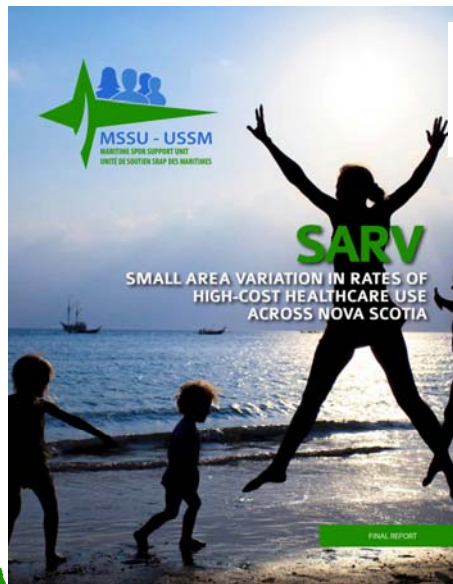


Small Area Rate Variation: Small area rate variation in the prevalence and characteristics of high-cost users of health services in Nova Scotia

George Kephart PhD
and the SARV Study Team

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<http://www.spor-maritime-srap.ca/news/all/mssu-research-reports>

Research Team

Collaboration between the MSSU and the Nova Scotia Primary and Integrated Health Care Innovations Network(NS-PIHCI)

Interdisciplinary Team:

Yukiko Asada, Department of Community Health and Epidemiology
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 Lynn Lethbridge, Maritime SPOR SUPPORT Unit
 Adrian Levy, Nominated Principal Investigator, Maritime SPOR SUPPORT UNIT
 Mikiko Terashima, School of Planning

Project Consultants:

Health Navigators from Your Way to Wellness, Cancer Care Nova Scotia and Nova Scotia Diabetes Centres



3

Research Team and Capacity

- **Maritime SPOR SUPPORT Unit (MSSU):** Evidence synthesis, patient engagement, knowledge translation, privacy and ethics, economic evaluation, epidemiology and study design, database and statistical analysis
- **NS Primary and Integrated Health Care Innovations Network:** Support, identify, and scale-up new approaches to the delivery of health services for individuals with complex needs across the life course
- **Inter-disciplinary study team:** university researchers, representatives from NS Dept. of Health and Wellness, and MSSU staff
- **Health Data Nova Scotia (HDNS)**
 - Maintains administrative health data available for research purposes
 - Data access procedures and protocols
 - Analytic expertise and tools
- **Patients and Health Navigators**
 - Your Way to Wellness
 - Diabetes Education Centres
 - Cancer Care NS Navigators



4

Why study small area rate variation?

- Striking small area rate variation (SARV) in health services use, care patterns and outcomes.
- SARV evidence can help increase accountability and provide impetus for targeted change.
- Studies have consistently shown that **less than 5%** of users account for the majority of health care spending in most jurisdictions.
 - These people are defined as **High Cost Users** (HCU).



5

Study objectives


- To estimate small area variations (SARV) in the prevalence rates of high-cost healthcare use among persons age 30 and older in Nova Scotia .
- To determine the extent to which SARV in prevalence rates of high-cost healthcare use are explained by age, sex and chronic disease patterns (type and multiple morbidities) of area residents



6

The study

Health Data Sets	Patient Engagement	Translation
<p>Data for all persons age 30+, 2010–2012 costs, disease indicators, multi-morbidity, end-of-life, care patterns</p> <p>Geo-coding of Communities Postal Code FSAs</p> <p>Estimation of area rates of high cost users demography, end-of-life, disease patterns and multi-morbidity, type of care, determinants of health</p>	<p>Engaged early in study design and through analysis of results.</p> <p>Provided highly valuable contribution</p> <ul style="list-style-type: none"> contextualizing high cost service use by area info on chronic disease management programs by area recommend further research areas 	<p>Identify areas of high and low rates of high cost use</p> <p>Categorize regions by possible contributing cause of high or low rate of high cost use</p> <ul style="list-style-type: none"> demographic, disease pattern and other/s began high level inquiry on other contributing causes for high cost use



7

Data and Linkage

- *Health Data Nova Scotia:*
<http://medicine.dal.ca/departments/department-sites/community-health/research/hdns.html>
- Provincial health services registration file:
 - Eligibility dates
 - Demographics
 - Place of residence: postal code
- Vital statistics: end-of-life
- Physician: fee-for-service (or “shadow billing”) physician claims
- Hospital discharge abstracts



8

Costing

- Physician: fee-for-service claims
- Inpatient Hospital:
 - Resource intensity weights
 - Average cost per weighted case
- Annualized annual combined cost
 - Exclusion: <365 days exposure over 3 years
- High cost users: top 5% of average annualized costs



