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## Medical, Social, and Other Determinants of Health Care Costs in MassHealth

Arlene S. Ash

*University of Massachusetts Medical School*

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# MEDICAL, SOCIAL, AND OTHER DETERMINANTS OF HEALTH CARE COSTS IN MASSHEALTH

Arlene S. Ash

Dept. of Quantitative Health Sciences  
UMCCTS 6th Annual Research Retreat

May 20, 2016



# A Collaborative Work-In-Progress

- Conflict of interest
  - This work is funded by the State and builds upon the DxCG risk scores that MassHealth licenses from Verisk Health, Inc. **I was a co-developer of the DxCG models and currently consult for Verisk**
- Many people have contributed to the current project
  - MassHealth and other state agencies
  - UMMS (QHS, Commonwealth Medicine)
  - Boston University
- All interpretations and conclusions in this talk are my responsibility, and do not necessarily reflect the opinions of anyone from the State

# Setting the Context

- State Medicaid programs like MassHealth are struggling to manage costs and care
- One strategy they're considering is moving from a **fee-for-service (FFS) payment model** to a **global payment model** in which money to care for the people it enrolls is transferred to each "full-service" contractor, such as: an HMO, insurance company, ACO, ...
- **What is the right amount of money?**

# MassHealth “Programs”

- Enrollees sign up with either a Primary Care Clinician (PCC) or with a Managed Care Organization (MCO)
- In PCC, payments are FFS; in MCO, they are based on a risk model
  - **Now: MCO plans are paid** using DxCG relative risk score (RRS) **based on age, sex, and diagnoses** from claims (encounter) records
  - **Goal: Add** social determinants of health (SDH) information to a payment model to be used for “almost everybody” starting in 2017

# Project Objectives

- We examined
  - Differences in characteristics and associated costs between PCC and MCO members
  - Can we improve predictions by adding SDH factors to RRS?
- We considered additional predictors
  - **Personal:**
    - **SDH:** homelessness, multiple address changes, income, education, language, race, ethnicity, income, ...
    - **Disability:** as a reason for Medicaid entitlement; as a client of the Dept. of Mental Health or Developmental Services
    - Selected **medical conditions:** asthma in kids, substance use disorders, ...
  - **Contextual (Neighborhood) SDH**
    - Based on census block groups or tracts
    - % living alone, % >age 25 w/o GED/HS, % w income < 100% FPL, ...

# Study Design

- **Population:** MassHealth members enrolled for 183+ days in each of CY2011 to CY2014 in the PCC or MCO populations
  - The numbers referenced here are from CY2013
- We use **concurrent models** to predict costs (that is, 2013 patient characteristics to predict 2013 costs) from the **relative risk score** (RRS) and additional factors (as just shown)

# Examining Model Performance: Looking at how well models predict for special populations

- Define model-based **predictive ratios (PRs)** for a subgroup G as

$$\text{PR (G)} = \text{Actual costs (G)} / \text{Model-predicted costs (G)}$$

- **PR > 1** when group G's costs exceed what the model would pay (**suggests underpayment** for that group)
- We seek models with PRs ~ 1 for most policy-relevant subgroups
- We also look at global measures, such as “percent of variability explained” (**R<sup>2</sup>s**)



# Comparing Costs (or Use) in PCC vs. MCO

Example: Excess MCO cost per RRS unit for non-disabled members (rounded numbers)

	PCC	MCO	Ratio of MCO to PCC
<b>N</b>	285,000	465,000	-
<b>Mean Cost</b>	\$3,700	\$3,800	1.03
<b>Mean RRS</b>	0.70	0.65	0.93
<b>Cost per RRS unit</b>	\$5,286	\$5,846	1.11
<b>Excess MCO Cost per RRS unit (expressed as a percent deviation from 1)</b>			11%

