Puerto Rico Central Cancer Registry

Cancer in Puerto Rico 2004

CANCER INCIDENCE AND MORTALITY IN PUERTO RICO

Centro Comprensivo de Cáncer
universidad de puerto rico

Registro Central de Cáncer de Puerto Rico

Departamento de Salud
Gobierno de Puerto Rico

Cancer in Puerto Rico 2004

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Letter from the director

Dear Puerto Ricans:

Cancer is the second leading cause of death in our Island and affects every family. In 2004, more than 11,000 Puerto Ricans developed cancer. During this same year, we will mourn the loss of more than 5,000 people due to cancer. The Puerto Rico Central Cancer Registry is pleased to present the report **Cancer in Puerto Rico 2004.**

This Report is a review of the status of cancer in Puerto Rico. It presents a description of the incidence and mortality data for cancer in PR for the period of 1987 to 2004. In addition, it describes the distribution of the main types of cancers that affect our population.

This information is essential to identify changes in cancer occurrence in Puerto Rico and to set priorities in comprehensive cancer control. It should serve as the guide for the development and implementation of interventions aimed at diminishing the burden of the disease in our population, as well as to measure the outcomes of such interventions.

Nayda R Figueroa-Vallés, MD, MPH

Director
Puerto Rico Central Cancer Registry
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In 2004 more than 11,000 Puerto Ricans developed cancer and nearly 5,000 died from cancer. In Puerto Rico, cancer is second cause of death after heart disease. This information is based upon incidence data of the Puerto Rico Central Cancer Registry (PRCCR) and from mortality data received from the Puerto Rico Department of Health. The PRCCR has been recording the occurrence of cancer in Puerto Rico since 1951, and is one of the oldest cancer registries in the world.

"*Cancer in Puerto Rico 2004*" presents a general report to the public on the status of cancer. This report will focus on:

- **a description of the PRCCR and its goals;**
- **an overview of cancer in Puerto Rico until 2004;**
- **brief summaries of selected types of cancer;**
- **a selected list of investigations using data from the PRCCR.**

General Information request for cancer data or possible research collaborations are welcome and should be sent to mtorres@rcpr.org.

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Introduction

Puerto Rico Central Cancer Registry: A Brief History

The Puerto Rico Central Cancer Registry (PRCCR) is the fourth oldest population based cancer registry in the world and collects information of cancer in Puerto Rico (PR) since 1951. The PRCCR is part of the National Program of Cancer Registries (NPCR) administered by the Centers for Disease Control and Prevention (CDC). It was created in 1951 under State Law No. 28 of March 20, 1951, making cancer reporting compulsory for physicians and facilities in the format provided by the Registry and containing all information as deemed necessary by the Puerto Rico Department of Health (PRDH).

In 1973, the PRCCR became part of the National Cancer Institutes Surveillance Epidemiology and End Results Program (SEER) registries. The PRCCR worked with local and federal funds until 1989, once the participation of the above mentioned program ended. In 1993, the PRCCR published a complete and detailed report of cancer in Puerto Rico with data until year 1991. Between the periods of 1989 to 1997, the PRCCR worked only with local funds, remaining a latecomer in technology, personnel and physical facilities, not being able to complete the information for the years following 1992.

Since 1994, the Center for Disease Control and Prevention (CDC) runs the National Program of Cancer Registries (NPCR), upon decree from the United States Congress. The goal was to establish a national cancer surveillance system that would complement the SEER Program. Puerto Rico was one of the last U.S.A. jurisdictions to establish a contract with CDC, converting into an NPCR Registry by the end of year 1997. Nevertheless, it was not until 2001 that the PRCCR started to update the data base, with the continuous support from the CDC.

The contract with CDC requires transferring the responsibility of reporting the complete and exact information about their cancer cases to the PRCCR, to facilities in which the cancer was diagnosed or treated, and that the information be reported electronically in the format required by the Registry, following the national standards.

The PRCCR's responsibility in the reporting process is to train and provide technical support. It took more than one year to get the system working effectively, due to errors accumulated through time and problems with the application of the necessary conversions of the International Classification of Diseases (ICD). To facilitate its management, the database was divided in two parts: 1950-1986 and 1987 to the present. The latter period includes the active database.

The process to update the system included the purchase of modern equipment and its programming, recruitment and training of professionals about tumor registry, training of the reporting facilities' personnel, transferring the reporting responsibility to the medical institutions, developing the capacity for the electronic report, depuration of the active database (including the applicable conversions), and the establishment of a structure to raise the cancer data up to the national standards of timeliness, completeness, and quality.

In the year 2001, the PRCCR used additional databases to identify cases and find information, as complementary methodology. The files of the Puerto Rico health insurances were used for recovering and completing the information, while the cases were confirmed by the pathology reports that already had been received in the Registry.

In April 2002, the PRCCR requested CDC a site visit from experts to evaluate and validate the PRCCR's methodology and to make recommendations. In June 2002, personnel of CDC and cancer registry expert, Dr. Thomas Tucker - Director of the Kentucky Central Registry and previous president of the North American

Central Association of Cancer Registry (NAACCR), the organization that imposes the national standards, visited the PRCCR offices. They validated and make recommendations for the publication of the data.

Eventually, most of the hospital reports were received in the Registry. Up to date, almost the 98% of the Puerto Rico institutions are electronically reporting their cases to the PRCCR. In 2003, a regular audit done to registries on their fifth year of contract, led by the CDC found a rate of coverage of 95.3 % for Puerto Rico. The median coverage for the United States of America was 95%.

Beginning in July, 2008, the PRCCR became part of the Comprehensive Cancer Center of the University of Puerto Rico, Medical Sciences Campus. During 2010 the Law No. 113 of July 30, 2010 (Law of Puerto Rico Central Cancer Registry) was created, this law derogates the last Law No. 28 of 1951. Law No. 113 enforces the PRCCR to obtain better and complete information from the reporting facilities; this is a big achievement of the PRCCR.

Main objective of the PRCCR

The main goal of the PRCCR is to maintain an effective cancer surveillance system that provides accurate data necessary for statistical analysis, to disseminate the findings and to educate the community with the most complete information about cancer in Puerto Rico.

Among the specific objectives are:

- Observe cancer trends over time in Puerto Rico.
- Determine cancer patterns among the Puerto Rican population.
- Provide information for a national database about cancer incidence in Puerto Rico.
- Guide the formation and evaluation of cancer control programs.
- Help establish priorities in health resources and services.
- Improve clinical and epidemiological research.
- Maintain the security and confidentiality of all medical records in conformity to PRDH regulations and federal law.
- Establish and maintain collaboration with cancer research agencies.
- Provide support in the development of decision making strategies for detection and prevention of all types of cancer.
- Inform the general public about statistics related to cancer incidence, mortality, survival and trends in Puerto Rico.

Data Sources and Methods

Incidence Data

Population based reporting of newly diagnosed cancers was fully implemented in 1950 in Puerto Rico. The primary source of data on cancer incidence is the medical records. Staff at health care facilities (including hospitals, physicians' offices, therapeutic radiation facilities, freestanding surgical centers, and pathology laboratories) abstract data from patients' medical records, and report these data to the PRCCR. Standards for data abstracting, collection, and reporting to PRCCR are based on the North American Association of Central Cancer Registries (NAACCR) standards (1). Incidence data contained in this report are based on cases of primary cancer which were diagnosed among residents from Puerto Rico between January 1, 2000 and December 31, 2004.

Selection Criteria

The cases included in this report are only from residents of Puerto Rico. Persons who were treated in Puerto Rico but were residents of another country at the time of the cancer diagnosis are not included in this report. Cases reported to the PRCCR with unknown age (< 0.4%) were excluded from the analyses presented in this report. No unknown or ambiguous gender was observed for the study period (1987-2004). Cases of unknown site at diagnosis accounted for 5,877 (3.5%) incident cancers, and were included in the counts and rates for all sites combined (1987-2004). The coding of cancer as unknown or ill-defined exerts a downward bias on the rates of the specific cancers that were the true sites. Cases with unknown municipality of diagnosis for the period of 2000-2004 were excluded only from the calculations of municipality-specific rates (3.8%).

For this report, only malignant (invasive) cancers were included, except for *in situ* bladder cancers that were combined with invasive bladder cancers and are included in the total for all invasive cancer sites combined. *In situ* and invasive bladder cancers were combined because of the difficulty in the interpretation of the information used by pathologists to describe the extent of invasion of bladder cancers which is not always available or reliable (2). Carcinoma *in situ* of the cervix and basal and squamous cell carcinomas of the skin were excluded, with the exception of those on the skin of the genital organs (3). Counts and rates for *in situ* breast cancer cases among females are presented in separate tables and are not included in counts or rates for the "All Sites" category.

Childhood Cancer (00-19 years)

The incidence data used for the Childhood Cancer section was grouped according to the SEER modification of the International Classification of Childhood Cancers, Third Edition (ICCC-3) specifications based on ICD-O-3 (4). The ICCC presents childhood cancers in 12 groups classified primarily by morphology. These 12 broad categories were used individual and combined for the present analysis.

Mortality data were coded according to the International Classification of Diseases (ICD-10). The use of ICCC to describe the incidence of childhood cancer and, ICD-10 codes for mortality results in categories that in some cases are not strictly comparable. For these reasons, the mortality data are presented only for All Sites cancers combined.

Case Definition

A "case" is defined as a primary cancer, and the anatomic site recorded is the site of tumor origin. Additional tumors that result from the spread or metastasis, of cancer to another organ were not counted as incidence cancers. Since individuals can have more than one primary cancer and each primary tumor counts as a case, the number of incident cases for a given year will be higher than the number of persons who were diagnosed as having cancer.

Classification of Anatomic Site

Primary anatomic site and histology type of case were coded according to the International Classification of Diseases for Oncology edition in use at the time of diagnosis. Cases diagnosed in 2000 which were originally reported using the second edition of the International Classification of Disease for Oncology (ICD-O-2) (5) were converted to ICD-O3 (6). All cancer cases diagnosed since 2001 were reported using ICD-O3. Cancers were grouped according to the convention of the SEER program (http://seer.cancer.gov/siterecode/icdo3_d01272003/). For children and adolescents, diagnostic groups were organized using the SEER Program's site/histology modification to the International Classification of Childhood Cancer (ICCC) (4, 7).

Microscopic Confirmation

Microscopic confirmation was obtained for 88.5% of the cases.

Death Certificate Only Cases

The PRCCR is routinely linked with computerized death certificate files to identify persons who die of cancer, but whose cancer has not yet been reported. Unreported cancer-related deaths receive follow back to the reporting physician and facility to verify the diagnosis and to obtain more information, such as date of diagnosis, residence at diagnosis and treatment received. If a person death certificates lists cancer as the underlying cause of death, but the diagnosis cannot be verified thru follow back, the decedent is added to the Registry as a "death certificate only case" – that is, the death certificate is the only source of information on the patient's cancer. Overall, 8.8% of cases in the Registry are "death certificate only" for the period of 1987-2004.

Confidentiality

All data obtained by the PRCCR from the medical record of individual patients are held in strict confidence by the Registry. Researchers may obtain case-specific and/or patient identifiable information from the PRCCR by submitting a written application that describes how the data will be used for scientific study. In situations where contact with a patient of patient's family is proposed, the applicant must substantiate the need for any such contact and submit approval from an Institutional Review Board. Upon favorable review by the PRCCR, the applicant must also agree to maintain the confidentiality and security of the data throughout the course of the study, to destroy or return to the Registry at the end of the study and to present material to the Registry prior to publication to assure that no identifiable information is released. Aggregate data (i.e. statistical information) from the Registry are considered open to the public and are available upon request.

Mortality

Computerized files containing information on cancer-related deaths were obtained from the Puerto Rico Department of Health, Division of Statistical Analysis, Auxiliary Secretariat for Planning and Development (8). Death certificate master files from 1987-2004 were used for all years included in this report. Cause of Death was coded by the International Classification of Diseases, Ninth Edition (ICD-9) for deaths occurring from 1987-

1998 (9). Beginning in 1999 and thereafter, cause of death was coded by the International Classification of Diseases, Tenth Edition (ICD-10) (10). All mortality analyses presented in this report are the responsibility of the authors, and were not reviewed or endorsed by the Puerto Rico Demographic Registry prior to publication. Only deaths among Puerto Rican residents were included in these analyses. As with incidence data, deaths with unknown age (0.04%) were excluded from the rates calculations. Deaths of unknown site accounted for 7.8 % of cancer related deaths. Deaths with unknown municipality (residence of the patient at the moment of death) for the period of 2000-2004 were only excluded from the calculations of municipality-specific rates (0.02%).

Population Estimates

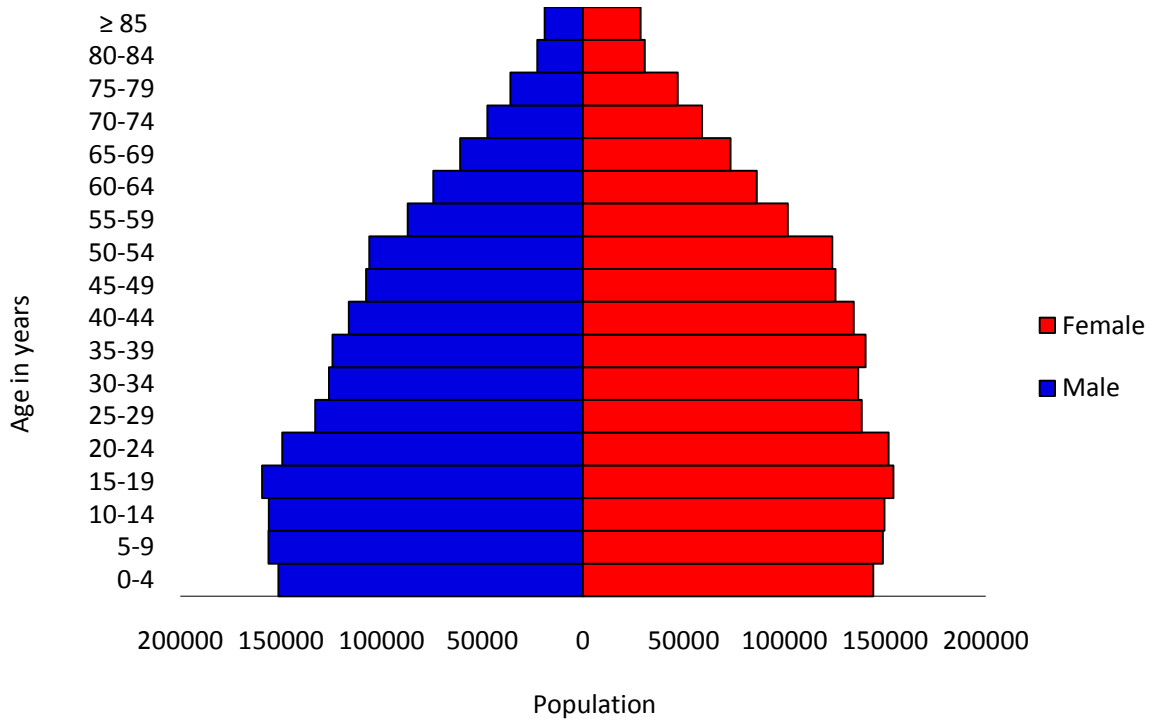
Annual midyear population estimates were obtained by age, sex and municipality of residence from the U.S Census Bureau, provided by the Puerto Rico Planning Board, Census Bureau (11). Population estimates are subjected to periodic revisions, which may also modify the age and sex specified population distribution for all years in the series. The rates presented in this report are internally consistent with the most recent released official population estimates. In 2000, a total population of 3,808,610 was estimated in PR; 32.0% of the population was under age 20; 35.5% between 20-44 years; 21.3% between 45-64 years; 9.9% between 65-84 years and 1.3% for 85+ years (See Figure 1 on page 11).

Puerto Rico 2000 Population

The population used to age-adjust the rates in this report is the PR 2000 population (12). The PR 2000 population is based on the proportion of the 2000 census population in specific age groups (<1 year, 1–4 years, 5–9 years, 10–14 years, ... 85+ years); the proportions of the 2000 population in these age groups serve as weights for calculating age-adjusted incidence and death rates. These standard weights are used to compute age-adjusted incidence and death rates by the method of direct standardization as implemented in the National Cancer Institute's (NCI's) SEER*Stat software (13).

Official population estimates for calculation of rates were provided by the Planning Board of Puerto Rico. PRCCR works closely with the Planning Board demographers to document the methodology for post censal, intercensal, and projected populations. Although in the 2000 Census, only 80.5% of PR residents identified themselves as white, there is no official classification by race used in PR. This datum does not appear in any official document. PRCCR is collecting racial and ethnic data consistent with population data. Although classification by ethnicity is very good in PRCCR, the NAACCR Hispanic Identification Algorithm (NHIA) is used to enhance the identification of Hispanic/Latino persons with cancer.

Figure 1: Population Pyramid for Puerto Rico, Census 2000



Geospatial Cloropleth Maps

This report includes geospatial maps that graphically displays the incidence and mortality cancer rates at the primary site and municipality level for PR. The maps were created using Arc GIS 9.2 (Geographic Information System), which allows users to visually compare incidence and mortality cancer rates for municipalities in PR. There are several methods that Arc GIS uses to categorize the class break values (e.g., equal-interval, quartiles, natural breaks, and standard deviations). There is no single best data classification method; each classification method has its advantages and disadvantages. For this report, the maps were created using quantile classification methods to specify the number of data classes into which the data were categorized.

In quartile method classification, an equal number of observations are placed in each class. The rates for the areas of interest (eg, municipalities) were first rank-ordered, and then an equal number of observations were placed in each class. The number of classes also determines the specific type of quartile map (three classes = tertile; four classes = quartile; five classes = quintile). Quartile maps can be helpful in identifying the spatial patterns of the relative rankings of rates within the geographic units of interest (eg, municipalities) (14). The major disadvantage of the quartile classification is that it does not consider how the data are distributed. Therefore, if the data has a highly skewed distribution (e.g., many outliers) this classification will force data observations into the same class (either the lowest or highest, in this case) where this may not be appropriate; as a result, the quartile classification may give a false impression that there is a relatively normal data distribution. Caution must be required in interpreting incidence and mortality cancer rates at municipality level.

Statistical Terms

Age-Adjusted Rate

All rates in this document were age-adjusted to the Puerto Rico 2000 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-Specific Rates

Age-Specific rates were calculated by dividing the number of cases or deaths in a specific age group by the total population at risk in that age group. Age at diagnosis or at death was categorized into (<1 year, 1-4 years, 10-14 years,… 85+ years).

Incidence vs. Mortality

Incidence refers to the number or rate of newly diagnosed cases of cancer. The incidence rate is calculated as the number of new cancers diagnosed in Puerto Rico (or specific municipality in the case of municipality-specific rates) during one year divided by the number of residents in the state or municipality during the year. Mortality refers to the number or rate of deaths from cancer.

The incidence and mortality rates were expressed as the number of cancers per 100,000 population, except for childhood cancer rates which were expressed for 1,000,000 population. In this report, the childhood cancer rates were presented as average annual rates per million because of the small number of cancer cases in children relative to adult cancers.

Cancer incidence rates is,

*Incidence rate = (New cancers / Population)*100,000*

The *numerator* of the incidence rate is the number of new cancers; the *denominator* of the incidence rate is the number of persons that are at risk for that cancer. The number of new cancers may include multiple primary cancers occurring in one patient. The primary site reported is the site of origin and not a metastatic site. The population used depends on the rate to be calculated. For cancer sites that occur in only one sex, the sex-specific population (e.g., females for cervical cancer) is used. The incidence rate can be computed for a given type of cancer or for all cancers combined. Except for 5-year age-specific rates, all incidence rates in this report are *age-adjusted* to the PR 2000 population.

Cancer death (or mortality) rate is,

*Mortality rate = (Cancer Deaths / Population)*100,000*

The *numerator* of the death rate is the number of deaths; the *denominator* of the mortality rate is the size of the population. As with the incidence rate, the population used depends on the rate to be calculated. The mortality rate can be computed for a given cancer site or for all cancers combined. Except for 5-year age-specific rates, all mortality rates in this report are *age-adjusted* (see below) to the PR 2000 population.

Annual Percent Change (APC)

This is the average rate of change (increase or decrease) in a cancer rate over several years and is used to measure trends over a specific period of time. The APC is calculated by fitting a least squares regression line to

the natural logarithm of the annual rates (*r*) using the calendar year as a predictive variable: $ln\ (r) = m(year) + b$ (15, 16) as implemented in the National Cancer Institute's (NCI's) SEER*Stat software (13). From the slope of the regression line m, the APC is calculated as $EAPC = 100^* (e^m - 1)$. Testing the hypothesis that the APC is equal to zero is equivalent to testing the hypothesis that the slope of the line in the regression is equal to zero. The slope of the line is tested for significant increases or decreases (95% confidence intervals were recorded, and $p < 0.05$ was considered significant). The APC was calculated for incidence and mortality trends in specific primary sites where there were 15 or more incidence cases or deaths for each year reported during the period of 1987 to 2004.

