creativity and determination in identifying and securing treatment services for women diagnosed with breast cancer or cervical abnormalities. These treatment sources reflect the extent of state and local government support, medical provider generosity, and community commitment.

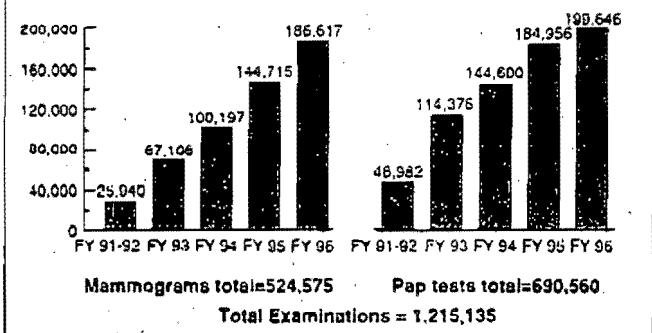
Examples of these resources include county programs for the indigent, state-funded cancer clinics, and in one state, a legislative mandate to use cigarette tax revenue to pay for treatment. The Indian Health Service has funded treatment for many American Indian/Alaska Native organizations. Medical providers and hospitals in communities have also donated treatment services.

Percent Distribution of Mammograms and Papanicolaou Tests Provided to NBCCEDP Participants, by Race/Ethnicity, 1991–1996



Source: NBCCEDP data through 9/30/96

Number of Examinations for Fiscal Years 1991–1996 among NBCCEDP Participants



Source: NBCCEDP data through 9/30/96

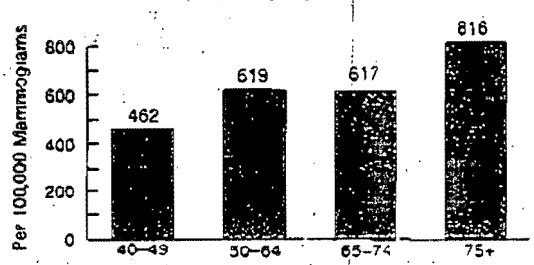
Surveillance

How the Program Has Helped

Through September 1996, more than 1,200,000 screening tests were provided by the program. Of the 506,673 mammograms provided to women aged 40 years and older, 33,218 (6.5 percent) were abnormal, and 2,918 led to a diagnosis of breast cancer. As depicted below, the rates of breast cancer increased with increasing age.

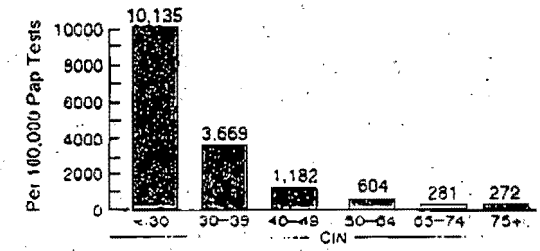
Of the 690,560 Pap tests provided, 27,135 (4 percent) were abnormal. A total of 21,257 cases of cervical intraepithelial neoplasia (CIN) I, II, or III, a precursor of invasive cervical cancer that can be successfully treated, were diagnosed. A total of 258 cases of invasive cervical cancer were diagnosed, a rate of 39 per 100,000. As depicted below, the rates of CIN decreased with increasing age.

Rate of Breast Cancers per 100,000 Mammograms among NBCCEDP Participants, by Age Group, 1991–1996



Source: NBCCEDP data through 9/30/96
Includes biopsy-diagnosed in situ and invasive breast cancer

Rate of Cervical Intraepithelial Neoplasia (CIN) per 100,000 Pap Tests among NBCCEDP Participants, by Age Group, 1991–1996



Source: NBCCEDP data through 9/30/96
Includes biopsy-diagnosed CIN I, CIN II, CIN III

Public Education and Outreach

"Comprehensive strategies will be needed to educate and motivate women to seek screening services."

—*Donna E. Shalala, Secretary*
U.S. Department of Health and Human Services

Congressional Gansler
RE: 225-4426

Innovative Program Strategies

The program has made significant progress in building state and community partnerships to serve women. Various outreach activities have been designed to educate women and motivate them to be screened.

- In Anchorage, Alaska, the Southcentral Foundation's Alaska Native Women's Wellness Project and many other partners collaborate to bring breast and cervical cancer screening and community outreach to medically underserved women. Alaska Native women face many barriers in seeking health care that require the development of culturally specific outreach strategies and educational materials. This partnership reaches out to many organizations that can bring special competencies and skills to provide women with breast health education and screening services. The project is managed by Alaska Natives, who are close to the community and who understand Native ways of communicating and interacting.
- Glendale, California is a multi-ethnic Los Angeles suburb where non-English speaking underserved populations include Eastern Europeans, Asians, and Hispanics. The California Department of Health's Breast and Cervical Cancer Early Detection Program joined forces with the YWCA of Glendale, the Mission City Clinic, University of California Los Angeles, and numerous community-based organizations to deliver comprehensive screening services. Through these partners' combined efforts, a high volume of women from a large and diverse community receive high quality breast screening services and education.
- The Nebraska Breast and Cervical Cancer Early Detection Program is concerned about Vietnamese women for whom cervical cancer is the leading cancer site. In Hastings, Nebraska, the program determined that Vietnamese women were not returning for their annual clinic visits because reminders were in English. In July 1996, letters in Vietnamese were mailed to all Vietnamese women aged 18 years and over in Hastings. This letter invited them to attend a program at the YWCA in Vietnamese that provided education about and referrals for screening services. Because Vietnamese women may be more comfortable accessing health care with other women, the women who are scheduled for clinic visits have an interpreter with them and go as a group. These efforts illustrate Nebraska's commitment to culturally sensitive outreach.

Partnerships and Coalition Development

National Organizations

Since 1992, CDC has awarded funds to national organizations to educate their constituents about breast and cervical cancers, to increase access to breast and cervical cancer screening among underserved women, and to develop strategies for reaching women in collaboration with state and territorial health agencies and American Indian/Alaska Native organizations. These organizations include

- American Association of Retired Persons
- American Federation of Teachers Education Foundation
- American Indian Healthcare Association
- Mayo Foundation, Inc.
- National Caucus and Center on Black Aged, Inc.
- National Center for Farmworker Health, Inc.
- National Coalition of Hispanic Health and Human Service Organizations
- National Education Association
- National Hispanic Council on Aging
- Susan G. Komen Breast Cancer Foundation
- World Education
- YWCA of the U.S.A.

National Center for Farmworker Health, Inc.

The Traveling Lay Health Advisors (TLHA) program was developed to address the need for comprehensive and culturally sensitive early detection of cancer among mostly Hispanic migrant and seasonal farmworkers. TLHAs provide basic education on women's health, referrals to breast and cervical cancer screening sites, tracking and follow-up services, and translation of service information for farmworkers. TLHAs help assure continuity of care, assisting health centers and clinics in arranging follow-up care and referrals and in locating patient medical records. These activities contribute to the mission of the health centers by reaching a greater percentage of the target population while strengthening NBCCEDP efforts to decrease barriers to breast and cervical cancer screening.

National Center for Farmworker Health, Inc. collaborated on developing a community media guide for advocates who are interested in health promotion with a focus on breast and cervical cancers. This step-by-step guide on how to use media channels to reach Hispanic audiences is available in Spanish and English from the National Center for Farmworker Health, Inc.

Other National Collaborations

The ability to implement a national program to control breast and cervical cancers depends largely on the involvement of various partners in state and local governments, physicians, national and private sector organizations, and consumers. CDC relies heavily on these partnerships to build the necessary infrastructure to provide screening services for all women who need them.

- **American Cancer Society.** The CDC and ACS collaboration combines the resources of national ACS divisions with CDC and its strong ties to the departments of health in every state. ACS assists in developing and delivering CDC-funded programs. ACS divisions serve as partners with state health agencies to increase screening services to medically underserved women. CDC collaborates with ACS staff in all programmatic areas, including establishing early detection programs, provider education efforts, and special demonstration projects.
- **Avon.** In 1993, a unique public-private partnership was established among CDC, Avon Products Inc., YWCA of the U.S.A., the National Alliance of Breast Cancer Organizations (NABCO), and the National Cancer Institute to educate women about breast health and to improve access to early detection services. Avon's Breast Cancer Awareness Crusade has raised more than $18 million for breast cancer programs nationwide through the sale of its Breast Cancer Awareness pink ribbon products. Avon has funded more than 200 programs through NABCO and YWCA of the U.S.A.
- **National Breast Cancer Teleconference.** In April 1996, the NBCCEDP, Avon's Breast Cancer Awareness Crusade, the New York State Department of Health, and WQED Pittsburgh, conducted a national teleconference at 650 locations. The teleconference highlighted five case studies, which addressed successful partnerships and proven outreach strategies for reaching low-income, minority and older women. A package is available to help in the implementation of breast health outreach programs in communities. CDC continues to support partnership development as an important component of successful cancer prevention and control efforts.

Quality Assurance

Quality assurance is essential if breast and cervical cancer early detection is to be an effective cancer control tool. CDC has supplied all participating programs with screening guidelines, assisted the Food and Drug Administration (FDA) in conducting quality assurance training programs, teamed with the American College of Radiology to improve and assure the quality of mammography screening, and developed guidelines on the evaluation of common breast problems.

The Mammography Quality Standards Act of 1992

The Mammography Quality Standards Act established a nationwide program to regulate the quality assurance practices in all mammography facilities throughout the United States and authorized FDA to carry out this program. CDC has assisted FDA in formulating a training program for officials responsible for regulating facilities. CDC's activities in quality assurance have also included the creation of educational programs for appropriate professionals.

Quality Assurance in Cytology

CDC has funded the Association of State and Territorial Public Health Laboratory Program Directors to write recommendations regarding the impact of closing laboratories that are found to provide inferior cytology services. This report is focusing on the responsibilities and roles of the health department in notifying patients and physicians who have received services and diagnostic tests from these facilities. A working group of state laboratory directors and national experts has been convened to study and recommend policies concerning these issues.

Professional Education

The National Training Center for the Prevention and Early Detection of Cancers

CDC's Division of Cancer Prevention and Control has established a National Training Center for the Prevention and Early Detection of Cancer through a contract with R.O.W. Sciences, Inc. This center will provide training programs, educational opportunities, and educational materials for practicing health care professionals of state and territorial health agencies and tribal organizations. The target audience will include program managers, administrative staff and data managers, health educators, physicians, nurses, radiologists, radiological technologists, cytotechnologists and outreach workers. Training will be skills-based and will use new and creative approaches, including live, interactive satellite courses.

Other Key Partners

American College of Physicians
American College of Radiology
American Public Health Association
Association of State and Territorial Chronic Disease Program Directors
Association of State and Territorial Directors of Public Health Education
Association of State and Territorial Health Officials
Association of Teachers of Preventive Medicine
Food and Drug Administration
Health Care Financing Administration
Health Resources and Services Administration
Indian Health Service
National Alliance of Breast Cancer Organizations
National Association of County Health Officials
National Cancer Institute
National Governors Association
National Medical Association

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http://www.cdc.gov/nccdphp/dcpc

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

CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

Reprinted from
MORBIDITY AND MORTALITY WEEKLY REPORT
June 14, 1996, Volume 45, Number 23
Pages 484–487

John Hart avail. for 5pm, Sat. morning? Let you know well

2 sets (616) 2888

Update: National Breast and Cervical Cancer Early Detection Program — July 1991–September 1995

During the 1990s, breast or cervical cancer will be diagnosed in an estimated 2 million women in the United States, and 500,000 will die as a result of these diseases (*1*). Screening mammography followed by timely and appropriate treatment can reduce breast cancer mortality by 30% for women aged 50–69 years, and routine use of the Papanicolaou (Pap) test followed by timely and appropriate treatment can prevent nearly all deaths from cervical cancer (*2,3*). The Breast and Cervical Cancer Mortality Prevention Act of 1990* established a nationwide, comprehensive public health program for increasing access to breast and cervical cancer screening services for underserved women. This report summarizes the impact of this initiative, CDC's National Breast and Cervical Cancer Early Detection Program (NBCCEDP), during July 1991–September 1995.

During the reporting period, the NBCCEDP was implemented in 35 state health agencies and nine American Indian/Alaskan Native programs that provided screening, referral, and follow-up services; public and professional education; quality assurance; surveillance; and coalition and partnership development. Outreach efforts were initiated to women in high-priority groups, including older women, women with low income, uninsured or underinsured women, or women of racial/ethnic minority groups. During the reporting period, approximately 800,000 screenings for breast and cervical cancer were provided to uninsured or underinsured women.

During July 1991–September 1995, the program provided 327,017 mammograms; 61.2% of the mammograms were provided to women aged ≥50 years, and 46.7% were provided to women of racial and ethnic minorities. Breast cancer was diagnosed in 1674 of the women who received mammograms. Although the rate of abnormalities detected by mammogram was highest for younger women, the rate of breast cancers detected per 100,000 mammograms increased directly with increasing age (Figure 1).

A total of 472,188 Pap tests were performed; 59.1% of the Pap tests were provided to women aged ≥40 years, and 46.5% were provided to women in racial/ethnic minorities. Cervical intraepithelial neoplasia, a precursor of cervical cancer that can be successfully treated, was diagnosed in 15,119 women. Invasive cervical cancer was diagnosed in 184 women. The rate of abnormal Pap tests varied inversely with age.

Reported by: Program Svcs Br and Office of the Director, Div of Cancer Prevention and Control, National Center for Chronic Disease Prevention and Health Promotion, CDC.

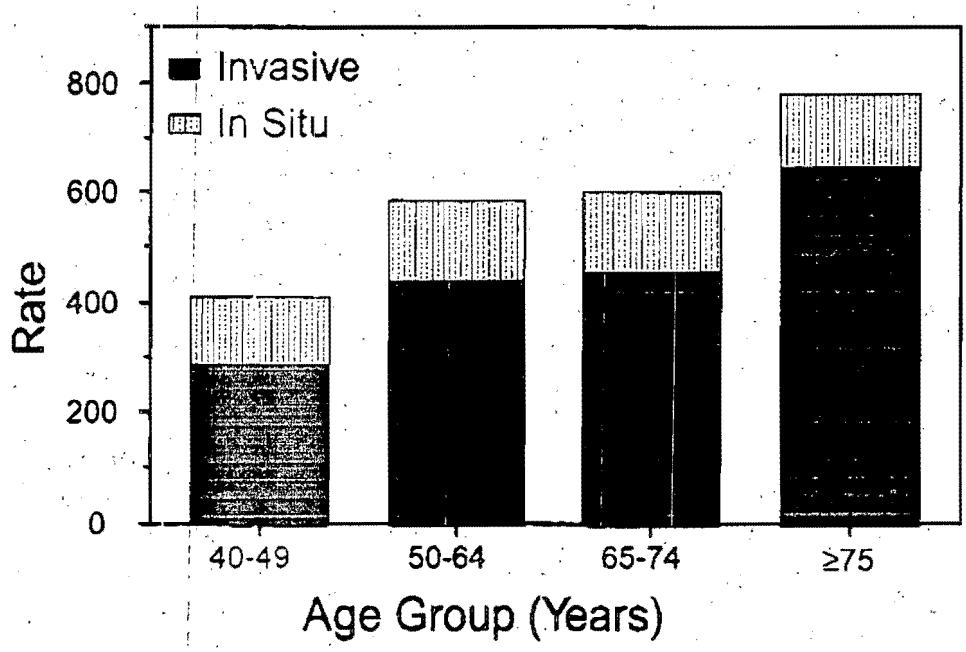
Editorial Note: The national health objectives for the year 2000 include increasing to at least 60% the proportion of women in low-income groups and aged ≥50 years who have received a clinical breast examination and mammogram within the preceding

* Public Law 101-354.

2 years and increasing to at least 80% the proportion of low-income women and women aged ≥18 years (with uterine cervix) who have received a Pap test within the preceding 3 years (objectives 16.11b and 16.12d) (4). The Breast and Cervical Cancer Mortality Prevention Act has enabled state health agencies to build a public health infrastructure to increase access to breast and cervical cancer screening services for women who are medically underserved. During fiscal year 1996, CDC entered the sixth year of the program; the number of women screened for breast and cervical cancer has increased substantially each year.

Although screening mammography and Pap tests are essential strategies for cancer prevention and control, these procedures have been substantially underused. The most important risk factors for breast cancer are female sex and older age (5); however, findings from the 1992 National Health Interview Survey (NHIS) indicated that only 35% of women aged ≥50 years reported having had a screening mammogram during the previous year. In addition, even though cervical cancer death rates are higher among older women (6), older women are less likely to receive Pap tests on a regular basis (3). The 1992 NHIS indicated that only 63% of women aged 50–64 years reported having had a Pap test during the previous 3 years (7). Use of mammograms and Pap tests was lower among women of racial/ethnic minorities, women who had less than a high school education, and women who had a low income (7). Reasons for the low proportion of women who use these screening tests include lack of a recommendation for screening from a health care provider, costs associated with the tests, and lack of an understanding of the value of early detection.

FIGURE 1. Rate* of breast cancers, by age — United States, National Breast and Cervical Cancer Early Detection Program, July 1991–September 1995



*Per 100,000 mammograms, age-adjusted to the 1970 U.S. population.

Early detection programs at the state and community levels have resulted in increased staff resources and expertise for cancer control, innovative public and professional education programs for women and health-care providers, collaborative partnerships involving the private and public sectors, state and community coalitions, and improved understanding of the barriers that prevent underserved women from seeking screening services. Improvements in measures for ensuring quality of screening tests and the establishment of public and private partnerships have benefitted all women. For example, when the NBCCEDP was implemented in 1991, provider agencies participating in the program were required to meet technical guidelines for mammography and cytology services, which included having all mammography facilities meet standards established by the American College of Radiology and the Food and Drug Administration and all cytology laboratories meet standards established by the Clinical Laboratory Improvements Act of 1988. To promote the importance of screening services for all women, CDC has developed partnerships with national organizations such as the American Cancer Society, Young Women's Christian Association of the USA, and Susan G. Komen Breast Cancer Foundation.

During fiscal year 1996, CDC received Congressional appropriations of $125 million for breast and cervical cancer control. CDC now provides funding to 35 states and nine American Indian/Alaskan Native programs for comprehensive screening programs, and infrastructure grants have been provided to 15 states, the District of Columbia, and three territories. During 1996, CDC will implement a nationwide comprehensive screening program by funding the remaining 15 states, the District of Columbia, and several of the U.S. territories.

