

# **Income-related Equity in the Utilization of Health Care in Ontario: Comparison of Self-report and Actual Utilization**

**Michel Grignon, Jeremiah Hurley, and Li Wang**

Centre for Health Economics and Policy Analysis

McMaster University

Project supported by the Ontario Ministry of Health and Long-term Care as part of a joint pilot project between the OMHLTC, Statistics Canada and McMaster University that made administrative data available in McMaster's SC-sponsored Research Data Centre. Funding by the OMHLTC to the Centre for Health Economics and Policy Analysis is also acknowledged. All views expressed are those of the authors.

# Equity in Health Care Utilization

- Fundamental goal of health care system
  - Allocate care according to need
- Assess equity-related performance of system
  - Disease/condition-specific analyses
  - Health-survey-based analyses

# Survey-based Approaches

- Population-based analyses
- GP, specialist and hospital services
- General health indicators
- Regression-based to isolate impact of income in utilization process
- Explosion of interest since development of concentration-index approach through ECuity Project (O'Donnell et al. 2008)
- Widely applied to Canadian data

## Limitation: Self-report data

- Measurement error
- crude

# Comparison of Inequity in Utilization: Self-report vs. Administrative Data

## Linked CCHS-OMHLTC utilization data

- Self-reported
  - GP and specialist visits
  - number of inpatient hospital night
- Administrative
  - Count and dollar value of physician services by fee-schedule code
  - Hospital inpatient admissions
  - Day procedures
- CCHS masterfile
  - continuous income measure
  - More detailed health status measures

# Measuring Income-related Inequity in Utilization

## 3 Critical Pieces of Information for each person

- a. Actual utilization
- b. Need-related utilization
- c. Income

Assess extent to which difference between (a) and (b) is correlated with (c)

Two challenges:

1. Observe (a) and (c): how do we get (b)?
2. How to measure relationship between deviation from need and income

# Deriving Need-standardized Utilization

1. Estimate the best utilization model possible, including both needs-based factors and non-needs-based factors that influence utilization

$$u_i = \alpha + \sum_k \beta_k x_{ki} + \sum_m \gamma_m z_{mi} + \varepsilon_i$$

where:  $x_{ki}$  are needs-related variables  
 $z_{mi}$  are non-need drivers of utilization

2. Generate the needs-predicted utilization

$$\hat{u}_i^N = \hat{\alpha} + \sum_k \hat{\beta}_k x_{k,i} + \sum_m \gamma_m \bar{z}_m$$

