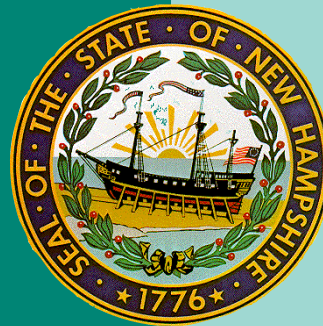


2006

Cancer in New Hampshire

AN ANNUAL REPORT ON CANCER INCIDENCE AND MORTALITY

New Hampshire Department of Health and Human Services
Division of Public Health Services
Office of Health Statistics and Data Management
New Hampshire State Cancer Registry



John H. Lynch
Governor

Nicholas A. Toumpas
Commissioner
Department of Health
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January, 2010

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An electronic version of this report is available on the DPHS web site:
<http://www.dhhs.state.nh.us/DHHS/HSDM/>

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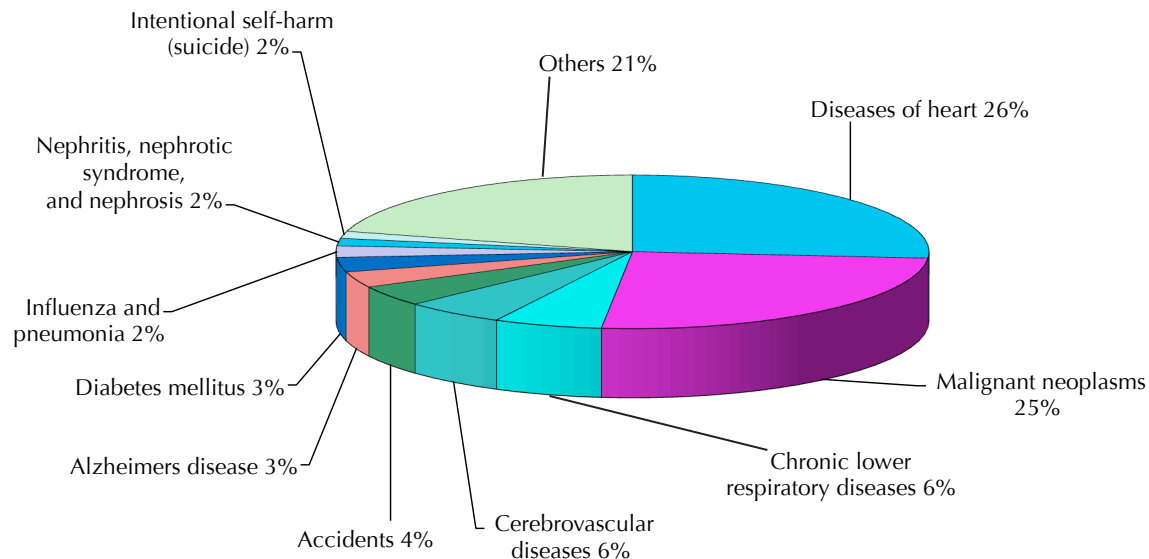
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Cancer in New Hampshire 2006

AN ANNUAL REPORT ON CANCER INCIDENCE AND MORTALITY

In the United States and in New Hampshire, cancer is the leading cause of death for residents younger than 85 years old, with approximately 6,000 new cases and 2,500 people dying from cancer each year in New Hampshire. For the past five years, the top three leading causes of death in New Hampshire have been heart disease, cancer, and chronic lower respiratory diseases. Unlike the mortality trends for other disease groups, the mortality rate for cancer has risen steadily over the last few decades.

Cause of Deaths in New Hampshire, 2002-2006



Data Source: New Hampshire Department of Health and Human Services, Office of Health Statistics and Data Management.

I. The New Hampshire State Cancer Registry (NHSCR)

This report is based on cancer incidence data collected by the New Hampshire State Cancer Registry. Cancer became reportable in New Hampshire in 1985, and since 1986 the NHSCR has been charged with identifying all new cases of cancer occurring among residents of the state. The Centers for Disease Control and Prevention's (CDC) National Program of Cancer Registries (NPCR), through a cooperative agreement, currently provides a large grant to New Hampshire's Department of Public Health Services (DPHS) with the principle aim of collecting high quality cancer incidence data. The specific goals of the New Hampshire State Cancer Registry are to:

- assess the cancer burden in the NH population,
- provide high quality data for research to investigate the risk factors for cancer,
- evaluate and plan patient care services, and
- evaluate early diagnosis and treatment programs.

