

Short Report

All Cancers Age-Adjusted Mortality Rate Surpasses Diseases of the Heart

Age-Adjusted Mortality Rate among Kentucky Women

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In 1900, the three leading causes of death in the United States were infectious diseases: Pneumonia/Influenza, Tuberculosis, and Gastritis/Enteritis/Colitis.¹ By the mid-20th century, three chronic diseases (Diseases of the Heart, Malignant Neoplasms and Cerebrovascular Disease) were firmly entrenched as the leading causes of death in the U.S. Late in the 20th century, seven of every ten U.S. resident deaths each year were the result of a chronic disease. At that time, the two most common causes of death, Diseases of the Heart and Malignant Neoplasms (All Cancers) accounted for more than 50% of the total deaths annually in the United States. The number of annual deaths attributed to Diseases of the Heart, and the corresponding mortality rate, were both much higher than the corresponding death count/rate for All Cancers.² However, over the past decade, the gap between Diseases of the Heart and All Cancers annual death counts and mortality rates has been closing. Declining Diseases of the Heart deaths and mortality rates- attributed to several factors including: improved access to emergency care for acute events, an enhanced portfolio of medications that reduce risk for heart disease deaths, evolving diagnostic and treatment technologies/strategies, and increased public health interventions- have made monitoring mortality data trends of great public health interest.

Methods

Death data were collected in the Commonwealth of Kentucky using the certificate of death form, and

analyzed for the years 2005-2009. Medical certifiers (physicians, coroners, chiropractors, or dentists, by law in Kentucky) were responsible for entering immediate and underlying causes of death. All causes of death are either handwritten or typed by the medical certifier. No electronic death reporting system was available in the state prior to July 2010.

The analysis that we report on was limited to immediate cause of death data. No analyses were conducted on underlying or secondary causes of death. Immediate cause of death is defined as "final disease or condition resulting in death" and underlying cause defined as "disease or injury that initiated events resulting in death." Due to the exchange of vital records data among states, the analysis included death data from all Kentucky residents, regardless of place of death. Rank order for causes of death was determined by total count of occurrences for a given year.

National Center for Health Statistics (NCHS) mortality coders assigned death codes to each cause of death using the International Statistical Classification of Diseases and Related Health Problems, *Tenth Revision*.³ NCHS provides consistent and standard categories for 113 selected causes of death. The NCHS leading causes of death are taken from the list of 113, including the 10 most common which are presented in this report: Diseases of the Heart (I00-I09, I11, I13, I20-I51); Malignant Neoplasms/All Cancers (C00-C97); Cerebrovascular Diseases (I60-I69); Chronic Lower Respiratory Diseases (J40-J47); Alz-

heimer's Disease (G30); Accidents (Unintentional Injuries) (V01-X59, Y85-Y86); Diabetes Mellitus (E10-E14); Influenza and Pneumonia (J10-J18); Nephritis, Nephrotic Syndrome, Nephrosis (N00-N07, N17-N19, N25-N27); and Septicemia (A40-A41).

Annual state population estimates used to calculate crude mortality rates (CMR) were provided by the Kentucky State Data Center, University of Louisville. The total death counts, CMR, and the Age-Adjusted Mortality Rates (AAR) are important indicators of disease burden within the population. The AAR is an important indicator since it controls for the effect of age in the population, allowing for comparisons over time regarding the influence of factors other than age on death rates. All age-adjusted mortality rates were standardized to the 2000 U.S. population.

Findings

During the five-year period, 2005 to 2009, Diseases of the Heart caused the greatest number of deaths (4,614) among Kentucky female residents, as compared to the 4,515 deaths attributed to All Cancers. However, for the first time the All Cancers age-adjusted mortality rate eclipsed the corresponding Diseases of the Heart rate among female Kentuckians. (**Figure 1**)

Table 1 presents annual death counts, Crude Mortality Rates (CMR), and Age-Adjusted Mortality Rates (AAR) for both All Cancers and Diseases of the Heart, for Kentucky female residents who died during

the 2005-2009 time period. During this five year period, the annual death count, CMR and the AAR for Diseases of the Heart decreased each year. Counts of annual deaths attributed to All Cancers fluctuated over the five-year period, as did the CMR and AAR, but compared to the counts and rates for Diseases of the Heart, remained much more stable. The CMR gap between Diseases of the Heart and All Cancers narrowed considerably during this period. In 2005, the CMR for Diseases of the Heart was 25% higher than the All Cancers CMR; by 2009 the CMR for Diseases of the Heart was only 2% higher.

For female residents of Kentucky, **Table 2** presents annual death counts and crude mortality rates for the ten leading causes of death for the most recent five-year period for which data are available. Comparing the first year (2005) and last year (2009) of the 5-year period, three (Diseases of the Heart, Cerebrovascular Diseases, and Influenza/Pneumonia) of the ten leading causes of death exhibited a decrease in the number of annual deaths.

Only Diseases of the Heart deaths decreased in each year of the five-year period. From the 2005 to 2009, Diseases of the Heart exhibited the largest decrease in the number (79 or 14.6%) of deaths. In contrast, Chronic Lower Respiratory Diseases and All Cancers showed the largest increase in the number of deaths; 205 (15.7%) and 195 (4.5%) respectively. Septicemia showed the largest percentage increase (25.2% and 78 deaths).