where:  $\bar{z}$  = mean of each  $z$  in the sample

3. Calculate the indirectly needs-standardized distribution:

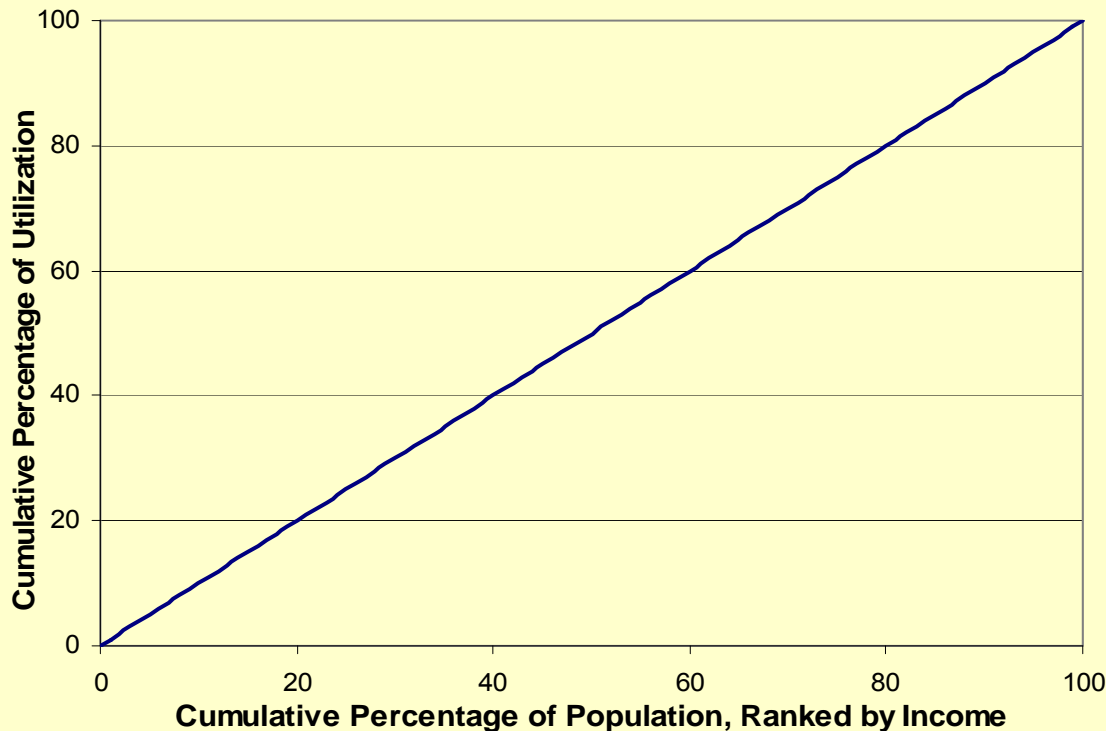
$$u_i^{IS} = u_i - \hat{u}_i^N + \bar{u}$$

