

CANCER IN NORTH AMERICA, 1995-1999

EXECUTIVE SUMMARY

NAACCR is pleased to release this three-volume monograph of cancer incidence and mortality in North America for 1995 to 1999. This is NAACCR's 12th release of cancer incidence statistics and its 6th release of cancer mortality statistics. *Cancer in North America, 1995-1999 (CINA)* reflects the efforts of many people from many organizations: organizational and central cancer registries in 49 states and regions of the United States and 12 provinces and territories of Canada, NAACCR sponsors, Information Management Services, Inc., NAACCR's Data Evaluation and Publication Committee (DEPC), and its *CINA* Production Subcommittee. As a result of their diligence, we have been able, once again, to translate cancer case reports into meaningful aggregate information.

Sixty-one registries participated this year. Of these, data from 28 U.S. central cancer registries (23 states and five metropolitan areas) and seven Canadian cancer registries met the criteria for inclusion in combined cancer incidence rates for each of the two nations and for North America, 1995-1999. To be included in the combined incidence rates, each registry was required to submit five years of data and to passing rigorous criteria for each single year's data, including: completeness of reporting, non-duplication of records, percent unknown in critical data fields, percent of cases registered with information from death certificates only, and internal consistency among data items. These registries whose data were used to construct combined rates for the U.S. and North America cover about 55% of the total U.S. population. The seven Canadian registries whose data were used to construct combined rates for Canada and North America cover about a third of the Canadian population.

The data used in this monograph were submitted to NAACCR on or before December 3, 2001. This means that within 23 months of the close of the 1999 diagnosis year, registries throughout North America were able to register the vast majority of new cases for 1999 and have a data file available for analysis and submission to NAACCR. This is the third consecutive year in which registries were able to meet this ambitious deadline without sacrificing data completeness. In fact, the completeness and quality of the data included in this volume are the best ever published in *CINA*. Thirty-five registries met or exceeded stringent NAACCR standards of completeness and quality. These achievements are helping central registries use their data confidently in research, in the design and management of cancer control interventions, and in the development of cancer control policies. It is again with great pride in our member registries, therefore, that we release *Cancer in North America, 1995-1999*, on behalf of them all.

Two tables summarizing the five most common cancer types for eight racial groups and for persons of Hispanic origin are included in Volume III. These include data on the cancer burden in the United States of Filipinos, Japanese, Chinese, Vietnamese, Koreans, American Indians / Alaska Natives, and Hispanic populations, in addition to comparable data on the cancer burden of blacks, whites, and all persons in the U.S.

Among males of different races, prostate cancer is the most common cancer type for all groups except the Vietnamese and Koreans, among whom lung cancer is the most common of all cancers. Liver cancer is included among the top five common sites for the each of the Asian American populations except Japanese males, reflecting the burden of hepatitis and other liver disease in the developing countries from which substantial proportions of these groups have immigrated. Stomach cancer is also listed among the top five cancers among four of the five Asian American populations (excluding Filipinos), for African Americans, and for American Indians/Alaskan Natives probably reflecting differences in the diets of these groups and American males as a whole. Stomach cancer is less likely to be found among white males than males of other

racers in the U.S., although it still ranks among the top ten cancers for white males. Cancer of the lung, cancer of the colon and rectum rank among the top five cancers for males of all race/ethnic groups. These statistics demonstrate substantial opportunities for cancer prevention, by reducing the use of tobacco and by screening effectively for cancers of the colon and rectum, both proven interventions. Reducing the use of tobacco would also prevent many of the bladder and kidney cancers observed among U.S. males.

Among females of different races, breast cancer is the most common cancer in each of the nine racial or ethnic groups. This may be a good sign, as it may reflect aggressive screening for breast cancer among all groups. Aggressive screening for breast cancer has had the effect of increasing the incidence of breast cancer in the U.S., as formerly “occult” tumors are uncovered by improved mammographic techniques. Cancer of the lung and cancer of the colon and rectum also rank among the top five most common cancers in each of the populations, again, as in the case of males, suggesting opportunities for cancer prevention. Unfortunately, cancer of the cervix persists as one of the most common cancers for Hispanic, African American, Vietnamese, Korean, and American Indian / Alaskan Native women, reflecting failures of screening. The Pap test, when used according to guidelines, should be able to detect almost all cervical lesions before they become invasive, like the tumors counted in *CINA*.

As racial and ethnic diversity increases in the populations we serve, it is essential to be able to classify case reports ever more finely according to race and ethnicity. Doing so helps us serve each of our subpopulations more effectively, and also provides significant opportunities for study of the determinants and consequences of cancer. In this vein, NAACCR conducted an assessment of member registries’ practices related to the collection, editing, and coding of data on race and ethnicity. Member registries were surveyed about these practices in 2001, and the responses are being analyzed carefully by NAACCR’s Collaborative Research Working Group under the leadership of Dr. Dee West of the Greater Bay Area Registry at the Northern California Cancer Center. Dr. West presented preliminary results at the NAACCR Annual Meeting in 2001. Phase II of this project (including continued study and the testing of practical approaches to the solution of coding issues) was planned after the Annual Meeting and fielded early in 2002.

Like its predecessors, *Cancer in North America, 1995-1999* contains cancer mortality data for all 50 states, the District of Columbia, five metropolitan areas and all provinces and territories of Canada, as well as comparable statistics for each nation. For the first time, however, *CINA* includes population estimates and cancer death rates for American Indians/Alaskan Natives, Asians/Pacific Islanders, and Hispanics in Volume Two, Mortality.

Special tables of combined rates for the United States and Canada, sorted by country, race (where applicable), and U.S. region (for mortality statistics) are included in this monograph to facilitate comparisons of rates among registry areas. In Volume Three, NAACCR Combined Incidence Rates, these special tables include data from the 35 registries achieving NAACCR’s highest standards of quality, to minimize the effect that under-ascertainment of cases would have on interpreting rate differences among the registries. In Volume Two, Mortality, these special tables include mortality data for all states of the United States and all provinces and territories of Canada, as well as comparable statistics for each nation.

For the first time, *CINA* includes age-adjusted cancer incidence and death rates using the Year 2000 Standard Population of the United States, in conformity with policy set by the United States Government in 1998¹. At that time, the U.S. Department of Health and Human Services issued a directive to all federal agencies to calculate age-adjusted death rates using the Year 2000 Standard, beginning with data year 1999. This policy breaks with two long-standing conventions used by the U.S. government for age-adjusting health data, the 1940 U.S. standard population, adopted shortly after National Vital Statistics System had reached maturity,

¹ Klein RJ, Schoenborn CA. Age adjustment using the 2000 projected U.S. population. Healthy People 2010. Statistical Notes No. 20, January 2001.

and the 1970 U.S. standard population, adopted by the National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) Program in the early 1970s. In the U.S., most central cancer registries were established after that time, and thus have always used the 1970 U.S. Standard Population for age-adjusting cancer incidence and death rates. It may come as a shock to see age-adjusted cancer rates in *CINA* that are about 25% higher than last year.

