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## **Towards a More Comprehensive Understanding of Cancer Burden in North Carolina: Priorities for Intervention**

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## **Abstract**

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We dedicate this to our good friend, Deb Blocker, whose ever-ready smile and warm character made work on this project a pleasure, and whose untimely passing leaves an unfillable void.

**Objective**—To apply 4 measures of population burden in examining cancer burden in North Carolina and to identify priorities for intervention.

**Methods**—Four measures were used: incidence, mortality, prevalence, and years of potential life lost (YPLL). The North Carolina Central Cancer Registry provided summary data on incidence and mortality and record-level data that were examined using SEER\*Stat software to calculate prevalence. North Carolina vital statistics (mortality) data and life expectancy estimates stratified by age, race, and sex were used to calculate YPLL. Each cancer site was ranked according to burden for each of the 4 individual burden measures and summarized into an overall rank. Burden was examined overall and by sex and race.

**Principal Findings**—Four cancers—lung/bronchus, female breast, prostate, and colon/rectum—accounted for approximately 57% of the total cancer incidence, prevalence, mortality, and YPLL in North Carolina. Patterns of burden in gender and race subgroups were similar, although non-whites often had higher mortality rates than did whites despite similar incidence rates. An estimated 207 583 people were living with cancer in 2004. Breast and prostate cancer accounted for 42% of these survivors. Lung/bronchus cancer was the most severe cancer, accounting for more deaths and years of life lost than any other 5 cancers combined.

**Conclusions**—Each of the 4 measures provides unique insight and guidance for cancer coordination and control efforts. Lung/bronchus, female breast, prostate, and colon/rectum cancers accounted for the majority of North Carolina's cancer burden and should be priorities for intervention.

## Keywords

neoplasms/epidemiology; population surveillance; prevalence; survivorship; North Carolina

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The burden of cancer is substantial and increasing. As the leading cause of death among those under 85 years of age nationally,<sup>1</sup> cancer recently replaced heart disease as the overall leading cause of death in North Carolina.<sup>2</sup> In 2008, approximately 1.4 million people nationwide will be diagnosed with cancer, and more than 560 000 will die from it.<sup>3</sup> North Carolina had 43335 new cancer cases and 17 267 cancer deaths in 2005 and 2006, respectively.<sup>4</sup> Cancer incidence and mortality are long-familiar measures of cancer burden and primarily reflect the diagnosis and treatment phases in the middle of the cancer care continuum.<sup>5</sup> However, due to substantial improvements in prevention, early detection, and treatment, understanding the beginning of the continuum (risk assessment, primary prevention, and detection) and the end of the continuum (survivorship care and recurrence surveillance) are increasingly important for comprehensive cancer control efforts.

Since the 1970s, we have seen the 5-year survival rate for the top 15 cancers grow from 42.7% for men and 56.6% for women to 64.0% for men and 64.3% for women.<sup>6</sup> Cancer survivorship has tripled during that time, with approximately 11 million Americans currently living with a cancer diagnosis.<sup>6</sup> The trend in North Carolina reflects that of the nation overall, with cancer survival improving and mortality rates beginning to slow or even decline.<sup>1,4,7</sup> Cancer is changing shape in terms of the populations it affects and is evolving from an acute disease of short duration to a chronic one with multiple phases of longer-term management.<sup>1,6</sup> This reflects the fact that people are living longer with cancer but also points to a need for application of broader measures of cancer burden to appropriately inform cancer care coordination and planning.

For over a decade, North Carolina has been a national leader in comprehensive cancer planning.<sup>8</sup> An important first step in planning for the next decade is to assess North Carolina's cancer burden.<sup>9,10</sup> In this analysis, we examine North Carolina's cancer burden using 4 different measures and, in the absence of known methods for integrating burden

measures, present a straightforward yet novel system for combining them into a single overall measure that identifies the most burdensome cancers and informs priorities for intervention to reduce that burden.

## METHODS

Two dimensions of the population burden of cancer are examined: *disease frequency* (how often the disease occurs: incidence, prevalence), and *disease severity* (how serious the disease is: mortality, years of potential life lost). Burden was examined overall and by gender and race.

