Racialized Economic Segregation and Inequities in Survival Among Patients with Multiple Myeloma

ISPOR NUMBER 126400

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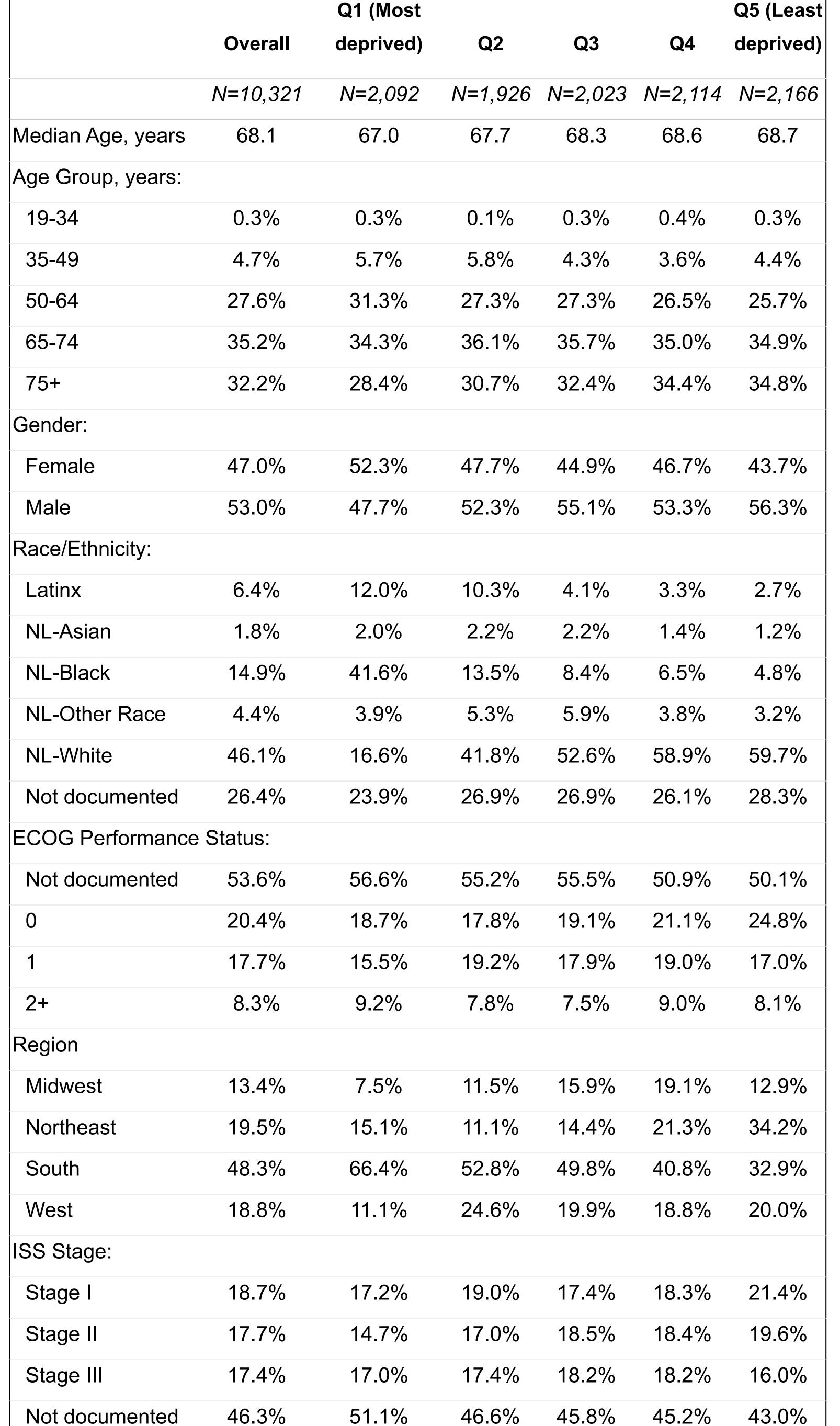
Background

- There are **existing inequities in multiple myeloma incidence and survival**: Black adults have higher incidence and a greater risk of death than White adults [1]
- Systemic and **structural racism** are forms of racism embedded in systems, laws, written or unwritten policies, entrenched practices, and established beliefs perpetuating widespread unfair treatment of people of color [2]
- **Racial and economic segregation** may drive persistent inequities in multiple myeloma treatment and survival
- Here we operationalize structural racism as a composite **neighborhood-level measure of racialized economic segregation.** This study examines the association between structural racism and real-world overall survival in a cohort of patients with multiple myeloma