9

Cost Predictors

- Area: 78 small geographic areas (Postal code FSA)
- Demographics: Age X sex
- End-of-life: proportion of each person's observation time which is in the last year of life
- Chronic disease patterns
 - Canadian Chronic Disease Surveillance system case definitions (9 common chronic conditions)
 - Dementia
 - Injury
 - Multi-morbidity: number of conditions
- Area level variables



10

Modeling

- Individual-level data
- Random intercept logistic regression models predicting high-cost use
- Estimated small area rates from area random effect: 78 areas based on postal codes
- Sequential models with incremental adjustment
 - Crude rates
 - + Age-sex adjustment
 - + End-of-life adjustment
 - + Chronic disease adjustment



11

KEY FINDINGS



12

Key Finding # 1

Most health spending is consumed by a small proportion of the population

- Top 1% of healthcare users account for 33% of total inpatient hospital and physician costs.
- Top 5% of healthcare users account for 64% of total inpatient hospital and physician costs.

Centile	% of total spending
Top 1%	33.4
Top 5%	63.8
Top 10%	77.3



13

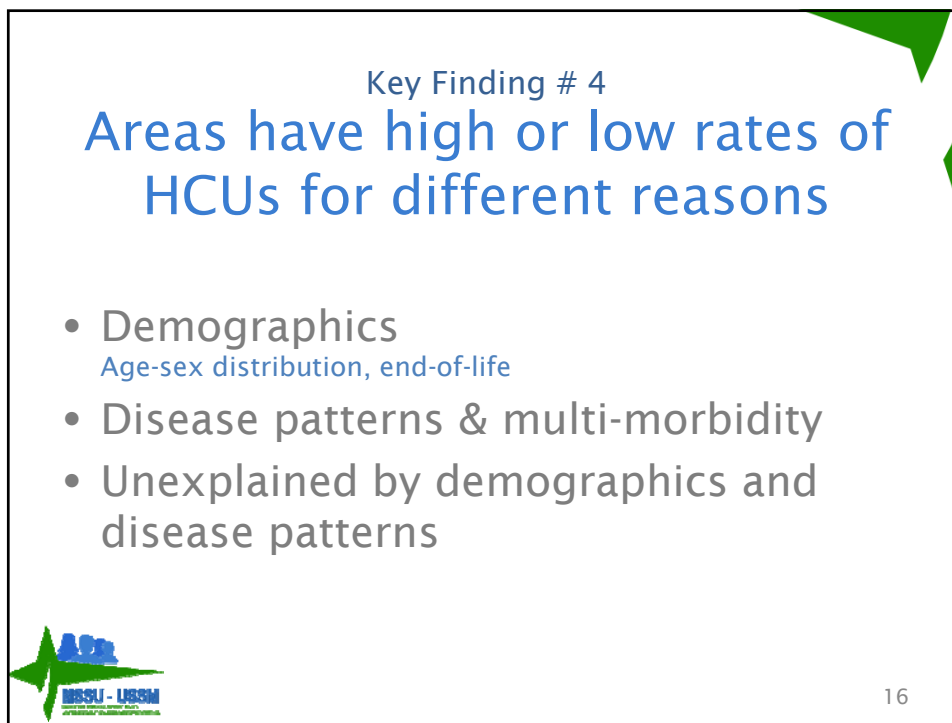
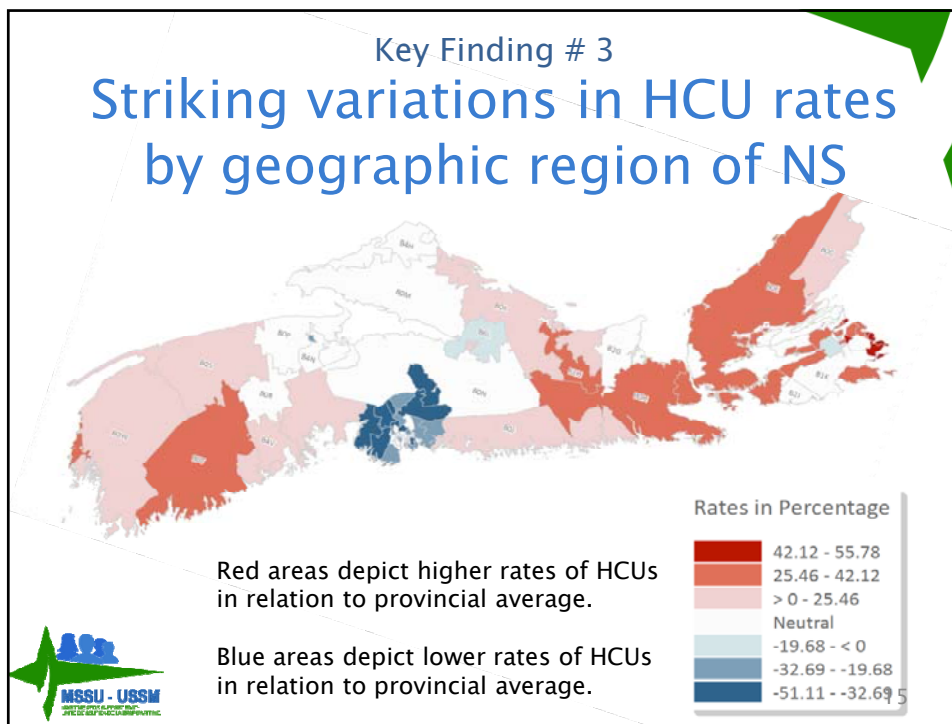
Key Finding # 2