### Disease Frequency Measures: Incidence and Prevalence

Incidence, the yearly number of new cancer cases, represents the burden of cancer diagnosis and initial treatment. For incidence, North Carolina Central Cancer Registry (CCR) summary data for 2005 were examined, both as number of new cases and as rates (cases per 100 000 population, based on North Carolina's 2005 population and age-adjusted to the 2000 US population).<sup>4</sup>

Prevalence, the number of persons alive with cancer, combines incidence with disease survival to represent the ongoing burden of living with cancer (survivorship). For prevalence, the CCR provided person-level incidence and mortality data for 1995 through 2004, the most current years deemed complete and internally consistent. These data were merged with North Carolina population estimates for the same years from the Surveillance Epidemiology and End Results (SEER) state population estimates using 4 expanded races (white, black, American Indian/Alaska Native, Asian/Pacific Islander) and single ages (0–85+).<sup>11</sup> Using SEER\*Stat software,<sup>12</sup> the counting method of prevalence estimation was used based on the first primary cancer in the database.<sup>13</sup> Limited-duration prevalence was estimated for the most extended period possible: 9.5 years.

### Disease Severity Measures: Mortality and Years of Potential Life Lost

Mortality, the yearly number of deaths from cancer, represents the loss of life attributable to cancer. To examine mortality, CCR summary data for year 2006 were examined, both as number of cases and as rates (deaths per 100 000 population, based on North Carolina's 2006 population and age-adjusted to the 2000 US population).

Years of potential life lost (YPLL), the difference in years between actual and expected lifespan, quantifies the number of years of life lost prematurely due to cancer. To determine YPLL, we obtained individual-level mortality records for 2006 from North Carolina vital statistics files and used ICD-10 codes to identify deaths attributable to cancer.<sup>14</sup> Life expectancy estimates for the years 1996–2000 stratified by age, race, and sex were obtained from the North Carolina State Center for Health Statistics.<sup>15</sup> YPLL was calculated for each cancer death by subtracting each individual's actual age at death from his/her age-, race-, and gender-specific expected age at death. YPLL for each cancer type was calculated by summing the YPLL for all individuals who died from each cancer.

### Burden Ranking and Summary Measure

For each of the 4 measures of burden, each cancer site was ranked based on its relative relationship to all other cancers. Incidence and mortality were ranked by the number of new cases and number of deaths, accordingly; prevalence was ranked by the number of people living with each cancer; and YPLL was ranked by the total estimated years of life lost to each cancer. The 10 most burdensome cancers were then scored on a scale of 1 to 10 for each of the 4 measures of burden, with the most burdensome site receiving a score of 10,

descending to the 10th most burdensome site, which received a score of 1. Each cancer site's scores were then summed across the 4 measures to create summary scores for disease frequency (incidence and prevalence scores), disease severity (mortality and YPLL scores), and total burden (all 4 scores summed). Scores were thus used to determine relative burden and are presented by each cancer site. (See Table 4.)

## RESULTS

### Overall Population

North Carolina's overall cancer incidence rate was 492.2 cases per 100 000 persons (492.2/100 000), with 43 335 new cases in 2005. (See Table 1.) An estimated 207 583 persons diagnosed with cancer between 1995 and 2004 were alive with the disease in July 2004. The overall cancer mortality rate was 192.6 deaths per 100 000 persons (192.6/100 000), resulting in 17 267 deaths and an estimated 233 294 YPLL in 2006.

A small number of sites represented a substantial proportion of the cancer burden. (See Table 1.) The top 10 ranked cancer sites accounted for 72%–82% of each measure's total burden. Four cancers—lung/bronchus, female breast, prostate, and colon/rectum—accounted for 55%–60% of incident and prevalent cases and 52%–59% of cancer deaths and YPLL. All but prostate cancer ranked in the top 5 for all 4 measures. Other cancers ranked among the top 5 in any measure included melanoma (incidence, prevalence), pancreas (mortality, YPLL), and leukemia (YPLL).

The cancers of greatest frequency were prostate cancer and female breast cancer—with gender-specific incidence rates at least twice those of any other cancer—and lung/bronchus cancer. Prostate and female breast cancers were also the most prevalent, representing 41.9% of all survivors. The cancer with greatest severity was lung/bronchus cancer, accounting for 31.0% of all cancer deaths and 33.9% of all YPLL—more deaths and YPLL than any of the other 5 cancers combined.

