

Health Priorities in Wisconsin: A Case for Tracking Childhood Mortality

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ABSTRACT

Objective: To assess trends in mortality among children ages 1-14 in Wisconsin over the last 2 decades and prompt policymakers to include annual monitoring of childhood mortality in the state Health Plan for 2010.

Methods: Data for all-cause and cause-specific (intentional-, unintentional-, non-injury related) mortality for 1980-1999 were obtained from WONDER, the Centers for Disease Control and Prevention's mortality database, and stratified by black/white race and gender. Trends were assessed using the 5-year moving average method and projected to 2010 to estimate future mortality.

Results: Childhood mortality rates in Wisconsin decreased 26% from 1980-1999 to 23.7/100,000 population, representing 87 lives saved annually. Throughout this period, Wisconsin's mortality rate was lower than the national average; however, disparities have increased. Boys and blacks experienced the highest death rates and the greatest increases in rates from homicide and suicide. If trends continue, Wisconsin is predicted to have the same overall rate as the United States in 2010.

Conclusions: Wisconsin has experienced slower rates of decline in childhood mortality than the United States over the past 20 years, due, in part, to increasing disparities by race and gender. To halt this phenomenon, policymakers should include annual monitoring of childhood mortality rates in the state health plan and support appropriate interventions for children at risk.

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INTRODUCTION

Children ages 1-14 comprise nearly 20% of Wisconsin's population, and premature mortality in this group is a substantial source of potential years of life lost in the population. Wisconsin's leaders have identified the health of children as a special priority in the state's new health plan, *Healthiest Wisconsin 2010*, one that "transcends Wisconsin's 11 health priorities."¹ One of these priorities, injuries (unintentional and intentional self-harm and assault),² comprises 3 of the top 6 causes of death for children in this age group.

Mortality among children is an important health outcome, since it provides an overall measure of the health of this population. In the United States over the last 35 years, mortality among children (ages 1-14 years old) decreased at rates greater than those for any other age group, except infants (<1 year old).² In fact, by 1995, the United States had achieved its 2000 goal for mortality in children (28 per 100,000 population).³ As a result, the US Department of Health and Human Services has established aggressive objectives for reducing mortality rates in this life stage by 2010, according to age subgroups: 1-4 year olds (18.6 per 100,000), 5-9 year olds (12.3), and 10-14 year olds (16.8).⁴ Eliminating disparities in health is a primary goal⁴ and an important priority for children since black-white disparities in mortality in the United States still exist.^{2,5} However, unlike the United States, Wisconsin's health plan for 2010 does not yet include objectives aimed at monitoring mortality rates among children over time.

The purpose of this study was to provide policymakers in Wisconsin with evidence to support inclusion of annual monitoring objectives for childhood mortality in the state health plan. We evaluate trends in childhood mortality in Wisconsin from 1980 to 1999, and use historical trends to predict the mortality rate in 2010. Additionally, we explore reasons for these trends, including disparities between boys and girls and black and white races, and offer suggestions of ways to address these key issues.

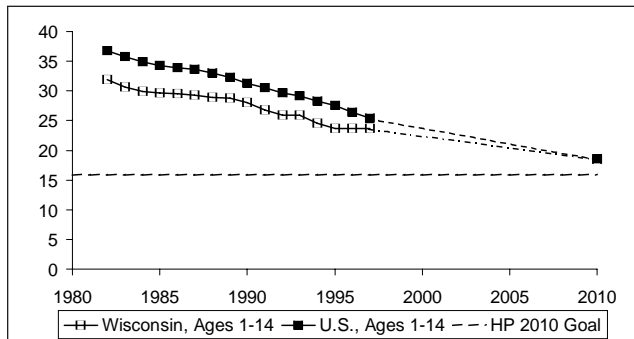


Figure 1. Trends in all-cause mortality (deaths/100,000) for children ages 1-14 in Wisconsin and the US, 1980-1999, with projected rates in 2010.

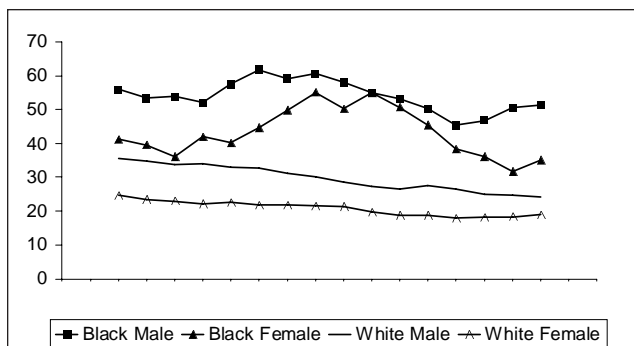


Figure 2. Disparities in progress for all-cause mortality (deaths/100,000) for children ages 1-14 in Wisconsin, 1980-1999, by race and sex.