# Measuring Income-related Inequality

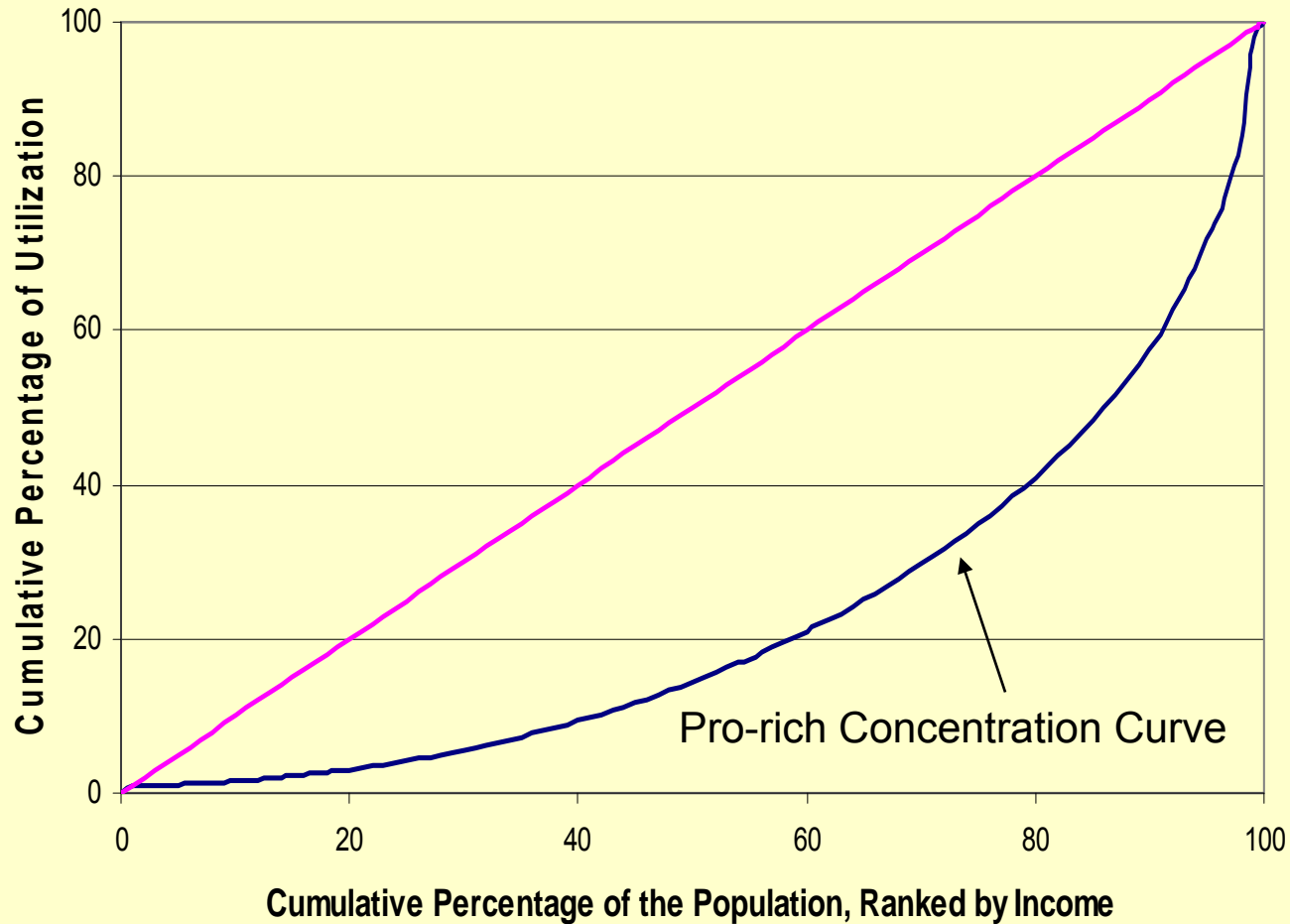
## Concentration Curve

Suppose there was no relationship between income and utilization

- bottom 10% of income distribution used 10% of service, bottom 25% used 25% of services, etc.



# Concentration Curve: Pro-rich Relationship between Income and Utilization



# Concentration Index

- CI is equal to twice the area between the concentration curve and the diagonal
- Value falls in the interval  $[-1, 1]$ 
  - CI equal to zero indicated no income-related inequality
- By convention:
  - pro-poor distributions take on negative values
  - pro-rich distributions take on positive values
- Interpretation:
  - CI is approximately the proportion of utilization that must be redistributed to achieve a CI of zero

# Data

## ***Canadian Community Health Survey, Cycle 1.1***

- Self-report measures of GP, specialist and hospital utilization
- Household income
- Health status, demographic and related measures

## ***OHIP Physician Services Utilization***

- Number and dollar value of physician services

## ***CIHI Discharge Abstract Database***

- Inpatient hospitalizations
- Day procedures

# Utilization Measures

## CCHS

## Administrative Data

---

GP Utilization	<ul style="list-style-type: none"> <li>•Self-Reported # GP visits</li> </ul>	<ul style="list-style-type: none"> <li>•Actual # GP visits</li> <li>•\$ value all GP services</li> </ul>
Specialist Utilization	<ul style="list-style-type: none"> <li>•Self Reported # Specialist visits</li> </ul>	<ul style="list-style-type: none"> <li>•Actual # Specialist visits</li> <li>•\$ value all Spec services</li> </ul>
Total Physician	<ul style="list-style-type: none"> <li>•Sum of self-reported GP and SP visits</li> </ul>	<ul style="list-style-type: none"> <li>•Sum of GP and SP visits</li> <li>•\$ value of all MD services</li> </ul>
Hospital Inpatient	<ul style="list-style-type: none"> <li>•Self-reported # inpatient nights</li> </ul>	<ul style="list-style-type: none"> <li>•Actual # of nights</li> <li>•Imputed \$ value of inpatient admissions</li> </ul>
Hospital Day Procedure	<ul style="list-style-type: none"> <li>•NA</li> </ul>	<ul style="list-style-type: none"> <li>•\$ value of day procedures</li> </ul>
Total Hospital	<ul style="list-style-type: none"> <li>•NA</li> </ul>	<ul style="list-style-type: none"> <li>•\$ value of inpatient and day procedures</li> </ul>
Total MD and Hospital	<ul style="list-style-type: none"> <li>•NA</li> </ul>	<ul style="list-style-type: none"> <li>•\$ value of all physician and hospital services</li> </ul>

