Descriptive Cancer Epidemiology & Cancer Survivorship

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Epidemiology is the study of the distribution and determinants of disease frequency in human populations.

Two fundamental assumptions:

- human disease does not occur at random
- human disease has causal and preventive factors that can be identified through systematic investigation
EPIDEMIOLOGY

Disease frequency
- how many people are getting disease

Distribution of disease
- who is getting disease
- when and where does disease occur

Determinants of disease
- what causes disease
Focuses on describing people who develop disease in terms of their personal characteristics and where and when they were exposed to the agent causing the disease.

- Provides a systematic method for characterizing a health problem providing basic data on health, disease, and mortality.

- Ensures understanding of the basic dimensions of a health problem.

- Helps identify populations at higher risk for the health problem in relation to person, place, and time.

- Provides information used for allocation of resources

- Enables development of testable hypotheses
**Descriptive** Epidemiology deals with the questions: Who, What, When, and Where

No preconceived ideas about relation between exposure and disease, but results can suggest hypothesis that can be tested by analytical studies.

**Analytic** Epidemiology deals with the remaining questions: Why and How

- Case-Control Studies (Retrospective Studies)
- Cohort Studies (Prospective Studies)
STUDY DESIGNS IN CANCER EPIDEMIOLOGY

Descriptive Studies

Case-Control Study (Retrospective)

Cohort Study (Prospective)
PERSON

- Age
- Gender
- Race
- Ethnicity
- Socioeconomic status
- Education
- Occupation
- Anthropometric measurements
PLACE

- School
- Residence
- Workplace
- Relation to water or food supply
TIME

- Secular trends
- Cyclic changes (e.g. seasonal variation)
- Clusters in time and place
GOALS OF DESCRIPTIVE EPIDEMIOLOGY

- Evaluation of trends in health
  - comparison of populations

- Basis for planning, provision, and evaluation of health services
  - public health administration

- Generation of hypotheses for investigation of disease etiology
  - analytic epidemiology
PREVALENCE

The number of affected persons present in the population divided by the number of people in the population.

\[
\text{Prevalence} = \frac{\text{Number of cases}}{\text{Number of people in the population}}
\]

- Good for looking at the burden of disease
- Valuable for planning
- **Not** useful for determining what caused disease
In 2008, a large metropolitan area estimated there were 250,000 residents over age 20 with type 2 diabetes. The Census bureau estimated that the population in the metropolitan area over age 20 was 5,030,250.

Prevalence = $\frac{250,000}{5,030,250} = 0.0497$

In 2008, the prevalence of diabetes in the metropolitan area was 4.97%.

Can also be expressed at 49.7 (50) cases per 1,000 residents over 20 years of age.
The number of new cases of disease that occur during a specified period of time divided by the number of persons at risk of developing the disease during the same period of time

\[
\text{Incidence} = \frac{\text{No. of new cases of disease over a specific period of time}}{\text{No. of persons at risk of disease over that specific period of time}}
\]

- Good for looking at the burden of disease
- Valuable for planning
- **Not** useful for determining what caused disease
A study in 2011 examined depression among women newly diagnosed with breast cancer. The study recruited 201 women. Of the 201, 21 had a prior diagnosis of depression. Over the first year, 7 of these women developed depression.

\[
\text{Incidence} = \frac{7}{201-21} = \frac{7}{180} = 0.0389
\]

The one year incidence of depression among study participants is 3.89%.

Can also be expressed as 38.9 (39) cases by 1,000 persons with breast cancer.
NATURAL HISTORY OF CANCER AND RELATED DATA SOURCES

- Health Outcomes
  - Recurrence
  - Death

Selected data sources

- Screening test results
- Medical Records
- Hospital Records
  - Cancer Registry
  - Death Certificates
Surveillance Epidemiology and End Results (NCI)
(http://seer.cancer.gov/)

- Primary source of cancer statistics in United States began in 1973
- Collects information on incidence, prevalence, and survival from specific geographic areas representing 28% of US popln.
- Composed of 17 population-based cancer registries (Alaska Native Tumor Registry, Arizona Indians, Cherokee Nation, Connecticut, Detroit, Atlanta, Greater Georgia, Rural Georgia, San Francisco-Oakland, San Jose-Monterey, Greater California, Hawaii, Iowa, Kentucky, Los Angeles, Louisiana, New Jersey, New Mexico, Seattle-Puget Sound, Utah.
- Compiles reports on all these plus cancer mortality for entire country.

- World’s largest, on-going telephone health survey system, tracking health conditions and risk behaviors in the United States yearly since 1984. More than 350,000 adults are interviewed each year.

- Since 2011, use of a new sampling frame that includes both landline and cell phone households

- Currently, data are collected monthly in all 50 states, the District of Columbia, Puerto Rico, the U.S. Virgin Islands, and Guam.

- States use BRFSS data to identify emerging health problems, establish and track health objectives, and develop and evaluate public health policies and programs. Many states also use BRFSS data to support health-related legislative efforts.
CancerMondial
International Agency for Research on Cancer (WHO)
(http://www-dep.iarc.fr/)

- GLOBOCAN provides access to recent estimates (for 2008) of the incidence of, and mortality from 27 major cancers worldwide.

- CI5 (Cancer Incidence in Five Continents) provides detailed information on the incidence of cancer recorded by cancer registries (regional or national) worldwide.

- WHO presents long time series of selected cancer mortality recorded in selected countries of the world.
CANCER DATA SOURCES

CancerMondial
International Agency for Research on Cancer (WHO)
(http://www-dep.iarc.fr/)

- ACCIS (Automated Childhood Cancer Information System) provides access to data on cancer incidence and survival of children collected by European cancer registries.

- ECO (European Cancer Observatory) provides estimates (for 2008) of the incidence of, and mortality from 25 major cancers in the countries of the European Union (EU-27)

- NORDCAN presents up-to-date long time series of cancer incidence, mortality and prevalence from 40 cancers recorded by the Nordic countries
6th in series of reports describing progress against cancer along the cancer control continuum based on data from NCI, the Centers for Disease Control and Prevention, federal agencies, professional groups, and researchers.

**CANCER CONTROL CONTINUUM**

- Prevention
- Early Detection
- Diagnosis
- Treatment
- Life after Cancer
- End of Life
CANCER PREVENTION

- Cancer caused by a variety of factors over a number of years
- Important to follow national trend data to monitor trends in factors that influence likelihood of getting cancer
- Focus on behavioral factors, environmental, policy/regulatory effects
- Approximately 50-75% of cancer deaths in the US are caused by human behaviors such as smoking, physical inactivity, and poor dietary choices.
Smoking causes about 30% of all US deaths from cancer and is single most important risk factor for cancer.

Cigarette smoking causes cancers of the lung, larynx, mouth, esophagus, pharynx, and bladder. In addition, it plays a role in acute myeloid leukemia and cancers of the pancreas, kidney, cervix, stomach, and liver.
Tobacco Use in the US, 1900-2009

Trends in Tobacco Use and Lung Cancer Death Rates* in the US

Per Capita Cigarette Consumption

Male Lung Cancer Death Rate

Female Lung Cancer Death Rate

Lung Cancer Deaths per 100,000 Persons

*Age-adjusted to 2000 US standard population.