METHODS

Mortality data for children (ages 1-14) for the years 1980-1999 were obtained from WONDER, the Center for Disease Control and Prevention's (CDC) database for mortality statistics.⁶ All-cause mortality rates by year were obtained for Wisconsin and the United States, and rates for Wisconsin were further stratified by black/white race, sex, and cause of death.

To minimize year-to-year variability in mortality rates and improve visualization of trends, the 5-year moving average method was used to plot rates over time. For this method, an average mortality rate is calculated for every 5 years of data, and the average rate for that period (mrate) is plotted at the midpoint year. For example, mortality rates for 1980, 1981, 1982, 1983, and 1984 are added, and the sum divided by 5. This average rate (mrate'82) is plotted at the year 1982 (Figures 1 and 2). Similarly, rates for 1981-1985 are averaged and plotted at 1983. Crude death rates were used, since age-adjustment did not alter rates or provide additional information.

Trends in all-cause mortality (Figure 1) for the United States and Wisconsin were also projected to 2010. Predicted mortality for each year after 1999 was calcu-

lated as a constant annual percent change from year to year. This constant annual percent change was calculated by estimating the annual percent change in mortality rate between 1980 and 1999 (i.e., between the 1982 and 1997 mrates). A weighted summary objective for the United States for the overall age group of 1-14 (15.8 per 100,000) was calculated as the average of the current subgroup-specific objectives (1-4, 5-9, 10-14 year olds), weighted to the 2000 age-specific US population.

The percent change in all-cause (Table 1) and cause-specific (Table 2) mortality between the 1980-1984 and 1995-1999 time periods for Wisconsin was calculated for black/white race subgroups and for boys and girls (Table 1) as $(\text{mrate}'82 - \text{mrate}'97) / (\text{mrate}'82) \times 100$. Estimated average annual numbers of lives saved were calculated as the difference between the "expected" annual number of deaths for this period $[(\text{mrate}'82) \times (\text{average annual population}'95-'99)]$ and the observed annual number of deaths in the 1995-1999 time period, rounded up to the nearest integer. Race categories include only whites and blacks since CDC WONDER does not provide further detail on other race groups, such as Native Americans, and Asian and Pacific Islanders, or ethnicities, such as Hispanic. Deaths for these groups are summarized as one rate for "Other." However, for these analyses, data for the "Other" group is not shown, because this group had only a small number of deaths during the study period, making year-to-year comparisons not meaningful.

Cause-specific mortality categories for ages 1-14 were chosen to illustrate trends and disparities in major causes of death that may be considered preventable (unintentional and intentional injury) and non-injury related. Causes were classified according to the Ninth Revision of the International Classification of Diseases (ICD-9) system for 1980-1998, and according to the Tenth Revision (ICD-10) system for 1999. Comparable ICD-9 and ICD-10 codes (adjusted using published comparability ratios from the National Vital Statistics System)⁷ were queried so that 1999 data could be combined with 1980-1998 data. The following categories were queried: Unintentional Injury (e.g. motor vehicle-related, drowning, poisoning; ICD-9: 800-869, 880-929; ICD-10: V01-X59, Y85-Y86), Non-injury (e.g. malignant neoplasms, congenital malformations, and diseases of the heart; ICD-9: 001-799, ICD-10: A00-U99), and Intentional Injury (homicide and suicide; ICD-9: 950-969; ICD-10: X60-Y09, Y87-Y87.1).

RESULTS

Between 1980 and 1999, all-cause mortality rates for children ages 1-14 in Wisconsin declined from 31.9 to

Table 1. All-Cause Mortality Rates, Average Annual Numbers of Deaths, and Lives Saved Annually for Children Ages 1-14 in Wisconsin, 1980-1999

Group	1980-1984		1995-1999		Percent Change*	Lives Saved [Lost] Annually, #
	Annual Rate	Average #	Annual Rate	Average #		
All Groups						
Wisconsin	31.9	321	23.7	246	-26%	87**
US	36.8		25.4		-31%	
Gender						
Boys	37.2	195	26.6	145	-28%	54
Girls	26.3	127	20.6	101	-22%	33
Race						
White	30.3	280	21.6	198	-29%	80
Boys	35.6	171	24.2	116	-32%	52
Girls	24.7	109	18.9	82	-23%	29
Black	48.6	32	43.4	36	-11%	7
Boys	56.0	19	51.5	22	-8%	3
Girls	41.1	14	35.1	13	-15%	5

*Percent change in mortality rate between 1980-1984 and 1995-1999.