Relative Risks

The relative risk of developing or dying of cancer was calculated by dividing the age-adjusted rate in the population whose risk was being evaluated by the age-adjusted rate in the comparison population. A relative risk of 1.0 indicates that the risk of cancer is the same in the two groups. A relative risk greater than 1.0 indicates that the likelihood of cancer is greater in the group being studied than in the comparison population; conversely, a relative risk of less than 1.0 indicates that the cancer rates are lower in the group of interest.

Lifetime Risk

The lifetime risk is the probability of developing cancer in the course of one's lifespan. Lifetime risk may also be discussed in terms of the probability of developing or of dying from cancer. The estimates of developing and dying from cancer are implemented using the National Cancer Institute's (NCI's) DevCan Software (17). The methodology is described in detail by Fay (2003, 2004) (18, 19).

Cautions on Interpretation

The validity of the cancer rates depends on the completeness of cancer reporting and on the accuracy of population estimates. Incidence data on this report are based on cases of primary cancers which were first diagnosed among the residents of Puerto Rico between January 1, 2000 and December 31, 2004 and were reported to the PRCCR as of June 2010. Additional cancer cases will continue to be reported to the PRCCR for 2004 and for earlier years and will be included in future reports. Population estimates released by the Puerto Rico Census Bureau are also subject to periodic revisions. For these reasons, rates in this report are not directly comparable to those released in previous annual reports. Care should be taken in interpreting the data at the municipality level. One case of cancer in a municipality with a small population can cause the rate in that municipality to be very high relative to other municipalities in the island. For example, one case of cancer in a municipality with a population of 10,000 will result in a rate of cancer that is roughly twice as high as the rate of cancer in a municipality with population of 20,000 that also has only one case.

Small Numbers

When the numbers of cases or deaths used to compute rates are small, those rates tend to have poor reliability. Caution must be observed in interpreting data when the number of events is small and the probability of such events is small (such as being diagnosed with a rare disease). In this report rates based on counts of cases that are fewer than 6 are not shown due to their instability; this is also done to avoid potential identification of patients. Finally, statistical significance variation in rates can occur by chance alone, and additional assessment is required to separate chance occurrences from real public health problems. Statistical significance does not necessarily indicate the overall importance of the result.

Cancer in Puerto Rico: An Overview

Cancer Incidence and Mortality

This overview highlights some of the findings of this report and summarizes the status of cancer in Puerto Rico.

New cases and deaths in 2004

In Puerto Rico 11,211 new cancer cases were reported in 2004, of these 6,240 (55.6%) were males and 4,971 (44.3%) were females. Prostate cancer is the most frequent cancer among males with 2,576 new cases. Breast cancer is the most common in females; this year 1,555 cases were reported. There were 795 new cases of colorectal cancer among males and 729 cases among females. Lung and bronchus cancer is also one the most

Table 1: Incidence for Specific Cancer Sites by Sex, Puerto Rico, 2000-2004*

Primary Sites	Male						Female					
	2000-2004			2004			2000-2004			2004		
	Rate*	Count	%	Rate*	Count	%	Rate*	Count	%	Rate*	Count	%
All Sites	***337.5***	***30,119***	***100***	***333.0***	***6,240***	***100***	***222.8***	***24,474***	***100***	***217.0***	***4,971***	***100***
Oral Cavity and Pharynx	15.5	1,393	4.6	15.0	273	4.4	3.8	426	1.7	3.1	73	1.5
Esophagus	7.4	661	2.2	6.5	122	2.0	1.9	219	0.9	1.9	46	0.9
Stomach	13.0	1,147	3.8	12.0	217	3.5	6.8	767	3.1	6.1	146	2.9
Colon and Rectum	43.5	3,878	12.9	42.0	795	12.7	30.8	3,449	14.1	31.0	729	14.7
Liver and Intra-hepatic Bile Duct	9.4	840	2.8	9.4	177	2.8	4.0	449	1.8	3.6	86	1.7
Pancreas	5.6	495	1.6	5.6	105	1.7	4.0	458	1.9	4.4	107	2.2
Larynx	7.1	638	2.1	6.0	113	1.8	0.7	80	0.3	0.6	13	0.3
Lung and Bronchus	22.6	2,011	6.7	21.0	389	6.2	9.6	1,083	4.4	9.0	223	4.5
Melanoma of the Skin	2.5	220	0.7	2.4	45	0.7	1.9	210	0.9	1.7	39	0.8
Breast	0.7	61	0.2	0.9	17	0.3	71.5	7,795	31.9	68.0	1,555	31.3
Cervix Uteri	~	~	~	~	~	~	8.9	948	3.9	8.2	179	3.6
Corpus and Uterus, NOS	~	~	~	~	~	~	15.3	1,676	6.8	16.0	369	7.4
Ovary	~	~	~	~	~	~	6.6	711	2.9	5.7	130	2.6
Prostate	128.7	11,466	38.1	138	2,576	41.3	~	~	~	~	~	~
Testis	2.8	259	0.9	2.6	48	0.8	~	~	~	~	~	~
Urinary Bladder	14.1	1,239	4.1	12.0	229	3.7	4.3	493	2.0	3.7	90	1.8
Kidney and Renal Pelvis	6.3	569	1.9	6.3	118	1.9	3.1	343	1.4	3.2	73	1.5
Brain and Other Nervous System	4.1	376	1.2	2.9	54	0.9	3.4	353	1.4	3.7	78	1.6
Thyroid	2.5	224	0.7	3.1	59	0.9	8.7	907	3.7	10.5	225	4.5
Hodgkin Lymphoma	2.4	219	0.7	2.4	45	0.7	1.8	187	0.8	1.8	38	0.8
Non-Hodgkin Lymphoma	11.3	1,013	3.4	12.0	221	3.5	8.2	898	3.7	8.1	185	3.7
Myeloma	3.9	345	1.1	3.5	65	1.0	2.8	318	1.3	2.8	66	1.3
Leukemia	7.8	701	2.3	8.0	149	2.4	5.1	541	2.2	4.6	100	2.0
Bones and Joints	1.2	109	0.4	0.7	14	0.2	0.9	93	0.4	1.0	22	0.4
Other Sites	25.2	2,255	7.5	22.0	409	6.6	18.6	2,070	8.5	17.3	399	8.0

*Rates are per 100,000 and age-adjusted to the PR 2000 population.
~ Not applicable

common cancer sites with 389 new cases in males and 223 in females (Table 1).

During 2004, 4,826 deaths due to cancer were reported; of these, 2,721 (56.3%) were males and 2,105 were (43.6%) females. Prostate cancer is the most frequent cause of death due to cancer among males with 515 deaths. Breast cancer is the most common cause of death due to cancer in females with 414 deaths reported. There were 353 deaths by colorectal cancer among males and 279 among females. Lung and bronchus cancer is also among the most common causes of death by cancer with 388 deaths in males and 227 in females (Table 2).

Table 2: Mortality for Specific Cancer Sites by Sex, Puerto Rico, 2000-2004*

Primary Site	Male						Female					
	2000-2004			2004			2000-2004			2004		
	Rate*	Count	%	Rate*	Count	%	Rate*	Count	%	Rate*	Count	%
All sites	***155.0***	***13,621***	***100***	***147.5***	***2,721***	***100***	***90.8***	***10,210***	***100***	***88.4***	***2,105***	***100***
Oral Cavity and Pharynx	6.3	563	4.1	6.1	114	4.2	1.3	152	1.5	1.2	29	1.4
Esophagus	6.7	596	4.4	5.5	102	3.7	1.5	171	1.7	1.3	32	1.5
Stomach	9.6	845	6.2	9.4	172	6.3	4.8	556	5.4	4.7	114	5.4
Colon and Rectum	17.9	1,578	11.6	19.0	353	13.0	11.7	1,329	13.0	11.5	279	13.3
Liver and Intrahepatic Bile Duct	10.5	939	6.9	10.4	194	7.1	5.1	583	5.7	4.5	109	5.2
Pancreas	5.8	513	3.8	5.1	95	3.5	4.0	452	4.4	4.4	108	5.1
Larynx	3.6	316	2.3	3.1	58	2.1	0.3	37	0.4	0.3	6	0.3
Lung and Bronchus	22.4	1,986	14.6	20.9	388	14.3	9.5	1,073	10.5	9.4	227	10.8
Melanoma of the Skin	0.4	40	0.3	0.3	5	0.2	0.3	36	0.4	0.4	9	0.4
Prostate	30.3	2,581	18.9	28.7	515	18.9	~	~	~	~	~	~
Testis	0.3	24	0.2	0.4	7	0.3	~	~	~	~	~	~
Breast	0.2	18	0.1	0.2	4	0.1	16.4	1,814	17.8	17.7	414	19.7
Cervix Uteri	~	~	~	~	~	~	2.3	246	2.4	2.2	50	2.4
Corpus and Uterus, NOS	~	~	~	~	~	~	3.4	380	3.7	3.5	84	4.0
Ovary	~	~	~	~	~	~	3.9	433	4.2	4.1	95	4.5
Urinary Bladder	3.4	296	2.2	4.0	72	2.6	1.6	187	1.8	1.5	36	1.7
Kidney and Renal Pelvis	2.3	205	1.5	2.8	52	1.9	1.0	114	1.1	1.2	28	1.3
Brain and Other Nervous System	2.4	217	1.6	1.9	36	1.3	1.4	155	1.5	1.3	31	1.5
Thyroid	0.3	23	0.2	0.3	5	0.2	0.4	45	0.4	0.4	9	0.4
Hodgkin Lymphoma	0.4	36	0.3	0.4	7	0.3	0.3	33	0.3	0.3	7	0.3
Non-Hodgkin Lymphoma	4.9	435	3.2	4.5	85	3.1	3.0	332	3.3	3.2	74	3.5
Myeloma	2.9	259	1.9	2.4	45	1.7	2.3	255	2.5	2.0	48	2.3
Leukemia	5.6	497	3.6	6.0	111	4.1	3.6	395	3.9	3.2	73	3.5
Bones and Joints	1.4	120	0.9	1.1	21	0.8	0.7	82	0.8	0.7	16	0.8
Other Sites	17.3	1,534	11.3	15.1	280	10.3	12.0	1,350	13.2	9.6	227	10.8

*Rates are per 100,000 and age-adjusted to the PR 2000 population.
~ Not applicable

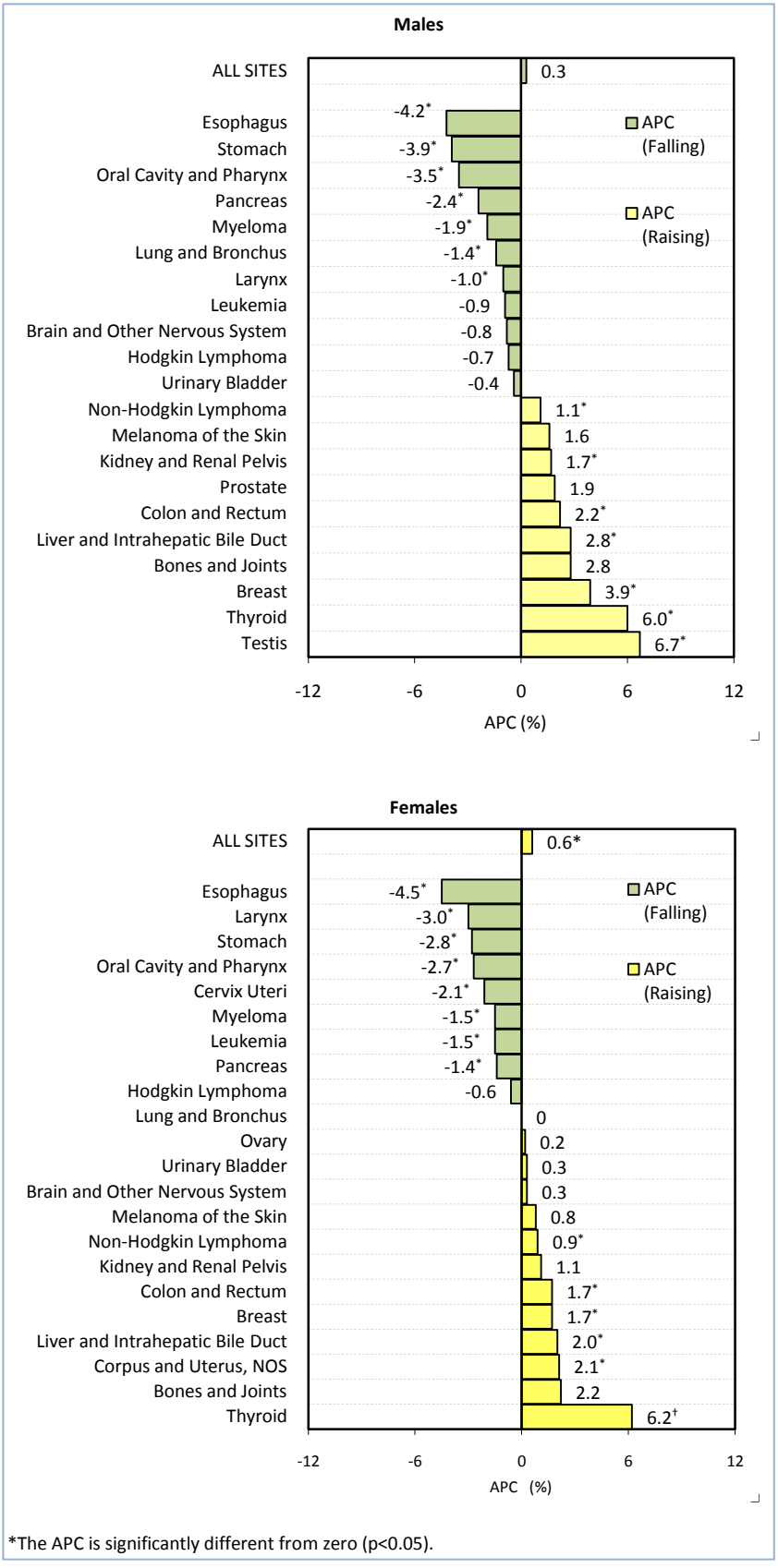
All Sites, 2000-2004

Approximately 54,593 people in Puerto Rico were diagnosed with invasive cancer between 2000 and 2004; also 23,831 deaths due to cancer were registered during the same period. There were 10.3% more cancers diagnosed in males (30,119 people) than in females (24,474 people). In mortality there were 14.3% more deaths due to cancer in males (13,621 people) than in females (10,210 people).

On average, approximately 6,024 males and 4,895 females were diagnosed annually with cancer and 2,724 deaths due to cancer in males and 2,042 deaths due to cancer in females were registered annually (Table 1 and Table 2).

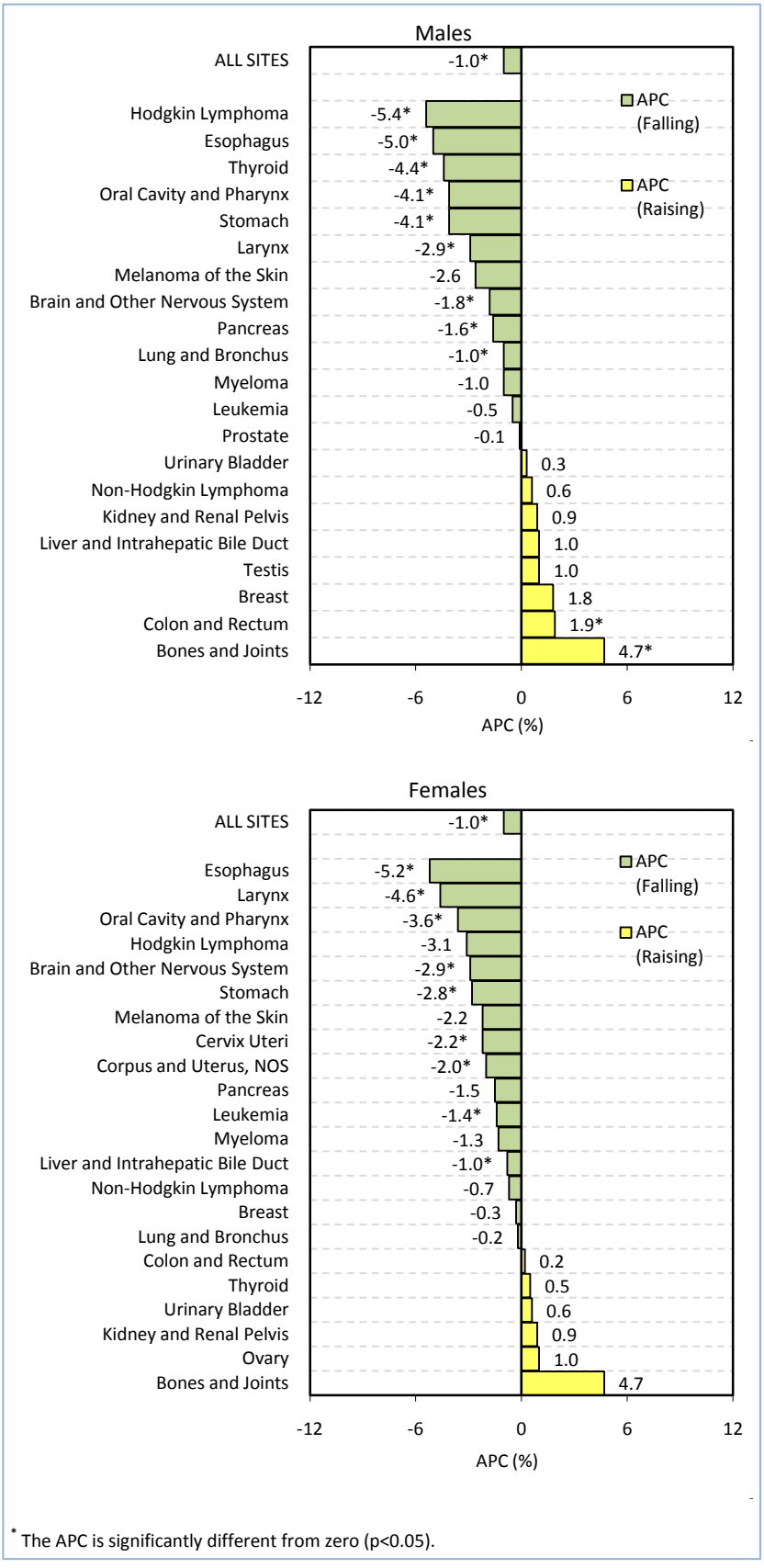
In males incidence rates increased from 289.0 per 100,000 in 1987 to 333.0 per 100,000 in 2004, while females incidence rates increased from 203.7 per 100,000 in 1987 to 216.6 per 100,000. Incidence rates among males had a slight increase of an average of 0.3% each year; in females the incidence rates increased by an average of 0.6% each year during this period. These increases were statistically significant ($p<0.05$).

Figure 2: Annual Percent Change (APC)-Incidence Rates by Sex, Puerto Rico, 2000-2004



*The APC is significantly different from zero ($p<0.05$).

Figure 3: Annual Percent Change (APC)-Mortality Rates by Sex, Puerto Rico, 2000-2004



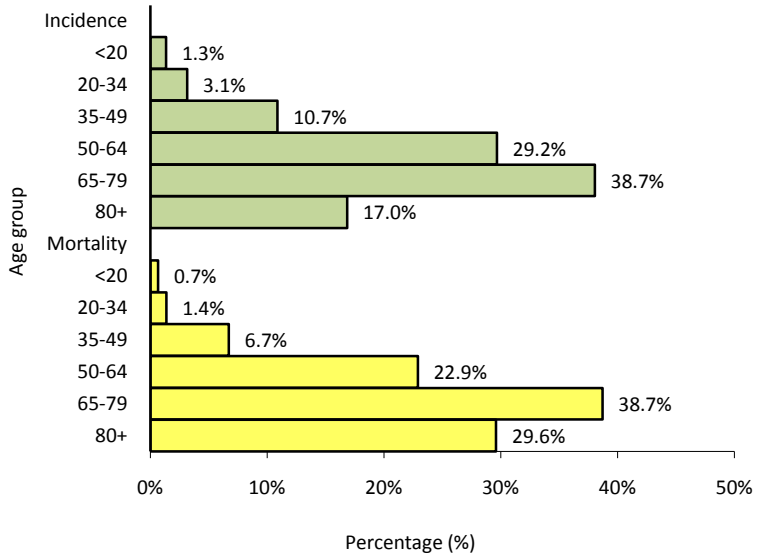
* The APC is significantly different from zero (p<0.05).