Use of the 1996 Canadian Standard Population reflects a change as well. In previous editions of *CINA*, Canadian rates (and U.S. rates calculated for comparison with Canadian rates) have used the 1991 Canadian Standard Population. This year, at the request of its Canadian members, NAACCR has substituted the 1996 Canadian Standard Population for this purpose. Unlike the change in U.S. standard populations, the shift in Canadian standards has a much smaller statistical impact, because of the similarity between the age distribution of the population in Canada 1991 and in Canada 1996. To help us with these transitions, NAACCR has calculated age-adjusted rates for *CINA*, 1995-1999 using *four* standard populations, U.S. 1970, U.S. 2000, World, and Canada 1996.

Readers who visit NAACCR's comprehensive website will find an educational module devoted entirely to developing a better understanding of age-adjustment, use of the new U.S. standard population, and its effects on age-adjusted cancer rates. Consider a visit to www.naacccr.org for this purpose.

The data submitted annually for use in *CINA* are also made available to researchers following guidelines approved by the NAACCR membership. During the past year, NAACCR members and staff worked together to make this process more open and understandable to the membership, while tightening safeguards on the distribution and use of the data. With the guidance of NAACCR's Board of Directors and the Data Evaluation and Publication Committee (DEPC), NAACCR staff held a "telephone town meeting" to elicit the thoughts and requests of the entire NAACCR membership about the availability and use of data submitted to our organization in its annual call for data. Following the town meeting, NAACCR staff corresponded by e-mail with those members who wished to submit written comments on the various issues inherent in this process. Many thoughtful ideas were offered by telephone and by e-mail. With the help of DEPC, NAACCR staff incorporated the comments and suggestions of the membership in Packet 4 of NAACCR's *Call for Data*, mailed to the membership on September 25, 2001. Packet 4 contains:

- ***NAACCR Call for Data Assurances Agreement:*** The assurance from NAACCR to its members about NAACCR's handling of their data, co-signed by NAACCR's Executive Director and by NAACCR members; the 11-page *Assurances Agreement* is specific and comprehensive.
- ***Data Confidentiality Agreement for NAACCR Researchers:*** An agreement to be signed by NAACCR members who may request NAACCR data for research projects; it governs the use of members' data.
- ***Policy and Procedures Statement – Review of Scientific Papers:*** Contains rules about the review and release of scientific papers written by NAACCR committees. Release is allowed or disallowed by NAACCR's Scientific Editorial Board, whose excellent work over the past few years has realized high standards for NAACCR's scientific publications.
- ***Consent Form for NAACCR Secondary Uses of CINA Data:*** The way in which a member registry may formally allow NAACCR to distribute or to use its data for specifically-defined projects according to procedures defined in the *Assurance Agreement*. As new projects are defined, additional consent forms will be distributed to the membership for their consideration.

Packet 4 represents a major development in our organization's handling and use of data, meeting the needs of the membership and researchers in ways which balance data security and availability. Packet 4 symbolizes how far our organization has come in a few short years, reflecting the increasing demand for data which are recognized for their accuracy, completeness, and utility.

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CANCER IN NORTH AMERICA, 1995-1999

VOLUME TWO: MORTALITY

**A Publication of the
North American Association of Central Cancer Registries (NAACCR)**

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VOLUMES ONE & THREE: INCIDENCE, 1995-1999

UNITED STATES:

Data from 49 U.S. central cancer registries (43 states, the District of Columbia, and 5 metropolitan areas) were received in response to the NAACCR 2002 *Call for Data*. Of these, data from 28 central cancer registries (23 states and 5 metropolitan areas) met the NAACCR criteria for inclusion in the combined cancer incidence statistics. The 23 states were California, Colorado, Connecticut, Delaware, Hawaii, Idaho, Illinois, Iowa, Kentucky, Louisiana, Michigan, Minnesota, Nebraska, New Jersey, New Mexico, New York, North Carolina, Pennsylvania, Rhode Island, Utah, West Virginia, Wisconsin, and Wyoming. The 5 metropolitan areas were the Greater Bay Area (California), Los Angeles (California), Atlanta (Georgia), Detroit (Michigan), and Seattle (Washington). To meet the criteria for the NAACCR U.S. combined cancer incidence statistics, each registry was required to submit five years (1995-1999) of data. Data from each single year of all five years had to pass rigorous criteria for completeness of reporting, non-duplication of records, internal consistency among data items, and low percentages of death-certificate-only cases and cases with missing/unknown sex, race, age, or county. If data from a metropolitan area and its state both met the criteria, only state data were used. Data for the NAACCR U.S. combined cancer incidence statistics cover about 55% of the total U.S. population, 54% of whites, 50% of blacks, and 72% of all other races combined.

A total of 3,372,940 cancers (all invasive and bladder in situ cancers) was diagnosed in the NAACCR U.S. combined areas in the 5-year period (1995-1999), averaging 674,588 cancers per year or 1,847 per day. A little over half (51%) of these cancers occurred in males; slightly less than half (49%) occurred in females.

Common Cancers

- ▶ **All races and genders combined.** For all races and both genders, the five most commonly diagnosed cancers in the NAACCR U.S. combined areas were cancers of the breast (102,565 cancers per year), prostate (98,102), lung (97,309), colon and rectum (80,492), and bladder (30,661).
- ▶ **Whites.** An average of 295,390 cancers was diagnosed among white males and 289,179 cancers among white females in each of the five years (1995-1999) in the NAACCR U.S. combined areas. The five most commonly diagnosed cancers among white males were cancers of the prostate (28%), lung (16%), colon and rectum (12%), and bladder (7%) and non-Hodgkin's lymphoma (4%). The five most commonly diagnosed cancers among white females were cancers of the breast (31%), lung (13%), colon and rectum (12%), uterine corpus (including uterus, NOS) (6%), and ovary (4%).
- ▶ **Blacks.** An average of 32,071 cancers was diagnosed among black males and 28,178 cancers among black females in each year of the five-year period (1995-1999) in the NAACCR U.S. combined areas. The three most commonly diagnosed cancers among black males were the same as those among white males: cancers of the prostate (35%), lung (18%), and colon and rectum (10%). The fourth most commonly diagnosed cancer was non-Hodgkin's lymphoma (3%) and the fifth was stomach cancer (3%). The four most commonly diagnosed cancers among black females were the same as those among white females; however, ranks for cancers of the lung and colon and rectum were reversed. Black females most often were diagnosed with cancers of the breast (30%), colon and rectum (13%), lung (13%), and uterine corpus (including uterus, NOS) (5%). Instead of ovarian cancer, the fifth most commonly diagnosed cancer among black females was cervical cancer (4%).

