

# Supply and Utilization of General Practitioner and Family Physician Services in Ontario



**ICES Investigative Report**

**August 2005**

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## **Authors**

**Benjamin T.B. Chan, MD, MPH, MPA**

**Susan E. Schultz, MA, MSc**

**August 2005**

## Publication Information

Published by the Institute for Clinical Evaluative Sciences (ICES)

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### How to cite this publication

Chan BTB, Schultz SE. Supply and Utilization of General Practitioner and Family Physician Services in Ontario. ICES Investigative Report. Toronto: Institute for Clinical Evaluative Sciences; 2005.

Institute for Clinical Evaluative Sciences (ICES)  
G1 06, 2075 Bayview Ave.  
Toronto, ON M4N 3M5  
Telephone: 416-480-4055  
[www.ices.on.ca](http://www.ices.on.ca)

## Authors' Affiliations

**Benjamin T.B. Chan, MD, MPH, MPA**

*Senior Scientist*, Institute for Clinical Evaluative Sciences

*Assistant Professor*, Faculty of Medicine, University of Toronto

*Chief Executive Officer*, Saskatchewan Health Quality Council

*Clinical Professor*, Department of Community Health and Epidemiology, College of Medicine, University of Saskatchewan

**Susan E. Schultz, MA, MSc**

*Senior Research Coordinator*, Institute for Clinical Evaluative Sciences

## Acknowledgments

### Critical Review

The authors wish to thank the following individuals for their guidance and insightful comments during the production of this report.

**Dr. Andreas Laupacis**

*President and Chief Executive Officer and Senior Scientist, Institute for Clinical Evaluative Sciences*

**Dr. Joshua Tepper**

*Associate Scientist, Institute for Clinical Evaluative Sciences*

**Dr. Doug Manuel**

*Scientist, Institute for Clinical Evaluative Sciences*

**Ms. Caroline Abrahams**

*Manager, Health Human Resources Forecasting and Modelling Unit, Ministry of Health and Long-Term Care*

**Mr. Graham Woodward**

*Manager, Health Information Products and Services Unit, Ministry of Health and Long-Term Care*

**Mr. Paul Brochu**

*Senior Health Information Analyst, Ministry of Health and Long-Term Care*

### Knowledge Transfer

**Paula McColgan**

*Vice President, Policy and External Relations, Institute for Clinical Evaluative Sciences*

### Editor

**Carolynne Varney**

*Institute for Clinical Evaluative Sciences*

### Layout

**Shelley Drennan**

*Institute for Clinical Evaluative Sciences*

### Cover and Map Design

**Laura Benben**

*Institute for Clinical Evaluative Sciences*

## About ICES

### **Ontario's resource for informed health care decision-making**

ICES (Institute for Clinical Evaluative Sciences) is an independent, non-profit organization that conducts health services evaluations on a broad range of topical issues to enhance the effectiveness of health care for Ontarians. Internationally recognized for its innovative use of population-based health information, ICES knowledge provides evidence to support health policy development and changes to the organization and delivery of health care services.

Unbiased ICES evidence offers fact-based measures of health system performance; a clearer understanding of the shifting health care needs of Ontarians; and a stimulus for discussion of practical solutions to optimize scarce resources.

Key to ICES' work is our ability to link anonymous population-based health information on an individual patient basis, using unique encrypted identifiers that ensure privacy and confidentiality. This allows scientists to obtain a more comprehensive view of specific health care issues than would otherwise be possible. Linked databases reflecting 12 million of 30 million Canadians allow researchers to follow patient populations through diagnosis and treatment, and to evaluate outcomes.

ICES brings together the best and the brightest talent under one roof. Many of our faculty are not only internationally recognized leaders in their fields, but are also practising clinicians who understand the grassroots of health care delivery, making ICES knowledge clinically-focused and useful in changing practice. Other team members have statistical training, epidemiological backgrounds, project management or communications expertise. The variety of skill sets and educational backgrounds ensures a multi-disciplinary approach to issues management and creates a real-world mosaic of perspectives that is vital to shaping Ontario's future health care.

ICES collaborates with experts from a diverse network of institutions, government agencies, professional organizations and patient groups to ensure that its findings are relevant.