Mortality rates for males decreased from 170.1 per 100,000 in 1987 to 147.5 per 100,000 in 2004, while female's mortality rates decreased from 103.1 per 100,000 in 1987 to 88.4 per 100,000. The mortality rates among males, decreased by an average of 1.0% each year; also in females the rates decreased by an average of 1.0% annually. These decreases were statistically significant ($p < 0.05$).

From 2000-2004, the median age at diagnosis for cancer of all sites was 66 years of age. Approximately 1.3% were diagnosed under age 20; 3.1% between 20 and 34; 10.7% between 35 and 49; 29.2% between 50 and 64; 38.7% between 65 and 79; and 17.0% were 80+ years of age.

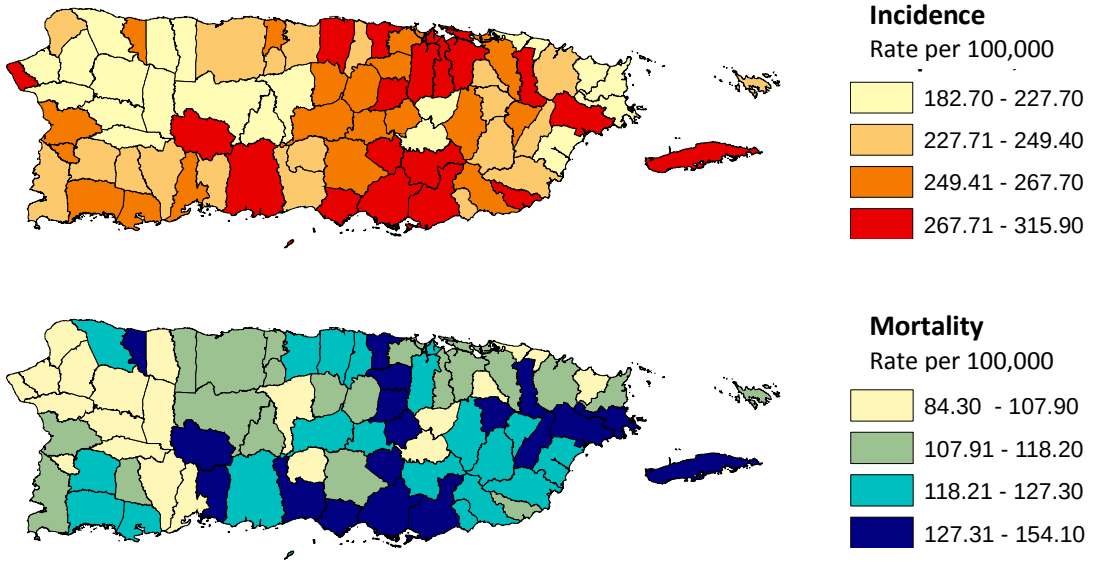
From 2000-2004, the median age at death for cancer for all sites was 72 years of age. Approximately 0.7% were diagnosed under age 20; 1.4% between 20 and 34; 6.7% between 35 and 49; 22.9% between 50 and 64; 38.7% between 65 and 79; and 29.6% were 80+ years of age.

Figure 4: Incidence and Mortality Age Distribution for All Sites Cancer, Puerto Rico, 2000-2004



Based on the rates from 2000-2004, 34.2% of males and 27.1% of females born today will be diagnosed with cancer at some time during their lifetime. This number can also be expressed as 1 in 3 males and 1 in 4 females will be diagnosed with cancer during their lifetime.

Figure 5: Age-Adjusted All Sites Cancer Incidence and Mortality Rates by Municipality in Puerto Rico, 2000-2004



Age and Sex

(Based on data 2000-2004)

The incidence and mortality of invasive cancer varies with age, sex and the type of tumor. About 54.9% of all new cases and the 67.9% of all death by cancer in Puerto Rico occur after the age of 65 years. Following is a description of the burden and types of cancers most often diagnosed and the principal cause of cancer deaths among males and females in various age groups.

Figure 6: The most frequent incident cancers by age and sex, 2000-2004

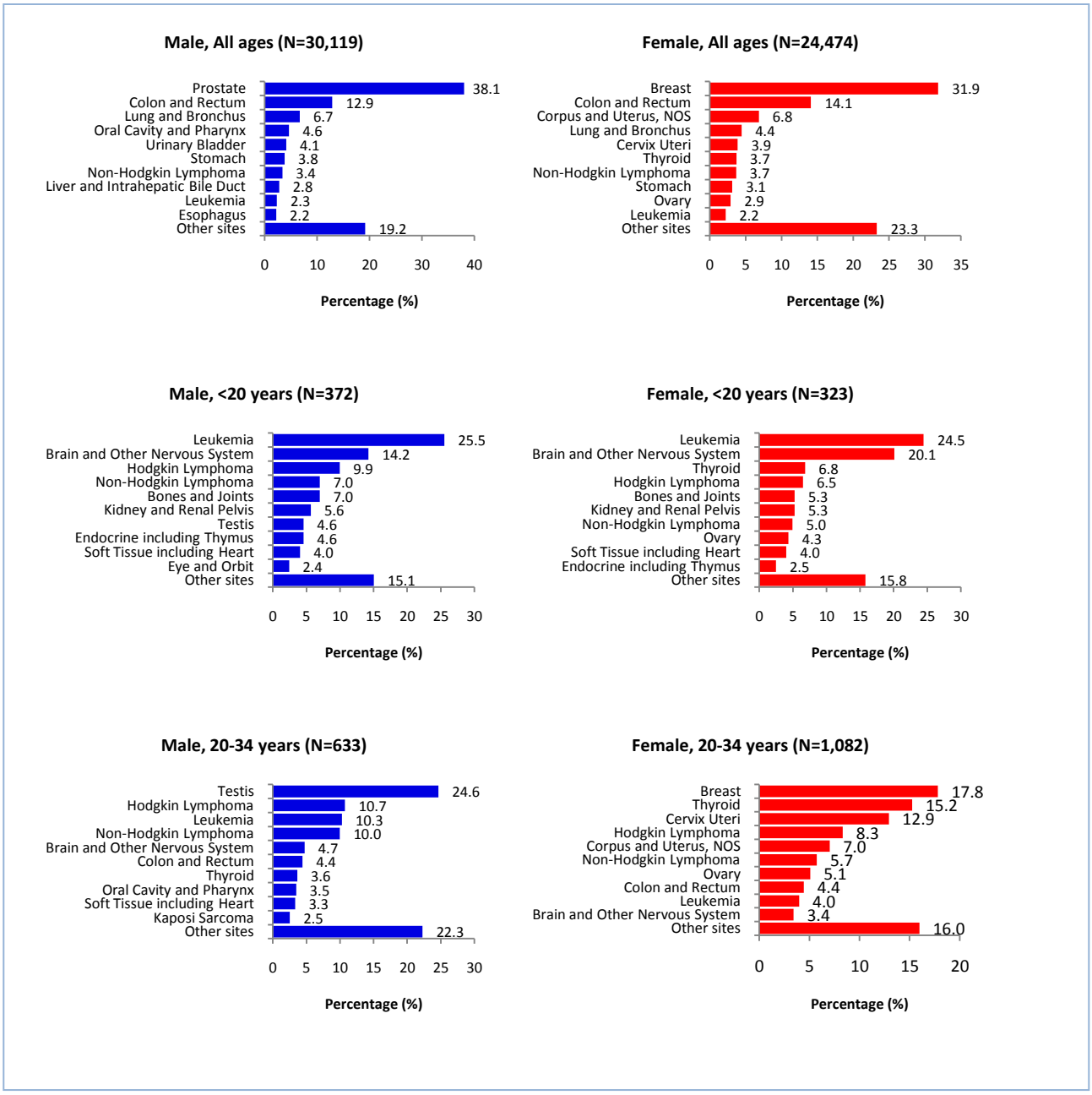


Figure 6: The most frequent incident cancers by age and sex, 2000-2004, (Continued)

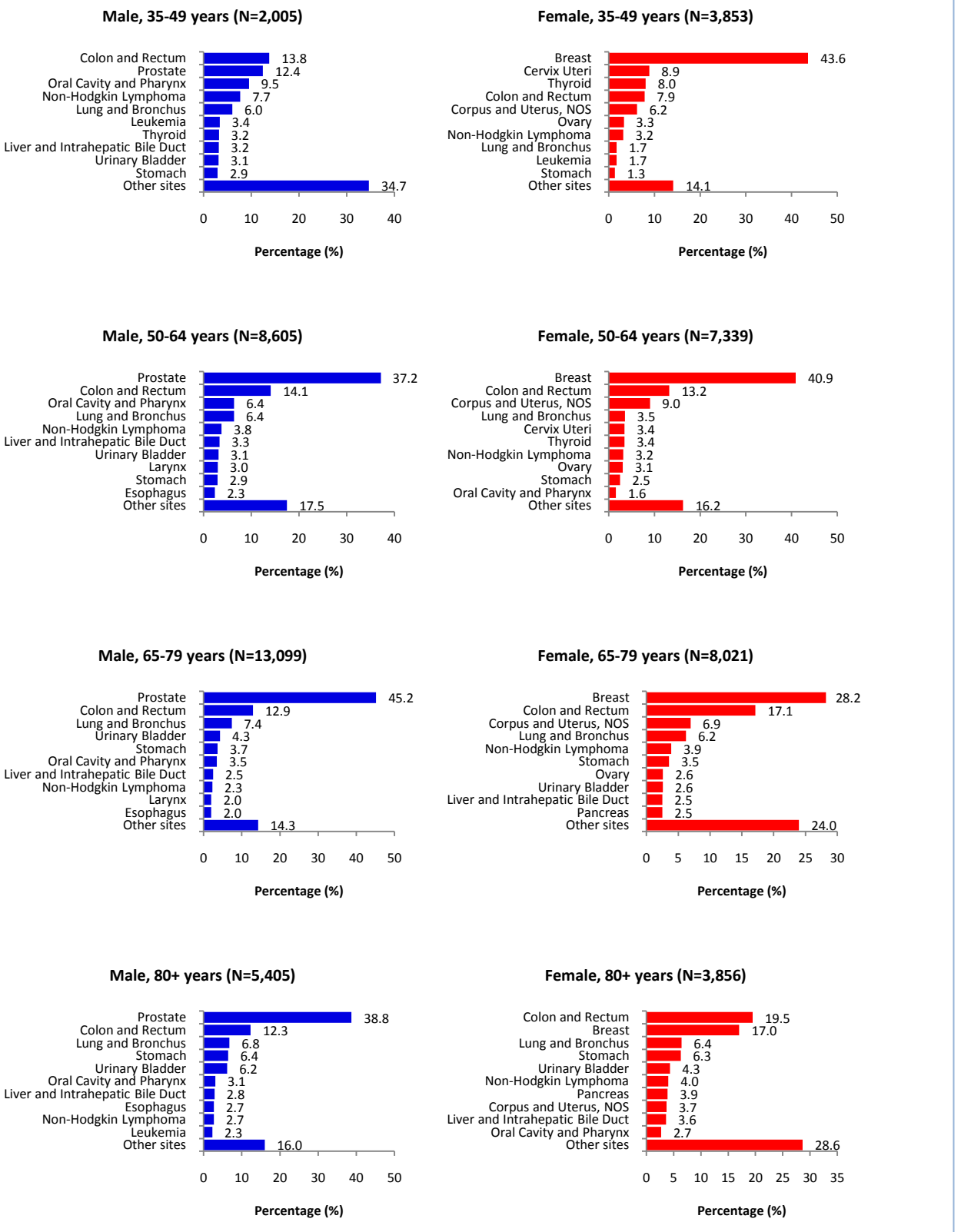


Figure 7: The most frequent causes of death due to cancer by age and sex, 2000-2004

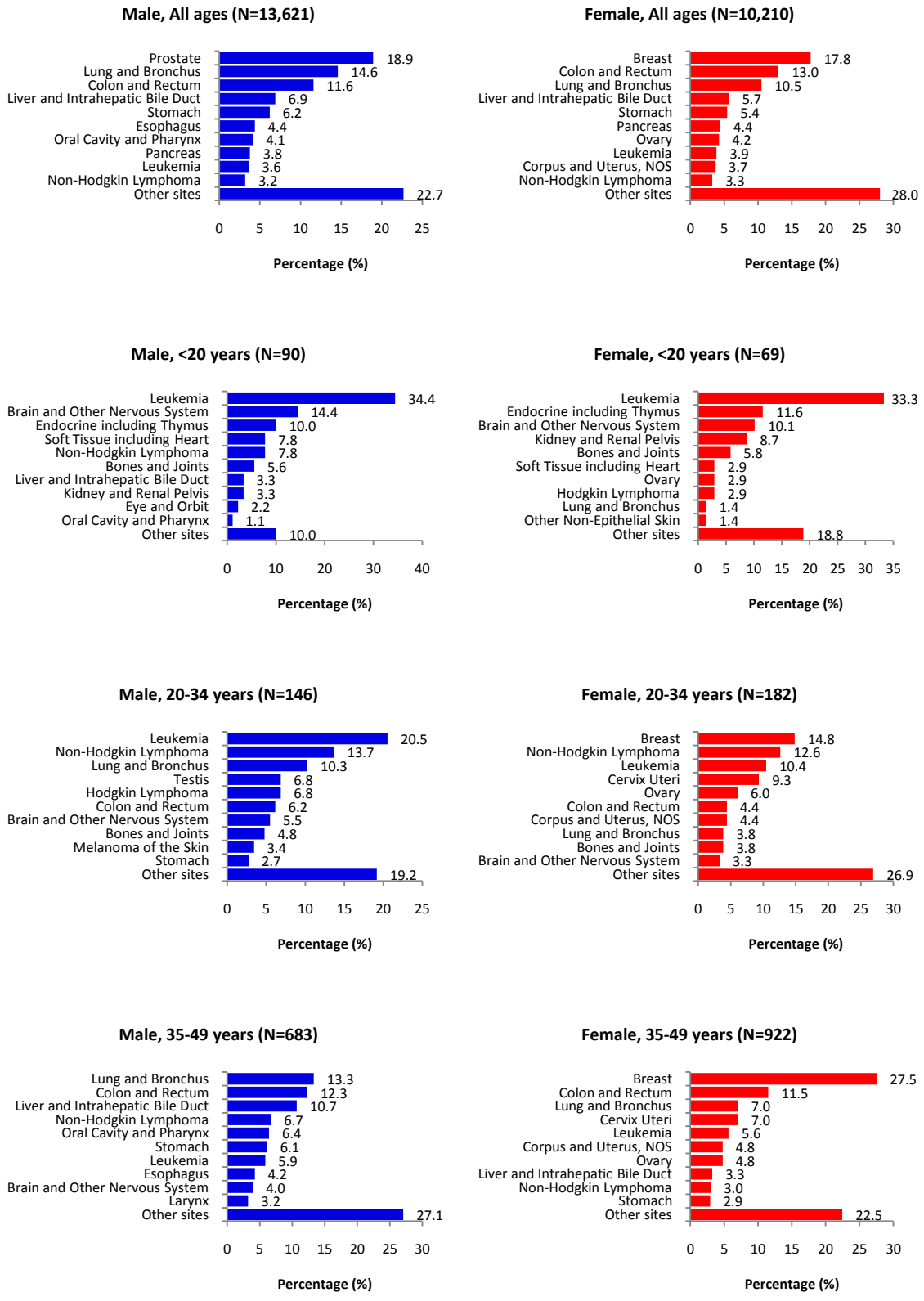
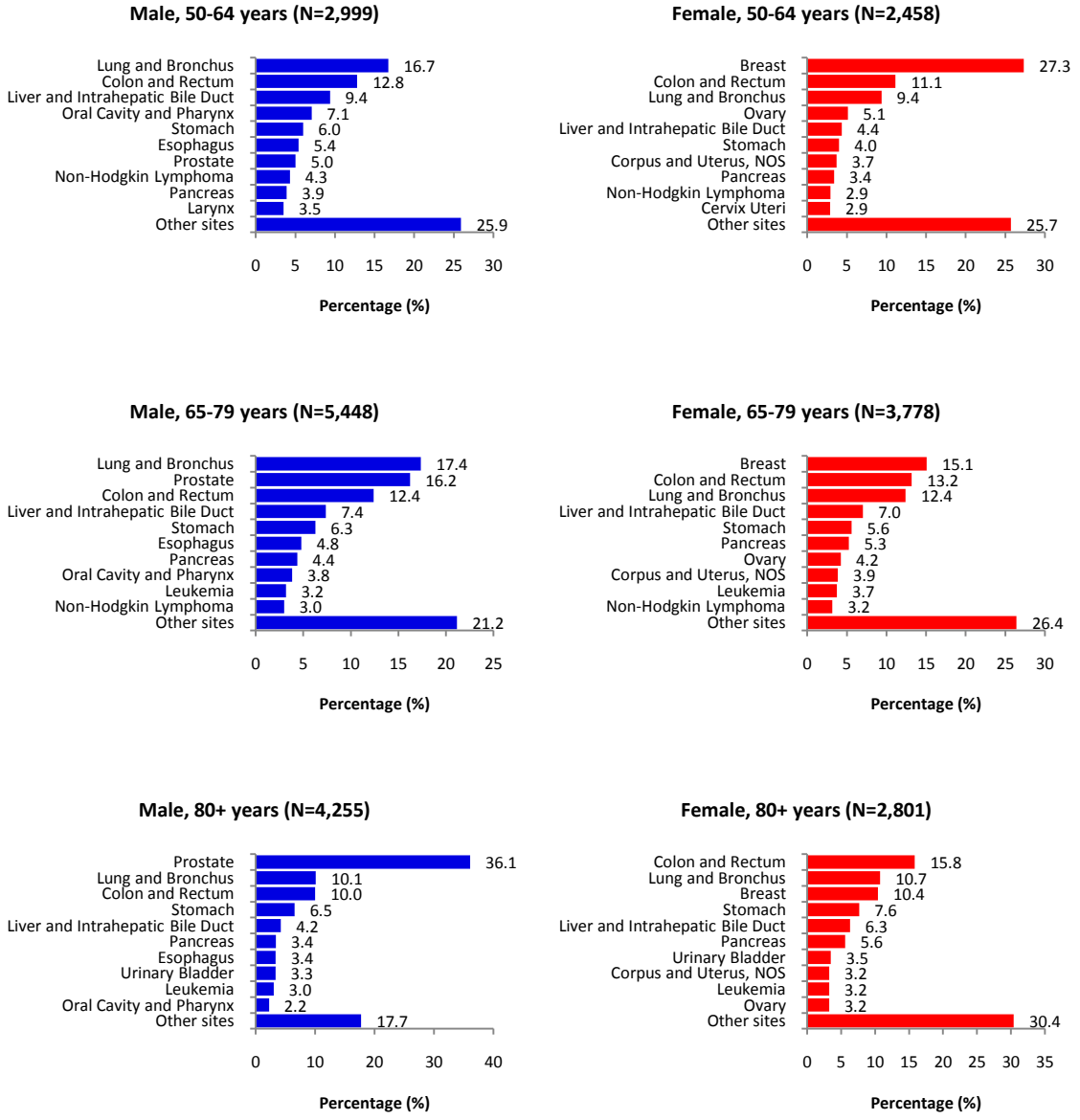


Figure 7: The most frequent causes of death due to cancer by age and sex, 2000-2004 (Continued)



Incidence and Mortality of Selected Types of Cancer

Cancer of the Oral Cavity and Pharynx

Oral cavity and pharynx cancer is one of the most commonly diagnosed cancers among males; it ranks fourth (after prostate, colorectal and lung and bronchus cancer). Also it is one of the leading causes of death in males. Oral cavity and pharynx cancers are the cancers that occur in the mouth and the pharynx, a hollow tube about 5 inches long that starts behind the nose and leads to the esophagus and the trachea. The oral cavity and pharynx consists of many parts: lips, lining of cheeks, salivary glands, roof of your mouth (hard palate), back of your mouth (soft palate and uvula), floor of your mouth (area under the tongue),

Figure 8: Age-Adjusted Incidence and Mortality Rates for Oral Cavity and Pharynx Cancer by Sex, Puerto Rico 1987-2004