Methods

- This retrospective study used the nationwide **Flatiron Health electronic health record-derived de-identified database**, focusing on a cohort of 10,321 patients from community oncology practices with a diagnosis of multiple myeloma between January 1, 2011 and October 31, 2022
  - The Flatiron Health database is a longitudinal database, comprising de-identified patient-level structured and unstructured data, curated via technology-enabled abstraction. During the study period, the de-identified data originated from approximately 280 US cancer clinics (~800 sites of care)[3]
- The **Index of Concentration at the Extremes** (ICE) is a measure simultaneously quantifying concentrated extremes of both privilege and deprivation[4]:
  - $ICE_i = (P_i - D_i) / T_i$, where the ICE in neighborhood i denotes the difference between the number of privileged (P_i) and deprived persons (D_i) in neighborhood, i divided by the total neighborhood population (T_i)
  - For this study, our measure of ICE focused on differences between high-income White households (earning at least $100,000) and low-income Black households (earning less than $25,000)
- Using data from the American Community Survey, we constructed a census tract-level measure of **ICE categorized as US population-weighted quintiles**, ranging from most to least privileged areas
- We estimated median real-world overall survival using Kaplan-Meier methods and examined associations using Cox proportional hazard models adjusted for clinical factors: age, sex, ECOG performance status, ISS stage

Results

Table 1. Patient characteristics overall and by ICE quintile

	Overall	Q1 (Most deprived)	Q2	Q3	Q4	Q5 (Least deprived)
	N=10,321	N=2,092	N=1,926	N=2,023	N=2,114	N=2,166
Median Age, years	68.1	67.0	67.7	68.3	68.6	68.7
Age Group, years:						
19-34	0.3%	0.3%	0.1%	0.3%	0.4%	0.3%
35-49	4.7%	5.7%	5.8%	4.3%	3.6%	4.4%
50-64	27.6%	31.3%	27.3%	27.3%	26.5%	25.7%
65-74	35.2%	34.3%	36.1%	35.7%	35.0%	34.9%
75+	32.2%	28.4%	30.7%	32.4%	34.4%	34.8%
Gender:						
Female	47.0%	52.3%	47.7%	44.9%	46.7%	43.7%
Male	53.0%	47.7%	52.3%	55.1%	53.3%	56.3%
Race/Ethnicity:						
Latinx	6.4%	12.0%	10.3%	4.1%	3.3%	2.7%
NL-Asian	1.8%	2.0%	2.2%	2.2%	1.4%	1.2%
NL-Black	14.9%	41.6%	13.5%	8.4%	6.5%	4.8%
NL-Other Race	4.4%	3.9%	5.3%	5.9%	3.8%	3.2%
NL-White	46.1%	16.6%	41.8%	52.6%	58.9%	59.7%
Not documented	26.4%	23.9%	26.9%	26.9%	26.1%	28.3%
ECOG Performance Status:						
Not documented	53.6%	56.6%	55.2%	55.5%	50.9%	50.1%
0	20.4%	18.7%	17.8%	19.1%	21.1%	24.8%
1	17.7%	15.5%	19.2%	17.9%	19.0%	17.0%
2+	8.3%	9.2%	7.8%	7.5%	9.0%	8.1%
Region						
Midwest	13.4%	7.5%	11.5%	15.9%	19.1%	12.9%
Northeast	19.5%	15.1%	11.1%	14.4%	21.3%	34.2%
South	48.3%	66.4%	52.8%	49.8%	40.8%	32.9%
West	18.8%	11.1%	24.6%	19.9%	18.8%	20.0%
ISS Stage:						
Stage I	18.7%	17.2%	19.0%	17.4%	18.3%	21.4%
Stage II	17.7%	14.7%	17.0%	18.5%	18.4%	19.6%
Stage III	17.4%	17.0%	17.4%	18.2%	18.2%	16.0%
Not documented	46.3%	51.1%	46.6%	45.8%	45.2%	43.0%

Notes: Age, ECOG, and region correspond to initial diagnosis. NL denotes non-Latinx.