Increasing efficiency of care delivery to HCU's could have a big impact on health care costs

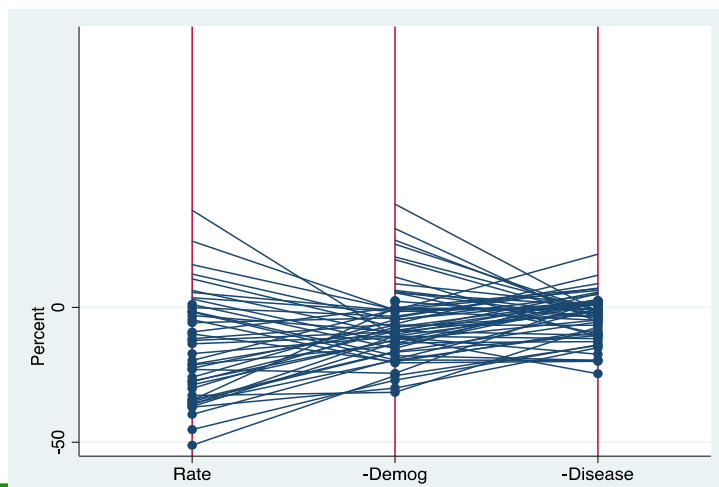
Reduction in Costs by High Cost Users	Potential Annual Returns to Provincial Health System (\$million)
5%	\$35
10%	\$71
15%	\$106
20%	\$142



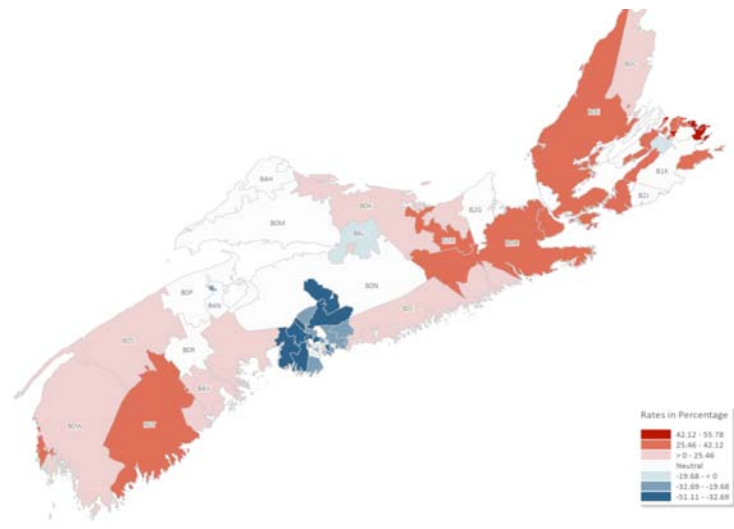
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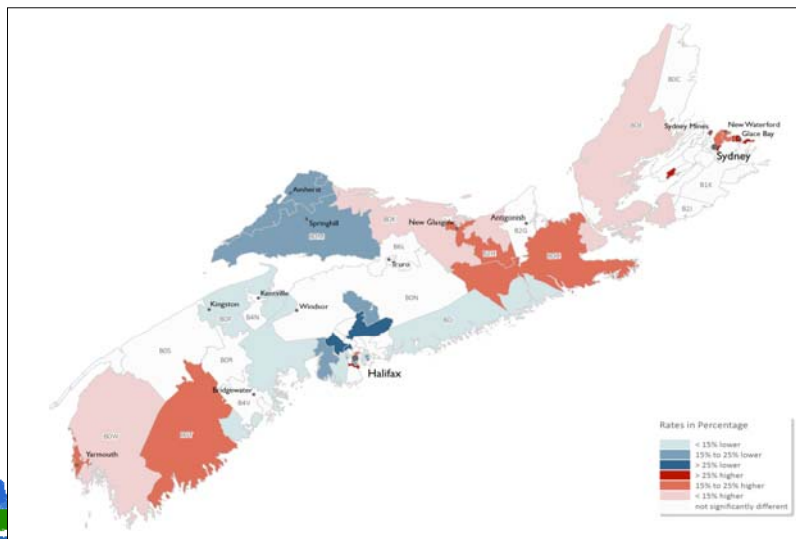
Changes in Area Estimates of Rates of High Cost Use with Sequential Adjustment for Demographics and Chronic Disease