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DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Centers for Disease Control
and Prevention (CDC)
Atlanta GA 30341-3724

National Center for Chronic Disease Prevention and Health Promotion
Division of Cancer Prevention and Control

Available Publications

Breast and Cervical Cancer

_____ 1997 National Breast Cancer Awareness Month Kits

_____ National Strategic Plan for Early Detection and Control of Breast and Cervical Cancers

_____ The National Breast and Cervical Cancer Early Detection Program At-A-Glance, 1997

_____ Breast and Cervical Cancer Screening: Barriers and Use among Specific Populations, January 1995

_____ Developing Intervention Strategies for Breast and Cervical Cancer Screening: A Self-Study Guide for Program Planners, 1995

_____ Listening to Your Audience: Using Focus Groups to Plan Breast and Cervical Cancer Public Education Programs

_____ Beyond the Brochure: Alternative Approaches to Effective Health Communication

_____ Resources for Reaching Special Populations, Breast and Cervical Cancer Prevention and Control, Jan 1994

_____ State Laws Relating to Breast Cancer, DCPC, Legislative Summary, September 1996

_____ Your Message Counts, A Guide for Community Leaders, How to Plan Your Communications Strategy for Breast and Cervical Cancer, Bilingual Guide, May 1995 (National Center for Farmworker Health)

_____ Evaluation of Common Breast Problems: A Primer for Primary Care Providers

From *Morbidity and Mortality Weekly Report* (MMWR):

_____ National Breast Cancer Awareness Month, Breast Cancer Incidence and Mortality — U.S. 1992; October 4, 1996; Vol. 45 / No. 39

_____ Update: National Breast and Cervical Cancer Early Detection Program — July 1991-September 1995; MMWR; June 14, 1996; Vol. 45 / No. 23

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_____ Screening Rates for Colorectal Cancer: New Guidelines and Current Utilization — MMWR; Feb 9, 1996; Vol. 45 / No. 5

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Estimated New Cancer Cases and Deaths by Sex for All Sites, United States, 1997*

	Estimated New Cases			Estimated Deaths		
	Both Sexes	Male	Female	Both Sexes	Male	Female
All Sites	1,382,400	785,800	596,600	560,000	294,100	265,900
Oral cavity & pharynx	30,750	20,900	9,850	8,440	5,600	2,840
Tongue	6,400	4,200	2,200	1,820	1,200	620
Mouth	11,000	6,700	4,300	2,500	1,400	1,100
Pharynx	8,800	6,400	2,400	2,030	1,500	530
Other oral cavity	4,550	3,600	950	2,090	1,500	590
Digestive system	225,900	120,000	105,900	127,070	67,440	59,630
Esophagus	12,500	9,400	3,100	11,500	8,700	2,800
Stomach	22,400	14,000	8,400	14,000	8,300	5,700
Small intestine	4,900	2,600	2,300	1,140	540	600
Colon	94,100	45,500	48,600	46,600	22,600	24,000
Rectum	37,100	20,900	16,200	8,300	4,400	3,900
Anus, anal canal, & anorectum	3,400	1,400	2,000	410	150	260
Liver	13,600	9,100	4,500	12,400	7,500	4,900
Gallbladder & other biliary	6,900	2,500	4,400	3,500	1,300	2,200
Pancreas	27,600	13,400	14,200	28,100	13,500	14,600
Other digestive organs	3,400	1,200	2,200	1,120	450	670
Respiratory system	194,600	111,400	83,200	165,920	98,490	67,430
Larynx	10,900	8,900	2,000	4,230	3,300	930
Lung	178,100	98,300	79,800	160,400	94,400	66,000
Other respiratory organs	5,600	4,200	1,400	1,290	790	500
Bones & joints	2,500	1,300	1,200	1,410	750	660
Soft tissue (including heart)	6,600	3,700	2,900	4,100	1,900	2,200
Skin (excluding basal & squamous)	54,300	34,900	19,400	9,490	6,100	3,390
Melanomas	40,300	22,900	17,400	7,300	4,600	2,700
Other nonepithelial skin	14,000	12,000	2,000	2,190	1,500	690
Breast	181,600	1,400	180,200	44,190	290	43,900
Reproductive organs	424,800	343,000	81,800	68,870	42,370	26,500
Cervix uteri	14,500	—	14,500	4,800	—	4,800
Corpus uteri	34,900	—	34,900	6,000	—	6,000
Ovary	26,800	—	26,800	14,200	—	14,200
Vulva	3,300	—	3,300	800	—	800
Vagina & other female genital	2,300	—	2,300	700	—	700
Prostate	334,500	334,500	—	41,800	41,800	—
Testis	7,200	7,200	—	350	350	—
Penis & other male genital	1,300	1,300	—	220	220	—
Urinary system	85,400	58,000	27,400	23,520	15,060	8,460
Urinary bladder	54,500	39,500	15,000	11,700	7,800	3,900
Kidney	28,800	17,100	11,700	11,300	7,000	4,300
Ureter & other urinary organs	2,100	1,400	700	520	260	260
Eye & orbit	2,100	1,100	1,000	250	140	110
Brain	17,600	10,100	7,500	13,200	7,200	6,000
Endocrine system	17,560	5,530	12,030	2,070	870	1,200
Thyroid	16,100	4,700	11,400	1,230	450	780
Other endocrine	1,460	830	630	840	420	420
Lymphoma	61,100	34,200	26,900	25,280	13,220	12,060
Hodgkin's disease	7,500	3,900	3,600	1,480	820	660
Non-Hodgkin's lymphoma	53,600	30,300	23,300	23,800	12,400	11,400
Multiple myeloma	13,800	7,900	5,900	10,900	5,500	5,400
Leukemia	28,300	15,900	12,400	21,310	11,770	9,540
Acute lymphocytic leukemia	3,000	1,600	1,400	1,410	770	640
Chronic lymphocytic leukemia	7,400	4,300	3,100	4,900	2,800	2,100
Acute myelocytic leukemia	9,200	4,700	4,500	6,300	3,400	2,900
Chronic myelocytic leukemia	4,300	2,400	1,900	2,400	1,400	1,000
Other leukemia	4,400	2,900	1,500	6,300	3,400	2,900
Other & unspecified primary sites	35,500	16,500	19,000	34,000	17,400	16,600

*Excludes basal and squamous cell skin cancers and in situ carcinomas except bladder. Carcinoma in situ of the breast accounts for about 30,000 new cases annually, and melanoma carcinoma in situ accounts for about 17,300 new cases annually. Basal cell and squamous cell skin cancers account for more than 900,000 new cases annually. About 2,100 nonmelanoma skin cancer deaths are included among the deaths from cancer of other and unspecified sites which are expected to occur in 1997.
Estimates of new cases are based on incidence rates from NCI SEER program 1980-1993.
American Cancer Society Surveillance Research, 1997.
Data source: NCI Surveillance, Epidemiology, and End Results Program, 1996.

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Estimated Cancer Mortality, by State, 1997*

State	Reported Mortality Rate per 100,000†	All Sites	Female Breast	Cervix	Colon & Rectum	Corpus Uteri	Lung	Melanoma	Non-Hodgkin's Lymphoma	Pancreas	Prostate	Urinary Bladder
Alabama	179	9,400	670	80	660	80	2,800	140	380	420	670	150
Alaska	171	600	60	5	50	5	190	5	10	20	40	5
Arizona	159	8,900	670	50	810	100	2,600	130	390	450	710	180
Arkansas	180	6,400	470	60	610	50	2,200	60	270	280	530	130
California	162	51,700	4,200	510	4,700	530	13,800	780	2,200	2,600	3,900	1,100
Colorado	147	6,000	520	50	590	70	1,500	90	260	360	500	130
Connecticut	166	7,000	480	20	690	50	1,800	100	320	370	520	180
Delaware	195	1,800	140	20	140	10	540	20	80	80	110	60
Dist. of Columbia	221	1,400	130	10	130	20	330	5	50	100	110	30
Florida	168	40,100	2,900	380	3,700	430	12,100	510	1,700	2,100	3,200	940
Georgia	177	12,900	950	100	1,100	150	3,900	190	390	690	960	180
Hawaii	137	1,900	110	10	220	10	490	10	100	130	140	40
Idaho	149	2,000	170	5	190	5	510	30	90	70	180	40
Illinois	181	26,500	2,200	240	2,700	260	7,100	340	1,100	1,200	1,900	530
Indiana	178	12,800	960	120	1,300	140	4,000	170	490	690	850	290
Iowa	159	6,800	590	50	770	90	1,800	90	350	280	490	180
Kansas	159	5,400	380	50	550	60	1,500	110	250	290	430	100
Kentucky	193	9,400	650	100	940	70	3,300	130	350	460	560	160
Louisiana	194	9,400	760	50	920	70	3,000	110	320	530	690	130
Maine	186	3,300	240	20	310	30	1,000	40	150	160	220	70
Maryland	190	10,400	840	100	1,100	130	3,000	110	380	480	810	200
Massachusetts	181	14,400	1,100	90	1,600	120	3,800	220	650	700	1,000	360
Michigan	177	20,500	1,500	160	2,100	260	6,100	220	860	1,000	1,600	490
Minnesota	156	8,900	720	40	860	90	2,200	100	530	420	700	150
Mississippi	181	6,000	430	70	510	20	1,700	50	200	300	510	70
Missouri	177	12,800	840	120	1,300	150	4,100	170	550	570	890	250
Montana	162	1,900	150	20	190	20	510	20	90	100	180	30
Nebraska	157	3,400	270	10	380	30	890	30	170	170	260	60
Nevada	184	3,500	260	30	310	10	1,100	60	140	160	220	50
New Hampshire	182	2,600	230	30	240	5	720	30	120	130	150	60
New Jersey	184	18,500	1,600	130	1,900	220	4,700	230	760	940	1,400	460
New Mexico	146	2,800	240	20	220	40	660	60	120	140	220	70
New York	172	38,100	3,400	400	3,900	580	10,200	410	1,800	2,100	2,600	910
North Carolina	175	16,000	1,200	110	1,500	180	4,800	230	640	760	1,300	300
North Dakota	157	1,500	120	5	150	20	310	20	90	70	170	40
Ohio	181	25,700	2,100	220	2,600	330	7,700	260	1,100	1,200	1,800	560
Oklahoma	170	7,100	480	70	680	40	2,300	100	360	340	530	150
Oregon	168	7,200	490	40	590	80	2,200	120	310	380	560	140
Pennsylvania	179	31,300	2,700	270	3,300	380	8,500	390	1,400	1,500	2,400	630
Rhode Island	179	2,400	200	20	280	20	710	30	130	90	120	70
South Carolina	178	8,000	620	80	800	70	2,400	90	260	360	630	180
South Dakota	155	1,600	140	10	160	10	400	10	50	90	140	50
Tennessee	179	11,800	910	100	1,200	110	3,800	200	480	580	780	230
Texas	170	35,300	2,800	400	3,600	350	10,800	450	1,600	1,900	2,600	620
Utah	126	2,400	200	20	230	30	460	70	140	110	240	60
Vermont	175	1,200	80	10	100	10	360	30	50	50	90	30
Virginia	179	13,200	1,100	100	1,300	150	3,700	200	520	720	980	250
Washington	165	11,000	850	60	930	100	3,200	150	450	520	810	230
West Virginia	184	4,900	320	40	490	40	1,600	70	170	200	320	130
Wisconsin	166	11,200	890	100	1,000	170	2,700	130	540	590	1,000	250
Wyoming	154	830	80	10	70	5	240	20	30	40	80	10
United States‡	173	560,000	43,900	4,800	54,900	6,000	160,400	7,300	23,800	28,100	41,800	11,700

*Excludes basal and squamous cell skin cancers and in situ carcinomas except bladder.

†Average annual mortality rate for 1989-1993, adjusted to the age distribution of the 1970 US census population. ‡State estimates may not add to US total due to rounding.

American Cancer Society Surveillance Research, 1997.

Data source: NCI Surveillance, Epidemiology, and End Results Program, 1996.

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20 Year Trends in Cancer Death Rates* per 100,000 Population, 1971-1973 to 1991-1993

Sites	Sex	Rates in 1971–1973	Rates in 1991–1993	Percent Changes	Number of Deaths 1973	Number of Deaths 1993
All Sites	Male	204.5	219.0	7%	190,487	279,375
	Female	132.0	142.0	8%	159,110	250,529
Brain	Male	4.7	5.1	9%	4,650	6,551
	Female	3.2	3.5	9%	3,661	5,442
Breast	Male	0.3	0.2	-33%	293	355
	Female	26.8	26.4	-1%	31,850	43,555
Cervix	Female	5.6	2.9	-48%	6,041	4,583
Colon & rectum	Male	25.3	22.3	-12%	22,680	28,199
	Female	20.0	15.1	-25%	24,823	29,206
Corpus uteri	Female	4.7	3.4	-28%	5,686	6,098
Esophagus	Male	5.0	6.2	24%	4,768	7,813
	Female	1.4	1.5	7%	1,723	2,637
Hodgkin's disease	Male	1.9	0.7	-63%	1,732	900
	Female	1.1	0.4	-64%	1,188	674
Kidney	Male	4.3	5.1	19%	4,004	6,358
	Female	1.9	2.3	21%	2,330	3,964
Larynx	Male	2.8	2.5	-11%	2,656	3,163
	Female	0.3	0.5	67%	388	818
Leukemia	Male	8.9	8.4	-6%	8,262	10,873
	Female	5.3	4.9	-8%	6,216	8,834
Liver	Male	3.4	4.6	35%	3,013	6,068
	Female	1.8	2.1	17%	2,116	3,995
Lung	Male	61.3	73.5	20%	59,082	92,493
	Female	12.7	32.9	159%	15,706	56,234
Melanoma	Male	2.0	3.2	60%	1,964	4,128
	Female	1.3	1.5	15%	1,465	2,584
Multiple myeloma	Male	2.8	3.8	36%	2,579	4,902
	Female	1.9	2.6	37%	2,389	4,939
Non-Hodgkin's lymphoma	Male	5.8	8.1	40%	5,473	10,458
	Female	3.9	5.3	36%	4,747	10,028
Oral cavity	Male	5.9	4.4	-25%	5,553	5,515
	Female	1.9	1.6	-16%	2,269	2,726
Ovary	Female	8.6	7.8	-9%	9,885	12,870
Pancreas	Male	11.1	10.0	-10%	10,380	12,669
	Female	6.7	7.3	9%	8,273	13,776
Prostate	Male	21.4	26.8	25%	18,830	34,865
Stomach	Male	10.4	6.6	-37%	9,178	8,229
	Female	5.0	3.0	-40%	6,020	5,621
Testis	Male	0.7	0.2	-71%	798	374
Thyroid	Male	0.4	0.3	-25%	315	398
	Female	0.5	0.4	-20%	657	732
Urinary bladder	Male	7.2	5.7	-21%	6,481	7,474
	Female	2.2	1.7	-23%	2,855	3,488

*Adjusted to the age distribution of the 1970 US census population.

Note: Even though death rates declined or remained stable, the number of deaths increased because the population over 65 has become larger and older. The US population increased 22% from 1973 to 1993.

American Cancer Society Surveillance Research, 1997.

Data source: Vital Statistics of the United States, 1993.

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BREAST CANCER

New Cases: An estimated 180,200 new invasive cases among women in the United States during 1997. About 1,400 new cases of breast cancer will be diagnosed in men in 1997. Between 1982 and 1987, breast cancer incidence rates for women increased about 4% a year but recently have leveled off at about 110 per 100,000. Most of the recent increase in rates is believed to be due to marked increases in mammography utilization, allowing the detection of early-stage breast cancers, frequently before they would become clinically apparent.

Deaths: An estimated 44,190 deaths (43,900 women, 290 men) in 1997; in women, the second major cause of cancer death. According to the most recent data, mortality rates continue to decline in white women and, for the first time, are also declining in younger African-American women. These decreases may be due to earlier detection and improved treatment.

Signs and Symptoms: The earliest sign of breast cancer is an abnormality that shows up on a mammogram before it can be felt by the woman or her health care provider. When breast cancer has grown to the point where physical symptoms exist, breast changes may include a lump, thickening, swelling, dimpling, skin irritation, distortion, retraction, scaliness, pain, tenderness of the nipple, or nipple discharge. Breast pain is very commonly due to benign conditions, and is uncommonly the first symptom of breast cancer.

Risk Factors: The risk of breast cancer increases with age. The risk is higher in the woman who has a personal or family history of breast cancer; some forms of benign breast disease; early menarche; late menopause; lengthy exposure to postmenopausal estrogens; recent use of oral contraceptives; never having children or having the first live birth at a late age; and higher education and socioeconomic status. International variability in breast cancer incidence rates correlate with variations in diet, especially fat intake, although a causal role for dietary factors has not been firmly established. Additional factors that may be associated with increased breast cancer risk and that are currently under study include pesticide and other chemical exposures, alcohol consumption, induced abortion, and physical inactivity. Exciting new research about BRCA1 and BRCA2 susceptibility genes for breast cancer is also in progress, although, general screening in the population for these genes is not yet recommended. Research is ongoing to learn more about the complex characteristics of these genes and to evaluate their contribution to the incidence of breast cancer.

A majority of women will have one or more risk factors for breast cancer. However, most risks are at such a low level that they only partly explain the high frequency of the disease in the population. To date, knowledge about risk factors has not translated into practical ways to prevent breast cancer. Since women may not be able to alter their personal risk factors, the best opportunity for reducing mortality is through early detection.

Early Detection: The value of mammography is that it can identify breast abnormalities that may be cancer *before* physical symptoms develop. Numerous studies have shown that early detection increases survival and treatment options. The Society's guidelines for early breast cancer detection (see page 29) stress mammography and physical examinations.

Most breast lumps are not cancer, but only a physician can make a diagnosis. When a woman has a suspicious lump or when a suspicious area is identified on a mammogram, diagnostic mammography can help determine whether additional tests are needed and if there are other lesions that are too small to be felt in the same or the opposite breast. *All* suspicious lumps should be biopsied for a definitive diagnosis.

Treatment: Taking into account the medical situation and the patient's preferences, treatment may involve lumpectomy (local removal of the tumor) and removal of the lymph nodes under the arm, mastectomy (surgical removal of the breast) and removal of the lymph nodes under the arm, radiation therapy, chemotherapy, or hormone therapy. Often, two or more methods are used in combination. Numerous studies have shown that, for early-stage disease, long-term survival after lumpectomy plus radiotherapy is similar to survival after simple mastectomy or mastectomy plus radiotherapy. Patients should discuss possible options for the best management of their breast cancer with their physicians. Significant advances in reconstruction techniques provide women a variety of options for breast reconstruction after mastectomy. In recent years, this has been performed most often immediately at the same time as the mastectomy. High-dose chemotherapy with bone marrow transplant or stem cell rescue is a new treatment under study for certain special cases of breast cancer.

Survival: The 5-year relative survival rate for localized breast cancer has increased from 72% in the 1940s to 97% today. If the cancer has spread regionally, however, the rate is 76%, and for women with distant metastases

Leading Sites of New Cancer Cases and Deaths—1997 Estimates*

Cancer Cases by Site and Sex		Cancer Deaths by Site and Sex	
Male	Female	Male	Female
Prostate 334,500	Breast 180,200	Lung 94,400	Lung 66,000
Lung 98,300	Lung 79,800	Prostate 41,800	Breast 43,900
Colon & rectum 66,400	Colon & rectum 64,800	Colon & rectum 27,000	Colon & rectum 27,900
Urinary bladder 39,500	Corpus uteri 34,900	Pancreas 13,500	Pancreas 14,600
Non-Hodgkin's lymphoma 30,300	Ovary 26,800	Non-Hodgkin's lymphoma 12,400	Ovary 14,200
Melanoma of the skin 22,900	Non-Hodgkin's lymphoma 23,300	Leukemia 11,770	Non-Hodgkin's lymphoma 11,400
Oral cavity 20,900	Melanoma of the skin 17,400	Esophagus 8,700	Leukemia 9,540
Kidney 17,100	Urinary bladder 15,000	Stomach 8,300	Corpus uteri 6,000
Leukemia 15,900	Cervix 14,500	Urinary bladder 7,800	Brain 6,000
Stomach 14,000	Pancreas 14,200	Liver 7,500	Stomach 5,700
All Sites 785,800	All Sites 596,600	All Sites 294,100	All Sites 265,900

*Excluding basal and squamous cell skin cancer and in situ carcinomas except bladder.
American Cancer Society Surveillance Research, 1997.