TRENDS IN CIGARETTE SMOKING PREVALENCE* (%), BY SEX, ADULTS 18 AND OLDER, US, 1965-2011

PERCENTAGE OF ADULTS AGED 18 YEARS AND OLDER WHO WERE CURRENT CIGARETTE SMOKERS, 1991-2006

Source: Centers for Disease Control and Prevention, National Center for Health Statistics. National Health Interview Survey.
Data are age-adjusted to the 2000 standard using age groups: 18-24, 25-34, 35-44, 45-64, 65+.
CURRENT* CIGARETTE SMOKING PREVALENCE (%) AMONG HIGH SCHOOL STUDENTS BY SEX AND RACE/ETHNICITY, US, 1991-2009

*Smoked cigarettes on one or more of the 30 days preceding the survey.
INITIATION OF CIGARETTE USE AMONG CHILDREN, ADOLESCENTS, AND YOUNG ADULTS, US, 2002-2010

Figure PS1: Initiation of cigarette use among children, adolescents and young adults by age of respondent: 2002-2010

Source: Substance Abuse and Mental Health Services Administration, National Household Survey on Drug Use and Health.
Data are not age-adjusted.
Diets rich in plant foods such as fruits and vegetables are associated with lower risk of cancers of the mouth, pharynx, larynx, esophagus, stomach, lung, and there is some evidence for colon, pancreas, and prostate.

A diet high in fruits and vegetables helps to reduce calorie intake and may help to control weight.

4 to 13 servings of fruits and vegetables daily, depending on energy needs. This includes 2 to 5 servings of fruits and 2 to 8 servings of vegetables, with emphasis on dark-green and orange vegetables and legumes.
TRENDS IN CONSUMPTION OF FIVE OR MORE RECOMMENDED VEGETABLE AND FRUIT SERVINGS FOR CANCER PREVENTION, ADULTS 18 AND OLDER, US, 1994-2005

Note: Data from participating states and the District of Columbia were aggregated to represent the United States.

AVERAGE CUPS OF FRUIT AND VEGETABLES CONSUMED PER 1,000 CALORIES BY INDIVIDUALS 2 AND OLDER: 1994-2004

Figure PFV1: Average cups of fruit and vegetables consumed per 1,000 calories by individuals aged 2 years and older: 1994-2004

Data are age-adjusted to the 2000 US standard population using age groups: 2-3, 4-8, 9-13, 14-18, 19-30, 31-50, 51-70, 70+. 
Fruit consumption is highest among the youngest and oldest segments of the population.

Total fruit and vegetable consumption tends to increase with age, education and income.

Among racial and ethnic groups, Blacks have the lowest intake and Mexican Americans have the highest.
Red meat/processed meat are associated with increased risk of colorectal cancer, with some evidence for other cancers, such as prostate.

Some research has suggested that processed, but not fresh meat may increase risk.

The increased risk may be due to the iron and fat in red meat, and/or the salt and nitrates/nitrites in processed meat.

Additionally, when meat is cooked at high temperatures, substances are formed that may be mutagenic or carcinogenic.
AVERAGE DAILY OUNCES OF RED MEAT CONSUMED BY INDIVIDUALS AGED 2 YEARS AND OLDER: 1994-2004
- Alcohol intake increases risk of cancers of the mouth, esophagus, pharynx, larynx, and liver in men and women, and of breast cancer in women. Heavy use may also increase risk of colorectal cancer.

- The earlier long-term, heavy alcohol use begins, the greater the cancer risk.

- Using alcohol with tobacco is riskier than using either one alone because it further increases the chances of getting cancers of the mouth, throat, and esophagus.
ANNUAL PER CAPITA ALCOHOL CONSUMPTION IN GALLONS BY INDIVIDUALS 14 YEARS AND OLDER: 1990-2009

Figure PAC1: Annual per capita alcohol consumption in gallons by individuals aged 14 years and older: 1990-2009

Data are not age-adjusted.
Many people start drinking as early as middle school (aged 13–14 years).

Among those aged 12–17 years, Whites and Hispanics are more likely than Blacks to use alcohol.

Among alcohol drinkers, those aged 18–25 years consume greater quantities than any other group.
Physical activity at work or during leisure time is linked to a 30-percent lower risk of getting colon cancer, lower risk of breast cancer, and possibly lung and endometrial cancer.

Physical activity improves quality of life among cancer patients and survivors. Studies are beginning to explore the potential for physical activity to improve cancer survival.

Physical activity appears to be effective in reducing the amount of weight gained during and after treatment of breast cancer.
PERCENTAGE OF ADULTS AGED 18 YEARS AND OLDER REPORTING NO PHYSICAL ACTIVITY IN THEIR LEISURE TIME BY SEX: 1997-2010

Figure PPA1: Percentage of adults aged 18 years and older reporting no physical activity in their leisure time by Sex: 1997-2010

Source: Centers for Disease Control and Prevention, National Center for Health Statistics. National Health Interview Survey. Data are age-adjusted to the 2000 US standard population using age groups: 18-24, 25-34, 35-44, 45-64, 65+. 
PERCENTAGE OF ADULTS AGED 18 YEARS AND OLDER REPORTING NO PHYSICAL ACTIVITY IN THEIR LEISURE TIME BY RACE/ETHNICITY: 1997-2010
PERCENTAGE OF ADULTS AGED 18 YEARS AND OLDER REPORTING NO PHYSICAL ACTIVITY IN THEIR LEISURE TIME BY POVERTY INCOME LEVEL: 1997-2010

Figure PPA3: Percentage of adults aged 18 years and older reporting no physical activity in their leisure time by poverty income level: 1997-2010

Source: Centers for Disease Control and Prevention, National Center for Health Statistics. National Health Interview Survey. Data are age-adjusted to the 2000 US standard population using age groups: 18-24, 25-34, 35-44, 45-64, 65+. 
TRENDS IN PREVALENCE (%) OF NO LEISURE-TIME PHYSICAL ACTIVITY, BY EDUCATIONAL ATTAINMENT, ADULTS 18 AND OLDER, US, 1992-2009

TRENDS IN PREVALENCE (%) OF HIGH SCHOOL STUDENTS ATTENDING PE CLASS DAILY, BY GRADE, US, 1991-2009

Source: Youth Risk Behavior Surveillance System, 1991-2009 National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, 2010
Demographics of Physical Activity

- Women are more likely than men to not engage in leisure-time physical activity.
- Blacks and Hispanics are more likely than Whites to report no leisure-time physical activity.
- Lack of physical activity also is more common among those with less education and those with lower incomes.
- For youth, physical activity is lower among females, especially Blacks. Also, physical activity decreases as children get older.
OVERWEIGHT AND OBESITY

- Obesity associated with increased risk of many common cancers, such as colon, postmenopausal breast, uterine, esophageal, and renal cell cancers.