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## Executive Summary

### Issue

Primary care practitioners play a critical role in Canada's health care system. They serve as a first line of contact for patients and are gatekeepers to other types of more specialized services. They coordinate the care of the patient and advocate for his or her best care. Primary care practitioners in Canada are, for the most part, general practitioners and family physicians (GP/FPs). Some generalist specialties, such as pediatrics, also provide care to a small proportion of the province's primary care patients. Increasingly, more emphasis is being placed on primary care practitioners working in teams.<sup>1</sup> In such models, family physicians work in group practices alongside other health professionals, such as nurse practitioners, dietitians, mental health counsellors, social workers or midwives.

In recent years, physician organizations, governments and policy committees have raised concerns about the sustainability of the primary care workforce.<sup>2,3</sup> Sources of concern include:

- A general, modest decline in the physician-population ratio in Canada since its peak in 1993;<sup>4</sup>
- A steady increase in the average age of the physician workforce;<sup>5</sup>
- Increasing service demands from an aging population;
- The popularity of family medicine as a specialty among women,<sup>6</sup> and lower workload of female physicians during child-rearing years;<sup>4</sup>
- Fewer residents choosing family medicine;<sup>7,8</sup>
- Anecdotal reports identifying some regions of the province where patients cannot find a family physician accepting new patients;<sup>9</sup> and,
- Fewer family physicians practicing in non-office settings, such as emergency departments, hospital wards, long-term care facilities, and obstetrics.<sup>10</sup>

This report provides policymakers, health care providers, and the public, with information about Ontario's standing with regard to trends affecting primary care.

### Study

This study used administrative data to examine changes in the supply and utilization of GP/FP services in Ontario from 1993/94 to 2001/02. Information about the utilization of GP/FP services was drawn from the Ministry of Health and Long-Term Care (MOHLTC) Ontario Health Insurance Plan (OHIP) database of physician billings and the MOHLTC Registered Persons Database (RPDB), which contains information about the age, sex and location of residence of all persons with valid health insurance in Ontario. Physician information came from the Institute for Clinical Evaluative Sciences (ICES) Physician Workforce Database, which is constructed from data from the Ontario Physician Human Resource Data Centre (OPHRDC), the MOHLTC Ontario Health Insurance Plan (OHIP) Corporate Provider Database (CPDB) and OHIP physician billings. Population estimates by age, sex, and county, for each year were obtained from Statistics Canada.

This study examined the following trends in Ontario, from 1993/94 to 2001/02:

- Average number of GP/FP visits per person per year;
- The proportion of the population with no GP/FP visits during the year;
- The number of GP/FPs in Ontario, both the head count and the number of full-time equivalents;
- The supply of GP/FPs as measured by the physician: population ratio, using the unadjusted population and the population adjusted for age, sex and the flow of patients across geographic boundaries such as counties or regions;
- The age-sex composition of the GP/FP workforce;



- Participation of GP/FPs in non-office practice settings such as hospital and nursing home visits, emergency departments, obstetrics and anesthesia; and,
- Physician workload as measured by the average number of assigned patients per physician, the average number of days worked per physician and the average number of patients seen per day worked.

Geographical variation in 2001/02 was examined for:

- Average number of GP/FP visits per person;
- GP/FP supply;
- Participation in non-office practice settings; and,
- Physician workload, measured in terms of the number of patients per physician, the number of days worked per year and the number of patients seen per day.

### Key findings

- By 2001/02, the average number of visits to a GP/FP per person per year had fallen 13% from the average in 1993/94 (4.3 to 3.7). This is largely attributable to fewer visits by children and young adults. The rate for the elderly, who often have complex, chronic conditions, stayed relatively stable.
- The proportion of the Ontario population with no GP/FP visits, adjusted for age and sex, rose 15%, from 21% to 25%.
- Approximately one-quarter to one-third of all visits to GP/FPs are of probable low acuity and could potentially be dealt with by a non-physician health care provider, such as a nurse practitioner.
- From 1993/94 to 2001/02 the absolute number of GP/FPs has stayed relatively constant, but the increasing population has led to a decline in the number of physicians per population.
- There has been a steady decline in the proportion of the GP/FP physician population under age 35 and an increased proportion in the 55–64 year age group. Many in the latter group are likely nearing retirement, and this could have serious implications for the future supply of primary care physicians.
- The comprehensiveness of GP/FP practice continues to decline. Decreased participation in emergency room, obstetrics and inpatient care suggests GP/FPs are becoming increasingly disconnected from the hospital environment.