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the rate is 20%. Survival after a diagnosis of breast cancer continues to decline beyond five years. Sixty-five percent of women diagnosed with breast cancer survive 10 years, and 56% survive 15 years.

For more information about breast cancer, please inquire about the American Cancer Society publication *Breast Cancer Facts & Figures.*

Cervix (Uterus) Cancer

New Cases: An estimated 14,500 cases of invasive cervical cancer will be diagnosed in 1997. Rates have decreased steadily over the past several decades, declining from 14.2 per 100,000 in 1973 to 8.2 per 100,000 in 1993. As Pap screening has become more prevalent, carcinoma in situ of the cervix is now more frequent than invasive cancer, particularly in women under age 50.

Deaths: An estimated 4,800 cervical cancer deaths in 1997. Rates declined 48% between 1971–1973 and 1991–1993. Rates for African Americans declined more rapidly than those for whites; however, in 1993 the mortality rate for African-American women was still more than two times greater than the rate among white women.

Signs and Symptoms: Abnormal vaginal bleeding or spotting; abnormal vaginal discharge. Pain and systemic symptoms are late manifestations of the disease.

Risk Factors: Cervical cancer risk is closely linked to sexual behavior and to sexually transmitted infections with certain types of human papillomavirus. Women who have first intercourse at an early age, multiple sexual partners, or partners who have had multiple sexual partners are at increased risk of developing the disease. Other risk factors include cigarette smoking and low socioeconomic status.

Early Detection: The Pap test is a simple procedure that can be performed by a health care professional as part of

How to Estimate Cancer Statistics Locally, 1997

To obtain the estimated number of...	Multiply community population by: All Sites	Female Breast*	Colon & Rectum	Lung	Prostate*
New cancer cases	0.0052	0.0013	0.0005	0.0007	0.0026
Cancer deaths	0.0021	0.0003	0.0002	0.0006	0.0003
People who will eventually develop cancer	0.4325	0.1261	0.0589	0.0704	0.1984
People who will eventually die of cancer	0.2252	0.0353	0.0259	0.0616	0.043

*For female breast cancer multiply by female population and for prostate cancer multiply by male population.

Note: These calculations provide only a rough approximation of the number of people in a specific community who may develop or die of cancer. These estimates should be used with caution because they do not reflect the age or racial characteristics of the population, access to detection and treatment, or exposure to risk factors. Many states have cancer registries which count the number of cancers that occur in localities throughout the state. The American Cancer Society recommends using data from these registries, when it is available, to more accurately estimate local cancer statistics.

American Cancer Society Surveillance Research 1997.

Data source: NCI Surveillance, Epidemiology, and End Results Program, 1996.

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a pelvic exam. A small sample of cells is swabbed from the cervix, transferred to a slide, and examined under a microscope. This test should be performed annually with a pelvic exam in women who are, or have been, sexually active or who have reached age 18 years. After three or more consecutive annual exams with normal findings, the Pap test may be performed less frequently at the discretion of the physician.

Treatment: Invasive cervical cancers generally are treated by surgery or radiation, or by a combination of the two. In situ cancer stages, changes in the cervix may be treated by cryotherapy (the destruction of cells by extreme cold), by electrocoagulation (the destruction of tissue through intense heat by electric current), laser ablation or by local surgery.

Survival: Eighty-seven percent of cervical cancer patients survive one year after diagnosis, and 69% survive five years. When detected at an early stage, invasive cervical cancer is one of the most successfully treatable cancers with a 5-year relative survival rate of 91% for localized cancers. Whites are more likely than African Americans to have their cancers diagnosed at this early stage. Fifty-four percent of cervical cancers among white women and 39% of cancers among African-American women are diagnosed at a localized stage.

Colon and Rectum Cancer

New Cases: An estimated 131,200 cases in 1997, including 94,100 of colon cancer and 37,100 of rectal cancer. Colorectal cancers account for about 9% of new cancer diagnoses. Incidence rates have declined in recent years from a high of 53 per 100,000 in 1985 to 45 per 100,000 in 1993. This decline has been experienced primarily by whites, while incidence rates for African Americans have stabilized but have not yet begun to decline. Research has suggested that the recent decline may have been due to increased sigmoidoscopic screening and polyp removal, preventing progression of polyps to invasive cancers.

Deaths: An estimated 54,900 deaths (46,600 from colon cancer, 8,300 from rectal cancer) in 1997, accounting for about 10% of cancer deaths. Mortality rates for colorectal cancer have fallen 32% for women and 14% for men during the past 20 years, reflecting decreasing incidence rates and increasing survival rates. However, the mortality rate for African-American men continues to rise.

Signs and Symptoms: Rectal bleeding, blood in the stool, a change in bowel habits.

Risk Factors: A personal or family history of colorectal cancer or polyps, and inflammatory bowel disease have been associated with increased colorectal cancer risk. Other possible risk factors include physical inactivity, high-fat and/or low-fiber diet, as well as inadequate intake of fruits and vegetables. Recent studies have suggested that estrogen replacement therapy and nonsteroidal antiinflammatory drugs such as aspirin may reduce colorectal cancer risk.

Early Detection: Digital rectal exam, fecal occult blood test, and sigmoidoscopy are recommended by the American Cancer Society to detect colon or rectal cancer in asymptomatic patients. These tests offer the best opportunity for the diagnosis and removal of polyps, and hence the prevention of these cancers. Digital rectal exam is performed by a physician during an office visit. The American Cancer Society recommends that this exam be performed annually after age 40. The fecal occult blood test is a simple method to test feces for hidden blood. The specimen is obtained by the patient

Five-Year Relative Survival Rates by Stage at Diagnosis*

Site	All Stages %	Local %	Regional %	Distant %	Site	All Stages %	Local %	Regional %	Distant %
Brain	29	34	32	52	Melanoma	87	95	61	16
Breast (female)	84	97	76	20	Oral	53	81	42	18
Cervix	69	91	50	9	Ovary	46	92	51	25
Colon & rectum	61	91	63	7	Pancreas	4	13	5	2
Corpus uteri	84	95	66	26	Prostate	87	99	93	30
Esophagus	11	22	11	2	Stomach	21	61	23	2
Kidney	59	88	60	9	Testis	95	99	97	72
Larynx	66	84	54	40	Thyroid	95	100	94	47
Liver	6	13	8	2	Urinary bladder	81	93	49	6
Lung	14	48	18	2					

*Adjusted for normal life expectancy. This chart is based on cases diagnosed from 1986 to 1992, followed through 1993.
Data source: NCI Surveillance, Epidemiology, and End Results Program, 1996.

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had children are more likely to develop ovarian cancer than those who have. Pregnancy and the use of oral contraceptives appear to be protective against ovarian cancer. Women who have had breast cancer or have a family history of breast or ovarian cancer are at increased risk. Mutations in BRCA1 or BRCA2 have been observed in these families. Another genetic syndrome is characterized by colorectal cancer, endometrial cancer, and ovarian cancer. Certain rare genetic disorders are associated with increased risk. With the exception of Japan, industrialized countries have the highest incidence rates.

Early Detection: Periodic, thorough pelvic exams are important. The Pap test, useful in detecting cervical cancer, only rarely uncovers ovarian cancer. Transvaginal ultrasound and a tumor marker, CA 125, may assist diagnosis. Women over the age of 40 should have a cancer-related checkup every year.

Treatment: Surgery, radiation therapy, and drug therapy are treatment options. Surgery usually includes the removal of one or both ovaries and fallopian tubes (salpingo-oophorectomy), and the uterus (hysterectomy). In some very early tumors, only the involved ovary will be removed, especially in young women who wish to have children. In advanced disease, an attempt is made to remove all intraabdominal disease, to enhance the effect of chemotherapy.

Survival: Seventy-eight percent of ovarian cancer patients survive one year after diagnosis; the 5-year relative survival rate is 46%. If diagnosed and treated early, the rate is 92%; however, only about 24% of all cases are detected at the localized stage. Five-year relative survival rates for women with regional and distant disease are 51% and 25%, respectively.

Pancreas Cancer

New Cases: An estimated 27,600 new cases in the United States in 1997. There is some evidence of a slightly more frequent incidence of pancreatic cancer in African Americans than in white Americans. Among men, incidence rates have been declining since the early 1970s.

Deaths: An estimated 28,100 deaths in 1997. Since the early 1970s, mortality rates among white Americans have been decreasing slightly while mortality among African Americans has been increasing.

Signs and Symptoms: Cancer of the pancreas generally occurs without symptoms until it is in advanced stages.

Risk Factors: Very little is known about what causes the disease or how to prevent it. Risk increases after age 50, with most cases occurring between ages 65 and 79. Smoking is a risk factor; incidence rates are more than twice as high for smokers as for nonsmokers. Some studies have suggested associations with chronic pancreatitis, diabetes, or cirrhosis. In countries where the diet is high in fat, pancreatic cancer rates are higher.

Early Detection: At present, only surgical biopsy yields a certain diagnosis, and because of the "silent" course of the disease, the need for biopsy is likely to be obvious only after the disease has advanced. Researchers are focusing on ways to diagnose pancreatic cancer before symptoms occur. Ultrasound imaging and computerized tomography scans are under investigation.

Treatment: Surgery, radiation therapy, and anticancer drugs are treatment options, but generally have little influence on the outcome. Clinical trials with several new agents could suggest improved survival and should be considered an option.

Survival: For all stages combined, the 1-year relative survival rate is only 20%, and the 5-year rate is 4%.

Trends in Cancer Survival by Race and Year of Diagnosis, United States, 1960–1992

	White					African American				
	Relative 5-Year Survival Rate (Percent)					Relative 5-Year Survival Rate (Percent)				
Site	1960-63	1970-73	1974-76	1980-82	1986-92	1960-63	1970-73	1974-76	1980-82	1986-92
All sites	39	43	50	52	59*	27	31	39	40	44*
Brain	18	20	22	25	29*	19	19	27	31	32
Breast (female)	63	68	75	77	85*	46	51	63	66	70*
Cervix	58	64	69	68	71	47	61	64	61	56*
Colon & rectum	NA	NA	50	55	62*	NA	NA	45	46	53*
Corpus uteri	73	81	89	83	86*	31	44	61	54	56
Esophagus	4	4	5	8	12*	1	4	4	5	8*
Hodgkin's disease	40	67	72	75	82*	NA	NA	69	72	72
Kidney	37	46	52	51	60*	38	44	49	55	55
Larynx	53	62	66	69	68	NA	NA	58	59	52
Leukemia	14	22	35	39	43*	NA	NA	31	33	34
Liver	NA	NA	4	4	7*	NA	NA	1	2	5*
Lung	8	10	12	14	14*	5	7	11	12	11
Melanoma	60	68	80	83	88*	NA	NA	66†	60†	72†
Multiple myeloma	12	19	24	28	28*	NA	NA	27	29	30
Non-Hodgkin's lymphoma	31	41	47	52	52*	NA	NA	48	51	44
Oral	45	43	55	55	55	NA	NA	36	31	33
Ovary	32	36	36	39	46*	32	32	40	39	40
Pancreas	1	2	3	3	4*	1	2	3	5	5*
Prostate	50	63	68	75	89*	35	55	58	65	73*
Stomach	11	13	15	16	19*	8	13	17	19	20
Testis	63	72	79	92	95*	NA	NA	76†	90†	86†
Thyroid gland	83	86	92	94	96*	NA	NA	88	95	90
Urinary bladder	53	61	74	79	82*	24	36	47	59	60*

Note: All sites category excludes basal and squamous cell skin cancers and in situ carcinomas except bladder.
*The difference in rates between 1974-76 and 1986-92 is statistically significant ($p < 0.05$).
†The standard error of the survival rate is greater than 5 percentage points.
NA = not available.
Data source: End Results Group, 1960-1973; NCI Surveillance, Epidemiology, and End Results Program, 1996.

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physician. Melanomas often start as small, mole-like growths that increase in size and change color. A simple ABCD rule outlines the warning signals of melanoma: A is for asymmetry. One half of the mole does not match the other half. B is for border irregularity. The edges are ragged, notched, or blurred. C is for color. The pigmentation is not uniform or intensely black. D is for diameter greater than 6 millimeters. Any sudden or progressive increase in size should be of particular concern.

Treatment: There are five methods of treatment for basal cell cancer and squamous cell cancer: surgery (used in 90% of cases), radiation therapy, electrodessication (tissue destruction by heat), cryosurgery (tissue destruction by freezing) and laser therapy for early skin cancer. For malignant melanoma, the primary growth must be adequately excised, and it may be necessary to remove nearby lymph nodes. Removal and microscopic examination of all suspicious moles is essential. Advanced cases of melanoma are treated according to the characteristics of the case.

Survival: For basal cell or squamous cell cancers, cure is highly likely if detected and treated early. Malignant melanoma can spread to other parts of the body quickly; however, when detected in its earliest stages, and with proper treatment, it is highly curable. The 5-year relative survival rate for patients with malignant melanoma is 87%. For localized malignant melanoma, the 5-year relative survival rate is 95%; and rates for regional and distant disease are 61% and 16%, respectively. About 82% of melanomas are diagnosed at a localized stage.

RACIAL AND ETHNIC PATTERNS

Cancer affects Americans of all racial and ethnic groups and kills more people annually than AIDS, accidents, and homicide *combined*. In 1997 alone, the American Cancer Society estimates that 560,000 cancer deaths will occur, 483,500 among whites, 62,200 among African Americans, and 14,300 among Americans of other races. Many of these deaths could be prevented through increased cancer prevention and screening, and improved access to medical care.

Information on racial and ethnic differences in cancer occurrence can help focus our efforts in the war against cancer. In this new special section of *Cancer Facts & Figures*, we present information on racial and ethnic patterns in the occurrence of cancer, risk factors, and screening examinations, in an effort to promote a better understanding of the cancer burden in the United States.

ALL CANCERS COMBINED

Although cancer is common in Americans of all racial and ethnic groups, the rate of cancer occurrence (often called the incidence rate) varies considerably from group to group. Among men, cancer rates are highest among African-Americans, followed by whites whose rates are about 16% lower. Cancer incidence rates for American Indian men in New Mexico are the lowest, and rates among Asian men, in particular, Chinese, Filipinos, and Koreans, are also low. Among women, the differences in rates across racial and ethnic groups are less pronounced than among men. Rates are highest among Alaska-Native women, followed closely by white women. Cancer rates are lowest for American Indian women from New Mexico and Koreans, but are also low for Chinese and Filipino women.

GROUP PROFILES

African Americans

The Population: The US census refers to African Americans as blacks and defines them as "persons whose lineage includes ancestors who originated from any of the black racial groups of Africa." The majority of African Americans are descendants of slaves who were transported from Africa to the US and the Caribbean during the 17th through the 19th centuries. However, an increasing proportion of this population is comprised of either new immigrants or their first or second generation descendants. African Americans comprise the second largest racial group in the US. According to the 1990 census, there are approximately 30 million African Americans in the US, accounting for about 12% of the population.

Cancer Incidence: The leading cancer sites for African-American men during 1988-1992 were prostate, lung, colon and rectum, oral cavity, and stomach. African-American men have a higher overall cancer incidence rate than any other racial or ethnic group in the US. They also have higher incidence rates for cancers of the prostate, lung, and oral cavity than those for other groups.

The leading cancer sites for African-American women include breast, colon and rectum, lung, corpus uteri, and cervix uteri. Rates for cancers of the lung, and colon and rectum are higher among African-American women than among women of any racial or ethnic group other than Alaska Natives.

Risk Factors, Screening, and Access to Health Care: Obesity is a major health problem for African-American men and women. According to data from the Behavioral Risk Factor Surveillance System, 37.7% of African-American women and 28.4% of African-American men are overweight. African-American women are more likely to be overweight than women of other races or ethnicities.

High smoking rates and low participation in breast screening exams are also major contributing factors to health problems among African Americans. According to the most recent data, 33.9% of African-American men and 21.8% of African-American women report that they currently smoke. Only 54.9% of African-American women over 50 report having had a mammogram and a clinical breast exam within the previous two years.

Asians and Pacific Islanders

The Population: According to the 1990 US census, a person is an Asian or Pacific Islander if he or she has "origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands." This group is very diverse, including individuals from at least 24 ethnic populations who speak more than 30 major languages or dialects. Due to immigration and high birthrates, the Asian and Pacific Islander population is growing rapidly. The 1990 US census counted 7.5 million Asians and Pacific Islanders living in the US, comprising about 3% of the population. This percentage is expected to increase to 4.5% by the year 2000 and to 10.7% by 2050.

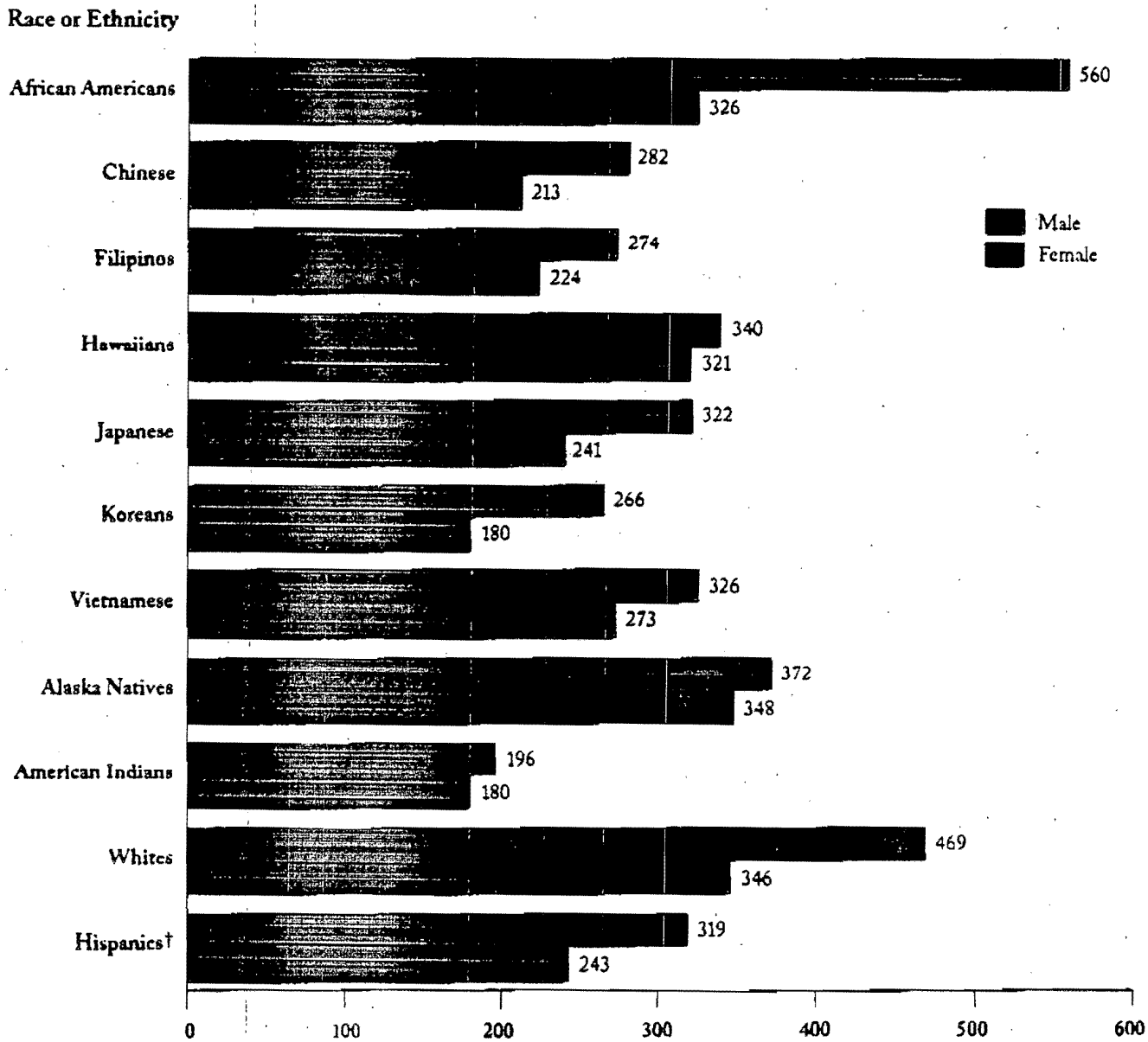
Cancer Incidence: Cancer incidence rates vary considerably among subgroups of the Asian and Pacific Islander

population. However, for 1988–1992, information on cancer incidence is only available for Chinese, Filipino, Hawaiian, Japanese, Korean, and Vietnamese men and women. Even among these six subpopulations there is variation in the leading cancer sites. Among men, the top three sites among Chinese, Filipinos, Hawaiians, and Japanese are prostate, lung, and colon and rectum; among Koreans they are lung, stomach, and colon and rectum; and among Vietnamese, they are lung, liver, and prostate. Stomach cancer rates among Korean men and liver cancer rates among Vietnamese men are higher than those among men of any other racial or ethnic group.