- Recent studies indicate that obesity and being overweight may increase the risk of death from many cancers, accounting for up to 14 percent of cancer deaths in men and 20 percent of cancer deaths in women.

- Weight groups are defined by BMI.
  - Healthy weight - BMI between 18.5 and 24.9
  - Overweight - BMI between 25.0 and 29.9
  - Obese - BMI equal to or greater than 30.0
PERCENTAGE OF ADULTS AGED 20 - 74 YEARS WHO WERE AT HEALTHY WEIGHT, OVERWEIGHT, OR OBESE, 1971-2010.
TRENDS IN OBESITY* PREVALENCE (%), BY GENDER, ADULTS AGED 20 TO 74, US, 1960-2010

*Obesity=body mass index ≥ 30 kg/m²; estimates are age adjusted to the 2000 US standard population.

TRENDS IN OVERWEIGHT AND OBESITY* PREVALENCE (%), ADULTS 18 AND OLDER, US, 1992-2010

*Body mass index ≥ 25.0 kg/m². Source: Behavioral Risk Factor Surveillance System, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention.
TRENDS IN OVERWEIGHT* PREVALENCE (%), CHILDREN AND ADOLESCENTS, BY AGE GROUP, US, 1971-2010

*Body mass index ≥ the sex-and age-specific 95th percentile cutoff points from CDC Growth Charts.

Overweight and obesity are most common among Black and Mexican American women. The same patterns are seen for children and teens in these groups.

Overweight children are more likely to become overweight adults. As with adults, the trend toward excess weight among children has greatly increased in recent years.
Use of screening tests to detect cancers early provides better opportunities for patients to obtain more effective treatment with fewer side effects.

Patients whose cancers are found early and treated in a timely manner are more likely to survive these cancers than are those whose cancers are not found until symptoms appear.

Evidence suggests that the following screening tests decrease the chances of dying from cancer: Mammography for breast cancer, Pap test for cervical cancer, fecal occult blood test for colorectal cancer, colorectal endoscopy (sigmoidoscopy or colonoscopy for colorectal cancer).
Yearly mammograms are recommended starting at age 40.

A clinical breast exam should be part of a periodic health examination, about every 3 years for women in their 20s and 30s. Asymptomatic women aged 40 and older should continue to undergo a clinical breast exam, preferably annually*.

Beginning in their early 20s, women should be told about the benefits and limitations of breast-self examination. Women should know how their breasts normally feel and report any breast changes promptly to their health care providers.

* Beginning at age 40 years, annual CBE should be performed prior to mammography
Regular use of screening mammograms, followed by timely treatment when breast cancer is diagnosed, can help reduce the chances of dying from breast cancer.

For women between the ages of 50 and 69, there is strong evidence that screening lowers this risk by 30 percent.

For women in their 40s, the risk can be reduced by about 17 percent.

For women aged 70 and older, mammography may be helpful, although firm evidence is lacking.
PERCENT OF WOMEN AGED 40 AND OLDER WHO HAD A MAMMOGRAPHY WITHIN THE PAST 2 YEARS BY RACE AND ETHNICITY: 1987-2010

Figure SBR1: Percent of women aged 40 years and older who had mammography within the past 2 years by race/ethnicity: 1987-2010

Source: Centers for Disease Control and Prevention, National Center for Health Statistics. National Health Interview Survey. Data are age-adjusted to the 2000 US standard population using age groups: 40-49, 50-64, 65-74, 75+. 
MAMMOGRAM PREVALENCE (%), BY EDUCATIONAL ATTAINMENT AND HEALTH INSURANCE STATUS, WOMEN 40 AND OLDER, US, 1991-2008

![Graph showing mammogram prevalence over years for different educational attainment and health insurance statuses.]

* A mammogram within the past year. Note: Data from participating states and the District of Columbia were aggregated to represent the United States.

Screening should begin approximately three years after a woman begins having vaginal intercourse, but no later than 21 years of age.

Screening should be done every year with regular Pap tests or every two years using liquid-based tests.

At or after age 30, women who have had three normal test results in a row may get screened every 2-3 years with cervical cytology (either conventional or liquid-based Pap test) alone, or every 3 years with a human papillomavirus DNA test plus cervical cytology.

Women 70 and older who have had three or more consecutive Pap tests in the last ten years may choose to stop cervical cancer screening.

Screening after a total hysterectomy (with removal of the cervix) is not necessary unless the surgery was done as a treatment for cervical cancer.
PERCENT OF WOMEN AGE 18 YEARS AND OLDER WHO HAD A PAP SMEAR TEST WITHIN THE PAST 3 YEARS BY RACE AND ETHNICITY: 1987-2010

Figure SCE1: Percent of women aged 18 years and older who had a pap smear test within the past 3 years by race/ethnicity: 1987-2010

Source: Centers for Disease Control and Prevention, National Center for Health Statistics. National Health Interview Survey. Data are age-adjusted to the 2000 US standard population using age groups: 18-24, 25-34, 35-44, 45-64, 65+. 
TRENDS IN RECENT* PAP TEST PREVALENCE (%), BY EDUCATIONAL ATTAINMENT AND HEALTH INSURANCE STATUS, WOMEN 18 AND OLDER, US, 1992-2008

PAP TESTING

- Regular use of the Pap test followed by appropriate and timely treatment reduces deaths from cervical cancer.

- Women who have never been screened or who have not been screened in the past 5 years face a greater risk of developing invasive cervical cancer.

- Older, poor, and less educated women are less likely to be screened for cervical cancer.

- Older women are at greater risk than younger women of developing and dying from cervical cancer.
Beginning at age 50, men and women should follow one of the following examination schedules:

- A flexible sigmoidoscopy (FSIG) every five years
- A colonoscopy every ten years
- A double-contrast barium enema every five years
- A Computerized Tomographic (CT) colonography every five years
- A guaiac-based fecal occult blood test (FOBT) or a fecal immunochemical test (FIT) every year
- A stool DNA test (interval uncertain)
  - Tests that detect adenomatous polyps and cancer
  - Tests that primarily detect cancer

People who are at moderate or high risk for colorectal cancer should talk with a doctor about a different testing schedule.
Fecal occult blood test (FOBT). When done every 1 to 2 years using home test kits in people aged 50 to 80, the FOBT can decrease the number of deaths due to colorectal cancer.

Colorectal endoscopy (sigmoidoscopy or colonoscopy). Regular sigmoidoscopy can reduce colorectal cancer deaths. More research needed to learn the best timing between exams.

Colonoscopy also is the diagnostic procedure used to follow up positive FOBT and sigmoidoscopy screening tests.

Immigrants and those with lower incomes, with less education, without insurance, and lacking a usual health care provider are less likely to be screened for colorectal cancer.
TRENDS IN RECENT* FECAL OCCULT BLOOD TEST PREVALENCE (%), BY EDUCATIONAL ATTAINMENT AND HEALTH INSURANCE STATUS, ADULTS 50 YEARS AND OLDER, US, 1997-2008

* A fecal occult blood test within the past year. Note: Data from participating states and the District of Columbia were aggregated to represent the United States.

