

# Socioeconomic status and allied health use

## *Among patients in an academic family health team*

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### Abstract

**Objective** To identify whether socioeconomic status is associated with allied health use among patients in a large academic family health team (FHT).

**Design** Data were collected through a retrospective chart review using an electronic medical record system.

**Setting** A large academic FHT in Ottawa, Ont.

**Participants** Patients with at least 1 in-person clinician encounter between January 1, 2012, and December 31, 2013.

**Main outcome measures** Descriptive statistics were used to compare patients who accessed allied health services with those who did not. We conducted logistic regression analyses to determine whether income quintile was independently associated with allied health use after adjusting for other patient characteristics.

**Results** The inclusion criteria identified 2938 unique patients, of whom 949 (32.3%) saw an allied health provider (AHP) during the study period. While patients in the fourth income quintile had the greatest AHP use per person (41.2% of patients had at least 1 AHP visit), those in the lowest income quintile had the greatest mean number of AHPs seen (mean [SD]=1.48 [0.80]). After adjustment, the odds of seeing an AHP were significantly increased with older age (odds ratio [OR]=1.02, 95% CI 1.01 to 1.02) and female sex (OR=1.81, 95% CI 1.48 to 2.22). Compared with patients in the highest income quintile, patients in the lowest (OR=1.33, 95% CI 1.02 to 1.72) and fourth (OR=1.88, 95% CI 1.33 to 2.66) income quintiles had significantly higher odds of seeing AHPs.

#### EDITOR'S KEY POINTS

- Despite investments in primary care reform in Ontario, newer primary care models including family health teams (FHTs) tend to serve healthier patients of higher socioeconomic status. A capitation-based FHT should be able to deliver equitable care among patients of varying socioeconomic status, with allied health resources appropriately allocated to those unable to pay for such services. This study aimed to identify whether socioeconomic status was associated with allied health use in an academic FHT.
- While 73.7% of the study population belonged to the highest income quintile, the authors did find that lower-income patients were more likely to use allied health services, and this association was even stronger after exclusion of patients who had allied health visits exclusively with the diabetes team or the nurse practitioner. Patients in the second-highest income quintile had the highest odds of seeing allied health providers.

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**Conclusion** Within an academic FHT, lower-income patients were more likely to use allied health services, suggesting equitable allocation of resources. We encourage other FHTs to similarly assess their allied health resource allocation as an important outcome for investments in Ontario FHTs.

# Statut socioéconomique et utilisation des ressources complémentaires en santé

*Chez les patients d'une équipe universitaire de santé familiale*

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## Résumé

**Objectif** Déterminer s'il existe une association entre le statut socioéconomique et l'utilisation des ressources complémentaires en santé, et ce, dans une importante équipe universitaire de santé familiale (ESF).

**Type d'étude** Une revue rétrospective de dossiers effectuée à l'aide d'un système pour dossiers médicaux électroniques a servi à recueillir les données.

**Contexte** Une importante ESF universitaire d'Ottawa, Ontario.

**Participants** Des patients qui ont eu une rencontre avec un clinicien entre le premier janvier 2012 et le 31 décembre 2013.

**Principaux paramètres à l'étude** On s'est servi de statistiques descriptives pour comparer les patients qui ont eu accès à des services de santé complémentaires avec ceux qui n'en avaient pas eu. Une analyse de régression logistique a permis de déterminer s'il existait une relation indépendante entre le quintile de revenu et l'utilisation des services complémentaires en santé, et ce, après ajustement pour d'autres caractéristiques des patients.

**Résultats** Les critères d'inclusion ont permis d'identifier 2938 patients différents, dont 949 (32,3%) avaient rencontré un dispensateur de soins complémentaires (DSC) au cours de l'étude. Alors que les patients appartenant au quatrième quintile de revenu avaient rencontré le plus de DSC par personne (41,2% des patients en avaient rencontré au moins 1), ceux du quintile de revenu le plus bas en avaient rencontré en moyenne le plus grand nombre (moyenne [DS]=1,48 [0,80]). Après ajustement, la probabilité de rencontrer un DSC était significativement plus élevée pour les plus âgés (rapport de cotes [RC]=1,02, IC à 95% 1,01 à 1,02) et pour les femmes (RC=1,81, IC à 95% 1,48 à 2,22). Par rapport aux patients du quintile le plus haut, ceux du quintile le plus bas étaient significativement plus susceptibles de rencontrer un DSC (RC=1,33, IC à 95% 1,02 à 1,72) de même que ceux du quatrième quintile (RC=1,88, IC à 95% 1,33 à 2,66).