Figure 1. Median survival estimates by ICE quintile

Notes: Median survival estimates from Kaplan-Meier analysis

Figure 2. Survival by ICE quintile

Notes: Median survival estimates from Kaplan-Meier analysis
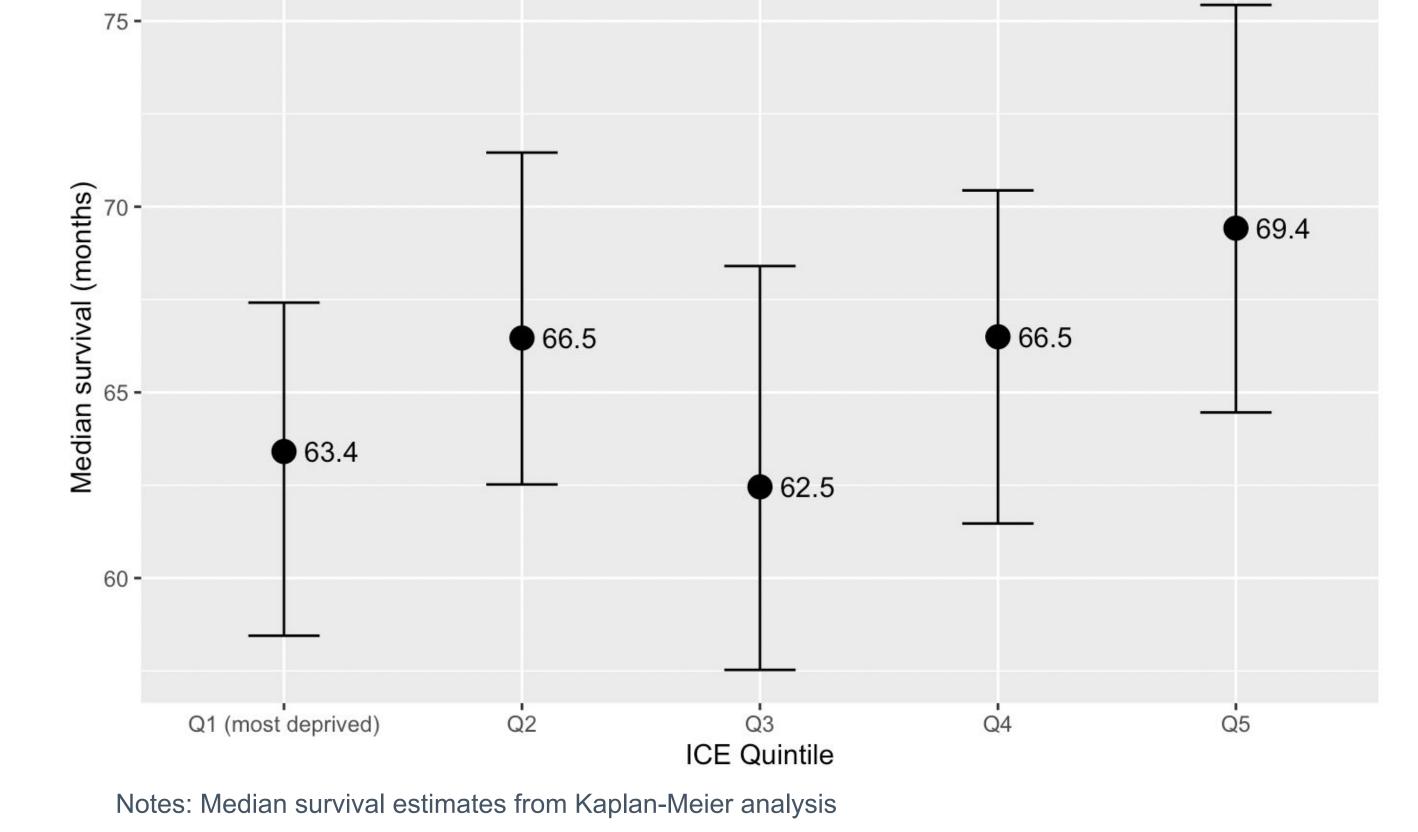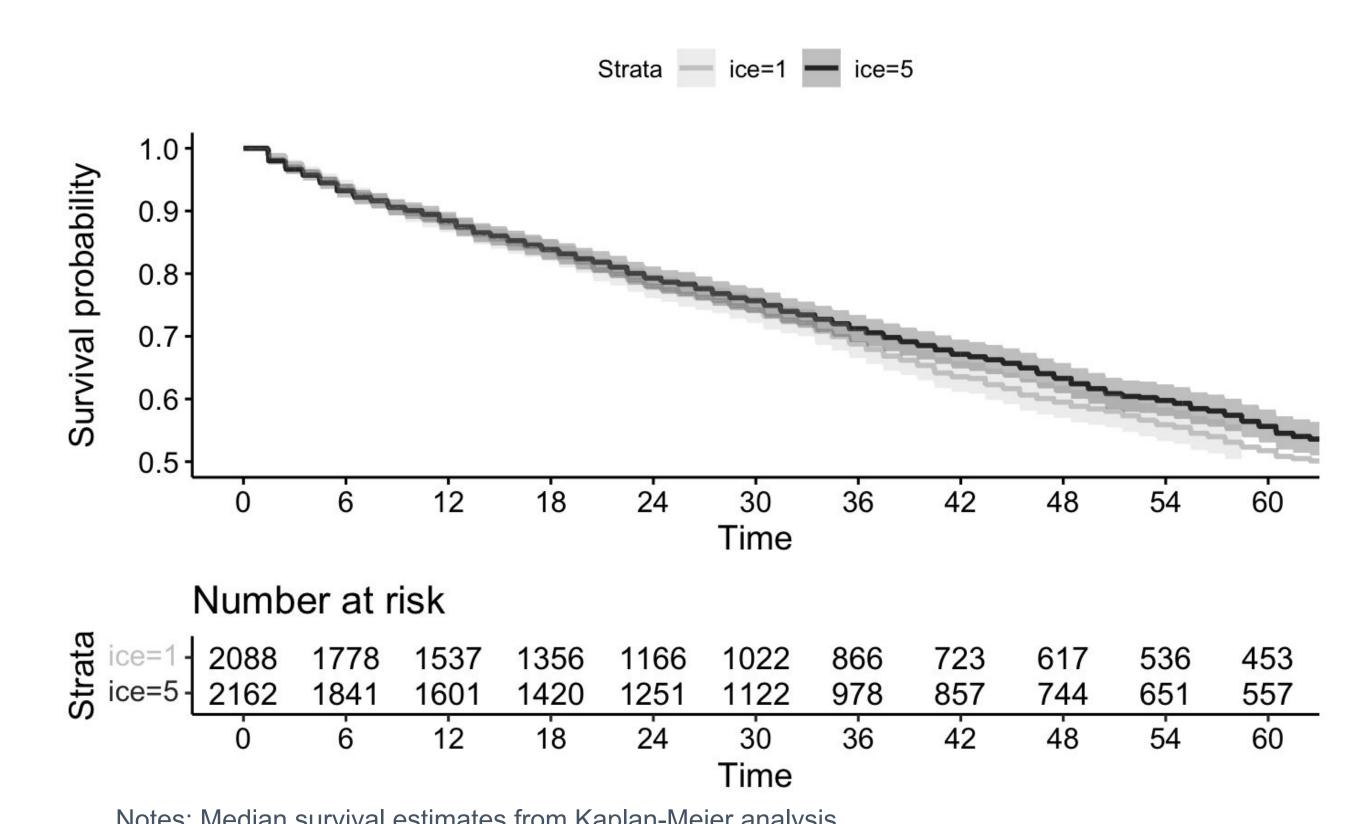