- ▶ **American Indians/Alaskan Natives (AI/AN).** An average of 543 cancers was diagnosed among AI/AN males and 552 cancers among AI/AN females in each of the five years (1995-1999) in the NAACCR U.S. combined areas. The three most commonly diagnosed cancers among AI/AN males were the same as those among white males and black males: cancers of the prostate (23%), lung (18%), and colon and rectum (12%). The fourth most commonly diagnosed cancer among AI/AN males was kidney cancer (6%) and the fifth was non-Hodgkin's lymphoma (4%). The four most commonly diagnosed cancers among AI/AN females were the same as those among white females: cancers of the breast (26%), lung (12%), colon and rectum (11%), and uterine corpus (including uterus, NOS) (6%). The fifth most commonly diagnosed cancer among AI/AN females was cervix cancer (5%), which also ranked fifth among black females.

- ▶ **Filipinos.** An average of 1,780 cancers was diagnosed among Filipino males and 1,873 cancers among Filipino females in each of the five years (1995-1999) in the NAACCR U.S. combined areas. The three most commonly diagnosed cancers among Filipino males were the same as those among white and black males: cancers of the prostate (29%), lung (19%), and colon and rectum (13%). The fourth and fifth most commonly diagnosed cancers among Filipino males were non-Hodgkin's lymphoma (5%) and liver cancer (4%). The four most commonly diagnosed cancers among Filipino females were the same as those among black females: cancers of the breast (36%), colon and rectum (10%), lung (8%), and uterine corpus (including uterus, NOS) (7%). The fifth most commonly diagnosed cancer among Filipino females was thyroid cancer (6%), which ranked among the leading five cancers only for Filipino and Vietnamese women.

- ▶ **Japanese.** An average of 1,530 cancers was diagnosed among Japanese males and 1,681 cancers among Japanese females in each year of the five-year period (1995-1999) in the NAACCR U.S. combined areas. The order of the three most commonly diagnosed cancers among Japanese males differed slightly from those among other race groups. Prostate cancer (26%) was the most commonly diagnosed cancer among Japanese males as in other race groups. Instead of lung cancer, the second most common diagnosis was cancer of the colon and rectum (19%), followed by cancers of the lung (13%). The fourth and fifth most commonly diagnosed cancers were cancers of the stomach (8%) and bladder (5%). The four most commonly diagnosed cancers among Japanese females were the same as those among black and Filipino females. They were cancers of the breast (34%), colon and rectum (16%), lung (9%), and uterine corpus (including uterus, NOS) (6%). The fifth most common cancer among Japanese females was stomach cancer (5%).

- ▶ **Chinese.** An average of 2,144 cancers was diagnosed among Chinese males and 1,999 cancers among Chinese females in each of the five years (1995-1999) in the NAACCR U.S. combined areas. The three most commonly diagnosed cancers among Chinese males were the same as those among white, black, AI/AN, and Filipino males: cancers of the prostate (19%), lung (16%), and colon and rectum (15%). The fourth and fifth most common cancers among Chinese males were cancers of the liver (8%) and stomach (6%). The three most commonly diagnosed cancers among Chinese females were the same as those among black, Filipino, and Japanese females: cancers of the breast (28%), colon and rectum (14%), and lung (11%). The fourth and the fifth most commonly diagnosed cancers among Chinese females were the same as those among white females: cancers of the uterine corpus (including uterus, NOS) (5%) and ovary (4%).

- ▶ **Vietnamese.** An average of 580 cancers was diagnosed among Vietnamese males and 556 cancers among Vietnamese females in each of the five years (1995-1999) in the NAACCR U.S. combined areas. The types of cancer diagnosed most commonly among Vietnamese males differed from among males in other race groups. The most common cancer among Vietnamese males was lung cancer (18%), followed by cancers of the liver (15%), prostate (12%), colon and rectum (10%), and stomach (7%). The two most commonly diagnosed cancers among Vietnamese females were the same as those among black, Filipino, Japanese, Chinese, and Korean females: cancers of the breast (23%) and colon and rectum (10%). The third most frequently diagnosed cancer among Vietnamese females was cervical cancer (9%), followed by lung cancer (9%) and thyroid cancer (6%).

- ▶ **Koreans.** An average of 594 cancers was diagnosed among Korean males and 659 cancers among Korean females in each year of the five-year period (1995-1999) in the NAACCR U.S. combined areas. In contrast to all the other racial and ethnic groups except Vietnamese, Korean males were diagnosed more often with lung cancer (16%) than with any other cancer. Stomach cancer was the second most commonly diagnosed cancer, accounting for 15.96% of all cancers. Ranking third to fifth among Korean males were cancers of the colon and rectum (14%), prostate (11%), and liver (10%). The two most common cancers among Korean females were the same as those among black, Filipino, Japanese, Chinese, and Vietnamese females: cancers of the breast (23%) and colon and rectum (12%). Stomach cancer (10%) was the third most commonly diagnosed cancer among Korean females, followed by lung cancer (8%) and cervical cancer (7%).

- ▶ **Hispanic Ethnicity (any race).** An average of 15,047 cancers was diagnosed among Hispanic males and 15,362 cancers among Hispanic females in each of the five years (1995-1999) in the NAACCR U.S. combined areas. The five most commonly diagnosed cancers among Hispanic males were the same as those among black males although ranks for cancers of the lung and colon and rectum were reversed: cancers of the prostate (27%), colon and rectum (11%), and lung (11%), non-Hodgkin's lymphoma (6%) and stomach cancer (4%). The five most commonly diagnosed cancers among Hispanic females were cancers of the breast (29%), colon and rectum (10%), lung (7%), cervix (7%), and uterine corpus (including uterus, NOS) (5%), which were the same as those among black females except for reversed ranks for cervical cancer and cancer of the uterine corpus (including uterus, NOS).

Average Annual Age-adjusted Cancer Incidence Rates

This is the first *Cancer in North America* monograph that presents cancer incidence rates adjusted to the 2000 U.S. population standard in conformity with policy set by the United States government in 1998. For all cancers combined, incidence rates adjusted to the 2000 U.S. population standard were 18%-20% higher than incidence rates adjusted to the 1970 U.S. population standard among race/gender groups presented in this monograph. However, for specific cancer sites and geographic areas, the rates adjusted to the 2000 U.S. population standard were higher but by varying percentages. In the comparisons of incidence rates presented below, similar rate ratios were observed using the incidence rates adjusted to either of the population standards.