TRENDS IN RECENT* FLEXIBLE SIGMOIDOSCOPY OR COLONOSCOPY PREVALENCE (%), BY EDUCATIONAL ATTAINMENT AND HEALTH INSURANCE STATUS, ADULTS 50 YEARS AND OLDER, US, 1997-2008

The rates of newly diagnosed cancer cases (incidence) are one way to measure progress against cancer. The lower the rates, the better.

Another important measure is the proportion of cancers diagnosed at a later stage of development.

The stage of a cancer shows how far the disease has progressed and spread within the body. The earlier the stage at diagnosis, the better the chances for cure.

Downward trends in the proportion of late cancer diagnoses are a sign that screening is working for the cancers for which early detection methods are available.
2013 ESTIMATED US CANCER CASES*

Estimated New Cancer Cases* in the US in 2013

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th>Women</th>
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</thead>
<tbody>
<tr>
<td>Prostate</td>
<td>28%</td>
<td>29%</td>
</tr>
<tr>
<td>Lung &amp; bronchus</td>
<td>14%</td>
<td>14%</td>
</tr>
<tr>
<td>Colon &amp; rectum</td>
<td>9%</td>
<td>9%</td>
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<tr>
<td>Urinary bladder</td>
<td>6%</td>
<td>6%</td>
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<tr>
<td>Melanoma of skin</td>
<td>5%</td>
<td>6%</td>
</tr>
<tr>
<td>Kidney &amp; renal pelvis</td>
<td>5%</td>
<td>4%</td>
</tr>
<tr>
<td>Non-Hodgkin lymphoma</td>
<td>4%</td>
<td>4%</td>
</tr>
<tr>
<td>Oral cavity</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>Leukemia</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>Pancreas</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>All Other Sites</td>
<td>20%</td>
<td>19%</td>
</tr>
</tbody>
</table>

*Excludes basal cell and squamous cell skin cancers and in situ carcinoma except urinary bladder.
The Lifetime Probability of Developing Cancer for Men, 2007-2009*

<table>
<thead>
<tr>
<th>Site</th>
<th>Risk</th>
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</thead>
<tbody>
<tr>
<td>All sites†</td>
<td>1 in 2</td>
</tr>
<tr>
<td>Prostate</td>
<td>1 in 6</td>
</tr>
<tr>
<td>Lung and bronchus</td>
<td>1 in 13</td>
</tr>
<tr>
<td>Colon and rectum</td>
<td>1 in 19</td>
</tr>
<tr>
<td>Urinary bladder‡</td>
<td>1 in 26</td>
</tr>
<tr>
<td>Melanoma§</td>
<td>1 in 35</td>
</tr>
<tr>
<td>Non-Hodgkin lymphoma</td>
<td>1 in 43</td>
</tr>
<tr>
<td>Kidney</td>
<td>1 in 49</td>
</tr>
<tr>
<td>Leukemia</td>
<td>1 in 63</td>
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<tr>
<td>Oral Cavity</td>
<td>1 in 66</td>
</tr>
<tr>
<td>Stomach</td>
<td>1 in 92</td>
</tr>
</tbody>
</table>

* For those free of cancer at beginning of age interval.
† All sites exclude basal and squamous cell skin cancers and in situ cancers except urinary bladder.
‡ Includes invasive and in situ cancer cases
§ Statistic for white men.
The Lifetime Probability of Developing Cancer for Women, 2007-2009*

<table>
<thead>
<tr>
<th>Site</th>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>All sites†</td>
<td>1 in 3</td>
</tr>
<tr>
<td>Breast</td>
<td>1 in 8</td>
</tr>
<tr>
<td>Lung &amp; bronchus</td>
<td>1 in 16</td>
</tr>
<tr>
<td>Colon &amp; rectum</td>
<td>1 in 21</td>
</tr>
<tr>
<td>Uterine corpus</td>
<td>1 in 38</td>
</tr>
<tr>
<td>Non-Hodgkin lymphoma</td>
<td>1 in 52</td>
</tr>
<tr>
<td>Urinary bladder‡</td>
<td>1 in 87</td>
</tr>
<tr>
<td>Melanoma§</td>
<td>1 in 54</td>
</tr>
<tr>
<td>Ovary</td>
<td>1 in 72</td>
</tr>
<tr>
<td>Pancreas</td>
<td>1 in 69</td>
</tr>
<tr>
<td>Uterine cervix</td>
<td>1 in 147</td>
</tr>
</tbody>
</table>

* For those free of cancer at beginning of age interval.
† All sites exclude basal and squamous cell skin cancers and in situ cancers except urinary bladder.
‡ Includes invasive and in situ cancer cases
§ Statistic for white women.
CANCER INCIDENCE RATES* BY SEX, US, 1975-2009

*Age-adjusted to the 2000 US standard population and adjusted for delays in reporting.
CANCER INCIDENCE RATES* AMONG MEN, US, 1975-2009


*Age-adjusted to the 2000 US standard population and adjusted for delays in reporting.
Source: Surveillance, Epidemiology, and End Results Program, Delay-adjusted Incidence database:
CANCER INCIDENCE RATES* BY SEX AND RACE, US, 1975-2009

Cancer Incidence Rates* by Sex and Race, US, 1975-2009

*Age-adjusted to the 2000 US standard population.
Source: Surveillance, Epidemiology, and End Results Program, Delay-adjusted Incidence database:
CANCER INCIDENCE RATES* BY RACE AND ETHNICITY, 2000-2009

Cancer Incidence Rates* by Race and Ethnicity, 2005-2009

*Age-adjusted to the 2000 US standard population.
†Persons of Hispanic origin may be of any race.
LATE-STAGE DIAGNOSIS OF CANCER

- Cancers can be diagnosed at different stages in their development. Stage of cancer diagnosis may be expressed as numbers (I, II, III, or IV, for example) or by terms such as "localized," "regional," and "distant."

- The lower the number or the more localized the cancer, the better a person's chances of benefiting from treatment and being cured.

- Tracking the rates of late-stage (distant) cancers is a good way to monitor the impact of cancer screening. When more cancers are detected in early stages, fewer should be detected in late stages.

- A lower rate of diagnosis at late stages is an early sign of the effectiveness of cancer screening efforts. These lower rates can be expected to occur before decreases in death rates are seen.
RATES OF NEW CANCERS OF DISTANT STAGE DISEASES
BY CANCER SITE: 1980-2008

Figure DST1: Rates of new cancers of distant stage diseases by cancer site:
1980-2008

Figure DST2: Rates of new late stage breast cancer: 1980-2008

Source: SEER Program, National Cancer Institute. Incidence data are from the SEER 9 areas (http://seer.cancer.gov/registries/terms.html).
Late stage breast cancer includes cases diagnosed at regional and distant stages.
Data are age-adjusted to the 2000 standard using age groups:<1, 1-4, 5-9, 10-14, 15-19,
20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65-69, 70-74, 75-79, 80-84,
Advances in the ways that cancer is diagnosed and treated have increased the number of people who live disease-free for long periods of time.