The New Hampshire DPHS and Health Statistics and Data Management have overall responsibility for the registry, which it funds through a state contract awarded through a competitive bidding process. This contract is held by Dartmouth College and is administered through the Department of Community and Family Medicine at Dartmouth Medical School. The most recent competition for this contract was in 2002. Under the requirements of the CDC grant, DPHS and the contractor of NHSCR provide additional, in-kind contributions.

The NHSCR receives reports from hospital registrars operating in all large hospitals, hospital reporters in small hospitals, physician practices, a freestanding radiation oncology center, out-of-state pathology laboratories, and other sources, as required by New Hampshire regulations. New Hampshire also receives reports about cancer incidence among its residents from the central cancer registries of Massachusetts, Vermont, New York and other states, based on inter-state data exchange agreements. Similarly, reports made to NHSCR of cancer cases among residents of these other states are transmitted to the appropriate central cancer registries. These cases form the basis of the NHSCR data file which is used by DPHS to prepare its report and by other users within DPHS; national registry programs who generate cancer incidence and mortality statistics; and by appropriately qualified medical and other scientific researchers.

As part of the cooperative agreement, the NPCR annually assesses the completeness of data reported by state cancer registries and periodically conducts audits of data quality. In addition, the National Association for Central Cancer Registries (NAACCR) provides an assessment of data completeness and quality for central cancer registries. The NHSCR remains in the front rank of population based cancer registries in the United States, in terms of both data quality and completeness, as assessed by independent sources. Since 2001, NHSCR has been awarded seven Gold certifications and two Silver certifications for data quality by NAACCR for years 1998-2006.

Cancer surveillance is the key to a unified scientific and public health approach to fighting cancer. Without a central cancer registry, it would be impossible to determine if reductions in cancer rates occur in New Hampshire and if resources are being directed appropriately. Data collected by the NHSCR provide the basis for identification of cancer trends within the state.

The success of the cancer registry is critically dependent on the help and collaboration of numerous individuals. Below we list our current collaborators, the cancer registrars and reporting staff of health care facilities throughout New Hampshire.

Cancer Registrar

Marilyn Thorson, BS, CCS
Barbara Ellis
Shirley Foret, CTR
Sue Samon, CTR
Deb Dugrenier, CTR
Cheryl Bernier, CTR
Rosemary Couch, CTR
Sieglinde Rothwangl, CTR
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Darlene Austin, CTR
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Simone Boudle, CTR
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Judy Levine, RHIT, CTR
Mary St.Jean, CTR
Marjorie Moulton, RHIT
Cynthia Dreyer, CTR
Priscilla Matthews, RHIA
Karl Neuberger
Susan McGarry
Barbara O'Shea
Ann Wiggett, RN
Richard Clark, CTR
Nancy Mason, RN, CCS
Doreen Martin, RHIT
Scarlett Denman, RHIT
Sandy Cyr, RHIT, CTR
Barbara Snyder, CTR
Marni Piper, CTR
Claire Abel, CTR
Nancy Ramirez, CTR
Cindy Wright, CMT
Debbie Rivet, RHIT, CTR
Heather Placey, RHIT
Linda Fullam, RHIT
Carrie Marshall
Karen Wilke, CTR
Susan Goebel, CTR
Suzanne Ogden
Mary Sylvain