**This represents total lives saved annually from all causes, including Unintentional-, Intentional-, and Non-injury related causes (shown in Table 2), as well as unidentified causes and complications of medical/surgical care.

Table 2. Cause-Specific Mortality Rates and Lives Saved Annually for Children Ages 1-14 in Wisconsin, 1980-1984 to 1995-1999, by Race and Sex

Cause	1980-1984		1995-1999		Percent Change*	Lives Saved [Lost] Annually, #
	Annual Rate	Average #	Annual Rate	Average #		
Unintentional Injury						
Gender						
Boys	17.3	88	11.7	62	-32%	29
Girls	9.3	45	7.8	40	-16%	7
Race						
White	12.8	117	9.3	85	-27%	32
Black	16.8	11	13.9	12	-18%	4
Total	13.2	131	9.7	101	-26%	36
Non-Injury Related						
Gender						
Boys	18.1	92	12.1	64	-33%	32
Girls	15.8	76	10.9	55	-31%	25
Race						
White	16.2	148	10.6	97	-35%	51
Black	26.9	17	20.1	17	-25%	6
Total	17.0	168	11.5	119	-32%	57
Intentional Injury						
Gender						
Boys	1.4	7	2.5	13	79%	(6)
Girls	1.0	5	1.7	9	70%	(4)
Race						
White	1.0	10	1.5	13	50%	(5)
Black	3.2	2	8.5	7	166%	(5)
Total	1.2	12	2.1	22	75%	(10)

*Percent change in mortality rate between 1980-1984 and 1995-1999.

23.7 per 100,000 children (Figure 1 and Table 1), which represents a 26% decline in mortality and an estimated 87 lives saved annually (Table 1). Over this same time period, Wisconsin's mortality rate was less than the national average in every year (Figure 1). However, Wisconsin's rate did not decline as fast as the national average over this time period (31% decline). As a result, if historical trends continue, Wisconsin is predicted to be at, rather than below, the national average for childhood mortality in 2010, failing to achieve the national goal set forth by *Healthy People 2010* (Figure 1).

Variations in all-cause mortality rates over time by race and gender in Wisconsin are shown in Figure 2 and Table 1. Over time, boys (both black and white) consistently experienced higher mortality rates than girls; and black children (Figure 2) experienced higher rates than white children. Additionally, trends in mortality rate reduction were not the same for all groups (Figure 2). Rates for black boys and girls increased between 1985 and 1988 before declining, and have increased again since 1994; however, rates for white children have steadily declined over the years. The greatest numbers of lives saved occurred among boys and the white population, with 54 and 80 lives, respectively, saved annually.

Disparities by specific cause of death are also evident (Table 2). By gender, annual rates, percent decline in rates, and overall numbers of lives saved were greater for boys than girls, except for intentional injury, where boys experienced a greater increase in mortality rate (79% vs 70%) and more lives lost. By race, black children had higher overall mortality rates, smaller declines in mortality rates, and fewer lives saved for unintentional and non-injury related causes of death, while also experiencing the greatest increase in mortality from intentional injury (166% vs. 50%).

DISCUSSION

This study provides substantial evidence to support the inclusion of age-specific mortality objectives for children in Wisconsin's health plan for 2010. Results from the analysis of childhood mortality rates in Wisconsin demonstrate that although mortality among children has declined over the last 20 years in Wisconsin, increasing disparities by race and gender threaten future reductions. Historically, childhood mortality rates in Wisconsin have been lower than the national average, but we predict that rates will be no better than the national average in 2010 if trends continue. Highly disparate mortality rates between black and white children in particular appear to play an important role in slowing Wisconsin's overall progress—periods of increasing

mortality in black children parallel periods of unchanging mortality rates in the overall Wisconsin population. These trends suggest a need for actively addressing disparities, which requires setting specific objectives to monitor progress in childhood mortality.

The results of Table 2 demonstrate the importance of monitoring cause-specific mortality, a marker for the success of targeted efforts to reduce mortality from common causes. Unintentional injury is the major cause of death among children, so that overall trends in mortality are driven by trends for this cause. Not surprisingly, since the majority of Wisconsin's population is white, the most lives saved over time from reductions in unintentional injury-related deaths were for white children. The second leading cause of death among children—non-injury related causes—showed more similar declining trends across genders and races, but small differences between girls and boys and whites and blacks contribute to the problem of growing disparities. Finally, and in contrast to the trends noted for the previous 2 causes, mortality from intentional injuries increased for all race and gender groups over the last 2 decades, slowing overall childhood mortality reduction at the state level. Increasing racial disparities should be of particular concern to policymakers in Wisconsin, since the population of black children has increased by almost a third over the last 20 years, while the population of white children has remained stable (data not shown). As the black population continues to grow in Wisconsin, disparities will contribute greater numbers of minority deaths and result in higher overall state mortality rates.