The top three cancer sites among Asian and Pacific Islander women are breast, lung, and colon and rectum with the following exceptions. The stomach is a leading cancer site among Japanese and Korean women, and the cervix is a leading cancer site among Vietnamese women. Cervical cancer incidence rates among Vietnamese women are more than two and a half times higher than rates for any other racial or ethnic group.

Risk Factors, Screening, and Access to Health Care: Because the Asian and Pacific Islander population is very diverse, risk factor and screening prevalence rates would be expected to vary considerably among

Cancer Incidence Rates* for All Sites Combined by Race, Ethnicity, and Sex, US, 1988–1992



*Incidence rates are per 100,000 and are age-adjusted to the 1970 US standard population.
†Persons of Hispanic origin may be of any race.
Data source: NCI Surveillance, Epidemiology, and End Results Program, 1996.

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Incidence Rates* for the Five Most Frequently Diagnosed Cancers by Race, Ethnicity, and Sex, US, 1988–1992

Males

African Americans	Chinese	Filipinos	Hawaiians	Japanese	Koreans	Vietnamese	Alaska Natives	American Indians	Whites	Hispanics†
Prostate 180.6	Lung 52.1	Prostate 69.8	Lung 89.0	Prostate 88.0	Lung 53.2	Lung 70.9	Lung 81.1	Prostate 52.5	Prostate 134.7	Prostate 89.0
Lung 117.0	Prostate 46.0	Lung 52.6	Prostate 57.2	Colon & rectum 64.1	Stomach 48.9	Liver 41.8	Colon & rectum 79.7	Colon & rectum 18.6	Lung 76.0	Lung 41.8
Colon & rectum 60.7	Colon & rectum 44.8	Colon & rectum 35.4	Colon & rectum 42.4	Lung 43.0	Colon & rectum 31.7	Prostate 40.0	Prostate 46.1	Kidney 15.6	Colon & rectum 56.3	Colon & rectum 38.3
Oral 20.4	Liver 20.8	Non-Hodgkin's lymphoma 12.9	Stomach 20.5	Stomach 30.5	Liver 24.8	Colon & rectum 30.5	Stomach 27.2	Lung 14.4	Urinary bladder 31.7	Urinary bladder 15.8
Stomach 17.9	Stomach 15.7	Liver 10.5	Non-Hodgkin's lymphoma 12.5	Urinary bladder 13.7	Prostate 24.2	Stomach 25.8	Kidney‡ 19.0	Liver‡ 13.1	Non-Hodgkin's lymphoma 18.7	Stomach 15.3

Females

African Americans	Chinese	Filipinos	Hawaiians	Japanese	Koreans	Vietnamese	Alaska Natives	American Indians	Whites	Hispanics†
Breast 95.4	Breast 55.0	Breast 73.1	Breast 105.6	Breast 82.3	Breast 28.5	Cervix 43.0	Breast 78.9	Breast 31.6	Breast 111.8	Breast 69.8
Colon & rectum 45.5	Colon & rectum 33.6	Colon & rectum 20.9	Lung 43.1	Colon & rectum 39.5	Colon & rectum 21.9	Breast 37.5	Colon & rectum 67.4	Ovary 17.5	Lung 41.5	Colon & rectum 24.7
Lung 44.2	Lung 25.3	Lung 17.5	Colon & rectum 30.5	Stomach 15.3	Stomach 19.1	Lung 31.2	Lung 50.6	Colon & rectum 15.3	Colon & rectum 38.3	Lung 19.5
Corpus uteri 14.4	Corpus uteri 11.6	Thyroid 14.6	Corpus uteri 23.9	Lung 15.2	Lung 16.0	Colon & rectum 27.1	Kidney‡ 16.7	Gallbladder 13.2	Corpus uteri 22.3	Cervix 16.2
Cervix 13.2	Ovary 9.3	Corpus uteri 12.1	Stomach 13.0	Corpus uteri 14.5	Cervix 15.2	Stomach 25.8	Cervix 15.8	Corpus uteri 10.7	Ovary 15.8	Corpus uteri 13.7

*Incidence rates per 100,000, age-adjusted to 1970 US standard population.
†Persons of Hispanic origin may be of any race.
‡Rate is based on fewer than 25 cases and may be subject to greater variability than the other rates which are based on larger numbers.
Data source: NCI Surveillance, Epidemiology, and End Results Program, 1996.

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subpopulations of this group. Unfortunately, data on national patterns of risk factors and screening for subpopulations of Asians and Pacific Islanders are not currently available to prove or disprove this hypothesis. Among all Asian and Pacific Islander groups combined, prevalence rates for tobacco use, chronic alcohol consumption, and obesity are lower than those for other racial or ethnic groups. However, the prevalence of these risk factors could be further reduced through targeted intervention efforts. In addition, cancer screening rates among Asian and Pacific Islander women could be improved. In 1991–1992, Asian and Pacific Islander women had lower rates of Pap test screening and mammography and clinical breast examination than any other US racial or ethnic population.

Native Americans

The Population: The US census refers to Native Americans as American Indians and Alaska Natives, and defines them as "any person having origins in the original peoples of North America, and who maintains cultural identification through tribal affiliations or community recognition." American Indians and Alaska Natives represent more than 500 tribes each with unique cultural, genetic, and sociodemographic characteristics. In 1990, the US census counted about 2.1 million American Indians and Alaska Natives living in all 50 States, approximately one-third on reservations and half in urban centers. Native Americans comprised about 0.8% of the US population in 1990.

Cancer Incidence: Information on cancer incidence among Native Americans is only available for American

Percent of US Adults with Selected Self-Reported Risk Factors, by Race, Ethnicity, and Sex, US 1991–1992

	% Men					% Women				
Risk Factor	African Americans	Asians and Pacific Islanders	Native Americans	Whites	Hispanics*	African Americans	Asians and Pacific Islanders	Native Americans	Whites	Hispanics*
Current tobacco use[1]	33.9	20.4	53.7	28.0	24.3	21.8	7.5	33.1	24.7	15.2
Chronic alcohol consumption[2]	4.3	2.3	6.9	6.7	5.9	0.7	†	†	1.1	0.8
Overweight[3]	28.4	10.8	33.8	24.8	23.8	37.7	10.1	30.3	21.7	26.5
Lack of health care plan[4]	22.2	17.5	33.2	15.1	35.5	20.8	15.7	24.8	12.5	32.6
Pap test within the past 2 years[5]	—	—	—	—	—	66.1	58.4	61.2	62.3	63.4
Mammography and clinical breast exam within the preceding 2 years, women 50 and older[5]	—	—	—	—	—	54.9	48.5	60.7	57.7	55.0

*Persons of Hispanic origin may be of any race.

† Unstable estimate based on less than 50 observations.

[1]Data source: National Health Interview Survey, US, 1994. Persons who have ever smoked 100 cigarettes and who are current smokers.

[2]Data source: Behavioral Risk Factor Surveillance System, 1991-1992. Persons who consumed 60 or more drinks during the past month.

[3]Data source: Behavioral Risk Factor Surveillance System, 1991-1992. Body Mass Index (BMI) 27.3 or greater in women or 27.8 or greater in men.

[4]Data source: Behavioral Risk Factor Surveillance System, 1991-1992. No coverage by insurance, HMO, or government plan, such as Medicare or Medicaid.

[5]Data source: Behavioral Risk Factor Surveillance System, 1991-1992.

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Indians from New Mexico and Alaska Natives. The top three cancer sites for Alaska Native men are lung, colon and rectum, and prostate, while the leading sites for American Indian men from New Mexico are prostate, colon and rectum, and kidney. Colorectal cancer rates among Alaska Native men and kidney cancer rates among American Indian men are higher than those for any other racial or ethnic group. The liver cancer rate among American Indians is also quite high, but this rate may not be very accurate, due to the small number of liver cancer cases occurring in this racial group.

Among Alaska Native women, the leading cancer sites are breast, colon and rectum, and lung, while among American Indian women from New Mexico, breast, ovary, and colon and rectum, are the leading sites. Alaska Native women have higher rates of colorectal cancer and lung cancer than any other racial or ethnic group, and American Indian women have very high rates of ovarian and gallbladder cancers.

In general, the cancer rates we have presented for American Indians are lower than those for other racial or ethnic groups. It is not known whether these low rates are accurate, whether they are representative of American Indians from New Mexico but not other areas, or whether they are undercounts of the true incidence rate. Data on a larger cross-section of the American Indian population are needed to more completely evaluate the cancer status of this group.

Risk Factors, Screening, and Access to Health Care: Native Americans have very high rates of exposure to cancer risk factors, in particular cigarette smoking. According to data from the 1994 National Health Interview Survey, 53.7% of Native-American men and 33.1% of Native-American women reported that they currently smoke. Smoking rates for Native-American men are over 50% higher than rates among men in other racial and ethnic groups. In addition to cancer risk factors, access to health care is also a problem for Native Americans, who are second only to Hispanics in their lack of health care coverage: 33.2% of Native-American men and 24.8% of Native-American women reported having no health care plan in 1991–1992.

Whites

The Population: Whites are defined by the US census as "persons having origins in any of the original peoples of Europe, North Africa, or the Middle East." Whites are by far the largest racial group in the US, and health care programs historically have been targeted toward them. In 1990, the US census counted about 209 million whites, comprising about 84% of the US population.

Cancer Incidence: The leading cancers among white men are prostate, lung, colon and rectum, urinary bladder, and non-Hodgkin's lymphoma. White men have higher urinary bladder cancer incidence rates than men of any other racial or ethnic group—almost two times higher than Hispanic men who have the second highest rates. The leading cancer sites among white women are breast, lung, colon and rectum, corpus uteri, and ovary. Breast cancer rates among white women are higher than those

for women of any other racial or ethnic group. Since most Americans are whites, the leading cancer sites for whites are also the leading sites for the US as a whole.

Risk Factors, Screening, and Access to Health Care: Although whites do not have higher prevalence rates for tobacco use, chronic alcohol consumption, or obesity than other racial and ethnic groups, reduced exposure to these risk factors could help to reduce overall cancer incidence rates. Among white women, rates of Pap test screening and mammography screening with clinical breast exam are in the same range as those for other racial and ethnic groups. White men and women are more likely to have a health care plan than individuals in other racial or ethnic groups.

Hispanics

The Population: The US Census defines Hispanics as "persons of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race." The term "Latino" is also often used to describe individuals in this group. The 1990 census counted 22.4 million Hispanics, comprising about 9% of the US population. Due to high birth and immigration rates, the Hispanic population is growing rapidly. According to US census projections, by the year 2010, Hispanics will surpass non-Hispanic African Americans as the largest US racial or ethnic group, and by the year 2050, 22.7% of the US population are expected to be Hispanic. There are Hispanics in every racial group. In 1990, the US census reported that 91.3% of the Hispanic population was white, 5.4% African American, 1.2% Native American, and 2.1% Asian and Pacific Islander.

Cancer Incidence: The leading cancer sites for Hispanic men and women are the same as those for whites: prostate, breast, lung, and colon and rectum. This is not surprising since most Hispanics are white. Incidence rates among Hispanics for each of these cancers, however, are at least 30% lower than rates for whites. Other cancers commonly diagnosed among Hispanics include cancers of the urinary bladder and stomach in men and cancers of the uterine cervix and corpus in women. Cervical cancer rates among Hispanic women are highest of any group other than Vietnamese women.

Risk Factors, Screening, and Access to Health Care: The most striking difference between Hispanics and non-Hispanics with respect to their risk factor and health care status is that Hispanic men and women are about two and a half times more likely than non-Hispanic men and women to report having no health care plan. A 1986 survey suggested that this difference might be because of the large number of Hispanics who are employed as farm workers or in service occupations where health insurance is not always offered as a benefit. Despite this deficit in health care coverage, Hispanic women are about as likely as non-Hispanic women to have had a recent Pap test or mammogram and clinical breast exam. The prevalence of chronic alcohol consumption and of obesity is similar in Hispanics and non-Hispanics.

Limitations and Future Challenges

Some of the differences in cancer incidence rates and risk factor and screening prevalences among racial and ethnic groups may be due to factors associated with social class rather than race or ethnicity. Poverty levels vary considerably by race and ethnicity, with 11% of whites, 32% of African Americans, 32% of Native Americans, 12% of Asians, and 28% of Hispanics, living in poverty in 1990. Social class, more than race has been shown to predict a person's chance for a good education, occupation, income, and living conditions—all related to a person's cancer risk profile. Unfortunately, national data is not available to evaluate the impact of social class on cancer risk.

A second area of concern relates to the accuracy of the available statistics. The small size of many non-white population groups and the methods used to collect data may yield counts of cancer cases, risk factors, and screening examinations that are too high, too low, or simply unrepresentative of the group as a whole.

Despite these limitations, the information that we have presented provides a starting point for future cancer control efforts. Only when the health needs of all races and ethnicities are considered can we develop the prevention and screening programs necessary to reduce the impact of cancer on all Americans.

Additional Information

More detailed information on cancer in specific racial and ethnic groups may be found in the following publications:

1. American Cancer Society. *Cancer Facts and Figures for African Americans.* Atlanta, GA: American Cancer Society, 1996.

2. Burhansstipanov L, Dresser CM. Native American Monograph No. 1: *Needs of American Indians and Alaska Natives.* National Cancer Institute. NIH Publication No. 93-3603, 1993.

3. Centers for Disease Control and Prevention. *Chronic Disease in Minority Populations.* Atlanta: Centers for Disease Control and Prevention, 1992.

4. Miller BA, Kolonel LN, Bernstein L, et al. (eds). *Racial/Ethnic Patterns of Cancer in the United States 1988-1992.* National Cancer Institute. NIH pub. No. 96-4104. Bethesda, MD, 1996.

5. Wingo PA, Bolden S, Tong T, et al. *Cancer Statistics for African Americans, 1996. CA—A Cancer Journal for Clinicians* 1996;46:113-125.

SEER CANCER STATISTICS REVIEW, 1973-1994

NATIONAL INSTITUTES OF HEALTH
National Cancer Institute

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ADDITIONAL COMMENTS:

SEER DATA on Cervical Cancer

BACKGROUND AND DATA SOURCES

The primary measures associated with assessing the impact of cancer in the general population are the number of new cases per year per 100,000 persons (incidence rate), the number of deaths per 100,000 persons (mortality rate), and a determination of the proportion of patients alive at some point subsequent to the diagnosis of their cancer (survival rate). All three measures are included in this report using data from the Surveillance, Epidemiology, and End Results (SEER) Program based within the Cancer Control Research Program at the National Cancer Institute (NCI) and cancer mortality data provided by the National Center for Health Statistics (NCHS) for the entire United States (U.S.). All incidence and mortality rates in this report are age-adjusted to the 1970 United States standard million (see Appendix) unless otherwise specified. Age-adjustment minimizes the effect of a difference in age distributions when comparing rates.

The SEER Cancer Statistics Review (CSR) containing the most recent cancer incidence, mortality and survival statistics is made available by NCI annually. Since 1996, the CSR has been available electronically on the SEER Home Page, http://www-seer.ims.nci.nih.gov under "Publications." The WEB page allows for the more timely distribution of the CSR. This CSR includes incidence, mortality and survival data from 1973 through 1994, the most recent year for which complete data are available. Incidence data for 1994 appear to be 98 to 99 percent complete. Therefore, caution must be exercised when comparing rates for 1994 with those for previous years. Data are presented for a wide spectrum of cancers. The scope and purpose of this review are consistent with a report to the Senate Appropriations Committee (Breslow, 1988) which recommended that a broad profile of cancer be presented to the American public on a routine basis.

Incidence and survival data: The National Cancer Act of 1971 mandated the collection, analysis and dissemination of data useful in the prevention, diagnosis and treatment of cancer. This mandate led to the establishment of the SEER Program. A continuing project of the NCI, the SEER Program collects cancer data on a routine basis from designated population-based cancer registries in various areas of the country. Trends in cancer incidence, mortality and patient survival in the United States are derived from this database.

A sequel to two earlier NCI programs--the End Results Program and the Third National Cancer Survey--the SEER Program was initiated in several geographic areas of the United States and its territories, with case ascertainment beginning with January 1, 1973 diagnoses. The initial SEER reporting areas were the states of Connecticut, Iowa, New Mexico, Utah, and Hawaii and the metropolitan areas of Detroit, Michigan; San Francisco-Oakland, California; and the Commonwealth of Puerto Rico.

In 1974-1975, the program was expanded to include the metropolitan area of New Orleans, Louisiana, the thirteen-county Seattle-Puget Sound area in the State of Washington and the metropolitan area of Atlanta, Georgia. New Orleans participated in the program only through the 1977 data collection year. In 1978 ten predominantly black rural counties in Georgia were added. American Indian residents of Arizona were added in 1980. In 1983, four counties in New Jersey were added with coverage retrospective to 1979. New Jersey and Puerto Rico participated in the program only until the end of the 1989 reporting year. Two areas of California, Los Angeles County and the San Jose-Monterey area (Monterey, San Benito, Santa Clara and Santa Cruz Counties) began reporting with 1992 diagnoses. Both population-based cancer registries began data collection earlier than 1992 and they have provided earlier data from 1988 through 1991 for inclusion in the CSR. The incidence trends and survival data for this report are from five States: Connecticut, Hawaii, Iowa, New Mexico, and Utah and four metropolitan areas: Detroit SMSA, Atlanta SMSA, San Francisco-Oakland SMSA, and Seattle-Puget Sound (Fig. I-1). Incidence rates by SEER area including Los Angeles and San Jose-Monterey are shown for the most recent 5-year period along with area-specific mortality in each section.

