

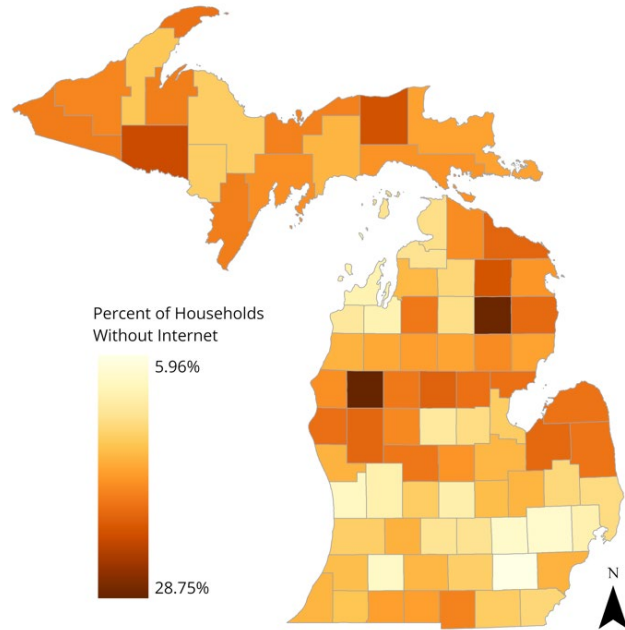
Why Area-Level Data on SDOH Can Be Useful

Nora V. Becker, MD, PhD
Assistant Professor of General Medicine
University of Michigan

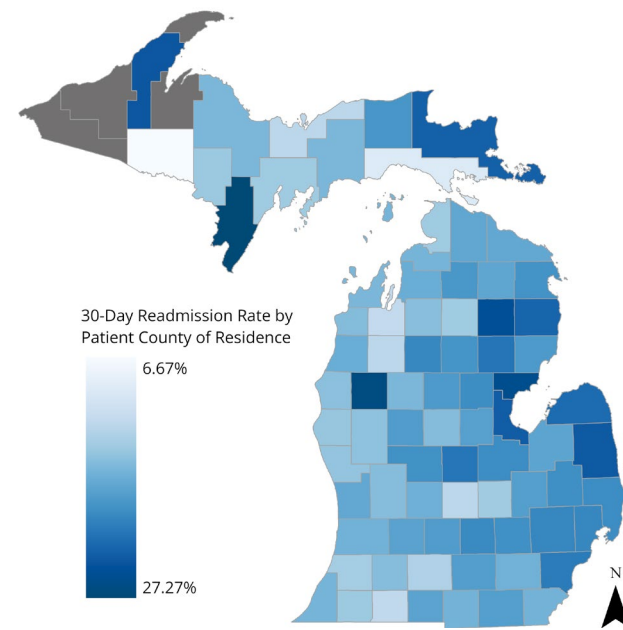
Why Use Area-Level SDOH Measures?

- The MVC analytics team just shared a lot of area-level social determinants of health metrics with you
- Why are these data useful?

Percent of households without internet



Post-admission readmission rate



Are Area-Level SDOH Measures Useful?

- These are area-level measures of SDOH associated with area-level measures of health utilization/health outcomes
- Do these area-level data accurately reflect individual-level associations between SDOH and health utilization and outcomes?

Yes, they do.

Let's briefly see a few examples for the data the MVC team just presented...