**Conclusion** Dans cette ESF, les patients les moins fortunés étaient plus susceptibles d'utiliser les services de santé complémentaires, ce qui suggère une dispensation équitable des ressources. Nous encourageons d'autres ESF à faire une évaluation semblable de la façon dont ils dispensent leurs ressources complémentaires, un objectif important compte tenu des sommes investies dans les ESF en Ontario.

## POINTS DE REPÈRE DU RÉDACTEUR

• Malgré tout ce qui a été investi dans la réforme des soins primaires en Ontario, les nouveaux modèles de pratique pour les soins primaires, incluant des équipes de santé familiale (ESF), ont tendance à traiter des patients en meilleure santé et d'un niveau socioéconomique plus élevé. Toute ESF devrait être en mesure de traiter des patients de façon équitable en offrant des ressources de santé complémentaires à ceux qui sont incapables de se les payer, quel que soit leur statut socioéconomique. Cette étude voulait vérifier s'il existe une association entre le statut socioéconomique et l'utilisation des ressources complémentaires en santé dans une ESF.

• Même si 73,7% de la population à l'étude appartenait au quintile de revenu le plus élevé, les auteurs ont constaté que les patients moins fortunés étaient plus susceptibles d'utiliser les services complémentaires en santé; et cette association était même plus forte lorsqu'on excluait les patients qui avaient été vus uniquement par l'équipe du diabète ou par une infirmière praticienne. Les patients du deuxième quintile de revenu le plus élevé avaient les meilleures chances d'être vus par des soignants des soins complémentaires en santé.

Cet article a fait l'objet d'une révision par des pairs.  
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Primary health care in Ontario has undergone considerable transformation over the past decade, with the aim of improving the accessibility, comprehensiveness, and quality of care provided.<sup>1</sup> Much of this change has arisen from the transition of solo-practice physicians in strict fee-for-service reimbursement to blended capitation remuneration across various models.<sup>2</sup> The first model to fully embrace a multidisciplinary approach was the family health team (FHT), adopted in 2006.<sup>1,3</sup> The popularity of this model is evidenced by the nearly 200 FHTs that have enrolled more than 2.7 million Ontarians into care since its introduction.<sup>3-5</sup>

However, despite considerable investment in FHTs, their benefits to patients and funders have been elusive. Newer models, including FHTs, tend to serve healthier patients of higher socioeconomic status, yet have higher-than-expected emergency department use compared with other models.<sup>3</sup> Such lack of demonstrated improvement in care has led the Ontario Ministry of Health and Long-Term Care to issue a moratorium on the further expansion of FHTs and other blended-capitation models.<sup>6,7</sup>

Despite our public funding of physician services, disparities in health and primary care access persist, and socioeconomic status continues to be an important factor affecting health outcomes.<sup>8,9</sup> The relationship between socioeconomic status and health has long been established for outcomes including hospitalization rates, the incidence of disabilities, acute and chronic health conditions, and mortality.<sup>10</sup> This highlights a need to mitigate the disparities in health arising among low-income patients through the use of multidisciplinary teams that have been shown to improve the quality of care delivered to patients with chronic diseases.<sup>11,12</sup>

A capitation-based FHT providing interdisciplinary care should be able to deliver equitable care with allied health resources appropriately allocated to those who are unable to pay for such services owing to a lack of private health insurance or limited personal finances. In order to explore this, the objective of this study was to identify whether socioeconomic status was associated with allied health use among patients within a large academic FHT.

## METHODS

### Study setting

The study took place in an academic FHT serving approximately 5000 patients in a semiurban area of Ottawa, Ont. At the time of our study, our clinical site had 7 staff physicians, 2 locum physicians, and 14 medical residents working alongside nursing staff, as well as the following allied health team members: a nurse

practitioner, a dietitian, a social worker, a pharmacist, a shared mental health team (psychiatric nurse, social worker, psychologist, and psychiatrist), and a diabetes team (diabetes nurse and diabetes dietitian).

