Source: https://www.ormanagement.net/aimages/2023/GSN0623_004a_8201_600.jpg

Expanding Hospital at Home to Vulnerable U.S. Communities through Area Deprivation Index (ADI): A Phased Approach to Measurement & Benchmarking

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Aim Statements

- **What is ADI?**
- **Why ADI for HaH?**
- **How have we applied measurement of socioeconomic deprivation to Hospital at Home?**
- **Future Directions & Next steps**

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CMS Evaluation of the AHCAH Waiver September 2024

STUDY AND REPORT.—

1. IN GENERAL.—The Secretary shall conduct a study to—
   A. analyze, to the extent practicable, the criteria established by hospitals under the Acute Hospital Care at Home initiative of the Secretary to determine which individuals may be furnished services under such initiative; and

''(i) quality of care furnished to individuals with similar conditions and characteristics in the inpatient setting and through the Acute Hospital Care at Home initiative, including health outcomes, hospital readmission rates, hospital mortality rates, length of stay, infection rates, and patient experience of care;

''(ii) clinical conditions treated and diagnosis-related groups of discharges from the inpatient setting and under the Acute Hospital Care at Home initiative;

''(iii) costs incurred by furnishing care in the inpatient setting and through the Acute Hospital Care at Home initiative;

''(iv) the quantity, mix and intensity of such services (such as in-person visits and virtual contacts with patients) furnished in the Acute Hospital Care at Home initiative and furnished in the inpatient setting; and

''(v) socioeconomic information on beneficiaries treated under the initiative, including racial and ethnic data, income, and whether such beneficiaries are dually eligible for benefits under this title and title XIX.

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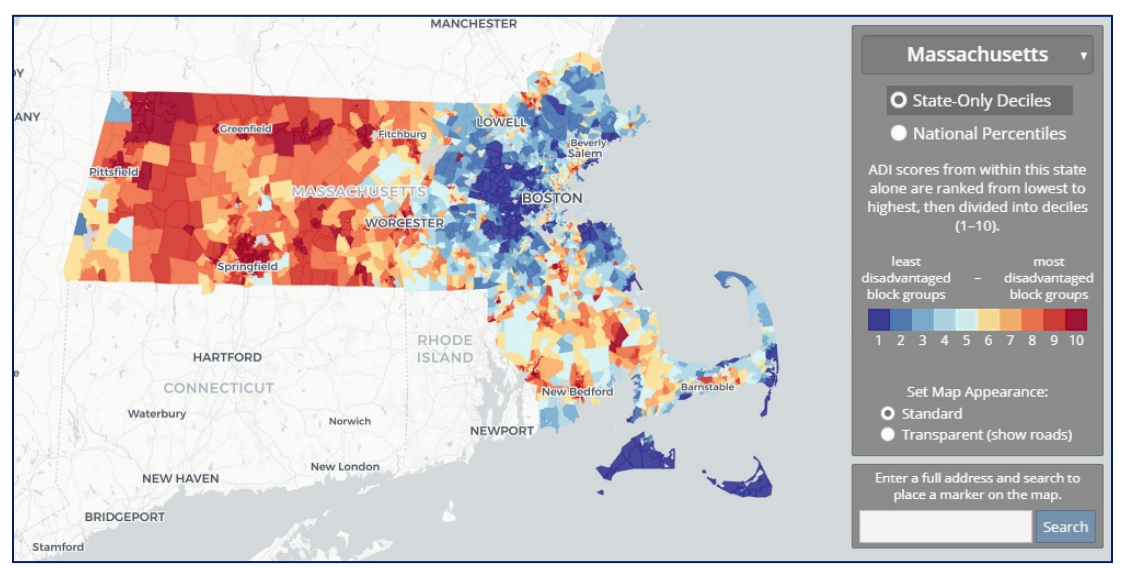
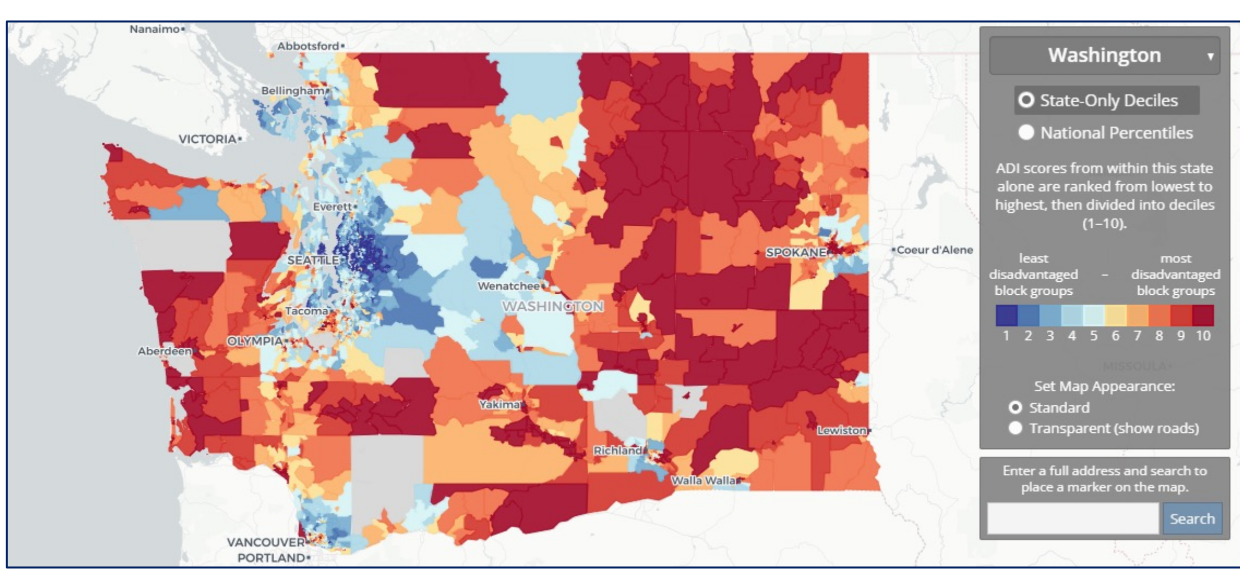
What is ADI?

