The Urban Paradox: Intersectional Mortality Disparities and the Geographic Divide in Early-Onset Multiple Myeloma (1999–2020)

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INTRODUCTION

- The median age of diagnosis for Multiple Myeloma (MM) is 69[1].
- Early-onset MM is uncommon and, despite modern therapy, younger patients who die prematurely still experience substantial excess mortality; some cohorts suggest more aggressive presentation, though evidence on uniquely adverse biology is mixed.[2]
- Disparities in MM outcomes are shaped by race/ethnicity, socioeconomic status, and geography, which influence diagnosis, access to transplant and novel agents, and survival.[3]

AIM

- While the therapeutic landscape of MM has evolved significantly since 1999, survival improvements may not be equitably distributed.[4,5]
- This study evaluates the intersectional mortality rates of early-onset MM to determine if structural inequalities and geographic location dictate premature survival outcomes

METHOD

Data source & Cohort

- Mortality data from CDC WONDER Underlying Cause of Death & Single Race database data base from year 1999 to 2020 using ICD 10 codes.
- The primary Cause of death restricted to multiple myeloma and malignant plasma cell neoplasm (ICD-10 CODE C90.0).

Statistical Approach

- Rates standardized per 1,000,000 population using annual U.S. census estimates
- We utilized intersectional demographic analysis, cross-stratifying absolute death distributions and population person-years across 2013 NCHS Urban-Rural classifications, Sex, and Race, to calculate crude mortality rates (MR) per 100,000 and Rate Ratios (RR).
- American Indian/Alaska Native is dropped from all age-adjusted figures as every AI/AN stratum in this dataset was flagged “unreliable" by NCHS (death counts <20).

CONCLUSIONS

- Over a two-decade period, early-onset MM mortality demonstrates drastic intersectional disparities.
- The extreme mortality rate among Urban black males, contrasting with the high rural mortality seen in white male populations, suggests that physical proximity to metropolitan academic centers does not equate to life-saving healthcare access for marginalized groups.
- However, as this study utilizes an ecological and population-level design, definitive causal conclusions regarding the drivers of these structural and geographic disparities cannot be drawn without further patient-level investigation.

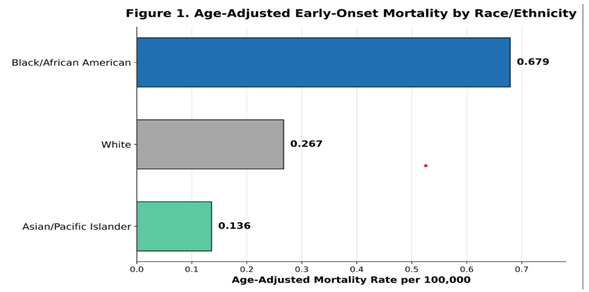
RESULTS

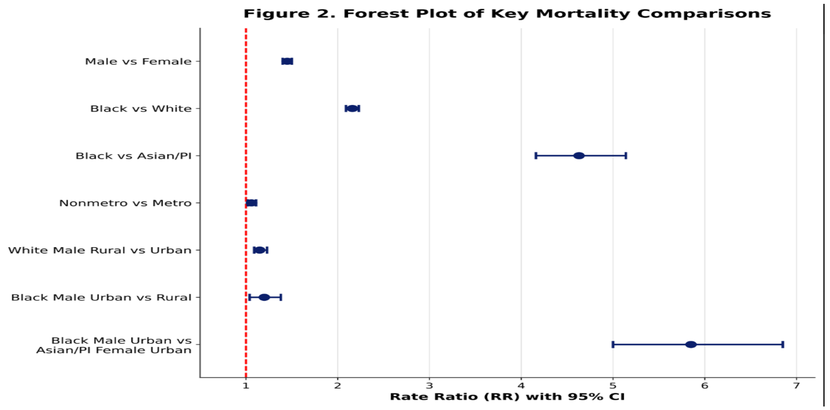
- **Cohort characteristics**: Total of **16,116 early-onset MM deaths** (age <55 years), representing 5,001,575,829 person-years of observation.
- The overall crude mortality rate (MR): **0.322 per 100,000 person-years**.
- **Sex disparities:** Male patients experienced significantly higher mortality than female patients (crude MR 0.381 vs. 0.263 per 100,000; RR = 1.448, 95% CI 1.403 - 1.495; age-adjusted MR 0.383 vs. 0.260). This sex disparity was consistent across all racial and geographic strata (see Table 1).
- **Racial disparities and Crude MR:** Mortality varied substantially by race. Black/African American patients had the highest crude MR (0.610 per 100,000), followed by White (0.283), American Indian/Alaska Native (0.169; NCHS-suppressed, interpret with caution), and Asian/Pacific Islander patients (0.132) (see Figure 2).
- Black patients experienced more than double the mortality rate of White patients (**crude RR = 2.158, 95% CI 2.085–2.234; age-adjusted RR = 2.550**), and more than 4.6-fold higher mortality than Asian/Pacific Islander patients (**crude RR = 4.626, 95% CI 4.160–5.144**) (see Figure 1).

Table 1. Characteristics and Mortality Rates

Characteristic	Deaths	Crude MR	Age-Adjusted MR
Male	9,614	0.381	0.383
Female	6,502	0.263	0.260
Black/African American	4,572	0.610	0.679
White	11,098	0.283	0.267
Asian/Pacific Islander	368	0.132	0.136
Metro	13,768	0.320	0.323
Non-metro	2,348	0.339	0.314

- **Geographic disparities.** Nonmetropolitan (rural) residents had modestly but significantly higher crude mortality than metropolitan residents overall (0.339 vs. 0.320 per 100,000; RR = 1.061, 95% CI 1.016–1.109).





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