More and more people are benefiting from the early detection of cancer and its successful treatment. These medical advances are improving both quality of life and length of survival.

National data regarding life after cancer are limited and include survival rates by each stage at diagnosis, economic impact of cancer, cancer survivor’s smoking status.
WHO ARE CANCER SURVIVORS?

- Any person who has been diagnosed with cancer, from the time of diagnosis through the balance of life.
- In practice, concept of survivorship often associated with period after active treatment ends.

3 Distinct Phases of Cancer Survival

- Diagnosis to end of initial treatment
- Transition from treatment to extended survival
- Long-term survival
Dr Rowland talks to ecancertv at the European Breast Cancer Conference, Vienna, March 2012, about the developing field of cancer survivorship.

http://ecancer.org/tv/conference/140/1333
RANGE OF CANCER EXPERIENCES AMONG SURVIVORS

Cancer-free

≥1 late treatment complication

Dying after late recurrence

Second cancer

Intermittent periods of active disease requiring treatment

Continuous cancer without disease-free period
The National Cancer Survivorship Resource Center (The Survivorship Center) is a collaboration between ACS and the George Washington Cancer Institute funded by a 5-year cooperative agreement from the Centers for Disease Control and Prevention.

Its goal is to shape the future of cancer survivorship care and improve the quality of life of cancer survivors as they transition from treatment to recovery.

>100 volunteer survivorship experts to develop tools for cancer survivors, caregivers, health care professionals, advocates, and policy makers.
As of January 1, 2012, it is estimated that there are 13.7 million cancer survivors (~4% of the population).

Increased from 3 million (1.5%) in 1971.

Increasing number of survivors due to:

- Aging and growth of population
- Improved survival rates

Invasive/1st Primary Cases Only
# ESTIMATED NUMBER OF US CANCER SURVIVORS BY SITE IN 2012 AND 2022

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>As of January 1, 2012</td>
<td>As of January 1, 2022</td>
<td>As of January 1, 2012</td>
<td>As of January 1, 2022</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td></td>
<td>Prostate</td>
<td>Breast</td>
<td>Prostate</td>
<td>Breast</td>
</tr>
<tr>
<td></td>
<td>2,778,630 (43%)</td>
<td>2,971,610 (41%)</td>
<td>3,922,600 (45%)</td>
<td>3,786,610 (41%)</td>
</tr>
<tr>
<td>Colon &amp; rectum</td>
<td>595,210 (9%)</td>
<td>Uterine corpus</td>
<td>Colon &amp; rectum</td>
<td>Colon &amp; rectum</td>
</tr>
<tr>
<td>Melanoma</td>
<td>481,040 (7%)</td>
<td>606,910 (8%)</td>
<td>Melanoma</td>
<td>661,980 (8%)</td>
</tr>
<tr>
<td>Urinary bladder</td>
<td>437,180 (7%)</td>
<td>Urinary bladder</td>
<td>Thyroid</td>
<td>548,870 (6%)</td>
</tr>
<tr>
<td>Non-Hodgkin lymphoma</td>
<td>279,500 (4%)</td>
<td>Non-Hodgkin lymphoma</td>
<td>371,980 (4%)</td>
<td>662,280 (7%)</td>
</tr>
<tr>
<td>Testis</td>
<td>230,910 (4%)</td>
<td>255,450 (4%)</td>
<td>Kidney &amp; renal pelvis</td>
<td>300,800 (3%)</td>
</tr>
<tr>
<td>Kidney &amp; renal pelvis</td>
<td>213,000 (3%)</td>
<td>Testis</td>
<td>295,590 (3%)</td>
<td>341,830 (4%)</td>
</tr>
<tr>
<td>Lung &amp; bronchus</td>
<td>189,080 (3%)</td>
<td>Lung &amp; bronchus</td>
<td>Oral cavity &amp; pharynx</td>
<td>Lung &amp; bronchus</td>
</tr>
<tr>
<td>Oral cavity &amp; pharynx</td>
<td>185,240 (3%)</td>
<td>Lung &amp; bronchus</td>
<td>232,330 (3%)</td>
<td>Oral cavity &amp; pharynx</td>
</tr>
<tr>
<td>Leukemia</td>
<td>167,740 (3%)</td>
<td>Ovary</td>
<td>Kidney &amp; renal pelvis</td>
<td>Ovary</td>
</tr>
<tr>
<td>All sites</td>
<td>6,442,280</td>
<td>7,241,570</td>
<td>all sites</td>
<td>8,796,830</td>
</tr>
<tr>
<td>All sites</td>
<td>6,442,280</td>
<td>7,241,570</td>
<td>all sites</td>
<td>8,796,830</td>
</tr>
</tbody>
</table>

Majority of cancer (64%) diagnosed 5 or more years ago.

15% diagnosed 20 or more years ago.
71% of survivors are currently 60 years of age and older.
Almost half (45%) are age 70 years of age or older.
Only 5% are younger than 40 years of age.
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>All sites</td>
<td>49</td>
<td>56</td>
<td>68</td>
</tr>
<tr>
<td>Breast (female)</td>
<td>75</td>
<td>84</td>
<td>90</td>
</tr>
<tr>
<td>Colon</td>
<td>51</td>
<td>61</td>
<td>65</td>
</tr>
<tr>
<td>Leukemia</td>
<td>34</td>
<td>43</td>
<td>58</td>
</tr>
<tr>
<td>Lung &amp; bronchus</td>
<td>12</td>
<td>13</td>
<td>17</td>
</tr>
<tr>
<td>Melanoma</td>
<td>82</td>
<td>88</td>
<td>93</td>
</tr>
<tr>
<td>Non-Hodgkin lymphoma</td>
<td>47</td>
<td>51</td>
<td>71</td>
</tr>
<tr>
<td>Ovary</td>
<td>36</td>
<td>38</td>
<td>43</td>
</tr>
<tr>
<td>Pancreas</td>
<td>2</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Prostate</td>
<td>68</td>
<td>83</td>
<td>100</td>
</tr>
<tr>
<td>Rectum</td>
<td>48</td>
<td>58</td>
<td>68</td>
</tr>
<tr>
<td>Urinary bladder</td>
<td>73</td>
<td>79</td>
<td>80</td>
</tr>
</tbody>
</table>

5-year relative survival rates based on patients diagnosed from 2002 to 2008, all followed through 2009.
## Five-year Relative Cancer Survival Rates (%) by Race, 2002-2008