Hospital

Alice Peck Day Memorial Hospital
Androscoggin Valley Hospital
Catholic Medical Center
Catholic Medical Center
Cheshire Medical Center
Concord Hospital
Concord Hospital
Concord Hospital
Concord Hospital
Cottage Hospital
Dartmouth Hitchcock Medical Center
Dartmouth Hitchcock Medical Center
Dartmouth Hitchcock Medical Center
Dartmouth Hitchcock Medical Center
Elliot Hospital
Elliot Hospital
Elliot Hospital
Elliot Hospital
Exeter Hospital
Franklin Regional Hospital
Frisbie Memorial Hospital
Frisbie Memorial Hospital
Huggins Hospital
Lakes Region General Hospital
Lakes Region General Hospital
Littleton Hospital
Manchester VA Medical Center
Memorial Hospital
Monadnock Community Hospital
New London Hospital
Parkland Medical Center
Portsmouth Regional Hospital
Portsmouth Regional Hospital
Southern NH Regional Medical Center
Southern NH Regional Medical Center
Speare Memorial Hospital
St. Joseph Hospital
Upper Connecticut Valley Hospital
Valley Regional Hospital
Weeks Memorial Hospital
Wentworth Douglas Hospital
Wentworth Douglas Hospital
Wentworth Douglas Hospital
Wentworth Douglas Hospital

II. New Hampshire Cancer Incidence and Mortality, 2006.

Cancer incidence and mortality data for New Hampshire, 2006, are presented in Tables 1-2.

In 2006, 6,989 new cases of invasive cancer were diagnosed among New Hampshire residents and reported to the NHSCR. Of these, 3,399 were diagnosed in women and 3,590 in men.

In 2006, there were 2,522 cancer related deaths among New Hampshire residents. Of those who died of cancer, 1,238 were females and 1,284 males. These causes remain the same leading mortality causes as in previous years and are summarized with incidence and mortality data in the tables to follow.

Cancer Site	Incidence	Rate/100,000	Lower CI	Upper CI
Bladder	376	26.77	24.04	29.5
Brain & other CNS	89	6.46	5.19	7.95
Breast (female)	1001	129.09	121.02	137.17
Cervical	49	6.85	5.06	9.05
Colorectal	606	42.91	39.47	46.36
Esophagus	107	7.26	5.87	8.65
Hodgkins Disease	37	2.76	1.94	3.8
Kidney & Renal Pelvis	184	12.58	10.74	14.42
Larynx	73	4.89	3.84	6.15
Leukemia	166	11.94	10.11	13.78
Liver	57	4.01	3.03	5.19
Lung & Bronchus	940	66.29	62.01	70.57
Melanoma of the Skin	378	26.88	24.13	29.62
Multiple Myeloma	66	4.63	3.58	5.88
Non-Hodgkins Lymphoma	265	18.64	16.37	20.91
Oral Cavity & Pharynx	130	8.79	7.26	10.31
Other	567	40.65	37.28	44.03
Ovary	94	12.12	9.79	14.83
Pancreas	180	12.48	10.64	14.32
Prostate	1051	157.02	147.3	166.75
Stomach	79	5.58	4.41	6.95
Testis	51	8	5.96	10.52
Thyroid	199	14.35	12.33	16.37
Uterine	244	30.41	26.56	34.26

Table 1: Cancer Incidence and Age-adjusted Rates and Confidence Intervals, New Hampshire, 2006.

Among women, the highest proportions of cases were cancers of the breast (29.4%), lung (13.7%), and colorectal (8.6%) where as for men it was prostate (29.3%), lung (13.2%), and colorectal (8.7%).

The leading causes of cancer deaths among women were lung/bronchus (27%), breast (13.3%), and colorectal (9.4%) where as for men it was lung (29.0%), colorectal (9.9%), and prostate (9.9%).

Cancer Site	Mortality	Rate/100,000	Lower CI	Upper CI
Bladder	62	4.49	3.44	5.76
Brain & other CNS	71	5.1	3.99	6.44
Breast (Female)	165	20.38	17.23	23.52
Cervical	17	2.23	1.3	3.56
Colorectal	243	17.16	14.98	19.33
Esophagus	89	6.39	5.13	7.86
Hodgkins Disease	3	0.19	0.04	0.56
Kidney & Renal Pelvis	52	3.66	2.74	4.8
Larynx	21	1.49	0.92	2.28
Leukemia	98	6.92	5.62	8.43
Liver	67	4.75	3.68	6.04
Lung & Bronchus	706	50.33	46.59	54.08
Melanoma of the Skin	48	3.29	2.43	4.36
Multiple Myeloma	51	3.61	2.69	4.75
Non-Hodgkins Lymphoma	67	4.9	3.8	6.23
Oral Cavity & Pharynx	36	2.51	1.76	3.48
Other	281	20.32	17.92	22.71
Ovary	68	8.51	6.61	10.78
Pancreas	169	11.85	10.04	13.65
Prostate	127	24.02	19.78	28.26
Stomach	40	2.88	2.06	3.93
Testis	1	0.13	0	0.71
Thyroid	5	0.33	0.11	0.77
Uterine	27	3.34	2.2	4.86

Table 2: Cancer Mortality and Age-adjusted Rates and Confidence Intervals, New Hampshire, 2006.