### Males by Race/Ethnicity

In 2005, North Carolina's cancer incidence rate for males of all races was 563.3/100 000 (data not shown), resulting in 21 537 new cases—17 286 white and 4251 non-white. (See Table 2.) An estimated 100 503 men diagnosed with cancer between 1995 and 2004 were alive with the disease in July 2004. In 2006, the overall cancer mortality rate for males was 242.3/100 000, with 9127 deaths and an estimated 112.391 YPLL. Prostate, lung/bronchus, and colon/rectum cancers accounted for 54.5% of incidence, 49.3% of prevalence, 52.8% of mortality, and 54.4% of YPLL.

Patterns of cancer burden for non-white and white males were similar. Prostate, lung/bronchus, and colon/rectal cancers together accounted for half or more of the incidence, prevalence, mortality, and YPLL for each group. Prostate cancer was the most frequently diagnosed cancer for both non-whites and whites; lung/bronchus cancer was the most severe. For both groups, pancreatic cancer was among the top 5 in severity, along with leukemia for white men and liver cancer for minorities. Prostate cancer was the most prevalent cancer among men, accounting for 51.2% of non-white survivors and 36.6% of white survivors.

Disparities in cancer burden existed between the 2 groups. Mortality for non-white males was 1.33 times that of whites (306.7 vs. 231.2/100 000); incidence was 1.08 times greater (596.4 vs. 550.1/100 000). Prostate cancer mortality among non-white males was 2.90 times that of whites; incidence was 1.63 times greater. Non-whites had higher mortality for lung/

bronchus (ratio: 1.16) and colon/rectum (1.47) cancers despite having similar incidence rates (1.00 and 1.05, respectively).

### Females by Race/Ethnicity

In 2005, North Carolina's cancer incidence rate for females was 447.0/100 000, resulting in 21 640 new cases. (See Table 3.) An estimated 107 080 women diagnosed with cancer between 1995 and 2004 were alive with the disease in July 2004. In 2006, the cancer mortality rate for females was 156.2/100 000 resulting in 8140 deaths and an estimated 117 349 YPLL. Breast, lung/bronchus, and colon/rectum cancers accounted for 56% of incidence, 61% of prevalence, 51% of mortality, and 58% of YPLL.

Patterns of cancer burden for non-white and white females were similar. Breast, lung/bronchus, and colon/rectum cancers accounted for half or more of the incidence, prevalence, mortality, and YPLL for each racial group. Breast cancer was the most frequent cancer for both non-whites and whites. Lung/bronchus cancer was the most severe for whites and was tied with breast cancer as the most severe among non-whites. Uterine cancer was among the 5 most frequent cancers in both groups, while melanoma was in the top 5 for whites and cervical and endocrine cancers were for non-whites. Pancreatic and ovarian cancers were among the top 5 in mortality and YPLL for both groups, while minority women also included uterine cancer. Breast cancer was the most prevalent cancer in both race/ethnicity groups, accounting for 44.4% of nonwhite and 44.0% of non-white survivors.

Disparities in cancer burden for females also existed. Mortality for non-white females was 1.10 times that of whites (169.3vs.153.8/100 000) despite incidence that was 0.91 times that of whites (414.7 vs. 453.6/100 000). Lung/bronchus cancer was the most severe for both groups, with breast cancer also ranking first (tied) for non-white women. Lung cancer incidence and mortality rates for white women were both 1.38 times greater than those for non-white women. Breast cancer mortality among non-whites was 1.40 times greater than that of whites, despite incidence that was 0.95 times that of whites. Colon/rectal cancer incidence and mortality rates for non-white women were 1.18 and 1.52 times greater than those of white women. Mortality for pancreatic cancer was 1.71 times greater for non-whites than whites.

### Summary Burden

Overall, 4 cancers—lung/bronchus, female breast, prostate, and colon/rectal—ranked substantially ahead of other cancers in summary cancer burden. (See Table 4.) Among them, lung/bronchus and colon/rectal rank higher in severity than frequency, while female breast and prostate cancers ranked higher in frequency than severity. In rank order, non-Hodgkin's lymphoma, pancreatic cancer, melanoma, leukemia, bladder, and kidney and liver cancers (the last 2 tied for 10th) were the next most burdensome cancers, with all but non-Hodgkin's lymphoma having a polar weighting in their burden—either 100% due to frequency or 100% due to severity.

## DISCUSSION

As cancer continues to evolve from an acute disease of short duration to a chronic disease with multiple phases of longer-term management,<sup>1,6</sup> it is increasingly the case that no single metric adequately captures cancer burden. Accordingly, we used 4 measures—2 for disease frequency (incidence, prevalence) and 2 for disease severity (mortality, YPLL)—to assess cancer burden in North Carolina. A summary measure combining the 4 individual measures emphasizes the relative dominance of 4 cancers—lung/bronchus, female breast, prostate,

and colon/rectum cancers—that together account for the majority of cancer burden (55%–60% of disease frequency; 52%–59% of disease severity).

