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Updating Progress in Cancer Control in Wisconsin

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ABSTRACT

Background: In 1989, experts in cancer prevention, early detection, and treatment met in Madison to set the public health agenda for cancer control. Part of the plan defined target percent change in cancer mortality rates to be met by the year 2000. During the 1990s, public health and health care professionals developed programs and policies to reach these goals. The purpose of this analysis is to evaluate Wisconsin's progress in reducing cancer mortality and success in meeting the year 2000 objectives.

Methods: Wisconsin mortality data for 1984-1986 and 1999-2001 were obtained from the Centers for Disease Control and Prevention, CDC Wonder. Percent change was calculated between the 2 time periods and compared to the 2000 target percent change for all-site cancer and site specific cancer mortality.

Results: All-site cancer mortality decreased by 7% from 1984-1986 to 1999-2001 with a greater than 16% decline in age groups <65 years. Mortality from breast, colorectal, and cervical cancer each decreased by at least 25%. Lung cancer and malignant melanoma mortality rates increased by 5% and 17%, respectively. Among additionally analyzed cancers, mortality decreased in prostate, stomach, and childhood cancers and increased in liver cancer and non-Hodgkin's lymphoma.

Conclusion: The results of the state's cancer control effort are mixed. The year 2000 objectives were met for breast and colorectal cancer. Progress was made in reducing mortality from cervical cancer and from all sites combined, but the other year 2000 objectives were not met. Mortality rates increased for lung cancer and malignant melanoma during the 15-year period.

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INTRODUCTION

In 1989, experts in cancer prevention, early detection, and treatment met in Madison to set the public health agenda for cancer control as part of *Healthier People in Wisconsin 2000* (HPW 2000). This group established the year 2000 objectives for Wisconsin for reducing cancer mortality rates and improving cancer prevention, early detection, and treatment.[1] During the 1990s, public health and health care professionals in Wisconsin developed programs and implemented policies to reach these goals and reduce the burden from cancer.

Despite public health efforts to increase prevention and early detection of cancer in Wisconsin, cancer remains a significant cause of mortality statewide. In 2000, cancer caused 23% of all Wisconsin deaths, accounting for more than 10,500 lost lives.[2] At the same time, research has demonstrated that progress is being made in cancer control.[3,4] Five years ago, Quenan and Remington examined trends in cancer mortality in Wisconsin and assessed mid-course progress in reaching the state's goals.[4] The purpose of this analysis is to update Wisconsin's progress and assess its successes and shortcomings in reaching the year 2000 objectives. In addition, the analysis is expanded to include prostate, liver, and stomach cancers, childhood cancers, and non-Hodgkin's lymphoma, cancers whose recent trends merit their surveillance. These additional cancers were chosen for observation because they account for a significant number of lives saved or lost in the United States in 2000 compared to 1990.[3] Examining mortality trends is a useful surrogate for evaluating the success of primary prevention and screening and early detection initiatives in Wisconsin under the assumption that decreasing mortality follows successful public health efforts.

METHODS

The methods used in the analysis replicate those used by Quenan and Remington and were designed for consistent reporting with the data and mortality objectives in HPW 2000. Wisconsin population data and mortality data for 1984-1986 and 1999-2001 were obtained from the Centers for Disease Control and Prevention, CDC Wonder[2] by sex (male and female), race (3 groups: white [Caucasian and Hispanic], black and other [American Indian or Alaska Native, and Asian or Pacific Islander]), and age (8 categories: <35, 35-44, 45-54, 55-64, 65-74, 75-84, and >85 years). The International Classification of Diseases (ICD) version 9 and version 10 codes, respectively, were used: all sites (140-208; C00-C97), lung (162; C33-C34), breast (174-175; C50), cervical (180; C53), colorectal (153-154; C18-C21), malignant melanoma (172; C43), prostate (185; C61), liver (155; C22), stomach (151; C16), non-Hodgkin's lymphoma (200, 202; C82-C85). Comparability between ICD-9 and ICD-10 was confirmed.[5] For childhood cancers, data were obtained for all sites for persons <20 years.

Three-year periods of Wisconsin population and mortality data (1984-1986, 1999-2001) were used in the analysis. Mortality rates were calculated per 100,000 and age-adjusted to the standard 1970 United States population. Breast, cervical, and prostate cancer were calculated as sex-specific rates but were age-adjusted to the standard 1970 United States population.