Area Deprivation Index (ADI*), based on measures created by *Health Resource & Service Administration* (HRSA) over three decades ago, was refined and validated to Census Block Group "neighborhood" level by researchers at the University of Wisconsin-Madison.

- allows for rankings of neighborhoods by socioeconomic disadvantage in a region (e.g., state or national level)
- includes 17 factors for the theoretical domains of income, education, employment, and housing quality
- informs healthcare delivery and policy for most disadvantaged neighborhood groups
- Now applied to ACO Reach, HEDIS, CMS Health Equity Pillar, US News & World Report.





Source: https://www.neighborhoodatlas.medicine.wisc.edu/

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Why ADI? Evolving HaH quality indicator for health equity measurement

Area Deprivation Index (ADI) is an established measure of socioeconomic vulnerability, applicable to HaH

Research applications include: CHF re-admission rates, maternal perinatal mortality rates, cancer, CV mortality

Area Deprivation Index and Cardiac Readmissions: Evaluating Risk-Prediction in an Electronic Health Record

Amber E. Johnson, Jianhui Zhu, William Garrard, Floyd W. Thoma, Suresh Mulukutla, Kiarri N. Kershaw and Jared W. Magnani

Originally published 2 Jul 2021 | https://doi.org/10.1161/JAHA.120.020466 | Journal of the American Heart Association. 2021;10:e020466

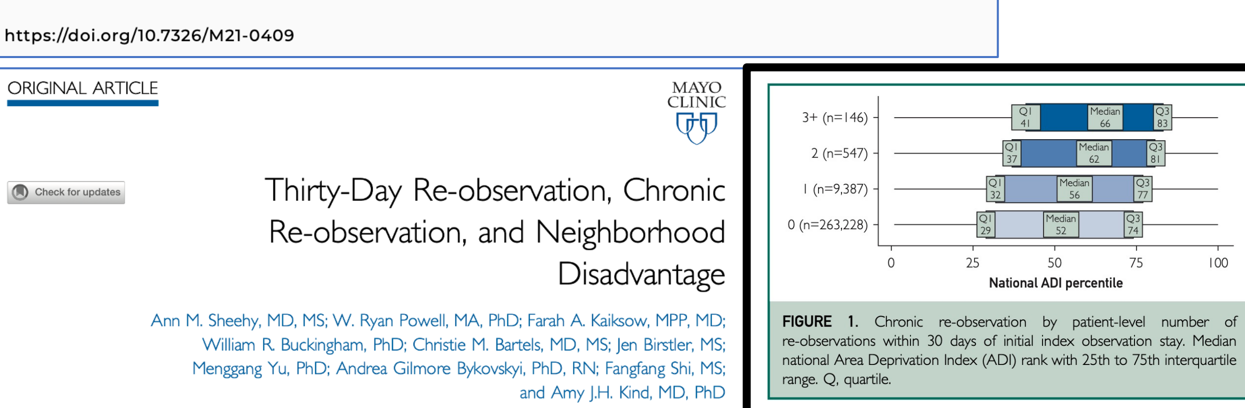
Other version(s) of this article

Factors Associated With Risk for Care Escalation Among Patients With COVID-19 Receiving Home-Based Hospital Care FREE

