

Income-related horizontal inequities in physician use by asthmatics and diabetics: evidence using linked administrative data from Ontario

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Overview of the Paper

Objectives

1. measure (quantify) income-related inequities in physician use based on linked administrative-survey data
2. combine the population-based approach (general population) with the condition specific approach (asthmatic & diabetic populations)

Why focus on income-related inequities in physician use?

▶ Physicians

- ▶ single most important health care provider (in terms of treatment decisions and resource allocation)

▶ Income-related inequality

- ▶ the extent to which people with differing incomes systematically use different amounts of MD services

▶ Income-related inequity

- ▶ the extent to which people with the same health care need, but differing incomes, systematically use different amounts of MD services

General Population

- ▶ no inequity in the probability of GP use
- ▶ pro-poor inequity in conditional GP use (conditional on having any use)
- ▶ small pro-rich inequity in the probability and conditional use of specialists

Asthmatics and Diabetics

- ▶ no inequity in the probability of GP use
- ▶ pro-poor inequity in conditional GP use
- ▶ no income-related inequity in the probability of specialist use (asthmatics)
- ▶ small pro-rich inequity in the probability of specialist use (diabetics)
- ▶ no inequity in the conditional use of specialists

1. Ontario Health Insurance Plan (OHIP)

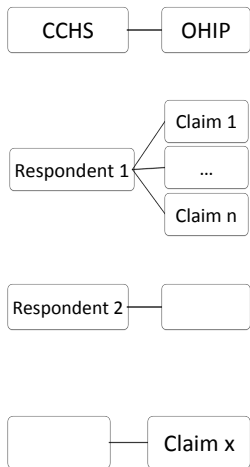
- ▶ Provides measures of the number of the dollar value of physician services received
 - ▶ dollar value is a measure of intensity

2. Canadian Community Health Survey 1.1 (CCHS)

- ▶ Nationally representative social survey conducted by Statistics Canada
- ▶ Provides measures of an individual's demographic, socioeconomic, and health status

Linking CCHS Respondents to their OHIP Claims

Record linkage uses a deterministic matching approach based on a CCHS respondent's unique health card number.



Ontario Health Insurance Plan (OHIP)

Years: April 1, 1999 to March 31, 2002

Target Population:

- ▶ Ontario residents who received fee-for-service (FFS) physician services
 - ▶ CIHI (2002) notes ~93% of physician payments in Ontario were FFS, higher for GPs (ICES (2006))

Dependent Variables (constructed):

- ▶ the dollar value of physician services received

OHIP Variables used to construct dependent variables:

- ▶ the specialty of a physician
- ▶ the fee service code (FSC)
- ▶ the dollar value of the fee service code

Canadian Community Health Survey (CCHS 1.1)

Years: 2000 / 2001

Sample Size:

- ▶ 39,278 persons (CCHS 1.1, Ontario)
- ▶ 32,848 persons (CCHS-OHIP, Ontario Link File)

Target Population:

- ▶ Ontario household residents, age 12 and older
- ▶ Excludes residents of Indian Reserves, Crown Lands, Institutions, certain remote regions, and full-time members of the Armed Forces

Sample Restrictions:

- ▶ Age 18 and older (less 3,245)
- ▶ Reported education (less 471)
- ▶ Reported income (less 2,247)
- ▶ Reported marital status, number of chronic conditions, and self-reported health status reported (less 222)

Analysis Sample Size: 26,663

Control Variables

Need Variables (x_{ji})

Age	Sex
Self-Reported Health Status	Severity of Chronic Conditions
Activity Limitation	BMI

Non-Need Variables (z_{ji})

Household Income	Education
Employment Status	Marital Status
Urban/Rural	Immigrant Status

Descriptive Statistics: Dollar Value of Services Received, GPs and Specialists (1999-2002)

	GP (1)	Specialist (2)
General Population (n=26,663)		
Mean - Total Use	\$ 481 (5)	\$ 897 (10)
% with Positive Use	93.7%	86.9%
Mean - Conditional on Positive Use	\$ 514 (5)	\$ 1032 (11)
Asthmatics (n=2,359)		
Mean - Total Use	\$ 683 (19)	\$ 1176 (34)
% with Positive Use	96.9%	92.2%
Mean - Conditional on Positive Use	\$ 705 (19)	\$ 1276 (36)
Diabetics (n=1,507)		
Mean - Total Use	\$ 836 (20)	\$ 2056 (72)
% with Positive Use	98.1%	98.0%
Mean - Conditional on Positive Use	\$ 853 (20)	\$ 2099 (73)

standard errors are reported in brackets.

Average of Select Need (x_i) Variables, by Sample

	General Population	Asthmatics	Diabetics	Ratio of Means	
	(1)	(2)	(3)	(2) / (1) (4)	(3) / (1) (5)
Age	44.7 (0.100)	42.3 (0.350)	59.7 (0.380)	0.95	1.34
Female	51.0% (0.000)	63.0% (0.010)	45.0% (0.010)	1.24	0.88
Asthma	8.0% (0.000)	100.0% (0.000)	10.0% (0.010)	-	-
Diabetes	5.0% (0.000)	6.0% (0.000)	100.0% (0.000)	-	-
Excellent/Very Good	64.0% (0.000)	48.0% (0.010)	25.0% (0.010)	0.75	0.39
Good	24.0% (0.000)	28.0% (0.010)	33.0% (0.010)	1.17	1.38
Fair/Poor	13.0% (0.000)	24.0% (0.010)	41.0% (0.010)	1.85	3.15
Activity Limitation	24.5% (0.003)	43.9% (0.010)	48.2% (0.013)	1.79	1.97
n	26,663	2,359	1,507		