Figure 1: Cancer Incidence and Deaths, New Hampshire, 2006.

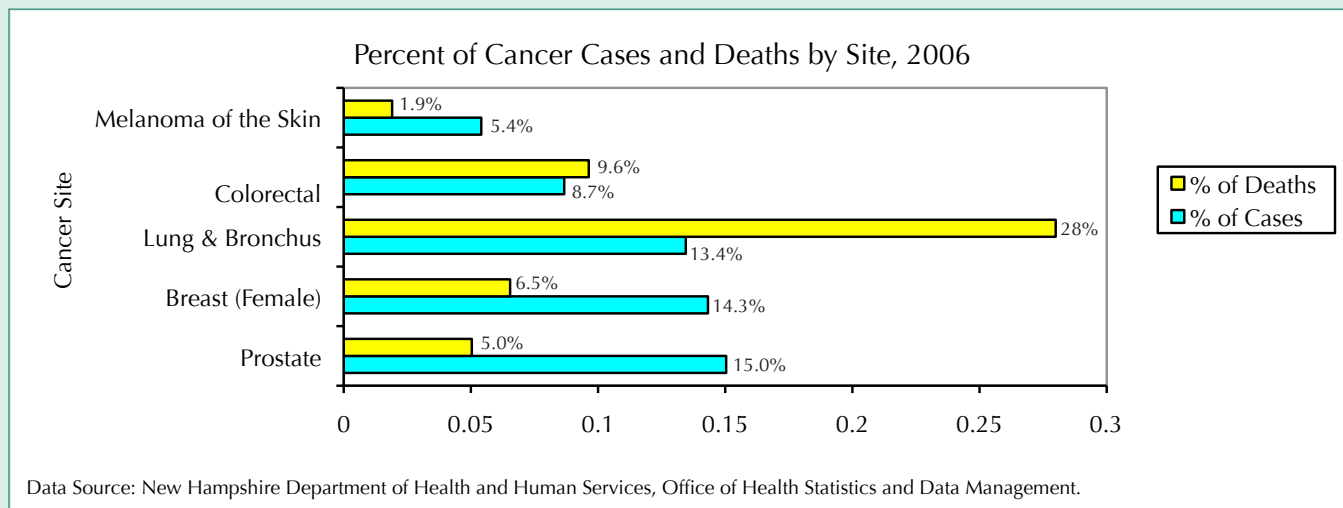


Figure 2. New Hampshire Cancer Incidence by County, 2006.

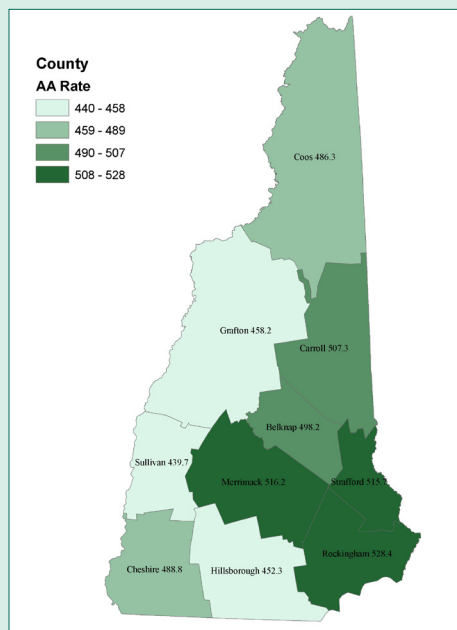
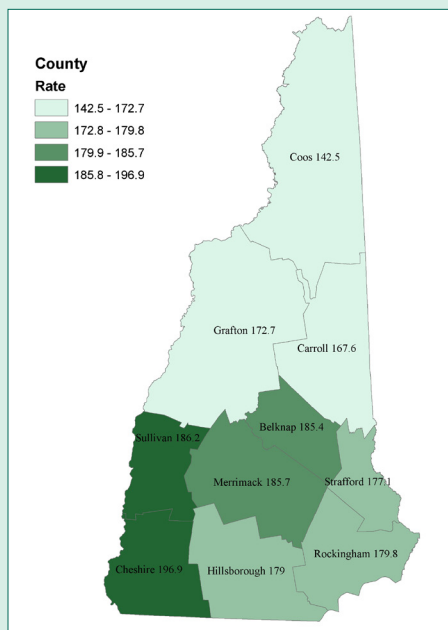


