

# Patient poverty and workload in primary care

## *Study of prescription drug benefit recipients in community health centres*

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### Abstract

**Objective** To determine if patient poverty is associated with increased workload for primary care providers (PCPs).

**Design** Linkage of administrative data identifying patient poverty and comorbidity with survey data about the organizational structure of community health centres (CHCs).

**Setting** Ontario's 73 CHCs.

**Participants** A total of 64 CHC sites (N=63 included in the analysis).

**Main outcome measures** Patient poverty was determined in 2 different ways: based on receipt of Ontario Drug Benefits (identifying recipients of welfare, provincial disability support, and low-income seniors' benefits) or residence in low-income neighbourhoods. Patient comorbidities were determined through administrative diagnostic data from the CHCs and the Institute for Clinical Evaluative Sciences. Primary care workload was determined by examining PCP panel size (the number of patients cared for by a full-time-equivalent PCP during a 2-year interval).

**Results** The CHCs with higher proportions of poor patients had smaller panel sizes. The smaller panel sizes were entirely explained by the medical comorbidity profile of the poor patients.

**Conclusion** Poor patients generate a higher workload for PCPs in CHCs; however, this is principally because they are sicker than higher-income patients are. Further information is required about the spectrum of services used by poor patients in CHCs.

### EDITOR'S KEY POINTS

- Poverty is an important determinant of health. This study aimed to examine whether patient poverty generated higher workloads (as measured by smaller panel sizes) for primary care providers (PCPs) in community health centres (CHCs); and, if so, whether the higher workload was due only to the increased burden of illness among poor patients, or whether the social problems associated with "being poor" independently increased workload.
- In this study, drug benefit assistance recipients and residents of poor neighbourhoods did increase the workload of PCPs in CHCs, as reflected by PCP panel size. However, the increased workload was accounted for by the medical comorbidities of the patients.
- The authors were surprised by this finding, as they expected that dealing effectively with the social challenges of poor patients in the primary care setting would create a lot of work for PCPs. The authors were unable to determine exactly how the CHCs met the nonmedical needs of their poor patients, but it might be that other services delivered by CHCs, such as community-level programs, contributed to the care of these patients.

This article has been peer reviewed.  
*Can Fam Physician* 2013;59:384-90

# Clientèle pauvre et charge de travail dans les soins primaires

*Étude sur les bénéficiaires de programmes de médicaments d'ordonnance dans les centres de santé communautaire*

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## Résumé

**Objectif** Déterminer si le fait de servir une clientèle pauvre entraîne une augmentation de la charge de travail pour les soignants de première ligne (SPL).

**Type d'étude** Recherche d'une relation entre les données administratives permettant d'établir la pauvreté et la comorbidité des patients et les données d'une enquête sur la structure organisationnelle de centres de santé communautaire (CSC).

**Contexte** Soixante-treize CSC de l'Ontario.

**Participants** Un total de 64 sites de CSC (63 étant retenus pour l'analyse).

**Principaux paramètres à l'étude** Le niveau de pauvreté des patients a été établi de 2 façons : en se basant sur les reçus du programme de médicaments de l'Ontario (qui identifie les patients qui reçoivent de l'aide sociale, de l'aide pour incapacité et des suppléments pour personnes âgées à faible revenu) ou sur le fait d'habiter un quartier défavorisé. La comorbidité des patients a été déterminée à l'aide des données administratives sur les diagnostics des CSC et de l'Institute for Clinical Evaluative Sciences. La tâche de travail pour des soins primaires a été établie en examinant la taille de la clientèle des SPL (nombre de patients traités par un SPL équivalent plein temps sur une période de 2 ans).

**Résultats** Les CSC qui avaient la plus forte proportion de patients pauvres avaient les plus petites clientèles. Cela s'expliquait entièrement par le profil de comorbidité médicale des patients pauvres.