Comparisons of incidence rates by race/gender group

- ▶ **Higher incidence rates for all cancers combined among males than among females.** Overall, the age-adjusted (2000 U.S.) incidence rate for all cancers combined was approximately 33% higher among males (559.5 per 100,000) than among females (420.1 per 100,000). However, the male/female rate ratios varied greatly by race group: 30% among whites (550.0 per 100,000 for males and 424.4 per 100,000 for females) and 66% among blacks (652.1 per 100,000 for males and 393.4 per 100,000 for females).
- ▶ **Higher incidence rate for all cancers combined among blacks than among whites for males but not for females.** The age-adjusted (2000 U.S.) incidence rate for all cancers combined was 19% higher among black males (652.1 per 100,000) than among white males (550.0 per 100,000). In contrast, the rate among black females (393.4 per 100,000) was 7% lower than the rate among white females (424.4 per 100,000).
- ▶ **Higher incidence rates for specific cancer types among blacks than among whites.** The age-adjusted (2000 U.S.) incidence rates were higher among black males than among white males for cancers of the prostate (57% higher), lung (34%), buccal cavity and pharynx (36%), esophagus (76%), stomach (77%), liver (72%), pancreas (31%), and larynx (67%) and multiple myeloma (95%). The age-adjusted (2000 U.S.) incidence rates among black females were also higher than the rate among white females for cancers of the esophagus (1.1 times higher), stomach (1.1 times), liver (68%), pancreas (46%), and larynx (50%) and multiple myeloma (1.3 times). In addition, the rates were also higher among black females than among white females for cancers of the cervix (63% higher) and colon and rectum (12%). The rates for cancers of the lung and buccal cavity and pharynx were similar among white females and black females.
- ▶ **Higher incidence rates for specific cancer types among whites than among blacks.** Although the overall cancer incidence rates were higher among blacks than among whites, the age-adjusted (2000 U.S.) incidence rates for some specific cancer types were higher among whites than among blacks. For males, the rates were higher among whites than blacks for cancers of the bladder (1.2 times higher), and brain and other nervous system (89%), non-Hodgkin's lymphoma (30%), leukemias (36%), and melanoma of the skin (15 times). For females, besides cancers of the bladder (44% higher) and brain and other nervous system (65%), non-Hodgkin's lymphoma (51%), leukemia (28%), and melanoma of the skin (13 times), the incidence rates were also higher among whites than among blacks for cancers of the breast (18% higher), uterine corpus (including uterus, NOS) (39%), and ovary (48%).

Geographic variations in cancer incidence rates by race/gender group

Age-adjusted incidence rates varied widely by geographic area. These variations could relate to geographic differences in cancer risks, the prevalence of cancer screening, and other factors.

- ▶ **Geographic variations in incidence rates for all cancers combined by race/gender group.** The age-adjusted (2000 U.S.) incidence rates for all cancers combined varied among the NAACCR U.S. combined areas. Utah had the lowest incidence rates for both white males (472.3 per 100,000) and white females (349.2 per 100,000). Rhode Island had the highest rates for both white males (646.5 per 100,000) and white females (476.7 per 100,000). The differences from the lowest to the highest rates were about 37% for both white males and white females. The geographic variations in rates were much larger among blacks than among whites for both males and females. Among black males, the rates ranged from a low of 359.5 per

100,000 in New Mexico to a high of 780.8 per 100,000 in Atlanta (Georgia). Among black females, the rates varied from a low of 110.9 per 100,000 in Idaho to a high of 456.3 in Delaware. The highest was 2.2 times the lowest for black males and almost 4.1 times for black females.

- ▶ **Geographic variations in incidence rates for lung cancer by race/gender group.** Kentucky had the highest lung cancer rates (2000 U.S.) for white males (140.8 per 100,000) and white females (67.8 per 100,000) while Utah had the lowest lung cancer rates for white males (42.7 per 100,000) and white females (22.7 per 100,000) among the NAACCR U.S. combined areas. The highest rates were 3.3 times the lowest for white males and almost three times for white females. The lung cancer rates (2000 U.S.) varied from a low of 37.8 per 100,000 in Utah to a high of 162.0 per 100,000 in Wisconsin among black males and from a low of 28.8 per 100,000 in New Mexico to a high of 79.3 per 100,000 in Kentucky among black females. The highest was 4.3 times the lowest for black men and almost 2.8 times the lowest for black women.
- ▶ **Geographic variations in incidence rates for prostate cancer by race.** Unlike its lung cancer incidence rates, Kentucky had the lowest prostate cancer incidence rate (2000 U.S.) among the NAACCR U.S. combined areas for white males (124.2 per 100,000) - 32% lower than the highest rate (182.7 per 100,000), in Detroit (Michigan). For black males, Atlanta (Georgia) had the highest prostate cancer incidence rate (312.7 per 100,000) and New Mexico had the lowest rate (139.6 per 100,000). The highest rate was 2.2 times the lowest rate for black males.
- ▶ **Geographic variations in incidence rates for cancer of the colon and rectum by race/gender group.** The age-adjusted (2000 U.S.) incidence rates for cancers of the colon and rectum also varied widely among the NAACCR U.S. combined areas. New Jersey had the highest rate for white males (79.6 per 100,000) and Rhode Island had the highest rate for white females (57.6 per 100,000). The lowest rates were 48.7 per 100,000 in Utah for white males and 36.8 per 100,000 in New Mexico for white females. The differences between the highest and the lowest rates were 63% for white males and 57% for white females. West Virginia had the highest rate for both black males (86.6 per 100,000) and black females (64.3 per 100,000). For black males the rate was 87% higher than the lowest rate (46.3 per 100,000), in Utah. For black females, the rate was 2.3 times higher than the lowest rate (28.5 per 100,000), in New Mexico.
- ▶ **Geographic variations in incidence rates for female breast cancer by race.** For white females, the Greater Bay Area (California) had the highest age-adjusted (2000 U.S.) incidence rate for breast cancer (154.3 per 100,000) among the NAACCR U.S. combined areas. This rate was 31% higher than the lowest rate (117.7 per 100,000), in West Virginia. For black females, Iowa had the highest incidence rate for breast cancer (148.3 per 100,000), which was 2.1 times higher than the lowest rate (47.4 per 100,000), in Utah.
- ▶ **Geographic variations in incidence rates for cervical cancer by race.** For white females, West Virginia had the highest age-adjusted (2000 U.S.) incidence rate (13.6 per 100,000) for cervical cancer among the NAACCR U.S. combined areas. This rate was 94% higher than the lowest rate (7.0 per 100,000), in Minnesota. In contrast, Minnesota had the highest cervical cancer incidence rate (20.9 per 100,000) for black females. The rate was over three-fold the lowest rate (6.4 per 100,000) for black females, in Seattle (Washington).
- ▶ **Geographic variations in incidence rates for ovarian cancer by race.** For white females, Seattle (Washington) had the highest age-adjusted (2000 U.S.) incidence rate (21.0 per