Shih-Hsiung Chou, PhD, Andrew McWilliams, MD, MPH, Stephanie Murphy, DO, ... View all authors +

Author, Article, and Disclosure Information

https://doi.org/10.7326/M21-0409


ORIGINAL ARTICLE

MAYO CLINIC

Check for updates

Thirty-Day Re-observation, Chronic Re-observation, and Neighborhood Disadvantage

Ann M. Sheehy, MD, MS; W. Ryan Powell, MA, PhD; Farah A. Kaiksow, MPP, MD; William R. Buckingham, PhD; Christie M. Bartels, MD, MS; Jen Birstler, MS; Menggang Yu, PhD; Andrea Gilmore Bykovskyi, PhD, RN; Fangfang Shi, MS; and Amy J.H. Kind, MD, PhD

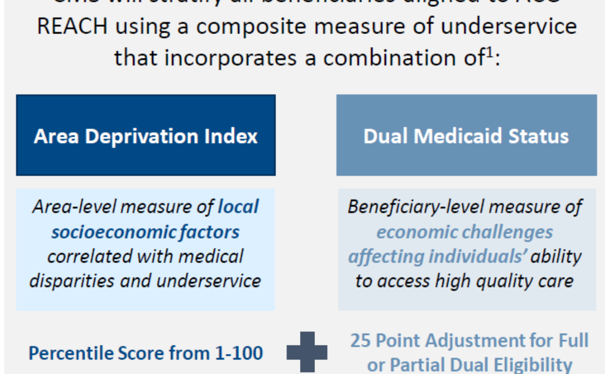


FIGURE 1. Chronic re-observation by patient-level number of re-observations within 30 days of initial index observation stay. Median national Area Deprivation Index (ADI) rank with 25th to 75th interquartile range. Q, quartile.

Health Equity Benchmark Adjustment

ACO REACH includes a benchmark adjustment that increases benchmarks for ACOs serving higher proportions of underserved beneficiaries

CMS will stratify all beneficiaries aligned to ACO REACH using a composite measure of underservice that incorporates a combination of[1]:

Area Deprivation Index

Area-level measure of local socioeconomic factors correlated with medical disparities and underservice

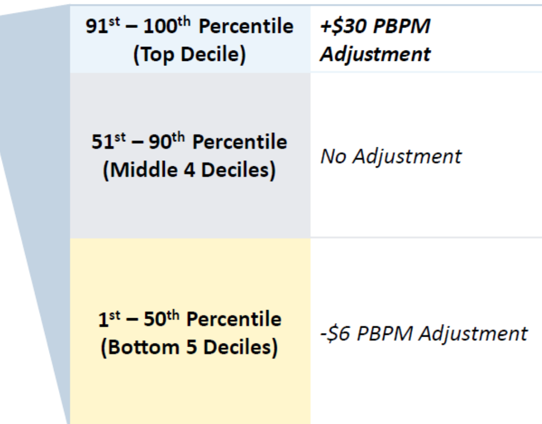
Percentile Score from 1-100

+

Dual Medicaid Status

Beneficiary-level measure of economic challenges affecting individuals' ability to access high quality care

25 Point Adjustment for Full or Partial Dual Eligibility



Percentile	Adjustment
91st – 100th Percentile (Top Decile)	***+$30 PBPM Adjustment***
51st – 90th Percentile (Middle 4 Deciles)	*No Adjustment*
1st – 50th Percentile (Bottom 5 Deciles)	*-$6 PBPM Adjustment*

How is ADI Calculated?