### Implications

The face of family medicine has changed substantially during the past several years. Young patients are visiting doctors less. Physician supply has decreased, the workforce is aging, more women are in the workforce, and the comprehensiveness of care continues to decline. Some of these changes are likely the result of specific policy decisions a decade ago, while others result from evolving social trends in the choices of physicians about how they practice and the choices of patients about how they interact with their primary care physician.

Health human resource planners need to regularly monitor the impact of their policies, and the evolution of social trends. Policies governing the entry and exit of physicians, the models of care, and the numbers of physicians targeted for the system need to be constantly revised as new information becomes available.

## Introduction

General practitioners and family physicians (GP/FPs) are the main providers of primary care in Ontario. The definition of GP/FP for this study includes all physicians identified in the Ontario Physician Human Resources Data Centre (OPHRDC) database as being in active practice and having a main specialty of GP, FP, or FP with emergency medicine training (CCFP(EM)). This includes both fee-for-service and non-fee-for-service physicians. A physician who was a GP/FP in year A, and became a specialist in year B, was considered a GP/FP in year A only.

Efforts to address concerns about the sustainability of the primary care workforce include a global increase in medical student enrolment,<sup>11</sup> increasing the supply of nurse practitioners and midwives<sup>12,13,14</sup> to help fill gaps in care, and the development of family health networks aimed at accelerating the team-based approach to care.<sup>15</sup>

Information provided in this report can assist policymakers in making system capacity decisions about the level of resources to be deployed into the system. The research questions were divided into two broad groups: 1) how patients interact with their GP/FP, and 2) size and composition of the GP/FP workforce, as outlined below.

### How patients interact with GP/FPs

1. How often do patients see their GP/FP each year? Is this frequency changing over time?
2. How does the frequency of visits vary by patient age, sex and location?
3. What proportion of Ontarians sees a GP/FP in a year? Is this proportion rising over time?
4. For what medical conditions do patients visit their GP/FP? What proportion of these visits is for probable low acuity conditions?
5. How does the volume of GP/FP visits vary throughout the year?

### Size and composition of the GP/FP workforce

1. What is the supply of GP/FPs relative to the population, and how has it changed over time?
2. How does GP/FP supply vary across the province, and are these variations changing over time?
3. Is the proportion of women GP/FPs increasing?
4. Is the age distribution of GP/FPs changing?
5. Is workload increasing?
6. Is the comprehensiveness of family physician services changing? Are GP/FPs continuing to reduce participation in non-office settings (e.g., emergency departments, hospital wards or nursing homes)?

## Findings/Exhibits

### Physician utilization

#### *Frequency of visits to GP/FPs*

Exhibit 1. Age/sex-adjusted average number GP/FP office visits per person-year, in Ontario, 1993/94–2001/02

Exhibit 2a. Age/sex-specific average number GP/FP office visits per person-year, in Ontario, 2001/02

Exhibit 2b. Percent change in the age/sex-specific average number GP/FP office visits per person-year, in Ontario, 2001/02 compared with 1993/94

Exhibit 3. Percent of the population that had no GP/FP office visits during the year, in Ontario, 1993/94–2001/02

Exhibit 4. Frequency of GP/FP office visits, in Ontario, 2001/02

Exhibit 5. Age/sex-adjusted average number GP/FP office visits per person-year, by county, in Ontario, 2001/02

#### *Purpose of visits to GP/FPs*

Exhibit 6. Age/sex-specific distribution of GP/FP office visits, by diagnostic category, in Ontario, 2001/02

Exhibit 7. Distribution of GP/FP office visits, by major diagnostic categories and subcategories, in Ontario, 2001/02

Exhibit 8. Number and proportion of GP/FP visits of probable low acuity, by diagnosis, in Ontario, 2001/02

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Exhibit 9. Seasonal variation in GP/FP and emergency department (ED) utilization, in Ontario, 9-year average, 1993/94–2001/02