Percent change between the 1984-1986 and the 1999-2001 rates was calculated for the Wisconsin population and calculated by sex, race, and age group for each cancer site. The calculation was done by subtracting the 1984-1986 rate from the 1999-2001 rate, then dividing by the 1984-1986 rate.

The trend graphs in Figure 1 represent the entire population (except in the case of breast, cervical, and prostate cancer, which are sex specific). Where applicable, the year 2000 objective for Wisconsin was graphed as a reference.

RESULTS

Between 1984-1986 and 1999-2001, the overall cancer mortality rate for all cancer sites in the Wisconsin population declined by 7%, in contrast to the objective set in HPW 2000 of a 25% decline (Table 1). At least a 15% decline was observed in all age groups <65 years old (Table 2).

Examining the rates by sex and race revealed comparable declines in every category. As a result, the 1999-2001 mortality rate for males (187 deaths per 100,000) remained higher than females (128 deaths per 100,000),

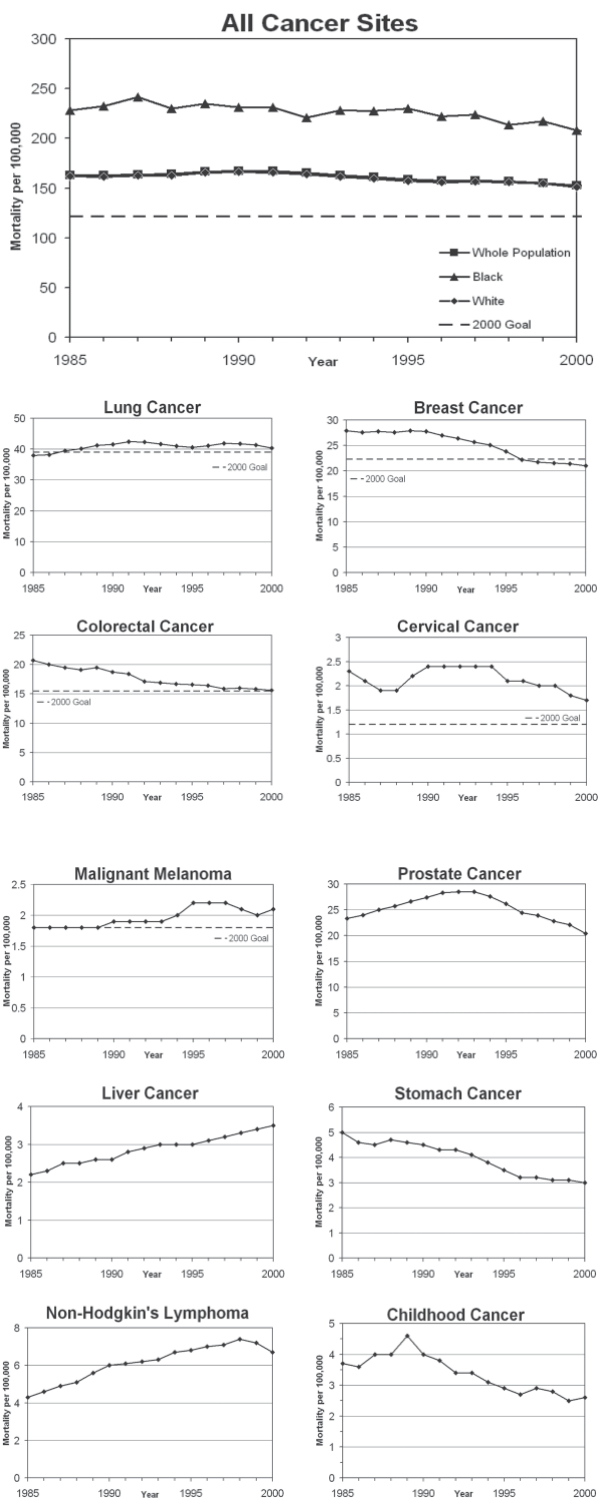

Figure 1. Annual age-adjusted mortality rate among various cancer sites, 1985 to 2000. Each data point represents 3 years of data to stabilize fluctuating rates. Rates are age-adjusted to the standard 1970 United States population. When applicable, the year 2000 objective is graphed as a reference.