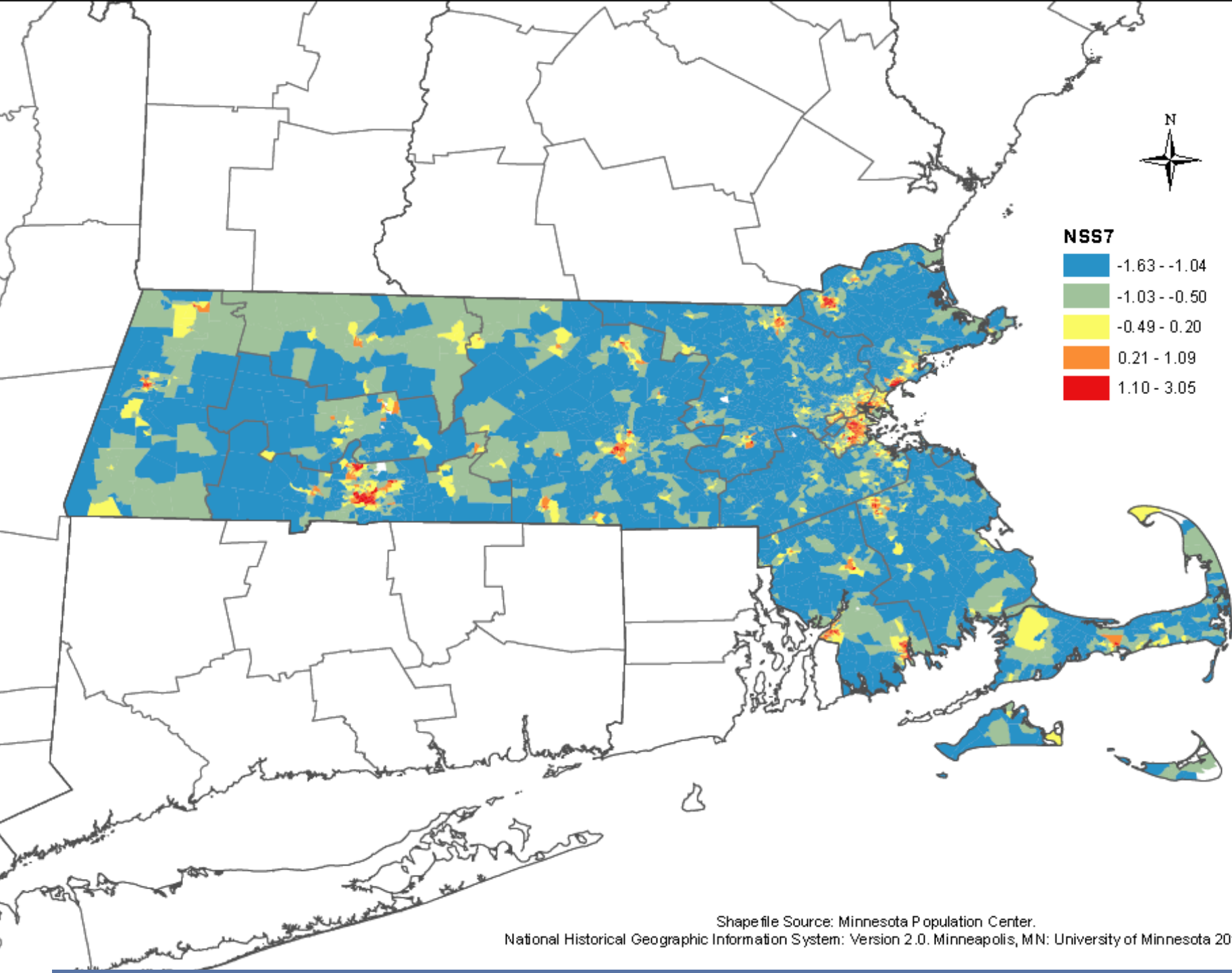
# We Can Improve the Risk Model

- RRS alone predicts total medical expense well (concurrent  $R^2 = 51.6\%$  in PCC and  $60.0\%$  in MCO)
- Expanded models are more accurate ( $R^2$ s =  $56.4\%$  and  $61.3\%$ ) and PRs closer to 1 for almost all subgroups
  - Eg, asthma in kids: PR was 1.24, is now 1.00 (0.90 in MCO)

Disability issues	Medical conditions
DMH client	Serious mental illness (SMI)
Not DMH but DDS client	Substance use disorder (SUD)
All other disabled	Diabetes
<b>Housing issues</b>	Asthma/COPD (Age $\geq 18$ )
Homeless, by ICD-9 coding	Asthma (Age $< 18$ )
$\geq 3$ addresses in a year	Polyneuropathy
<b>Neighborhood risk factors</b>	Schizophrenia
NSS7 [see next slide]	Post-traumatic stress disorder
% living alone	Profound/severe DD
Not able to geocode (flag)	