### Physician supply and workload

#### *Number of GP/FPs*

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Exhibit 12. Supply of GP/FPs, by sex as a proportion of the total, in Ontario, 1993/94–2001/02

Exhibit 13. Supply of GP/FPs, by age group as a proportion of the total, in Ontario, 1993/94–2001/02

Exhibit 14a. Population by region and county, in Ontario, 2001/02

Exhibit 14b. Supply of GP/FPs, by region and county, in Ontario, 2001/02

Exhibit 14c. Change in GP/FP supply, by region and county, in Ontario, 2001/02

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Exhibit 16. Trends in the comprehensiveness of physician services: percent of active GP/FPs performing selected services, in Ontario, 1993/94–2001/02

Exhibit 17. Comprehensiveness of physician services: percent of active GP/FPs performing selected services, by county, in Ontario, 2001/02

Exhibit 18. Supply of GP/FPs, by region and quasi-specialty, in Ontario, 2001/02

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Exhibit 20. Age/sex-adjusted average number of office patients seen per day by GP/FPs, in Ontario, 1993/94–2001/02

Exhibit 21. Age/sex-adjusted average number of assigned weighted patients per GP/FP, in Ontario, 1993/94–2001/02

Exhibit 22. Physician office practice workload, active GP/FPs, by county, in Ontario, 2001/02

Exhibit 23. Relationship between GP/FP supply (FTEs per 10,000 population) and workload (mean number of patient visits per day), by county, in Ontario, 2001/02

Exhibit 24. Relationship between GP/FP supply (FTEs per 10,000 population) and workload (number of patients per physician), by county, in Ontario, 2001/02

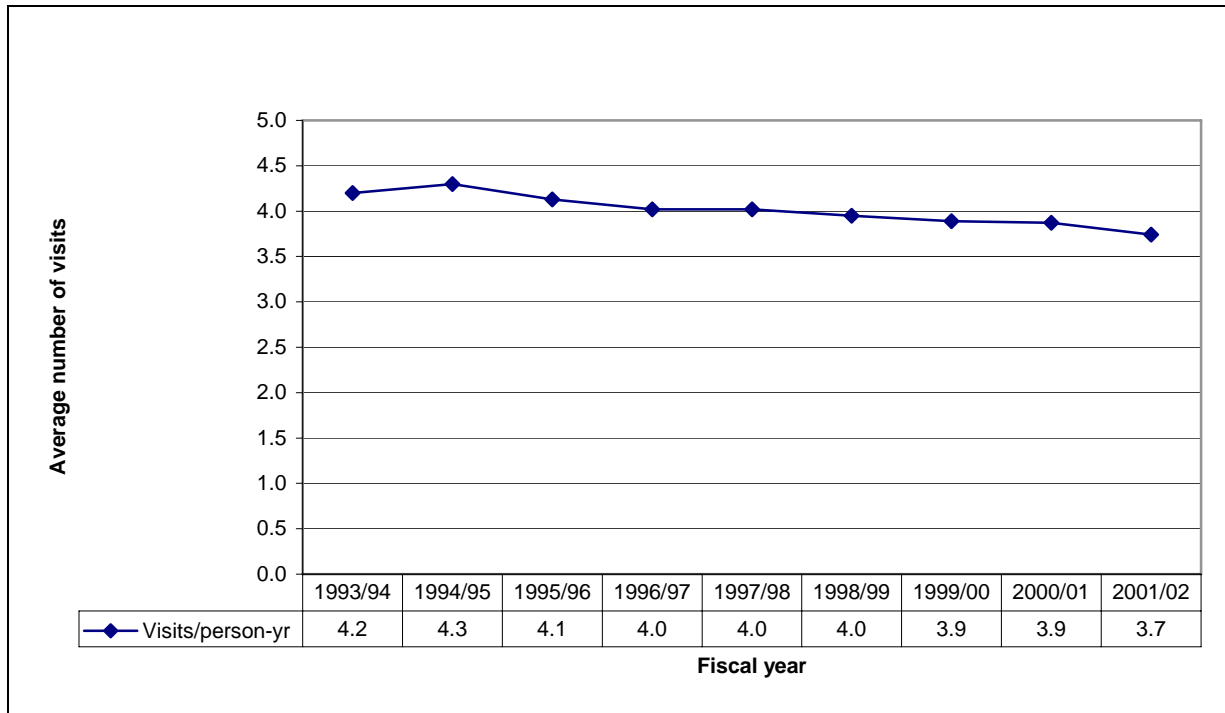
### *Overall trends by health region*

Exhibit 25. Overall trends in GP/FP supply, by region, in Ontario, 1993/94–2001/02

