

Diminishing Gains in Non-Hodgkin Lymphoma Mortality in the United States: A Joinpoint Analysis of the Rituximab and COVID-19 Eras (1999–2024)

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INTRODUCTION

Non-Hodgkin lymphoma (NHL) mortality has declined in the United States over recent decades, largely due to therapeutic advances including rituximab-based regimens. However, it remains unclear whether the magnitude of improvement has remained stable across time and demographic groups. This study evaluates long-term NHL mortality trends in the United States, with emphasis on era-specific changes and differences by age, sex, and race/ethnicity.

AIM

To evaluate changes in NHL mortality over time, specifically:

- To Identify mortality trend inflection points.
- To compare trends by sex, race/ethnicity, and age group.
- To assess the differences between pre-rituximab (1999–2005) and post-rituximab (2006–2024) periods.
- To compare the pre-COVID (1999–2019) and COVID-19 (2020–2024) eras.

METHOD

We conducted a population-based temporal trend analysis of age-adjusted NHL mortality in the United States from 1999-2024 using joinpoint regression. Annual percent change (APC) and trend inflection points were estimated to evaluate changes in mortality over time. Analyses were stratified by sex, ethnicity (White, Black, Hispanic, Asian), and age groups. Era-based comparisons were performed for the pre-rituximab period (1999-2005) and post-rituximab period (2006-2024), as well as the pre-COVID(1999-2019) and COVID-19 era (2020-2024)

CONCLUSION

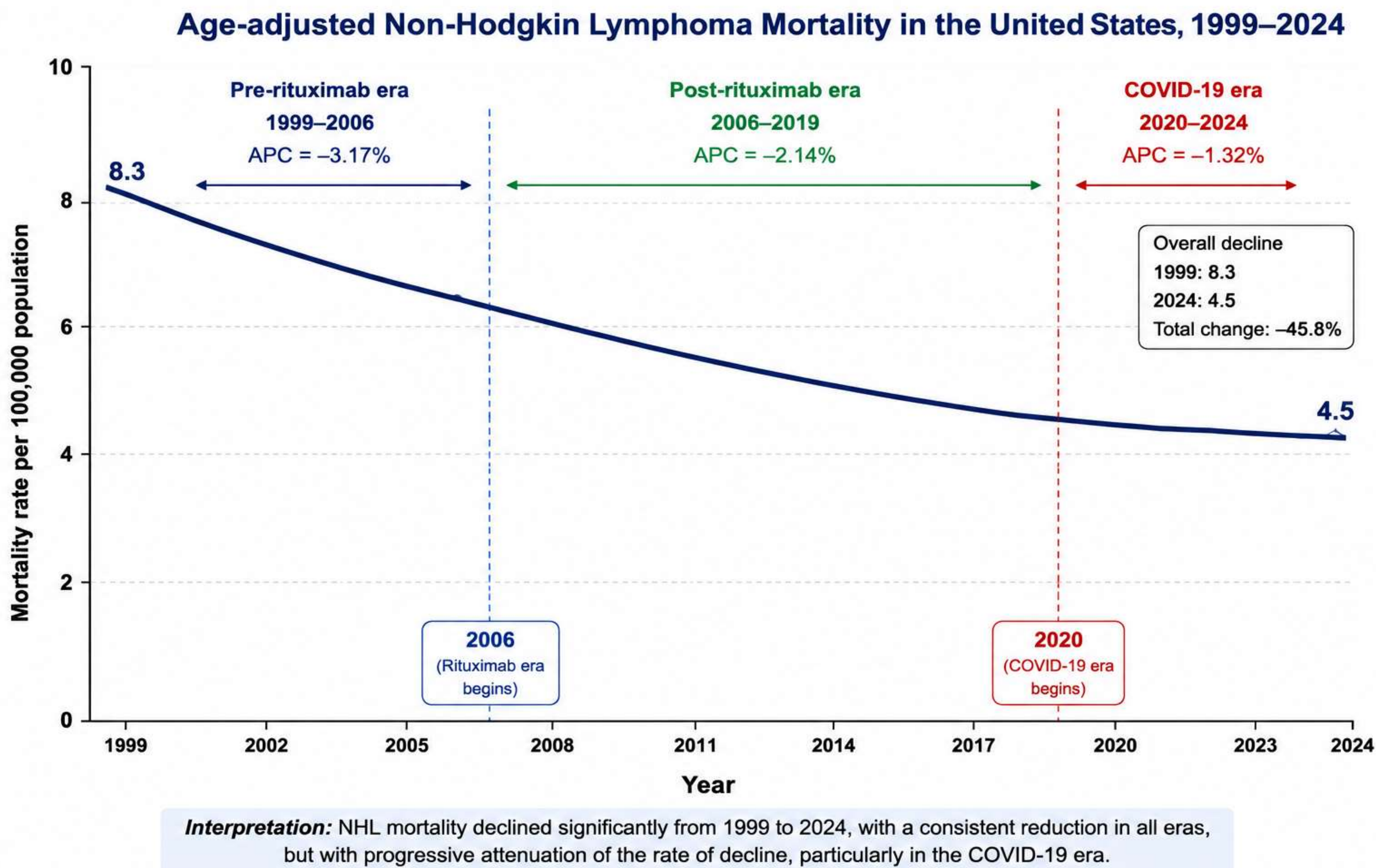
NHL mortality continues to decline in the United States, but the rate of improvement has slowed in the post-rituximab and COVID-19 eras. This deceleration is consistent across demographic groups, with limited gains in older adults, suggesting diminishing returns from earlier therapeutic advances and the need for continued innovation and targeted strategies in high-risk populations.

RESULTS

Overall NHL mortality declined from 8.3 to 4.5/100,000 between 1999-2024, with significant deceleration after 2006 (APC –3.17% to –2.14%). Males had persistently higher mortality than females, with similar attenuation over time (10.3 to 5.8 vs. 6.9 to 3.4/100,000). A strong age gradient was observed: adults aged 45–54 years showed the steepest decline (4.8 to 1.8/100,000), while adults aged ≥85 years had minimal improvement (77.7 to 70.1/100,000; APC –0.75%). White individuals showed deceleration after 2007 (8.8 to 4.8/100,000), whereas Black individuals demonstrated a biphasic pattern with an early increase (2001-2004; APC +10.26%) followed by sustained decline (APC -2.04%). Hispanic and Asian populations showed steady declines. During the COVID-19 era, mortality continued to decline without reversal, but with further attenuation in slope (e.g., APC -1.32% in adults aged 45-54 years).

Key Finding:

NHL mortality continued to decline through 2024, but the magnitude of improvement progressively attenuated, with the least improvement observed among adults ≥85 years.



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