Home Internet Access & Computing

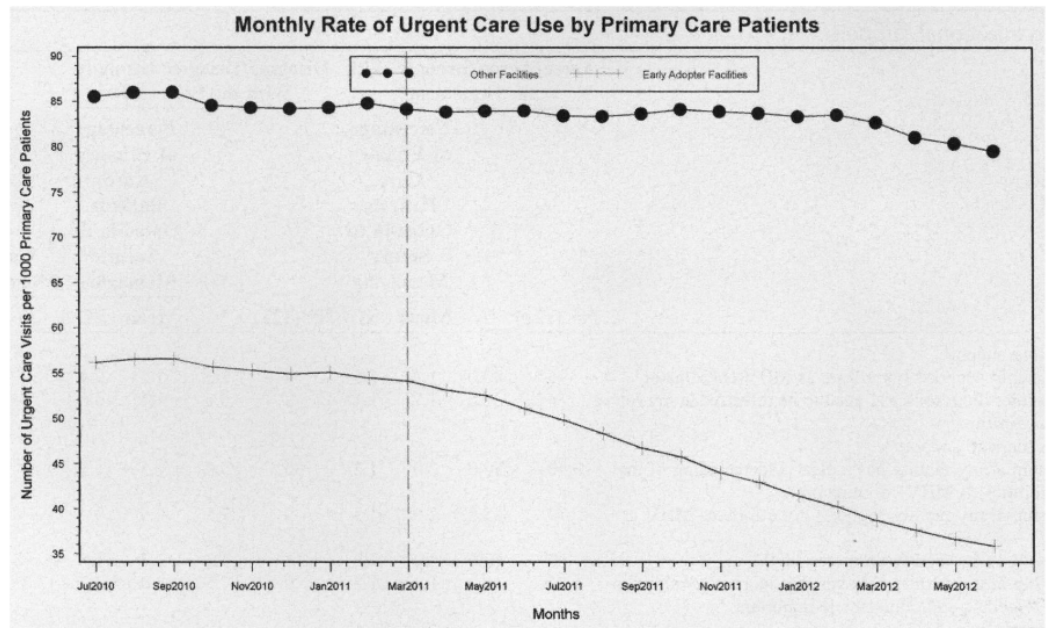
EXHIBIT 1

Difference In Performance On HEDIS Effectiveness-Of-Care Measures Among Patients Using And Not Using Secure E-Mail To Communicate With Their Physicians, Kaiser Permanente Southern California, 2008

HEDIS measure	HEDIS performance difference between users and nonusers of secure e-mail ^a	p value
PATIENTS WITH DIABETES		
HbA1c screening	6.9	$p < 0.0001$
HbA1c less than 9%	11.1	$p < 0.0001$
LDL-C screening	7.2	$p < 0.0001$
LDL-C less than 100 mg/dl	10.5	$p < 0.0001$
Retinopathy screening	8.3	$p < 0.0001$
Nephropathy screening	4.2	$p < 0.0001$
BP less than 140/90	6.6	$p < 0.0001$
BP less than 130/80	6.1	$p < 0.0001$
PATIENTS WITH HYPERTENSION ONLY		
BP control less than 140/90	4.0	$p < 0.0001$

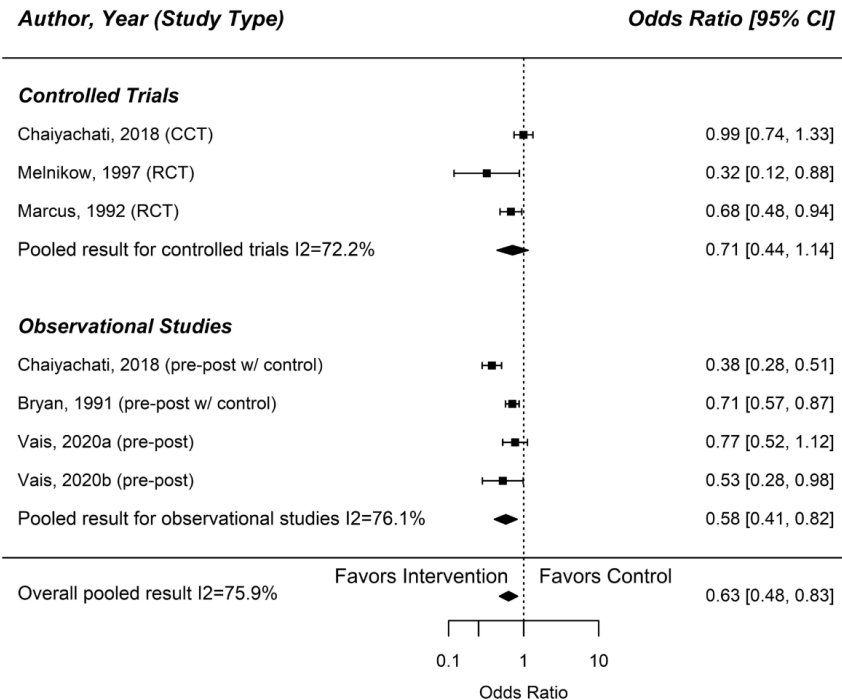
- 2010 study of 450,000 people enrolled with Kaiser Permanente with diabetes, hypertension, or both
- Examined the association between a patient having emailed with their PCP and HEDIS quality measures
- Controlled for patient demographics and the patient's PCP