## Physician utilization

### Frequency of visits to GP/FPs

**Exhibit 1. Age/sex-adjusted<sup>1</sup> average number of GP/FP office visits per person-year, in Ontario, 1993/94–2001/02**

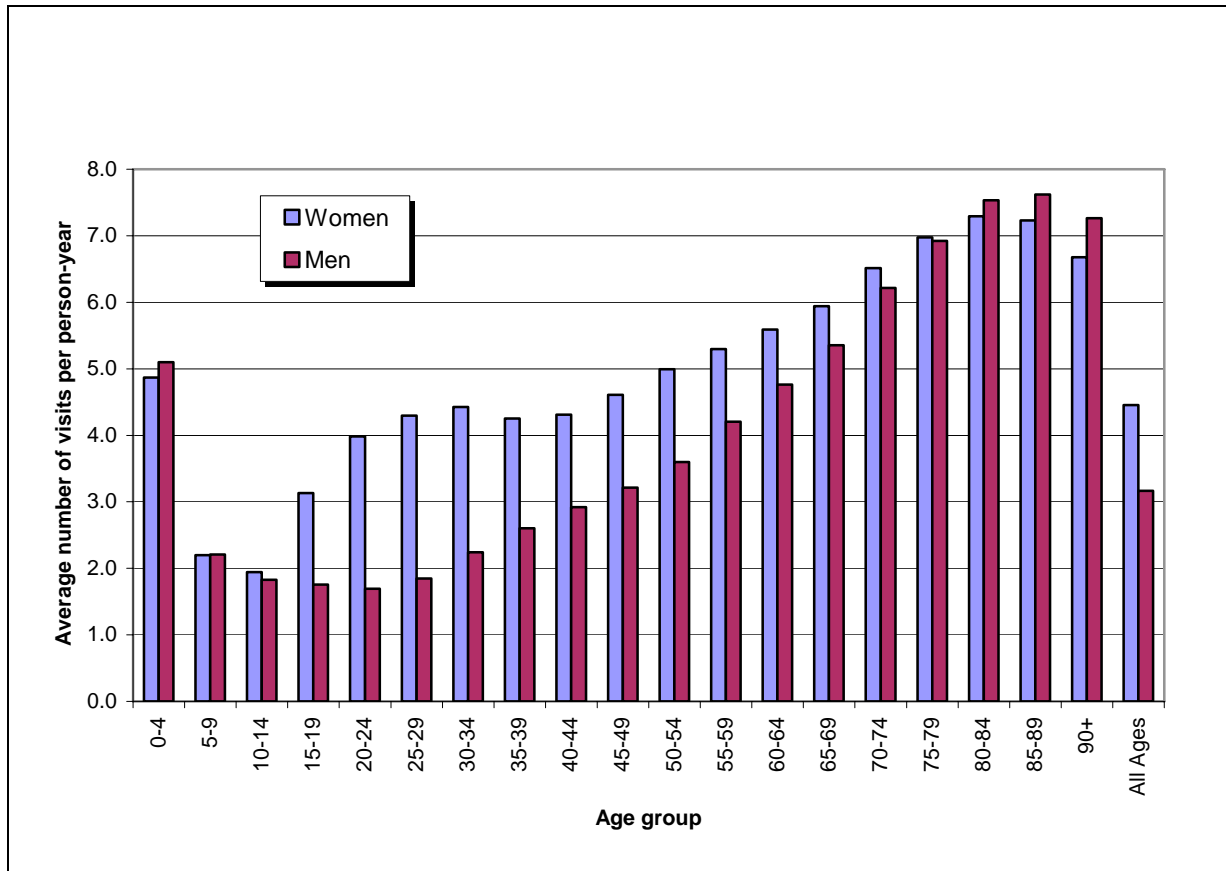


<sup>1</sup>Standardized to the 1991 Canadian Population

Data sources: Ministry of Health and Long-Term Care—Ontario Health Insurance Plan and Registered Persons Database; Statistics Canada—*Annual Demographic Statistics*, Cat. No. 91-213-XMP