Figure 3. New Hampshire Cancer Deaths by County, 2006.



III. Cancer Data Use

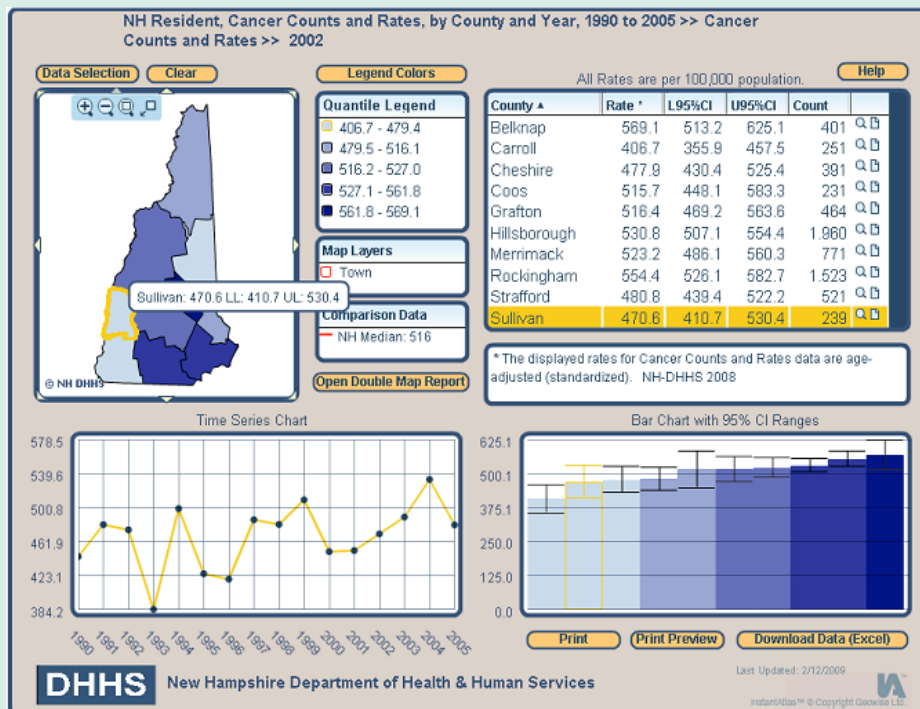
The DHHS is committed to making registry data as useful as possible while safeguarding the confidentiality of the individuals whose cancer data are held by the registry. In New Hampshire, cancer data are used in many ways: to design and monitor the effectiveness of cancer prevention programs and to follow trends in early detection, treatment and survivorship, as well as emerging issues in cancer. The DHHS staff conducts special studies of cancer, using the NHSCR database as the starting point for a more focused analysis of patient and medical care data. The registry is also a resource for research studies of cancer epidemiology, and for scientists engaged in other types of investigation.

The cancer data have been a key resource for the development and implementation of the NH-DHHS comprehensive cancer control plan. In addition, with the past 5 years, NHSCR data have also been used by research investigators for different studies of ovarian, colorectal, bladder, skin, lung, and breast cancer in the past 5 years. Other data users include various programs of the NH Health Department and other Departments within NH, non-profit organizations, universities, individuals, town health departments, Public Health Network hospitals, and Manchester and Nashua City Health Departments. NHSCR data have also been used in the investigations of suspected cancer clusters.

IV. Sources of Cancer Data

Five web-based resources are described here, which may be used to find aggregate, population-based cancer data.

