

Progress in Reducing Mortality Among Wisconsin Residents, 1980-2000: Rates Decline, but Black-White Disparities Increase

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ABSTRACT

Purpose: To assess progress towards 2 overarching public health goals—improvement in length of life and reducing health disparities.

Methods: Age specific mortality rates in Wisconsin from 1980 to 2000 were obtained from the US Centers for Disease Control and Prevention WONDER database. Rates for each age group were gathered for the entire Wisconsin population and for black and white subgroups. Trends in mortality rates were plotted, change in mortality rates was estimated, and the number of “lives saved” annually from 1980-1984 to 1996-2000 was calculated. In addition, black vs white rate ratios were calculated at both the beginning and the end of the time period to determine trends in black-white mortality disparities.

Results: Mortality is decreasing in Wisconsin in every age group. The largest relative improvements in mortality rates occurred among infants <1 year (-30%), children 1-14 years (-27%), and adults 45-64 years (-23%). Comparatively little progress was seen among adults 25-44 years (-5%) and those 85 years and older (-0.5%). Black/white disparities increased in every age group. During 1996-2000, approximately 5000 fewer deaths occurred each year than expected based on mortality rates from 1980-1984.

Conclusion: Despite progress towards increasing length of life, progress towards eliminating disparities was not seen over the 1980 to 2000 time period.

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INTRODUCTION

The US *Healthy People 2000* called for reductions in mortality rates for infants to adults 45-64 years of age, and for reductions in health disparities.¹ The current Wisconsin state health plan calls for the protection and promotion of the health of all and elimination of health disparities by 2010.² These goals correspond to the national health plan, *Healthy People 2010*, which establishes improvement in the quality and length of life and elimination of health disparities as the plan's overarching goals.³ Research focusing on the nation as a whole has shown that although overall mortality rates are decreasing in many states and improvements may be seen for both blacks and whites, the health of blacks has not progressed as fast as whites in recent decades.^{4,5} However, the most recently published life tables have shown that life expectancy for blacks increased slightly more from 1999 to 2000 than did life expectancy for whites for both males and females.⁶

Multiple measures exist to assess population health. One such measure is age-specific mortality rates. While mortality rate analyses are limited in scope and do not offer direct insight into changes in the quality of life or deaths due to specific causes of disease, they do permit measurement of improvements in the length of life and progress toward elimination of disparities in mortality. Many factors may influence mortality rates in the population, including access to health care, health related-behaviors, socioeconomic factors, and the physical environment. Thus, monitoring trends in mortality measures the combined effects of changes in these multiple determinants of health and highlights the role of the health care system, the public health system, and policy decisions in improving health outcomes.

In this issue of *WMJ*, researchers from the University of Wisconsin Medical School examine trends in mortality by age group in a series of research papers. Monitoring of mortality rates by race and age allows for evaluation of progress towards the goals set forth by the

state health plan and can aid in focusing future public health efforts. Understanding how these individual groups impact the overall mortality of the population provides insight into appropriate resource allocation.

METHODS

Wisconsin mortality statistics from 1980 to 2000 were obtained from the WONDER mortality database maintained by the US Centers for Disease Control and Prevention (CDC).⁷ All-cause annual mortality rates were obtained for 8 age groups: <1 year, 1-14 years, 15-24 years, 25-44 years, 45-64 years, 65-74 years, 75-84 years, and >85 years. With the exception of the youngest and oldest age groups, age-group-specific rates were age-adjusted within age-groups (to the US 2000 age distribution within the corresponding age group).

Trends in Mortality

To examine trends in mortality rates (per 100,000) by age from 1980 to 2000, we compared the 5-year moving average annual mortality rates for each age group in Wisconsin. Five-year moving rates, calculated by averaging mortality rates for every 5 years of data, smooths year-to-year variability in rates. The average is then plotted at the midpoint year (e.g. annual mortality rates for 1980, 1981, 1982, 1983, and 1984 are averaged and plotted at 1982).