100,000) for ovarian cancer among the NAACCR U.S. combined areas. This rate was 60% higher than the lowest rate (13.1 per 100,000) in Louisiana. For black females, Seattle (Washington) also had the highest ovarian cancer incidence rate (15.8 per 100,000) in the NAACCR U.S. combined areas. The rate was 2.7 times the lowest rate (5.8 per 100,000), in Minnesota.

Cancers Among Children (ages 0-14) and Adolescents (ages 15-19)

Common cancers among children and adolescents

- ▶ **All races and genders combined.** An average of 4,621 cancers was diagnosed among children and 2,055 cancers among adolescents in each of the five years (1995-1999) in the NAACCR U.S. combined areas. The five most commonly diagnosed cancers among children were leukemia (32%), cancer of the central nervous system (21%), lymphoma (10%), cancer of the sympathetic nervous system (7%), and soft tissue sarcoma (7%). The five most commonly diagnosed cancers among adolescents differed from those among children. Lymphoma was the most common cancer among adolescents, accounting for 25% of all cancers in this age group. Other commonly diagnosed cancers were germ cell tumors (14%), leukemia (13%), and cancers of the central nervous system (10%) and bone (8%).
- ▶ **Whites.** An average of 3,760 cancers was diagnosed among white children and 1,707 cancer among white adolescents in each of the five years (1995-1999) in the NAACCR U.S. combined areas. The five most commonly diagnosed cancers among white children were leukemia (33%), cancer of the central nervous system (21%), lymphoma (10%), cancer of the sympathetic nervous system (7%) and soft tissue sarcoma (7%). The five most commonly diagnosed cancers among white adolescents differed from those among white children. Lymphoma was the most common cancer among adolescents, accounting for 26% of all cancers in this age group. Germ cell tumors (15%) were the second most commonly diagnosed cancer, followed by leukemia (13%) and cancers of the central nervous system (10%) and bone (8%).
- ▶ **Blacks.** An average of 509 cancers was diagnosed among black children and 206 cancers among black adolescents in each of the five years (1995-1999) in the NAACCR U.S. combined areas. The three most commonly diagnosed cancers among black children were the same as those among white children: leukemia (25%), cancer of the central nervous system (21%) and lymphoma (11%). Instead of cancer of the sympathetic nervous system, the fourth most commonly diagnosed cancer among black children was renal tumors (9%), followed by soft tissue sarcoma (9%). The five most commonly diagnosed cancers among black adolescents differed from those among black children. Lymphoma was the most common cancer among black adolescents, accounting for 25% of all cancers in this age group. Other commonly diagnosed cancers were leukemia (13%), soft tissue sarcoma (12%), germ cell tumors (12%), and cancer of the central nervous system (11%).

Comparisons of cancer incidence rates among children and adolescents by race/gender group

- ▶ **Higher incidence rates among male children than among female children.** Overall, the age-adjusted (2000 U.S.) incidence rate for all cancers combined was 19% higher among male children than among female children in the NAACCR U.S. combined areas. The male/female rate ratios were about the same for white children as for black children. In addition, for most specific cancer types, the age-adjusted (2000 U.S.) incidence rates were higher for male children than female children.
- ▶ **Higher incidence rates among female children than among male children.** For a few cancer types, renal tumors and germ cell tumors, female children had higher incidence rates than male children in the NAACCR U.S. combined areas.
- ▶ **Higher incidence rates for all cancers combined among whites than among blacks.** Unlike cancer incidence rates for all ages combined, the age-adjusted (2000 U.S.) incidence rates for all cancers combined among children were 28% higher for whites (148.3 per million) than for blacks (115.6 per million). Among adolescents, the rate was 45% higher for whites (208.1 per million) than for blacks (144.0 per million).
- ▶ **Higher incidence rates for renal tumors among blacks than among whites.** Although the age-adjusted (2000 U.S.) incidence rates for all cancers combined and most specific cancer types were higher for white children than for black children, the rate for renal tumors was 31% higher among black children (10.6 per million) than among white children (8.1 per million). The rate was also higher for blacks than for whites among adolescents.
- ▶ **Higher incidence rates for all cancers combined among children aged 0-4 and adolescents (ages 15-19) than among those in the other two age groups.** The age-specific incidence rates for all cancers combined were higher among children aged 0-4 (202.8 per million) and adolescents (199.2 per million) than among children aged 5-9 (111.3 per million) and 10-14 (122.5 per million). This pattern was seen among whites and blacks as well.

CANADA:

Data from 12 Canadian central cancer registries (10 provinces and 2 territories) were received in response to the 2002 NAACCR *Call for Data*. Of these, data from six provinces and one territory met the NAACCR criteria and were used to compute the NAACCR Canadian combined cancer incidence statistics. The six provinces and one territory were Alberta, British Columbia, Manitoba, New Brunswick, Prince Edward Island, Saskatchewan, and Northwest Territories. To be included in the NAACCR Canadian combined cancer incidence statistics, each registry was required to submit five years (1995-1999) of data. Data from each single year of all five years had to pass rigorous criteria for completeness of reporting, non-duplication of records, internal consistency among data items, and low percentages of death-certificate-only cases and cases with missing/unknown sex, race or age. Data from these 7 central registries cover about one third of the Canadian population.

A total of 203,511 cancers (all invasive and bladder in situ cancers) was diagnosed in the NAACCR Canadian combined areas in the 5-year period (1995-1999), averaging 40,702 cancers per year or 112 per day. A little over half (53%) of these cancers occurred in males; slightly less than half (47%) occurred in females.

Common Cancers

- ▶ **All races and genders combined.** For all races and genders combined, the five most commonly diagnosed cancers in the NAACCR Canadian combined areas were cancers of the prostate (5,870 cancers per year), breast (5,823), lung (5,824), colon and rectum (5,024), and bladder (1,968).
- ▶ **Gender differences.** An average of 21,390 cancers was diagnosed among males and 19,313 cancers among females in each of the five years (1995-1999) in the NAACCR Canadian combined areas. The five most commonly diagnosed cancers among Canadian males were the same as those among U.S. males: cancers of the prostate (27%), lung (16%), colon and rectum (13%), and bladder (7%) and non-Hodgkin's lymphoma (4%). The five most commonly diagnosed cancers among Canadian females were the same as those among U.S. females: cancers of the breast (30%), lung (12%), colon and rectum (12%), uterine corpus (including uterus, NOS) (5%), and ovary (4%).