<table>
<thead>
<tr>
<th>Site</th>
<th>White</th>
<th>African American</th>
<th>Absolute Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Sites</td>
<td>66</td>
<td>58</td>
<td>8</td>
</tr>
<tr>
<td>Breast (female)</td>
<td>90</td>
<td>78</td>
<td>12</td>
</tr>
<tr>
<td>Colon</td>
<td>64</td>
<td>56</td>
<td>8</td>
</tr>
<tr>
<td>Esophagus</td>
<td>18</td>
<td>11</td>
<td>7</td>
</tr>
<tr>
<td>Leukemia</td>
<td>55</td>
<td>48</td>
<td>7</td>
</tr>
<tr>
<td>Non-Hodgkin lymphoma</td>
<td>69</td>
<td>61</td>
<td>8</td>
</tr>
<tr>
<td>Oral cavity</td>
<td>63</td>
<td>42</td>
<td>21</td>
</tr>
<tr>
<td>Prostate</td>
<td>100</td>
<td>96</td>
<td>4</td>
</tr>
<tr>
<td>Rectum</td>
<td>67</td>
<td>59</td>
<td>8</td>
</tr>
<tr>
<td>Urinary bladder</td>
<td>78</td>
<td>64</td>
<td>14</td>
</tr>
<tr>
<td>Uterine cervix</td>
<td>69</td>
<td>59</td>
<td>10</td>
</tr>
<tr>
<td>Uterine corpus*</td>
<td>84</td>
<td>60</td>
<td>24</td>
</tr>
</tbody>
</table>

In 2012, estimated 2.9 million women living in US with history of invasive BrCa

- Median age at Dx is 61
- 20% of BrCa occurs in women ≤50 yrs; 40% in women ≥ 65 yrs
- 60% of BrCa diagnosed at localized stage, 2001-07

10 to 50% of patients develop lymphedema of the arm as a side effect of surgery and radiation

- Use of sentinel lymph node biopsy, rather than axillary lymph node dissection reduces risk.
- Some evidence that upper body exercise and physical activity may reduce risk.

Numbness or tightness, pulling, stretching in the chest wall, arms, or shoulders

Premature menopause, impaired fertility among younger patients

Increased risk of osteoporosis

Treatment with aromatase inhibitors can cause muscle pain, joint stiffness and/or pain, osteoporosis.
2.8 M men living with a history of prostate cancer in US
Additional 241,740 estimated cases in 2012.
Median age at Dx is 67
Most men diagnosed by PSA screening, although expert groups conclude data is insufficient to recommend routine use of PSA.
>90% of all prostate cancers are discovered in the local or regional stages for which the 5-yr mortality rate is 100%.
10 and 15 yr survival rate is 97.8% and 91.4%, respectively.
SPECIAL CONCERNS OF PROSTATE CANCER SURVIVORS

- Survivors treated with surgery or radiation therapy experience incontinence, erectile dysfunction, bowel complications.
- Patients receiving hormonal treatment may experience loss of libido, menpausal-like symptoms including hot flashes, night sweats, irritability, and osteoporosis.
- Over long-term, hormone therapy increases risk of diabetes, cardiovascular disease, obesity.
CANCERS IN CHILDREN

- 1% of all new cancers (birth to age 14)
- 2nd leading cause of death in children (accidents is 1st)
- 58,510 childhood cancer survivors in US
- ~12,060 will be diagnosed in 2012.
- 5-year survival rate has improved over past 30 yrs due to new and improved treatments,
Children may experience treatment-related side effects many years after diagnosis.

Aggressive treatments used during 1970s and 80s, and even some newer treatments, result in a number of late effects, including risk of second cancers, organ dysfunction, reduced growth and development, decreased fertility, cognitive impairments, early death.

Most common second cancers are breast, brain/CNS, bone, thyroid soft tissue, melanoma, acute myeloid leukemia.
Radiation to brain or spine can slow growth. If “at risk” for being short, healthcare provider can recommend tests and treatments.

Survivors treated with chest radiation or anthracyclines might have heart problems. More likely at higher doses and if treatment occurred before heart finished growing.

Radiation and some anticancer drugs affect sexual development and reproduction. Risk of delayed puberty, infertility, early menopause.

Adolescents and young adults face additional challenges related to insurance coverage.

Medicaid covers cancer treatment for pediatric cancer patients meeting income criteria, but more general coverage lapses at age 18 or 21 depending on state of residence.
Management of cancer and treatment-related symptoms is an important aspect of cancer care, affecting QOL, functional status, and completion of treatment.

Most common side-effects:
- Pain
- Fatigue
- Emotional distress
- Bone density
- Cardiotoxicity
- Cognitive Deficits

- Identified surveillance and applied research as major areas of public health focus for cancer survivorship.
- Recommended development of infrastructure for comprehensive database on cancer survivorship
- Recommended improved coordination among administrators of existing databases and the addition of variables of indicators to collect supplementary information on cancer survivors.

Reports Recommending Cancer Survivorship Data Collection/Surveillance


- Emphasized the importance of surveillance in monitoring cancer treatment and factors associated with the ongoing health concerns of cancer survivors
Established in 1984

Largest continuously conducted telephone health survey in the world

>355,710 interviews annually

50 states, District of Columbia, Puerto Rico, Virgin Islands, Guam
BRFSS CORE TOPICS (2007)

- Demographics
- Health Status
- Health Care Access
- Healthy Days
- Life Satisfaction
- Emotional Support
- Disability
- Tobacco Use
- Oral Health
- Alcohol Consumption
- Exercise
- Immunization
- HIV/AIDS
- Diabetes
- Asthma
- Cardiovascular Disease
- Emerging Issues
- Veteran’s Status
- Hypertension Awareness
- Cholesterol Awareness
- Arthritis Burden
- Physical Activity
- Fruits and Vegetables
- Oral Health
- Emerging Issues
- Veteran’s Status
Core Questions

1. Have you ever been told by a doctor, nurse, or other health care professional that you had cancer?

2. [If yes] At what age were you told that you had cancer?

3. How many different types of cancer have you had?

4. [If one] What type of cancer was it? [Or if more than one] With your most recent diagnosis of cancer, what type of cancer was it?
States may choose to ask 10 questions added as an optional module

Source of questions
- 1992 National Health Interview Survey Cancer Survivorship Supplement
- State CCC programs, CDC staff

Allowed state-level assessment of survivorship issues related to cancer treatment, pain, and access to care
- 2009: 4 states participated (Connecticut, North Carolina, Vermont, Virginia)
- 2010: 10 states participated (Alaska, Connecticut, Guam, Indiana, Massachusetts, Missouri, New Mexico, Ohio, South Dakota, Wisconsin)
1. Previously you said that you had been told by your doctor that you had cancer. I will now ask you about your experiences with cancer. Are you currently receiving treatment for cancer? By treatment, we mean surgery, radiation therapy, chemotherapy, or chemotherapy pills.

2. What type of doctor provides the majority of your health care? (cancer surgeon, family practitioner, etc)

3. Did any doctor, nurse, or other health professional EVER give you a written summary of all the cancer treatments that you received?

4. Have you EVER received instructions from a doctor, nurse, or other health professional about where you should return or who you should see for routine cancer check-ups after completing treatment for cancer?
5. Were these instructions written down or printed on paper for you?

6. With your most recent diagnosis of cancer, did you have health insurance that paid for all or part of your cancer treatment? (Note: "Health insurance" also includes Medicare, Medicaid, or other types of state health programs.)