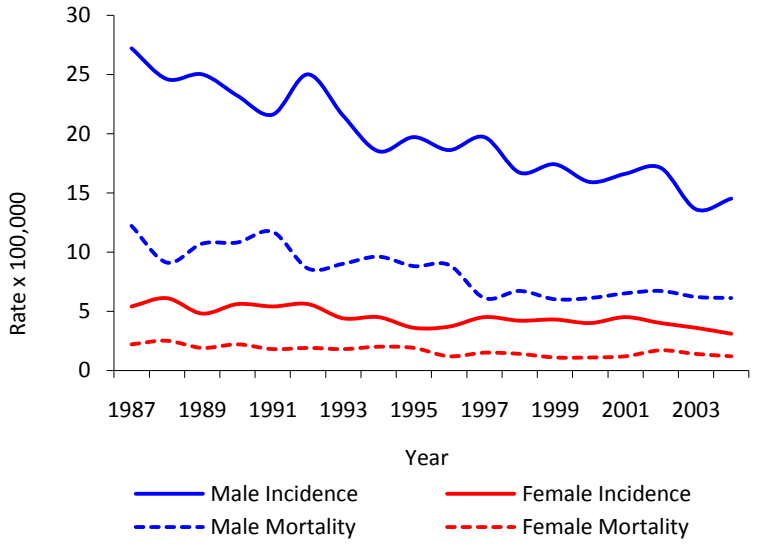
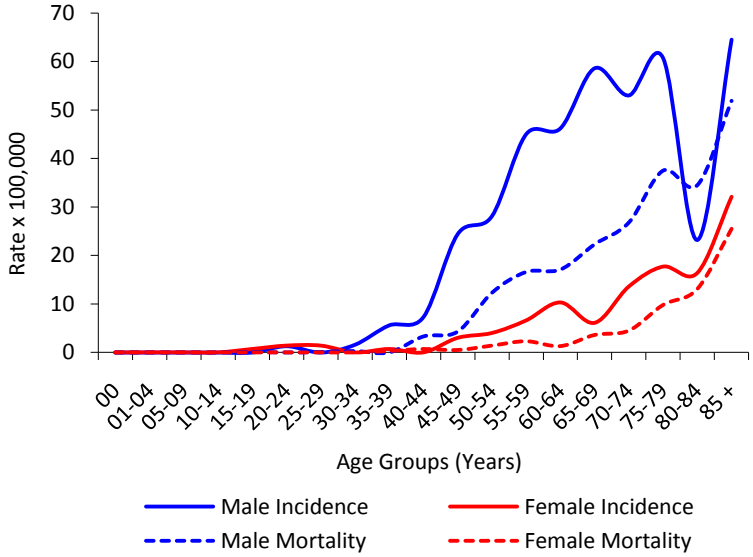


Figure 9: Average Annual Age-Specific Incidence Rates for Oral Cavity and Pharynx Cancer by Sex, Puerto Rico 2000-2004



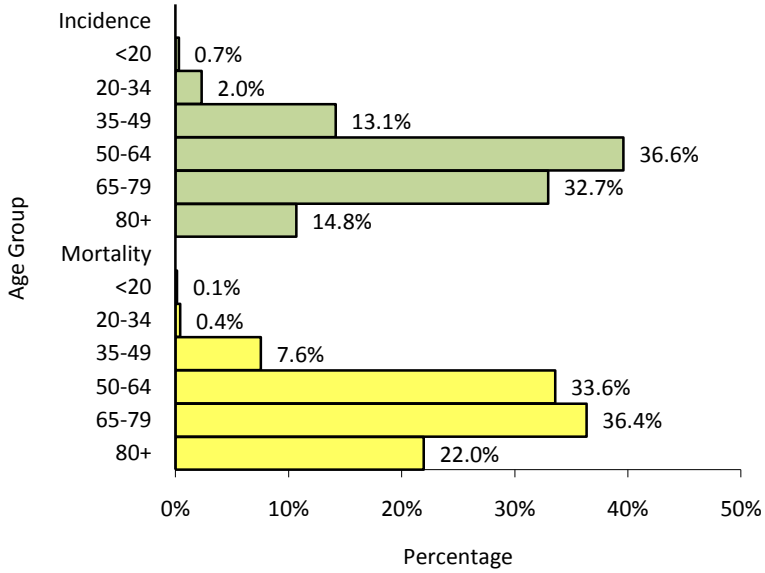
Key Points

- Oral cavity and pharynx cancer accounts for 4.6% of all male cancers and 1.7% of all female cancers between 2000-2004.
- It accounts for 4.1% of all male cancer deaths and 1.5% of female cancer deaths between 2000-2004.
- An average of approximately 279 males and 86 females were diagnosed with oral cavity and pharynx cancer between 2000-2004.
- Approximately 113 males and 30 females die from oral cavity and pharynx cancer each year.
- Between 2000-2004, the age-adjusted incidence rate was 15.5 per 100,000 males per year and 3.8 per 100,000 females per year.
- Cancer incidence for oral cavity and pharynx cancer was 4.1 times (Confidence Interval (CI) 95%: 3.6, 4.5) higher among males than among females, during 2000-2004.
- Between 2000-2004, the age-adjusted mortality rate was 6.3 per 100,000 males per year and 1.3 per 100,000 females per year.
- Mortality due to cancer mortality was 4.7 times (CI 95%: 4.0, 5.7) higher among males than among females, during 2000-2004.

gums and teeth, tongue, tonsils and pharynx; it has three parts: **n**asopharynx, oropharynx and hypopharynx. The following are risk factors for oral cancer: smoking cigarettes, cigars, or pipes; using or chewing tobacco and dipping snuff; drink alcohol; human papillomavirus (HPV) infection; exposure to the sun and a personal history of head and neck cancer(20).

From 2000-2004, the median age at diagnosis for cancer of the oral cavity and pharynx was 64 years of age. The median age at death for oral cavity and pharynx cancer was 68 years of age.

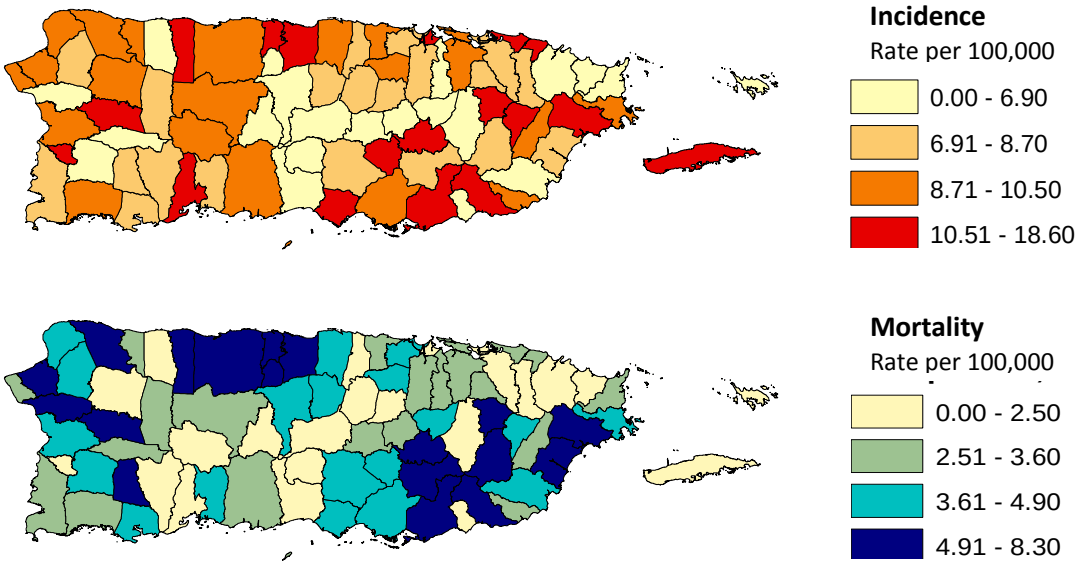
Figure 10: Incidence and Mortality Age Distribution for Oral Cavity and Pharynx Cancer, Puerto Rico, 2000-2004



The incidence rate among males decreased by an average of 3.5% ($p < 0.05$) each year, while in females it decreased by an average of 2.7% ($p < 0.05$) annually. Cancer mortality rate in males decreased by an average of 4.1% ($p < 0.05$) each year, while in females it decreased by an average of 3.6 % ($p < 0.05$) annually.

Based on rates from 2000-2004, 1.0% of males and females born today will be diagnosed with cancer of the oral cavity and pharynx at some time during their lifetime. This number can also be expressed as 1 in 100 males and females will be diagnosed with cancer of the oral cavity and pharynx during their lifetime.

Figure 11: Age-Adjusted Oral Cavity and Pharynx Cancer Incidence and Mortality Rates by Municipality in Puerto Rico, 2000-2004



Cancer of the Stomach

Stomach cancer is the sixth most commonly diagnosed cancer among males and the eighth most commonly diagnosed cancer in females in Puerto Rico. Stomach cancer is also known as gastric cancer. Studies have found the following risk factors for stomach cancer: Helicobacter pylori infection; long-term inflammation of the stomach; smoking and family history. Also, studies suggest that people who have a diet high in foods that

Figure 13: Age-Adjusted Incidence and Mortality Rates for Stomach Cancer by Sex, Puerto Rico 1987-2004

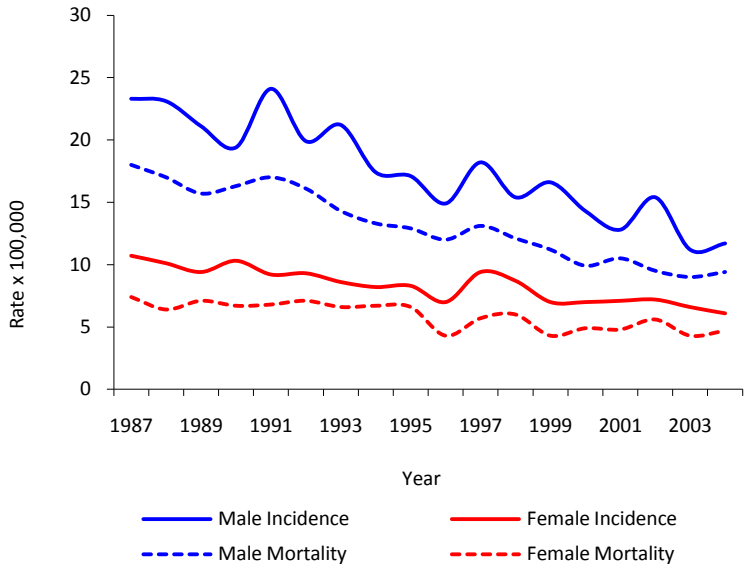
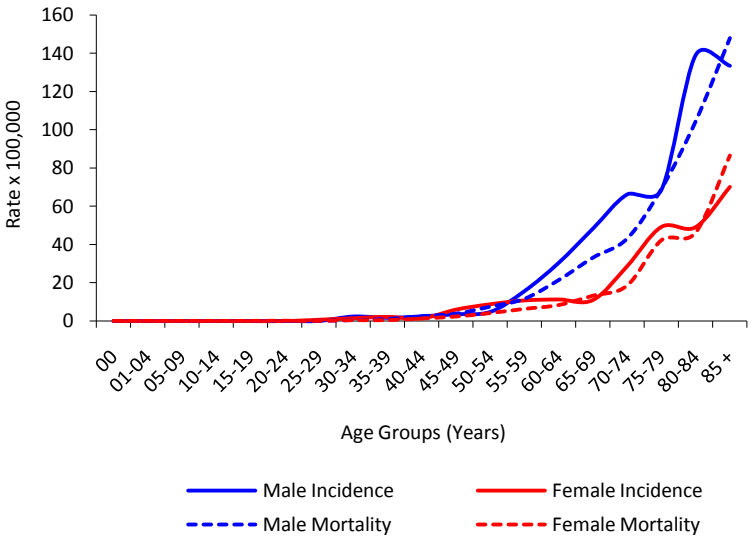


Figure 12: Average Annual Age-Specific Incidence Rates for Stomach Cancer by Sex, Puerto Rico 2000-2004



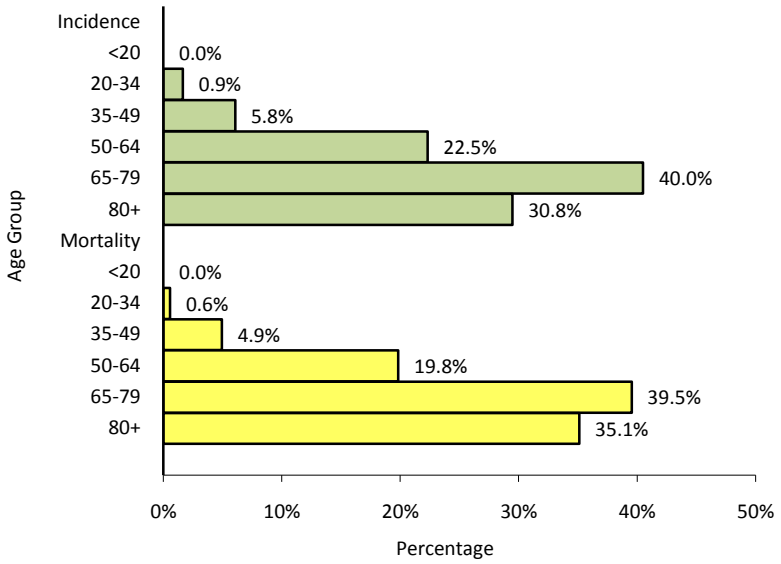
Key Points

- Stomach cancer accounts for 3.8% of all male cancers and 3.1% of all female cancers between 2000-2004.
- It accounts for 6.2% of all male cancer deaths and 5.4% of female cancer deaths between 2000-2004.
- An average of approximately 230 males and 154 females were diagnosed with stomach cancer between 2000-2004.
- Approximately 169 males and 111 females die from stomach cancer each year.
- Between 2000-2004, the age-adjusted incidence rate was 13.0 per 100,000 males per year and 6.8 per 100,000 females per year.
- Stomach cancer incidence are 1.9 times (Confidence Interval (CI) 95%: 1.8, 2.1) higher among men than among women, during 2000-2004.
- Between 2000-2004, the age-adjusted mortality rate was 9.6 per 100,000 males per year and 4.9 per 100,000 females per year.
- Stomach cancer mortality are 2.0 times (CI 95%: 1.8, 2.2) higher among males than among females, during 2000-2004.

are smoked, salted, or pickled have an increased risk for stomach cancer. On the other hand, people who have a diet high in fresh fruits and vegetables may have a lower risk of this disease. A lack of physical activity may increase the risk of stomach cancer. Also, people who are obese may have an increased risk of cancer developing in the upper part of the stomach (20).

From 2000-2004, the median age at diagnosis for cancer of the stomach was 73 years of age. The median age at death for stomach cancer was 75 years of age.

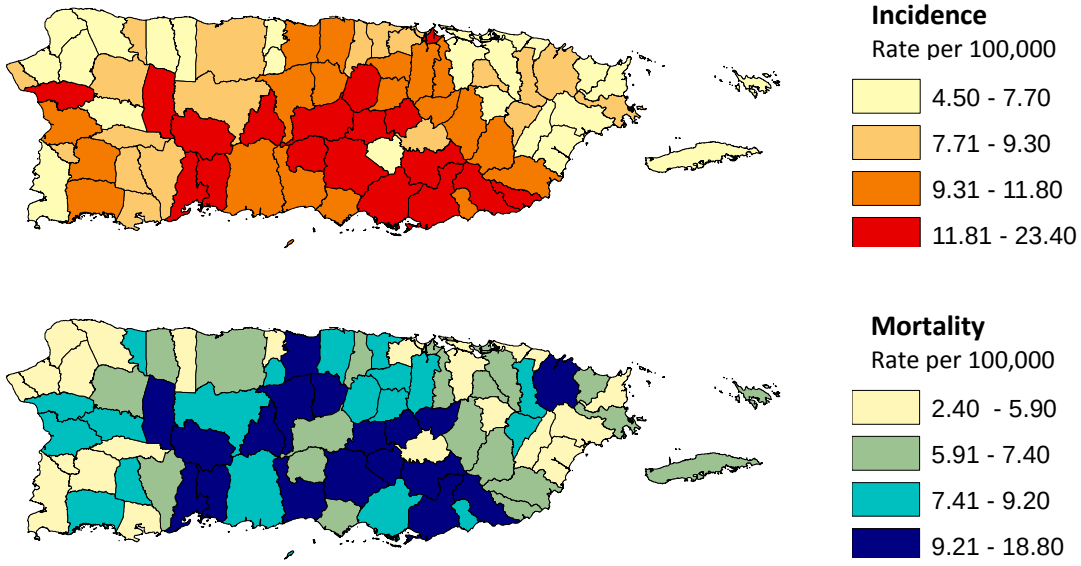
Figure 14: Incidence and Mortality Age Distribution for Stomach Cancer, Puerto Rico, 2000-2004



The incidence rate among males decreased by an average of 3.9% (p <0.05) each year, while in females it decreased by an average of 2.8% (p<0.05) annually. Cancer mortality rates in males decreased by an average of 4.1% (p <0.05) each year, while .

Based on rates from 2000-2004, 1.3% of males and females born today will be diagnosed with cancer of the stomach at some time during their lifetime. This number can also be expressed as 1 in 80 males and females will be diagnosed with cancer of the stomach during their lifetime.

Figure 15: Age-Adjusted Stomach Cancer Incidence and Mortality Rates by Municipality in Puerto Rico, 2000-2004



Cancer of the Colon and Rectum

Colorectal cancer is the second most commonly diagnosed cancer among males and females in Puerto Rico. Also is one the leading causes of cancer deaths ranking third among males and second among females. The exact causes of colorectal cancer are not known. Nevertheless, studies have demonstrated that some risk factors increase the chance of developing colorectal cancer. The risk factors for colorectal cancer are: personal or familiar history of polyps, ulcerative colitis and Crohn's disease, a diet high in fat and calories and low in fruits and vegetables,

Figure 16: Age-Adjusted Incidence and Mortality Rates for Colon and Rectum Cancer by Sex, Puerto Rico 1987-2004

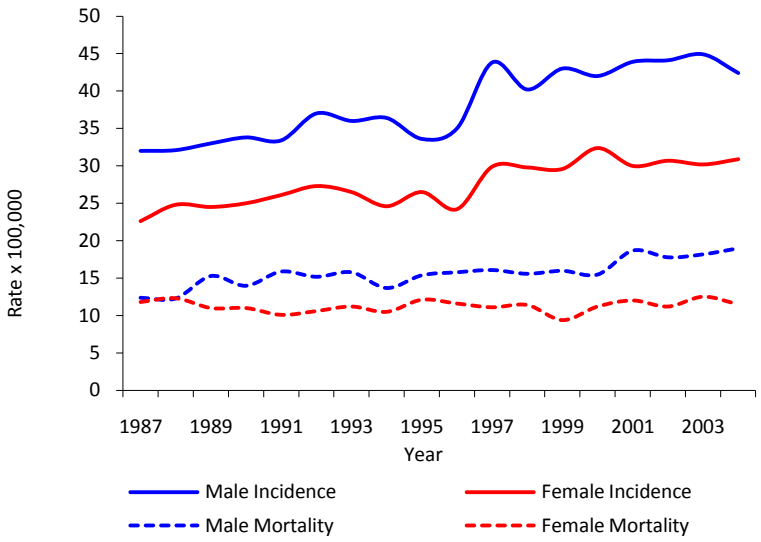
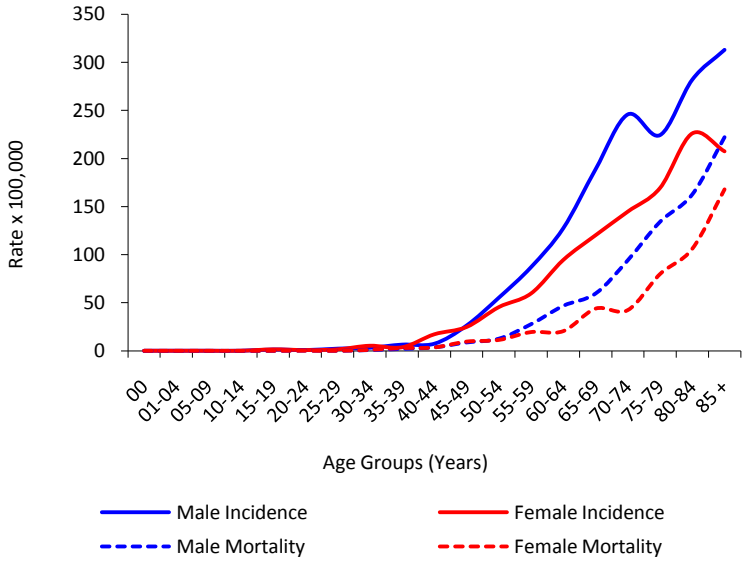


Figure 17: Average Annual Age-Specific Incidence Rates for Colon and Rectum Cancer by Sex, Puerto Rico 2000-2004



Key Points

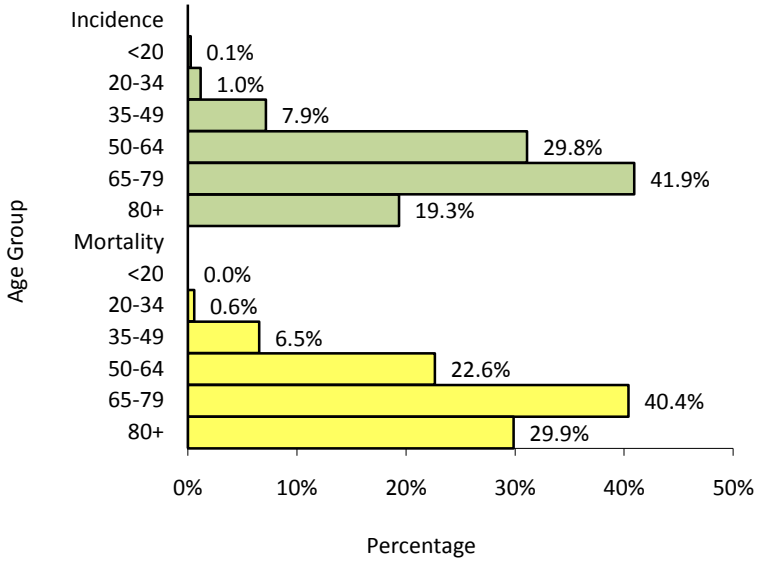
- Colorectal cancer accounts for 12.9% of all male cancers and 14.1% of all female cancers between 2000-2004.
- It accounts for 11.6% of all male cancer deaths and 13.0% of female cancer deaths between 2000-2004.
- An average of, approximately 778 males and 692 females were diagnosed with colorectal cancer between 2000-2004.
- Approximately 316 males and 266 females die from colorectal cancer each year.
- Between 2000-2004, the age-adjusted incidence rate was 43.5 per 100,000 males per year and 30.8 per 100,000 females per year.
- Colorectal cancer incidence was 1.4 times (Confidence Interval (CI) 95%: 1.3, 1.5) higher among men than among women, during 2000-2004.
- Between 2000-2004, the age-adjusted mortality rate was 17.9 per 100,000 males per year and 11.6 per 100,000 females per year.
- Colorectal cancer mortality was 1.5 times (CI 95%: 1.4, 1.6) higher among males than among females, during 2000-2004.

cigarette smoking and physical inactivity (20).