This analysis added 2 measures—cancer prevalence and years of potential life lost (YPLL)—to the familiar measures of incidence and mortality. With the growing relevance of survivorship, prevalence is an increasingly important measure of cancer burden. Compared to people with no history of cancer, survivors tend to have poorer overall health and increased medical care use for ongoing follow-up and surveillance services.<sup>6,16,17</sup> Knowing the extent of cancer-specific prevalence can help identify needs for ongoing care, tertiary prevention, monitoring, and psychosocial support, as well as targeted prevention and early detection for these individuals and their families and caregivers.

Whereas data from SEER registries are the basis for many prevalence estimates, the high quality of North Carolina's CCR allows the examination of prevalence using actual North Carolina data on cancer incidence and mortality. These data reveal that an estimated 207 583 people diagnosed with cancer between 1995 and 2004 were living with cancer in July 2004, a number which has no doubt continued to grow since then. Breast and prostate cancer survivors were the greatest in number, together accounting for 42% of all survivors. A previous estimate for North Carolina used a different approach and calculated a 5-year limited duration prevalence (1990–1994), but found a similar distribution of survivors for the 4 major cancers.<sup>18</sup> Similar to other limited-duration prevalence estimates, our 9.5-year estimate likely underestimates the number of cancer survivors by excluding long-term survivors of childhood cancers, survivors diagnosed before 1995, and those with cancer who immigrated to North Carolina. New methods of calculating prevalence have recently been developed to correct for these causes of underestimation to yield a more complete estimate of prevalence.<sup>19,20</sup> The North Carolina Comprehensive Cancer Program and the North Carolina CCR have recently initiated an intensive examination using these methods to fully leverage the strengths of our cancer registry and develop a more thorough and detailed understanding of complete prevalence and cancer survivorship in North Carolina.

Years of potential life lost (YPLL) incorporates not only the number of lives lost to cancer but also the number of years of life that were lost. Because lost productivity due to premature death is a major component in estimating the cost of disease, YPLL has been considered a surrogate for an economic measure of disease burden<sup>21</sup> and is important to understand given the changing shape of cancer. In 2000, cancer accounted for an estimated 259 318 years of potential life lost in North Carolina, ranking it first among all causes of death.<sup>22</sup> Using similar methods as Buescher and colleagues, we estimated 233 294 years of potential life lost due to cancer in 2006, a decline of approximately 10% since 2000, likely reflecting the tremendous advances in early detection and treatment.<sup>1,3,6</sup>

We also estimated YPLL by cancer site. Lung/bronchus cancer (5355 deaths; 79 167 YPLL) clearly was North Carolina's most severe cancer—no other 5 cancers combined exceeded its number of deaths or years of potential life lost. Prostate cancer ranked seventh in YPLL due primarily to late median age at diagnosis (age 67.0 years in North Carolina, 2004) and improved survival following treatment.<sup>1,3,6</sup>

While the methodology employed in this analysis represents an extension of that used by Buescher,<sup>22</sup> neither methodology adjusts for comorbidities, which could independently contribute to a shortening of individuals' lives. This would cause this method to slightly overestimate the YPLL due exclusively to the cancer itself. At the same time, the life-table estimates used are race-specific, and while this lends greater precision to the estimates for the whites and African Americans who comprise 95.7% of our state population,<sup>23</sup> it does not include others including our Native American and Asian populations. Regardless, we



believe these methods are accurate and appropriate both for calculating this measure of burden and as a basis for consistent comparison because many comorbidities are sequelae from the cancer or its treatment, and moreover, this methodology uses data on the underlying cause of death (cancer) rather than immediate cause of death (eg, pneumonia) or all-cause mortality for all individuals diagnosed with cancer. The apparent decline in YPLL is good news, but merits further exploration in terms of the changes in this statistic's underlying characteristics (eg, average age at diagnosis, relative distribution of cancer diagnoses, etc.).