Table 1. Comparison of Cancer Mortality Rates* in Wisconsin by Cancer Site: 1984-1986 vs. 1999-2001

Cancer Site	Baseline Rate 1984-1986	Observed Rate 1999-2001	Goal Rate† 2000	Observed % Change	Goal % Change	Goal Met?
All Sites	163	153	122	-7	-25	No
Lung	38	40	39	5	2.6	No
Breast	28	21	22	-25	-20	Yes
Cervical	2.3	1.7	1.2	-26	-50	No
Colorectal	21	16	16	-25	-25	Yes
Malignant Melanoma	1.8	2.1	1.8	17	0	No
Prostate	23	20	N/A	-12	N/A	N/A
Liver	2.2	3.4	N/A	55	N/A	N/A
Stomach	5.0	3.0	N/A	-40	N/A	N/A
Non-Hodgkin's Lymphoma	4.3	6.7	N/A	56	N/A	N/A
Childhood	3.7	2.6	N/A	-30	N/A	N/A

*Rates per 100,000 population
Age-adjusted to the 1970 Standard Million Population.
† Based on goal percent change from 1984-1986 rate as set by *Healthier People in Wisconsin* in 1990.

while the mortality rate for the black population (208 deaths per 100,000) remained higher than both the white population (151 deaths per 100,000) and the other race population (118 deaths per 100,000) (Table 2).

The year 2000 objectives were reached for cancers of the breast and colon. Breast cancer mortality declined from 28 to 21 deaths per 100,000, exceeding the 20% decrease goal set by HPW 2000. For colorectal cancer, Wisconsin exactly realized the year 2000 objective with a 25% decline in mortality, from 21 to 16 deaths per 100,000 (Table 1).

Progress was made, but the goal was not reached, for cervical cancer. Although the rate declined by 26% (Table 1), HPW 2000 aimed for a 50% decline. However, the breakdown by age and race uncovers a >50% decline among black women and women >75 years (data not shown).

For some cancers, no progress was seen by 2000. HPW 2000 forecasted an overall 20% increase in lung cancer mortality without intervention; the stated objective was to limit this increase to 2.5%. Although lung cancer mortality dropped by 11% in men, it increased by 45% in women, resulting in a 5% increase for the entire population (data not shown). Similarly, the year 2000 objective for malignant melanoma was to maintain the 1984-1986 mortality rate of 1.8 deaths per 100,000. However, the mortality rate for malignant melanoma rose to 2.1 deaths per 100,000, an increase of 17% (Table 1).

The trends were mixed for the cancers that did not have year 2000 objectives. Prostate, childhood, and stomach cancer mortality rates declined by 12%, 30%, and 40%, respectively, from 1985 to 2000. On the other hand, mortality rates for liver cancer and non-Hodgkin's lymphoma increased by 55% and 56%, respectively, in the same time period (Table 1).

Figure 1 shows the variety of trends in site-specific cancer mortality that contribute to the all-site cancer mortality trend.

DISCUSSION

The results of the state's cancer control effort are mixed. During the 15-year period, 1985-2000, mortality rates declined for breast, cervical, and colorectal cancers. Wisconsin met the year 2000 objective for breast and colorectal cancer, translating into a significant number of lives saved. The decline in cervical cancer, though it represents progress, was not enough to meet the year 2000 objective. Mortality rates increased for malignant melanoma and lung cancer. Among the additionally analyzed cancers, mortality rates declined significantly for stomach and childhood cancers, declined slightly for prostate cancer, and increased for liver cancer and non-Hodgkin's lymphoma during the 15-year period (1985-2000).

Overall, Wisconsin's 7% decline in all-site cancer mortality seems disappointing in comparison to the goal of a 25% decline. However, based on the national mortality reduction goal for the year 2000 of 3%, Wisconsin's progress is respectable. For all-site, lung, breast, and colorectal cancers, Wisconsin's goals were more ambitious than the national goals reflecting the state's commitment to reducing the burden of cancer through the allocation of resources to achieve these goals. Wisconsin met the national goal for lung cancer (to limit the increase to 9%) and far exceeded national standards in reducing breast and colorectal cancer mor-

tality (10% reduction for both cancers). National cancer mortality reduction goals were set by *Healthy People 2000* using 1987 as the baseline year.[6]

Examining the conditions of primary prevention and screening and early detection that surround each cancer site can provide clues to what is creating Wisconsin's mortality trends. In addition, the implementation steps for meeting the HPW 2000 objectives focused on primary prevention and screening and early detection meriting emphasis on those pieces of cancer control in this discussion. Though advancing treatments and changing incidence influence mortality trends as well, they will not be thoroughly considered here.