(1) Aggregate New Hampshire cancer data are available on the internet at <http://www.dhhs.state.nh.us/DHHS/HSDM/instantatlas.htm>. To access these data, click on NH Cancer Incidence Data, 1990-2005 to see the following page:



The website provides cancer incidence data for diagnosis years 1990-2005 and is updated annually. Data reports may be customized for counties, cancer sites, year and gender, and a variety of graphical displays and maps may be selected. The aggregate data are also available in Excel format.

(2) New Hampshire cancer data are also available at <http://nhhealthwrqs.org/>. This page provides a menu-driven web reporting and querying system that uses a wealth of commonly used public health statistics, and which can be applied to standard or customized geographic areas. It is created as a joint effort of the New Hampshire Department of Health and Human Services and University of New Hampshire.

Click on Report Library and you will be taken to this page:



Data are available for data sets such as births, deaths, cancer etc. Usually these data are updated once every year. Data can be selected by geographic region such as town, or by public health network, hospital service area, county, cancer site, year and gender.

(3) New Hampshire cancer reports may be viewed at <http://www.dhhs.state.nh.us/DHHS/HSDM/cancer-data.htm>.

(4) Information on the New Hampshire Comprehensive Cancer Collaboration (NHCCC) may be found at <http://www.nhcancerplan.org/>. This organization was founded in 2003 with the goal of creating and implementing a statewide plan to address important issues in cancer in New Hampshire. The cancer control plan, "Cancer in NH: A Call to Action 2010", is being updated in to include objectives for the next funding period.

(5) Finally, national cancer data are available at <http://statecancerprofiles.cancer.gov/>, a website that allows state-by-state comparison of cancer statistics including incidence and mortality for diagnosis years 2001-2005. The data reports can be customized by state, cancer site, race and gender. Other related data are available on this website, including maps, screening data, risk factor data, and census data.

Appendix: Glossary of Terms, Definitions and Notes

AGE ADJUSTMENT AND RATES

All rates in this document are age-adjusted to the 2000 U.S. standard population. This allows the comparison of rates among populations having different age distributions by standardizing the age-specific rates in each population to one standard population. Age-adjusted rates refer to the number of events that would be expected per 100,000 persons in a selected population if that population had the same age distribution as a standard population. Age-adjusted rates were calculated using the direct method as follows:

Where,

m = number of age groups

d_i = number of events in age group i

P_i = population in age group i

S_i = proportion of the standard population in age group i

This is a weighted sum of Poisson random variables, with the weights being (S_i / p_i)

$$\hat{R} = \sum_{i=1}^m s_i (d_i / p_i) = \sum_{i=1}^m w_i d_i$$

AGE SPECIFIC RATE

The age-specific rate is the number of individuals diagnosed as having cancer per year within a specific age group, divided by the estimated number of individuals of that age living in New Hampshire at the midpoint of the year.

BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM

Since 1990, New Hampshire and 49 other states and three territories have tracked risk behaviors using a telephone survey of adults called the Behavioral Risk Factor Surveillance System.

CONFIDENCE INTERVALS (CI)

The standard error can be used to evaluate statistically significant differences between two rates by calculating the confidence interval. If the interval produced for one rate does not overlap the interval for another, the probability that the rates are statistically different is 95% or higher.

The formula used is:

Where,

R = age-adjusted rate of one population

z = 1.96 for 95% confidence limits

SE = standard error as calculated below

$$R \pm z (SE)$$

A confidence interval is a range of values within which the true rate is expected to fall. If the confidence intervals of two groups (such as New Hampshire and the U.S.) overlap, then any difference between the two rates is not statistically significant. All rates in this report are calculated at a 95 percent confidence level. For example, the age-adjusted New Hampshire male lung cancer incidence rate is 82.1 (95% CI, 78.6-85.6) per 100,000 population. There is a 95 percent probability that the confidence interval contains the true adjusted rate.

DATA COLLECTION

The New Hampshire Cancer Registry is covered by state statute Title X Chapter 141-B under code of administrative rules of Part He-P 304. These rules require physicians and hospitals to report information on all cases of cancer that they diagnose or treat, with the exception of squamous and basal carcinomas of the skin, benign neoplasms except brain, and in situ carcinomas of the cervix or skin. Through interstate agreements, information on New Hampshire residents diagnosed or treated in other states is also included in registry data. The information is not collected directly from patients.