Examining these 4 measures yields a multifaceted understanding of cancer burden in North Carolina, although reliable, accurate data by site were lacking for detailed examinations of many individual race/ethnic groups as well as for other measures of burden such as quality adjusted life years and cost of illness. North Carolina's non-white population is primarily (>80%) African American, but the state has one of the nation's fastest growing Hispanic populations, and in the coming decades Hispanics with cancer will contribute more significantly to the cancer burden.<sup>24</sup> Significant differences in non-white/white mortality despite similar incidence suggest the need to examine early detection and treatment patterns by race/ethnicity.<sup>25</sup>

Cancer burden is one basis for identifying priority opportunities for intervention, but it is not the only one. For example, in this analysis cervical cancer ranked low in burden, but effective and relatively inexpensive early detection and treatment options are widely available.<sup>26</sup> Further, the recently introduced human papillomavirus vaccination opens the door to effective primary prevention, although not without controversy.<sup>27-29</sup> Moreover, significant disparities by race/ethnicity remain in cervical cancer burden in North Carolina.<sup>4</sup> Assessing cancer burden is an important first step, but complementary emphases on trends in burden and availability of effective interventions are equally important.

The 4 cancers that account for the majority of North Carolina's cancer burden all have effective, tangible, and actionable points of intervention.<sup>30</sup> Tobacco use is the leading cause of lung cancer and is a cause of other cancers among North Carolina's top 10, as well as cardiovascular disease, the number 2 cause of death in North Carolina.<sup>2,31</sup> Overall smoking rates are nearly identical between white Americans and African Americans, with 23.1% and 23.5% respectively reporting currently smoking "daily" or "some days."<sup>32</sup> Unhealthy diet and lack of physical activity are risk factors for colon cancer, may be related to breast and prostate cancers, and are related to other chronic diseases including heart disease and diabetes. Breast and colon cancer screening have been shown to reduce cancer mortality. Completing prescribed treatment regimens and receiving guideline-concordant care yield higher survival rates.<sup>33</sup> The opportunities for intervention are many.

North Carolina faces challenges in exploring opportunities to reduce burden for these 4 major cancers. In 2005, 22.6% of adults, 20.3% of high school students, and 5.8% of middle school students in North Carolina reported currently smoking cigarettes, 63% of adults reported being overweight or obese, 62% did not engage in recommended levels of physical activity, and 77% ate fewer than the recommended 5 daily servings of fruits and vegetables. Appropriate use of effective cancer screening tests is increasing, although the tests remain greatly underutilized.<sup>34-39</sup>

At the same time, interventions to meet these challenges already exist. Tobacco interventions including higher excise taxes, indoor air policies, restrictions on youth access to tobacco, media campaigns, and cessation programs have been shown to reduce tobacco use among adults and prevent initiation among youth.<sup>40,41</sup> The state has acted to experience some of these benefits, for example, by enacting legislation to prohibit smoking in

government office buildings;<sup>42</sup> however challenges remain, as local governments continue to be prohibited from enacting laws to regulate smoking that are more restrictive than state law.<sup>43</sup> There are environmental and policy interventions to promote physical activity, such as improving the safety of pedestrian environments, developing community walking trails, providing fitness equipment at worksites and community centers, and initiating outreach programs to promote their use.<sup>44</sup> Interventions targeting individuals and medical practices have been shown to increase cancer screening.<sup>45–47</sup> At the same time, treatment guidelines and chemoprevention options continue to emerge as do programs supporting cancer survivors and their families/caregivers.<sup>48–52</sup>

## CONCLUSIONS

Cancer is a multifaceted disease that imposes a substantial burden on North Carolina. As the state continues to develop its Living Cancer Plan,<sup>8</sup> it faces a multitude of needs and opportunities. The 4 measures of cancer burden together provide enhanced guidance for statewide cancer coordination and control efforts, with each measure providing unique insight. No cancer should be ignored, but by focusing efforts on 4 priority cancers, North Carolina can reduce the state's overall cancer burden and continue its leadership role in statewide comprehensive cancer planning.