The 7% decline in all-site cancer mortality primarily reflects trends in lung cancer mortality because lung cancer accounts for a quarter of all cancer deaths. Wisconsin continues to experience increasing lung cancer mortality, a trend that is unlikely to change given the current trends in smoking prevalence. The Behavior Risk Factor Surveillance System reports 35% of young adults in Wisconsin were smoking in 2002 compared to 25% in 1995.[7] Smoking prevalence has increased similarly among high school students.[8]

Although sex-specific change in mortality between 1984-1986 and 1999-2001 appears alarmingly disparate (women: 45% increase; men: 11% decrease), tobacco control and cessation programs need not necessarily target women more aggressively. Because of the 20-30 year lag between tobacco use and lung cancer development, the currently increasing mortality among women is likely the result of the increased prevalence of tobacco use among women in the 1970s and 1980s. In Wisconsin, since at least 1990, smoking prevalence among men and women has been approximately equal.[6] Thus, tobacco control and cessation efforts would be most effective if targeted equally to men and women in order to reduce mortality in both groups in the future.

The impact of today's efforts to reduce lung cancer mortality will be seen in the future. New screening and early detection techniques such as low-dose helical computed tomography scans and detection of biomarkers in the sputum are being tested and refined, but until they prove reliable, Wisconsin must focus on tobacco control and cessation programs. Fortunately, Wisconsin is becoming increasingly dedicated to this cause. Organizations such as Smoke Free Wisconsin and the University of Wisconsin Center for Tobacco Research and Intervention are working to forward Wisconsin's progress on cancer control in research, community outreach, and policy reform. In addition, Wisconsin's Comprehensive Cancer Control plan targets tobacco control as 1 of its 3 main prevention measures.[9]

Table 2. Comparison of All-Site Cancer Mortality Rates* in Wisconsin by Age, Gender, and Race: 1984-1986 vs. 1999-2001

	Baseline Rate 1984-1986	Observed Rate 1999-2001	% Change
Age			
<35	6.8	5.0	-26
35-44	42	34	-19
45-54	155	114	-27
55-64	405	344	-15
65-74	818	802	-1.9
75-84	1252	1290	3.0
85+	1676	1850	10
Gender†			
Male	204	187	-8
Female	135	128	-5
Race†			
White	162	151	-7
Black	229	208	-9
Other‡	132	118	-10

* Rates per 100,000 population
† Age-adjusted to 1970 Standard Million Population
‡ Includes Am. Indian, Alaska Native, Asian, Pacific Islander

Substantial financial resources have been allocated to breast cancer programs in Wisconsin since the late 1980s. These resources have been used to improve mammography utilization by supporting programs that increase access to mammography facilities in rural areas and increase outreach efforts that promote screening.[10] The percent of Wisconsin women age >40 having had a mammogram within the previous year has increased from 61% to 70% between 1990 and 2000, which parallels increasing breast cancer in situ diagnosis, from 8% to 15%, in the same period.[7,11] Women in Wisconsin are living longer after breast cancer diagnosis and dying from other causes as evidenced by the steadily decreasing breast cancer mortality rates.

The 25% decrease in the colorectal cancer mortality rate shares a similar story. Like breast cancer, colorectal cancer is treatable when caught before its physical onset and multiple, reliable screening methods exist for that purpose. The percent of people having had a colorectal exam within 5 years has increased by approximately 25% from 1993 to 2000. But as of 2001, <50% of Wisconsin residents over age 50 were being screened in compliance with the American Cancer Society's screening recommendations.[7] A survey of Wisconsin primary care physicians suggests lack of familiarity/unclear guidelines and beliefs about low patient compliance as

2 main obstacles to further increasing screening compliance.[12] Colorectal cancer does not currently have the legislative support for screening programs that breast cancer has in Wisconsin, an additional barrier to further increasing compliance.[13]