To monitor progress towards reducing mortality rates for each age group from 1980-1984 to 1996-2000, the number of expected deaths annually between 1996-2000, lives saved annually between 1996-2000, and percent change in mortality rates over this period were calculated. Average annual expected deaths were determined by applying the 1980-1984 average annual mortality rates (mrate82) to the average annual population for the time period 1996-2000. The difference between the number of expected deaths and actual deaths is the average number of lives saved (or lost) annually, which can be attributed to the change in the mortality rate from 1980-1984 to 1996-2000. The percent change in mortality rates from 1980-1984 and 1996-2000 is calculated as $((\text{mrate98} - \text{mrate82})/\text{mrate82}) * 100$.

In addition to comparing overall mortality rates between age groups, mortality rates for whites and blacks were compared within each age group. Other races were not included in this analysis since the WONDER database does not include races other than black and white. Percent change in mortality rate over the period and lives saved annually were calculated by race within each age group. The black to white rate ratio for mortality within each age group was calculated for both 1980-1984 (T1) and 1996-2000 (T2). In order to monitor progress

Table 1. Average Annual Mortality Rate and Average Annual Lives Saved in Wisconsin by Age from 1980-2000

Age	Mortality Rate 1980-1984*	Mortality Rate 1996-2000*	Percent Change**	Lives Saved (Lost)
<1 year	993	659	-30%	202
1-14 years	32	20	-27%	93
15-24 years	88	74	-17%	113
25-44 years	130	125	-5%	99
45-64 years	731	550	-23%	1880
65-74 years	2718	2278	-13%	1291
75-84 years	6308	5439	-11%	1672
>84 years	15,458	15,633	-0.5%	61
Total Lives Saved				5411

* Mortality rate is the average annual rate per 100,000.

** Percent change in average annual mortality rates from 1980-1984 and 1996-2000.

towards national and state goals set for 2010, rate ratio improvement or decline from T1 to T2 was indicated.

Finally, to observe trends in mortality by race and age from 1980-1984 to 1996-2000, 5-year moving annual mortality rates were plotted as the percentage of the 1980-1984 rate.

RESULTS

In Wisconsin, mortality rates for all age groups declined from 1980-1984 to 1996-2000 (Table 1). Declines were significant for infants <1 year (-30%), children 1-14 years (-27%), and adults 45-64 years (-23%). Moderate declines occurred among those 15-24 years (-17%), 25-44 years (-5%), 65-74 years (-13%), and 75-84 years (-11%). Very little reduction in mortality was observed among those 85 years and older (-0.5%).

Despite overall improvements in mortality rates in every age group, differences emerge in mortality reduction when examined by race. In every age group, the ratio of black to white mortality rates increased from 1980-1984 to 1996-2000 (Table 2). The amount of change in rate ratio varies by age group.

Among infants, children 1-14 years, and adults 45-64 years, both blacks and whites experienced declines in mortality rates, though whites experienced greater declines in all groups. Among infants, whites and blacks achieved 36% and 9% reductions in mortality, respectively. Patterns in mortality rate declines among black (8%) and white (31%) children aged 1-14 years were similar to those seen in adults 45-64 years (9% for blacks and 24% for whites).

Among those 15-25 years, blacks experienced a 69% increase in mortality rates, while whites experienced a 24% decrease in mortality; rate ratio increased from .95 in 1980-1984 to 2.12 in 1996-2000. Black adults 25-44 years

Table 2. Average Annual Mortality Rate, Rate Ratio, and Percent Change in Mortality Rate in Wisconsin by Age and Race from 1980-2000