Average Annual Age-adjusted Cancer Incidence Rates

This is the first *Cancer in North America* monograph that presents Canadian cancer incidence rates adjusted to the 1996 Canadian population standard in conformity with the change in other cancer statistics in Canada for these years. Unlike the change in the U.S. population standard, the shift in the Canadian population standard has a smaller impact on cancer incidence statistics.

Comparisons of incidence rates by gender

- ▶ **Higher incidence rate for all cancers combined among males than females.** Overall, the age-adjusted (1996 Canadian population standard) incidence rate for all cancers combined was 31% higher among males (480.6 per 100,000) than among females (366.3 per 100,000).

Geographic variations in cancer incidence rates by gender

- ▶ **Geographic variations for all cancers combined by gender.** Among males, New Brunswick had the highest age-adjusted (1996 Cdn.) incidence rate (534.8 per 100,000) for all cancers combined among the NAACCR Canadian combined areas. This rate was approximately 28% higher than the lowest rate (416.3 per 100,000), in Northwest Territories. The rates were slightly closer for females, ranging from a low of 355.6 per 100,000 in Saskatchewan to a high of 389.3 per 100,000 in Manitoba. The difference between the highest and lowest rates for females was only 9%.
- ▶ **Geographic variations for lung cancer by gender.** For males, the age-adjusted (1996 Cdn.) incidence rate for lung cancer varied from a low of 71.1 per 100,000 in Saskatchewan to a high of 112.8 per 100,000 in Northwest Territories. The rate for Northwest Territories was 59% higher than the rate for Saskatchewan. The highest lung cancer rate for females was in Northwest Territories (101.1 per 100,000) - 1.5 times higher than the lowest rate (40.3 per 100,000), in Saskatchewan.
- ▶ **Geographic variations for colorectal cancer** Northwest Territories had the highest age-adjusted (1996 Cdn.) incidence rates for cancer of the colon and rectum for both males (102.7 per 100,000) and females (75.3 per 100,000). The lowest rates for cancer of the colon and rectum were 58.6 per 100,000 in British Columbia for males and 38.5 per 100,000 in Alberta

for females. The highest rates were 75% higher than the lowest rate for males and 96% higher than the lowest rate for females.

- ▶ **Geographic variations for prostate cancer.** The age-adjusted (1996 Cdn.) incidence rates for prostate cancer varied from a low of 45.2 per 100,000 in Northwest Territories to a high of 145.0 per 100,000 in New Brunswick. The highest rate was over three times the lowest rate.

Cancers Among Children (ages 0-14) and Adolescents (ages 15-19)

Common cancers among children and adolescents

- ▶ **All races and genders combined.** An average of 286 cancers was diagnosed among children and 126 cancers among adolescents in each of the five years (1995-1999) in the NAACCR Canadian Combined areas. The five most commonly diagnosed cancers among children were leukemia (32%), cancer of the central nervous system (22%), lymphoma (10%), cancer of the sympathetic nervous system (7%) and soft tissue sarcoma (6%). The five most commonly diagnosed cancers among adolescents differed from those among children. Lymphoma was the most commonly diagnosed cancer among adolescents, accounting for 26% of all cancers in this age group. Other commonly diagnosed cancers were germ cell tumors (16%), leukemia (11%), and cancers of the central nervous system (10%) and bone (8%).

Comparisons of incidence rates by gender

- ▶ **Higher incidence rates among male children than among female children.** Overall, the age-adjusted (1996 Cdn.) incidence rate for all cancers combined was 22% higher among male children than among female children in the NAACCR Canadian combined areas. In addition, for most specific cancer types, the age-adjusted (1996 Cdn.) incidence rates were higher for male children than for female children.
- ▶ **Higher incidence rates among female children than among male children.** For a few cancer types, female children had the higher incidence rates than male children in the NAACCR Canadian combined areas. In contrast to renal tumors and germ cell tumors in the NAACCR U.S. combined area, these cancers were cancer of the sympathetic nervous system and soft tissue sarcoma.
- ▶ **Higher incidence rates for all cancers combined among children aged 0-4 and adolescents (ages 15-19) than among those in the other two age groups.** The age-specific incidence rates for all cancers combined were higher among children aged 0-4 (207.5 per million) and adolescents (182.5 per million) than among children aged 5-9 (104.3 per million) and 10-14 (113.2 per million) in the NAACCR Canadian combined areas.

VOLUME TWO: MORTALITY, 1995-1999

Mortality data for the fifty U.S. states, the District of Columbia, and five SEER metropolitan areas were obtained from the National Center for Health Statistics via the National Cancer Institute. Mortality data for the ten Canadian provinces and two Canadian territories were provided by Statistics Canada.

- ▶ Age-adjusted cancer death rates for all races were very similar between the U.S. and Canada during the study period, although the rankings of specific cancers varied slightly.

UNITED STATES:

A total of 2,709,057 persons in the U.S. died of cancer in the five-year period (1995-1999), averaging more than half a million (541,811) per year, or 1,484 per day. A little over half (52%) of the cancer deaths occurred in males; slightly less than half (48%) occurred in females.