### Study population

The data were collected through a retrospective chart review using the FHT's electronic medical record (EMR) system (Nightingale). All patients with at least 1 in-person encounter with any clinician between January 1, 2012, and December 31, 2013, were eligible for inclusion. Patient encounters with no identified encounter date or designated encounter provider, or those for patients with non-Ontario postal codes, were excluded.

### Patient characteristics

We obtained the following patient characteristics from the EMR: age, sex, comorbidities, most responsible physician, postal code, and provider seen for each visit in the study period. We intended to collect data on patient comorbidities; however, it was not possible to reliably do so owing to the challenges of ascertaining comorbid condition status from the EMR.

Using their postal codes, we assigned patients to a Canadian neighbourhood income quintile, which represents the adjusted after-tax economic family income, in order to determine socioeconomic status. We used the postal code conversion file obtained through Statistics Canada to match each patient's postal code to a census tract unique identifier, which uniquely identifies a census tract within a census metropolitan area or census agglomeration.<sup>13</sup> Household income data from the National Household Survey were then linked to each census tract unique identifier to determine the individual-level income quintile. Patients with no available census tract data attributable to their postal code were excluded from the analyses.

### Outcomes

Our primary outcome of interest was whether the patient had at least 1 visit with an allied health provider (AHP) during the study period. As FHT referral practices recommended that all patients with diabetes be referred to the diabetes AHPs, and that many young female patients be referred to the nurse practitioner for periodic health assessments, our secondary outcome was whether the patient had at least 1 visit with an AHP not including the diabetes team and the nurse practitioner.

### Statistical analysis

We used descriptive statistics to describe our study population and compared patients who accessed allied health services with those who did not using  $\chi^2$  tests for

categorical variables and ANOVA (analysis of variance) for continuous variables. We conducted logistic regression analyses to determine whether income quintile was independently associated with allied health use after adjusting for other patient characteristics (age and sex) and accounting for clustering to individual most responsible physicians. We decided a priori on a significance level of .05 for all outcomes. All data analyses were performed using SPSS, version 19.

### Ethics approval

Approval for this study was obtained from the Ottawa Health Science Research Ethics Board.

## RESULTS

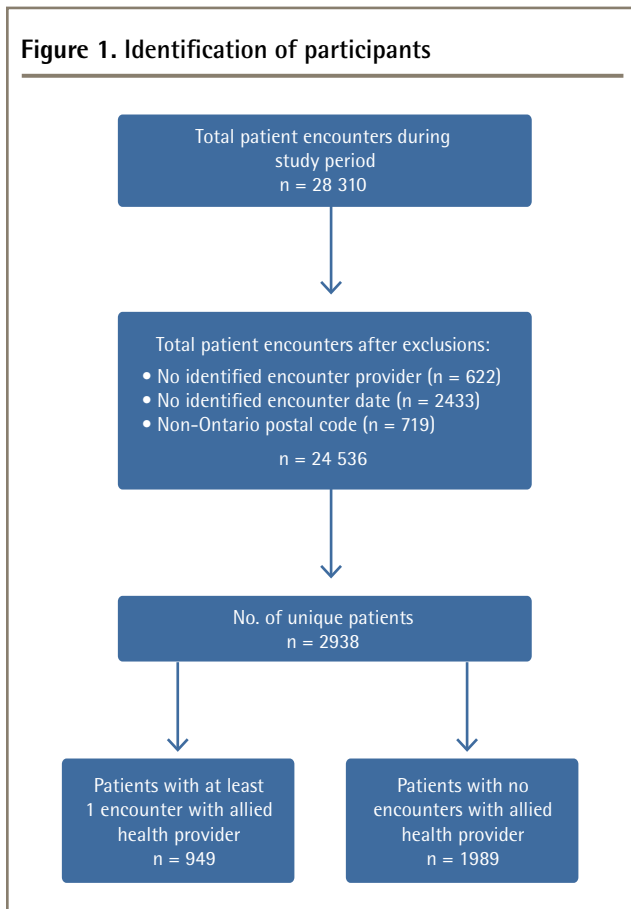
### Participants

We identified 4226 patients who had a total of 28310 in-person clinician encounters between January 1, 2012, and December 31, 2013. After exclusions, there were 2938 patients in the study population (**Figure 1**). In total, 949 (32.3%) patients had at least 1 visit to an AHP, with a mean (SD) number of AHPs seen of 1.35 (0.63). Excluding those patients for whom we were unable to assign an income quintile (n=166), patients in the