From 2000-2004, the median age at diagnosis for cancer of the colon and rectum was 68 years of age. The median age at death for colon and rectum cancer was 72 years of age.

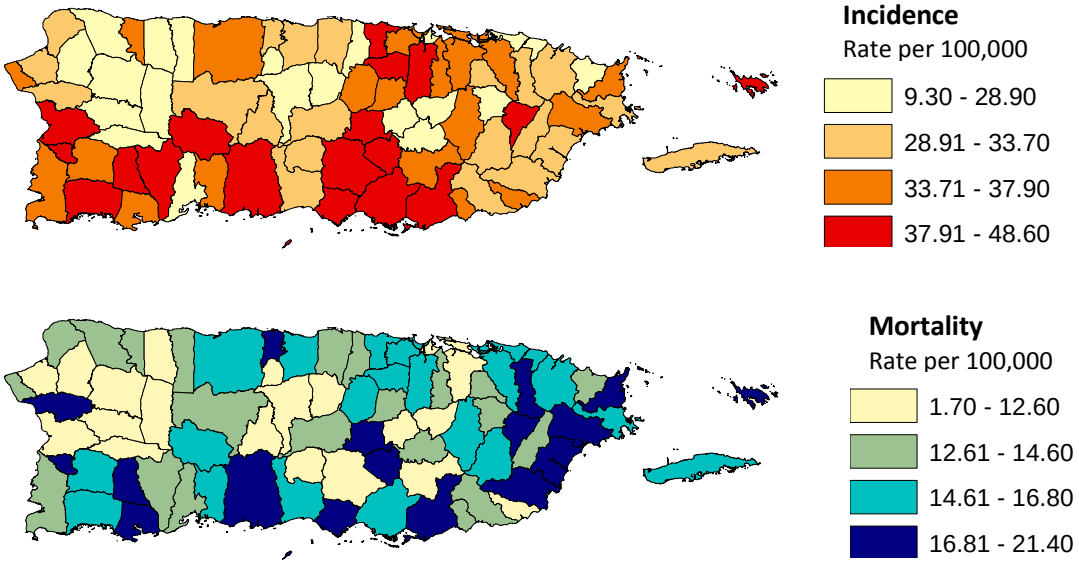
The incidence rate among males increased by an average of 2.2% ($p < 0.05$) each year, while in females it increased by an average of 1.7% ($p<0.05$) annually. Cancer mortality rate in males increased by an average of 1.9% ($p < 0.05$) each year, while in females it increased by an average of 0.2 % ($p > 0.05$) annually.

Figure 18: Incidence and Mortality Age Distribution for Colon and Rectum Cancer, Puerto Rico, 2000-2004



Based on rates from 2000-2004, 4.3% of males and females born today will be diagnosed with cancer of the colon and rectum at some time during their lifetime. This number can also be expressed as 1 in 23 males and females will be diagnosed with cancer of the colon and rectum during their lifetime.

Figure 19: Age-Adjusted Colon and Rectum Cancer Incidence and Mortality Rates by Municipality in Puerto Rico, 2000-2004



Cancer of the Liver and Intrahepatic Bile Duct

Liver and intrahepatic bile duct cancer is the eighth most commonly diagnosed cancer among males and the thirteenth most commonly diagnosed cancer in females in Puerto Rico. Liver and intrahepatic bile duct cancer is one the leading causes of cancer deaths in Puerto Rico. People with certain risk factors may be more likely than others to develop liver cancer. Studies have found the following risk factors for liver cancer: infection with hepatitis B virus (HBV) or hepatitis C virus (HCV); heavy alcohol use; *aflatoxin* (a harmful substance made by

Figure 20: Age-Adjusted Incidence and Mortality Rates for Liver and Intrahepatic Bile Duct Cancer by Sex, Puerto Rico 1987-2004

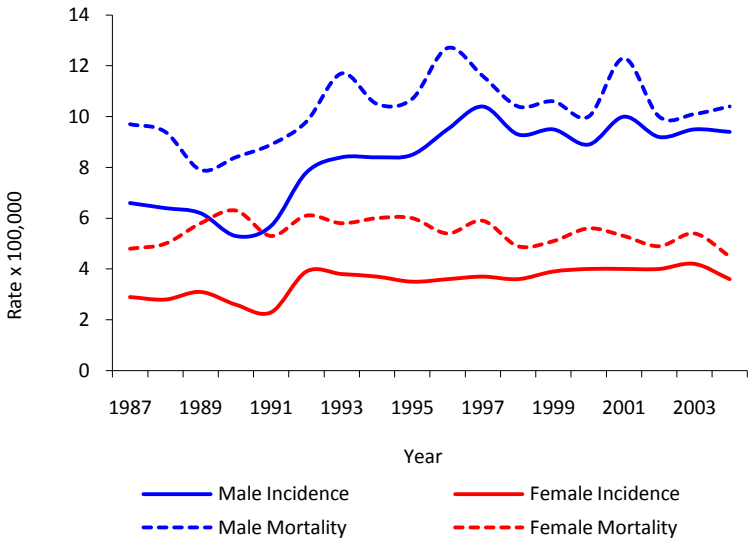
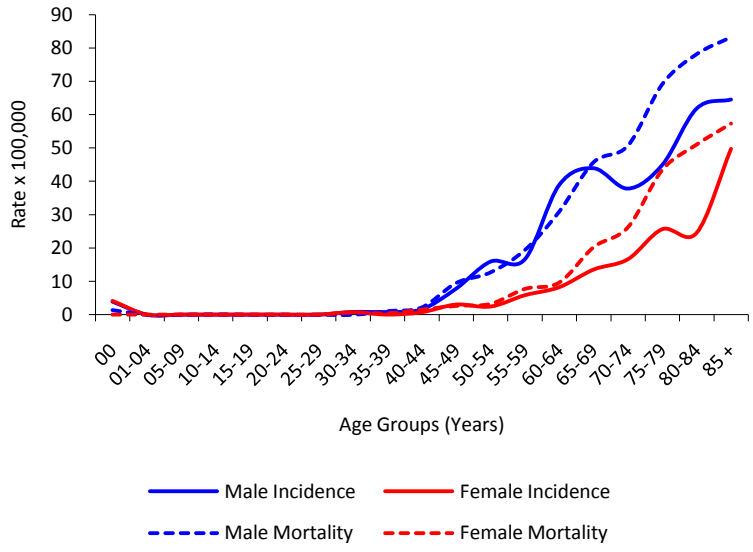


Figure 21: Average Annual Age-Specific Incidence Rates for Liver and Intrahepatic Bile Duct Cancer by Sex, Puerto Rico 2000-2004



Key Points

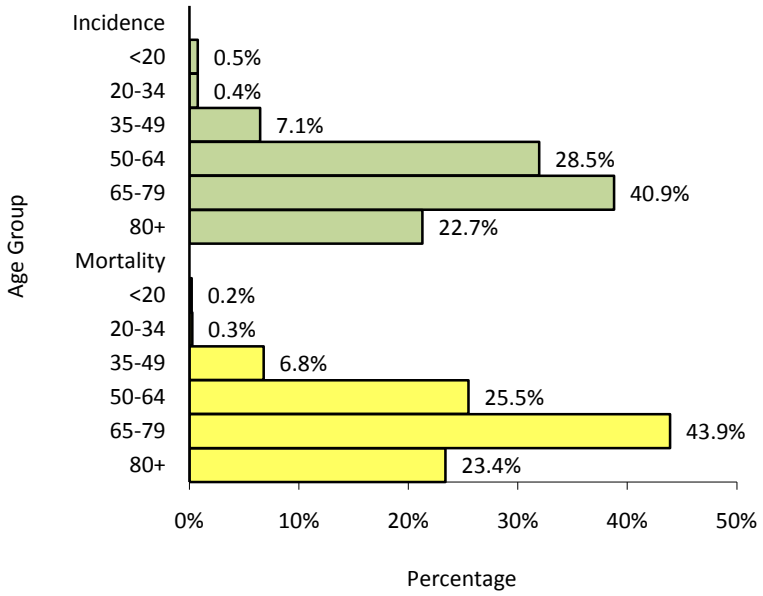
- Liver and intrahepatic bile duct cancer accounts for 2.8% of all male cancers and 1.8% of all female cancers between 2000-2004.
- It accounts for 6.9% of all male cancer deaths and 5.7% of female cancer deaths between 2000-2004.
- An average of, approximately 169 males and 91 females were diagnosed with liver and intrahepatic bile duct cancer between 2000-2004.
- Approximately 188 males and 117 females die from liver and intrahepatic bile duct cancer each year.
- Between 2000-2004, the age-adjusted incidence rate was 9.4 per 100,000 males per year and 4.0 per 100,000 females per year.
- Liver and intrahepatic bile duct cancer incidence was 2.4 times (Confidence Interval (CI) 95%: 2.1, 2.7) higher among men than among women, during 2000-2004.
- Between 2000-2004, the age-adjusted mortality rate was 10.5 per 100,000 males per year and 5.1 per 100,000 females per year.
- Liver and intrahepatic bile duct cancer mortality was 2.1 times (CI 95%: 1.9, 2.3) higher among males than among females.

certain types of mold); iron storage disease; cirrhosis; obesity and diabetes. There are two main types of primary liver cancer: hepatocellular carcinoma and cholangio-carcinoma. Hepatocellular carcinoma is the most common type of liver cancer (20).

From 2000-2004, the median age at diagnosis for cancer of the liver and intrahepatic bile duct was 69 years of age. The median age at death for liver and intrahepatic bile duct cancer was 70 years of age.

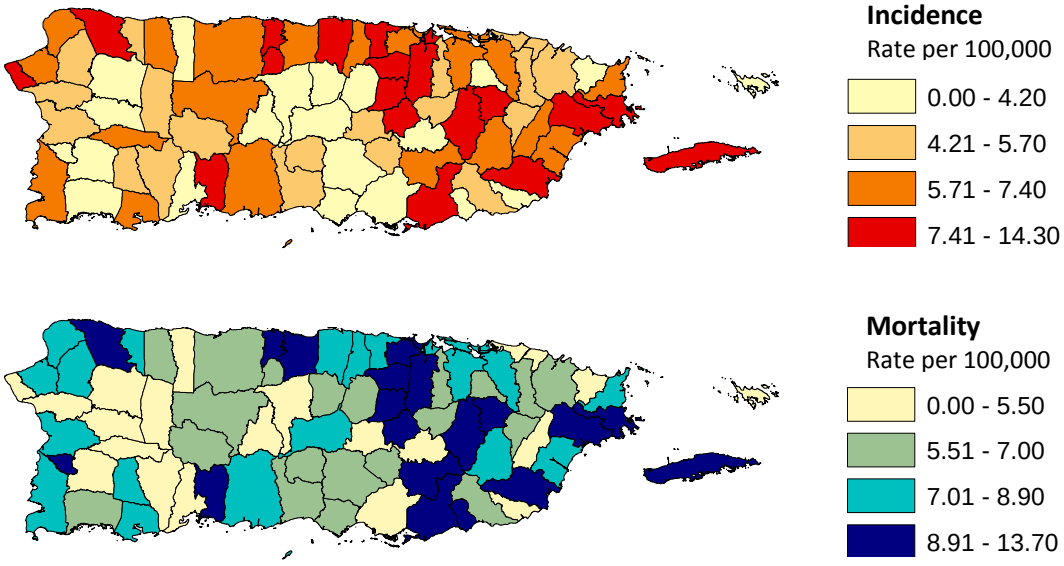
The incidence rate among males increased by an average of 2.8% (p <0.05) each year, while in females it increased by an average of 2.0% (p <0.05) annually. Cancer mortality rate in males increased by an average of 1.0% (p >0.05) each year, while in females it decreased by an average of 0.8 % (p >0.05) annually.

Figure 23: Incidence and Mortality Age Distribution for Liver and Intrahepatic Bile Duct Cancer, Puerto Rico, 2000-2004



Based on rates from 2000-2004, 0.8% of males and females born today will be diagnosed with cancer of the liver and intrahepatic bile duct at some time during their lifetime. This number can also be expressed as 1 in 125 males and females will be diagnosed with cancer of the liver and intrahepatic bile duct during their lifetime.

Figure 22: Age-Adjusted Liver and Intrahepatic Bile Duct Cancer Incidence and Mortality Rates by Municipality in Puerto Rico, 2000-2004



Cancer of the Lung and Bronchus

Among both males and females lung and bronchus cancer is one of the leading causes of cancer deaths in Puerto Rico. Lung and bronchus cancer is the third most commonly diagnosed cancer among males and the fourth most commonly diagnosed cancer in females in Puerto Rico. Cigarette smoking is the major cause of lung and bronchus cancer. The likelihood that a smoker will develop lung cancer is affected by the age at which smoking began, how long the person has smoked, the number of cigarettes smoked per day, and how deeply the smoker inhales.

Figure 24: Age-Adjusted Incidence and Mortality Rates for Lung and Bronchus Cancer by Sex, Puerto Rico 1987-2004

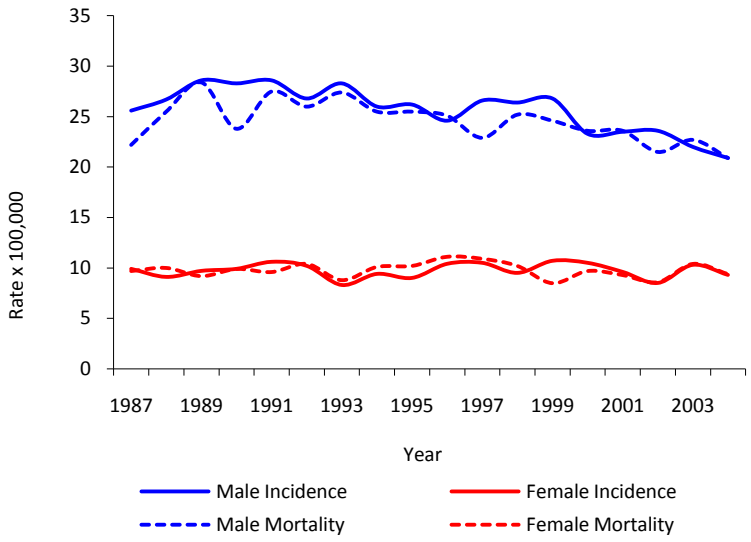
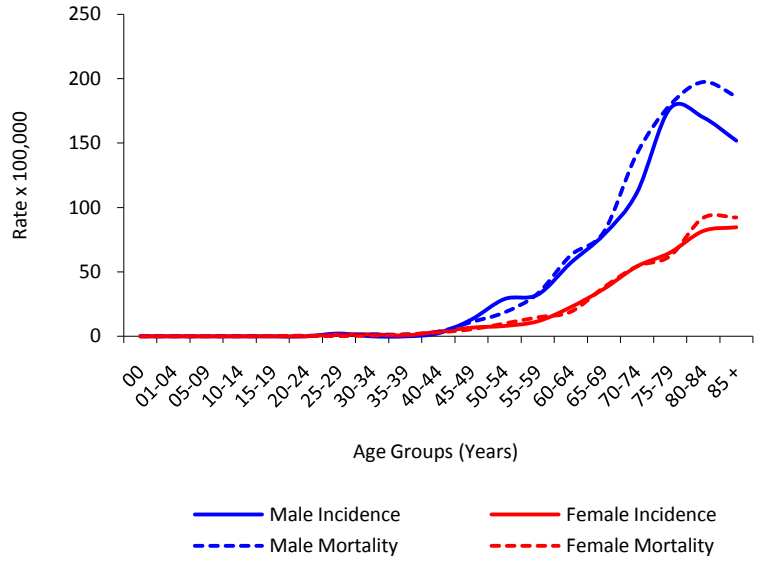


Figure 25: Average Annual Age-Specific Incidence Rates for Lung and Bronchus Cancer by Sex, Puerto Rico 2000-2004



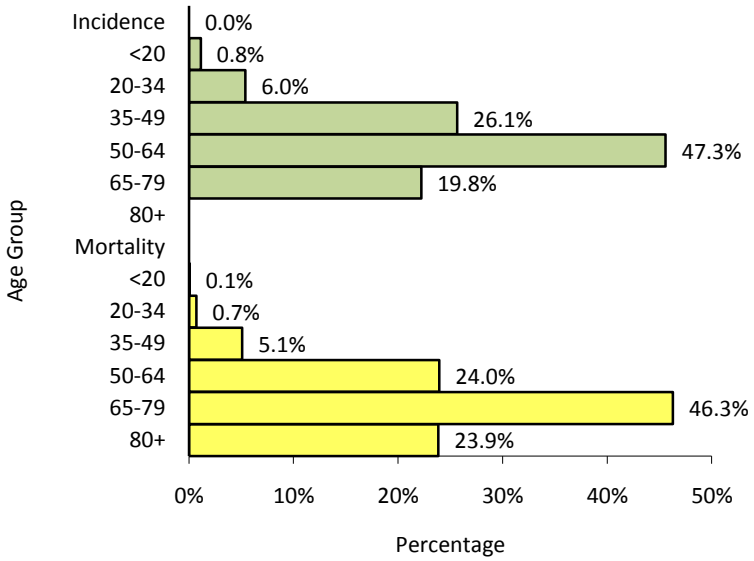
Key Points

- Lung and bronchus cancer accounts for 6.7% of all male cancers and 4.4% of all female cancers between 2000-2004.
- It accounts for 14.6% of all male cancer deaths and 10.5% of female cancer deaths between 2000-2004.
- An average of approximately 403 males and 217 females were diagnosed with lung and bronchus cancer between 2000-2004.
- Approximately 397 males and 214 females die from lung and bronchus cancer each year.
- Between 2000-2004, the age-adjusted incidence rate was 22.6 per 100,000 males per year and 9.6 per 100,000 females per year.
- Lung and bronchus cancer incidence was 2.3 times (Confidence Interval (CI) 95%: 2.2, 2.5) higher among men than among women, during 2000-2004.
- Between 2000-2004, the age-adjusted mortality rate was 22.4 per 100,000 males per year and 9.5 per 100,000 females per year.
- Lung and bronchus cancer mortality was 2.4 times (CI 95%: 2.2, 2.5) higher among males than among females, during 2000-2004.