7. Were you EVER denied health insurance or life insurance coverage because of your cancer?

8. Did you participate in a clinical trial as part of your cancer treatment?

9. Do you currently have physical pain caused by your cancer or cancer treatment?

10. Is your pain currently under control?
NATIONAL HEALTH INTERVIEW SURVEY (NHIS)

- (NHIS) has been monitoring the health of the nation since 1957.

- Data collected by the U.S. Census Bureau. National-level household data is collected on health status, health care access, and prevention practices.

- Every five years, CDC's Division of Cancer Prevention and Control, the NCI, and the National Center of Health Statistics work together to add a set of questions on cancer prevention (nutrition, physical activity, and tobacco and alcohol use) and early detection practices (such as cancer screening).

- In 2010, a set of questions addressing issues related to cancer survivorship were added. Similar questions had not appeared in the NHIS since 1992.

- This will give data on how cancer survivors are doing in the U.S. and inform the development of new programs and policies for cancer survivors at the national level.
The first nine questions in the Survivorship section (NAI) of the 2010 Cancer Control Supplement were asked of all sample adults.

Respondents were asked about their quality of life, physical health, mental health, fatigue, and pain.

The remaining questions were only asked of sample adults who were ever told they had cancer.

These questions collected information on the respondent’s cancer coming back, cancer treatment, after-treatment follow-up, insurance payment for cancer treatment, health professional discussing how cancer may affect the respondent’s emotions or relationships with other people, receiving professional counseling or joining a support group, denied insurance coverage because of cancer, and degree to which the cancer caused financial problems.
• **Mortality.** The ultimate measure of success against cancer is how quickly and how far we can lower death rates.

• The number of cancer deaths per 100,000 people per year, age-adjusted to a U.S. 2000 standard population.

• **Person-years of life lost (PYLL).** The years of life lost due to early death from a particular cause or disease. PYLL due to cancer helps to describe the extent to which life is cut short by cancer. On average, each person who dies from cancer loses an estimated 15.5 years of life.
2013 ESTIMATED US CANCER DEATHS

Estimated Cancer Deaths in the US in 2013

<table>
<thead>
<tr>
<th>Cancer Type</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lung &amp; bronchus</td>
<td>306,920</td>
<td>273,430</td>
</tr>
<tr>
<td>Prostate</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>Colon &amp; rectum</td>
<td>9%</td>
<td>14%</td>
</tr>
<tr>
<td>Pancreas</td>
<td>6%</td>
<td>9%</td>
</tr>
<tr>
<td>Liver &amp; intrahepatic bile duct</td>
<td>5%</td>
<td>7%</td>
</tr>
<tr>
<td>Leukemia</td>
<td>4%</td>
<td>5%</td>
</tr>
<tr>
<td>Esophagus</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>Urinary bladder</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>Non-Hodgkin lymphoma</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>Kidney &amp; renal pelvis</td>
<td>3%</td>
<td>2%</td>
</tr>
<tr>
<td>All other sites</td>
<td>24%</td>
<td>25%</td>
</tr>
</tbody>
</table>

Source: American Cancer Society, 2013.
# US Mortality, 2005

<table>
<thead>
<tr>
<th>Rank</th>
<th>Cause of Death</th>
<th>No. of deaths</th>
<th>% of all deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Heart Diseases</td>
<td>652,091</td>
<td>26.6</td>
</tr>
<tr>
<td>2.</td>
<td>Cancer</td>
<td>559,312</td>
<td>22.8</td>
</tr>
<tr>
<td>3.</td>
<td>Cerebrovascular diseases</td>
<td>143,579</td>
<td>5.9</td>
</tr>
<tr>
<td>4.</td>
<td>Chronic lower respiratory diseases</td>
<td>130,933</td>
<td>5.3</td>
</tr>
<tr>
<td>5.</td>
<td>Accidents (unintentional injuries)</td>
<td>117,809</td>
<td>4.8</td>
</tr>
<tr>
<td>6.</td>
<td>Diabetes mellitus</td>
<td>75,119</td>
<td>3.1</td>
</tr>
<tr>
<td>7.</td>
<td>Alzheimer disease</td>
<td>71,599</td>
<td>2.9</td>
</tr>
<tr>
<td>8.</td>
<td>Influenza &amp; pneumonia</td>
<td>63,001</td>
<td>2.6</td>
</tr>
<tr>
<td>9.</td>
<td>Nephritis*</td>
<td>43,901</td>
<td>1.8</td>
</tr>
<tr>
<td>10.</td>
<td>Septicemia</td>
<td>34,136</td>
<td>1.4</td>
</tr>
</tbody>
</table>

*Includes nephrotic syndrome and nephrosis.

CHANGE IN THE US DEATH RATES* BY CAUSE, 1950 & 2005

Rate Per 100,000

Heart Diseases: 586.8 (1950), 211.1 (2005)
Cerebrovascular Diseases: 46.6 (1950), 180.7 (2005)
Cancer: 193.9 (1950), 183.8 (2005)

* Age-adjusted to 2000 US standard population.
Sources: 1950 Mortality Data - CDC/NCHS, NVSS, Mortality Revised.
CANCER DEATH RATES* BY SEX, US, 1975-2009

Cancer Death Rates* by Sex, US, 1975-2009

*Age-adjusted to the 2000 US standard population.
CANCER DEATH RATES* AMONG WOMEN, US, 1930-2009

Cancer Death Rates* Among Women, US, 1930-2009

*Age-adjusted to the 2000 US standard population.
National Center for Health Statistics, Centers for Disease Control and Prevention.
Total Number of Cancer Deaths Averted from 1991 to 2009 in Men and 1992 to 2009 in Women

The blue line represents the actual number of cancer deaths recorded in each year, and the red line represents the number of cancer deaths that would have been expected if cancer death rates had remained at their peak.
CANCER DEATH RATES* BY SEX AND RACE, US, 1975-2009

Cancer Death Rates* by Sex and Race, US, 1975-2009

Rate Per 100,000


African American men
White men
African American women
White women

*Age-adjusted to the 2000 US standard population.
CANCER DEATH RATES* BY RACE AND ETHNICITY, US, 2005-2009


- White: Men 216.7, Women 150.8
- African American: Men 288.3, Women 174.6
- Asian/Pacific Islander: Men 132.6, Women 93.2
- American Indian/Alaskan Native: Men 184.9, Women 135.9
- Hispanic†: Men 146.4, Women 100.6

*Per 100,000, age-adjusted to the 2000 US standard population.
†Persons of Hispanic origin may be of any race.
## CANCER SITES IN MEN FOR WHICH AFRICAN AMERICAN DEATH RATES* EXCEED WHITE DEATH RATES*, US, 2000-2004

*Per 100,000, age-adjusted to the 2000 US standard population. Source: Surveillance, Epidemiology, and End Results Program, 1975-2004, Division of Cancer Control and Population Sciences, National Cancer Institute, 2007.