The decline in cervical cancer mortality, 26%, fell short of the 50% decline targeted by HPW 2000. Part of the decline in mortality may be attributable to the Wisconsin Well Women Program (WWWP).[14] Established in 1993, WWWP offers free or low cost cervical cancer screening to women without health insurance and financial means. Between 1994 and 1998 WWWP screened almost 10,000 women for cervical cancer.[15] Women of Native American, Alaska Native, Asian, or Pacific Islander descent may be a population to target in future screening programs. Among these women, the mortality rate increased by 60% from the 1984-1986 rate to the 1999-2001 rate with a mortality rate of 4.4 deaths per 100,000, more than twice as high as the white population (1.6 deaths per 100,000). In addition, only 77% had received cervical cancer screening within 3 years in 2000 while 87% of women in the white population had been screened.[7] However, caution should be used in interpreting these data because of small numbers.

The second leading cause of cancer deaths in men, prostate cancer, also saw a decline in mortality in the period examined. However, the decline, which began in 1990 after a rise in the 80s, is more difficult to interpret. The introduction of prostate-specific antigen (PSA) screening in 1986 may have led to an artificial rise in mortality due to death misclassification following an artificial rise in incidence shortly after the test was introduced.[16] Alternatively, declines may be the result of treatment advances or behavioral changes[17] and are likely an effect of multiple factors. Computer modeling done at the National Cancer Institute suggests PSA screening alone is not responsible for the decline seen in prostate cancer mortality.[18] Despite a lack of clear evidence that PSA screening decreases prostate cancer mortality, the American Cancer Society and Wisconsin's Comprehensive Cancer Control plan recommend annual PSA screening for men over age 50.[9,19]

The overall increase in malignant melanoma mortality is likely due to an increase of more than 26% among persons over age 65 and men. The success of health campaigns to educate the public about prevention strategies and early detection may be reflected in the 60% reduction in melanoma mortality in the population <35 years. These persons potentially became aware of the risks of high UV exposure earlier in life. Assuming future generations continue to protect themselves from excessive sun exposure, the malignant melanoma mortality rate should begin to decline as it has in the <35 years age group.

Wisconsin does not currently have any prevention and screening policies for liver, stomach, and childhood cancers, and non-Hodgkin's lymphoma. Fortunately, stomach cancer and childhood cancer mortality rates are steadily declining, decreasing by 40% and 30%, respectively, without active intervention. In contrast, liver cancer and non-Hodgkin's lymphoma mortality rates show an alarming increase from 1985 to 2000, of 55% and 56%, respectively. For both diseases, hypotheses for this increase center around nationally increasing prevalence of viral infections and toxic chemical exposure.[3]

The increase of 56% in non-Hodgkin's lymphoma mortality may be an artifact of incomplete case ascertainment. In 1993, the cancer reporting system mandated that non-Hodgkin's lymphoma cases treated in clinics and on an outpatient basis be recorded, adding to the number of places for non-Hodgkin's lymphoma surveillance.[20] As a result of incomplete reporting in the 1980s and early 1990s, the number of cases before 1993 was artificially low, making it appear that non-Hodgkin's lymphoma mortality rapidly increased when the reporting became more accurate. However, the extent to which this change in reporting impacts the mortality rate has not been studied in detail by the Wisconsin Cancer Registry.[20]

The analysis undertaken in this report reveals that Wisconsin is making progress in cancer control but has a long way to go. For continued progress in reducing the overall cancer mortality rate, Wisconsin must focus on site-specific cancers targeting intervention to the appropriate age, sex, and race groups. Continued research into risk factors associated with cancer may provide useful information for designing intervention and screening programs. In addition, targeting behavioral changes such as decreased tobacco use, increased fruit and vegetable intake, increased exercise and activity, and increased compliance with screening recommendations will play a pivotal role in decreasing the burden of cancer in Wisconsin. The difficulty in further reducing overall cancer mortality is a function of the complexities of educating the population about prevention, supporting behavioral changes, making screening options accessible, interpreting and reacting to site-specific progress, and funding cancer control initiatives. With Wisconsin's detailed cancer control plan for 2010, deaths due to cancer should continue to decline and more progress can be made in the less treatable cancers.

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