Data from the nine or eleven SEER geographic areas used in this report represent an estimated 9.5 or 13.9 percent of the United States population, respectively. By the end of 1994, the database contained

information on over 2 million cases diagnosed since 1973; currently over 150,000 new cases are accessioned yearly.

Areas were selected primarily for their ability to operate and maintain a population-based cancer reporting system and for their epidemiologically significant population subgroups. With respect to selected demographic and epidemiologic factors, they are reasonably representative subsets of the United States population.

The goals of the SEER Program are:

1. Assembling and reporting, on a periodic basis, estimates of cancer incidence and mortality in the United States.

2. Monitoring annual cancer incidence trends to identify unusual changes in specific forms of cancer occurring in population subgroups defined by geographic and demographic characteristics.

3. Providing continuing information on changes over time in the extent of disease at diagnosis, trends in therapy, and associated changes in patient survival.

4. Promoting studies designed to identify factors amenable to cancer control interventions, such as: a) environmental, occupational, socioeconomic, dietary, and health related exposures; b) screening practices, early detection and treatment; and c) determinants of the length and quality of patient survival.

The SEER Program is conducted under contract with nonprofit, medically oriented organizations having statutory responsibility for registering diagnoses of cancer among residents of their respective geographic coverage areas. Each contractor maintains a cancer information reporting system; abstracts records for resident cancer patients seen in every hospital in and outside the coverage area; abstracts all death certificates on which cancer is listed as a cause of death for residents dying in and outside the coverage area; searches records of private laboratories, radiotherapy units, nursing homes and other health services units which provide diagnostic service to ensure complete ascertainment of cases; registers all in situ and malignant neoplasms with the exception of certain histologies for cancer of the skin; records data on all newly diagnosed cancers, including selected patient demographics, primary site, morphology, diagnostic confirmation, extent of disease, and first course of cancer-directed therapy; provides active follow-up on all living patients except for those with in situ cancer of the cervix uteri; maintains confidentiality of patient records; submits a computer tape to NCI twice each year containing data on all reportable diagnoses of cancer which were made in residents of the coverage area. In situ cancers of the cervix uteri are not reportable to SEER beginning with 1996 diagnoses. Since 1992, the SEER program has coded site and histology by the International Classification of Diseases for Oncology, second edition (ICD-O-2) (Percy et al, 1990). All cases before 1992 were machine converted to ICD-O-2. The primary site groupings used for incidence are found in the Appendix. Follow-up rates are also in the Appendix.

Mortality data: A public use tape containing information on all deaths occurring in the United States by calendar year is obtained annually from the National Center for Health Statistics (NCHS). Information on each death includes age at death, sex, geographic area of residence, underlying and contributing causes of death. Only the underlying cause of death was used in the calculation of mortality rates. Numbers and the numerators for mortality rates for the SEER geographic areas, for each state and for the total U.S. are obtained from these tapes. A list of the mortality site groupings used in this publication is in the Appendix.

Number of estimated cancers and deaths in 1997: Projections of the number of cancer cases and number of cancer deaths in the United States for 1997 have been obtained from the American Cancer Society (ACS). The ACS projected incidence to 1997 based on incidence rates from SEER for 1979-93 and applied by the ACS to the 1997 estimated total U.S. population (Parker et al, 1997).

Population data: Population estimates are obtained each year from the U.S. Bureau of the Census. This year, revised estimates of the populations of U.S. counties were obtained by five-year age group (0-4, 5-9,..., 85 and over), sex, and race (including white and black) for July 1, 1994. SEER makes county estimates for each state available on the SEER Home Page (http://www-seer.ims.nci.nih.gov) for race (whites, blacks, non-white), 5-year age group, sex, and year of diagnosis (each year 1973 to 1994). Additional estimates can be obtained from the U.S. Census Bureau Home Page.

U.S. Bureau of the Census (BOC) population estimates for Hawaii were altered according to independent estimates developed from sample survey data collected by the Health Surveillance Program (HSP) of the Hawaii Department of Health. For Hawaii, the all races and black populations are the same as those sent by the BOC. Proportions of the population by different racial groups from the HSP were used to generate estimates for whites, etc. Since the HSP survey was for all of Hawaii and not by county, population estimates were not broken down by county. The white population estimates for Hawaii provided by the BOC are generally larger than those generated by the HSP. Since whites in Hawaii account for less than two percent of the total white population represented by the SEER reporting areas, white incidence rates for the entire SEER Program are not noticeably affected. Procedures for calculating rates by race for Hawaii are currently under review.

LONG-TERM TRENDS, 1950-1994

While many cancer trends have inconsistent patterns over time, i.e. at some times increasing and at other times decreasing, the more consistent trends become even more evident when examined over a longer period of time. Trends in cancer mortality from 1950 to 1994 are summarized by age for all cancers combined, excluding and including lung cancer (Table I-2). These mortality figures are based on the experience in the total United States.

Summaries of long-term trends in cancer incidence, mortality and survival are outlined in Table I-3. The table shows the estimated number of cancer cases and the reported number of cancer deaths for 1994; the next four columns show incidence and mortality changes over the 45-year time period from 1950 to 1994. Both the total percent change and the estimated annual percent change for incidence were based on incidence data from the five geographic areas for which data are available for each of three time periods, around 1950, 1969-71 and 1973-74 to 1994. Due to the limited availability of incidence data from the early time periods and the change in the composition of the non-white population over time, the incidence trends are presented for whites only. The estimates for children are for children of all races combined in Connecticut only. Mortality data are for the total United States and are for whites only for comparability to the incidence data. The last two columns display five-year relative survival figures for patients diagnosed during two time periods, 1950-54 and 1986-93 and are based on information from the End Results program for 1950-54 and SEER for 1986-93.

Caution should be exercised when interpreting these statistics. Evaluating trends over such a long period of time may hide recent changes in the trends. In addition, the straight line model fit to the log of the incidence and mortality rates and used to calculate the estimated annual percentage change may be inappropriate if the trend has changed directions or if the rate of change in rates has changed dramatically.

SUMMARY TABLES

While there are detailed tables in separate sections for each of the major cancer sites, information on some of the more rare cancers can be found in the summary tables of section I. For a detailed list of primary sites, the summary tables provide incidence and mortality rates for the most recent 5-year period, trends (percent change and estimated annual percent change) from 1973 to the most recent year, median age at diagnosis, median age at death, and survival rates. The information is provided by race (all races, whites, blacks) and by sex.

YEARS OF LIFE LOST DUE TO PREMATURE DEATH FROM VARIOUS CAUSES

Mortality rates alone give an incomplete picture of the burden deaths impose on the population. Another measure which adds a different dimension is the years of life lost due to premature death from a particular cause of death. This provides some indication of the extent to which life is cut short by a particular cause or disease.

This measure is estimated by linking sex-specific life table data to each death for a particular age. The life table permits a determination of the number of additional years a person would be expected to live at any given age. In this report, the ages used in the calculation were in five-year groups with the remaining years of life left averaged over the five ages within each age group. These years of life lost are summed over all deaths due to a particular cause yielding the estimate of the person-years of life lost (PYLL). Also presented is the average years of life lost (AYLL), obtained by dividing the PYLL by the number of deaths. Both of these measures can be calculated for any cause of death.

CANCER PREVALENCE

There are different ways to define cancer prevalence. It could be the number of people who currently have cancer. It could also be the number of people who have ever had a particular cancer. Long-term incidence and survival rates from the State of Connecticut back to 1940 were used to estimate age-specific prevalence rates for Connecticut for a recent year. The age-specific prevalence rates for Connecticut were applied to the total U.S. population to estimate the number of Americans who were (will be) alive at a specific point in time who were ever diagnosed with invasive cancer (but including in situ bladder cancer). These prevalence estimates are an attempt to quantify the number of persons in the U.S. who have ever had a diagnosis of cancer (i.e., history of cancer). Prevalence estimates in this section were calculated based on Feldman (1986). There are several studies currently underway to evaluate different methods of calculating prevalence and the reliability of using data from 9 SEER areas back to 1973 or data only for the State of Connecticut back to 1940. Caution should be used in interpreting prevalence estimates.

PROBABILITY OF BEING DIAGNOSED WITH OR DYING FROM CANCER

Tables in the Cancer Statistics Review present, for selected cancers, the probability (expressed as a percent) of an individual of specified age being diagnosed with the specified cancer within ten, twenty or thirty years and within their total remaining lifetime. Lifetime risks of being diagnosed with cancer and lifetime risks of dying from cancer also appear (as percents) in the tables.

Lifetime and interval risks of being diagnosed with cancer: The probability of being diagnosed with cancer is computed by applying cross-sectional age-specific 1992-94 incidence and mortality rates from the SEER areas to a hypothetical cohort of individuals. This hypothetical cohort, consisting of an arbitrarily specified number of live births (e.g., 10,000,000), is considered at risk for two mutually exclusive events: 1) developing the specified cancer; and 2) death due to other causes without the specified cancer. Thus a standard multiple decrement life table is derived (with five-year age intervals up to age 94 and a 95+ interval) using these two types of events. In each age interval we start with the number alive and free of the specified cancer at the beginning of the interval, and subtract out the number who develop the specified cancer and the number who die of other causes among the cancer free. The lifetime risk of being diagnosed with the specified cancer is derived by summing all cancer cases from age 0 through 95+ and dividing by 10,000,000. This calculation does not assume an individual lives to any particular age, rather it is the sum over all age intervals of the probability of living to the beginning of each age interval times the probability of developing cancer in that interval. The probability of developing cancer during any time period (e.g., within 10 years of turning 50 years of age) is calculated by adding up all the cancers in the life table over the specified age range and dividing by the number of individuals alive and free of the specified cancer at the beginning of the period.

For more details on this methodology see Feuer et. al (1992) and Feuer et al. (1993). One improvement over past calculations of the risk estimates was made in the population figures for people over age 85. To improve the precision of our calculations, populations for the age groups 85-89, 90-94, and 95+ were obtained by partitioning the 85+ figure from the SEER areas by interpolation using figures from the 1980 and 1990 decennial censuses. The BOC provided populations for these age groups for 1990 to 1994.

Lifetime risk of dying from cancer: The lifetime risk of dying from a specified cancer is derived using a standard multiple decrement life table (Elandt-Johnson, 1980) where a person is exposed to the risk of dying from the specified cancer and all other causes based on mortality data from the SEER registry areas. Although the lifetime risk of dying from cancer could have been derived for the entire U.S., these estimates were based only on data from SEER areas to allow comparison with the risk of diagnosis estimates.

U.S. CANCER MORTALITY RATES BY STATE

Average annual mortality rates for the most recent 5-year period are presented for all races by sex for selected cancers for all 50 states and the District of Columbia. The rates are per 100,000 and age-adjusted to the United States (U.S.) 1970 standard million population. The five states with the highest rates and the five states with the lowest rates are identified. The states are also ranked from highest rate to lowest rate for each of the cancers for which rates are reported. The percent difference (PD) between the individual state rates and the rate for the total U.S. is given and is based on the following formula:

$$PD = 100(\text{State rate} - \text{Total U.S. rate})/\text{Total U.S. rate}$$

The standard error provided for each age-adjusted rate is calculated based on the assumption that, for each age-specific rate, the number of deaths is a Poisson random variable (Keyfitz, 1966) with the variance of the age-adjusted rate being a linear combination of the variances of the age-specific rates (Snedecor, 1980a). The difference between each age-adjusted state rate and the age-adjusted total U.S. rate is also tested for statistical significance by calculating a Z statistic from the following formula:

$$Z = (\text{State rate} - \text{Total U.S. rate})/SE_d$$

It is recognized that the two rates being compared are not independent because each state is part of the U.S.; however, this should not compromise the statistical test since each state represents a small proportion of the total U.S.

The standard error of the difference between two age-adjusted rates (SE_d) is given by the following formula:

$$SE_d = [(SE_s)^2 + (SE_u)^2]^{1/2}$$

where SE_s and SE_u are the standard errors of an individual state rate and the total U.S. rate respectively. The variance of each rate, i.e, the square of the standard error, is based on the Poisson assumption.

The standard error does not represent the total error which may be present in the age-adjusted rate but is merely the variance associated with the rates. In addition to this variance, there also exist potential biases and errors in the measurement of the rate which are extremely difficult to accurately assess and probably have a differential impact on the error for one state rate versus another.

Errors in the "measurement" of death rates can occur in either the numerator (the number of reported deaths) or the denominator (the population at risk). Sources of numerator error may include the under registration of deaths. Although investigation by the National Center for Health Statistics indicates that over 99% of all deaths in this country are registered, little is known concerning differentials by geographic area, age, sex, or race.

Numerator error also can occur due to misclassifications. These may include misclassification of race or ethnicity and cause of death. Recent research indicates that, for infant mortality, misclassification is highest for races other than white or black (Hahn, 1992). The extent of racial or ethnic misclassifications in death certificate coding, however, remains unknown.

In coding overall cancer mortality, misclassifications of cause of death would occur in those cases where the true cause of death was cancer, but a cause other than cancer was coded (and the reverse). Within the subset of all cancer deaths, there is the additional problem of misclassification of the primary cancer. It is already known, for example, that this is a problem with primary liver cancer (Percy, 1990).

Denominator errors arise through census under- and over-enumeration in the decennial census (which is the base for intercensal population estimates and population projections). To the extent that any over- or under-count is substantial and variable among subgroups or geographic areas, it may have important consequences on death rates. The effect of an under-count is that it decreases the denominator leading to an over-estimation of the true rate. Conversely, an over-count would result in an under-estimation of the true rate.

In 1980, under-enumeration varied by age group with the greatest difference found for those 80 and older, who were under-counted by about five percent (U.S. Bureau of the Census, 1986). All other age groups were either over- or under-counted by less than 3 percent. For age-sex-race groups, the coverage was lowest for black men aged 40-49 where the under-count was 19 percent. It is thought that no improvement was achieved with the 1990 census, and in some instances, under-enumeration may be even worse than 1980.

The impact of any of these errors is that they alter the counts in either the numerator or the denominator which in turn affect the calculated rate. Since the types of error encountered may differ by type of cancer, age group, race, sex, or even state, their impact is difficult to ascertain. Caution is recommended when dealing with those areas where potential problems may be present.

In testing the differences between the total U.S. rate and the rate for each state and the District of Columbia for a given cancer, it was necessary to consider the large number of statistical tests that were performed, because it would be expected that some tests are significant due to chance alone. To account for multiple comparisons, the overall significance level was chosen such that the probability that at least one comparison would be significant is 0.01. Furthermore, based on one of Bonferroni's inequalities (Snedecor, 1980b), the significance level for each individual comparison was set equal to 0.01/51, where 51 is the number of comparisons made for each type of cancer. Thus, any individual comparison with an associated p value less than 0.0002 was considered to be statistically significant.

Caution must be exercised in assessing statistically significant differences. Some states may have rates that are very close to the total U.S. rate, but because of their large population, the difference between their rate and the total U.S. rate is found to be statistically significant. On the other hand, some smaller states may have rates that differ substantially from the total U.S. rate, but because of their relatively small population, the differences are found to be statistically nonsignificant.

If the percent difference between the two rates is small, there may be some question as to the importance of the difference. It is difficult to specify a percent difference below which there would be no concern because the relative difference observed will be a function of the magnitude of the rates involved. It may also be of value to consider the size of the absolute difference between a state rate and the national rate in assessing the importance of a statistically significant difference. To further assist in the interpretation of the data, the tables are footnoted to indicate absolute differences greater than 5, 10 or 15 percent, depending on the magnitude of the cancer rates.

It is important to note that comparing individual state rates with the total U.S. rate and assessing statistical significance is not an appropriate procedure for assessing geographic clustering of state rates. Identification of states which may represent regional clusters of high or low rates would require additional statistical and graphical analyses.

For a number of cancers, the District of Columbia is found to have the highest mortality rates. It can be argued that it is inappropriate to compare cancer rates for the District of Columbia with those from the 50 States because the District of Columbia is a predominantly urban area whereas states are comprised of a combination of urban, suburban, and rural areas. Mortality rates for many cancers are higher in urban areas. Also, the District of Columbia has a higher percentage of blacks (about two-thirds) than any state, and their higher mortality rates for several types of cancer elevate the overall rate for the District of Columbia.

INCIDENCE AND MORTALITY TIME TRENDS

Graphs depicting time trend lines are included for most of the individual cancers. Trend lines were fit using polynomial regression of the form

$$Y_x = B_0 + B_1x + \ldots + B_nx^n,$$

where Y_x is the rate in year x.

First order polynomials fit a linear trend representing either a constant yearly increase or decrease, or a trend which is basically flat over the years involved. Second order polynomials may fit a trend whose function may increase or decrease to some maximum or minimum point in time before changing direction or whose rate of increase or decrease may not be constant. Polynomials higher than second order fit trend functions which may reach several maximum or minimum points. The correct function is determined by whether the addition of a higher order leads to a significant value for the coefficient, B, associated with that particular order (i.e., a trend is second order if and only if the term B_2 is significantly different from zero). Trend lines were not fit for some cancers when annual rates showed substantial variation due to small numbers of cases in the numerator. Most of the trends were fit with either first or second order polynomial functions.

INTERPRETATION OF CANCER STATISTICS

In reviewing the various cancer incidence, mortality, and survival statistics provided in this report, the reader should be aware that a number of factors may affect the interpretation of many of these statistics.

Survival rates for all cancers combined: The mix of cancers is changing over time as the incidence of some cancers increase and the incidence of others decrease. Thus, the relative contribution of a specific cancer to the survival rate for all cancers combined may not be constant over time. Because survival rates differ by form of cancer, the overall cancer survival rate can fluctuate even when the survival rates for individual cancers remain unchanged. It is possible to adjust the survival rates for all cancers combined for a calendar period based on the relative frequency of each cancer for some specified reference period; however, rates adjusted in this manner have been found to differ by only a small amount from unadjusted rates. In the future, such an adjustment may become more important if there are substantial changes in the incidence of various cancers.

Early detection/screening: A factor that may lead to an artifactual increase in patient survival as well as incidence for a specific cancer is the detection and diagnosis of cancers earlier than otherwise expected. These changes can occur subsequent to the introduction of a new procedure to screen subgroups of the

population for a specific cancer and need not be related to whether or not use of the screening test results in a decrease in mortality from that cancer. As the proportion of cancers detected at screening increases, presumably as a result of increased screening of the population, patient survival will appear to increase. The additional survival associated with the time between a cancer being diagnosed by a screening procedure and the time at which the cancer would have been diagnosed in the absence of screening has been termed "lead-time" (Zelen, 1976) and results in an artifactual increase in patient survival. Screening for breast cancer has been demonstrated to result in increased survival over and above that resulting from "lead-time" alone. Screening for breast cancer has been demonstrated to reduce breast cancer mortality. The benefit of screening is being studied for some other cancers. Screening may also result in a decrease in survival rates for invasive cancer if the screening procedure consistently detects a cancer in a preinvasive phase. In this case, length-biased sampling (Zelen, 1976) may be operating and, if so, will result in those cancers that would have had a relatively good prognosis had they progressed to invasive disease being preferentially detected in a preinvasive phase. There is, therefore, the possibility of a systematic elimination of invasive cancers that would have had a relatively good prognosis. If this occurs, the mix of cancers that are not detected at screening and do progress to invasive becomes less prognostically favorable resulting in a temporal decrease in survival for patients with invasive cancers. This latter effect of screening on patient survival may at least partially explain survival trends for cervical cancer. Other possible cancers affected include breast, colon, rectum and prostate.