	Mortality Rate 1980-1984*	Mortality Rate 1996-2000*	% Change in MR	Lives Saved (Lost)	Rate Ratio T1**	Rate Ratio T2**	Direction of Change in RR***
<1 year					2.11	3.01	↑
Black	1944	1761	-9%	11			
White	921	585	-36%	196			
1-14 years					1.60	2.05	↑
Black	48	43	-8%	4			
White	30	21	-31%	87			
15-24 years					0.95	2.12	↑
Black	83	140	+69%	(30)			
White	87	66	-24%	140			
25-44 years					2.05	2.57	↑
Black	254	290	+14%	(23)			
White	124	113	-9%	174			
45-64 years					1.72	.06	↑
Black	1228	1112	-9%	65			
White	716	539	-24%	1,857			
65-74 years					1.28	1.52	↑
Black	3456	3531	+2%	(7)			
White	2706	2322	-14%	1,317			
75-84 years					1.16	1.26	↑
Black	7295	7090	-3%	1			
White	6303	5605	-11%	1,677			
85+ years					0.04	0.08	↑
Black	12,730	15,008	+18%	(27)			
White	15,501	15,411	-1%	77			

* Mortality rate (MR) is the average annual mortality rate per 100,000.

** Rate ratio (RR) T1 is the average annual rate ratio during 1980-1984. Rate ratio T2 is the average annual rate ratio during 1996-2000.

*** ↑ indicates an increase in RR from T1 to T2.

also experienced an increase in mortality (21%), while white adults experienced a decrease (10%).

Black adults aged 65-74 years and 75-84 years experienced little change in mortality rates during this period (+2% and -3%, respectively). In contrast, black adults over age 85 experienced an 18% increase in mortality. White adults in each of these age groups experienced declines, with -14%, -10%, and -0.5% changes.

Figures 1 and 2 depict the trends in mortality rates for each age group by race as a percentage of the baseline rate (1980-1984). Generally among whites (Figure 1), fairly steady declines were seen for all age groups. However, trends among blacks (Figure 2) were very different. For example, among blacks age 15-24, by 1993, mortality rates were more than double the 1980-1984 rate. Mortality rates among this group have declined steadily since, but had not yet reached the baseline rate by 2000.

Mortality rates among black children ages 1-14 years increased steadily until 1989, then steadily decreased until 1994, where they remained stable, but may again be

on the rise. Among other age groups of the black population, trends are less variable over the 15-year period.

A total of 5411 fewer deaths occurred annually from 1996-2000 than expected based on the 1980-1984 mortality rates (Table 2). Lives were "saved" in every age group of Wisconsin's population, most of which were attributable to older adult age groups. Ages 45-64, 65-74, and 75-84 years, had 1880, 1291, and 1672 fewer deaths annually than expected. However, as indicated by the increasing disparities in mortality rates by race, lives saved differed between blacks and whites. In fact, among blacks ages 15-24 and 25-44 years, more deaths occurred annually than predicted from 1980-1984 mortality rates (30 and 23 deaths respectively). Blacks 65-74 years experienced 6 more deaths annually than expected and those 85 years and older experienced 27 more deaths annually than expected. Lives were saved among blacks in other age groups. However, blacks consistently experienced fewer lives saved than did whites in these age groups.

DISCUSSION

Wisconsin made significant progress in reducing mortality rates in nearly every age group of the population from 1980 to 2000. From 1980-1984 to 1996-2000, infants, children, and adults aged 45-64 experienced the greatest declines in mortality rates, while those aged 25-44, 75-74, and 75-84 experienced moderate declines. Declines in mortality among those 85 years and older were minimal during this period.

If trends in mortality from 1980 to 2000 continue, Wisconsin will meet some, but not all of the goals set by the national and state health plans. *Healthy People 2010* establishes increasing quality and years of healthy life as its first goals.³ Though the methods used here cannot evaluate changes in quality of life, the results suggest that length of life is increasing, as indicated by lives saved in every age group in Wisconsin.

However, when analyzed by race, Wisconsin made less progress than it appeared initially. Both *US Healthy People 2010*, and *Healthiest Wisconsin 2010* establish eliminating disparities as their second goal.^{2,3} Despite improvements in overall mortality rates, differences in mortality rates between blacks and whites not only persist, they are more disparate in every age group of the population. In some age groups, mortality rates are simply decreasing faster among whites than among blacks. However, among many age groups, black mortality rates increased from 1980-1984 and 1996-2000, while white mortality rates decreased during this period. Increased mortality rates were not experienced among whites in any age group.