SARV in Rates of High-Cost Health Care Use Before Adjustment

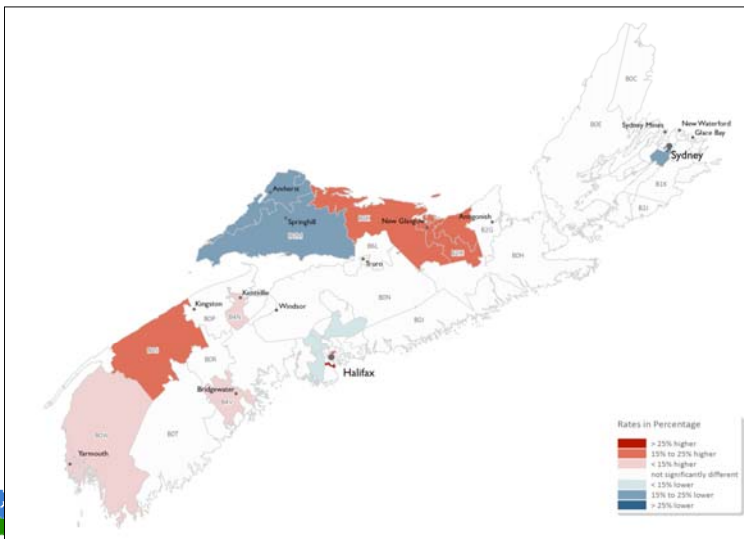


SARV in Rates of High-Cost Health Care Use After Adjustment for Demographics

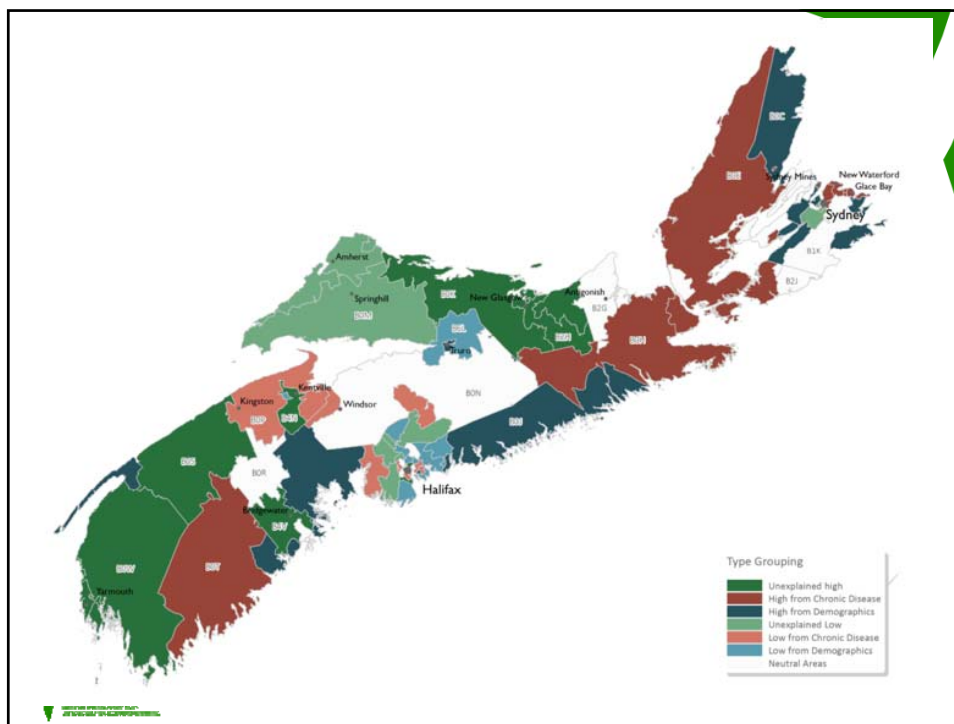


19

SARV in High-Cost Health Care Use After Adjustment for Demographics and Disease Patterns