Stopping smoking greatly reduces a person's risk for developing lung cancer. Additional risk for lung and bronchus cancer includes smoking cigars and pipes; environmental tobacco smoke (second hand smoke); exposure to radon gas, asbestos, and pollution; lung diseases such as tuberculosis, and having a personal history of lung cancer (20).

From 2000-2004, the median age at diagnosis for cancer of the lung and bronchus was 71 years of age. The median age at death for lung and bronchus cancer was 72 years of age.

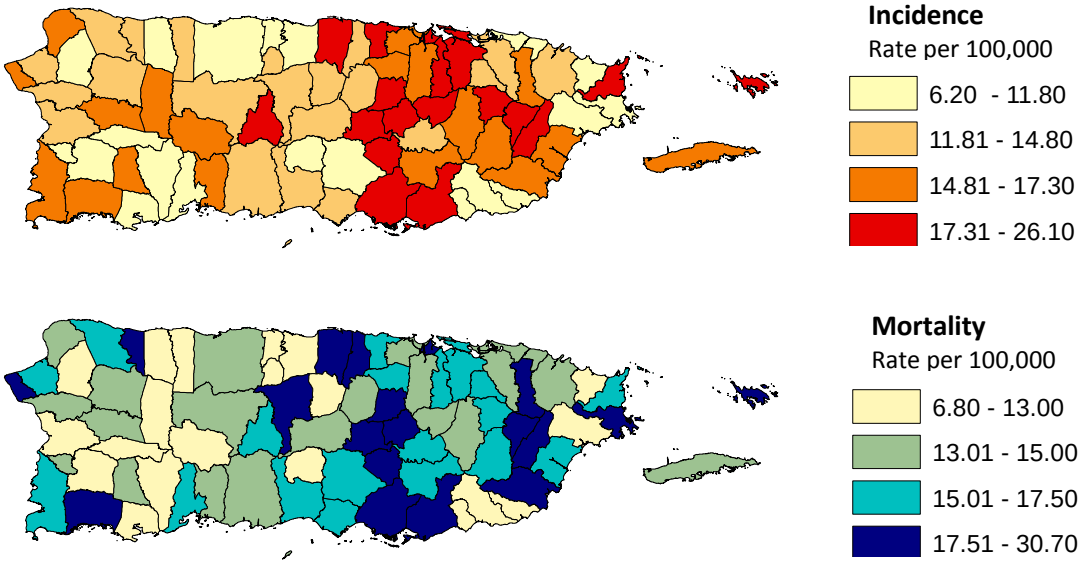
Figure 26: Incidence and Mortality Age Distribution for Lung and Bronchus Cancer, Puerto Rico, 2000-2004



The incidence rate among males decreased by an average of 1.4% ($p < 0.05$) each year, while in females remained constant for the period (0.0%). Cancer mortality rate in males decreased by an average of 1.0% ($p < 0.05$) each year, while in females it decreased by an average of 0.2 % ($p > 0.05$) annually.

Based on rates from 2000-2004, 1.9% of males and females born today will be diagnosed with cancer of the lung and bronchus at some time during their lifetime. This number can also be expressed as 1 in 53 males and females will be diagnosed with cancer of the lung and bronchus during their lifetime.

Figure 27: Age-Adjusted Lung and Bronchus Cancer Incidence and Mortality Rates by Municipality in Puerto Rico, 2000-2004



Cancer of the Breast

Breast cancer is the most commonly diagnosed cancer and the leading cause of cancer death among females in Puerto Rico. Many factors have been associated with the risk of developing breast cancer. Both genetic and environmental factors are believed to play a role in the development of breast cancer. Breast cancer is a disease predominantly influenced by risk factors related to lifestyle, as only approximately 15% of all breast cancer cases can be attributed to familial and genetic influences. Most of these factors can be linked to hazardous effects of

Figure 28: Age-Adjusted Incidence and Mortality Rates for Invasive Females Breast Cancer, Puerto Rico 1987-2004

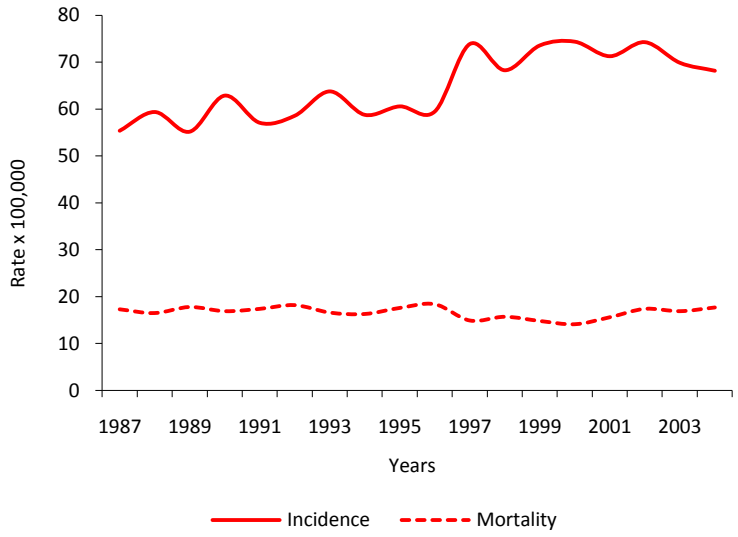
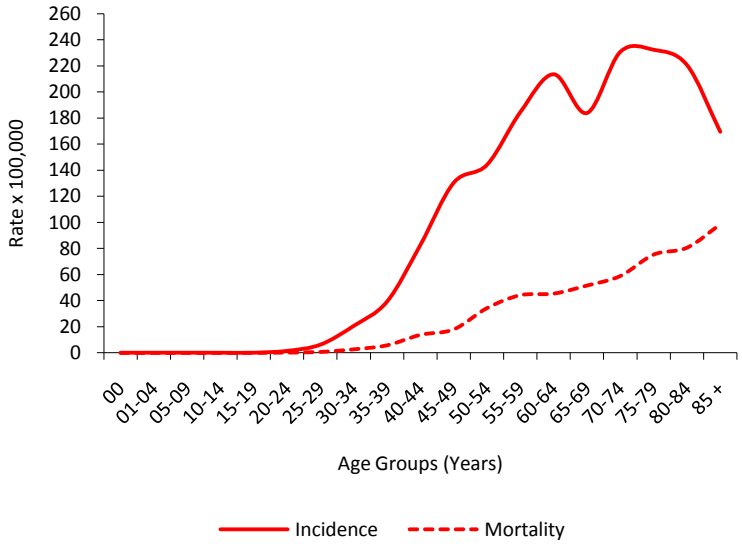


Figure 29: Average Annual Age-Specific Incidence Rates for Invasive Female Breast Cancer by Sex, Puerto Rico 2000-2004



Key Points

- Breast cancer is the most commonly diagnosed cancer among females in Puerto Rico.
- It accounts for 31.8% of all female cancers between 2000-2004 and 17.8% of all female cancer deaths between 2000-2004.
- An average of, approximately 1,562 females were diagnosed with invasive breast cancer between 2000-2004.
- Approximately 363 females die from breast cancer each year.
- Between 2000-2004, the age-adjusted incidence rate was 71.5 per 100,000 females per year.
- Between 2000-2004, the age-adjusted death rate was 16.4 per 100,000 females per year.

Table 3: Age-Adjusted Incidence Rates for *In Situ* Female Breast Cancer, Puerto Rico, 2000-2004

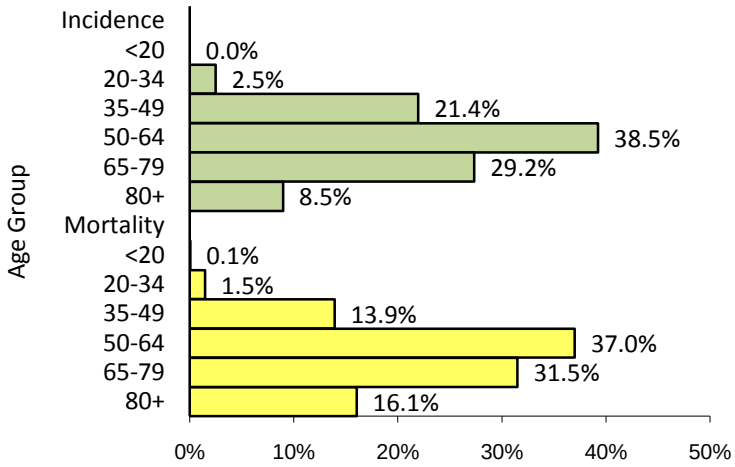
Age Group	2000-2004		2004	
	Rate	Count	Rate	Count
All	11.4	1,243	11.1	253
<40	0.8	49	0.7	8
40-59	22.8	578	22.3	117
60-79	39.7	557	39.8	118
80+	18.2	59	14.0	10

hormonal exposures (20).

From 2000-2004, the median age at diagnosis for cancer of the breast was 59 years of age. The median age at death for breast cancer was 63 years of age.

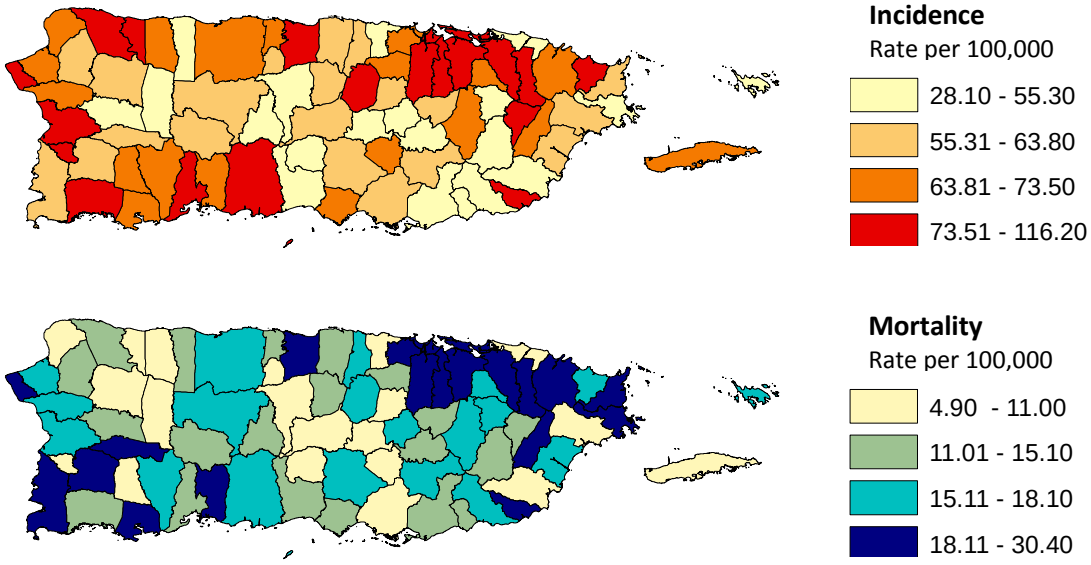
The breast cancer incidence rate among females in Puerto Rico increased by an average of 1.7% ($p < 0.05$) each year, while the mortality rates decreased by an average of 0.3% ($p > 0.05$) during 1987-2004.

Figure 30: Incidence and Mortality Age Distribution for Females Breast Cancer, Puerto Rico, 2000-2004



Based on rates from 2000-2004, 7.7% of females born today will be diagnosed with cancer of the breast at some time during their lifetime. This number can also be expressed as 1 in 13 females will be diagnosed with cancer of the breast during their lifetime.

Figure 31: Age-Adjusted Invasive Females Breast Cancer Incidence and Mortality Rates by Municipality in Puerto Rico, 2000-2004



Cancer of the Cervix Uteri

Cervical cancer is the fifth most commonly diagnosed cancer among females in Puerto Rico and represents approximately 4% of all female cancers. Cervical cancer is a disease in which malignant (cancer) cells form in the tissues of the cervix. The risk of developing cervical cancer has been associated mainly to sexual behavior as the major risk factor. Infection of the cervix with human papillomavirus (HPV) is the major risk factor for development of cervical cancer. Certain types of sexual behavior increase the risk factors to infect with HPV and develop cervical cancer like first sexual intercourse at a young age, numerous lifetime sexual partners,

Figure 32: Age-Adjusted Incidence and Mortality Rates for Invasive Cervix Uteri Cancer, Puerto Rico 1987-2004

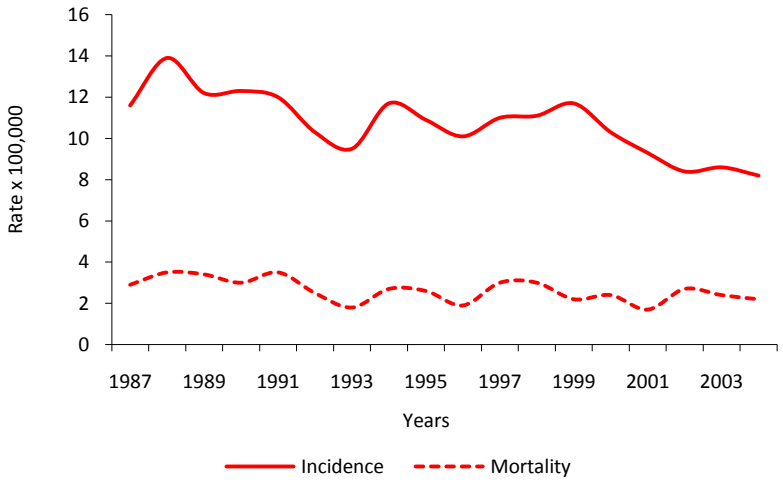
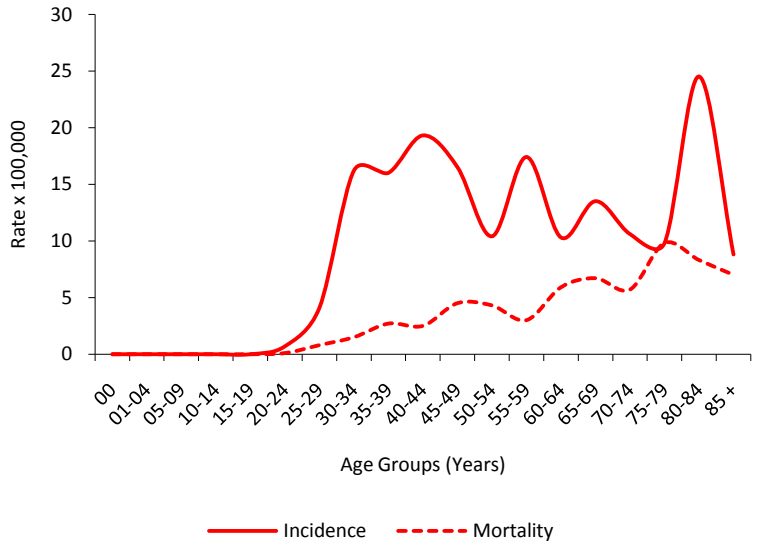


Figure 33: Average Annual Age-Specific Incidence Rates for Invasive Cervix Uteri Cancer by Sex, Puerto Rico 2000-2004



Key Points

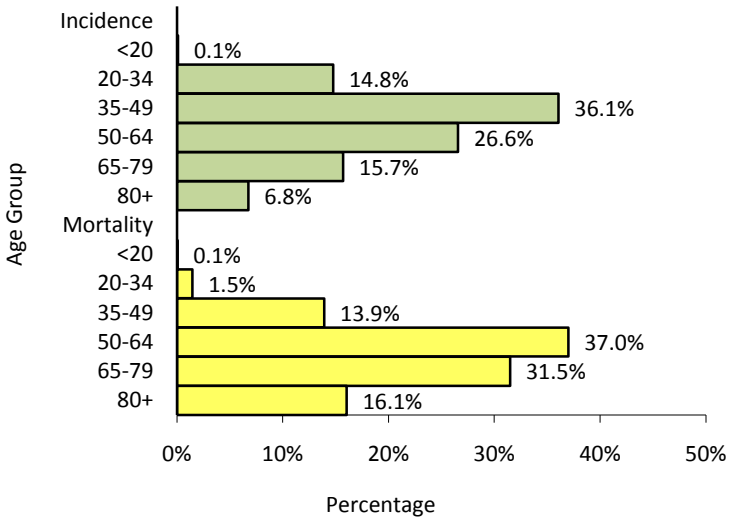
- Cervix Uteri cancer is the fifth commonly diagnosed cancer among females in Puerto Rico.
- It accounts for 3.9% of all female cancers between 2000-2004 and 2.4% of all female cancer deaths between 2000-2004.
- An average of approximately 190 females were diagnosed with invasive cervix uteri cancer between 2000-2004.
- Approximately 49 females die from cervix uteri cancer each year.
- Between 2000-2004, the age-adjusted incidence rate was 8.9 per 100,000 females per year.
- Between 2000-2004, the age-adjusted death rate was 2.3 per 100,000 females per year.

history of sexual transmission diseases, non use protection in any age and high parity. Other risk factors are: use long term oral contraceptive, history of smoking cigarettes, low socioeconomic status and dietetic factors (20).

From 2000-2004, the median age at diagnosis for cancer of the cervix uteri was 49 years of age. The median age at death for cervix uteri cancer was 59 years of age.

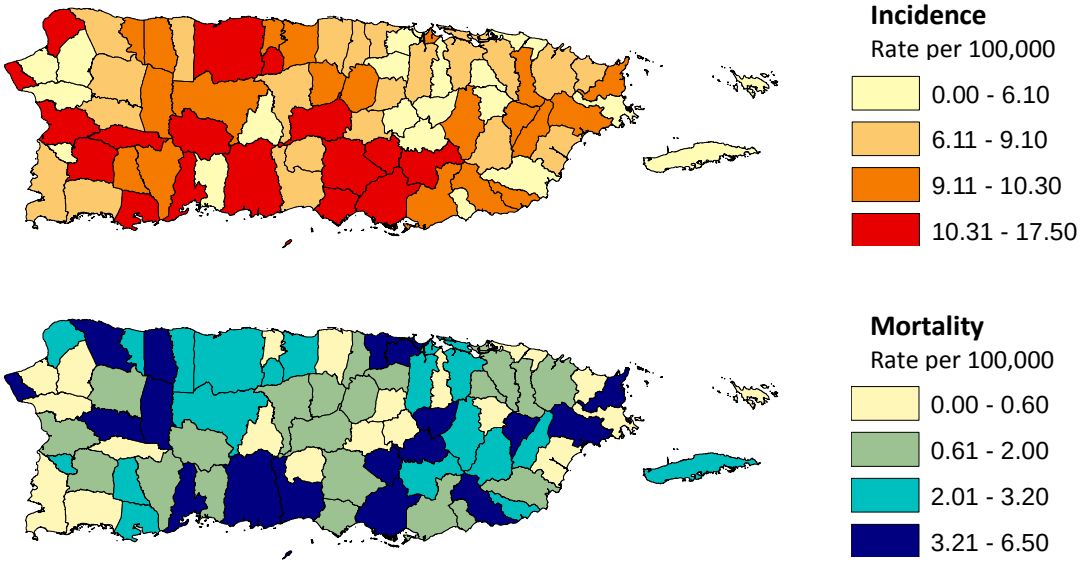
The cervix uteri cancer incidence rate among females in Puerto Rico decreased by an average of 2.1% ($p < 0.05$) each year, while the mortality rates decreased by an average of 2.2% ($p < 0.05$) during 1987-2004.

Figure 34: Incidence and Mortality Age Distribution for Cervix Uteri Cancer, Puerto Rico, 2000-2004



Based on rates from 2000-2004, 0.9% of females born today will be diagnosed with cancer of the cervix uteri at some time during their lifetime. This number can also be expressed as 1 in 118 females will be diagnosed with cancer of the cervix uteri during their lifetime.

Figure 35: Age-Adjusted Cervix Uteri Cancer Incidence and Mortality Rates by Municipality in Puerto Rico, 2000-2004



Cancer of the Corpus Uterus, NOS

Corpus and Uterus, Not Other Specified (NOS) cancer is the third commonly diagnosed cancer among females in Puerto Rico and is the most common malignancy of the female genital tract. In Puerto Rico nearly 87% of female with corpus and uterus, NOS cancer are composed by primary of endometrium.