CONCLUSION

The results of this analysis suggest that rather than setting priorities for the entire population, age-specific goals or objectives may be more appropriate, such as those set in *Healthy People: The Surgeon General's Report on Health Promotion and Disease Prevention*.⁸ Despite progress in most age groups, further declines in mortality are possible, if the proven prevention and control strategies are put into practice, especially among minorities and persons of lower socioeconomic status.

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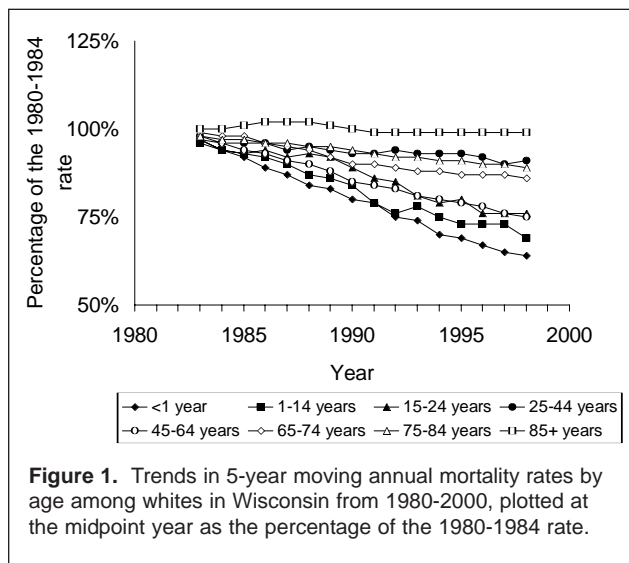


Figure 1. Trends in 5-year moving annual mortality rates by age among whites in Wisconsin from 1980-2000, plotted at the midpoint year as the percentage of the 1980-1984 rate.

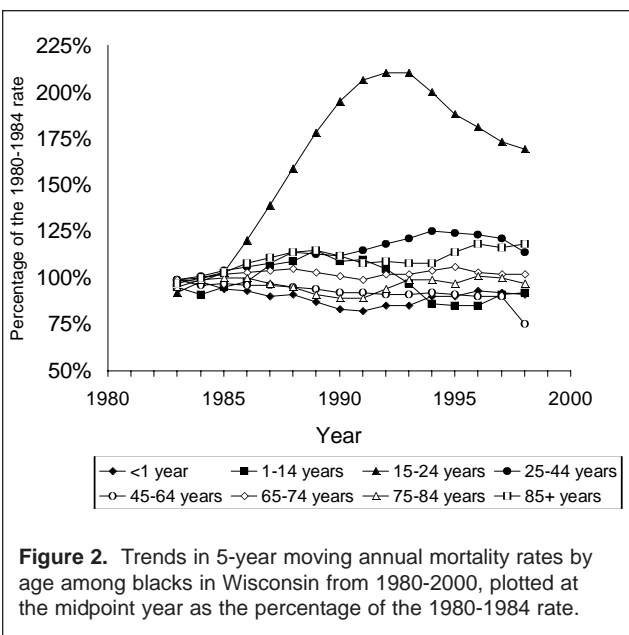
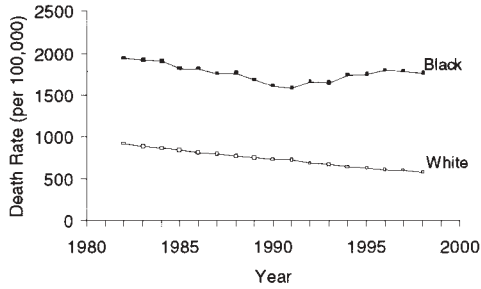