DATA CONFIDENTIALITY

All individuals working with the Registry database are governed by the confidentiality policy implemented under the New Hampshire Rules and Regulations governing the Registry. Release of confidential cancer data for research or other purposes is governed by RSA 141B. The law requires reporting for public health purposes, and does not allow people to opt out of the reporting. However, the Cancer Registry keeps all information that is required under the rules that could possibly be used to identify an individual, confidential. This includes identifying information regarding individual patients, health care providers and health care facilities. The law permits disclosure of certain confidential data to other cancer registries and federal cancer control agencies to collaborate in a national cancer registry and to health researchers for cancer control and prevention research studies. However, strict requirements, including prior approval of the researcher's academic Institutional Review Board for the protection of human subjects, must be met. Public data releases, such as published statistical reports, are carefully designed in order to provide data to the fullest extent possible while still realizing the mandate to protect patient confidentiality.

DATA QUALITY

Data quality is directly related to the completeness and accuracy of the information reported. New Hampshire State Cancer Registry (NHSCR) data tabulated in this report are based on information received and edited by the NHSCR as of January 2006 and reflects at least 95% of the true cancer incidence rate for the state. Delays in reports from out-of-state hospitals and incomplete medical records account for the balance of the cases. The NHSCR follows standard procedures for ensuring the accuracy of data. A comprehensive set of standard national edits are applied to all case reports received by the NHSCR prior to including those cases in the central database. New case reports are then merged with old case reports to ensure that only primary incident tumors are included. The NHSCR tumor registrars contact registrars at reporting institutions to resolve any outstanding edits. In addition to these quality assurance activities for case processing, the NHSCR conducts quarterly case reabstraction reviews to ensure that professional standards for case abstraction are consistently met across all reporting institutions. To ensure complete case reporting, the NHSCR performs quarterly independent audits of pathology and cytology reports at hospitals, free standing labs, and selected out-of-state laboratories performing microscopic reviews for physician offices. In addition, the NHSCR performs death clearance by linking incident cancer cases with vital statistics death certificates and follows up on all deaths with cancer as a diagnosis that were not previously reported to the Cancer Registry.

GRAPHS

Graphs have varying scales depending on the range of the data displayed. Therefore, caution should be exercised when comparing such graphs.

INCIDENCE

Incidence refers to the number or rate of newly diagnosed cases of cancer. Rates are age-adjusted to 2000 U.S. standard population and exclude basal cell and squamous skin cancers and in situ (malignant but non-invasive) carcinomas except urinary bladder. Some of the rates also include age-specific rates. Rates based on 10 or fewer cases are not calculated, as they are not reliable.

MORTALITY

Mortality refers to the number or rate of deaths from cancer. Rates are age-adjusted to the 2000 U.S. standard population. Some of the rates also include age-specific rates. Rates based on 10 or fewer cases are not calculated. Cancer mortality site groupings are defined by the National Center for Health Statistics and are based on ICD-10 classification. Cause of death before 1999 was coded according to ICD-9; beginning with deaths in 1999, ICD-10 was used.

NEW HAMPSHIRE / U.S. COMPARISON

U.S. incidence and mortality rates for whites, rather than those for all races, are used for comparison because racial minority groups were estimated to make up around four percent of the total New Hampshire population compared with the total U.S. non-white population of 25 percent in 2005 as reported by the American Community Survey. Nationwide, whites have a higher risk compared to people of other races for female breast, melanoma and bladder cancer incidence. Whites have a lower risk compared to other races for prostate, colorectal and cervical cancer. The much smaller populations of New Hampshire residents of other races may have very different risks of these cancers. Combining data over many years will be required to determine cancer rates for these groups.

NEW HAMPSHIRE STATE CANCER REGISTRY

The NHSCR is a central bank of information on all cancer cases diagnosed or treated in NH since January 1, 1987. The registry enables the state to collect information on new cases (incidence) of cancer. Previously, the state only kept records on deaths from cancer. The information maintained by the registry allows the Health Department to study cancer trends and improve cancer education and prevention efforts.