Studies have found the following risk factors: age; endometrial hyperplasia; hormone replacement therapy; obesity and related conditions; *tamoxifen* use and colorectal cancer. Other risk factors are related to how long

Figure 36: Age-Adjusted Incidence and Mortality Rates for Corpus Uterus, NOS Cancer, Puerto Rico 1987-2004

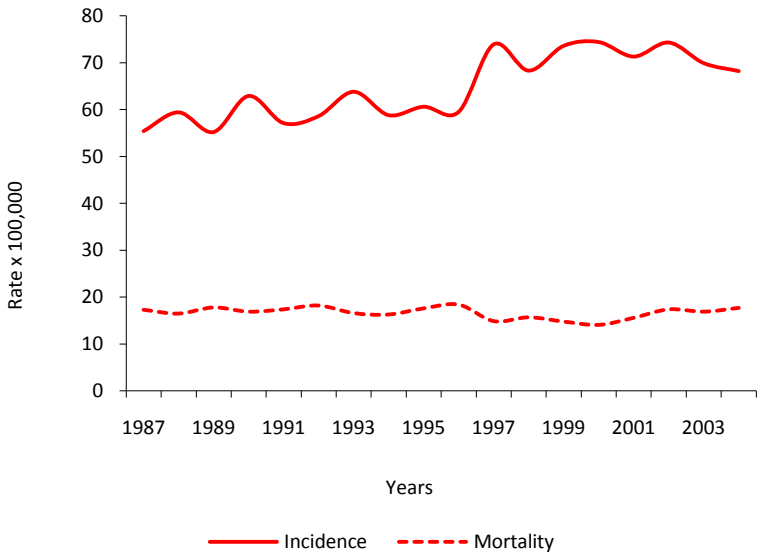
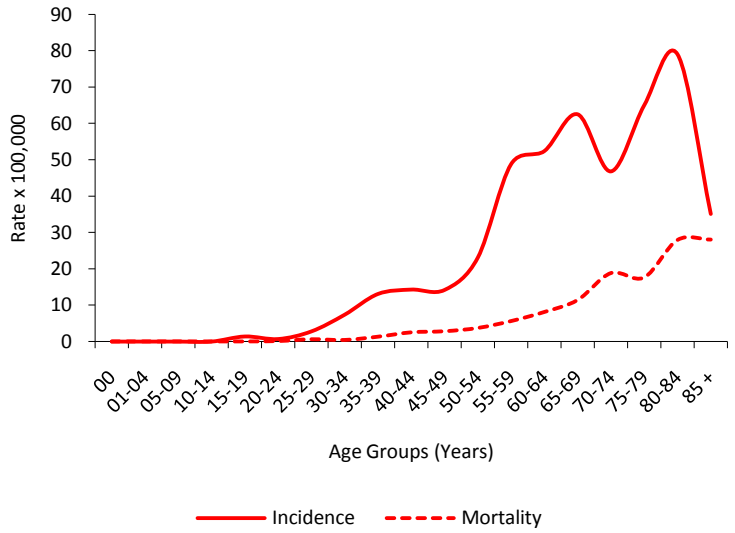


Figure 37: Average Annual Age-Specific Incidence Rates for Corpus Uterus, NOS Cancer by Sex, Puerto Rico 2000-2004



Key Points

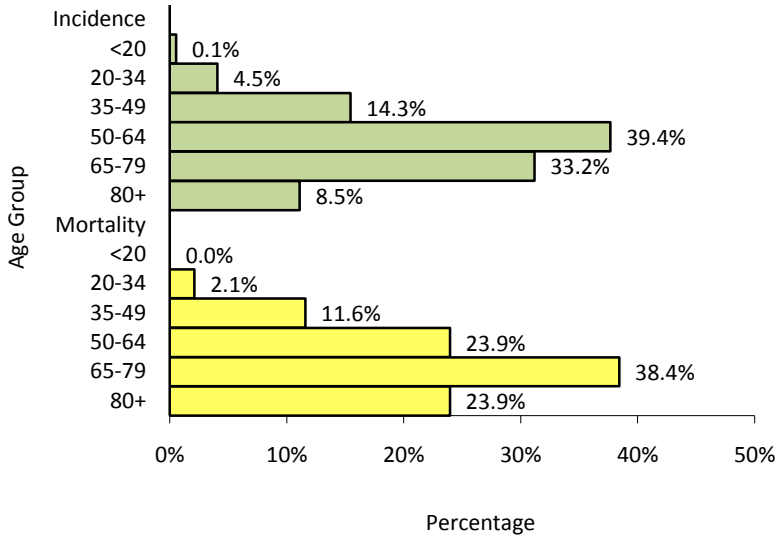
- Corpus uterus cancer is the third most commonly diagnosed cancer among females in Puerto Rico.
- It accounts for 6.8% of all female cancers between 2000-2004 and 3.7% of all female cancer deaths between 2000-2004.
- An average of approximately 336 females were diagnosed with invasive corpus uterus cancer between 2000-2004.
- Approximately 76 females die from corpus uterus cancer each year.
- Between 2000-2004, the age-adjusted incidence rate was 15.3 per 100,000 females per year.
- Between 2000-2004, the age-adjusted death rate was 3.4 per 100,000 females per year.

a woman's body is exposed to estrogen. Females who have no children, begin menstruation at a very young age, or enter menopause late in life are exposed to estrogen longer and have a higher risk (20).

From 2000-2004, the median age at diagnosis for cancer of the corpus uterus was 62 years of age. The median age at death for corpus uterus cancer was 70 years of age.

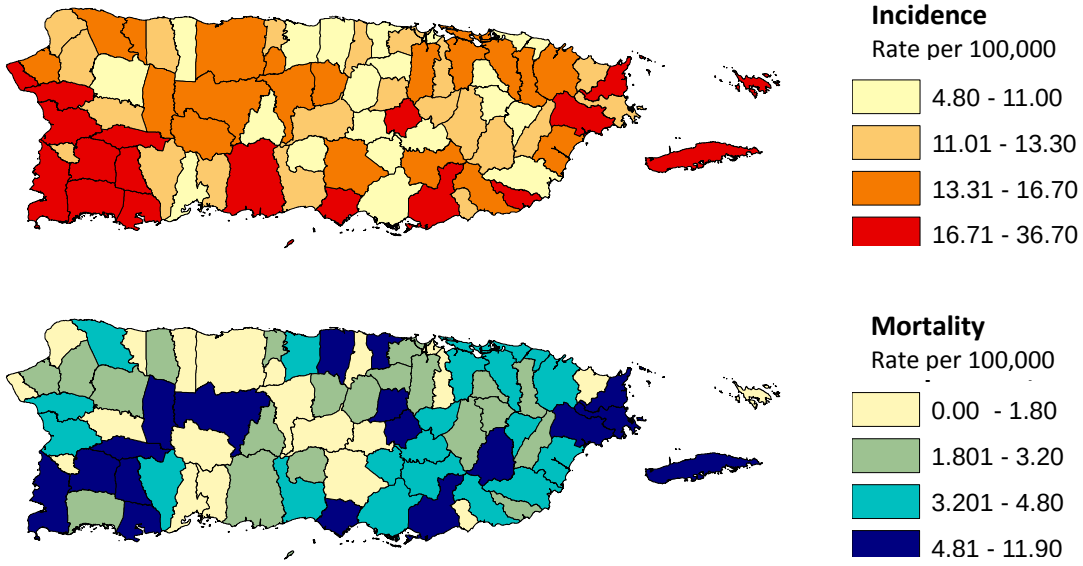
The corpus uterus cancer incidence rate among females in Puerto Rico increased by an average of 2.1% ($p < 0.05$) each year, while the mortality rates decreased by an average of 2.2% ($p > 0.05$) during 1987-2004.

Figure 38: Incidence and Mortality Age Distribution for Corpus Uterus, NOS Cancer, Puerto Rico, 2000-2004



Based on rates from 2000-2004, 1.7% of females born today will be diagnosed with cancer of the corpus uterus at some time during their lifetime. This number can also be expressed as 1 in 59 females will be diagnosed with cancer of the corpus uterus during their lifetime.

Figure 39: Age-Adjusted Corpus Uterus, NOS Cancer Incidence and Mortality Rates by Municipality in Puerto Rico, 2000-2004



Cancer of the Prostate

Prostate cancer is the most commonly diagnosed cancer among males in Puerto Rico, accounting for around 38% of all cancer diagnosed in males in Puerto Rico. Also it is the leading cause of death by cancer in males.

Prostate cancer usually occurs in older males. Research has shown that males with certain risk factors are more likely than others to develop prostate cancer. Studies have found the following risk factors: age (> 45 years), having a family history of prostate cancer, males with cells called high-grade prostatic intraepithelial neoplasia

Figure 40: Age-Adjusted Incidence and Mortality Rates Prostate Cancer, Puerto Rico 1987-2004

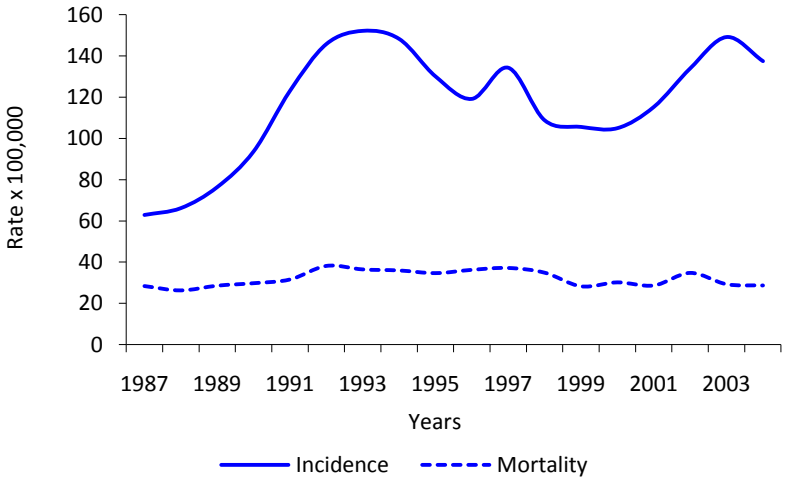
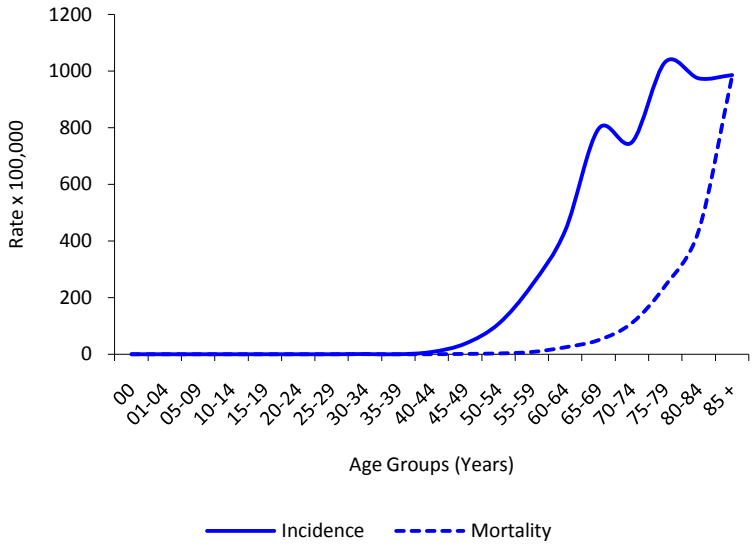


Figure 41: Average Annual Age-Specific Incidence Rates for Prostate Cancer by Sex, Puerto Rico 2000-2004



Key Points

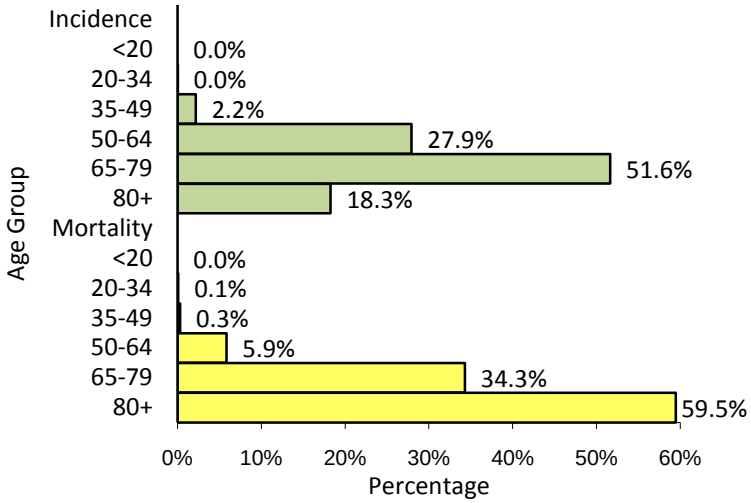
- Prostate cancer is the most commonly diagnosed cancer among males in Puerto Rico.
- It accounts for 38.1% of all male cancers between 2000-2004 and 18.9% of all male cancer deaths between 2000-2004.
- An average of approximately 2,300 males were diagnosed with invasive prostate cancer between 2000-2004.
- Approximately 516 males die from prostate cancer each year.
- Between 2000-2004, the age-adjusted incidence rate was 128.7 per 100,000 males per year.
- Between 2000-2004, the age-adjusted death rate was 30.3 per 100,000 males per year.

(PIN) may be at increased risk for prostate cancer, and a diet high in animal fat or meat (20).

From 2000-2004, the median age at diagnosis for cancer of the prostate was 69 years of age. The median age at death for prostate cancer was 82 years of age.

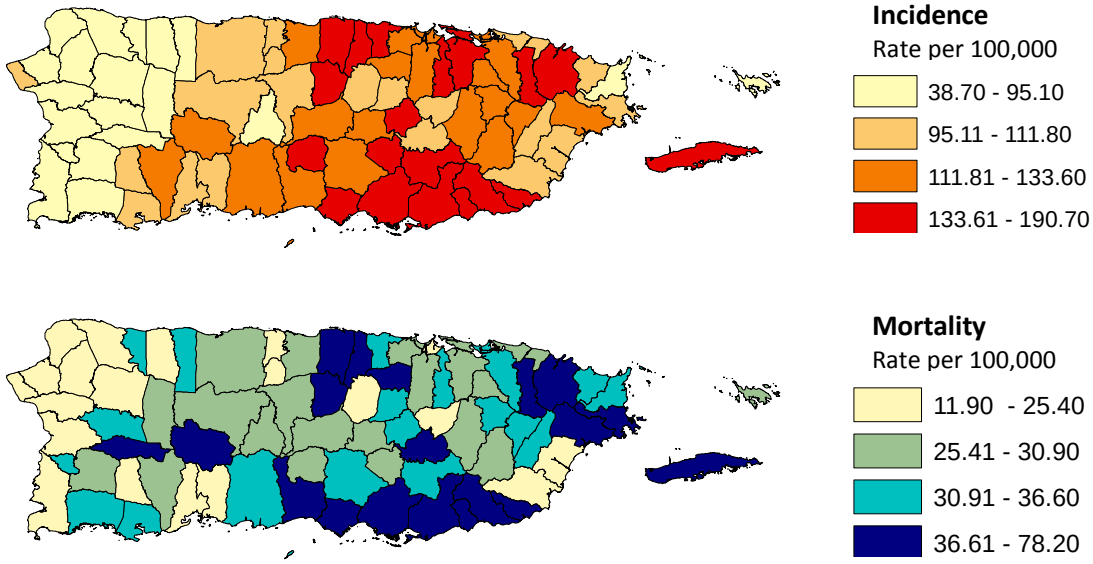
The prostate cancer incidence rate in Puerto Rico increased by an average of 1.9% (p >0.05) each year while the mortality rates decreased by an average of 0.1% (p >0.05) during 1987-2004.

Figure 42: Incidence and Mortality Age Distribution for Prostate Cancer, Puerto Rico, 2000-2004



Based on rates from 2000-2004, 13.7% of males born today will be diagnosed with cancer of the prostate at some time during their lifetime. This number can also be expressed as 1 in 7 males will be diagnosed with cancer of the prostate during their lifetime.

Figure 43: Age-Adjusted Prostate Cancer Incidence and Mortality Rates by Municipality in Puerto Rico, 2000-2004



Cancer of the Thyroid

Thyroid gland is an organ at the base of the throat that makes hormones that help control heart rate, blood pressure, body temperature, and weight. In Puerto Rico, thyroid cancer is the sixth most commonly diagnosed cancer among males and the fourth most commonly diagnosed cancer in females.

Studies have found the following risk factors for thyroid cancer: radiation, family history of medullary thyroid cancer, family history

Figure 45: Age-Adjusted Incidence and Mortality Rates for Thyroid Cancer by Sex, Puerto Rico 1987-2004

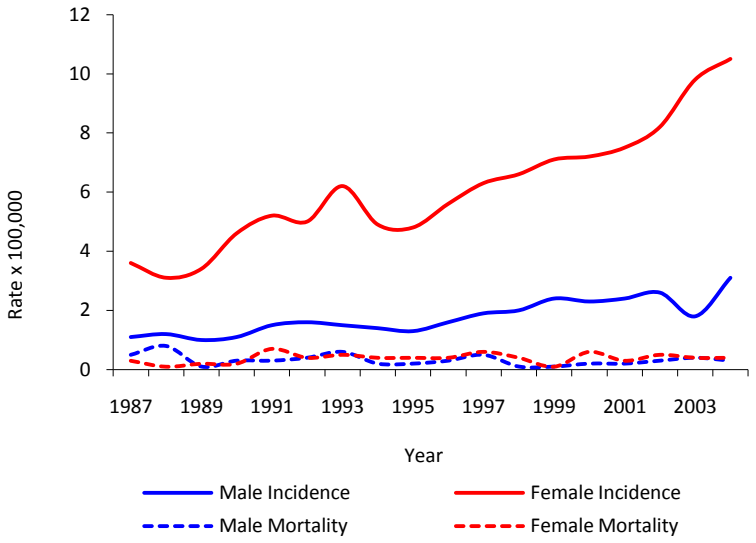
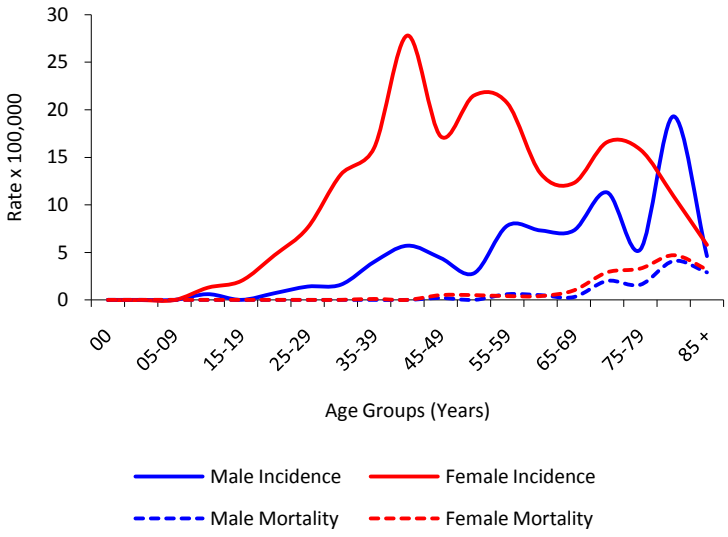


Figure 44: Average Annual Age-Specific Incidence Rates Thyroid Cancer by Sex, Puerto Rico 2000-2004



Key Points

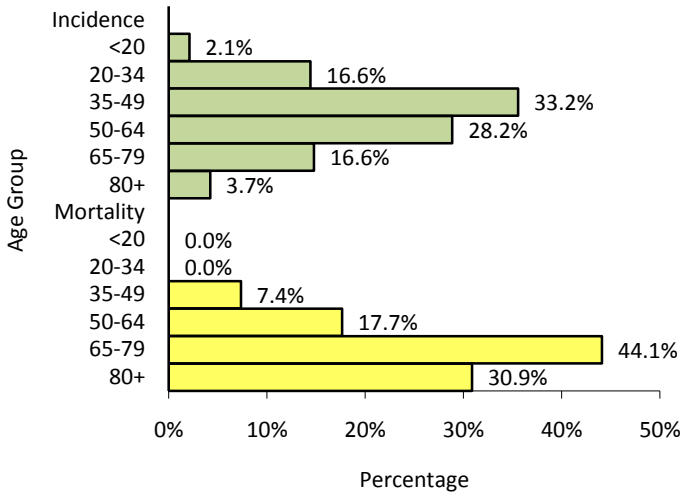
- Thyroid cancer accounts for 0.7% of all male cancers and 3.7% of all female cancers between 2000-2004.
- It accounts for 0.2% of all male cancer deaths and 0.4% of female cancer deaths between 2000-2004.
- An average of approximately 45 males and 182 females were diagnosed with thyroid cancer between 2000-2004.
- Approximately 5 males and 9 females die from thyroid cancer each year.
- Between 2000-2004, the age-adjusted incidence rate was 3.1 per 100,000 males per year and 10.5 per 100,000 females per year.
- Thyroid cancer incidence was 3.5 times (Confidence Interval (CI) 95%: 3.0, 4.1) higher among women than among men, during 2000-2004.
- Between 2000-2004, the age-adjusted mortality rate was 0.3 per 100,000 males per year and 0.4 per 100,000 females per year.
- Thyroid cancer mortality was 1.5 times (CI 95%: 0.9, 2.6) higher among females than among males, during 2000-2004.

of goiters or colon growths, personal history, having a goiter or benign thyroid nodules, being female and age over 45. Also scientists are studying exposure to iodine as a possible risk factor for thyroid cancer (20).