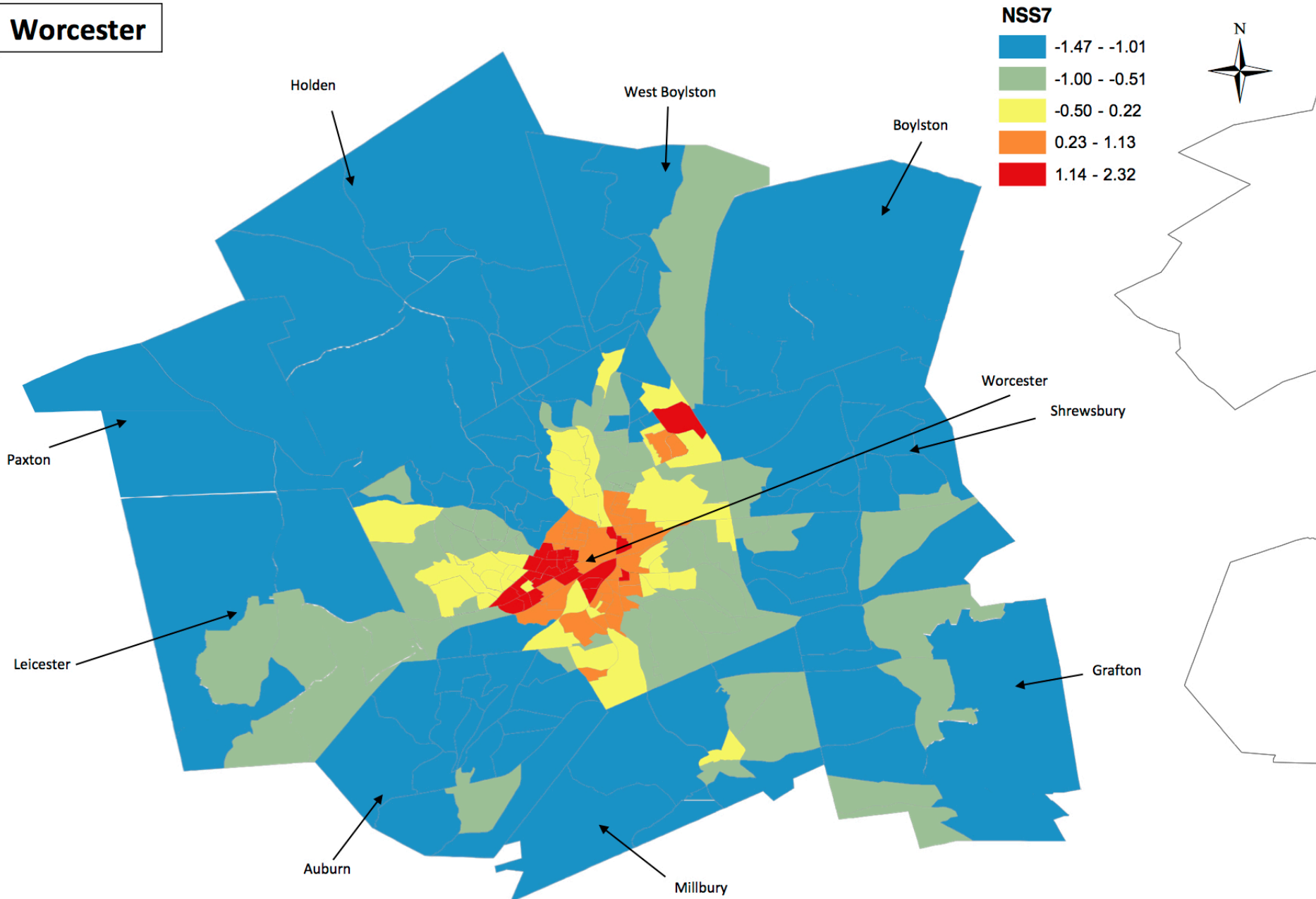
# NSS7 – A neighborhood stressor score based on 7 census variables

NSS7 [1st Principal Component]	2nd Principal Component
% Families, income <200% FPL	% Living alone
% Families, income <100% FPL	Some variables that were not used
% Families with public assistance	% Unemployed
% Families without a car	% Houses that are vacant
% Single parent	% Crowded
% With no high school degree	% English language problems
% Housing, renter occupied	% Minority
	% Hispanic



Shapefile Source: Minnesota Population Center.  
National Historical Geographic Information System: Version 2.0. Minneapolis, MN: University of Minnesota 2011.

# Worcester



# Reflections on SDH for MassHealth

- We can predict costs well with RRS alone – and better with SDH and other factors (e.g., disability)
- Surprisingly, MCOs spend more on their sickest people than similarly sick PCC members
- Models should reflect policy considerations, such as
  - We don't currently capture "homelessness" reliably
  - Vulnerable people (e.g., non-English speakers, or people living in stressed neighborhoods) may be underserved
  - Costs of new expensive therapies (e.g. Hepatitis C cure)
  - Hard to get the price right when Ns are small and costs are both high and highly variable (e.g., profound/severe DD)

# Reflections on SDH for MassHealth

- Likely trade-offs among long-term support services, housing assistance, and traditional medical costs
  - Risk models solve some problems and help identify others
  - Not easy to predict who “needs” expensive services
  - Not all problems can be solved with risk models
- The model is only a tool
  - It is “your servant” – “you are not its slave”
  - Some model coefficients (e.g., for “homelessness”) will be chosen “consistent with” – but not entirely driven by – the data

# SDH MassHealth Project

## Conclusions

- Risk factors, costs, and utilization of PCC and MCO members differ a lot
  - We still don't understand why as well as we should
- We build models to encourage (and support)
  - Efficient care for everyone
  - Excellent, well-coordinated care for the most vulnerable
  - Accuracy in recording the data needed to manage care
- Good risk adjustment is *dynamic and collaborative*
  - Consult with stakeholders to build best feasible models
  - Use risk-based payment and other policy tools to improve equity and efficiency
  - Use stakeholder concerns and modeling to identify mispricing
- Good models support *both*: **treating the underserved** and **improving the data needed to manage care**





**THANK YOU!**

**I WELCOME YOUR  
SUGGESTIONS AND FEEDBACK**

**ARLENE.ASH@UMASSMED.EDU**