---

# Independent Variables

## Needs-Related

- Age
- Sex
- Self-assessed health status
- Number chronic conditions
- Health limitation
- Disability days
- Injury
- Activity limitations
- Smoking status

## Non-need

- Equivalized household income
- Educational attainment
- Work status
- Marital status
- Ethnicity/race
- Immigrant status
- 5-category Urban Influence zone
- Risk attitude

# Incidence of Specialist Visit: Self-report vs. Administrative Data

CCHS Question: In the past 12 months, how many times have you seen, or talked on the telephone, about your physical, emotional or mental health with an eye specialist or any other medical doctor?

OHIP: Specialist	CCHS: specialist		Total
	No	Yes	
No	18,641 56.8	2106 6.4	20,747 63.2
Yes	4623 14.1	7451 22.7	12,074 36.8
Total	23,264 70.9	9557 29.1	32,821 100.0
Kappa	0.55		

# Income-related Equity of GP Utilization

		Visits		Service \$
		CCHS	OHIP	OHIP
<b>Unconditional Utilization</b>	CI: Obs Util	-0.107***	-0.080***	-0.070***
	HI: Inequity	-0.030***	-0.036***	-0.024***

# Income-related Equity of GP Utilization

		Visits		Service \$
		CCHS	OHIP	OHIP
<b>Unconditional Utilization</b>	CI: Obs Util	-0.107***	-0.080***	-0.070***
	HI: Inequity	-0.030***	-0.036***	-0.024***
<b>Incidence of use</b>	CI: Obs Util	0.000	-0.002	-0.003
	HI: Inequity	0.007***	0.006**	0.004*
<b>Conditional Utilization</b>	CI: Obs Util	-0.107***	-0.078***	-0.054***
	HI: Inequity	-0.036***	-0.040***	-0.022***

# Income-related Equity of Specialist Utilization

		Visits		Service \$
		CCHS	OHIP	OHIP
<b>Unconditional Utilization</b>	CI: Obs Util	-0.020	-0.049***	-0.040***
	HI: Inequity	0.082***	0.048***	0.034***

# Income-related Equity of Specialist Utilization

		Visits		Service \$
		CCHS	OHIP	OHIP
<b>Unconditional Utilization</b>	CI: Obs Util	-0.020	-0.049***	-0.040***
	HI: Inequity	0.082***	0.048***	0.034***
<b>Incidence of use</b>	CI: Obs Util	0.010	-0.001	-0.004
	HI: Inequity	0.060***	0.041***	0.020***
<b>Conditional Utilization</b>	CI: Obs Util	-0.029*	-0.048***	-0.029***
	HI: Inequity	0.018	-0.001	0.011

# Income-related Equity of Inpatient Hospital Utilization

		Nights		IP Hosp \$
		CCHS	CIHI	CIHI
<b>Unconditional Utilization</b>	CI: Obs Util	-0.235***	-0.218***	-0.153***
	HI: Inequity	-0.065*	0.060	-0.041

# Income-related Equity of Inpatient Hospital Utilization

		Nights		IP Hosp \$
		CCHS	CIHI	CIHI
<b>Unconditional Utilization</b>	CI: Obs Util	-0.235***	-0.218***	-0.153***
	HI: Inequity	-0.065*	0.060	-0.041
<b>Incidence of use</b>	CI: Obs Util	-0.124***	-0.142***	-0.142***
	HI: Inequity	-0.046***	-0.064***	-0.064***
<b>Conditional Utilization</b>	CI: Obs Util	-0.113***	-0.082**	-0.001
	HI: Inequity	-0.045*	-0.032	0.002

