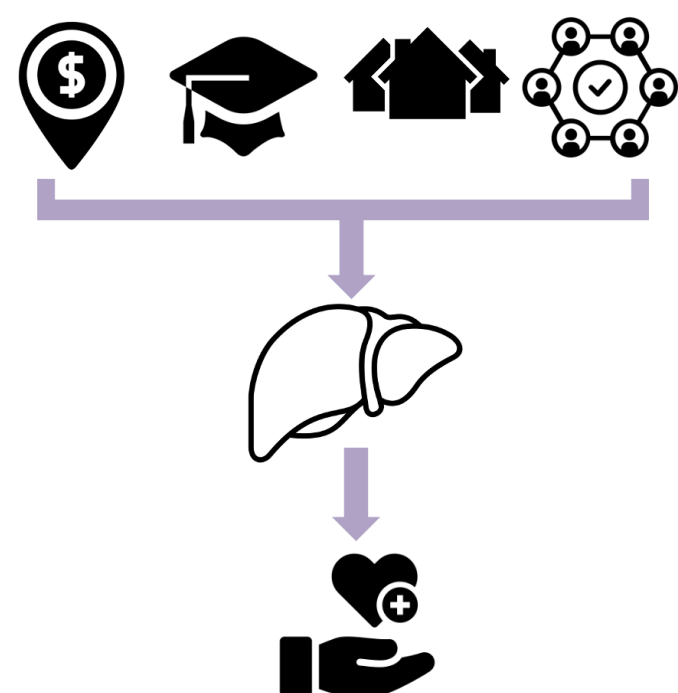


# Where You Live Matters: Patients With Cirrhosis Living in More Deprived Neighborhoods are Associated With Lower Survival and Transplant Waitlisting

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## Background



- Cirrhosis-related deaths: ↑65% in the past decade.<sup>1</sup>
  - Projected to increase with the ↑prevalence.
- Social determinants of health (SDOH) have emerged as important risk factors of clinical outcomes.<sup>2</sup>
- Single center study: low neighborhood socioeconomic status (SES) associated with lower risk of waitlisting & mortality without evaluation.<sup>3</sup>
- Little is still known on the effects of *specific* SDOH in patients with cirrhosis and transplantation.

## Research Objectives

To analyze the associated effects of neighborhood SES and its specific SDOH on clinical outcomes of patients with cirrhosis.

## Methods

- Retrospective, cohort analysis; 2006-2012
- HealthLNK: electronic health records from 6 health systems in the Chicago metropolitan area
- Clinical covariates: ICD-9 and CPT codes
- SDOH: Area Deprivation Index (ADI): 17-item score, ranks community ZIP-code level SES.<sup>1</sup>
- Multivariable, competing risk analysis performed with death and transplant as the competing risks
  - Controlled for age, race, gender, insurance status, cirrhosis etiology, decompensation event, HCC, MELD-Na, Charlson Comorbidity Index

