Neighborhood Deprivation Negatively Affects Survival Rate in Pediatric Oncology Patients

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Introduction

Box. Census Variables in the Area Deprivation Index

Domain	Variable
Education	% Population aged 25 years or older with less than 9 years of education
	% Population aged 25 years or older with at least a high school diploma
	% Employed population aged 16 years or older in white-collar occupations
Income/employment	Median family income in US dollars
	Income disparity
	% Families below federal poverty level
	% Population below 150% of federal poverty level
	% Civilian labor force population aged 16 years and older who are unemployed
Housing	Median home value in US dollars
	Median gross rent in US dollars
	Median monthly mortgage in US dollars
	% Owner-occupied housing units
	% Occupied housing units without complete plumbing
Household characteristics	% Single-parent households with children younger than 18
	% Households without a motor vehicle
	% Households without a telephone
	% Households with more than 1 person per room

Figure 1: This figure lists the 17 factors that the Area Deprivation Index (ADI) score is based on. From: *Centers for Disease Control and Prevention*

- Neighborhood is defined as Census Block Group.
- Deprivation is defined as low income, unemployment, poor living conditions, and lack of educational access.
- Neighborhood deprivation was previously calculated using an individual's residential zip code.
- ADI is a more efficient methodology utilizes an individual's complete home address.
  - Allows for increased geographic specificity and accurate representation of the diversity within zip codes, as some zip codes span wide geographic areas with extreme variations in resource availability.
- ADI scores range from 1-100 and are grouped into quintiles.
  - Scores of 1-20 represent those who are least deprived)
  - Scores of 80-100 represent the most deprived.

Methods

- A retrospective chart review was performed on cancer survivors from the Treatment After Cancer and Late Effects Clinic (TACLE Clinic) at Children's Hospital New Orleans (CHNOLA) and deceased cancer patients from the CHNOLA Pathology Department. It is important to note that patients are only eligible to be seen in the TACLE clinic if they are at least two years from completion of therapy for cancer or five years from diagnosis.
- A multi-variable logistic regression model was performed to analyze the data collected.
- The following variables were collected from the records: Race, Ethnicity, Parish, Cancer Type, and ADI Score.
- ADI was calculated by inputting the subjects' full home address into a website titled Neighborhood Atlas. (https://www.neighborhoodatlas.medicine.wisc.edu/mapping).

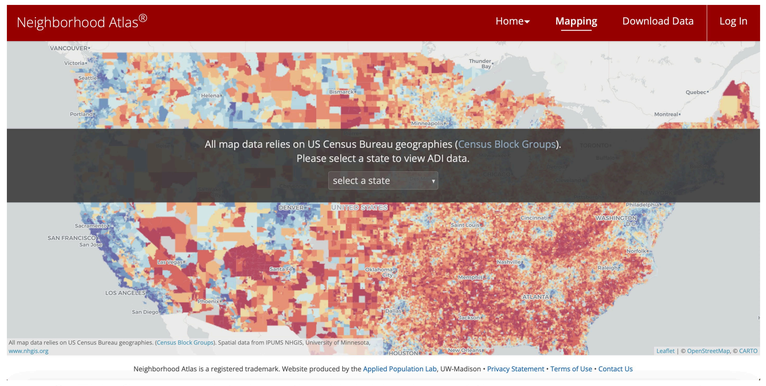

Figure 2: This figure depicts how the *Neighborhood Atlas* appears on a computer screen.

Results

Experiment 1: Overall ADI

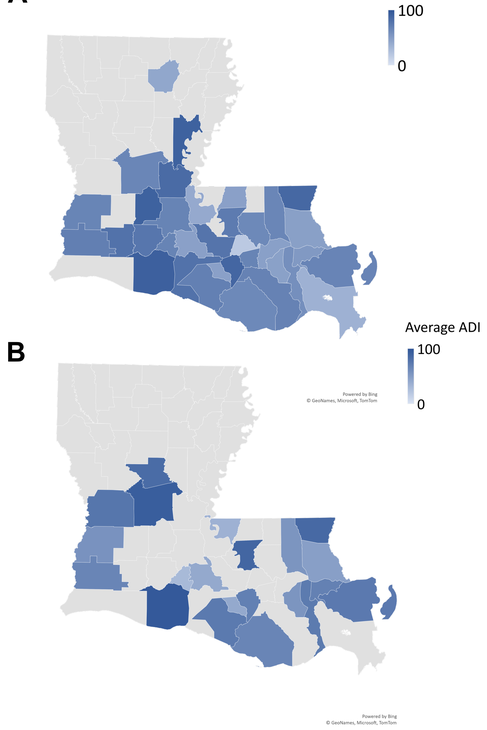

Figure 3: These graphs illustrate the average ADI Score, by parish, of our study cohort. **A.** Children's Hospital New Orleans TACLE Clinic. **B.** Children's Hospital New Orleans Pathology Department.

