Racial Disparities and the Impact of Failing to Achieve the *Healthy People 2010* Cancer Mortality Objective, 2000-2010

Introduction

Nearly a decade ago, the CDC's *Healthy People 2010* (*HP2010*) provided a national framework for health promotion by establishing national objectives to reduce the burden of disease. Eliminating health disparities and increasing quality of life were two main objectives set by *HP2010*. Reducing the burden of cancer through preventive and curative pathways was one of the major challenges to the public health community. Many advances in clinical and translational research and community outreach have contributed to reducing the burden of disease attributed to cancer; however, there remain significant disparities in cancer incidence and mortality rates among minority populations in the United States. Cancer health disparities arise from a complex set of social, biological, and environmental factors. Ongoing monitoring of the potential magnitude and impact of these disparities is important for setting national public health priorities.

In 2000, *HP2010* set a goal to reduce cancer mortality to 159.9 deaths per 100,000 by 2010. Deviation of the observed trend in cancer mortality from the path needed to achieve the *HP2010* goal is one indicator of the impact of failing to meet the national cancer objective. For the purposes of this study, this deviation will be referred to as excess mortality. The extent to which the ratio of excess to observed deaths differs among racial groups is one way to describe cancer health disparities.

The purpose of this study is to describe geographic and racial disparities in cancer mortality in the United States over ten years spanning the period between the establishment of the *HP2010* objective for overall cancer rates and the revision of the plan for 2020. This study focuses on national progress meeting the goals outlined by *HP2010* and explores the impact of racial cancer disparities between African Americans and whites.

Methods

Cancer deaths and population information were gathered from the compressed mortality database for each state for all cancer sites over the years 2000 to 2006, the most recent year available. Searches for cancer mortality data included "malignant neoplasms" covered by ICD-10 codes C00-97. Cancer mortality rates for each state were adjusted to the age structure of the 2000 US Census. For each state, the annual improvement needed to achieve the *HP2010* objective was calculated by dividing the difference between the states' 2000 cancer mortality rate and the *HP2010* goal by 10. For 2000 through 2006, excess mortality can be calculated from the difference between the goal trajectory and the observed mortality rates. From 2007 to 2010, mortality rates were estimated by extrapolating the linear trend observed from 2000-2006. The deviation between the observed number of deaths and the number of deaths projected by following the trajectory to achieve the *HP2010* goal provides the number of excess deaths. Cancer health disparities are estimated by comparing the ratio of projected deaths over the period under the observed trend to the *HP2010* trend among African Americans and whites.

Preliminary Results
In the United States, cancer mortality rates declined from 199.6 per 100,000 to 174.2 per 100,000 between 2000 and 2010. By failing to follow the annual trajectory to reduce cancer mortality rates to the *HP2010* goal of 159.9 per 100,000, the United States experienced 179,036 excess deaths over the decade, representing 3.3% of all cancer deaths.

Among whites, cancer mortality rates declined from 197.2 per 100,000 to 173.8 per 100,000 between 2000 and 2010. If whites had made annual progress to achieve the *HP2010* goal, 154,004 fewer people would have died from cancer over the decade (3.3% of all cancer deaths among whites over the decade).

Among African Americans, cancer mortality rates declined from 248.5 per 100,000 to 208.7 per 100,000 between 2000 and 2010. If African Americans had made annual progress to achieve the HP2010 goal, 66,659 fewer people would have died from cancer over the decade (12.0% of all cancer deaths among African Americans over the decade).

The full study will present excess mortality by state and race to show geographic distribution of inequity in the burden of cancer.

Discussion
Age-adjusted cancer mortality rates have decreased between 2000 and 2006 and are projected to continue declining toward the goals set in *HP2010*. However, most states are not projected to meet the goal set by *HP2010*. Most of the recent reduction in cancer mortality has been due to improved prevention, early detection, and treatment of a select group of cancers: lung, prostate, and colorectal cancer among men and breast, cervical, and colorectal cancer among women. Despite progress reducing cancer mortality rates, there are considerable geographic disparities among American states and racial disparities in cancer burden within states.

Factors known to contribute to racial disparities in cancer incidence and mortality vary by disease site but generally include differences in exposure to risk factors as well as access to screening, diagnosis, and treatment. Socioeconomic factors (such as poverty, inadequate health education, and lack of health insurance) and their interaction with known risk factors (such as tobacco use, physical inactivity, and obesity) have been shown in some studies to be more important in explaining racial disparities in cancer than many biological differences. Some recent studies have shown genetic and tumor morphology associations with survival and prognosis disparities among racial groups. Other factors that have been shown to influence racial health disparities include quality of care, exposure to environmental risk factors, and discrimination. African Americans have historically experienced higher exposure to several factors known to contribute to cancer disparities than whites, including higher rates of adult tobacco use and obesity, and lower screening rates, lower quality of healthcare, and less insurance coverage.