**Conclusion** Les patients pauvres exigent une charge de travail plus grande de la part des SPL dans les CSC; toutefois, cela dépend principalement du fait qu'ils sont plus malades que les patients mieux nantis. Il faudra obtenir davantage d'information sur l'éventail des services que requièrent les patients pauvres dans les CSC.

## POINTS DE REPÈRE DU RÉDACTEUR

- La pauvreté est un important déterminant de la santé. Cette étude voulait déterminer si une clientèle pauvre exige une plus grande charge de travail (telle que mesurée par des clientèle de plus petite taille) pour les soignants de première ligne (SPL) des centres de santé communautaire (CSC); et le cas échéant, établir si cette augmentation de la charge de travail était due uniquement à l'augmentation du fardeau causé par les maladies des patients pauvres ou si les problèmes sociaux associés au fait d'être pauvre agissaient de façon indépendante pour augmenter la charge de travail.

- Dans cette étude, les bénéficiaires du programme de médicaments et les résidents des milieux défavorisés augmentaient la tâche de travail des SPL dans les CSC, tel que démontré par la taille de la clientèle des SPL. Toutefois, cette augmentation de la tâche de travail était due aux problèmes de comorbidité des patients.

- Les auteurs ne s'attendaient pas à de tels résultats, puisqu'ils croyaient que le fait de s'occuper des problèmes sociaux des patients pauvres dans un contexte des soins primaires engendrerait beaucoup de travail pour les SPL. Ils n'ont pas pu déterminer exactement comment les CSC répondaient aux besoins non médicaux des patients pauvres, mais il se pourrait que d'autres services dispensés par les CSC, comme des programmes au niveau communautaire, contribuent aux soins de ces patients.

Cet article a fait l'objet d'une révision par des pairs.  
*Can Fam Physician* 2013;59:384-90

Poverty is an important determinant of health. The poor have higher incidence, prevalence, and severity of chronic diseases, acute illnesses, and injuries<sup>1</sup>; use more medications and physician and hospital services<sup>2</sup>; and require more clinician time in the primary care setting, not only owing to their complex health needs but also because of relationship and communication challenges.<sup>3</sup> Canadians living in poverty also report using health services for nonmedical needs, such as social connection.<sup>4</sup> However, recent Canadian studies demonstrate that increased health system utilization by people living in poor neighbourhoods is largely<sup>2</sup> or entirely<sup>5</sup> explained by medical comorbidities. Perhaps because of the uncertainty surrounding the effects of poverty itself (not mediated through high morbidity), the effect of patient “deprivation” on primary care practice has not been widely addressed through policy in North America.<sup>6,7</sup> A common measure of clinical workload in primary care is panel size (the number of patients regularly under the care of a full-time-equivalent [FTE] primary care provider [PCP]<sup>8</sup>), which is increasingly used to account for funding for physicians and other health professionals such as nurse practitioners (NPs).<sup>9</sup> Larger panel size has been linked to lower quality of some dimensions of care,<sup>10-12</sup> and the capacity to increase panel size also depends on office location, layout, and staffing.<sup>13</sup> Owing to their effects on PCP workload, patient characteristics such as medical comorbidities, age, sex, and socioeconomic status are used to adjust panel-size targets in some organizations.<sup>14</sup> Despite serving larger proportions of poor patients than other primary care models in Ontario do,<sup>15</sup> community health centres (CHCs) do not account for patient poverty in their panel-size targets. In CHCs, PCPs are paid by salary, work on interprofessional teams that use community-level actions on the social determinants of health,<sup>16</sup> and generally provide high-quality care.<sup>11,16-18</sup>

In this study, we examine 2 questions: Does patient poverty generate higher workloads (as measured by smaller panel sizes) for PCPs in CHCs; and, if so, is the higher workload due only to increased burden of illness, or do the social problems associated with “being poor” independently increase workload?