lowest income quintile had the greatest mean (SD) number of AHPs seen (1.48 [0.80]).

### Patient characteristics

**Table 1** shows the characteristics of study participants. The mean age of the patients was 44.9 years, 48.3% were men, and 73.7% lived in neighbourhoods in the highest income quintile. Nurse practitioners were by far the most commonly seen AHP (seen by 15.1% of all patients). The distribution of patients seeing the different AHPs is shown in **Table 2**. Differences existed among patients who did and did not see AHPs (**Table 3**). Those who saw AHPs were, on average, older (mean [SD] age of 49.3 [19.4] vs 42.9 [21.5] years), and more likely to be female (59.2% vs 47.9%). Those who saw AHPs also had statistically significant differences in their most responsible physician, although aside from the finding that those patients who did not see AHPs were more likely not to have an assigned most responsible physician, these differences were quite small. Most patients (73.7%) were in the highest income quintile; however, there was no significant difference in individual income quintiles between those who did and did not see AHPs.



**Table 1. Patient characteristics: Mean (SD) age 44.9 (21.1) y; N = 2938.**

PATIENT CHARACTERISTICS	N (%)
Age, y	
• 0-19	406 (13.8)
• 20-39	781 (26.6)
• 40-59	944 (32.1)
• 60-79	676 (23.0)
• ≥ 80	131 (4.5)
Sex	
• Male	1418 (48.3)
Income quintiles*	
• 1st (lowest)	376 (12.8)
• 3rd	49 (1.7)
• 4th	182 (6.2)
• 5th (highest)	2165 (73.7)
• Not available†	166 (5.7)
Allied health provider use	
• Shared mental health	113 (3.8)
• Social worker	214 (7.3)
• Dietitian	163 (5.5)
• Pharmacist	133 (4.5)
• Diabetes team	195 (6.6)
• Nurse practitioner	445 (15.1)

\*No patients in the study population belonged to the 2nd income quintile.

†Postal codes from 166 patients could not be linked to the Postal Code Conversion File, likely owing to small census tract size.

**Table 2. Distribution of patients according to allied health provider visits**

PATIENT CHARACTERISTICS	SHARED MENTAL HEALTH (N = 113), N (%)	SOCIAL WORKER (N = 214), N (%)	DIETITIAN (N = 163), N (%)	PHARMACIST (N = 133), N (%)	DIABETES TEAM (N = 195), N (%)	NURSE PRACTITIONER (N = 445), N (%)
Age, y						
• 0-19	2 (1.8)	16 (7.5)	7 (4.3)	1 (0.8)	0 (0.0)	51 (11.5)
• 20-39	48 (42.5)	61 (28.5)	37 (22.7)	24 (18.0)	11 (5.6)	131 (29.4)
• 40-59	46 (40.7)	83 (38.8)	58 (35.6)	47 (35.3)	62 (31.8)	146 (32.8)
• 60-79	16 (14.2)	42 (19.6)	48 (29.4)	41 (30.8)	100 (51.3)	89 (20.0)
• ≥80	1 (0.9)	12 (5.6)	13 (8.0)	20 (15.0)	22 (11.3)	28 (6.3)
Sex						
• Male	44 (38.9)	81 (37.9)	60 (36.8)	64 (48.1)	116 (59.5)	147 (33.0)
• Female	68 (60.2)	132 (61.7)	103 (63.2)	68 (51.1)	78 (40.0)	297 (66.7)
• Unknown	1 (0.9)	1 (0.5)	0 (0.0)	1 (0.8)	1 (0.5)	1 (0.2)
Income quintiles*						
• 1st (lowest)	21 (20.0)	33 (16.3)	26 (16.9)	32 (25.8)	29 (16.3)	53 (12.6)
• 3rd	3 (2.9)	2 (1.0)	4 (2.6)	2 (1.6)	4 (2.2)	10 (2.4)
• 4th	10 (9.5)	21 (10.4)	8 (5.2)	12 (9.7)	13 (7.3)	34 (8.1)
• 5th (highest)	71 (67.6)	146 (72.3)	116 (75.3)	78 (62.9)	132 (74.2)	323 (76.9)
• Not available <sup>†</sup>	8 (7.1)	12 (5.6)	9 (5.5)	9 (6.8)	17 (8.7)	25 (5.6)