Home Internet Access & Computing



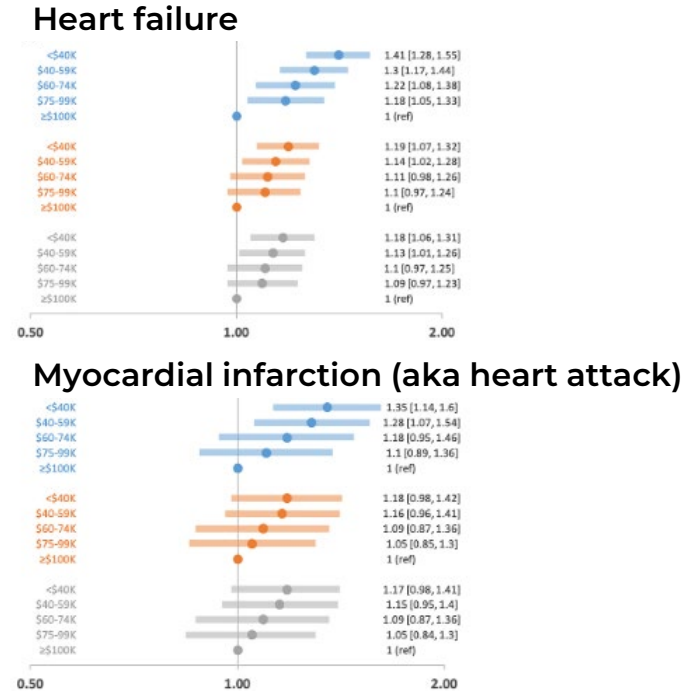
- 2013 study from the VA examining the adoption of a secure messaging (SM) system between patients and doctors
- Examined the changes in patient urgent care use before and after introduction of SM for facilities with higher and lower levels of SM use, “early adopter” facilities vs “later adopter” facilities

Vehicle Access



- 2022 meta-analysis of interventions that provided non-emergency medical transportation to patients
- Outcome was rates of missed appointments

Income, Financial Distress, & Food Insecurity



- 2019 study of 336,000 patients with atrial fibrillation
- Examined the association of patient income with heart failure and MI, adjusting for demographics and other clinical characteristics

Income, Financial Distress, & Food Insecurity

- 2015 literature review detailing the extensive associations between food insecurity and health outcomes and chronic conditions across the entire population

In children:

EXHIBIT 2

Summary Of Research On Food Insecurity And Health Among Children In The United States And Canada Published During 2006-14

Authors	Title	Data source	Central findings
Eicher-Miller et al. (Note 6)	Food insecurity is associated with iron deficiency anemia in US adolescents.	1999-2004 NHANES	↑ Iron deficiency anemia
Cook et al. (Note 8)	Child food insecurity increases risks posed by household food insecurity to young children's health.	1998-2004 Children's HealthWatch, various cities	↑ reported poor health
Howard (Note 9)	Does food insecurity at home affect non-cognitive performance at school? A longitudinal analysis of elementary student classroom behavior.	1999-2003 ECLS-K	↓ school performance
Whitaker et al. (Note 10)	Food insecurity and the risks of depression and anxiety in mothers and behavior problems in their preschool-aged children.	1998-2000 Fragile Families and Child Wellbeing Study	↑ maternal depression
Kirkpatrick et al. (Note 13)	Child hunger and long-term adverse consequences for health.	1994-2005 Canadian NLSCY	↑ asthma
Melchior et al. (Note 15)	Food insecurity and children's mental health: a prospective birth cohort study.	1997-2005 Québec Longitudinal Study of Child Development	↑ child depression/anxiety
McIntyre et al. (Note 16)	Depression and suicide ideation in late adolescence and early adulthood are an outcome of child hunger.	1994-2009 Canadian NLSCY	↑ teen suicidality
Chi et al. (Note 17)	Socioeconomic status, food security, and dental caries in US children: Mediation analyses of data from the National Health and Nutrition Examination Survey, 2007-2008.	2007-2008 NHANES	↑ dental disease

Income, Financial Distress, & Food Insecurity

- 2015 literature review detailing the extensive associations between food insecurity and health outcomes and chronic conditions across the entire population

In non-elderly adults:

EXHIBIT 3

Summary Of Research On Food Insecurity And Health Among Nonsenior Adults In The United States And Canada Published During 2004-14