20



Contributing Factor:	Demographics	Disease Patterns	Other Factors
Areas with High Rates of High Cost Use:	Cape Breton North (Ingonish Area) – Rural South East (Halifax County Area) – Rural West – Digby – Rural Port Morien Louisbourg East Bay North Sydney South Central Truro Central	Cape Breton West (Inverness Area) – Rural North East (Guysborough Area) – Rural South (Caledonia) – Rural Glace Bay Reserve Mines Dominion New Waterford Sydney North Sydney North Central North Sydney North Eskasoni	North Shore (Tatamagouche Area) – Rural Valley (Middleton) – Rural South West (Yarmouth Area) – Rural New Glasgow Dartmouth North Halifax Central Halifax South Kentville Bridgewater Yarmouth
Targeted Policy Response:	Planning for ageing populations	Disease Prevention Interventions	Disease Management Programs
Areas with Low Rates of High Cost Use:	Cape Breton South – Rural Dartmouth North Central Dartmouth East(East Lawrencetown / Preston / Mineville / Upper Lawrencetown Dartmouth Northwest (Burnside) Porters Lake Eastern Passage Harrietsfield Lower Sackville South Lower Sackville North Coldbrook Truro Colchester County	Valley (Wolfville) – Rural Lantz Dartmouth(Morris Lake / Cole Harbour) Dartmouth East Central(Portland Estates / South Woodside / Woodlawn) Halifax Lower Harbour Halifax Mid-Harbour Halifax Bedford Basin Halifax North West Arm Halifax West (Bayers Lake / Clayton Park) Tantallon Wolfville	North (Nb Border) – Rural North (Fundy Shore – Parrsboro) – Rural Sydney Southwest Sydney Central Enfield / Fall River(Yhz) Lakeside Bedford Southeast Bedford Northwest Lower Sackville West Amherst

Key Finding # 5

Patient experiences and characteristics of areas shed light on the 'other' factors that contribute to rate of HCUs

Potential 'other' factors:

- Multi-morbidity
- Socio-economic health determinants
- Care coordination & continuity of care
- ALC & discharge planning
- Chronic disease management
- Inter-provincial health care use

Multi-Morbidities among HCUs

75% of high-cost users have ≥ 2 conditions

25% of high-cost users have ≥ 4 conditions



23

Summary

1. **Inequality in health care use:** Concentration of healthcare spending in a small segment of the population
2. **Variation:** Rates of high cost use by area to uncover regional patterns
3. **Types of areas:** Areas have high or low rates of high cost use for different reasons



24

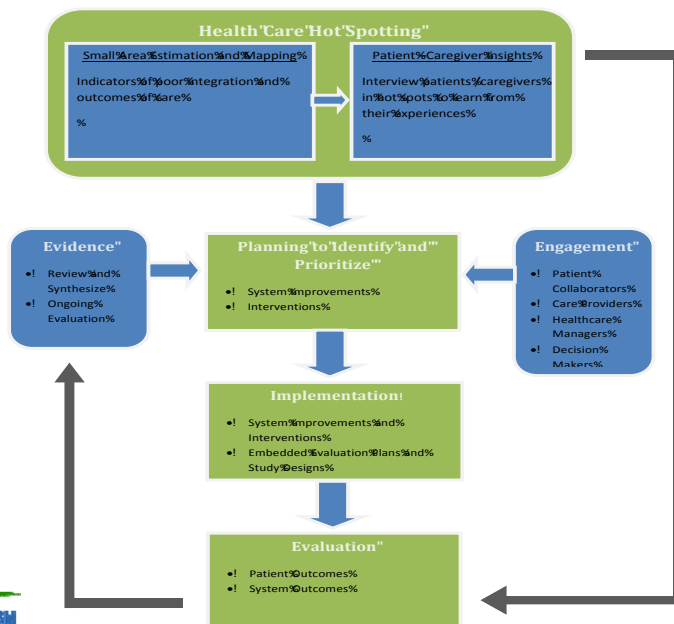
Next Steps

- *Constructive Tension*: Identify types of areas to guide targeted policies and resource allocation.
- *Hot Spotting*: Identify and learn from HCUs at point of care (e.g. EDs, hospitals)
- *Atlas project*
- *Further SARV work*
- Design dedicated programs/services for high-cost users, and evaluate their impact?



25

A "Learning" Health System to "Address the Needs of High Cost," Complex Patients"



26