# Income-related Equity of Hospital Utilization: Dollar Value of Services

		Inpatient	Day Proc	Total Hosp \$
<b>Unconditional Utilization</b>	CI: Obs Util	-0.153***	-0.048**	-0.136***
	HI: Inequity	-0.041	0.018	-0.020
<b>Incidence of use</b>	CI: Obs Util	-0.142***	-0.019	-0.062***
	HI: Inequity	-0.064***	0.034**	-0.001
<b>Conditional Utilization</b>	CI: Obs Util	-0.001	-0.003***	-0.014***
	HI: Inequity	0.002	-0.002	-0.003

# Equity of Physician and Hospital Utilization (\$ value of services)

		Hospital	Physician	Total MD & Hosp
<b>Unconditional Utilization</b>	CI: Obs Util	-0.136***	-0.051***	-0.091***
	HI: Inequity	-0.020	0.013	0.000
<b>Incidence of use</b>	CI: Obs Util	-0.062***	0.001	0.008
	HI: Inequity	-0.001	0.008***	0.008***
<b>Conditional Utilization</b>	CI: Obs Util	-0.014***	-0.044***	-0.078***
	HI: Inequity	-0.003	0.006	-0.006

# Conclusions: Income-related Inequity

- Results for self-report and actual utilization are broadly congruent
- Inequity less with respect to dollar value of services than visit counts
- Overall, more modest inequity when use measured with administrative data than with self-report data
- Most inequity is driven by probability of use, not use conditional on contacting the system
- Contrast between inpatient hospital and day procedures in hospital sector
- Beware of aggregation: zero overall effect can mask countervailing inequities across components
- Caveats:
  - Can't say if utilization is appropriate
  - Only examined income-related inequity