Common Cancers

- ▶ **All races and genders combined.** For all races and genders combined, the five leading causes of death from cancer in the U.S. were cancers of the lung (152,547 deaths per year), colon and rectum (57,057), breast (42,713), prostate (33,083), and pancreas (27,822).
- ▶ **Whites.** An average of 244,545 white males and 226,320 white females died of cancer in each of the five years (1995-1999). The five leading causes of death from cancer among white males were cancers of the lung (32%), prostate (11%), colon and rectum (10%), and pancreas (5%) and non-Hodgkin's lymphoma (4%). The five leading causes of death from cancer among white females were cancers of the lung (24%), breast (16%), colon and rectum (11%), pancreas (5%), and ovary (5%).
- ▶ **Blacks.** An average of 32,788 black males and 28,381 black females died of cancer in each year of the five-year period (1995-1999). The four leading causes of death from cancer among black males were the same as those among white males: cancers of the lung (32%), prostate (17%), colon and rectum (9%), and pancreas (5%). The fifth leading cause of death from cancer was esophageal cancer (4%). The five leading causes of death from cancer among black females were the same as those among white females: cancers of the lung (20%), breast (19%), colon and rectum (12%), pancreas (6%), and ovary (4%).
- ▶ **American Indians/Alaskan Natives (AI/AN).** An average of 910 AI/AN males and 860 AI/AN females died of cancer in each year of the five years (1995-1999). The five leading causes of death from cancer among AI/AN males were cancers of the lung (32%), colon and rectum (10%), prostate (9%), stomach (4%), and kidney (4%). The five leading causes of death from cancer among AI/AN females were the same as those among white and black females: cancers of the lung (22%), breast (14%), colon and rectum (10%), pancreas (5%), and ovary (4%).
- ▶ **Asians/Pacific Islanders (PI).** An average of 4,274 Asian/PI males and 3,733 Asian/PI females died of cancer in each year, 1995 through 1999. The five leading causes of death from cancer among Asian/PI males were cancers of the lung (26%), liver (11%), stomach (8%), and prostate (7%) and non-Hodgkin's lymphoma (4%). The three leading causes of death from cancer among Asian/PI females were the same as those among the other race groups: cancers of the lung (18%), breast (14%), and colon and rectum (10%). The fourth and fifth leading

causes of death from cancer among Asian/PI females were cancer of the stomach (7%) and pancreas (6%).

- ▶ **Hispanic origin (any race).** An average of 9,983 Hispanic males and 8,791 Hispanic females died of cancer in each of the five years (1995-1999). The five leading causes of death from cancer among Hispanic males were cancers of the lung (22%), prostate (11%), colon and rectum (10%), stomach (6%), and liver (6%). Breast cancer was the most common cause of cancer death among Hispanic females, accounting for 18% of all female deaths from cancer. Other leading causes of death from cancer among Hispanic females were cancers of the lung (13%), colon and rectum (9%), pancreas (6%), and ovary (5%).
- ▶ **Cervical cancer.** An average of 4,417 women in the U.S. died of cervical cancer in each of the five years (1995-1999). With early detection and prompt treatment, nearly all of these deaths could have been prevented.

Average Annual Age-adjusted Cancer Death Rates

This is the first *Cancer in North America* monograph that presents cancer death rates adjusted to the 2000 U.S. population standard in conformity with policy set by the United States government in 1998. Death rates adjusted to the 2000 U.S. population standard were higher than those adjusted to the 1970 U.S. population standard. For all cancers combined, death rates using 2000 U.S. population standard were about 23%-28% higher than death rates using 1970 U.S. population standard among the race/gender groups presented in this monograph. However, for specific cancer types and geographic areas, the rates adjusted to the 2000 U.S. population standard were higher, but by varying percentages.

- ▶ **Higher death rates among males than among females.** Overall, the age-adjusted (2000 U.S.) death rate for all cancers combined was approximately 51% higher among males (259.1 per 100,000) than among females (171.4 per 100,000). However, the male/female rate ratios varied by race group. The largest gender difference was seen among blacks, about 77%, and the smallest gender difference was seen among AI/AN, about 39%. A similar pattern was observed using the death rates adjusted to 1970 U.S. population standard.
- ▶ **Higher death rates for all cancers combined among blacks than among any other race groups.** For all cancers combined, the age-adjusted (2000 U.S.) death rate for black males (359.2 per 100,000) was 42% higher than the death rate for white males (253.0 per 100,000), and 2.3 times the rate for AI/AN males (156.0 per 100,000) and Asian/PI males (157.1 per 100,000). The death rate (2000 U.S.) for all cancers combined among black females (203.5 per 100,000) was 20% higher than the rate among white females (169.8 per 100,000), 82% higher than the rate among AI/AN females (112.0 per 100,000), and 96% higher than the rate among Asian/PI females (103.6 per 100,000). Similar distinctions were observed using the death rates adjusted to the 1970 U.S. population standard for both males and females.
- ▶ **Higher death rates for specific cancer types among black males than among males in other race groups.** Deaths from cancers of the prostate, lung, colon and rectum, and pancreas accounted for much of the elevation in the death rate of all cancers combined among black males compared with the rates among males in other race groups. The age-adjusted (2000 U.S.) death rate for prostate cancer among black males (72.8 per 100,000) was more than twice the rate among white males (31.2 per 100,000), more than four-fold the rate among AI/AN males (17.5 per 100,000), and more than five-fold the rate among Asian/PI males (14.3 per 100,000). In addition, death rates were also higher among black males than males in other race groups for cancers of the esophagus, stomach, larynx, and buccal cavity and pharynx. The death rate for

liver cancer among black males was higher than the rates among white and AI/AN males. Similar patterns were observed using the death rate adjusted to the 1970 U.S. population standard.

- ▶ **Higher death rates for specific cancer types among black females than among females in other race groups.** Cancers of the colon and rectum, breast, pancreas, and cervix accounted for much of the elevation in the death rate for all cancers combined among black females compared with the rates among females in other race groups. The age-adjusted (2000 U.S.) death rate for cancer of the cervix among black females (6.2 per 100,000) was more than twice the rates for white females (2.8 per 100,000), AI/AN females (3.1 per 100,000), and Asian/PI females (3.1 per 100,000). The death rate for bladder cancer among black females was higher than the rate among females in other race groups. Similar patterns were observed using the death rate adjusted to 1970 U.S. population standard.
- ▶ **Higher death rates for specific cancer types among whites than among other race groups.** The age-adjusted (2000 U.S.) death rates for cancers of the brain and non-Hodgkin's lymphoma were higher among whites than among all other race groups for both genders. The death rate for bladder cancer was higher among whites than among other race groups only for males.
- ▶ **Lower death rates for all cancers combined among AI/AN and Asians/PI compared with other race groups.** For all cancers combined, the age-adjusted (2000 U.S.) death rate among AI/AN males was 38% lower than the rate among white males and 57% lower than that among black males. The death rates for females among these race groups were closer than those for males. The rate for AI/AN females was 34% lower than the rate for white females and 44% lower than the rate for black females. The death rate for all cancers combined for Asians/PI was similar to the death rate for AI/AN. Similar patterns were observed in the death rates adjusted to the 1970 U.S. population standard.
- ▶ **Higher death rates for cancers of the liver and stomach among Asians/PI than among other race groups.** The age-adjusted (2000 U.S.) death rate for the liver cancer among Asian/PI males (14.3 per 100,000) was almost three times the rates among white males (4.9 per 100,000) and AI/AN males (5.2 per 100,000) and 1.7 times the rate among black males (8.3 per 100,000). The death rate for liver cancer among Asian/PI females (5.4 per 100,000) was 2.7 times the rate among white females (2.0 per 100,000), 1.8 times the rate among AI/AN females (3.0 per 100,000), and 1.7 times the rate among black females (3.2 per 100,000). The death rate of stomach cancer among Asian/PI males (12.9 per 100,000) was more than twice the rate among white males (6.3 per 100,000) and the rate among AI/AN males (6.6 per 100,000). For females, the death rate for stomach cancer among Asians/PI (7.7 per 100,000) was more 2.6 time the rate for whites (3.0 per 100,000), 1.1 times the rate for blacks (6.8 per 100,000), and almost 2 times the rate for AI/AN (4.0 per 100,000).
- ▶ **Geographic variations in death rates.** Cancer death rates by census division and state showed geographic variations. The death rates for all cancers combined were highest in the East South Central Division and lowest in the Mountain Division.