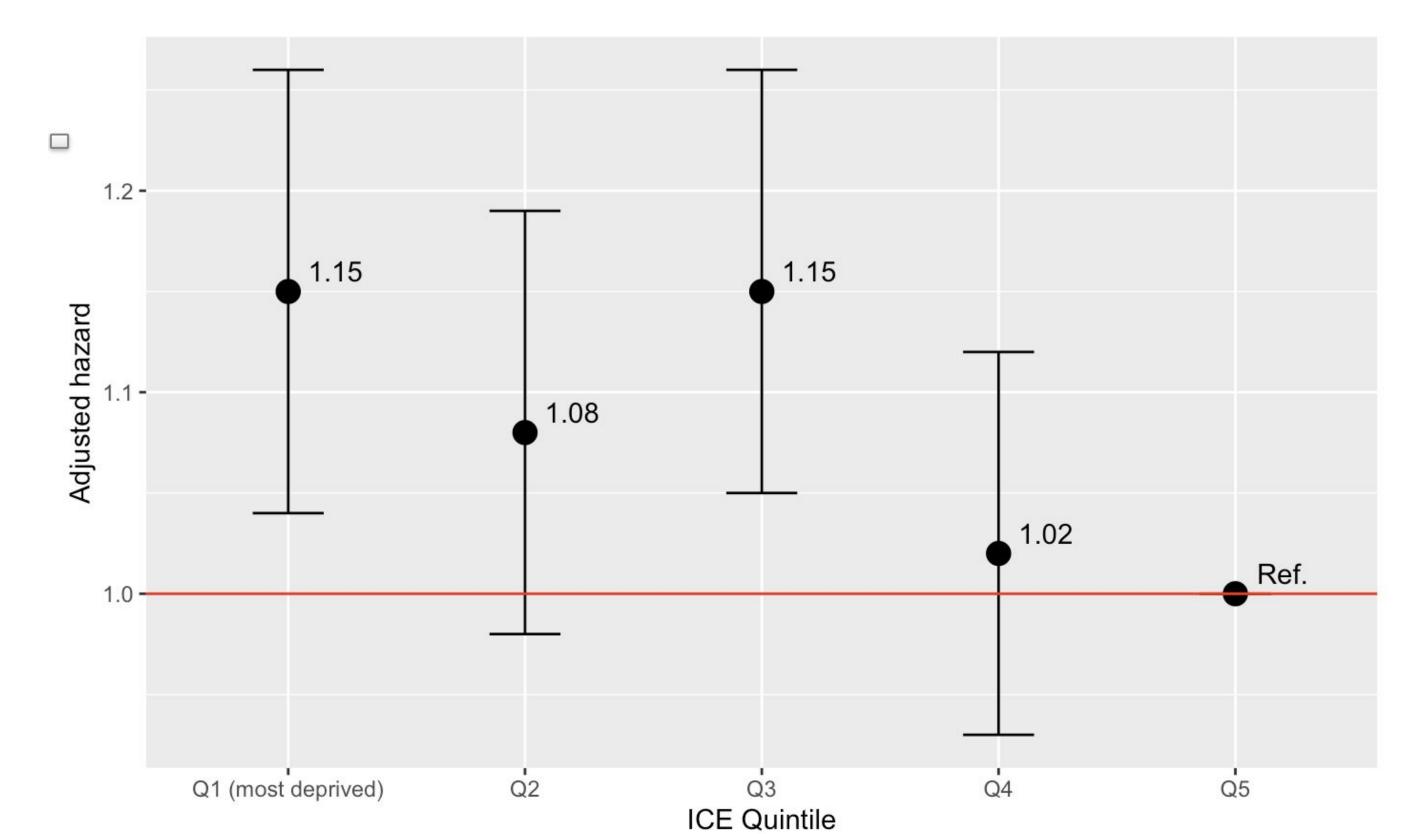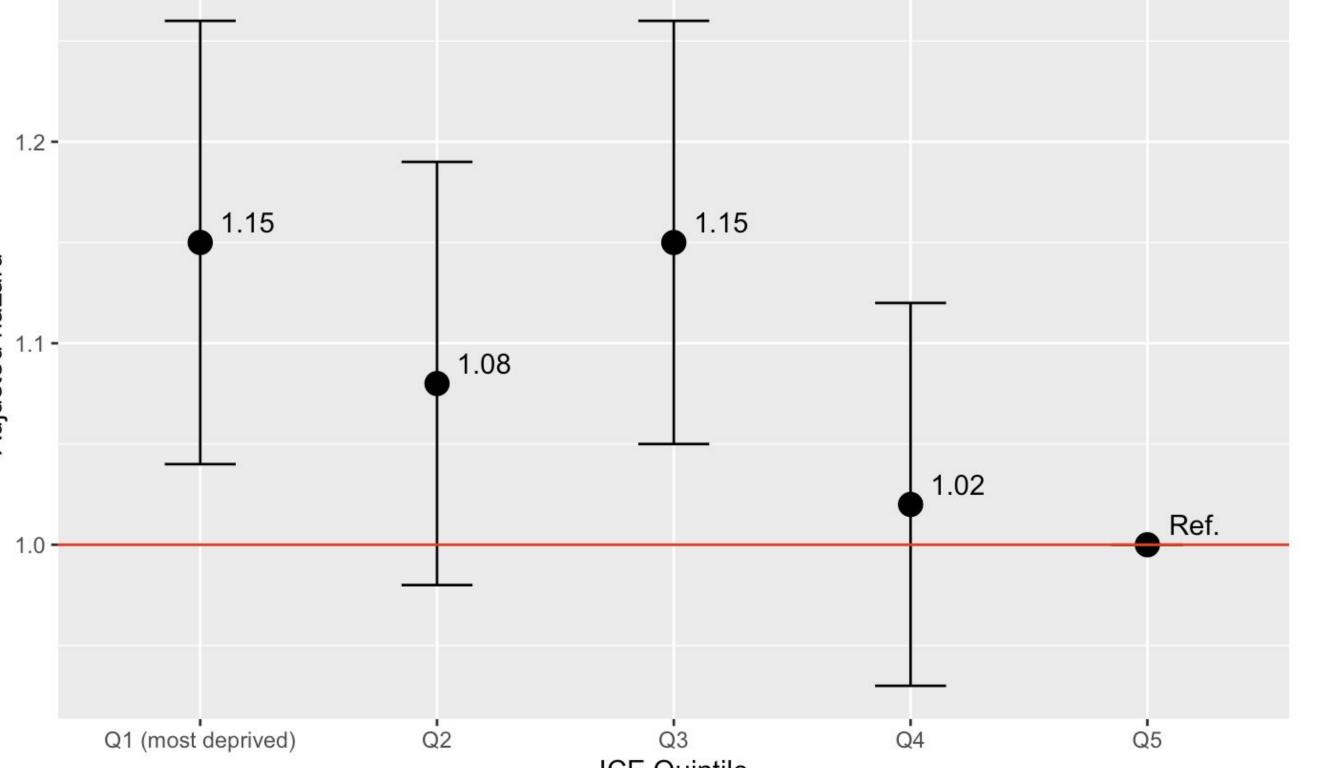
Figure 3. Adjusted hazard ratios by ICE quintile