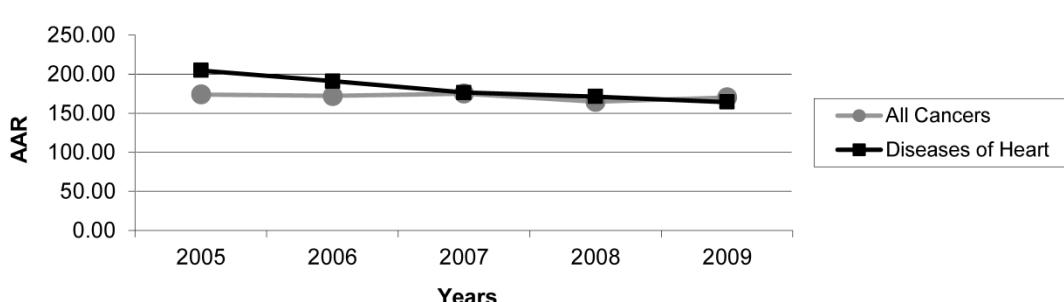


Figure 1: Age-Adjusted Mortality Rates (AAR) For Kentucky Females, 2005-2009

Table 1: Death Counts and Mortality Rates, Kentucky Female Residents, 2005-2009

	2005			2006			2007			2008			2009		
	Count	CMR [†]	AAR [‡]												
All Cancers	4,320	203.15	174.08	4,365	203.47	172.26	4,522	209.26	175.14	4,335	198.75	164.68	4,515	205.53	170.21
Diseases of Heart	5,404	254.13	204.87	5,144	239.78	190.95	4,842	224.07	176.44	4,837	221.77	171.37	4,614	210.04	164.24

† CMR; Crude Mortality Rate per 100,000

‡ AAR; Age-Adjusted Mortality Rate, per 100,000 of the 2000 US Standard Population

Table 2: Annual Leading Causes of Death of Female Kentuckians, 2005-2009

	2005		2006		2007		2008		2009	
	Count	CMR [†]								
DISEASES OF HEART	5,404	254.13	5,144	239.78	4,842	224.07	4,837	221.77	4,614	210.04
ALL CANCERS	4,320	203.15	4,365	203.47	4,522	209.26	4,335	198.75	4,515	205.53
CEREBROVASCULAR DISEASES	1,313	61.75	1,301	60.64	1,326	61.36	1,231	56.44	1,211	55.13
CHRONIC LOWER RESPIRATORY DISEASES	1,303	61.28	1,236	57.61	1,328	61.45	1,488	68.22	1,508	68.65
ALZHEIMER'S DISEASE	836	39.31	823	38.36	858	39.70	986	45.21	948	43.16
ACCIDENTS (UNINTENTIONAL INJURIES)	751	35.32	831	38.74	781	36.14	833	38.19	803	36.55
DIABETES MELLITUS	650	30.57	594	27.69	521	24.11	609	27.92	668	30.41
INFLUENZA AND PNEUMONIA	584	27.46	492	22.93	497	23.00	504	23.11	543	24.72
NEPHRITIS, NEPHROTIC SYNDROME AND NEPHROSIS	472	22.20	482	22.47	520	24.06	516	23.66	478	21.76
SEPTICEMIA	309	14.53	354	16.50	366	16.94	379	17.38	387	17.62

† CMR; Crude Mortality Rate, per 100,000

Discussion

The finding that the All Cancers age-adjusted mortality rate surpassed the corresponding rate for Diseases of the Heart among female Kentucky residents in 2009 is both significant and historic. A companion analysis for males in Kentucky, for the same time period, did not demonstrate a similar "crossing-over" of age-adjusted mortality rate trend lines for the two leading causes of death among Kentucky males, although the gap narrowed considerably. In addition, an analysis of All Cancers and the broader classification of Cardiovascular Diseases mortality among Kentucky females over the same time period, showed that the AAR gap narrowed considerably as well. In 2005, the Cardiovascular Diseases AAR among females in Kentucky was 57% higher than the All Cancers AAR; by 2009 it was only 31% higher.

The trend line (Figure 1) shows that the crossover occurred because the Diseases of the Heart AAR declined during the 5-year period, while the All Cancers AAR remained relatively stable. In addition to the factors previously cited as contributing to the declining mortality from Diseases of the Heart, smoking is an established risk factor for both heart disease and several cancers. In a state where smoking prevalence is high, this is an important issue. Although the prevalence of smoking among Kentucky adults is consistently among the highest in the U.S., adult smoking prevalence has decreased over the past decade due to enhanced public health interventions, including health policy efforts.⁴ It is reasonable to argue that these reductions in adult smoking prevalence would impact Diseases of the Heart mortality much sooner

than the All Cancers mortality. As with most analyses there are limitations. The primary limitation of the analysis is related to the reliance upon the accuracy and completeness of death certificate information/data.

The steady decline in Diseases of the Heart deaths, and associated mortality rates is a true success story. In their textbook, *The New Public Health*, Tulchinsky and Varavikova state: "The most important lesson since the 1950's in public health is that these (Heart Disease) risk factors and diseases can be reduced dramatically by suitable public health interventions."⁵ While many public health leaders likely can/would argue that the decline in cervical cancer mortality, since the introduction of the Papanicolaou Smear in the 1950's, is one of the most compelling "lessons-learned" in public health, it is not debatable that efforts to reduce heart disease risk factors and the subsequent decline in mortality is an impressive public health success story.

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Conflict of Interest

The authors have declared that no conflict of interest exists.

References

- Brownson, RC, Remington, PL, Davis, JR. Chronic Disease Epidemiology and Control. American Public Health Association. 1998.

2. Centers for Disease Control and Prevention. Indicators for Chronic Disease Surveillance. MMWR 2004;53:1-6.
3. World Health Organization. International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Volume 2, Second Edition. WHO. 1992: 1.
4. [Internet] Kentucky Health Facts; Foundation for a Healthy Kentucky. Accessed 01/18/2012. <http://Kentuckyhealthfacts.org>.
5. Tulchinsky TH, Varavikova EA. What is the "New Public Health"? Public Health Reviews 2010; 32:25-53.