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**Table 1**

Cancer Burden in North Carolina: Leading Sites for All Races and Sexes, by Measure

Rank	Incidence-2005*			Prevalence-July 1, 2004**		
	Site	Count	Rate	Site	Rate	Persons
1	Breast (Female)	7098	(147.5)	Breast (Female)		47 462
2	Lung/Bronchus	6699	(76.4)	Prostate		39 581
3	Prostate	5780	(147.8)	Colon/Rectum		23 920
4	Colon/Rectum	4264	(48.8)	Lung/Bronchus		13 975
5	Melanoma	1702	(19.4)	Melanoma		12 064
6	Bladder	1686	(19.5)	Bladder		9430
7	NH Lymphoma	1553	(17.8)	NH Lymphoma		7182
8	Kidney	1422	(16.0)	Corpus Uteri		6063
9	Endocrine	1062	(12.1)	Kidney/Renal Pelvis		5741
10	Oral Cavity	1019	(11.4)	Oral Cavity		4207
	Top 10(#)	32 285		Top 10(#)		169 625
	All Cancers (#)	43 335		All Cancers (#)		207 583
	Top 10(%)	74.5%		Top 10(%)		81.7%

  

Site	Mortality-2006*			Years of Potential Life Lost - 2006****		
	Count	Rate	Site	Count	Rate	Years
1	Lung/Bronchus	5355	(59.6)	Lung/Bronchus		79167
2	Colon/Rectum	1497	(16.7)	Breast (Female)		23235
3	Breast (Female)	1238	(23.9)	Colon/Rectum		21 282
4	Pancreas	1012	(11.2)	Pancreas		14402
5	Prostate	902	(27.6)	Leukemia		10350
6	Leukemia	649	(7.4)	NH Lymphoma		8441
7	NH Lymphoma	588	(6.7)	Prostate		7825
8	Liver	448	(4.9)	Brain/Other CNS		7487
9	Ovary	418	(8.0)	Liver		7382
10	Esophagous	401	(4.4)	Ovary		7045
	Top 10(#)	12 508		Top 10(#)		186 615

Mortality -2006*		Years of Potential Life Lost - 2006***		
Site	Count	Rate	Site	Years
All Cancers (#)	17 267		All Cancers (#)	233 294
Top 10(%)	72.4%		Top 10(%)	80.0%

\* Incidence and mortality rates are age-adjusted to the US 2000 Census; Incidence data for breast cancer include in situ cases.

\*\* 9.5-year prevalence estimates are used.

\*\*\* Data are for white and African American populations only.

Cancer sites ranked for each measure as follows: Incidence and mortality by count; prevalence by number of persons alive with a history of cancer; YPLL by total years of life lost. Rates for female breast, ovary, corpus uteri, and prostate are based on the gender-specific population.

**Table 2**

Male Cancer Burden in North Carolina: Leading Sites by Race, By Measure

<b>White</b>				
<b>Rank</b>	<b>Incidence* Site Cases (Rate)</b>	<b>Prevalence** Site Persons</b>	<b>Mortality* Site Deaths (Rate)</b>	<b>YPLL*** Site Years</b>
<b>1</b>	Prostate 4253 (132.0)	Prostate 29 839	Lung/Bronchus 2521 (80.5)	Lung/Bronchus 34 273
<b>2</b>	Lung/Bronchus 3135 (101.1)	Colon/Rectum 9803	Prostate 574 (21.4)	Colorectal 8054
<b>3</b>	Colon/Rectum 1765 (56.9)	Urinary Bladder 6495	Colon/Rectum 585 (18.9)	Pancreas 5502
<b>4</b>	Bladder 1133 (37.7)	Lung/Bronchus 460	Pancreas 404 (12.8)	Prostate 4713
<b>5</b>	Melanoma 920 (29.0)	Melanoma 6,437	Leukemia 320 (10.8)	Leukemia 4586
<b>Top 5 (#)</b>	11 206	59 034	4404	57 128
<b>All Cancers (#)</b>	17 286	81 505	7111	88 113
<b>Top 5 (%)</b>	64.8%	72.4%	61.9%	64.8%
<b>Minority</b>				
<b>Rank</b>	<b>Incidence* Site Cases (Rate)</b>	<b>Prevalence** Site Persons</b>	<b>Mortality* Site Deaths (Rate)</b>	<b>YPLL*** Site Years</b>
<b>1</b>	Prostate 1478 (214.5)	Prostate 9739	Lung/Bronchus 629 (93.1)	Lung/Bronchus 8538
<b>2</b>	Lung/Bronchus 694 (101.0)	Colon/Rectum 2080	Prostate 328 (62.0)	Prostate 2946
<b>3</b>	Colon/Rectum 420 (59.7)	Lung/Bronchus 1353	Colon/Rectum 184 (27.8)	Colorectal 2577
<b>4</b>	Kidney 173 (22.4)	Kidney/Renal Pelvis 679	Pancreas 108 (15.6)	Pancreas 1570
<b>5</b>	Oral Cavity 167 (20.7)	NH Lymphoma 588	Liver 76 (27.8)	Liver 1146
<b>Top 5 (#)</b>	2932	14 439	1325	16 777
<b>All Cancers (#)</b>	4251	18 998	2016	24 278
<b>Top 5(%)</b>	69.0%	76.9%	65.7%	69.1%

\* Incidence and mortality rates are age-adjusted to the US 2000 Census; Incidence data for breast cancer include in situ cases.