<table>
<thead>
<tr>
<th>Site</th>
<th>AA</th>
<th>EA</th>
<th>Ratio of AA/EA</th>
</tr>
</thead>
<tbody>
<tr>
<td>All sites</td>
<td>321.8</td>
<td>234.7</td>
<td>1.4</td>
</tr>
<tr>
<td>Prostate</td>
<td>62.3</td>
<td>25.6</td>
<td>2.4</td>
</tr>
<tr>
<td>Larynx</td>
<td>5.0</td>
<td>2.2</td>
<td>2.3</td>
</tr>
<tr>
<td>Stomach</td>
<td>11.9</td>
<td>5.2</td>
<td>2.3</td>
</tr>
<tr>
<td>Myeloma</td>
<td>8.5</td>
<td>4.4</td>
<td>1.9</td>
</tr>
<tr>
<td>Oral cavity and pharynx</td>
<td>6.8</td>
<td>3.8</td>
<td>1.8</td>
</tr>
<tr>
<td>Small intestine</td>
<td>0.7</td>
<td>0.4</td>
<td>1.8</td>
</tr>
<tr>
<td>Liver and intrahepatic bile duct</td>
<td>10.0</td>
<td>6.5</td>
<td>1.5</td>
</tr>
<tr>
<td>Colon and rectum</td>
<td>32.7</td>
<td>22.9</td>
<td>1.4</td>
</tr>
<tr>
<td>Esophagus</td>
<td>10.2</td>
<td>7.7</td>
<td>1.3</td>
</tr>
<tr>
<td>Lung and bronchus</td>
<td>95.8</td>
<td>72.6</td>
<td>1.3</td>
</tr>
<tr>
<td>Pancreas</td>
<td>15.5</td>
<td>12.0</td>
<td>1.3</td>
</tr>
<tr>
<td>Site</td>
<td>African American</td>
<td>White</td>
<td>Ratio of African American/White</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>------------------</td>
<td>-------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>All sites</td>
<td>189.3</td>
<td>161.4</td>
<td></td>
</tr>
<tr>
<td>Myeloma</td>
<td>6.3</td>
<td>2.8</td>
<td></td>
</tr>
<tr>
<td>Stomach</td>
<td>5.8</td>
<td>2.2</td>
<td></td>
</tr>
<tr>
<td>Uterine cervix</td>
<td>4.9</td>
<td>2.1</td>
<td></td>
</tr>
<tr>
<td>Esophagus</td>
<td>1.8</td>
<td>1.7</td>
<td></td>
</tr>
<tr>
<td>Uterine corpus</td>
<td>1.8</td>
<td>3.9</td>
<td></td>
</tr>
<tr>
<td>Small intestine</td>
<td>0.5</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>Larynx</td>
<td>0.8</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Pancreas</td>
<td>12.4</td>
<td>9.0</td>
<td></td>
</tr>
<tr>
<td>Colon and rectum</td>
<td>22.9</td>
<td>15.9</td>
<td></td>
</tr>
<tr>
<td>Liver and intrahepatic bile duct</td>
<td>3.9</td>
<td>2.8</td>
<td></td>
</tr>
<tr>
<td>Breast</td>
<td>33.8</td>
<td>25.0</td>
<td>1.4</td>
</tr>
<tr>
<td>Gallbladder</td>
<td>1.9</td>
<td>0.8</td>
<td></td>
</tr>
<tr>
<td>Urinary bladder</td>
<td>2.8</td>
<td>2.3</td>
<td>1.2</td>
</tr>
<tr>
<td>Oral cavity and pharynx</td>
<td>1.7</td>
<td>1.5</td>
<td></td>
</tr>
</tbody>
</table>

*Per 100,000, age-adjusted to the 2000 US standard population.
Level of education often used as marker for SES

If death rates of most educated non-Hispanic white applied to all individuals ages 25 to 64 – i.e. if everyone had same cancer burden as most educated – number of deaths in this age group could be reduced by 37%.

\[
\text{avoidable deaths} = \frac{(36,720 + 23,650)}{(86,270 + 77,920)} = 37\%
\]
Among AA aged 25-64, there were 12,710 cancer deaths in men and 11,850 deaths in women in 2007.

Eliminating economic disparities among AA could potentially avoid 10,050 cancer deaths, twice as many as eliminating racial disparities.
PERSON-YEARS OF LIFE LOST

- The difference between the actual age of death due to the disease/cause and the expected age of death.

- Specifically, this measure is estimated by linking life table data to each death of a person of given age and sex.

- The life table permits a determination of the number of additional years an average person of that age, race, and sex would have been expected to live.
PERSON-YEARS OF LIFE LOST IN THE US DUE TO MAJOR CAUSES OF DEATH. ALL RACES, BOTH SEXES: 2006

- Malignant Neoplasms: 8,628
- All Other Causes: 7,839
- Heart Disease: 7,285
- Accidents: 3,872
- Cerebrovascular: 1,475
- Chronic Lung Disease: 1,443
- Suicide & Self-Inflicted Injury: 1,132
- Diabetes Mellitus: 1,046
- Homicide: 669
- Cirrhosis: 620
- Pneumonia & Influenza: 572
- Nephritis & Nephrosis: 536
- Septicemia: 478
- Alzheimers Disease: 472
- HIV: 406
- Aortic Aneurysm & Dissection: 169
- Atherosclerosis: 68

PERSON-YEARS OF LIFE LOST IN THE US DUE TO CANCER, ALL RACES, MALES: 2006

[Bar chart showing years of life lost by cancer type for males in the US in 2006, with Lung & Bronchus leading at 1.274 million, followed by Colon & Rectum at 382 thousand, and so on.]
PERSON-YEARS OF LIFE LOST IN THE US DUE TO CANCER, ALL RACES, FEMALES: 2006

![Bar chart showing person-years of life lost in the US due to cancer for females in 2006. Lung & Bronchus leads with 1,106, followed by Breast (Female) with 774, Colon & Rectum with 375, Ovary with 257, Pancreas with 240, Leukemia with 162, Non-Hodgkin Lymphoma with 134, Brain & ONS with 130, Corpus & Uterus, NOS with 120, Cervix Uteri with 104, Liver & IBD with 91, Stomach with 75, Myeloma with 72, Kidney & Renal Pelvis with 71, Melanoma of the Skin with 56, Urinary Bladder with 47, Childhood Ages (0-14) with 45, Esophagus with 45, Oral Cavity & Pharynx with 40, Hodgkin Lymphoma with 13.

In 2006, cancer deaths were responsible for more than 8.6 million PYLL. This is more than heart disease or any other cause of death.

Lung cancer accounted for about 2.4 million PYLL, the most by far for any cancer, in part because of the relatively low survival rate and in part because of the relatively early age of onset.

In 2006, for each of the leading cancer sites affecting both men and women, men had more PYLL than women.

The number of person years of life lost due to collective cancer deaths among women, however, was slightly greater than that among men because of the number of person years of life lost due to cancers affecting only women (ex. female breast, ovary)
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