- The average number of visits made to a GP/FP in Ontario has declined since 1994/95.
- In that year, Ontarians visited GP/FPs an average of 4.3 times, but by 2001/02, the rate had dropped 13% to 3.7 visits.
- All figures include Ontarians who made 0 visits to a GP/FP.

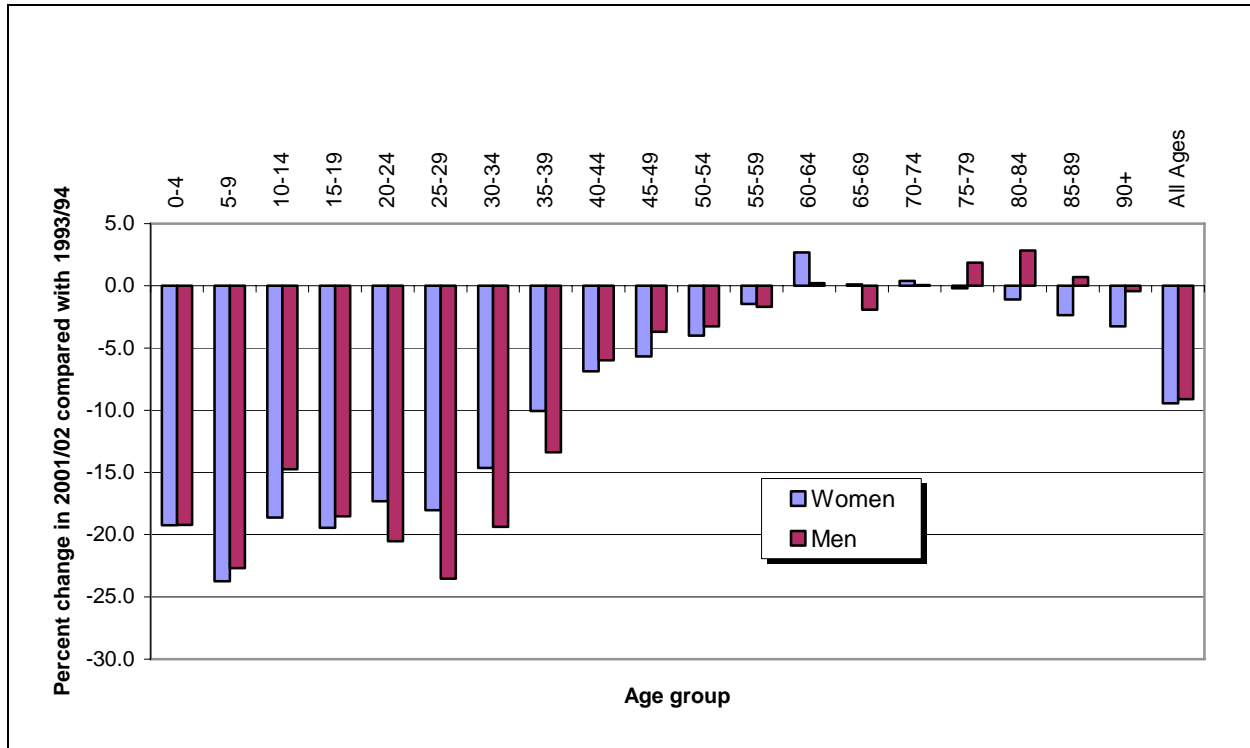
Exhibit 2a. Age/sex-specific average number of GP/FP visits per person-year, in Ontario, 2001/02



Data sources: Ministry of Health and Long-Term Care—Ontario Health Insurance Plan and Registered Persons Database; Statistics Canada—*Annual Demographic Statistics*, Cat. No. 91-213-XMP

- Young adult to middle-aged Ontarians visited GP/FPs less frequently than seniors and very young children.
- Women of child-bearing age (20–39) had about twice the number of visits per year as men in the same age group.
- On average, patients over age 70 visited their GP/FP at least once every two months.