## METHODS

### Design

We employed a cross-sectional design and used administrative data housed at the Institute for Clinical Evaluative Sciences (ICES) that was collected between April 1, 2008, and March 31, 2010, to assess poverty level, comorbidity, and case mix. Patient-level data were extracted from the CHCs’ electronic clinical

management systems (CMSs), including medical and sociodemographic information. We gathered practice-context information (including number and type of staff, physical layout, and other resource availability) through an organizational survey conducted in September 2010. The CMS data for each CHC site were linked to ICES databases and the corresponding organizational survey. The study was approved by the Ottawa Hospital Research Ethics Board.

### Setting

In Ontario, CHCs are non-profit, community-governed organizations that provide primary health care, health promotion, and community-development services, using interdisciplinary teams of providers who are paid by salary.<sup>19</sup> We approached the 71 main (n=60) and satellite (n=11) CHC sites in Ontario that had been operational for the entire 2-year study period.

### Sample

All eligible sites were invited to participate. Patient records from each site were eligible for inclusion if there was at least 1 face-to-face visit to a PCP (physician, NP, or physician assistant [PA]) at the site during the 2-year study interval. Patients were excluded if they died before April 1, 2010. Linkage of CHC patient data to ICES data was performed through the Ontario Health Insurance Plan (OHIP) number.

### Variables collected

Data collected from the CHCs’ CMSs included unique patient identifiers; patient age, sex, postal code, and OHIP numbers; reasons for the visits or the diagnoses (International Classification of Diseases, 9th revision, codes); and provider type (recorded at each visit). Variables available through linking to ICES data included patient age, sex, residential address, and postal code; hospital discharge information; outpatient visits to hospitals and emergency departments; physician visits (including diagnosis from billing); and patient receipt of social assistance or Ontario drug benefits for low-income seniors. Patients with no health insurance or those not insured in Ontario could not be linked to ICES data sets.

**Patient medical complexity.** The Johns Hopkins Adjusted Clinical Groups (ACG) methodology,<sup>20</sup> a measure of patient medical complexity that is based on groups of diagnoses, was applied to patient diagnoses captured in the CHCs’ CMSs and all diagnoses from data linkage at ICES. This generated a profile of the medical case mix in each CHC. The ACG system has demonstrated validity for explaining the health service use of Canadians.<sup>21,22</sup> Although we examined other ACG-derived measures of comorbidity, we principally used

the Standardized ACG Morbidity Index (SAMI), which represents the ratio of the average ACG for the practice relative to the provincial average ACG. The SAMI is used to examine differential morbidity at the practice level and to explain variation among practices.<sup>23</sup> It has been adapted for use in primary care in Ontario<sup>24</sup> and is considered a reasonable measure of expected workload in nonsalaried primary care practices. It has never before been used in CHCs. The “average” Ontario patient has a SAMI equal to 1, while values above and below 1 indicate higher- or lower-than-average expected resource use, respectively.

**Patient socioeconomic profile.** We were able to identify very-low-income patients who received assistance through the Ontario Drug Benefit (ODB) program if they filled a prescription at a pharmacy during the 2-year study period. The ODB recipients received social welfare through Ontario Works, received long-term disability benefits through the Ontario Disability Support Program (ODSP), or were low-income seniors<sup>25</sup> (Table 1).<sup>26-29</sup> Because the 3 different ODB recipient groups (Ontario Works, ODSP, and low-income seniors) differ considerably in terms of the reason for receipt of government assistance, we examined each group separately, but we also grouped all low-income ODB recipients (into a category of *total ODB*). In addition, we assigned each CHC patient to a neighbourhood income quintile generated by matching patient postal codes to Statistics Canada 2006 Census neighbourhood-level income data. We considered a patient poor by this measure if he or she lived in 1 of the lowest 2 income quintiles (which represent the lowest 40% of the population).

**Practice profile.** Organizational survey data were collected from CHC executive directors and primary care managers through an electronic survey. The survey requested information about each CHC site, including physical layout and the number of FTE physicians, NPs, PAs, nurses, social workers, and other support staff employed at the site during the study period.