Notes: Adjusted hazard ratios estimated using Cox-model adjusted for age, sex, ECOG performance status, ISS stage

Key results

Patient characteristics differed between those from the most and least deprived areas:

- Median age of 67 vs 69
- Race/ethnicity: 12% vs 2.7% Latinx; 42% vs 4.8% NL-Black
- ECOG performance status (among patients with documented ECOG PS): 21% vs 16% had a score of 2 or greater

Patients from the most deprived areas had a shorter median survival compared to patients from the least deprived areas: 63.4 months vs 69.4

- Patients from the most deprived areas had a greater risk of death after adjustment for clinical factors with a hazard ratio of 1.15 (95% CI: 1.04-1.26) compared to patients from the least deprived areas

Discussion

- Our results highlight that persistent health inequities exist in the US and the need to address the underlying social determinants of health that contribute to such inequities
- These findings are consistent with previous research demonstrating that living in racially segregated Black and Latinx neighborhoods is frequently associated with economic disadvantage, limited healthcare access, and increased exposure to environmental hazards [2]
- Further research needed to:
  - Examine how structural racism **mediates** associations between race/ethnicity and myeloma outcomes
  - Delineate the downstream factors that mediate the association between segregation and cancer outcomes such as access to novel therapies
- Such research is critical to informing the development of multifaceted approaches aimed at mitigating the adverse effects of structural racism
  - For example, interventions that address social and economic inequalities, such as providing transportation or financial support, may help improve access to care

Limitations

- Neighborhood segregation based on most recent documented address and may have differed at diagnosis
- Missing data and unmeasured confounders may have affected the estimation of inequities
- Analysis limited to community oncology practices

Conclusion

- Racialized economic segregation was associated with survival among patients with multiple myeloma, where those in the least privileged areas had worse survival and increased risk of death
- Given inequities in the burden of multiple myeloma, efforts to reduce persistent cancer inequities should assess and address racialized economic segregation and other forms of structural racism

Disclosures

- The authors report employment at Flatiron Health Inc., which is an independent subsidiary of the Roche Group, and stock ownership in Roche.

References

1. Kanapuru, Bindu, et al. "Analysis of racial and ethnic disparities in multiple myeloma US FDA drug approval trials." Blood advances 6.6 (2022): 1684-1691.
2. Braveman, Arkin, Proctor, et al. 2022. DOI: 10.1377/hlthaff.2021.01394.
3. Ma, Xinran, et al. "Comparison of population characteristics in real-world clinical oncology databases in the US: Flatiron Health, SEER, and NPCR." MedRxiv (2020): 2020-03.
4. Krieger, Nancy, et al. "Public health monitoring of privilege and deprivation with the index of concentration at the extremes." American journal of public health 106.2 (2016): 256-263.

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