Changes in diagnostic criteria: Early detection of cancer resulting from screening and/or earlier response to symptoms may result in the increasing diagnosis of small (early) tumors prior to their becoming life threatening. This may have the effect of raising the incidence and survival rates with little or no change in mortality rates. Breast, colon, prostate, cervix uteri, bladder and skin (melanoma) are some of the cancers most likely to be affected.

Technological advances in diagnostic procedures: Temporal trends in survival for patients with specific cancers by stage at diagnosis as well as temporal trends in distributions of stage at diagnosis are not presented in this report. However, it is possible that the reader might compare survival by stage and stage distributions given here with those for earlier time periods as provided in previous reports. Thus, it is necessary to comment on the effect of technological advances on the diagnosis and staging of cancer. The probability that a patient's cancer will be assigned to a particular stage may change over time due to advances in diagnostic technology. Utilization of new technology can give rise to a temporal phenomenon known as stage migration. Stage migration occurs when diagnostic procedures change over time resulting in an increase in the probability that a patient's cancer will be diagnosed in a more advanced stage. For example, certain distant metastases which would have been undetectable a few years ago can now be diagnosed by a Computer Tomography (CAT) scan or by Magnetic Resonance Imaging (MRI). Therefore, some of the patients who would have been previously diagnosed as having cancer in a localized or regional stage would now be classified as having cancer in a distant stage. Thus, the likely result would be to remove the worst survivors from the localized and regional categories, i.e. those with previously undetected distant metastases, and put them into the advanced stage category. As a result, the stage distribution for a cancer may become less favorable over time, but the survival rates for each stage category may improve. The latter occurs because those patients shifted from early to advanced stage likely have poorer survival than early stage patients, as indicated previously, but better survival than advanced stage patients as identified in past time periods. However, overall survival would not change. This has been referred to as the "Will Rogers phenomenon" (Feinstein, 1985) and is an important concept to understand when examining temporal changes in survival by stage as well as temporal changes in stage distributions. This phenomenon could affect staging for virtually all solid tumors.

Evolution of stage classifications: The American Joint Committee on Cancer has produced a new staging classification for many cancers every few years. The evolution of such classifications reflects the identification of new prognostic factors which may influence choice of treatment. Because the SEER Program collects data on extent of disease rather than some determination of stage specified in the

medical record, changes in stage definitions should not produce stage shifts as long as the detailed data on extent of disease are included in the medical record. For those cancers for which new prognostic variables are introduced into staging, such that previously collected detailed data on extent of disease cannot be collapsed into stage categories, there can be problems in assessing temporal trends in stage of disease. It is only possible to determine what effect changes in staging have had on stage-specific survival and stage distributions by reviewing the evolution of staging for a given cancer. One reason for using the historical categories of localized, regional and distant is that these categories have been fairly comparable over time.

Interpreting relative survival rates: The relative survival rate is the ratio of the observed survival rate to the expected survival rate for a patient cohort. The expected rate is based on mortality rates for the total population taking into account, as appropriate, the age, sex, race, and calendar year of diagnosis of the patients. It is assumed that the presence of cancer is the only factor which distinguishes the cancer patient cohort from the general population, with the relative survival rate indicating the probability that patients will escape death due to causes associated with their diagnosed cancer. In some cases, there is a factor related to the risk of a cancer which is also related to the risk of dying from causes unrelated to the cancer. An example of such a factor is smoking. Smoking is a major risk factor for lung cancer, and therefore, a cohort of lung cancer patients is going to consist of a much higher proportion of smokers than the general population. However, smoking is a risk factor for other diseases resulting in smokers having a shorter life expectancy than non-smokers. Expected survival rates for lung cancer patients based on the general population will be unduly optimistic for this reason and will result in relative rates which are lower than they should be. The problem cannot be easily corrected because life-tables for smokers and non-smokers are not readily available. The possibility that expected rates may not be appropriate for a given patient cohort should also be considered when examining relative survival rates for patients with cancers of the cervix uteri or breast, because the risk of these cancers has been associated with socioeconomic status (Baquet, 1991) which, in turn, may be related to life expectancy.

Comparison with other databases: The SEER data are obtained from population-based cancer registries covering about ten percent of the United States population. It is sometimes of interest to compare cancer statistics for SEER areas with those from other registries both in the United States and worldwide. In making such comparisons, it is essential that the factors considered above be carefully considered for both data sources. In addition, completeness of case ascertainment, rules used to determine multiple primaries, follow-up, and rules used in assigning and coding cause of death should be assessed along with the sources and procedures used in obtaining population estimates. Depending on the rates being compared, there could be other confounding factors which should be adjusted for or otherwise considered.

It is sometimes interesting to compare survival data for cancer patients in SEER areas with that from clinical trials. This must be done with great caution. Survival data from clinical trials may have been obtained from a patient population that is different from patients diagnosed in SEER areas in regard to prognostic factors for the cancer in question. Any survival comparisons would have to adjust for such differences. Also, it is necessary to verify that the methodology used in computing survival rates is the same for both data sources. Patients from clinical trials may differ from patients diagnosed in SEER areas in regard to characteristics that may be related to survival but are not recorded in either database. If this were true for a given cancer, it would not be possible to make valid comparisons of the type discussed here.

Errors in data collection: In the process of registering cancer patients, errors in abstracting and coding the data including demographic information, cancer site and/or histology, extent of disease, treatment, and patient survival may be made. Quality control studies are periodically carried out to detect and correct this type of error, but no attempt is made here to incorporate this source of error into the variance estimates of cancer rates reported here.

Comparison of this report with previous reports: The cancer registries that participate in the SEER Program submit data on all cancers diagnosed in their coverage areas to the National Cancer Institute

each year. Because of the dynamic nature of the registries' data bases, it is possible that the numbers of cancer cases in a particular race-sex-age-cancer category may change in a calendar year for which data have already been reported in a previous publication. One possible reason for this is that additional cancer cases that were previously overlooked for a given calendar year may be found and reported to the central registry. A second reason relates to follow-back of cancers diagnosed by death certificate only. Successful efforts to establish the dates of diagnosis for such patients will change the number of patients reported in a given year. A third reason relates to possible code changes that may occur when a patient dies. For example, information on race is generally available on the death certificate and may be used to update a previously unknown value. A fourth reason is the elimination of duplicate records for the same patient, often due to name changes or misspellings.

This discussion has addressed issues that may result in a recent report having a different number of cases for a given time period than in an earlier report with its resulting effect on incidence and possibly survival rates. Population estimates may also change from one report to another for some calendar years. This occurs because the NCI receives population estimates which are regularly updated by the Bureau of the Census. For example, previous population estimates for the nine years following the 1980 census were recently replaced with improved, new estimates controlled to population counts now available from the 1990 census. Such changes may result in some differences between incidence and mortality rates for a calendar period as published in two different reports.

STANDARD ERRORS OF RATES

Survival rates: In the tables presenting survival rates, the reliability of the rates is indicated based on the magnitude of the standard error. In addition, if there were fewer than 25 total diagnoses in the first interval of the life table constructed to calculate survival, or if all cases became lost to follow-up within an interval, a valid survival rate could not be calculated, as noted in the footnote.

The standard error (SE) of a relative survival rate is obtained as follows (Ederer, 1961):

$$SE(CR_t) = (CR_t)^*[(q_1/(e_1-d_1)) + (q_2/(e_2-d_2)) + \ldots + (q_t/(e_t-d_t))]^{1/2}$$

where CR_t is the t year relative survival rate, q_1 is the probability of dying in year 1, e_1 is the effective number of patients at risk in year 1, and d_1 is the number of deaths in year 1. The subscripts 2 through t refer to subsequent years after diagnosis.

Incidence and mortality rates: The standard errors of age-adjusted incidence and mortality rates are often not specified. However, the reader can approximate the standard error of a particular incidence or mortality rate by the following formula for the standard error of a crude incidence or mortality rate (Keyfitz, 1966):

$$SE(rate) = rate/[events]^{1/2}$$

where events refer to the number of cancer diagnoses associated with an incidence rate or the number of deaths associated with a mortality rate.

Appendix Tables A-1 and A-2 provide numbers of cancer diagnoses within SEER and numbers of deaths in the total U.S., respectively, by race and sex for the most recent five-year period. These can be used to obtain approximations of the standard errors for associated age-adjusted rates for the same time period using the above formula. To approximate the standard error for a rate for a single year the number of events is the number of diagnoses or deaths divided by five.

DEFINITIONS

Several technical terms are used in presenting the data in this report. The following definitions are presented here in an attempt to clarify their use to the reader.

Incidence rate: The cancer incidence rate is the number of new cancers of a specific site/type occurring in a specified population during a year, expressed as the number of cancers per 100,000 people. It should be noted that the numerator of the rate can include multiple primary cancers occurring in one individual. This rate can be computed for each type of cancer as well as for all cancers combined. Except for five-year age-specific rates, all incidence rates are age-adjusted to the 1970 U.S. standard population or to the world standard (see below). Rates are for invasive cancer only, unless otherwise specified.

Mortality rate: The cancer mortality rate is the number of deaths with cancer given as the underlying cause of death occurring in a specified population during a year, expressed as the number of deaths due to cancer per 100,000 people. This rate can be computed for each type of cancer as well as for all cancers combined.. Except for age-specific rates, all mortality rates are age-adjusted to the 1970 U.S. standard population or to the world standard (see below).

Age-adjusted rate: An age-adjusted rate is a weighted average of the age-specific cancer incidence (or mortality) rates, where the weights are the proportions of persons in the corresponding age groups of a standard population. The potential confounding effect of age is reduced when comparing age-adjusted rates computed using the same standard population. For this report, the 1970 United States standard million and world standard million populations are used as the standards in computing all age-adjusted rates.

Percent Change: The percent change in rates over the entire time period covered by this report was obtained by calculating the average of the 1973 and 1974 rates and the average of the rates for the most recent two years, subtracting the former from the latter, dividing the difference by the former, and then multiplying by 100 to convert the number to a percent. Percent changes are also provided for two five-year periods, 1975-79 and the most recent 5-year period.

Estimated Annual Percent Change: The Estimated Annual Percent Change (EAPC) was calculated by fitting a regression line to the natural logarithm of the rates (r) using calendar year as a regressor variable, i.e. $y = mx + b$ where $y = \text{Ln } r$ and x = calendar year. The EAPC = $100^{*}(e^{m} - 1)$. Testing the hypothesis that the Annual Percent Change is equal to zero is equivalent to testing the hypothesis that the slope of the line in the above equation is equal to zero. The latter hypothesis is tested using the t distribution of m/SE_m with the number of degrees of freedom equal to the number of calendar years minus two. The standard error of m, i.e. SE_m, is obtained from the fit of the regression (Kleinbaum, 1988). This calculation assumes that the rates increased/decreased at a constant rate over the entire calendar year interval. The validity of this assumption was not assessed. In those few instances where at least one of the rates was equal to zero, the linear regression was not calculated. Because the methods used in their calculation are not directly related, it is possible that the signs of the PC and the EAPC may disagree, and this occurs in a few instances in the tables presented. The differences between incidence and mortality trends for the time period 1975-79 versus those for the most recent five-year period are tested for statistical significance using a t statistic with six degrees of freedom defined as the difference in the regression coefficients divided by the standard error of the difference (Kleinbaum, 1988).

Observed survival rate: The observed survival rate is obtained using standard life table procedures and represents the proportion of cancer patients surviving for a specified length of time after diagnosis.

Relative survival rate: The relative survival rate is calculated using a procedure described by Ederer, Axtell, and Cutler (1961) whereby the observed survival rate is adjusted for expected mortality. The relative survival rate represents the likelihood that a patient will not die from causes associated

specifically with their cancer at some specified time after diagnosis. It is always larger than the observed survival rate for the same group of patients.

Standard error: The standard error of a rate is a measure of the sampling variability of the rate.

Person Years of Life Lost: The Person Years of Life Lost (PYLL) was calculated as follows. For each of the individuals who died of a particular cancer of interest, it was possible to obtain the number of additional years they were expected to survive conditional on their survival to the age at which they died of their cancer. This conditional expectation was obtained from life tables for the United States population available from the National Center for Health Statistics. The PYLL in the general population associated with a particular cancer is simply the sum of this conditional expectation over all those individuals who died of that cancer.

Average Years of Life Lost: The Average Years of Life Lost (AYLL) associated with a particular cancer is the PYLL associated with that cancer in the general population divided by the number of deaths from that cancer in the general population.

Stage of Disease at Diagnosis: Localized - an invasive neoplasm confined entirely to the organ of origin. Regional - a neoplasm that has extended beyond the limits of the organ of origin directly into surrounding organs or tissues; into regional lymph nodes; or both direct extension and regional lymph node involvement. Distant - a neoplasm that has spread to parts of the body remote from the primary tumor either by direct extension or by discontinuous metastasis. Unstaged - information is not sufficient to assign a stage.

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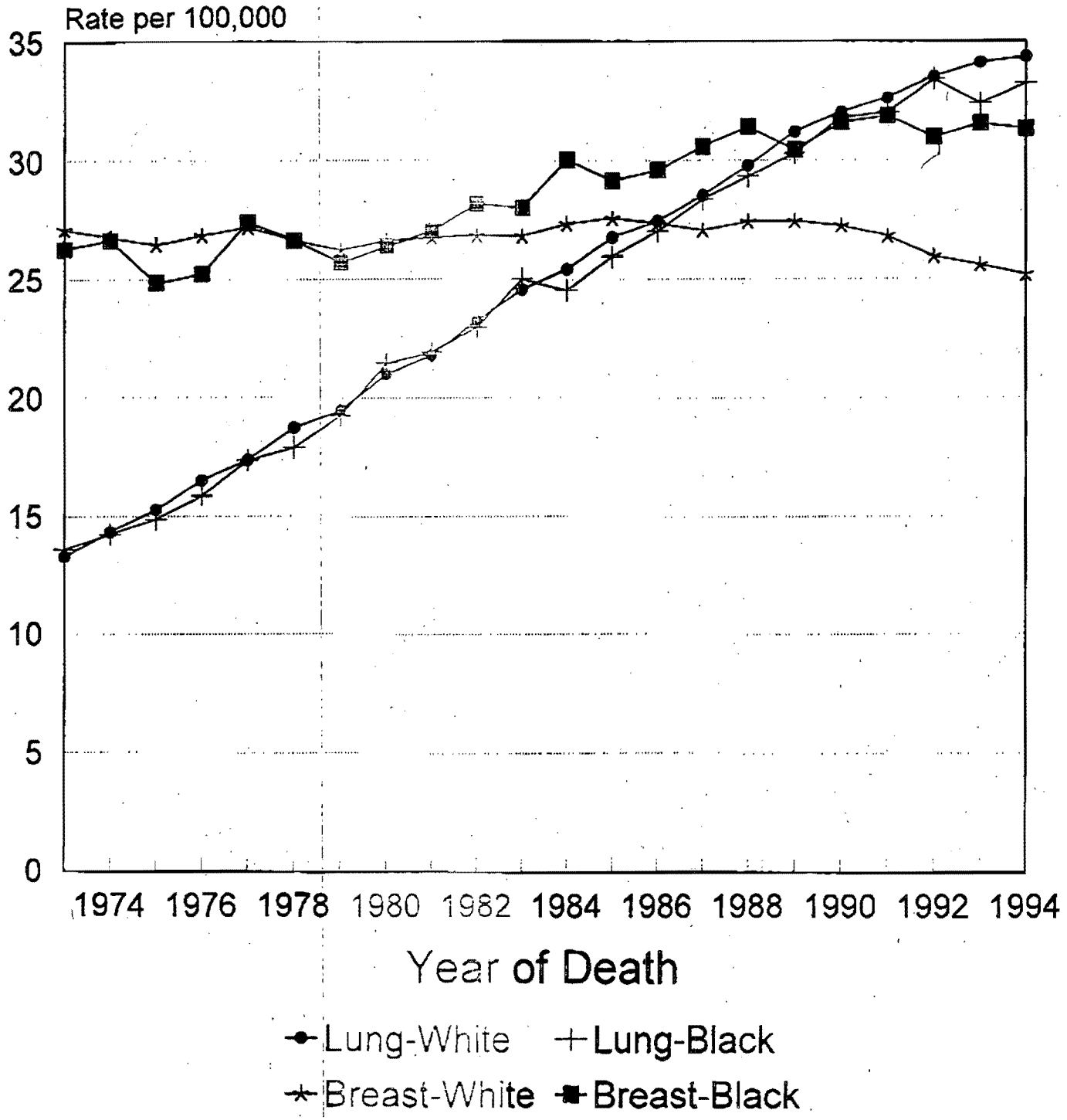
Figure IV-10

Breast vs. Lung Cancer Mortality
White Females vs. Black Females
United States, 1973-94



Age-adjusted to 1970 Standard

Table V-1
CERVIX UTERI CANCER (Invasive)

TRENDS IN SEER INCIDENCE AND U.S. MORTALITY, BY RACE AND AGE

	All Races, Females			White Females			Black Females		
	All	<50	50+	All	<50	50+	All	<50	50+
INCIDENCE TRENDS (expressed in percents)§:									
1973-94									
All Ages									
Percent Change (PC)	-40.6	-34.7	-45.6	-39.5	-28.7	-48.4	-58.9	-61.1	-57.4
Est. Annual PC (EAPC)	-2.3*	-1.6*	-2.9*	-2.1*	-1.2*	-3.0*	-4.3*	-4.3*	-4.4*
Under 65									
Percent Change (PC)	-38.1	-	-	-36.1	-	-	-57.5	-	-
Est. Annual PC (EAPC)	-2.0*	-	-	-1.8*	-	-	-4.1*	-	-
65-and-over									
Percent Change (PC)	-49.0	-	-	-51.1	-	-	-62.1	-	-
Est. Annual PC (EAPC)	-3.3*	-	-	-3.4*	-	-	-4.9*	-	-
1975-79 - ALL AGES									
Percent Change (PC)	-13.3	-11.4	-14.9	-14.7	-13.1	-16.1	-17.3	-15.9	-18.0
Est. Annual PC (EAPC)	-4.3*	-3.5	-5.1*	-4.9*	-4.2	-5.6*	-5.4	-4.6	-5.9
1990-94 - ALL AGES									
Percent Change (PC)	-7.6	-6.6	-8.7	-7.6	-5.5	-10.0	-16.9	-15.8	-17.6
Est. Annual PC (EAPC)	-2.8*	-2.9	-2.8*◆	-3.1*	-2.6	-3.6*◆	-5.6	-6.7	-5.1
MORTALITY TRENDS (expressed in percents)δ:									
1973-94									
All Ages									
Percent Change (PC)	-44.5	-36.5	-47.8	-43.1	-30.3	-48.1	-51.9	-53.8	-51.2
Est. Annual PC (EAPC)	-2.8*	-1.9*	-3.2*	-2.7*	-1.4*	-3.3*	-3.3*	-3.4*	-3.3*
Under 65									
Percent Change (PC)	-42.7	-	-	-39.8	-	-	-54.8	-	-
Est. Annual PC (EAPC)	-2.5*	-	-	-2.3*	-	-	-3.5*	-	-
65 and over									
Percent Change (PC)	-48.1	-	-	-49.3	-	-	-46.4	-	-
Est. Annual PC (EAPC)	-3.3*	-	-	-3.4*	-	-	-3.0*	-	-
1975-79 - ALL AGES									
Percent Change (PC)	-14.1	-11.8	-15.0	-13.9	-11.9	-14.7	-15.3	-12.8	-16.2
Est. Annual PC (EAPC)	-4.8*	-4.6	-4.9*	-4.7*	-4.6	-4.8*	-5.4*	-5.0*	-5.6*
1990-94 - ALL AGES									
Percent Change (PC)	-4.3	-3.6	-4.6	-3.0	-2.4	-3.3	-6.9	-7.8	-6.5
Est. Annual PC (EAPC)	-1.5*◆	-1.4◇	-1.6*◆	-1.0◆	-0.9	-1.1◆	-2.9	-3.3	-2.7

The Est. Annual PC is the Estimated Annual Percent Change (EAPC) over the time interval.
§ SEER Program.
δ NCHS public use tape.
* The EAPC is significantly different from zero ($p<.05$).
◆ The EAPC for 1990-94 is significantly different from the EAPC for 1975-79 ($p<.05$).
◇ The EAPC for 1990-94 is significantly different from the EAPC for 1975-79 ($p<.10$).
\- Statistic could not be calculated.