From the Census *5-Year American Community Survey*:

		ADI	NDI	SDI
Economic				
	GINI Index of Income Brackets	X		
	With Cash Public Assistance Income		X	
	Median Household Income		X	
	Median Family Income	X		
	Persons Below Poverty	X	X	X
	Unemployed Civilians	X		X
	Management, Business, Science and Arts Occupations	X	X	
	Service Occupations	X		
	Sales and Office Occupations	X		
Social				
	With Own Children Under 18 Years	X	X	X
	Less Than 9th Grade Education	X		
	High School Graduate or Higher	X	X	X
	Bachelors Degree or Higher		X	
Housing				
	Owner-Occupied	X	X	X
	Prenter-Occupied			X
	No Vehicles Available	X		X
	Lacking Complete Plumbing Facilities	X	X	
	No Telephone Service Available	X	X	
	Occupied Housing			X
	Median Home Value	X	X	
	Median Rent	X		

Why we chose ADI to enhance health equity measurement:

- ADI is a more robust indicator of poverty and inequity
- ADI may be refined at census block group level
- ADI has already been extensively used in research as a measure of inequality
- Recently updated index values (2021), publicly available
- In current use by Medically Home provider partners

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A Phased Approach to Area Deprivation Index (ADI)

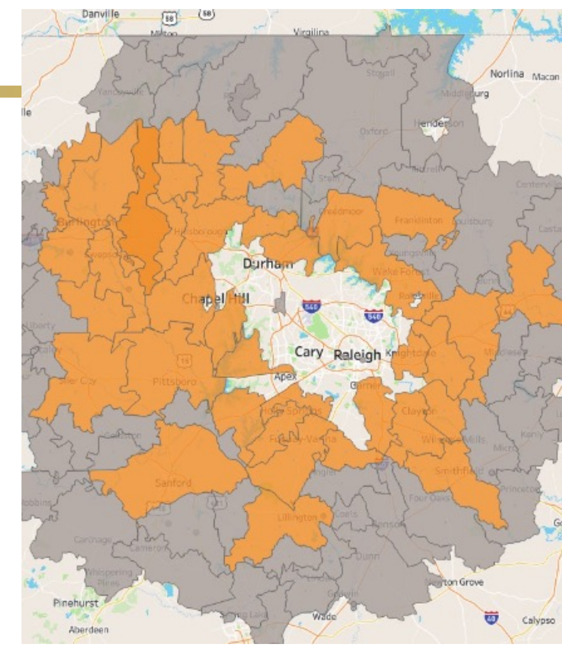
Phase 1 - Define ADI of zip code in which HaH patients primarily reside (by program); calculate weighted average of ADI decile values in a given zip code

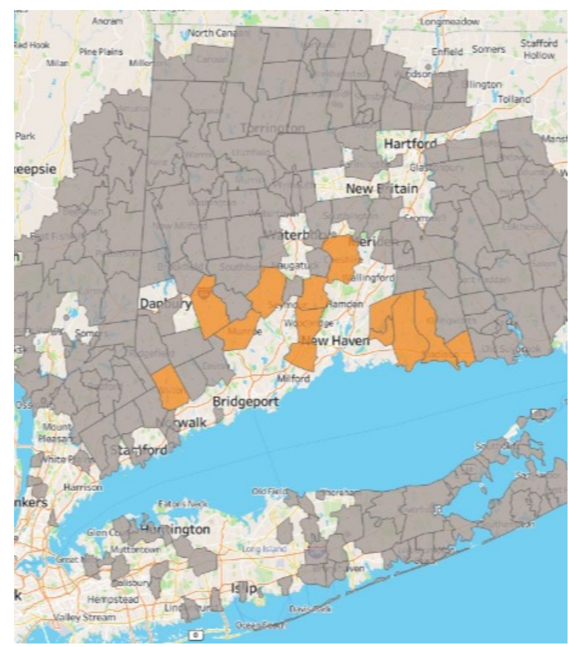
This is additional data normalization step serves to display ADI at zip code level, at which patient location is usually identified in EHR, claims, registry database.

Phase 2 – Via geolocation of patient address to Census Block Group, define ADI in which HaH patients primarily reside, at level of "neighborhood"

This improves precision of measurement to more granular geographic unit.