From 2000-2004, the median age at diagnosis for cancer of the thyroid was 48 years of age. The median age at death for thyroid cancer was 74 years of age.

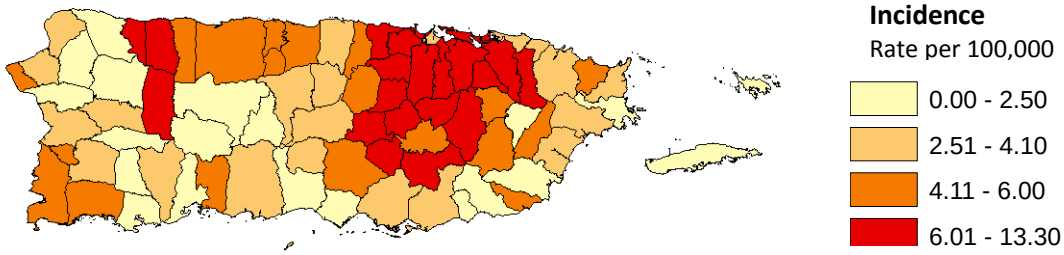
The incidence rate among males increased by an average of 6.0% ($p < 0.05$) each year, while in females it increased by an average of 6.2% ($p<0.05$) annually. Cancer mortality rate in males decreased by an average of 4.4% ($p < 0.05$) each year, while in females it increased by an average of 0.5 % ($p > 0.05$) annually.

Figure 46: Incidence and Mortality Age Distribution for Thyroid Cancer, Puerto Rico, 2000-2004



Based on rates from 2000-2004, 0.5% of males and females born today will be diagnosed with cancer of the thyroid at some time during their lifetime. This number can also be expressed as 1 in 206 males and females will be diagnosed with cancer of the thyroid during their lifetime.

Figure 47: Age-Adjusted Thyroid Cancer Incidence Rates by Municipality in Puerto Rico, 2000-2004



Detailed municipality-specific rates cannot be calculated for mortality because of the small number of cases in several municipalities.

Non-Hodgkin Lymphoma

Lymphomas are cancers that affect the white blood cells of the immune system, and are usually classified as either Hodgking lymphoma or non-Hodgking lymphoma. Non-Hodgking lymphoma is by far the most common of the two. In Puerto Rico, non-Hodgkin lymphoma is the seventh most commonly diagnosed cancer among males and females. The cause of non-Hodgkin lymphoma is unknown, although there is evidence that viral exposures and immune systems that have been suppressed by drugs, in those who have received organ transplants. People that have congenital disorder and acquired immunologic disorders are

Figure 48: Age-Adjusted Incidence and Mortality Rates Non-Hodgkin Lymphoma by Sex, Puerto Rico 1987-2004

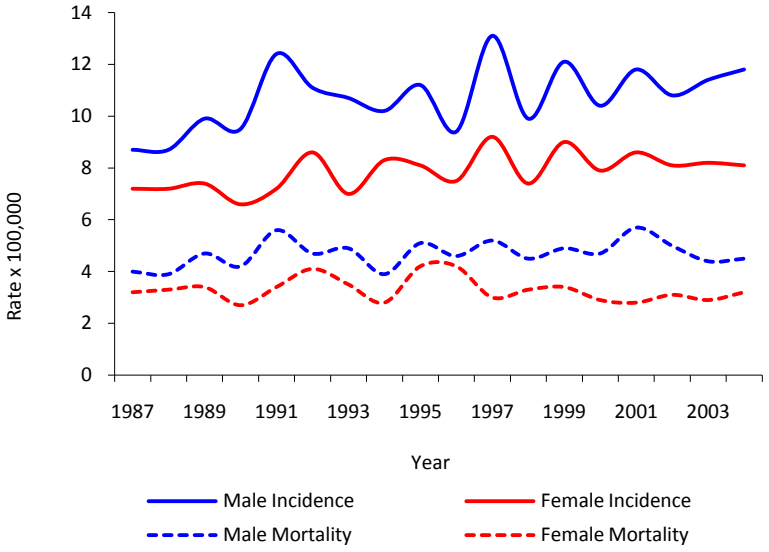
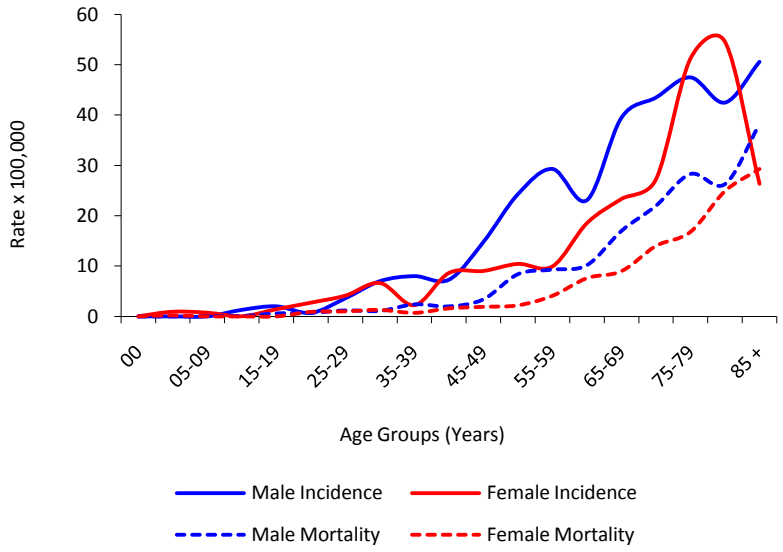


Figure 49: Average Annual Age-Specific Incidence Rates for Non-Hodgkin Lymphoma by Sex, Puerto Rico 2000-2004

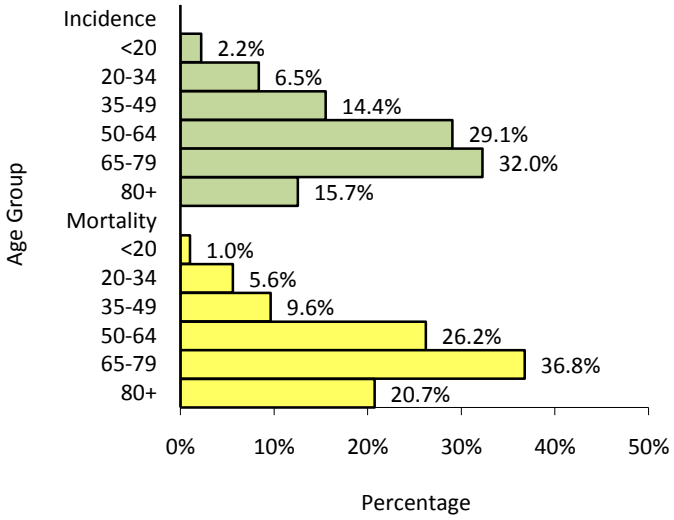


Key Points

- Non-Hodgking lymphoma accounts for 3.4% of all male cancers and 3.7% of all female cancers between 2000-2004.
- It accounts for 3.2% of all male cancer deaths and 3.3% of female cancer deaths between 2000-2004.
- An average of approximately 204 males and 180 females were diagnosed with non-Hodgkin lymphoma between 2000-2004.
- Approximately 87 males and 66 females die from non-Hodgking lymphoma cancer each year.
- Between 2000-2004, the age-adjusted incidence rate was 11.3 per 100,000 males per year and 8.2 per 100,000 females per year.
- Non-Hodgking lymphoma incidence are 1.4 times (Confidence Interval (CI) 95%: 1.3, 1.5) higher among men than among women, during 2000-2004.
- Between 2000-2004, the age-adjusted mortality rate was 4.9 per 100,000 males per year and 3.0 per 100,000 females per year.
- Non-Hodgking lymphoma mortality are 1.6 times (CI 95%: 1.4, 1.9) higher among males than among females, during 2000-2004.

at risk also. The increased incidence of the disease among this group of people suggests that hereditary influence may also be a risk factor. Some studies have found that occupational exposure to certain herbicides is a risk factor as well (20).

Figure 50: Incidence and Mortality Age Distribution for Non-Hodgkin Lymphoma, Puerto Rico, 2000-2004

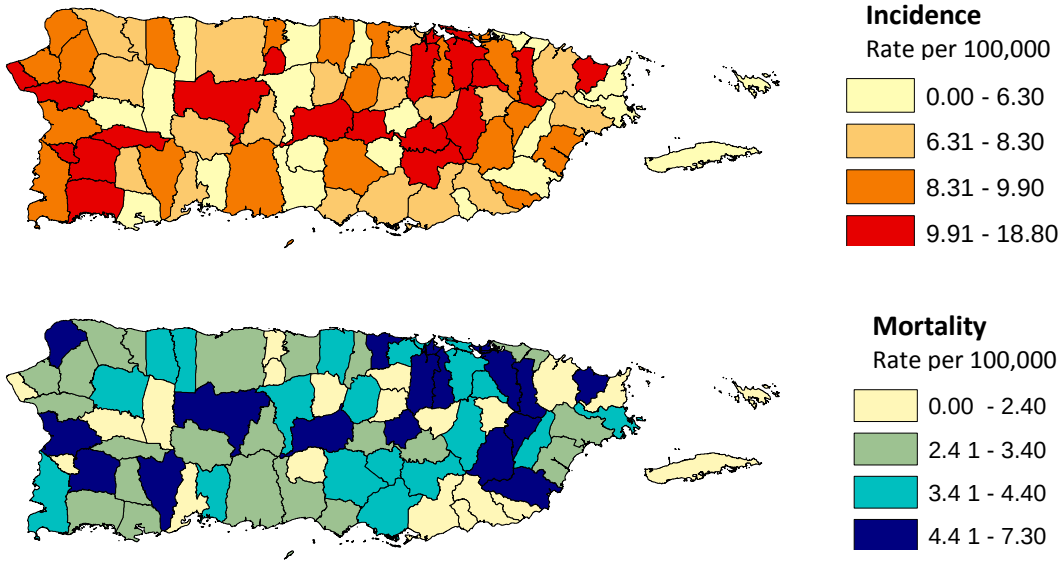


From 2000-2004, the median age at diagnosis for cancer of the non-Hodgkin lymphoma was 63 years of age. The median age at death for non-Hodgkin lymphoma was 68 years of age.

The incidence rate among males increased by an average of 1.1% ($p < 0.05$) each year, while in females it increased by an average of 0.9% ($p<0.05$) annually. Cancer mortality rate in males increased by an average of 0.6% ($p > 0.05$) each year, while in females it decreased by an average of 0.7 % ($p > 0.05$) annually.

Based on rates from 2000-2004, 1.0% of males and females born today will be diagnosed with cancer of the non-Hodgkin lymphoma at some time during their lifetime. This number can also be expressed as 1 in 96 males and females will be diagnosed with cancer of the non-Hodgkin lymphoma during their lifetime.

Figure 51: Age-Adjusted Non-Hodgkin Lymphoma Incidence and Mortality Rates by Municipality in Puerto Rico, 2000-2004



Childhood Cancer

Childhood cancer is a diverse spectrum of different rare malignancies, varying widely in histology and anatomical site. Childhood cancers are different from adult cancers with respect to diagnosis, risk factors, cancer sites, treatments, and prognosis. The causes of childhood cancers are largely unknown. Only a small percentage of cases can be explained by a few conditions such as specific chromosomal/genetic abnormalities (e.g., Down's syndrome) and ionizing radiation exposure. Environmental exposures have long been suspected of increasing the risk of certain childhood cancers. Researchers continue to examine environmental influences on childhood cancer (21).

Figure 52: Childhood Age-Adjusted Incidence and Mortality Rates for All sites Cancer by Sex, All ages, Puerto Rico 1987-2004

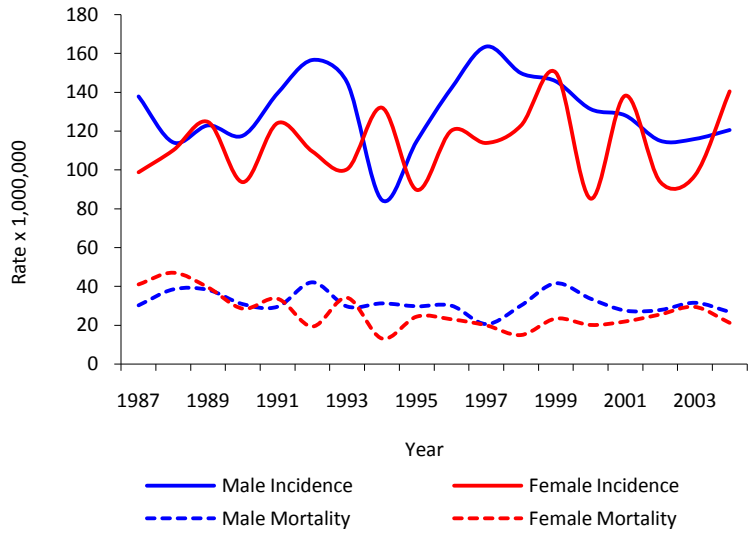
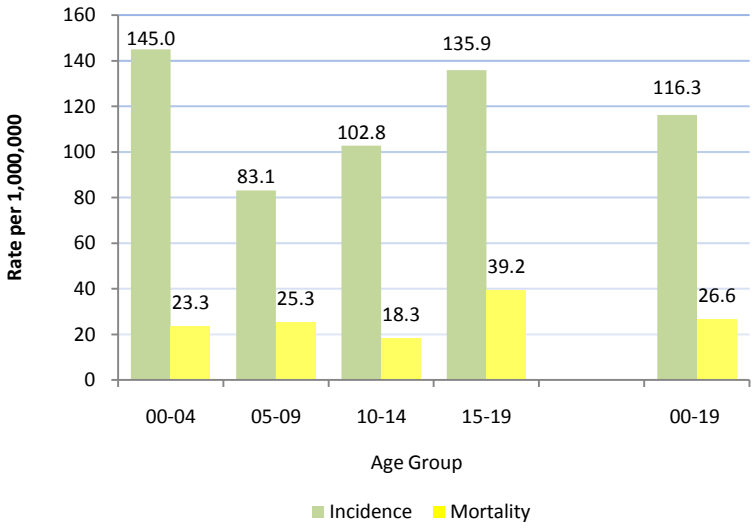


Figure 53: Childhood Age-Specific Incidence and Mortality Rates for All sites Cancer by Age Group, Puerto Rico 2000-2004

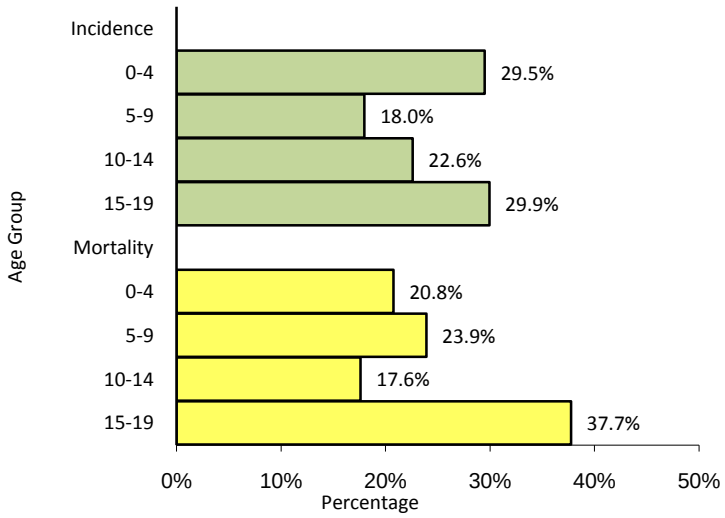


Key Points

- Childhood cancer is less common than cancer in adults, representing 1.3% of all cancers in Puerto Rico.
- An average of 139 children under the age of 20 were diagnosed with cancer and about 20 deaths from the disease were reported during period of 2000-2004.
- One (1) in 419 persons born today will develop cancer by age 20.
- Between 2000-2004, the age-adjusted incidence cancer rate for children cancers was 116.6 per million and the age-adjusted mortality rates was 26.6 per million for all cancers combined.
- Leukemia (27.5%), lymphomas (14.5%) and cancers of the central nervous system (17.3%), are the three most frequently diagnosed cancers in children.
- Incidence rates for childhood incidence cancer remained stable during the period of 1987-2004; being similar for male and females.
- Mortality rates of childhood cancer decreased 2.4% ($p<0.05$) annually during the period of 1987-2004; it decreased for both males (APC= -1.0%, $p>0.05$) and females (APC= -3.9%, $p<0.05$).

In 2000, nearly 32% of the population was younger than 20 years of age. Cancer in children is much less common than cancers in adults, representing less than 1.3% of all cancers diagnosed in Puerto Rico. From 2000 to 2004, a total of 639 new cancer cases were diagnosed among Puerto Rican children. These corresponds an average of 139 cases per year of invasive cancer among children; approximately 74 were males and 64 were female new cancers diagnosed from 2000 to 2004. For the same period, a total of 159 deaths due to cancer occurred in children less than 20 years, corresponding to an average of 31 deaths annually. Cancer is the fifth leading cause of death among Puerto Rican children.

Figure 54: Incidence and Mortality Distributions for Childhood Cancer, Puerto Rico 2000-2004



Leukemia, lymphomas and cancers of the central nervous system, are the three most frequently diagnosed cancers, accounting 59.3% of all childhood cancers (Table 4). Children in the youngest age group (<5 years) have much higher incidence rates for all cancers combined than the older age groups. This pattern is seen for both males and females. Trends for childhood incidence cancer remained stable during the period 1987-2004; been similar for male and females. Mortality childhood cancer trends decrease 2.4% ($p<0.05$) annually during period 1987-2004; 3.9% ($p<0.05$) among females and 1.0% ($p>0.05$) among males.

Table 4: Counts and Age-Adjusted Incidence Rates of Childhood Cancers (0-19 years) by ICCC Categories and Sex, Puerto Rico, 2000-2004*

Cancer Types	Total			Male		Female	
	Rate	Count	Percent	Rate	Count	Rate	Count
All Cancer Combined	116.6	695	100.0%	122.5	372	110.6	323
I Leukemias	32.0	191	27.5%	35.2	107	28.8	84
II Lymphomas	16.8	101	14.5%	20.6	63	12.9	38
III CNS Neoplasms	20.1	120	17.3%	17.7	54	22.6	66
IV SNS Tumors	5.1	30	4.3%	6.4	19	3.8	11
V Retinoblastoma	1.5	9	1.3%	2.4	7	0.7	<6
VI Renal Tumors	6.4	38	5.5%	7.0	21	5.9	17
VII Hepatic Tumors	1.2	7	1.0%	1.7	<6	0.7	<6
VIII Bone Tumors	6.7	40	5.8%	8.5	26	4.8	14
IX Soft Tissue Sarcomas	7.6	45	6.5%	8.6	26	6.5	19
X Germ-Cell Neoplasm	6.2	37	5.3%	5.6	17	6.8	20
XI Carcinomas	8.7	52	7.5%	5.2	16	12.2	36
XII Other and Unspecified	3.9	23	3.3%	3.6	11	4.1	12

Rates are per 1,000,000 and age-adjusted to the PR 2000 population.
Age-specific/site specific counts <6 are not presented to ensure confidentiality.

Selected List of Publications

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Other Information

Law No. 113 of July 30, 2010 (Law of the Puerto Rico Central Cancer Registry)

As of July 2008, the PRCCR administration was transferred to the Comprehensive Cancer Center of the University of Puerto Rico, Medical Sciences Campus. To improve cancer reporting timeliness and completeness, the Puerto Rico Legislature passed Law No. 113 of July 30, 2010 (Law of the Puerto Rico Central Cancer Registry), derogating Law No. 28 of 1951. The new law enforces cancer reporting to the PRCCR and facilitates obtaining accurate and complete information from the reporting facilities. This development is a huge step for the PRCCR toward achieving Gold Certification from the North American Association of Central Cancer Registries (NAACCR). For more information visit the following site:
http://www.lexjuris.com/lexlex/Leyes2010/lexl2010113.htm

Link to PRCCR Web Page

http://www.salud.gov.pr/RCancer/Pages/default.aspx

Requests for cancer data are welcome and should be sent to mtorres@rcpr.org. Interest in potential research collaborations must also be sent to mtorres@rcpr.org.

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