Panel size was calculated for each CHC site by dividing the total number of primary care patients by the total number of FTE PCPs to produce a panel size per PCP. Panel size per PCP, instead of panel size per physician, was chosen as the outcome measure because a previous study demonstrated that NPs were the principal providers for 22% of patients in CHCs.<sup>17</sup> Any PAs, who were present in very few CHCs during the study period, were also included as PCPs.

## Analysis

The unit of analysis was the CHC or satellite site (these were combined if they shared a CMS data set). Descriptive statistics of patient and practice characteristics across sites were generated. The effects of the different poverty measures on panel size were assessed using linear regression analysis. Linearity of continuous variables was verified. Potential confounding or mediating effects of variables known to be associated with panel size were examined using multiple linear regressions. Models were run using each of the poverty measures (lowest 2 income quintiles, total ODB, and the 3 ODB subgroups) as the independent variable. The next set of models examined poverty accounting for 2 organizational factors known to be associated with the capacity to increase panel size: the number of rooms for the provision of clinical care available to each PCP and the ratio of clinic staff assisting in the delivery of primary care per PCP.<sup>13</sup> A third model set examined poverty measures along with patient medical complexity, and the final model set included all of these variables. Because we hypothesized that some of the workload associated with caring for poor patients might be shifted to social workers in CHCs, a model including the ratio of social workers to PCPs was also examined.

## RESULTS

A total of 71 of the 73 eligible CHCs agreed to participate in the administrative data component

**Table 1. Ontario Drug Benefit recipients**

PROGRAM	CHARACTERISTICS OF RECIPIENTS	ANNUAL INCOME, 2009	PERCENT OF LICO*
Ontario Works	Younger than 65 y with temporary financial need	\$7501 for a single employable person	40.7%
Ontario Disability Support Program	Persons with disabilities who are in financial need	\$12905 for a single person	70.1%
Ontario Drug Benefit for low-income seniors	Older than 65 y; meeting financial requirements	<\$16018 (single); <\$24 175 (couple)	Varies

LICO—low income cutoff.

\*Percent of the annual before-tax income at the LICO (\$18 421) for a single person living in an urban area with population > 500 000 in 2009.<sup>26</sup> Below the LICO, households spend at least 20% more of their income than the average household on food, shelter, and clothing. The LICO is adjusted for family size and degree of urbanization.<sup>27</sup>

Data from the Ontario Ministry of Community and Social Services<sup>28</sup> and the Ontario Ministry of Health and Long-Term Care.<sup>29</sup>

of the study. A total of 1 164 511 visits (including telephone consultations) was recorded, representing 143 831 individual patients. Sixty-four sites (90.1%) completed organizational surveys (52 urban and 11 rural). One northern CHC was excluded from the analysis because of a pattern of practice (no physicians on site, use of telemedicine) that was not comparable to the other CHCs. Sixty-three CHCs (88.7%) were included in the analysis.

Most patients were female and relatively young. Twenty-two percent of patients made claims through ODB. On average, 34.8% of CHC patients lived in neighbourhoods in the lowest income quintile, and 55.1% lived in neighbourhoods in 1 of the 2 lowest income quintiles (Table 2). The range of values and the relatively large standard deviations for most variables indicated that different CHCs seemed to have very different clientele. Patients in CHCs had a mean (SD) SAMI of 1.84 (0.2), with a range of 1.5 to 2.7, demonstrating that their morbidity was much higher

than that of the general population of Ontario, for which the SAMI is 1.0. A total of 11.5% of CHC patients were not insured through OHIP. Like their patients, the CHC organizations themselves were quite diverse, specifically in terms of structure and staffing, including in their panel sizes (Table 3).