Authors	Title	Data source	Central findings
Whitaker et al. (Note 10)	Food insecurity and the risks of depression and anxiety in mothers and behavior problems in their preschool-aged children.	1998-2000 Fragile Families and Child Wellbeing Study	↑ maternal depression
Muirhead et al. (Note 18)	Oral health disparities and food insecurity in working poor Canadians.	2007 nationally representative stratified random sample of working poor Canadians ages 18-64	↑ dental disease
Park et al. (Note 25)	Iron deficiency is associated with food insecurity in pregnant females in the United States: National Health and Nutrition Examination Survey 1999-2010.	1999-2010 NHANES	↑ iron deficiency in pregnancy
Heflin et al. (Note 26)	Food insufficiency and women's mental health: findings from a 3-year panel of welfare recipients.	Women's Employment Study, 1997-99	↑ maternal depression
Casey et al. (Note 29)	Maternal depression, changing public assistance, food security, and child health status.	Children's Sentinel Nutrition Assessment Program household-level survey, 1998-2001 (at emergency departments and primary care clinics)	↑ maternal depression
Seligman et al. (Note 31)	Food insecurity is associated with diabetes mellitus: results from the National Health Examination and Nutritional Examination Survey (NHANES) 1999-2002.	1999-2002 NHANES	↑ diabetes
Seligman et al. (Note 32)	Food insecurity is associated with chronic disease among low-income NHANES participants.	1999-2004 NHANES	↑ hypertension & high cholesterol

Income, Financial Distress, & Food Insecurity

- 2015 literature review detailing the extensive associations between food insecurity and health outcomes and chronic conditions across the entire population

In the
elderly:

EXHIBIT 4

Summary Of Research On Food Insecurity And Health Among Seniors In The United States Published During 2001-08

Authors	Title	Data source	Central findings
Ziliak et al. (Note 2)	The causes, consequences, and future of senior hunger in America.	CPS 2001-5, NHANES 1999-2002, PSID 1999-2003	↓ functional status
Lee and Frongillo (Note 36)	Factors associated with food insecurity among U.S. elderly persons: importance of functional impairments.	NHANES 1988-1994, National Survey of the Elderly in New York State 1994	↓ functional status
Lee and Frongillo (Note 37)	Nutritional and health consequences are associated with food insecurity among U.S. elderly persons.	NHANES 1988-1994, National Survey of the Elderly in New York State 1994	↑ reported poor health

Income, Financial Distress, & Food Insecurity

- 2016 survey of 411 patients with diabetes
- Examined associations between food insecurity and financial insecurity and health outcomes

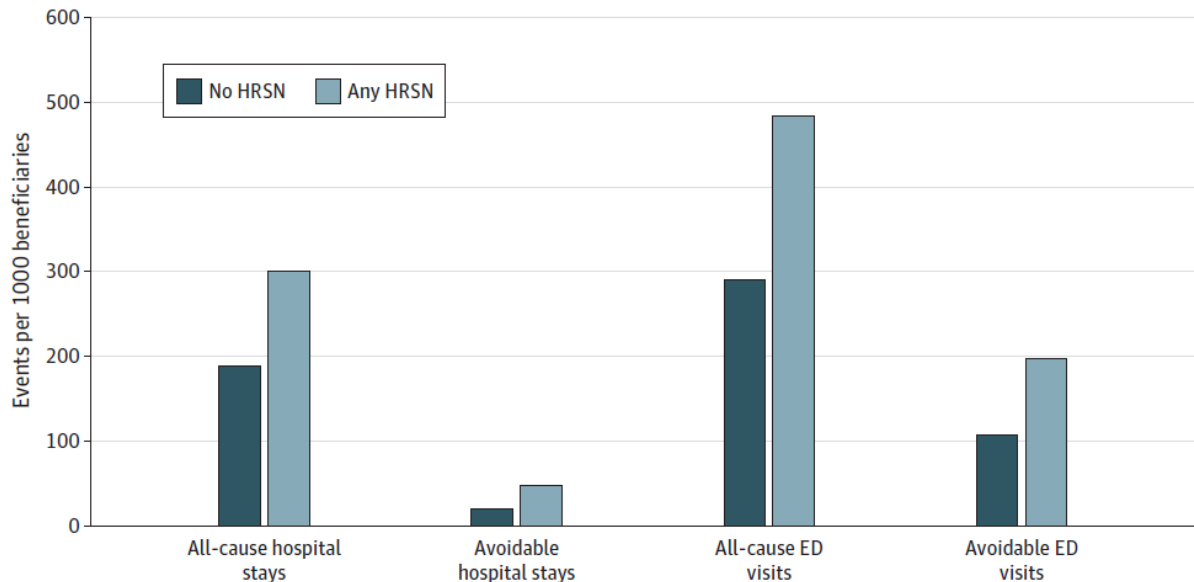
Table 3. Adjusted Comparisons of Material Need Insecurities With Control of Diabetes Mellitus and Use of Health Care Resources

