



Improving Prediction of Medical Costs among Medicare Beneficiaries by Incorporating Social Determinants of Health Indicators in Risk Prediction

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OBJECTIVE

- To assess the association between social determinants of health (SDoH) and Hierarchical Conditions Categories (HCC) scores/Merit-based Incentive Payment System (MIPS) quality scores using regression methods (and machine learning)
- HCC score: provider level
- MIPS provider level

RECENT LITERATURE

- Public payers (e.g., the Centers for Medicare & Medicaid Services, CMS) and private insurers use risk adjustment to prevent adverse selection.
- Risk adjustment= f (patient’s age-gender categories, diagnostic conditions, provider related factors).
- Risk adjustment does not adequately control for Social Determinants of Health (SDoH) - i.e., demographic, socioeconomic, attitudes and values, community and access to care measures.
- Providers serving high-risk patients are often penalized under a value-based payment system (between 6.1% and 6.6% lower MIPS scores according to Johnston et al., 2021)

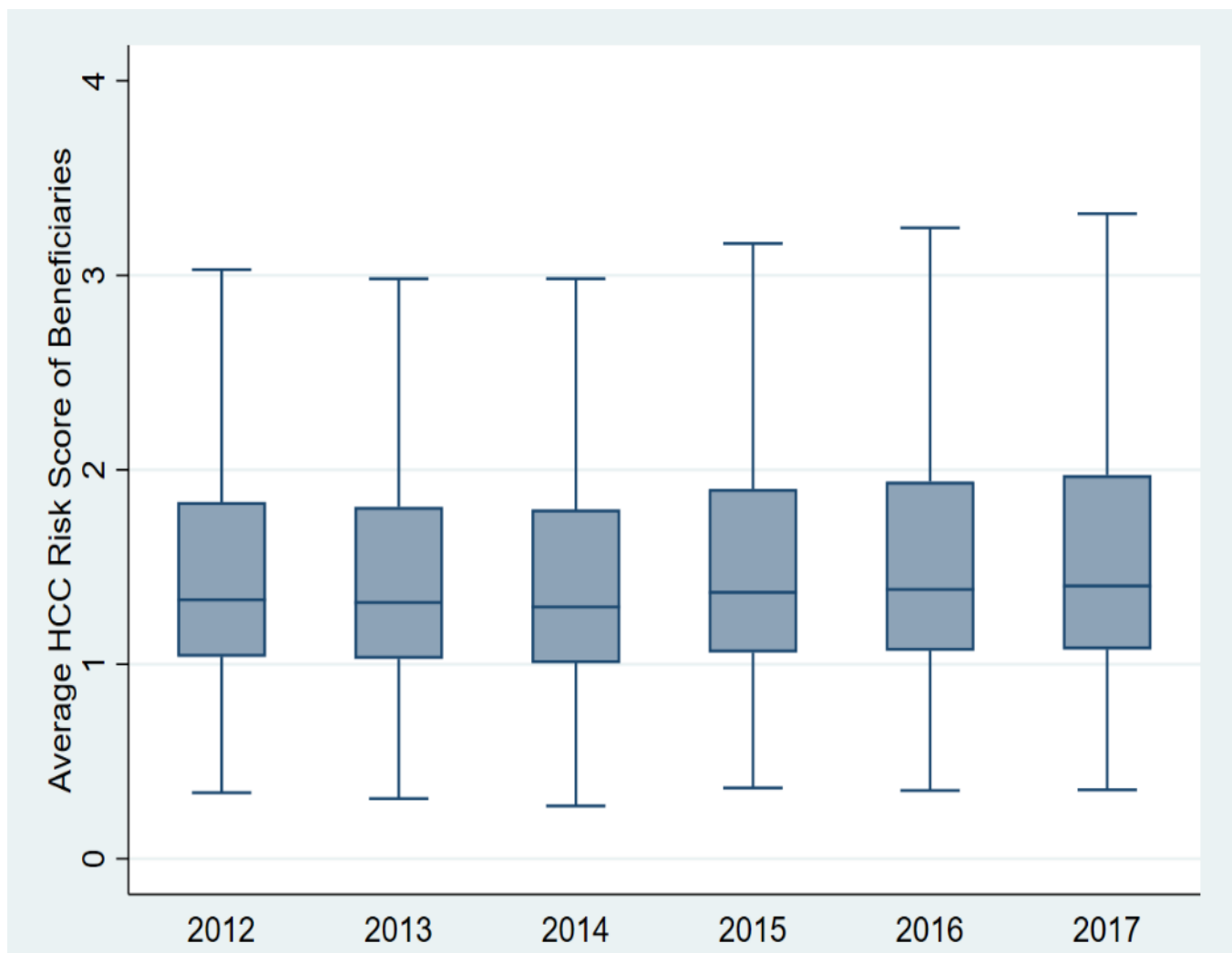
METHODS

- Data Sources:
 - Merit-Based Incentive Payment System (MIPS) Final Scores and performance category scores for clinicians [CMS]
 - Hierarchal Condition Category scores [CMS]
 - American Community Survey (ACS)
 - Area Health Resource File (AHRF)
- Method: Descriptive Analysis and Regression; linkage using NPI

RESULTS

CMS-HCC score by NCHS Urban-Rural Classification Scheme 2012-2017

Year	2012	2013	2014	2015	2016	2017
1-Large Central Metro	1.72	1.67	1.66	1.75	1.78	1.81
2-Large Fringe Metro	1.50	1.46	1.45	1.53	1.55	1.57
3-Medium Metro	1.49	1.46	1.44	1.52	1.55	1.57
4-Small Metro	1.42	1.40	1.39	1.47	1.50	1.52
5-Micropolitan	1.32	1.31	1.29	1.37	1.39	1.40
6-Noncore	1.30	1.29	1.27	1.35	1.37	1.39
Total	1.54	1.50	1.49	1.57	1.60	1.62



MIPS Score	Coefficient	t-statistic
% pop that does not speak english well	-0.145	-10.6***
% pop American Indian	0.071	9.23***
% pop Asian	0.007	2.05**
% pop Black	-0.012	-7.72***
% pop Hispanic	-0.015	-6.8***
Per capita income	0.000	-8***
% pop less than highschool education	0.076	15.18***
% pop no health insurance	-0.223	-40.21***
Distance(miles) to nearest urgent care	0.023	8.38***
Distance(miles) to nearest emergency department	-0.066	-5.43***
Distance(miles) to nearest medical-surgical ICU	0.022	2.55***
Distance(miles) to nearest trauma center	-0.076	-33.28***
Distance(miles) to nearest pediatric ICU	-0.009	-6.3***
Distance(miles) to nearest obstetrics department	-0.182	-20.24***
Distance(miles) to nearest health clinic	-0.047	-7.79***
Distance(miles) to nearest hospital with alcohol and drug abuse inpatient care	-0.006	-2.77***

Conclusions

- Incorporating social determinants of health may help improve risk prediction and thus could be useful for risk adjustment
 - HCC: unexpected signs
 - MIPS: disadvantaged areas have lower average MIPS score
- Caution
 - Interpretation – causal pathways indeterminant as SDoHs are interconnected
 - Justification – for providers who may lose

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