Average of Select Non-Need (z_i) Variables, by Sample

	General Population	Asthmatics	Diabetics	Ratio of Means	
	(1)	(2)	(3)	(2) / (1)	(3) / (1)
	(1)	(2)	(3)	(4)	(5)
Household Income	\$65,077 (293)	\$59,976 (955)	\$47,133 (1,006)	0.92	0.72
Less than High-School	9.5% (0.002)	12.6% (0.007)	23.8% (0.011)	1.33	2.50
High-School	14.3% (0.002)	13.6% (0.007)	18.5% (0.010)	0.95	1.30
Some Post-Secondary	7.2% (0.002)	8.6% (0.006)	6.0% (0.006)	1.19	0.83
Post-Secondary	69.0% (0.003)	65.3% (0.010)	51.7% (0.013)	0.95	0.75
Urban	86.0% (0.000)	85.0% (0.010)	86.0% (0.010)	0.99	1.00
n	26,663	2,359	1,507		

Methodology: Concentration Curves & Indices

Based on the methods of Wagstaff & van Doorslaer (2000)

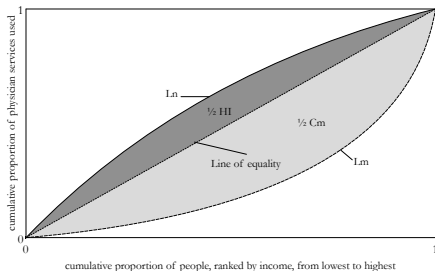
Concentration Curve (CC)

- ▶ graphs the cumulative proportion of MD services used by the proportion of population, ranked by income, for lowest to highest
- ▶ inequality curve (L_M) based on observed MD use
- ▶ inequity curve (L_N) based on need-standardized MD use

Concentration Index (CI)

- ▶ equal to twice the area between the CC and the line of equality
- ▶ inequality index (C_M)
- ▶ inequity index (H_I)

possible values: $\underbrace{-1 \leq CI}_{\text{(pro-poor)}} \leq \underbrace{1}_{\text{(pro-rich)}}$



Need-Standardize MD Use: Method of Indirect Standardization

Observed utilization is modelled as a function of need (X_{ji}) and non-need variables (Z_{ki}):

$$u_i = f \left(\alpha + \sum_j \beta_j X_{ji} + \sum_k \gamma_k Z_{ki} \right) + \epsilon_i \quad (1)$$

- ▶ $f(\cdot)$ is a logit model : probability of use
- ▶ $f(\cdot)$ is GLM model: conditional MD use
 - ▶ gamma-family distribution and a log-link function

$$\hat{u}_i^n = f \left(\hat{\alpha} + \sum_j \hat{\beta}_j X_{ji} + \sum_k \hat{\gamma}_k \bar{Z}_{ki} \right) \quad (2)$$

Calculating Need-Standardized Utilization

$$\hat{u}_i^{IS} = u_i - \hat{u}_i^n + \bar{u} \quad (3)$$

- ▶ \hat{u}_i^{IS} is interpreted as the distribution of MD use we would expect to observe independent of differences in the need variables over the income distribution

Results: Dollar Value of Services Received

Table: Concentration Indices (C_M and HI), GP and Specialist use

	Full Sample		Asthmatics		Diabetics	
	Inequality (C_M) (1)	Inequity (HI) (2)	Inequality (C_M) (3)	Inequity (HI) (4)	Inequality (C_M) (5)	Inequity (HI) (6)
1. General Practitioner Utilization						
Probability of Use	-0.002 (0.001)	0.002 ** (0.001)	-0.008 * (0.004)	-0.006 (0.004)	-0.002 (0.003)	-0.001 (0.003)
Conditional Use	-0.069 *** (0.010)	-0.019 ** (0.009)	-0.088 *** (0.018)	-0.030 * (0.016)	-0.109 *** (0.019)	-0.056 *** (0.017)
2. Specialist Utilization						
Probability of Use	0.002 (0.002)	0.012 *** (0.002)	-0.010 ** (0.005)	-0.001 (0.004)	0.000 (0.003)	0.003 (0.003)
Conditional Use	-0.071 *** (0.010)	0.015 (0.009)	-0.057 *** (0.027)	0.017 (0.023)	-0.087 *** (0.029)	-0.015 (0.025)

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Interpretation of results

- ▶ Should we expect to find zero income-related inequities - No.
- ▶ We ought to interpret GP and specialist results together
 - ▶ pro-poor conditional use of GPs and pro-rich probability of specialist use among general population may suggest:
 - ▶ differential referral patterns?
 - ▶ preferred access of higher income?
 - ▶ higher-income are stronger advocates for their health?
 - ▶ interestingly, this is less pronounced for asthmatic and diabetic populations

The condition specific approach seems important

- ▶ the population-based approach may be limited by the variables available to control for heterogeneity in health care need

Conclusion

Linked administrative-survey data

- ▶ provides an opportunity for marked improvement in health services and policy research

General Population

- ▶ there is some pro-rich income-related inequity in physician utilization (consistent with previous literature)
- ▶ not a meaningful problem

Asthmatics & Diabetics

- ▶ little income-related inequity within groups of higher need patients

Results suggest

- ▶ the Canadian health care system (i.e. MD use) has limited income-related inequities in utilization
- ▶ the disease specific approach may be better way to control for heterogeneity of health care need

Canadian Research Data Centre Network (CRDCN)

To learn more about the Canadian Research Data Centre Network (CRDCN), visit our website at www.rdc-cdr.ca



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