Primary Gastric Cancer Mortality Rates are Decreasing in Young Men but not Young Women in the US, 2000-2019: A Population-Based Time-Trend Analysis Using the CDC's National Center of Health Statistics (NCHS) Database

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Introduction

- Recent data showed that incidence of gastric cancer (GC) has been increasing in the US over the last two decades among younger women (<55 years) at a significantly greater rate compared to younger men.
- However, the impact of such findings on mortality has not been evaluated.
- The aim of this study was to investigate sex and age-specific GC mortality rates in the US using CDC's National Center of Health Statistics (NCHS) database.

Methods

- The NCHS database, part of the CDC, is the primary health statistics agency in the US, providing mortality data of many underlying causes of deaths, including cancer, covering ≈100% of US population.
- GC mortality rates per 100,000 population (age-adjusted to the 2000 US population and stratified by sex) were obtained from the NCHS database using SEER*Stat (v8.3.9.2, NCI) during 2000-2019.
- Time-trends, described as annual percentage change (APC) and average APC (AAPC), were estimated by Joinpoint Regression Program (v4.9.0.1, NCI).
- Monte Carlo permutation analysis was used to generate the simplest segmented line based on mortality data with a 2-tailed t-test to assess significance (P<0.05).
- Sex-specific trends were assessed for identicalness and parallelism.
- Further age and sex-specific analyses were conducted after subdividing the population with a cutoff at age 55 into two prespecified groups: ≥55 years (older adults) and <55 (younger adults).

Results

- During 2000-2019, a total of 230,158 patients died of GC (40.8% women).

Figure: Sex-Specific Trends for Gastric Cancer Mortality Among Different Age Groups.

Age group, y	Cancer cases (N=230,158)[a]	Trends[b]			Sex-specific AAPC difference (95% CI)	Pairwise comparison P-values		
		Time period	APC (95% CI)	AAPC (95% CI)		Sex-specific AAPC difference	Coincidence[e]	Parallelism[f]
All ages								
Women	93,966 (40.8%)	2000-2006	-3.00 (-3.41 to -2.60)	-2.34 (-2.55 to -2.13)	-0.53 (-0.83 to -0.24)	<0.001	<0.001	<0.001
		2006-2019	-1.85 (-2.12 to -1.58)					
Men	136,192 (59.2%)	2000-2008	-3.64 (-4.21 to -3.06)	-2.87 (-3.07 to -2.67)				
		2008-2019	-2.52 (-2.70 to -2.33)					
Aged ≥55								
Women	80,084 (34.8%)	2000-2007	-3.65 (-4.09 to -3.20)	-2.89 (-3.08 to -2.69)	-0.29 (-0.60 to 0.02)	0.07	<0.001	<0.001
		2007-2019	-2.44 (-2.65 to -2.23)					
Men	115,809 (50.3%)	2000-2006	-3.92 (-4.59 to -3.25)	-3.17 (-3.41 to -2.93)				
		2006-2019	-2.83 (-3.04 to -2.61)					
Aged <55 #								
Women	13,874 (6.0%)	2000-2019	0.01 (-0.33 to 0.36)	0.01 (-0.33 to 0.36)	-0.98 (-1.34 to -0.63)	<0.001	<0.001	0.001
Men	20,376 (8.9%)	2000-2019	-0.97 (-1.13 to -0.80)	-0.97 (-1.13 to -0.80)				

a Data are presented as death count numbers followed by percentages of the death count numbers from the total cases of cancer deaths in the database.

b Time-trends were computed using Joinpoint Regression Program (v4.9.0.1, NCI) with 3 maximum joinpoints allowed (4-line segments).

c A negative value indicates a greater AAPC in women compared to men.

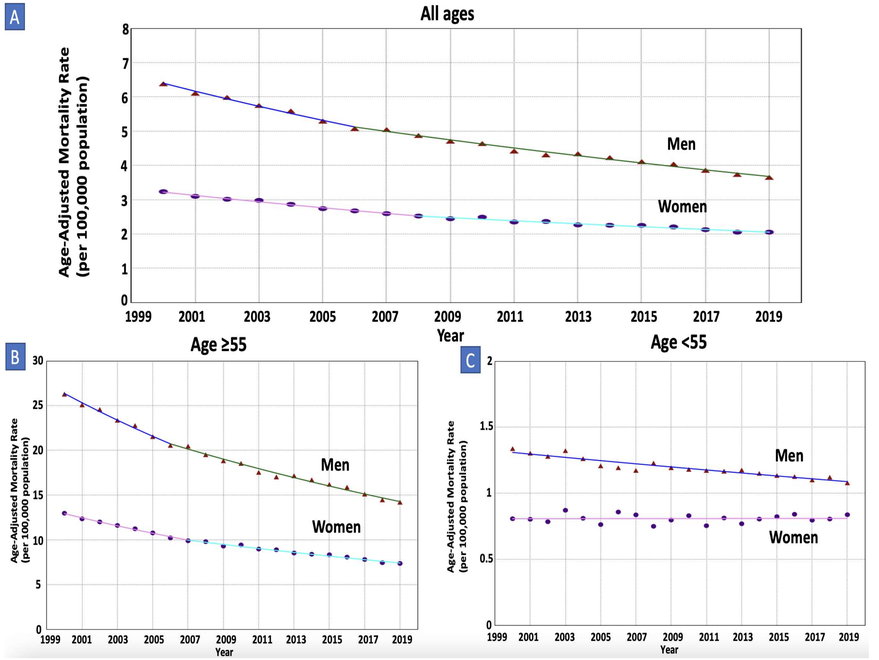
d Tests whether sex-specific trends were identical. A significant P-value indicates that the trends were not identical (i.e., they had different mortality rates and coincidence was rejected).

e Tests whether sex-specific trends were parallel. A significant P-value indicates that the trends were not parallel (i.e., parallelism was rejected).

Primary outcome.

- Overall, GC mortality rates were decreasing in men (AAPC=-2.87, p<0.001) at a significantly greater rate compared to women (AAPC=-2.34, p<0.001).
- Among older adults (195,893 deaths; 40.9% women), GC mortality rates have been decreasing in both men (AAPC=-3,17, p<0.001) and women (AAPC=-2.89, p<0.001) without a significant difference.
- Among younger adults (34,250 deaths; 40.5% women), GC mortality rates have been decreasing in men (AAPC=-0.97, p<0.001) but not in women (AAPC=0.01, p=0.93) with an absolute AAPC difference of 0.98 (p<0.001) and non-identical nor parallel data (both p<0.001) suggesting that mortality rates among men are decreasing at a significantly greater rate compared to the stable trend among women.

Figure: Sex-Specific Trends and Age-Adjusted Mortality Rates per 100,000 Population for Gastric Cancer Among Different Age groups.



A: The average annual percentage change (AAPC) is decreasing in men at a significantly greater rate than in women (-2.87 vs -2.34, p<0.001).

B: The AAPC is decreasing in men and women without a significant difference (-3.17 vs -2.89, p=0.07).

C: The AAPC is decreasing in men but not in women with a statistically significant difference (-0.97 vs 0.01, p<0.001).

Discussion

- Nationwide data from the CDC's NCHS database showed that mortality rates of GC were overall decreasing. However, among younger adults (aged <55 years), mortality rates were decreasing in men but not in women.
- While this could be due to the disproportional increase in GC incidence rates in younger women, future studies should elucidate risk factors in this population.

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