\*No patients in the study population belonged to the 2nd income quintile.

<sup>†</sup>Postal codes from 166 patients could not be linked to the Postal Code Conversion File, likely owing to small census tract size.

Proportions are calculated excluding these patients.

**Table 3. Comparison of characteristics among patients with and without allied health provider visits**

PATIENT CHARACTERISTICS	WITHOUT ALLIED HEALTH PROVIDER VISITS (N = 1989)	WITH ALLIED HEALTH PROVIDER VISITS (N = 949)	P VALUE
Mean (SD) age, y	42.9 (21.5)	49.3 (19.4)	< .001
Sex, n (%)			< .001
• Female	952 (47.9)	562 (59.2)	
• Male	1034 (52.0)	384 (40.5)	
• Unknown	3 (0.2)	3 (0.3)	
Most responsible physician, n (%)			< .001
• Physician 1	166 (8.3)	101 (10.6)	
• Physician 2	166 (8.3)	102 (10.7)	
• Physician 3	439 (22.1)	219 (23.1)	
• Physician 4	187 (9.4)	61 (6.4)	
• Physician 5	365 (18.4)	210 (22.1)	
• Physician 6	240 (12.1)	149 (15.7)	
• Physician 7	3 (0.2)	5 (0.5)	
• None	423 (21.3)	102 (10.7)	
Income quintiles,* n (%)			.055
• 1st (lowest)	245 (12.3)	131 (13.8)	
• 3rd	32 (1.6)	17 (1.8)	
• 4th	107 (5.4)	75 (7.9)	
• 5th (highest)	1491 (75.0)	674 (71.0)	
• Not available <sup>†</sup>	114 (5.7)	52 (5.5)	

\*No patients in the study population belonged to the 2nd income quintile.

<sup>†</sup>Postal codes from 166 patients could not be linked to the Postal Code Conversion File, likely owing to small census tract size.

### Income quintile and seeing an AHP

**Tables 4 and 5** show the results of our logistic regression analyses. After adjustment for patient age and sex, and accounting for clustering to most responsible physician, we found that the odds of seeing an AHP were significantly increased with older age (odds ratio [OR]=1.02, 95% CI 1.01 to 1.02) and female sex (OR=1.81, 95% CI 1.48 to 2.22). Compared with patients in the highest income quintile, patients in the lowest (OR=1.33, 95% CI 1.02 to 1.72) and fourth (OR=1.88, 95% CI 1.33 to 2.66) income quintiles had significantly higher odds of seeing AHPs. After we excluded patients who had allied health visits exclusively to the diabetes team or the nurse practitioner, adjusted analyses showed a stronger association with increased AHP use among patients in the lowest compared with the highest income quintile (OR=1.76, 95% CI 1.34 to 2.32). While a gradient effect across income quintiles was not observed, patients in all income quintiles had higher odds of seeing AHPs than those in the highest income quintile did.

### DISCUSSION

We found that lower-income patients within an academic FHT were more likely to use the allied health services available. While a “dose-response effect” was not apparent, this remains an important finding, demonstrating equitable access across socioeconomic status. While there has been recent literature demonstrating that newer models of primary care in Ontario are providing care to healthier and wealthier populations,<sup>3</sup> this is, to our knowledge, the first study examining how allied health care is distributed within a large FHT. Given that one of the goals of primary care reform has been to mitigate the effects of socioeconomic status by improving access to care and emphasizing the role of allied health professionals, our study sheds new light on the potential of new models to appropriately distribute resources among their patients.