Table V-2

CERVIX UTERI CANCER (Invasive)

SEER INCIDENCES AND U.S. MORTALITY δ RATES, AGE-ADJUSTED AND AGE-SPECIFIC RATES, BY RACE

	Incidences §			US Mortality δ		
	All Races, Females	White Females	Black Females	All Races, Females	White Females	Black Females
AGE-SPECIFIC RATES, 1990-94						
AGE AT DIAGNOSIS/DEATH:						
0-4	0.0	0.0	0.0	0.0	0.0	0.0
5-9	0.0	0.0	0.0	0.0	0.0	0.0
10-14	0.0	0.0	0.0	0.0	0.0	0.0
15-19	0.3	0.2	0.6	0.0	0.0	0.0
20-24	2.5	2.5	2.6	0.2	0.2	0.2
25-29	8.1	8.7	6.4	0.8	0.7	1.1
30-34	11.6	12.1	10.6	2.0	1.9	3.3
35-39	14.8	14.4	16.2	3.3	3.0	5.7
40-44	15.7	14.5	23.1	4.4	3.8	8.2
45-49	16.8	15.6	22.9	5.6	4.9	11.7
50-54	16.7	15.3	22.9	6.5	5.6	13.7
55-59	16.2	14.0	27.4	7.0	6.1	14.4
60-64	18.4	16.4	29.8	7.5	6.2	17.6
65-69	18.6	16.2	32.5	8.0	6.7	20.0
70-74	15.0	13.6	24.2	9.0	7.8	21.3
75-79	16.2	13.9	40.3	9.5	8.1	23.7
80-84	18.2	15.9	46.4	11.8	10.1	32.6
85+	15.0	12.0	46.7	12.6	11.1	30.1
AGE-ADJUSTED RATES, 1990-94						
AGE AT DIAGNOSIS/DEATH:						
All ages	8.3	7.7	12.2	2.9	2.5	6.3
Under 65	7.4	7.0	9.7	2.2	1.9	4.4
65 and over	16.8	14.7	34.4	9.3	8.0	23.3
All ages (world std.)⊕	7.8	7.3	10.9	2.5	2.2	5.4

§ SEER Program. Rates are per 100,000 and are age-adjusted to the 1970 U.S. standard population, except where noted.

δ NCHS public use tape. Rates are per 100,000 and are age-adjusted to the 1970 U.S. standard population, except where noted.

⊕ Rates are per 100,000 and are age-adjusted to the world standard population.

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Table V-3
CERVIX UTERI CANCER (Invasive)

SEER INCIDENCE[5] AND U.S. MORTALITY[6] RATES, AGE-ADJUSTED RATES, BY RACE AND AGE

	All Races, Females			White Females			Black Females		
	All	<50	50+	All	<50	50+	All	<50	50+
SEER INCIDENCE RATES									
YEAR OF DIAGNOSIS:									
1973	14.2	8.7	31.2	12.8	7.6	28.9	29.9	17.9	66.8
1974	12.7	7.6	28.6	11.6	7.0	25.8	25.2	12.0	65.7
1975	12.4	7.3	28.2	11.1	6.7	24.6	27.9	13.3	73.2
1976	11.9	7.2	26.6	10.8	6.7	23.6	24.6	12.0	63.6
1977	10.9	6.4	24.7	9.8	5.7	22.2	23.0	12.4	55.4
1978	10.5	6.3	23.5	9.5	5.8	20.7	19.9	9.3	52.8
1979	10.6	6.6	23.1	9.2	5.8	19.7	23.5	12.0	59.3
1980	10.2	6.1	22.7	9.1	5.5	20.3	19.0	10.0	46.8
1981	9.0	5.5	19.7	8.0	5.0	17.3	19.1	10.1	47.0
1982	8.9	5.4	19.7	7.9	5.1	16.4	17.8	7.6	49.4
1983	8.8	5.6	18.6	8.1	5.2	16.9	15.2	8.9	34.5
1984	9.2	6.1	18.7	8.3	5.7	16.4	17.4	9.7	41.0
1985	8.5	5.3	18.4	7.6	5.1	15.5	15.9	6.8	43.8
1986	9.0	5.9	18.5	8.9	5.8	15.9	15.2	7.9	37.7
1987	8.3	5.4	17.4	7.4	5.2	14.4	15.2	6.6	41.7
1988	8.8	6.0	17.6	8.0	5.6	15.1	15.4	8.0	38.2
1989	8.9	5.9	18.0	8.3	5.9	15.7	13.2	5.9	35.7
1990	8.9	6.0	17.7	8.3	5.9	15.9	13.8	7.2	34.3
1991	8.4	5.3	17.9	7.7	5.1	15.5	13.4	6.6	34.2
1992	8.3	5.6	16.7	7.8	5.4	15.2	11.0	7.1	23.1
1993	8.2	5.5	16.5	7.6	5.4	14.6	11.4	6.5	26.3
1994	7.8	5.2	16.0	7.1	5.0	13.6	11.3	5.3	30.2
1990-94	8.3	5.5	16.9	7.7	5.4	15.0	12.2	6.5	29.6
U.S. MORTALITY RATES									
YEAR OF DEATH:									
1973	5.2	2.0	15.0	4.4	1.6	12.9	13.1	5.0	37.9
1974	5.0	1.9	14.6	4.3	1.6	12.9	11.7	4.6	33.6
1975	4.6	1.8	13.4	3.9	1.4	11.6	11.1	4.2	32.1
1976	4.5	1.6	13.4	3.9	1.4	11.5	10.7	3.6	32.4
1977	4.1	1.5	12.3	3.5	1.2	10.6	10.1	3.7	30.0
1978	4.0	1.6	11.6	3.4	1.3	10.0	9.6	3.5	28.3
1979	3.8	1.4	11.2	3.3	1.2	9.8	8.8	3.3	25.8
1980	3.7	1.5	10.6	3.1	1.2	9.1	8.9	3.4	25.8
1981	3.6	1.4	10.5	3.1	1.2	9.0	8.2	2.7	24.9
1982	3.4	1.3	9.8	2.9	1.1	8.3	8.1	2.7	24.6
1983	3.3	1.3	9.6	2.8	1.1	8.1	8.1	2.9	24.3
1984	3.3	1.3	9.2	2.8	1.1	7.8	7.6	2.9	22.1
1985	3.1	1.3	8.9	2.7	1.1	7.6	7.3	2.5	22.3
1986	3.2	1.3	8.9	2.7	1.1	7.5	7.7	3.0	22.2
1987	3.0	1.3	8.3	2.6	1.1	7.1	6.8	2.7	19.6
1988	3.0	1.3	8.3	2.6	1.1	7.0	6.7	2.2	20.6
1989	3.0	1.3	8.2	2.5	1.1	6.8	7.1	2.4	21.5
1990	3.0	1.3	8.3	2.6	1.2	7.1	6.4	2.5	18.5
1991	2.9	1.3	8.0	2.5	1.1	6.7	6.4	2.3	18.8
1992	2.9	1.3	7.9	2.5	1.1	6.6	6.7	2.5	19.7
1993	2.8	1.2	7.7	2.4	1.1	6.6	6.3	2.3	18.7
1994	2.8	1.2	7.7	2.5	1.1	6.8	5.6	2.1	16.2
1990-94	2.9	1.3	7.9	2.5	1.1	6.8	6.3	2.4	18.4

5 SEER Program. Rates are per 100,000 and are age-adjusted to the 1970 U.S. standard population.
6 NCHS public use tape. Rates are per 100,000 and are age-adjusted to the 1970 U.S. standard population.

Table V-4

CERVIX UTERI CANCER (Invasive)

SURVIVAL RATES, BY RACE, DIAGNOSIS YEAR, STAGE AND AGE

	All Races, Females			White Females			Black Females		
	All	<50	50+	All	<50	50+	All	<50	50+
5-YR RELATIVE SURVIVAL RATES									
YEAR OF DIAGNOSIS:									
1960-63[a]	-	-	-	58	-	-	47	-	-
1970-73[a]	-	-	-	64	-	-	61	-	-
1974-76[b]	68.7	81.2	57.7	69.5	82.2	58.2	63.6	75.2	53.6
1977-79[b]	68.1	77.9	59.3	69.6	79.7	60.2	62.1	71.3	53.1
1980-82[b]	67.2	79.0	55.9	67.9	80.4	55.6	61.0	71.7	51.2
1983-85[b]	68.6	78.3	57.8	70.4	80.2	58.9	59.9	69.2	50.1
1986-93[b]	68.9	77.5Ω	57.8	71.4	80.2	59.2	57.1Ω	63.4Ω	50.7
1986-93[b]									
ALL STAGES	68.9	77.5	57.8	71.4	80.2	59.2	57.1	63.4	50.7
LOCALIZED	91.3	92.9	87.8	91.9	93.7	89.0	88.2	89.3	86.0
REGIONAL	49.4	51.7	47.7	51.1	54.9	40.2	40.9	38.9	43.1
DISTANT	9.1	8.1	9.6	9.8	11.0	9.3	7.7	2.9	10.6
UNSTAGED	63.4	78.7	51.4	64.4	80.0	52.6	62.7!	77.5!	48.5!
STAGE DISTRIBUTION (%) 1986-93[b]									
ALL STAGES									
Number of cases	8,465	4,654	3,811	6,652	3,760	2,892	1,261	630	631
Percent	100%	100%	100%	100%	100%	100%	100%	100%	100%
LOCALIZED	52	65	36	54	68	37	40	49	31
REGIONAL	33	25	43	31	23	42	40	36	43
DISTANT	8	5	12	8	4	12	12	7	17
UNSTAGED	7	6	9	7	5	9	9	9	9
5-YR RELATIVE SURVIVAL RATES, 1986-93[b]									
AGE AT DIAGNOSIS:									
<45	79.8	-	-	82.4	-	-	65.4	-	-
45-54	67.2	-	-	69.3	-	-	55.4	-	-
55-64	62.5	-	-	64.8	-	-	50.1	-	-
65-74	55.2	-	-	55.0	-	-	54.5	-	-
75+	41.7	-	-	42.8	-	-	40.2!	-	-
Under 65	73.6	-	-	76.3	-	-	59.3	-	-
65 and over	50.3	-	-	50.6	-	-	50.0	-	-

[a] Rates are based on End Results data from a series of hospital registries and one population-based registry.
[b] Rates are from the SEER Program. They are based on data from population-based registries in Connecticut, New Mexico, Utah, Iowa, Hawaii, Atlanta, Detroit, Seattle-Puget Sound and San Francisco-Oakland. Rates are based on follow-up of patients through 1994.
Ω The difference in rates between 1974-76 and 1986-93 is statistically significant ($p<.05$).
! The standard error of the survival rate is between 5 and 10 percentage points.
⇑ The standard error of the survival rate is greater than 10 percentage points.
\- Statistic could not be calculated.

Table V-5

CERVIX UTERI CANCER (Invasive)

INCIDENCE, MORTALITY, AND SURVIVAL RATES

By Year of Diagnosis/Death

All Races, Females

Year of Diagnosis/Death

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Incidence																						
SEER	14.2	12.7	12.4	11.9	10.9	10.5	10.6	10.2	9.0	8.9	8.8	9.2	8.5	9.0	8.3	8.8	8.9	8.9	8.4	8.3	8.2	7.8
Mortality																						
U.S.	5.2	5.0	4.6	4.5	4.1	4.0	3.8	3.7	3.6	3.4	3.3	3.3	3.1	3.2	3.0	3.0	3.0	3.0	2.9	2.9	2.8	2.8
SEER	4.4	4.6	3.8	4.1	3.5	3.6	3.2	2.9	3.1	2.9	2.8	2.7	2.7	2.6	2.4	2.5	2.7	2.3	2.4	2.3	2.2	2.5
Relative Survival Rates (SEER)																						
1-year	84.5	86.7	86.3	88.2	87.2	86.1	87.1	86.5	86.2	87.1	89.0	88.2	86.8	85.6	87.4	87.2	88.9	88.0	88.7	87.0	89.3	
2-year	75.4	76.3	78.2	78.7	78.2	77.4	77.5	77.0	76.9	75.2	78.5	78.5	75.8	76.3	77.9	78.6	80.9	79.4	79.2	77.4		
3-year	69.8	71.4	73.5	74.2	73.3	73.2	71.7	73.0	73.1	69.5	74.0	73.8	71.1	71.3	72.5	75.1	76.0	75.0	73.5			
4-year	66.5	68.8	70.6	71.7	71.6	69.7	68.6	70.1	69.8	67.2	71.0	70.9	68.6	68.1	69.7	73.4	73.0	72.6				
5-year	65.1	67.7	68.7	69.7	69.4	68.2	66.7	68.3	67.3	65.8	69.9	69.2	66.7	65.9	67.5	72.4	70.8					
6-year	63.3	65.5	67.7	68.9	68.9	67.0	65.3	67.1	66.2	63.7	67.7	66.9	65.8	65.2	66.8	70.2						
7-year	62.6	65.0	67.1	68.0	67.9	65.5	64.5	64.9	63.7	63.1	66.5	65.6	64.4	63.8	65.7							
8-year	61.6	63.6	66.1	67.5	67.7	64.4	63.7	64.0	62.2	62.6	65.1	64.2	63.2	63.0								
9-year	61.1	62.9	66.1	66.5	66.7	63.6	63.5	63.1	62.1	62.3	65.1	63.0	62.2									
10-year	61.1	61.6	64.7	65.8	66.1	63.6	62.0	61.8	62.0	62.3	64.9	62.8										
11-year	60.0	61.3	64.0	65.1	65.4	63.2	62.0	61.7	62.0	62.2	63.9											
12-year	59.4	61.3	63.9	64.1	64.9	63.0	62.0	61.0	61.7	61.3												
13-year	59.4	61.2	62.8	63.7	64.9	62.3	62.0	61.0	61.3													
14-year	58.8	60.8	62.6	62.9	64.6	61.2	62.0	60.3														
15-year	58.8	60.5	62.4	62.6	64.5	60.6	61.5															
16-year	58.8	60.3	61.1	62.6	64.1	60.1																
17-year	57.8	59.2	60.5	62.2	63.6																	
18-year	57.1	58.5	60.2	62.1																		
19-year	56.7	57.6	59.5																			
20-year	56.6	56.5																				
21-year	55.8																					

Note: Incidence and mortality rates are per 100,000 and are age-adjusted to the 1970 U.S. standard population.

Survival rates are relative rates expressed as percents.

Table V-6
CERVIX UTERI CANCER (Invasive)

Percent Diagnosed With Cancer In 10, 20 and 30 Years and In Remaining Lifetime, Given Cancer Free At Current Age By Race

Lifetime Risk (Percent) of Being Diagnosed With Cancer and Lifetime Risk (Percent) of Dying From Cancer

SEER Areas, 1992-94

All Races

Current Age	+10 yrs	+20 yrs	+30 yrs	Eventually
0	0.00	0.00	0.05	0.83
10	0.00	0.06	0.18	0.84
20	0.05	0.18	0.34	0.84
30	0.13	0.28	0.43	0.79
40	0.15	0.31	0.46	0.67
50	0.16	0.31	0.43	0.52
60	0.17	0.29	0.37	0.39

Lifetime Risk of Being Diagnosed = 0.83%
Lifetime Risk of Dying = 0.27%

Whites

Current Age	+10 yrs	+20 yrs	+30 yrs	Eventually
0	0.00	0.00	0.06	0.77
10	0.00	0.06	0.19	0.77
20	0.06	0.19	0.33	0.77
30	0.13	0.27	0.41	0.72
40	0.14	0.28	0.42	0.59
50	0.14	0.28	0.38	0.46
60	0.15	0.26	0.32	0.33

Lifetime Risk of Being Diagnosed = 0.77%
Lifetime Risk of Dying = 0.25%

Blacks

Current Age	+10 yrs	+20 yrs	+30 yrs	Eventually
0	0.00	0.00	0.04	1.12
10	0.00	0.04	0.16	1.14
20	0.04	0.16	0.38	1.15
30	0.13	0.35	0.55	1.12
40	0.22	0.43	0.64	1.02
50	0.22	0.44	0.60	0.83
60	0.24	0.43	0.59	0.68

Lifetime Risk of Being Diagnosed = 1.12%
Lifetime Risk of Dying = 0.49%

Table V-7

CERVIX UTERI CANCER (Invasive)

AVERAGE ANNUAL AGE-ADJUSTED CANCER MORTALITY6 RATES BY STATE, 1990-94

All Races, Females

State	Rate	SE	Rank	PD
TOTAL U.S.	2.9	0.02		
High Five States				
District of Columbia	3.9✪	0.46	(01)	34.5
Kentucky	3.8⊕✪	0.18	(02)	31.0
Delaware	3.8✪	0.44	(03)	31.0
South Carolina	3.8✪	0.19	(04)	31.0
Mississippi	3.7✪	0.22	(05)	27.6
Low Five States				
South Dakota	2.0✪	0.32	(47)	-31.0
Alaska	1.9✪	0.42	(48)	-34.5
Wyoming	1.8✪	0.38	(49)	-37.9
Idaho	1.6⊕✪	0.23	(50)	-44.8
Minnesota	1.5⊕✪	0.11	(51)	-48.3

State	Rate	SE	Rank	PD
Alabama	3.6✪	0.17	(06)	24.1
Alaska	1.9✪	0.42	(48)	-34.5
Arizona	2.5	0.15	(36)	-13.8
Arkansas	3.1	0.20	(19)	6.9
California	2.7	0.06	(29)	-6.9
Colorado	2.2✪	0.15	(40)	-24.1
Connecticut	2.0⊕✪	0.14	(45)	-31.0
Delaware	3.8✪	0.44	(03)	31.0
District of Columbia	3.9✪	0.46	(01)	34.5
Florida	3.2	0.09	(13)	10.3
Georgia	2.8	0.12	(27)	-3.4
Hawaii	2.0✪	0.25	(46)	-31.0
Idaho	1.6⊕✪	0.23	(50)	-44.8
Illinois	3.1	0.10	(18)	6.9
Indiana	3.0	0.13	(21)	3.4
Iowa	2.4✪	0.17	(37)	-17.2
Kansas	2.7	0.19	(30)	-6.9
Kentucky	3.8⊕✪	0.18	(02)	31.0
Louisiana	3.4✪	0.17	(09)	17.2
Maine	3.2	0.29	(15)	10.3
Maryland	2.8	0.14	(26)	-3.4
Massachusetts	2.2⊕✪	0.11	(41)	-24.1
Michigan	2.8	0.10	(28)	-3.4
Minnesota	1.5⊕✪	0.11	(51)	-48.3
Mississippi	3.7✪	0.22	(05)	27.6
Missouri	3.2	0.14	(14)	10.3

State	Rate	SE	Rank	PD
Montana	2.4✪	0.30	(39)	-17.2
Nebraska	2.0✪	0.21	(44)	-31.0
Nevada	2.6	0.27	(32)	-10.3
New Hampshire	3.3	0.33	(11)	13.8
New Jersey	2.9	0.11	(23)	0.0
New Mexico	2.6	0.25	(31)	-10.3
New York	3.1	0.08	(16)	6.9
North Carolina	3.0	0.12	(20)	3.4
North Dakota	2.5	0.37	(34)	-13.8
Ohio	2.9	0.09	(24)	0.0
Oklahoma	3.2	0.18	(12)	10.3
Oregon	2.1✪	0.16	(42)	-27.6
Pennsylvania	2.9	0.09	(22)	0.0
Rhode Island	2.6	0.31	(33)	-10.3
South Carolina	3.8✪	0.19	(04)	31.0
South Dakota	2.0✪	0.32	(47)	-31.0
Tennessee	3.5✪	0.15	(08)	20.7
Texas	3.3⊕	0.08	(10)	13.8
Utah	2.4✪	0.25	(38)	-17.2
Vermont	3.1	0.44	(17)	6.9
Virginia	2.8	0.12	(25)	-3.4
Washington	2.1⊕✪	0.12	(43)	-27.6
West Virginia	3.6✪	0.25	(07)	24.1
Wisconsin	2.5	0.13	(35)	-13.8
Wyoming	1.8✪	0.38	(49)	-37.9

6 NCHS public use tape. Rates are per 100,000 and are age-adjusted to the 1970 U.S. standard population.
SE Standard error of the rate.
PD Percent difference between state rate and total U.S. rate.
✪ Absolute difference between state rate and total U.S. rate is 15% or more.
⊕ Difference between state rate and total U.S. rate is statistically significant (p<=.0002).