Phase 3 – ADI benchmarking of HaH unit patients against ADI decile representation of brick-and-mortar patients (may match to med surg)





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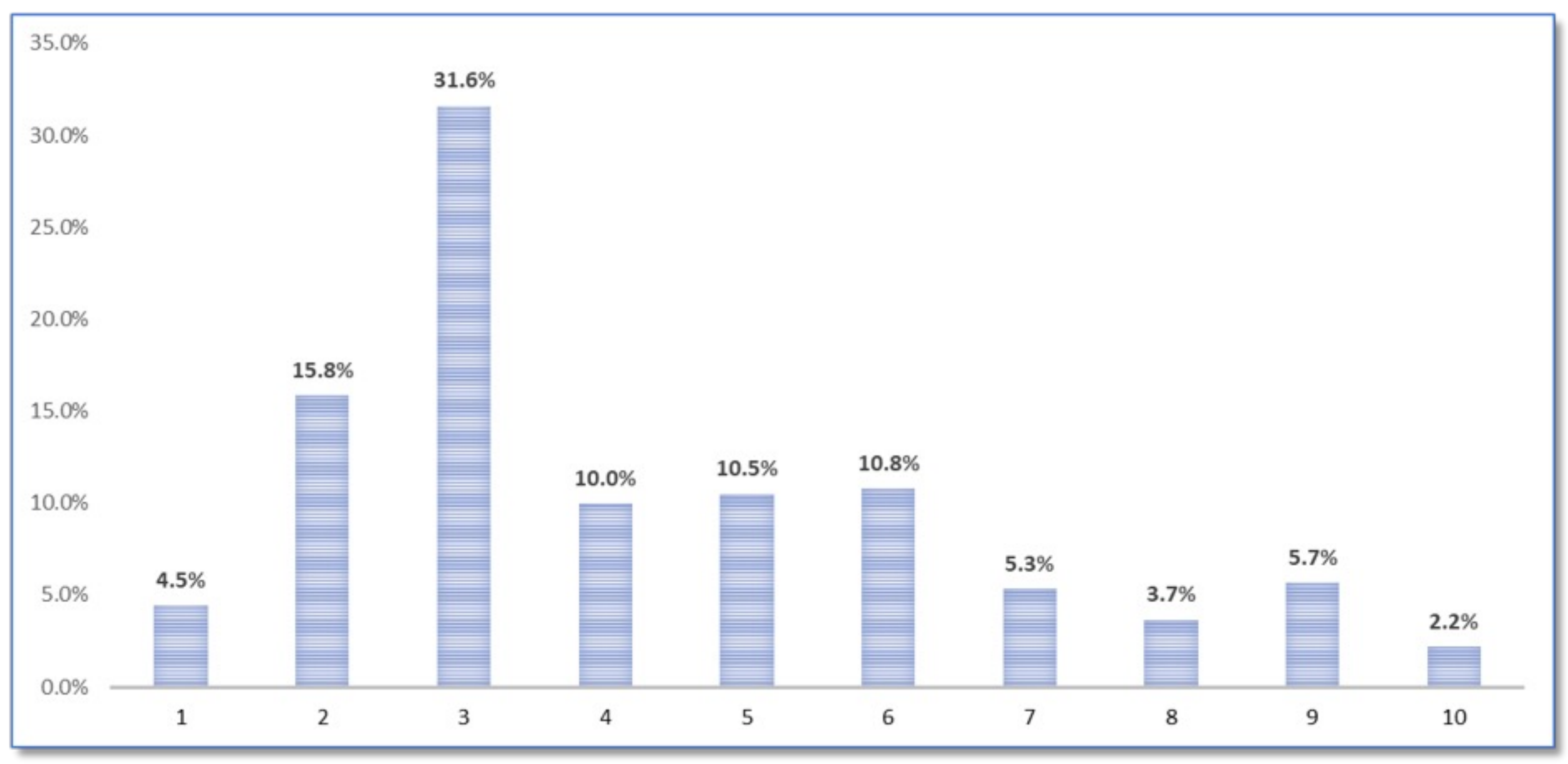
Phase 1: ADI decile representation across HaH programs

Process

- Access to Neighborhood Atlas
- Utilize patients' zip codes
- Weighted average of ADI by population by zip code
- Represent ADI deciles for HaH population



Representation across ADI deciles of HaH patient population

Considerations

- Patient zip codes are generally available data elements, can be normalized to census block group
- More reliable demographic-economic data is reported at census block and tract level
- This phase does not offer comparison to brick and mortar unit population