We found that by far most of our patient population belongs to the highest neighbourhood income quintile,

**Table 4. Logistic regression analysis to identify patient characteristics associated with allied health provider use**

PATIENT CHARACTERISTICS	UNADJUSTED ODDS RATIO (95% CI) OF SEEING AN ALLIED HEALTH PROVIDER	ADJUSTED ODDS RATIO (95% CI) OF SEEING AN ALLIED HEALTH PROVIDER*
Age	1.01 (1.01-1.02)	1.02 (1.01-1.02)
Sex		
• Female	1.79 (1.47-2.19)	1.81 (1.48-2.22)
• Male	Reference	Reference
Income quintiles <sup>†</sup>		
• 1st (lowest)	1.30 (1.00-1.67)	1.33 (1.02-1.72)
• 3rd	1.31 (0.69-2.51)	1.36 (0.70-2.63)
• 4th	1.81 (1.30-2.54)	1.88 (1.33-2.66)
• 5th (highest)	Reference	Reference

\*Results adjusted for patient age and sex, and accounting for clustering to most responsible physician.

<sup>†</sup>No patients in the study population belonged to the 2nd income quintile.

**Table 5. Secondary logistic regression analysis to identify patient characteristics associated with allied health provider use excluding the diabetes team and nurse practitioner**

PATIENT CHARACTERISTICS	UNADJUSTED ODDS RATIO (95% CI) OF SEEING AN ALLIED HEALTH PROVIDER	ADJUSTED ODDS RATIO (95% CI) OF SEEING AN ALLIED HEALTH PROVIDER*
Age	1.01 (1.01-1.02)	1.02 (1.01-1.02)
Sex		
• Female	1.53 (1.26-1.86)	1.57 (1.28-1.93)
• Male	Reference	Reference
Income quintiles <sup>†</sup>		
• 1st (lowest)	1.72 (1.31-2.26)	1.76 (1.34-2.32)
• 3rd	1.27 (0.61-2.66)	1.32 (0.62-2.77)
• 4th	1.98 (1.39-2.83)	2.07 (1.44-2.96)
• 5th (highest)	Reference	Reference

\*Results adjusted for patient age and sex, and accounting for clustering to most responsible physician.


<sup>†</sup>No patients in the study population belonged to the 2nd income quintile.

representing patients of higher socioeconomic status. This has been a similar trend seen in previous studies that demonstrate FHTs, along with family health organizations and family health networks, “appear to proportionally serve more socially advantaged populations and those with fewer health care needs.”<sup>3</sup> We also found significantly higher odds of seeing AHPs among female patients, which might speak to previous literature demonstrating that women in primary care practices in Ontario are more likely than men to self-report poor mental or physical health and to discuss related psychosocial issues.<sup>14</sup>

## Limitations

There are several limitations to our study. Given some of the system challenges with ascertaining comorbidity inherent to EMR data retrieval,<sup>15-17</sup> it is possible that our results are underadjusted for physical and mental health comorbidity that could explain differences in need-based rather than income-based allied health use. Second, our data measure patients actually having encounters with AHPs but do not measure whether allied health care referrals were recommended by physicians but not pursued owing to patient- or practice-level barriers. In addition, generalizability might be limited in this single-clinic study, as the socioeconomic characteristics of patients in our FHT differ substantially from FHTs across Ontario, in which only 21% of patients, on average, are in the highest income quintile.<sup>3</sup> Further, as an academic FHT with a mandate to train residents and medical students, practice patterns might differ from those in other FHTs. Finally, we do not have information on the private insurance status of our patients or their perceived ability to pay for outside allied health services.

## Conclusion

Although disparities in health care access persist, demonstrating that the allocation of allied health resources is associated with economic need is an important outcome for investments in FHTs. For these results to be generalizable and useful, we encourage other FHTs to examine whether the appropriateness of their allied health resource allocation is consistent. Further, future studies should examine referral patterns to allied health care providers funded within primary care settings, as well as persistent barriers to allied health care use among vulnerable populations. 

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### Contributors

Both authors contributed to the concept and design of the study; data gathering, analysis, and interpretation; and preparing the manuscript for submission.

### Competing interests

None declared

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