Experiment 2: Population Density

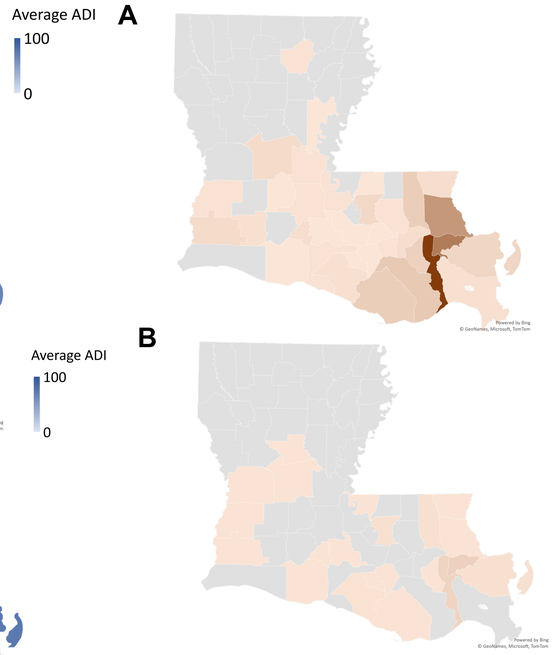

Figure 4: These graphs are designed to show where our study cohort is located. This is significant because it tells us how close the cohort is to healthcare access and where there is a dense number of patients (may illustrate a health disparity). It is shown here that our study cohort is mostly populated in Orleans and Jefferson Parishes, which was expected since the hospital is in New Orleans. **A.** Children's Hospital New Orleans TACLE Clinic. **B.** Children's Hospital New Orleans Pathology Department.

Experiment 3: Least Deprived

Figure 5: Zooming in to depict only Orleans and Jefferson Parishes, these graphs depict where the least deprived (ADI Score ranging between 1-20) patients in my study cohort live within Louisiana. **A.** Children's Hospital New Orleans TACLE Clinic. **B.** Children's Hospital New Orleans Pathology Department. Interestingly, there was not one deceased patient in my study cohort with an ADI score of 20 or less.

Experiment 4: Most Deprived

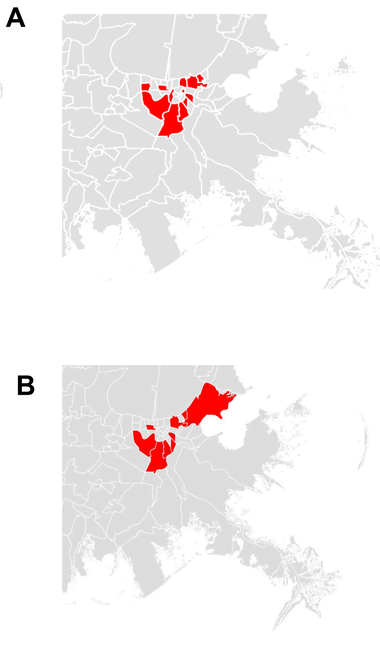

Figure 6: Zooming in to depict only Orleans and Jefferson Parishes, these graphs depict where the most deprived (ADI Score ranging between 80-100) patients in my study cohort live within Louisiana. **A.** Children's Hospital New Orleans TACLE Clinic. **B.** Children's Hospital New Orleans Pathology Department.

Conclusions

Experiment 5: ADI Score Compared to Cancer Survival Rate

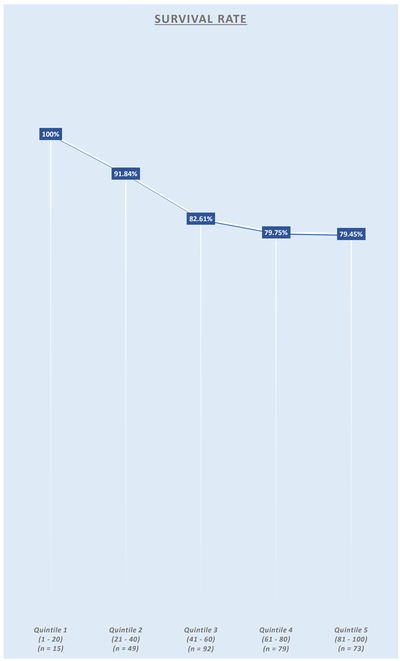

Figure 7: This figure illustrates the percentage of survivors in each quintile. This statistical analysis showed an inverse correlation between ADI and cancer survivorship. For every increase of 10 in ADI, the odds of cancer survivor reduces by 14.4%. These results demonstrate that a health disparity exists between neighborhood deprivation and overall cancer survival in pediatric oncology patients.

Discussion

- The purpose of this retrospective study is to determine if a correlation exists between pediatric cancer survivorship and ADI.
- Figures 3A and 4A depicts a parish in Louisiana that includes individuals described as both most and least deprived, which further illustrates the significant of using an ADI score.
  - These figures are accounting for two separate individuals who live three blocks apart, proving that a health disparity exists between cancer survival and neighborhood deprivation.
- ADI does not account for race, ethnicity, and cancer type.
  - I considered these factors in my analysis and found no significant correlation.
- I assigned each address to its Parish to see if Rural versus Suburban/Urban played a role.
  - It was determined that this also had no significance.
- Louisiana has a unique population, where some parishes are labeled as Acadian.
  - I compared Acadian versus Non-Acadian Parishes and found no significance in cancer survival.

Future Directions

- A proactive study with this current cohort to determine which individuals have access to healthcare.
  - This is significant because there may be a correlation to neighborhood deprivation and access to care.
- Using a different study cohort, to look at the likelihood of a cancer survivor developing a second cancer or experiencing relapse in comparison to their ADI Score.
  - We did not explore this question on our current study cohort because the patients in the TACLE Clinic are far along their recovery journey and unlikely to experience relapse or second cancers.

References

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