**The End**

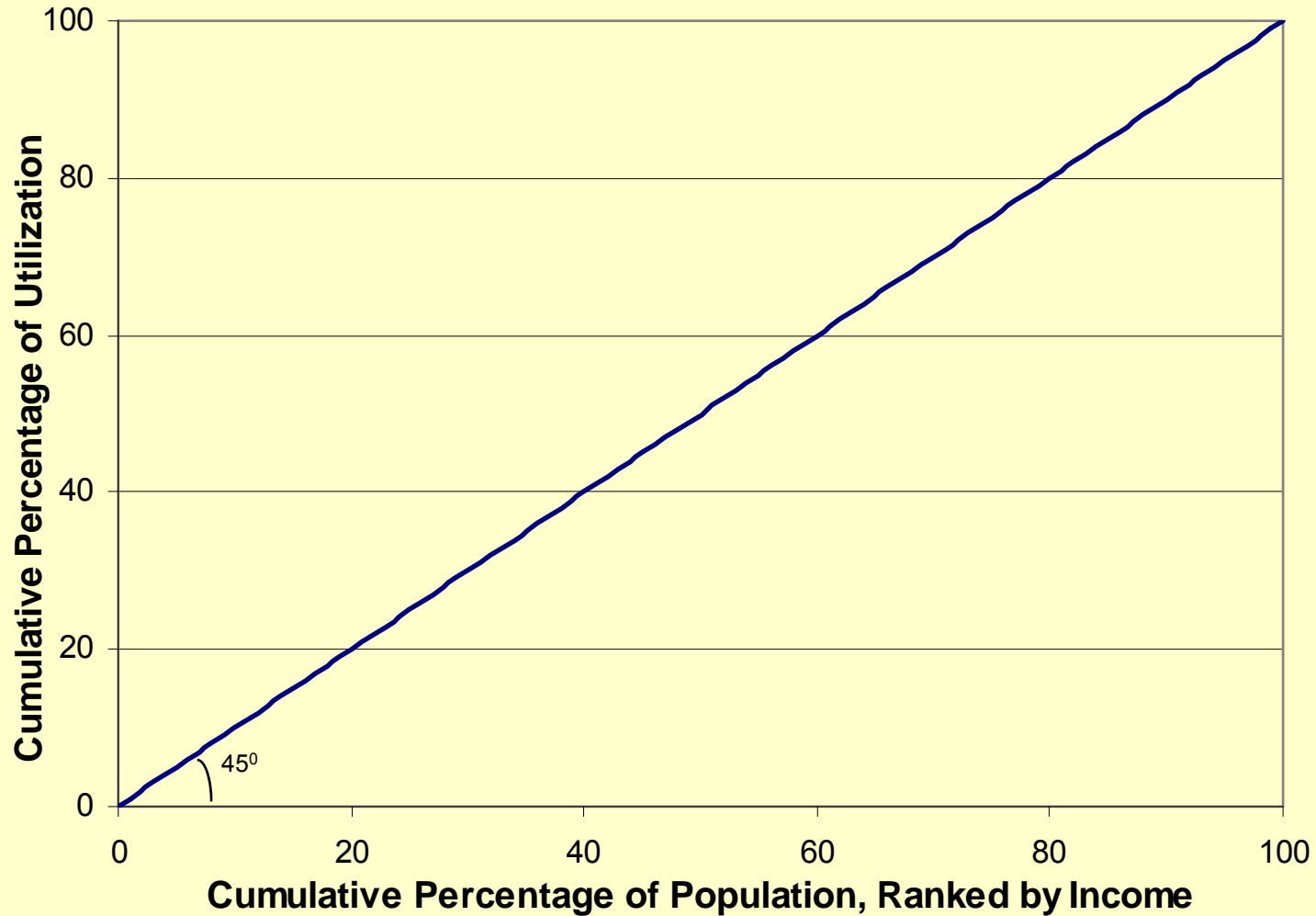
# Disease/Condition-specific Approaches

- D. Alter (1999, 2004, 2006) and L. Pilote's (2006) work on cardiovascular services; J. You's (2009) recent analysis of MRI utilization
- Strong epidemiological orientation
- Administrative data
- Ecological income data
- Assess extent to which income is a risk-factor

## Limitations:

- Specialist only
- Ecological income
- Generalizability beyond specific service

# Concentration Curve: No Relationship between Income and Utilization



# Incidence of GP Visit: Self-report vs. Administrative Data

CCHS Question: In the past 12 months, how many times have you seen, or talked on the telephone, about your physical, emotional or mental health with a family doctor or general practitioner?

OHIP: GP visit	CCHS: GP visit		Total
	No	Yes	
No	3714 11.3	3451 10.5	7165 21.9
Yes	2549 7.8	23,080 70.4	25,628 78.2
Total	6262 19.1	26,531 80.9	32,793 100.0
Kappa	0.46		

# Incidence of Inpatient Hospital Stay: Self-report vs. Administrative Data

CCHS Question: In the past 12 months, have you been a patient overnight in a hospital, nursing home or convalescent home? If yes, how many?

CIHI DAD: Overnight	CCHS: Overnight		Total
	No	Yes	
No	30,148 91.8	715 2.2	30,864 94.0
Yes	211 0.7	1751 5.3	1961 6.0
Total	30,359 92.5	2466 7.5	32,825 100.0
Kappa	0.80		

# Number of Visits/Nights: Self-report vs Administrative Data

Count	Agreement (CCHS-OHIP)	GP Visits		Specialist Visits		Hospital Nights	
		Obs	%	Obs	%	Obs	%
0	Agree	3,714	11.3	18,635	56.7	30,152	91.8
> 0	Agree	4,915	15.0	2,089	6.4	771	2.4
	Over, 1-2	6,276	19.1	2,651	8.1	880	2.7
	Over, 3-5	1,892	5.8	649	2.0	179	0.5
	Over ≥ 6	1,582	4.8	628	1.9	309	0.9
	Under, 1-2	7,875	24.0	5,001	15.2	336	1.0
	Under, 3-5	4,191	12.8	1,924	5.9	101	0.3
	Under ≥ 6	2,403	7.3	1,271	3.9	121	0.4