Policymakers should consider several steps towards reducing mortality among children in Wisconsin. First, a specific objective for the mortality rate for children in Wisconsin should be set. This has already been done on a national level in the health plan for the nation, *Healthy People 2010*. Wisconsin could consider adopting the same overall objective as the nation—to reduce childhood mortality to 15.8 deaths per 100,000 children by 2010—since it represents a similar reduction from where the state and the nation are predicted to be if trends continue to 2010. A critical companion objective will be to eliminate disparities in mortality by race and gender, an important goal identified at the national level.

The second important step for policymakers will be to monitor mortality rates on an annual basis, as a means to measure progress towards Wisconsin's health objectives. Active monitoring will provide evidence for the relative effectiveness of new interventions and pro-

vide guidance for implementation. The state should also explore means for collecting data on Native American, Hispanic, and Asian populations. The most important limitation of this study is that data from CDC WONDER were only available for black, white, and "other" races. Greater diversity exists in our state, and more detailed monitoring is necessary to examine characteristics relevant to other minority populations. Monitoring mortality may elucidate reasons for increasing disparities.

Third, policymakers should support interventions that attempt to eliminate preventable causes of mortality in children. Interventions should be guided by past successes and failures in achieving reductions in mortality for each of the top causes of death. Unintentional injuries represent the single largest cause of preventable mortality among children in Wisconsin, and reductions in mortality have occurred over the last 20 years. Since 1980, nearly half of all lives saved annually have resulted from progress in reducing death from unintentional injuries. The largest decline has been for motor vehicle-related deaths (the leading cause of unintentional injury in children),⁸⁻¹⁰ temporally related to policy changes (such as seat belt laws, speed limits, and licensing),¹¹ technical advances (such as air bags, changes in child safety seats, and improved trauma care), and changing societal norms concerning behaviors such as wearing seat belts and having children ride in the back seat.¹² Unfortunately, benefits from preventive interventions in some cases are experienced disproportionately by whites.^{13,14}

The alarming rate of increase in intentional injury causes of death requires cultural and gender-specific interventions. Intentional causes of death (such as homicide and suicide) among children in Wisconsin have increased more than 2-fold over the last 2 decades, an occurrence also seen at the national level.⁵ Increases exist for all race and gender groups, but are highest in black and male populations. Overall, homicide rates are lower in Wisconsin than in the United States,¹⁸ due to much lower rates among the larger white population. Empirical studies of white/black differentials and geographic variation in homicide rates provide evidence that homicides are more likely to occur in areas with unfavorable socioeconomic conditions, and that areas with high levels of family stability are more able to realize social norms (e.g., a safe, nonviolent environment) and maintain effective social controls.^{19,20} Prevention efforts require combined efforts by law enforcement, social services, and health care workers to identify problems of domestic violence and child abuse, mental health, and drug abuse.

Finally, policymakers should support interventions aimed at reducing mortality from non-injury-related causes of death, which include most other causes besides intentional and unintentional injuries. Progress over the last 2 decades has primarily resulted from improvements in treatment of disease. For example, for malignant neoplasms, the leading cause of non-injury-related death in children, preventive measures contribute minimally toward childhood cancer control. The major successes of therapeutic medicine have resulted in favorable mortality trends directly related to treatment innovations and their rapid and wide-spread application across population groups, apparently unrelated to socioeconomic group.^{15,16} Our results for malignant neoplasms (data not shown) support these findings; that is, few disparities exist among race and gender subgroups. However, disparities that persist for the entire group of non-injury causes may result from differential access to basic medical care for children from minority and lower socioeconomic groups for other disease states.¹⁷

The results of this study provide evidence for policymakers that reducing childhood mortality is an important part of improving the health of children in our state. Future progress is being threatened by increasing disparities between boys and girls and among races, and by increasing rates of mortality from intentional causes. To address these concerns, policymakers should set specific childhood mortality objectives and include annual monitoring of childhood mortality rates in the state's health plan, *Healthiest Wisconsin 2010*. By committing to change and tracking progress towards specific objectives, we will ensure the future of Wisconsin by ensuring the health of our children.

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