Exploring Socioeconomic Disparities in Acute Lymphoblastic Leukemia Outcomes: A Population-Level Analysis

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Introduction

- Acute lymphoblastic leukemia (ALL) is an aggressive hematologic malignancy characterized by the uncontrolled proliferation of immature lymphoid cells in the bone marrow and blood.
- Although diagnosis and treatment advancements have led to improved survival rates, especially among pediatric patients, disparities in outcomes persist across different demographic and socioeconomic groups.
- Our study aimed to assess the impact of socioeconomic disparities on survival outcomes in patients diagnosed with ALL.

Aim

- To examine how **demographics, socioeconomic status, and geography** influence overall survival in cancer patients.

Objectives

- Evaluate survival differences by **gender** and **race/ethnicity**.
- Assess the impact of **household income** and **rural vs. urban residence**.
- Identify **disparities** to guide interventions for **equitable cancer care**.

Methods

- We analysed data from the Surveillance, Epidemiology, and End Results (SEER) Registry, including patients diagnosed with ALL (ICD-O-3 code C91.0) in 2000–2021.
- Patients with missing or unknown race, income, or location were excluded. The primary outcome was 5-year overall survival (OS). Kaplan-Meier analysis was used to estimate OS, and Cox proportional hazards regression was applied for multivariable analysis.
- Differences between groups were assessed using the log-rank test, with hazard ratios (HRs) reflecting 5-year OS.

Results

A total of **31,360 patients** met inclusion criteria.

Gender:

- No significant difference in overall survival (OS) between males and females (**HR 0.98; 95% CI 0.94–1.01; P = 0.245**).

Race/Ethnicity:

- **Black patients** had worse OS than White patients (**HR 1.20; 95% CI 1.12–1.28; P < 0.001**).
- **Hispanic** and **NHAPI patients** had better OS (**HR 0.81; 95% CI 0.77–0.84 and 0.75–0.87, respectively; P < 0.001**).
- No significant difference was observed for **American Indian/Alaska Native patients** (**HR 0.95; 95% CI 0.79–1.14; P = 0.567**).

Socioeconomic Factors:

- **Household income < $70,000/year** was associated with worse OS (**HR 1.10; 95% CI 1.10–1.20; P < 0.001**).

Geography:

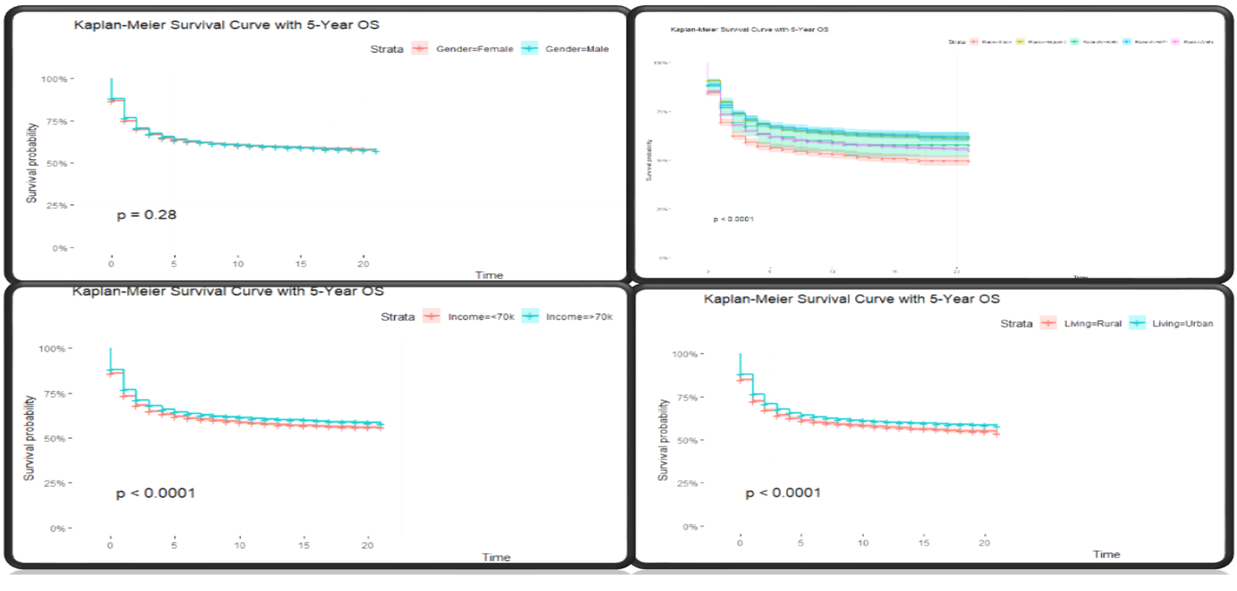
- **Rural residents** had worse OS than urban residents (**HR 1.10; 95% CI 1.10–1.20; P < 0.001**).

Category	Subgroup (N)	HR	95% CI	P-value
Sex	Male (17,589) vs Female (13,771)	0.98	0.94 – 1.01	0.245
Race	White (14,880)	Reference		
	Black (2,184)	1.20	1.12 – 1.28	<0.001
	Hispanic (11,395)	0.81	0.77 – 0.84	<0.001
	Asian/PI (2,598)	0.81	0.75 – 0.87	<0.001
	AI/AN (303)	0.95	0.79 – 1.14	0.567
Income	< $70,000 vs ≥ $70,000	1.1	1.1 – 1.2	<0.001
Residence	Rural (5,200) vs Urban (26,160)	1.1	1.1 – 1.2	<0.001

Conclusion

- Race, income, and rural residence significantly influenced overall survival, with **Black patients, lower-income households, and rural residents at higher risk**.
- These results highlight **persistent disparities** and the need for **targeted strategies to improve equity in cancer outcomes.**

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