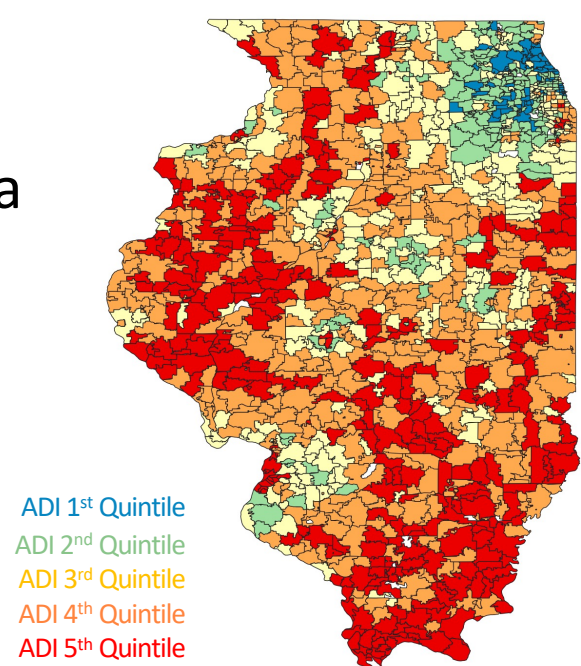


Figure 1. Distribution of ADI ZIP codes in Illinois, USA

## Results: Demographics

Characteristic	1 (least Deprived) (n = 1533)	2 (n = 4153)	3 (n = 4342)	4 (n = 4267)	5 (Most Deprived) (n = 806)	p-value
Age, year, mean (±SD)	58.94 (12.40)	57.39 (11.79)	57.01 (11.63)	56.6 (11.48)	56.34 (10.20)	<0.001
Female,	600 (39.14%)	1709 (41.15%)	1853 (42.68%)	1880 (44.06%)	372 (46.15%)	<0.001
Race, n (%)						
Non-Hispanic White	978 (64.80%)	2279 (54.88%)	2108 (48.55%)	966 (22.64%)	258 (32.01%)	<0.001
Black	159 (10.37%)	399 (9.61%)	778 (17.92%)	1916 (44.90%)	400 (49.63%)	<0.001
Hispanic	138 (9.00%)	659 (15.87%)	857 (19.74%)	959 (22.48%)	49 (6.08%)	<0.001
Asian	60 (3.91%)	221 (5.32%)	113 (2.60%)	36 (0.84%)	5 (0.62%)	<0.001
Other	198 (12.92%)	595 (14.33%)	486 (11.19%)	390 (9.14%)	94 (11.66%)	<0.001
Insurance						
Medicare/Medicaid	803 (52.4%)	1957 (47.12%)	2198 (50.62%)	2289 (53.64%)	451 (55.96%)	<0.001
Private	614 (40.05%)	1505 (36.24%)	1477 (34.02%)	1068 (25.03%)	194 (24.07%)	<0.001
Other	116 (7.57%)	691 (16.64%)	667 (15.36%)	910 (21.33%)	161 (19.98%)	<0.001
SDOH Variables						
ADI, mean (±SD)	12.73 (5.52)	30.35 (5.41)	48.3 (5.57)	67.11 (5.68%)	85.93 (4.28)	<0.001

Table 1. Socioeconomic demographics of patients with cirrhosis stratified by quintiles of Area Deprivation Index. SD = standard deviation, SDOH = social determinants of health