NEW HAMPSHIRE DIVISION OF VITAL RECORDS

In New Hampshire, towns are required to file certified copies of death certificates with the Division of Vital Records and Administration under Department of State for all deaths occurring in their jurisdictions. They are responsible for maintaining the vital statistics system, and they provide death data to the Cancer Registry.

POPULATION WEIGHTS

State and county population estimates for New Hampshire data are provided by Office Health Statistics and Data Management (HSDM), Division of Public Health Services (DPHS), and New Hampshire Department of Health and Human Services (DHHS). Population data are based on U.S. Census data apportioned to towns using New Hampshire Office of Economic Planning (OEP) estimates and projections, and further apportioned to age groups and gender using Claritas Corporation estimates and projections to the town, age group, and gender levels. Data add up to U.S. Census data at the county level between 1990 and 2005 but do not add to OEP or Claritas data at smaller geographic levels. Please contact Health Statistics for more information on methodology. For comparison purposes, the 2000 U.S. standard population weights used in calculating age-adjusted rates in this report are shown on the next page.

RATE COMPARISONS

To determine if there is a statistically significant difference between cancer incidence in New Hampshire compared to the U.S., the New Hampshire rate is compared to the U.S. SEER rate. If the SEER rate falls within the 95% confidence interval for the state rate, it suggests that the rates are not statistically different from one another. For example, the New Hampshire female breast cancer mortality rate is 24.1 (20.5, 27.6) per 100,000 populations, and the SEER rate is 25.3. Since the SEER rate is found within the confidence interval (20.5, 27.6) of the New Hampshire rate, no statistically significant difference exists between the two rates.

RELIABILITY OF RATES

Several important notes should be kept in mind when examining rates. Rates based on small numbers of events (e.g. less than 10 events) can show considerable variation. This limits the usefulness of these rates in comparisons and estimations of future occurrences. Unadjusted rates are not reliable for drawing definitive conclusions when making comparisons because they do not take factors such as age distribution among populations into account. Age-adjusted rates offer a more refined measurement when comparing events over geographic areas or time periods. When a difference in rates appears to be significant, care should be exercised in attributing the difference to any particular factor or set of factors. Many variables may influence rate differences. Interpretation of a rate difference requires substantial data and exacting analysis.

Age Group	2000 weight
0-4	0.0691
5-9	0.0725
10-14	0.0730
15-19	0.0722
20-24	0.0665
25-29	0.0645
30-34	0.0710
35-39	0.0808
40-44	0.0819
45-49	0.0721
50-54	0.0627
55-59	0.0485
60-64	0.0388
65-69	0.0343
70-74	0.0318
75-79	0.0270
80-84	0.0178
85 +	0.0155
All Ages	1.0000

SMALL NUMBERS

With very small counts, it is often difficult to distinguish between random fluctuation and meaningful change. According to the National Center for Health Statistics, considerable caution must be observed in interpreting the data when the number of events is small (perhaps less than 100) and the probability of such an event is small (such as being diagnosed with a rare disease). The limited number of years of data in the registry and the small population of the state require policies and procedures to prevent the unintentional identification of individuals. To protect patient privacy, county-specific data are published only for commonly diagnosed cancer sites. Data on rare cancer sites, race, and other variables that could potentially identify individuals are not published.

STANDARD ERRORS

The standard errors (S.E.) of the rates were calculated using the following formula:

Where,

w_j = fraction of the standard population in age category

n_j = number of cases in that age category

p = person-years denominator

U.S. INCIDENCE RATES

The National Cancer Institute funds a network of Surveillance, Epidemiology and End Results (SEER) registries. The SEER Program currently collects and publishes cancer incidence and survival data from 17 population-based cancer registries and three supplemental registries covering approximately 26 percent of the U.S. population. These rates are used to estimate U.S. cancer incidence rates. U.S. incidence is based on the SEER 9 Registries' white rates.

U.S. MORTALITY RATES

The U.S. Public Use Database Vital Statistical System maintains U.S. mortality rates. Based on the U.S. Public Use Database Vital Statistical System, U.S. cancer mortality rates are white population rates.

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Incidence Data: New Hampshire State Cancer Registry

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