CANADA:

A total of 298,403 persons in Canada died of cancer during the five-year period (1995- 1999), averaging about 59,681 per year, or 163 per day. More than half (54%) of the Canadian cancer deaths occurred among males; slightly less than half (46%) occurred among females.

Common Cancers

- ▶ **All races and genders combined.** For all races and genders combined, the most common causes of death from cancer in Canada were cancers of the lung (15,843 deaths per year), colon and rectum (7,591), breast (4,959), prostate (3,653), and pancreas (2,947).
- ▶ **Gender difference.** An average of 32,038 Canadian males and 27,643 Canadian females died of cancer in each of the five years (1995-1999). The five leading causes of deaths from cancer among males were cancers of the lung (31% of the total), colon and rectum (12%), prostate (11%), pancreas (5%), and stomach (4%). The five leading causes of death from cancer among females were cancers of the lung (21%), breast (18%), colon and rectum (13%), pancreas (5%), and ovary (5%).
- ▶ **Cervical cancer.** An average of 418 Canadian women died of cervical cancer in each of the five years (1995-1999). Because of the widespread availability and proven efficacy of the Pap test and effective treatments for cancer of the cervix, deaths from cervical cancer are largely preventable.

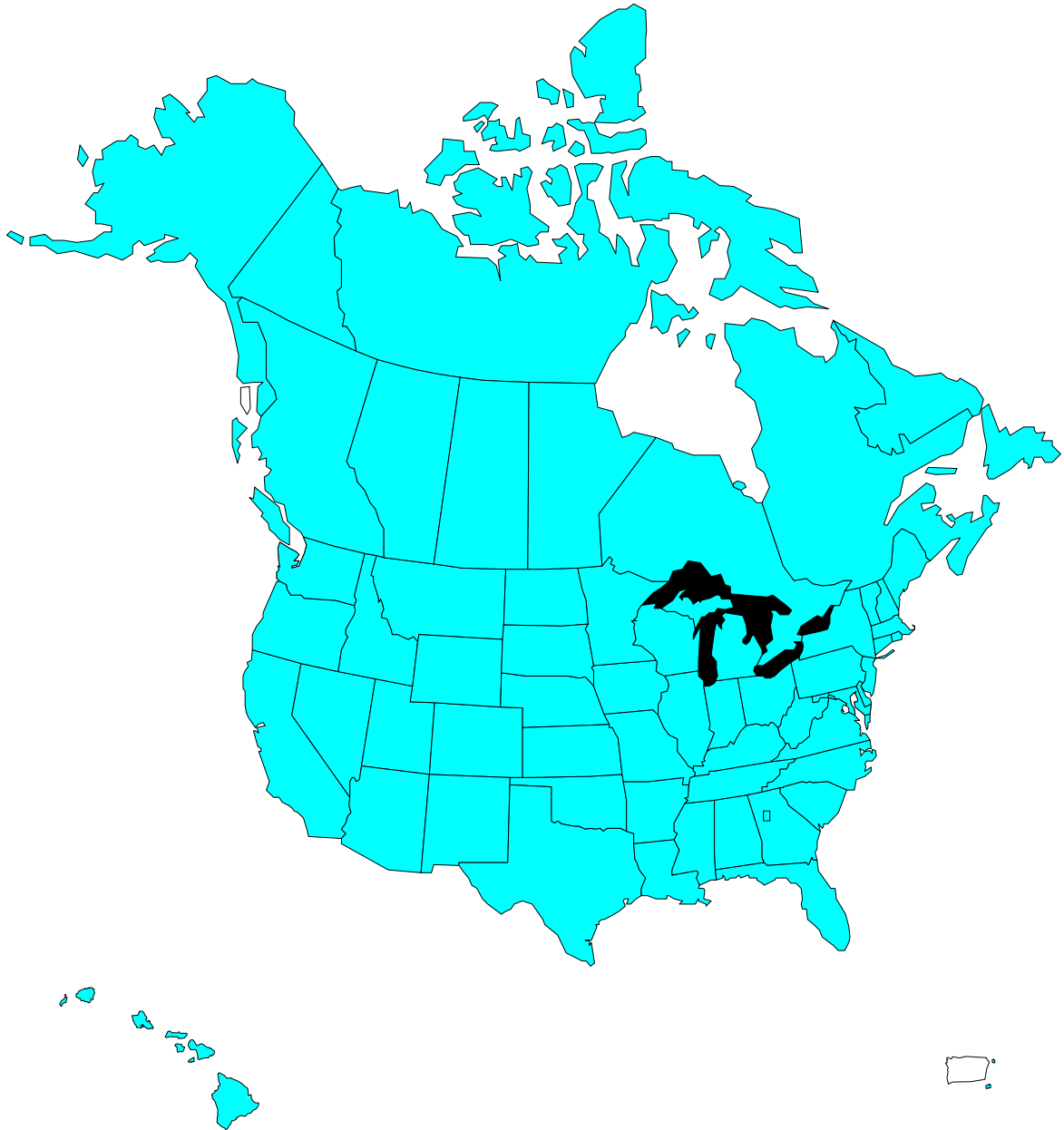
Average Annual Age-adjusted Cancer Death Rates


The death rates adjusted to the 1996 Canadian population standard in this monograph were approximately 7% higher than the rates adjusted to the 1991 Canadian population standard.

- ▶ **Higher death rates among males than among females.** Overall, the age-adjusted (1996 Canadian population standard) death rate for all cancers combined was 54% higher among males (248.1 per 100,000) than among females (161.1 per 100,000).
- ▶ **Geographic variations in death rates.** Provincial geographic variations showed, in general, higher rates for all cancers combined for the east coast – Quebec and the Atlantic provinces (New Brunswick, Prince Edward Island, Nova Scotia, and Newfoundland) than for the west coast (British Columbia and Alberta).

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NAACCR
1995-1999



 **Participating Registries**

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