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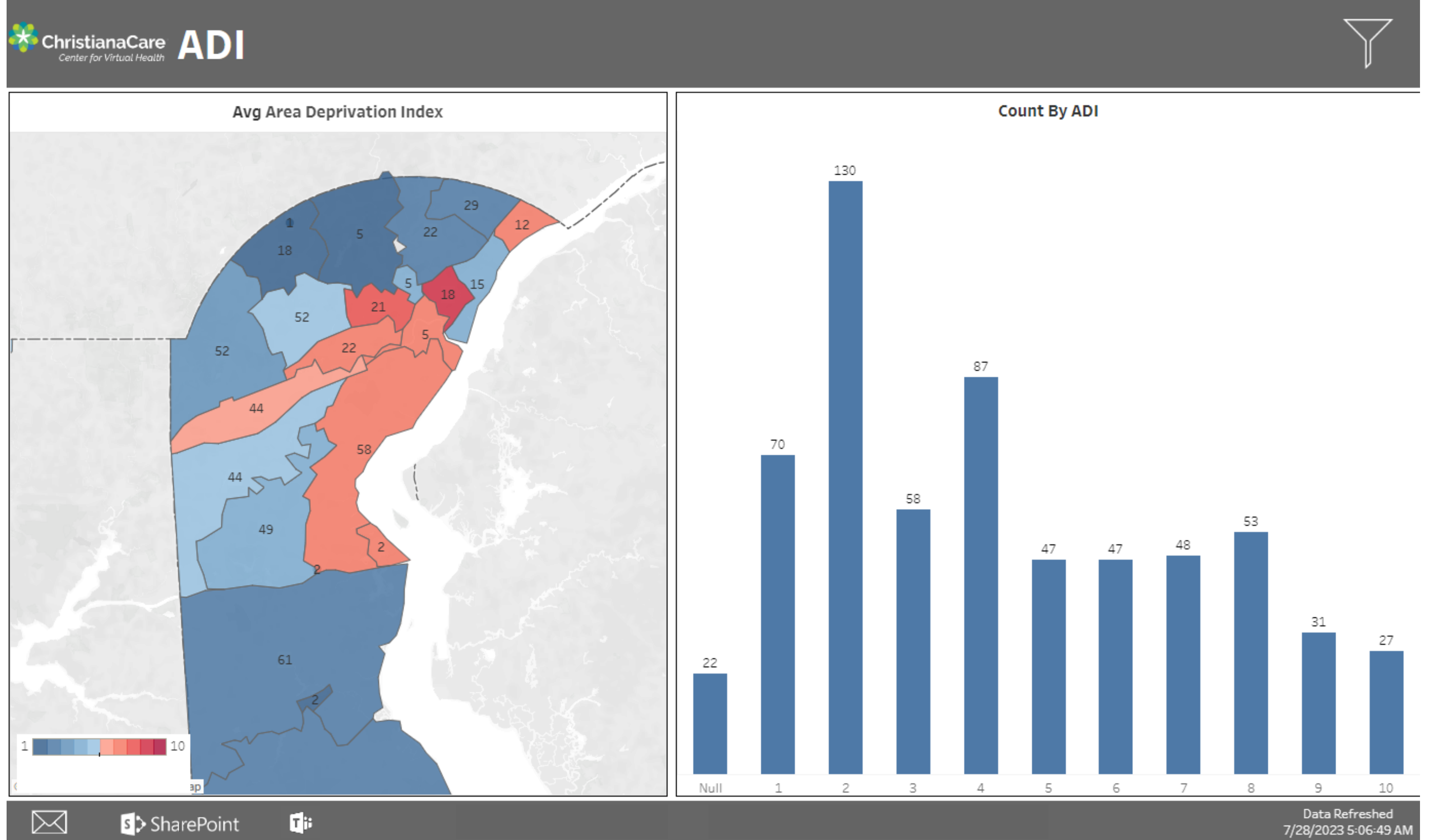
Phase 1: ChristianaCare HCH (HaH User Group Program-of-the-Year!)