In the past decade, there has been increasing discussion of strategies to reduce cancer health disparities. National reports have outlined interventions focused on modifiable

risk factors for cancer, such as smoking, physical inactivity, and obesity, the expanded use of recommended screening tests among vulnerable populations, and expanded access to clinical trials. In 2004 the Trans-Health and Human Services Cancer Health Disparities Progress Review Group stressed the need for community engagement in design of healthcare delivery systems, a culturally competent healthcare work force, more participatory research conducted with communities facing high cancer disparities, and expanded access to health care. *Healthy People 2010* and many state cancer control plans outline opportunities to reduce disparities across the cancer spectrum, including prevention, screening and detection, treatment, palliative care, and improved data collection.

Conclusion

The findings of this study indicate that disparities in cancer incidence and mortality between African Americans and whites are large and have persisted, if not worsened, over the past decade. Elimination of these chronic disparities will require further research into a multitude of contributing factors, as well as into effective intervention strategies. Any solution will require a careful balance of resources and appropriate priorities to target these inequities and engagement of the populations and communities affected. To help inform the pubic health community charged with reducing racial and ethnic disparities in cancer disease burden, findings in this study demonstrate the temporal persistence of African Americans' disproportionate cancer burden.

Table 1: Observed cancer mortality trends, cancer mortality trends necessary to achieve HP2010 cancer mortality goal, deaths projected by age, and deaths resulting from age-specific trends that would meet HP2010 goal, United States, 2000-2010.

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Observed age-adjusted cancer mortality rate	199.6	196.0	193.5	190.1	185.8	183.8	180.7	178.8	177.3	175.7	174.2
Age-adjusted mortality rate following HP2010 trajectory	199.6	195.7	191.7	187.7	183.7	179.8	175.8	171.8	167.8	163.9	159.9
Observed deaths (2000-2006) and projected deaths following linear trend (2007-2010)											
< 1 year	92	66	74	75	74	75	76	75	75	74	73
1-4 years	420	420	402	392	399	377	377	373	370	367	363
5-9 years	489	493	537	516	526	485	459	454	450	446	442
10-14 years	525	515	535	560	493	515	448	443	439	436	432
15-19 years	745	732	723	690	731	731	675	668	662	656	651
20-24 years	968	972	1,007	961	978	986	969	959	951	942	934
25-34 years	3,916	3,994	3,872	3,741	3,633	3,601	3,656	3,618	3,587	3,555	3,524
35-44 years	16,520	16,569	16,085	15,509	14,723	14,566	13,917	13,771	13,652	13,534	13,415
45-54 years	48,034	49,562	49,637	49,843	49,520	50,405	50,334	49,807	49,377	48,947	48,518
55-64 years	89,005	90,223	93,391	95,692	96,956	99,240	101,454	100,392	99,526	98,659	97,793
65-74 years	150,131	147,018	144,757	141,248	139,417	138,446	137,554	136,114	134,939	133,765	132,590
75-84 years	165,099	165,445	167,062	167,617	166,085	166,421	164,889	163,163	161,755	160,347	158,939
85+ years	77,136	77,751	79,182	80,046	80,345	83,455	85,072	84,181	83,455	82,728	82,002
All Ages	553,080	553,760	557,264	556,890	553,880	559,303	559,880	554,019	549,238	544,457	539,675
Projected deaths following the trajectory necessary to achieve the HP2010 cancer mortality goal of 159.9 per 100,000											
< 1 year		66	73	74	73	73	74	72	71	69	67
1-4 years		419	398	387	395	369	367	358	350	342	334
5-9 years		492	532	510	520	474	446	436	426	416	406
10-14 years		514	530	553	488	504	436	426	416	406	396
15-19 years		731	716	681	723	715	657	642	627	612	597
20-24 years		970	998	949	967	964	943	921	900	879	857
25-34 years		3,986	3,836	3,695	3,593	3,521	3,556	3,476	3,395	3,315	3,235
35-44 years		16,538	15,936	15,317	14,559	14,244	13,537	13,231	12,925	12,619	12,313
45-54 years		49,468	49,177	49,226	48,968	49,291	48,959	47,853	46,746	45,640	44,534
55-64 years		90,052	92,526	94,508	95,876	97,047	98,683	96,453	94,223	91,993	89,763
65-74 years		146,739	143,416	139,501	137,864	135,386	133,797	130,773	127,750	124,726	121,703
75-84 years		165,131	165,514	165,544	164,234	162,743	160,385	156,761	153,136	149,512	145,888
85+ years		77,603	78,448	79,056	79,450	81,611	82,748	80,878	79,008	77,138	75,269
All Ages		552,709	552,100	550,001	547,709	546,942	544,586	532,280	519,974	507,668	495,361

Table 2: Projected deaths following observed cancer mortality trends, projected deaths necessary to achieve HP2010 cancer mortality goal, and proportion of mortality estimated to result from not meeting the goal, by race, 2001-2010.

	US	African Americans	Whites
Total projected deaths following observed cancer mortality trend	5,528,366	622,246	4,774,190
Total projected deaths following trend necessary to achieve HP2010 goal	5,349,330	555,587	4,620,185
Difference	179,036	66,659	154,004
Proportion of excess mortality	3.3%	12.0%	3.3%