**Table 3. Organizational characteristics of CHCs: N = 63 CHCs.**

CHARACTERISTIC	MEAN (SD)	MAXIMUM	MINIMUM
FP FTEs	2.7 (1.6)	7.4	0.0
NP FTEs	2.8 (1.5)	7.5	0.0
Clinical support	1.1 (0.5)	2.6	0.2
Social support	0.42 (0.3)	1.7	0.0
Rooms per PCP	1.6 (0.8)	3.8	0.6
Panel size per PCP	444.9 (187.3)	1035.2	127.3

CHC—community health centre, FTE—full-time equivalent, NP—nurse practitioner, PCP—primary care provider.

**Table 2. Sociodemographic characteristics of patients in CHCs: N = 63 CHCs.**

CHARACTERISTIC	MEAN (SD)	MAXIMUM	MINIMUM
Proportion of female patients	59.8 (9.2)	96.8	45.3
Age, y			
• < 18	24.5 (8.6)	45.3	2.2
• 19–44	35.9 (12.9)	45.3	8.3
• 45–64	25.3 (8.4)	39.7	0.0
• ≥ 65	13.1 (10.2)	63.2	0.0
Proportion of total ODB*	21.8 (13.1)	66.4	3.7
Proportion of patients on Ontario Works	8.9 (6.9)	25.9	0.3
Proportion of patients on ODSP	9.6 (7.4)	38.8	1.4
Proportion of patients on ODB for low-income seniors	3.3 (2.5)	14.5	0.0
Income quintile			
• 1 (lowest)	34.8 (17.8)	72.3	3.9
• 2	20.3 (6.8)	41.7	1.6
• 3	16.7 (6.9)	35.2	7.0
• 4	14.2 (7.4)	32.6	2.2
• 5 (highest)	11.6 (9.4)	49.2	1.1

CHC—community health centre, ODB—Ontario Drug Benefits, ODSP—Ontario Disability Support Program.

\*Total ODB is the total proportion of clients on Ontario Works, ODSP, and ODB for low-income seniors.

Linear regressions using the different poverty measures and panel sizes showed an inverse relationship between the proportion of patients living in poverty and CHC panel size (Table 4), while the proportion of patients receiving ODSP payments was the only factor that reached statistical significance ( $P = .029$ ). Primary care staffing and office layout did not affect the relationship between poverty and panel size (Table 5). Models including poverty, comorbidity, primary care staffing, and office layout (Table 5) demonstrated that the association between higher levels of patient poverty and smaller panel sizes was entirely explained by the higher levels of comorbidity among the patients identified as poor. (Only results for all low-income ODB recipients [total ODB] are shown.) As expected, there was a nearly linear relationship between long-term disability on the ODSP and comorbidity (data not shown). A greater availability of social workers in the CHC did not affect the panel-size measures when poverty and comorbidities were included (results not shown).

**Table 4. Bivariate results for poverty and panel size**

POVERTY MEASURE	$\beta$	P VALUE
Income quintiles 1 and 2	-0.101	.430
Total ODB	-0.221	.072
Ontario Works	-0.111	.386
ODSP	-0.275	.029
ODB for low-income seniors	-0.061	.637

ODB—Ontario Drug Benefits, ODSP—Ontario Disability Support Program.

**Table 5. Multiple linear regression models ( $\beta$  coefficients) for poverty and panel size**

FACTOR	MODEL 1*	MODEL 2†	MODEL 3‡	MODEL 4 (FULL MODEL)
Total ODB <sup>§</sup>	-0.221 <sup>  </sup>	-0.230 <sup>  </sup>	-0.034	-0.072
Examination rooms per PCP		0.280 <sup>¶</sup>		0.096
Support staff per PCP		0.055		0.170
SAMI <sup>#</sup>			-0.368 <sup>¶</sup>	-0.291 <sup>¶</sup>

ACG—Adjusted Clinical Groups, CHC—community health centre, ODB—Ontario Drug Benefits, ODSP—Ontario Disability Support Program, PCP—primary care provider, SAMI—Standardized ACG Morbidity Index.

\*Adjusted for poverty.

†Adjusted for organization factors (examination rooms and support staff).

‡Adjusted for medical comorbidities.