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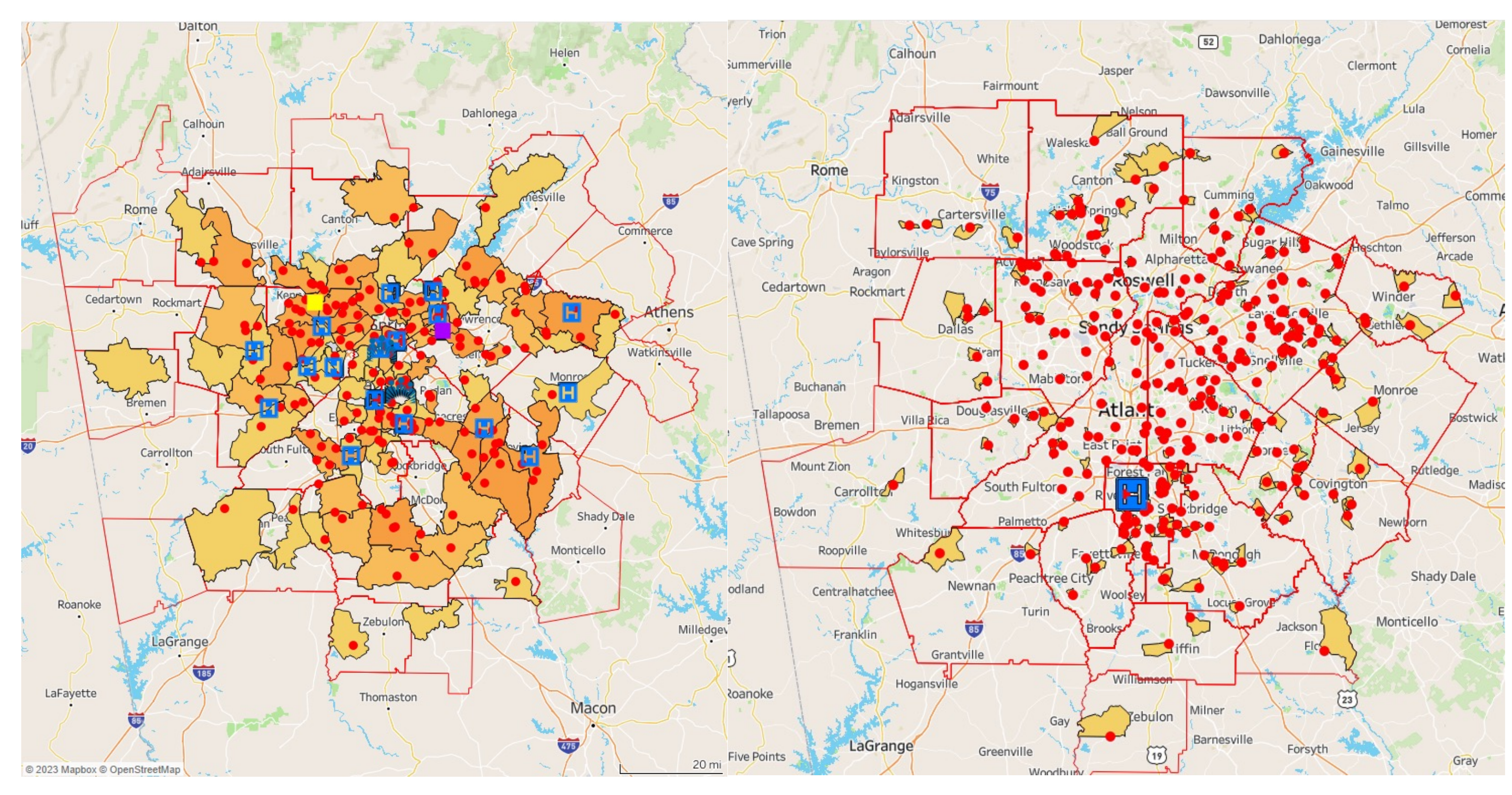
Phase 2: Geolocating at census block group for ADI

Process

- More granularity particularly important within an urban center (urban zip codes may be home to >100,000 ppl)
- Geolocation may require third party
  - API to census geolocator
  - EX: GeoPandas in R, Python

Considerations

- Importance of maintaining HIPAA compliance when using third party geolocation tools