	Poor Diabetes Control, OR (95% CI) ^a	IRR for Visits (95% CI) ^b	
		Outpatient	ED/Inpatient
Food			
Insecure	1.97 (1.58-2.47) ^c	1.19 (1.05-1.36) ^c	1.00 (0.51-1.97)
Secure	1 [Reference]	1 [Reference]	1 [Reference]
Cost-related medication underuse			
Insecure	1.91 (1.35-2.70) ^c	1.07 (0.95-1.21)	1.68 (1.21-2.34) ^c
Secure	1 [Reference]	1 [Reference]	1 [Reference]
Housing instability			
Insecure	1.10 (0.60-2.02)	1.31 (1.14-1.51) ^c	1.49 (0.81-2.73)
Secure	1 [Reference]	1 [Reference]	1 [Reference]
Energy			
Insecure	1.27 (0.96-1.69)	1.12 (1.00-1.25) ^c	1.31 (0.80-2.13)
Secure	1 [Reference]	1 [Reference]	1 [Reference]

Income, Financial Distress, & Food Insecurity

- 2022 survey of 56,000 Medicare Advantage enrollees asked about health-related social needs (financial strain, housing, food, utility, or transportation insecurity, and loneliness)

Figure 1. Unadjusted Rates of Acute Care Utilization by Presence of Health-Related Social Needs (HRSNs)



Are Area-Level SDOH Measures Useful?

- To summarize: the available literature strongly suggests that unmet health-related social needs are correlated with worse health outcomes and increased health utilization at the individual level
- But, individual-level health-related social needs are often unavailable
- Instead, we use area-level SDOH measures as a proxy for individual needs
- The reason we can do this is that we are confident these area-level proxies reflect underlying individual-level associations

References

- Canterberry M, Figueroa JF, Long CL, Hagan AS, Gondi S, Bowe A, Franklin SM, Renda A, Shrank WH, Powers BW. Association between self-reported health-related social needs and acute care utilization among older adults enrolled in Medicare Advantage. *InJAMA Health Forum* 2022 Jul 1 (Vol. 3, No. 7, pp. e221874-e221874). American Medical Association.
- Shekelle PG, Begashaw MM, Miake-Lye IM, Booth M, Myers B, Renda A. Effect of interventions for non-emergent medical transportation: a systematic review and meta-analysis. *BMC Public Health*. 2022 Apr 21;22(1):799.
- LaRosa AR, T O'Neal W, Lutsey PL, Chen LY, Bengtson L, Chamberlain AM, Alonso A, Magnani JW. Association of household income and adverse outcomes in patients with atrial fibrillation. *Heart*. 2020 Nov 1;106(21):1679-85.
- Shimada SL, Hogan TP, Rao SR, Allison JJ, Quill AL, Feng H, Phillips BD, Nazi KM, Haidary ST, Houston TK. Patient-provider secure messaging in VA: variations in adoption and association with urgent care utilization. *Medical Care*. 2013 Mar 1:S21-8.
- Martin P, Liaw W, Bazemore A, Jetty A, Petterson S, Kushel M. Adults with housing insecurity have worse access to primary and preventive care. *The Journal of the American Board of Family Medicine*. 2019 Jul 1;32(4):521-30.
- Gundersen C, Ziliak JP. Food insecurity and health outcomes. *Health affairs*. 2015 Nov 1;34(11):1830-9.
- Berkowitz SA, Meigs JB, DeWalt D, Seligman HK, Barnard LS, Bright OJ, Schow M, Atlas SJ, Wexler DJ. Material need insecurities, control of diabetes mellitus, and use of health care resources: results of the Measuring Economic Insecurity in Diabetes study. *JAMA internal medicine*. 2015 Feb 1;175(2):257-65.
- Zhou YY, Kanter MH, Wang JJ, Garrido T. Improved quality at Kaiser Permanente through e-mail between physicians and patients. *Health affairs*. 2010 Jul 1;29(7):1370-5.



Questions?