§Total ODB is the total proportion of clients on Ontario Works, ODSP, and ODB for low-income seniors.

|| $P \leq .01$ .

¶ $P \leq .05$ .

#Average SAMI for the CHC.

## DISCUSSION

We found a consistent association between smaller panel size in CHCs and greater proportions of patients receiving ODB assistance or living in poor neighbourhoods. We infer that poor patients generate greater workload for PCPs, and our study suggests that the greater workload conferred by poverty is related to the medical conditions associated with poverty. We were surprised by this finding, as we expected that dealing effectively with the social challenges of poor patients in the primary care setting would create a lot of work for PCPs. Limitations of the study design might have prohibited adequate assessment. Our indicators of poverty might not have been adequate; that is, patients labeled as *poor* in this study might have been relatively well-off compared with those not so identified. In addition to drug benefits, many ODB recipients have access to payments to support special diets and some medical needs.<sup>28</sup> This might make delivering care to them easier than to other groups who lack these benefits. However, we found the same pattern of results using neighbourhood-level poverty measures. The population size (63 CHCs) might have been too small to note an effect. The study also did not assess the equity of care provided in CHCs, but it did demonstrate that more clinical resources were devoted to those with greater medical needs. Existing evidence both supports and refutes the theory that CHCs provide highly equitable care.<sup>30,31</sup>


We also did not find a statistically significant association between the availability of social workers and the ability of PCPs to manage larger panels. Staff and programs in CHCs other than PCPs or social workers might be providing other services to help meet the needs of poor patients. Because CHCs often have additional resources (such as co-location with food banks or resources to support low-income parents) available for their poor patients, it might not be possible to extend our findings to other primary care models. Future research could describe population- and community-level actions and compare CHCs to primary care models not providing such services.

Our study reinforces the available literature suggesting that patients are not “one size fits all” and that panel-size targets for PCPs should be adjusted for patient characteristics.<sup>14</sup> Comorbidity measures such as those derived from the Johns Hopkins ACG system show promise for this use.

## Limitations

Persons not insured by OHIP could not be linked to the data housed at ICES, so their comorbidity status might have been underestimated. Some patients who qualified for ODB coverage might not have filled prescriptions during the study period, leading to their misclassification as non-ODB recipients. Neighbourhood income quintiles are also known to misclassify individuals. The organizational survey was a self-report survey, which might have resulted in the miscalculation of panel sizes owing to inaccuracies in representing the FTE count of PCPs. Finally, we were unable to adjust our calculations to account for PCPs who did work that would not be considered “usual” primary care, such as running HIV clinics or doing extensive outreach work. Such specialized work might have resulted in lower-than-expected panel sizes and was not accounted for in our regressions. Panel size itself might, in such cases, not accurately represent the actual workload of the PCPs.

## Conclusion

In this study, drug benefit assistance recipients and residents of poor neighbourhoods increased the workload of PCPs in CHCs, as reflected by their panel size. The increased workload was accounted for by the medical comorbidities of the patients. We were unable to determine exactly how the CHCs met the nonmedical needs of their poor patients, but it might be that other services delivered by CHCs, such as community-level programs, contributed to the care of these patients. Future research should examine how primary care settings can best serve poor patients. 

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**Acknowledgment**

This study was funded by the University of Ottawa Department of Family Medicine Research Funding Program. The views expressed in the article are those of the authors and do not necessarily reflect the views of the University of Ottawa.

**Contributors**

**Dr Muldoon** designed the study and oversaw its implementation, analysis, and interpretation; directed the writing; and approved the final version of the manuscript. **Dr Rayner** designed the study and oversaw its implementation, analysis, and interpretation; participated in the writing; and approved the final version of the manuscript. **Dr Dahrouge** assisted in the design of the study and its implementation, analysis, and interpretation; participated in the writing; and approved the final version of the manuscript.

**Competing interests**

**Dr Muldoon** is a family physician practising in a community health centre. The findings of this work could affect her day-to-day practice. Neither of the other authors has any competing interests to declare.

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