Zip code | **Census Block Group**

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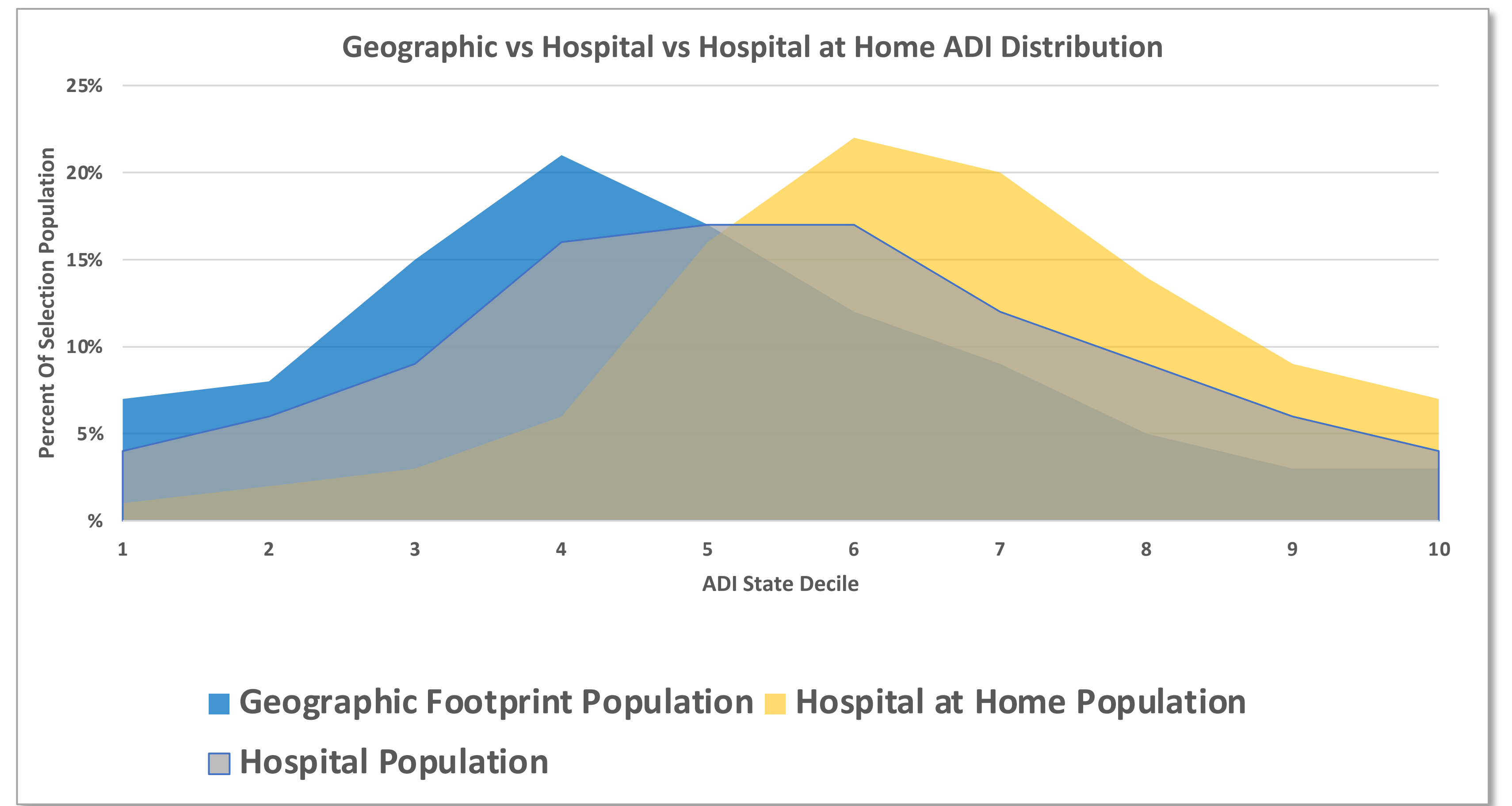
Phase 3: Benchmarking HaH unit ADI to brick & mortar patient ADI

Process

Geolocation of both virtual unit and brick and mortar patient to identify any differences between the two groups

Considerations

- May find comparable patient populations
  - Med surg discharges
  - Cohort of patients who declined HaH but otherwise eligible
  - ‘Off-hours’ control
  - Propensity score matched cohort
- Compare brick & mortar or HaH population to state or national sample



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Future Research Directions

Home-based acute care requires detailed understanding of health-impacting factors that are present in ADI.

ADI provides an index view of socioeconomic vulnerability for a patient population within a geographic unit, but does not identify individual indicators that drive scoring or specific structural biases that may exist in the underlying population.

Additional variables and SDoH that require further measurement to describe eligible HaH population:

- **Broadband penetration**, **density of housing**, **access to additional resources**
- **Remote/rural location of HaH residence**
- **Disease prevalence** and risk factors contributing to disease severity in population
- Payor representation & insurance mix of underlying population

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Conclusion

ADI is a robust index for socioeconomic vulnerability with applications to Hospital at Home for proxy measurement of social driver of health (SDoH) risk of underlying population.

This may be combined with insurance status, demographic variables, other SDoH variables captured during patient care to refine "socioeconomic information of beneficiaries" under CMS AHCaH waiver evaluation

There is further opportunity to think more holistically about health-impacting factors in decentralized care models and to push for a more tailored indicator.

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