## Results: Kaplan-Meier Survival Curve

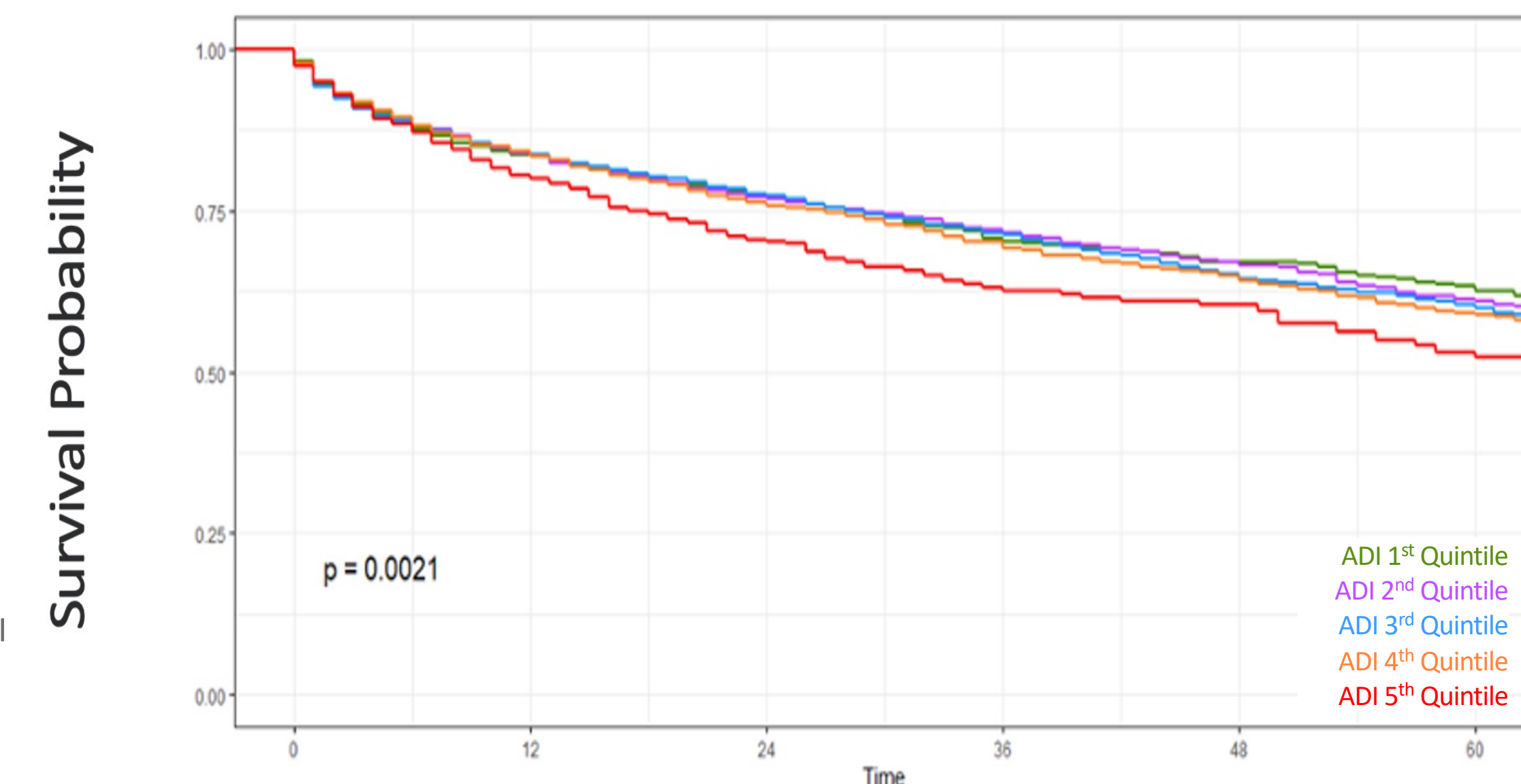


Figure 2. Kaplan Meier survival curve stratified by quintiles of Area Deprivation Index. Patients living in the most deprived neighborhoods (5<sup>th</sup> ADI Quintile, red) had higher rates of all-cause mortality compared to patients living in less deprived neighborhoods (1<sup>st</sup>-4<sup>th</sup> ADI Quintile).

## Results: Multivariable Analysis

Risk Factor	All-cause Mortality HR (95% CI)	Transplant Waitlist HR (95% CI)
Per capita income	0.96 (0.94-0.98)**	1.08 (1.05-1.12)***
Median family income	0.98 (0.97-1.00)*	1.12 (1.09-1.14)***
% Families below federal poverty level	1.03 (0.99-1.06)	0.62 (0.57-0.68)***
Income disparity	0.93 (0.88-0.98)**	0.73 (0.65-0.81)***
% Population with <9 years of education	1.02 (0.98-1.05)	0.72 (0.67-0.78)***
% Population with ≥ high school diploma	1.06 (1.03-1.10)***	0.98 (0.92-1.05)
% unemployed	1.17 (1.05-1.31)**	0.65 (0.49-0.84)***
Median home value	0.97 (0.96-0.99)***	1.01 (0.98-1.04)
Median gross rent	0.61 (0.47-0.80)***	2.38 (1.48-3.83)***
Median monthly mortgage	0.87 (0.81-0.93)***	1.01 (0.88-1.15)
% Owner-occupied housing units	1.00 (0.98-1.02)	1.23 (1.18-1.28)***
% Households with more than 1 person per room	0.96 (0.87-1.07)	0.43 (0.34-0.55)***
% Households without a motor vehicle	0.96 (0.93-0.99)*	0.66 (0.59-0.75)***
% Occupied housing units without complete plumbing	0.98 (0.85-1.14)	0.15 (0.08-0.26)***
% Single-parent households with children	1.02 (1.00-1.04)*	0.80 (0.76-0.84)***

Table 2. Cox proportional hazard model of all-cause mortality and transplant waitlist. \*p<0.05, \*\*p<0.01, \*\*\*p<0.001

- Patients living in the 5<sup>th</sup> ADI quintile had increased hazard of all-cause mortality (HR 1.09, CI 1.06-1.12, p<0.001) & lower hazard of liver transplantation (HR 0.72, CI 0.67-0.76, p<0.001).

## Limitations

- Retrospective review
- Accuracy of clinical diagnoses dependent on ICD-9 and CPT codes
- Population cohort study from 2006-2012

## Conclusions

- Neighborhood SES are associated with an increased risk of mortality and decreased likelihood of transplant waitlist.
  - SDOH is multifactorial and different domains have varying associations.
- Public health interventions are important to mitigate disparities among neighborhood disadvantage and access to care among patients with cirrhosis.

## References

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