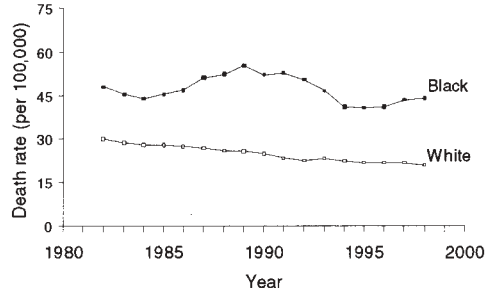
Figure 2. Trends in 5-year moving annual mortality rates by age among blacks in Wisconsin from 1980-2000, plotted at the midpoint year as the percentage of the 1980-1984 rate.

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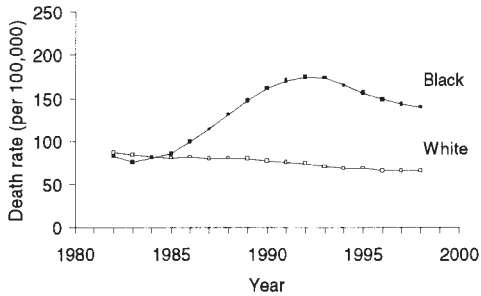
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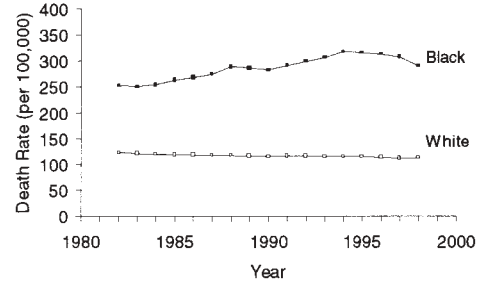
1-14 years



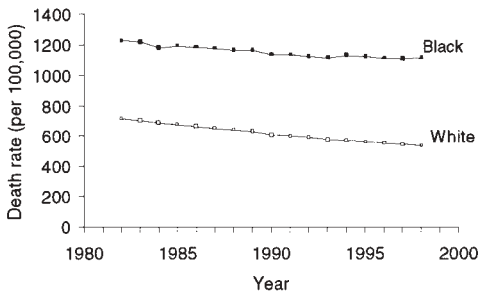
15-24 years



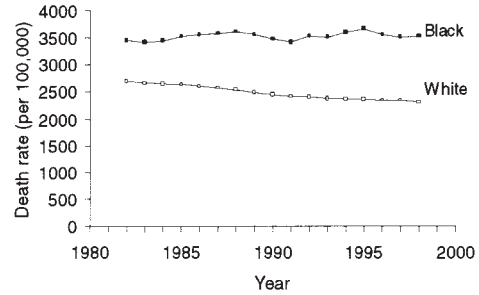
25-44 years



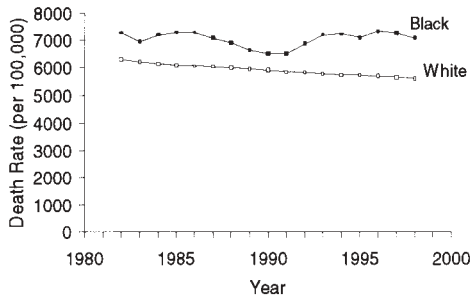
45-64 years



65-74 years



75-84 years



85+ years

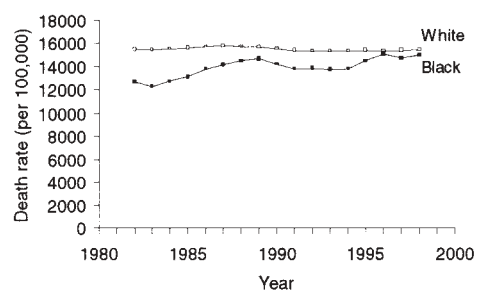


Figure 3. Trends in 5-year moving annual mortality rates by age group in Wisconsin from 1980-2000, plotted at the midpoint year as the percentage of the 1980-1984 rate.



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