Table V-8
CERVIX UTERI CANCER (Invasive)

AGE-ADJUSTED SEER INCIDENCE RATES§, SEER MORTALITY RATES δ, AND 5-YEAR RELATIVE SURVIVAL RATES ϕ
By Registry, Race and Age

	All Races, Females			White Females			Black Females		
	All	<50	50+	All	<50	50+	All	<50	50+
SEER INCIDENCE RATES§, 1990-94									
REGISTRY									
Standard 9 registries	8.3	5.5	16.9	7.7	5.4	15.0	12.2	6.5	29.6
San Francisco-Oakland	8.3	5.0	18.5	7.6	4.9	16.0	10.1	6.5	21.3
Connecticut	7.4	5.3	13.8	6.9	5.2	12.1	14.2	6.3	38.6
Metropolitan Detroit	9.1	6.0	18.6	7.9	5.5	15.2	12.9	7.1	30.6
Hawaii	9.2	6.2	18.5	9.3	5.8	20.3	-	-	-
Iowa	8.2	6.0	14.8	8.0	5.9	14.6	-	-	-
New Mexico	9.7	6.2	20.5	9.9	6.4	20.4	-	-	-
Seattle-Puget Sound	7.4	4.9	15.1	7.2	5.0	13.9	9.0	5.3	20.3
Utah	8.0	5.4	16.0	7.9	5.5	15.2	-	-	-
Metropolitan Atlanta	9.1	5.5	20.4	7.7	5.1	15.8	13.0	5.9	34.9
San Jose-Monterey	9.1	5.4	20.4	8.6	5.7	17.4	8.3	3.1	24.3
Los Angeles	11.8	7.5	25.0	11.7	8.1	22.7	11.9	6.6	28.2
SEER MORTALITY RATES δ, 1990-94									
REGISTRY									
Standard 9 registries	2.3	1.1	6.2	2.1	0.9	5.6	4.6	2.0	12.7
San Francisco-Oakland	2.3	1.0	6.4	2.1	1.0	5.4	3.9	1.9	10.4
Connecticut	2.0	0.9	5.2	1.8	0.9	4.7	4.7	1.5	14.5
Metropolitan Detroit	2.9	1.4	7.6	2.4	1.1	6.5	4.9	2.5	12.4
Hawaii	2.0	1.1	4.7	2.7	1.2	7.5	-	-	-
Iowa	2.4	1.2	6.1	2.4	1.2	6.0	-	-	-
New Mexico	2.6	1.0	7.7	2.4	1.0	7.0	-	-	-
Seattle-Puget Sound	2.0	1.0	5.2	1.8	0.8	4.7	5.0	2.6	12.4
Utah	2.4	0.9	7.1	2.4	0.9	6.7	-	-	-
Metropolitan Atlanta	2.2	0.8	6.4	1.4	0.6	4.1	4.7	1.5	14.7
San Jose-Monterey	2.4	0.9	7.0	2.2	0.9	6.0	2.8	0.8	9.1
Los Angeles	3.2	1.4	8.7	3.1	1.5	8.0	4.8	1.8	14.0
SURVIVAL RATES ϕ, 1986-93									
REGISTRY									
Standard 9 registries	68.9	77.5	57.8	71.4	80.2	59.2	57.1	63.4	50.7
San Francisco-Oakland	68.3	75.2	60.2	70.6	77.7	61.2	58.5	63.3|	51.9|
Connecticut	66.9	75.6	56.4	68.6	78.0	56.6	53.6|	49.8|	52.9|
Metropolitan Detroit	63.1	72.4	53.0	66.8	77.2	54.8	55.0	61.1	49.7
Hawaii	68.8	76.1	58.4|	62.3|	71.0|	47.5|	-	-	-
Iowa	72.7	80.0	63.4	72.9	80.2	63.5	-	-	-
New Mexico	69.3	78.3	56.9	71.8	80.4	59.5	-	-	-
Seattle-Puget Sound	75.2	82.9	61.7	76.2	84.6	61.3	61.6|	-	-
Utah	73.2	83.3	56.2‖	74.1	83.6	57.8|	-	-	-
Metropolitan Atlanta	69.3	79.0	54.7	76.4	85.0	61.0	58.5	68.3	46.7‖

Note: San Jose-Monterey and Los Angeles are new SEER areas as of 1992 and their data are only used in this table and not other tables in this section.

§ SEER Program. Incidence rates are per 100,000 and are age-adjusted to the 1970 U.S. standard population.

δ NCHS public use tape. Mortality rates are per 100,000 and are age-adjusted to the 1970 U.S. standard population.

ϕ Survival rates are relative rates expressed as percents and are based on follow-up of patients through 1994.

| The standard error of the survival rate is between 5 and 10 percentage points.

‖ The standard error of the survival rate is greater than 10 percentage points.

\- Statistic could not be calculated or populations are inadequate.

SEER Incidence and U.S. Mortality
Cervix Uteri, Under 50 Years of Age
By Race

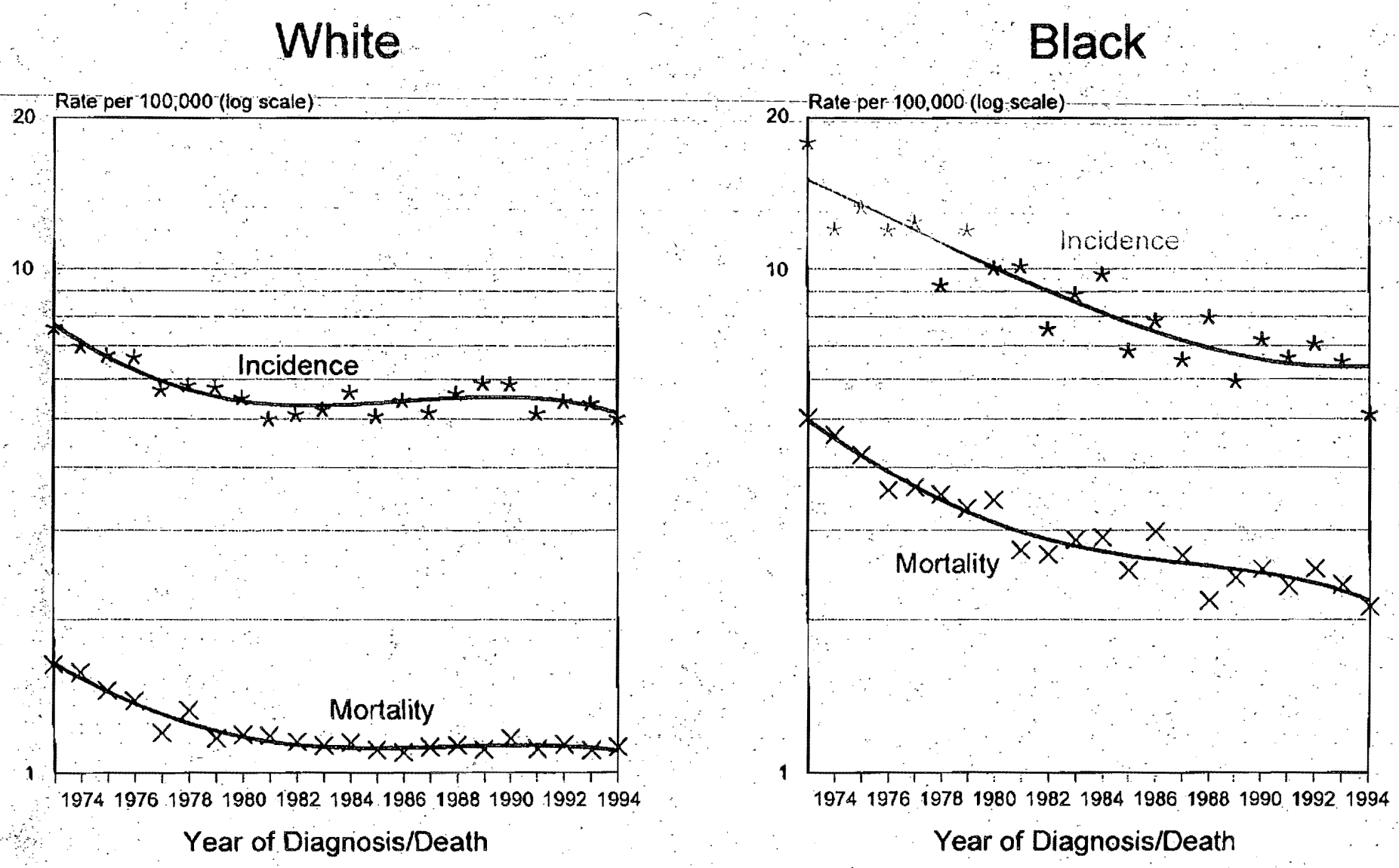

Figure V-1

SEER Incidence and U.S. Mortality
Cervix Uteri, Ages 50 and Over
By Race

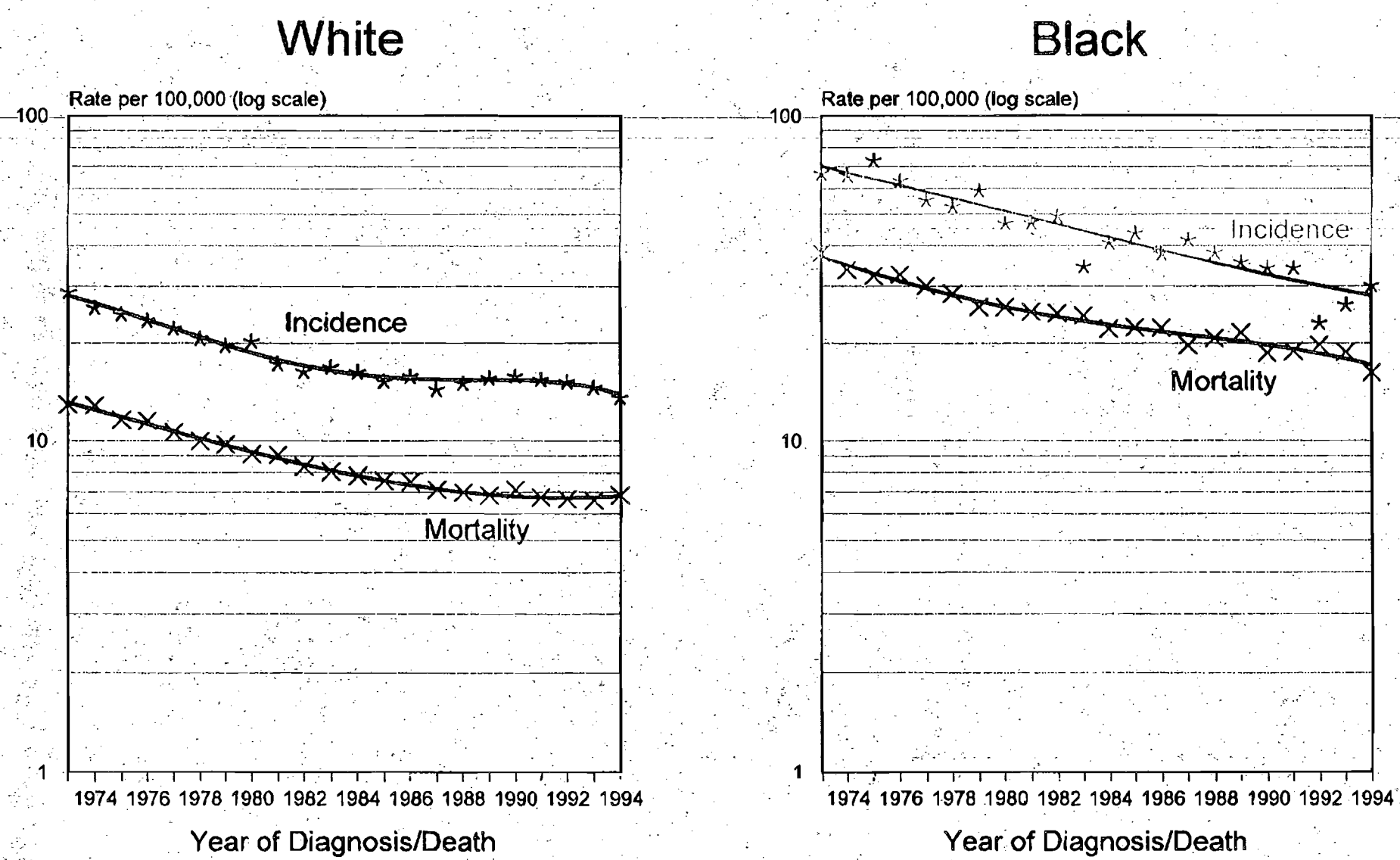

Figure V-2

Table VI-1
COLON AND RECTUM CANCER (Invasive)

TRENDS IN SEER INCIDENCE AND U.S. MORTALITY, BY RACE AND SEX

	All Races			Whites			Blacks		
	Total	Males	Females	Total	Males	Females	Total	Males	Females
INCIDENCE TRENDS (expressed in percents)§:									
1973-94									
All Ages									
Percent Change (PC)	-5.2	-1.9	-9.4	-7.6	-5.0	-11.5	22.5	34.6	14.1
Est. Annual PC (EAPC)	-0.2	0.1	-0.5*	-0.3	0.0	-0.7*	0.9*	1.4*	0.6*
Under 65									
Percent Change (PC)	-7.7	-0.9	-15.2	-11.8	-5.6	-19.3	26.9	37.1	18.5
Est. Annual PC (EAPC)	-0.4*	0.1	-0.9*	-0.6*	-0.1	-1.1*	1.0*	1.3*	0.8*
65 and over									
Percent Change (PC)	-3.9	-2.4	-6.0	-5.4	-4.7	-7.0	19.7	33.0	11.0
Est. Annual PC (EAPC)	-0.1	0.1	-0.4*	-0.2	0.0	-0.4*	0.9*	1.5*	0.4
1975-79 - ALL AGES									
Percent Change (PC)	2.3	3.7	1.3	2.2	3.9	0.7	7.0	4.8	10.9
Est. Annual PC (EAPC)	0.9	1.5	0.3	0.9	1.5	0.2	1.6	1.4	2.3
1990-94 - ALL AGES									
Percent Change (PC)	-6.6	-8.1	-5.5	-7.4	-9.0	-6.3	-3.4	-1.5	-4.9
Est. Annual PC (EAPC)	-2.3*♦	-2.7*♦	-2.0*♦	-2.5*♦	-3.0*♦	-2.3*♦	-1.1*◊	-0.4	-1.6
MORTALITY TRENDS (expressed in percents)δ:									
1973-94									
All Ages									
Percent Change (PC)	-19.6	-14.2	-25.0	-21.8	-16.6	-27.2	9.3	22.3	-0.1
Est. Annual PC (EAPC)	-1.1*	-0.8*	-1.5*	-1.3*	-0.9*	-1.7*	0.5*	1.0*	0.0
Under 65									
Percent Change (PC)	-23.8	-16.4	-31.9	-26.5	-19.6	-34.4	0.5	17.8	-13.7
Est. Annual PC (EAPC)	-1.4*	-0.9*	-2.0*	-1.5*	-1.0*	-2.2*	0.0	0.7*	-0.6*
65 and over									
Percent Change (PC)	-17.6	-13.2	-21.6	-19.7	-15.4	-23.8	14.5	24.7	8.6
Est. Annual PC (EAPC)	-1.0*	-0.7*	-1.3*	-1.1*	-0.9*	-1.4*	0.7*	1.2*	0.4*
1975-79 - ALL AGES									
Percent Change (PC)	-0.4	1.2	-1.8	-0.6	1.1	-2.1	1.2	1.6	1.1
Est. Annual PC (EAPC)	-0.1	0.4	-0.6	-0.2	0.4	-0.7	0.7	0.7	0.7
1990-94 - ALL AGES									
Percent Change (PC)	-4.6	-5.5	-4.3	-4.9	-5.9	-4.5	-2.5	-1.9	-3.5
Est. Annual PC (EAPC)	-1.6*♦	-1.9*♦	-1.5*♦	-1.7*♦	-2.0*♦	-1.5*◊	-1.0♦	-0.8	-1.3◊

The Est. Annual PC is the Estimated Annual Percent Change (EAPC) over the time interval.
§ SEER Program.
δ NCHS public use tape.
* The EAPC is significantly different from zero (p<.05).
♦ The EAPC for 1990-94 is significantly different from the EAPC for 1975-79 (p<.05).
◊ The EAPC for 1990-94 is significantly different from the EAPC for 1975-79 (p<.10).
\- Statistic could not be calculated.