\*\* 9.5-year prevalence estimates are used.

\*\*\* Data are for white and African American populations only.

Cancer sites ranked for each measure as follows: Incidence and mortality by count; prevalence by number of persons alive with a history of cancer; YPLL by total years of life lost. Rates for female breast, ovary, corpus uteri, and prostate are based on the gender-specific population.



**Table 3**

Female Cancer Burden in North Carolina: Leading Sites by Race, By Measure

<b>White</b>				
<b>Rank</b>	<b>Incidence* Site Cases (Rate)</b>	<b>Prevalence** Site Persons</b>	<b>Mortality* Site Deaths (Rate)</b>	<b>YPLL*** Site Years</b>
1	Breast 5587 (148.3)	Breast 38 796	Lung/Bronchus 1868 (45.5)	Lung/Bronchus 29,904
2	Lung/Bronchus 2404 (61.0)	Colon/Rectum 9414	Breast 907 (22.1)	Breast 16,057
3	Colon/Rectum 1586 (40.0)	Melanoma 5355	Colon/Rectum 533 (12.5)	Colorectal 7,350
4	Corpus Uteri 799 (20.7)	Lung/Bronchus 5288	Pancreas 354 (8.4)	Ovary 5,562
5	Melanoma 731 (20.5)	Corpus Uteri 5101	Ovary 341 (8.2)	Pancreas 5,054
<b>Top 5(#)</b>	11 107	63 954	4003	63,927
<b>All Cancers (#)</b>	17 269	88 156	6392	90,949
<b>Top 5 (%)</b>	64.3%	72.5%	62.6%	70.3%
<b>Minority</b>				
<b>Rank</b>	<b>Incidence* Site Cases (Rate)</b>	<b>Prevalence** Site Persons</b>	<b>Mortality* Site Deaths (Rate)</b>	<b>YPLL*** Site Years</b>
1	Breast 1482 (141.0)	Breast 8404	Lung/Bronchus 337 (32.9)	Breast 6618
2	Colon/Rectum 471 (47.1)	Colon/Rectum 2623	Breast 331 (30.9)	Lung/Bronchus 5590
3	Lung/Bronchus 438 (44.2)	Corpus Uteri 962	Colon/Rectum 195 (19.0)	Colorectal 3069
4	Corpus Uteri 200 (20.2)	Lung/Bronchus 874	Pancreas 146 (14.4)	Pancreas 2100
5	Endocrine 165 (14.9)	Cervix Uteri 713	Corpus Uteri 81 (8.3)	Ovary 1412
<b>Top 5(#)</b>	2756	13 576	1090	18 788
<b>All Cancers (#)</b>	4253	18 924	1748	26 400
<b>Top 5 (%)</b>	64.8%	71.7%	62.4%	71.2%

\* Incidence and mortality rates are age-adjusted to the US 2000 Census; Incidence data for breast cancer include in situ cases.

\*\* 9.5-year prevalence estimates are used.

\*\*\* Data are for white and African American populations only.

Cancer sites ranked for each measure as follows: Incidence and mortality by count; prevalence by number of persons alive with a history of cancer; YPLL by total years of life lost. Rates for female breast, ovary, corpus uteri, and prostate are based on the gender-specific population.

**Table 4**

Cancer Burden: Summary and Rank, by Site

Site	Frequency Burden Score	Severity Burden Score	Total Burden Score	Overall Burden Rank
Female Breast	20	17	37	1
Lung/Bronchus	16	20	36	2
Colon/Rectum	15	17	32	3
Prostate	17	10	27	4
NH Lymphoma	8	9	17	5
Pancreas	0	14	14	6
Melanoma	12	0	12	7
Leukemia	0	11	11	8
Bladder	10	0	10	9
Kidney	5	0	5	T-10
Liver	0	5	5	T-10
Corpus Uteri	3		3	
Ovary		3	3	
Brain/Other CMS		3	3	
Endocrine	2		2	
Oral Cavity	2		2	
Esophagus		1	1	