**Exhibit 2b. Percent change in the age/sex-specific average number of GP/FP visits per person per year, in Ontario, 2001/02 compared with 1993/94**



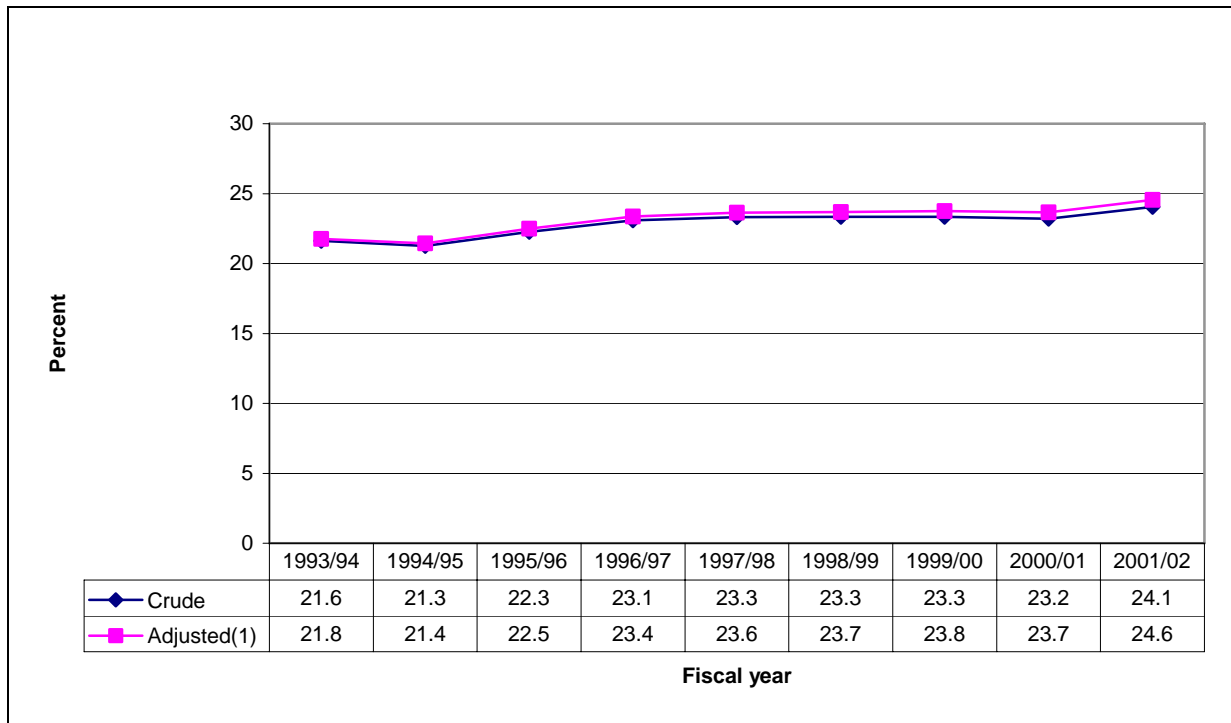
Data sources: Ministry of Health and Long-Term Care—Ontario Health Insurance Plan and Registered Persons Database; Statistics Canada—*Annual Demographic Statistics*, Cat. No. 91-213-XMP

- The overall decline in visits per person from 1993/94 to 2001/02 (noted in Exhibit 1) is attributable to a decreased utilization of 15-23% by Ontarians aged 0-29 years.
- Modest declines in visits were observed for people aged 30-54 years.
- There was little change in visit rates among those aged 55 and older.

To test whether the decline in visits among children and adolescents (ages 0-19) might be due to a shift from GP/FPs to pediatricians, the number of visits to pediatricians for office visits and annual health exams during the same period was examined.

- Total GP/FP visits for Ontarians aged 0-19 years dropped by about 1.7 million from 1993/94 to 2001/02. However, pediatrician visits only increased by 78,436, suggesting that the decline in GP/FP visits among the young is not attributable to a shift in care to pediatricians.

**Exhibit 3. Percent of the population that had no GP/FP visits during the year, in Ontario, 1993/94-2001/02**



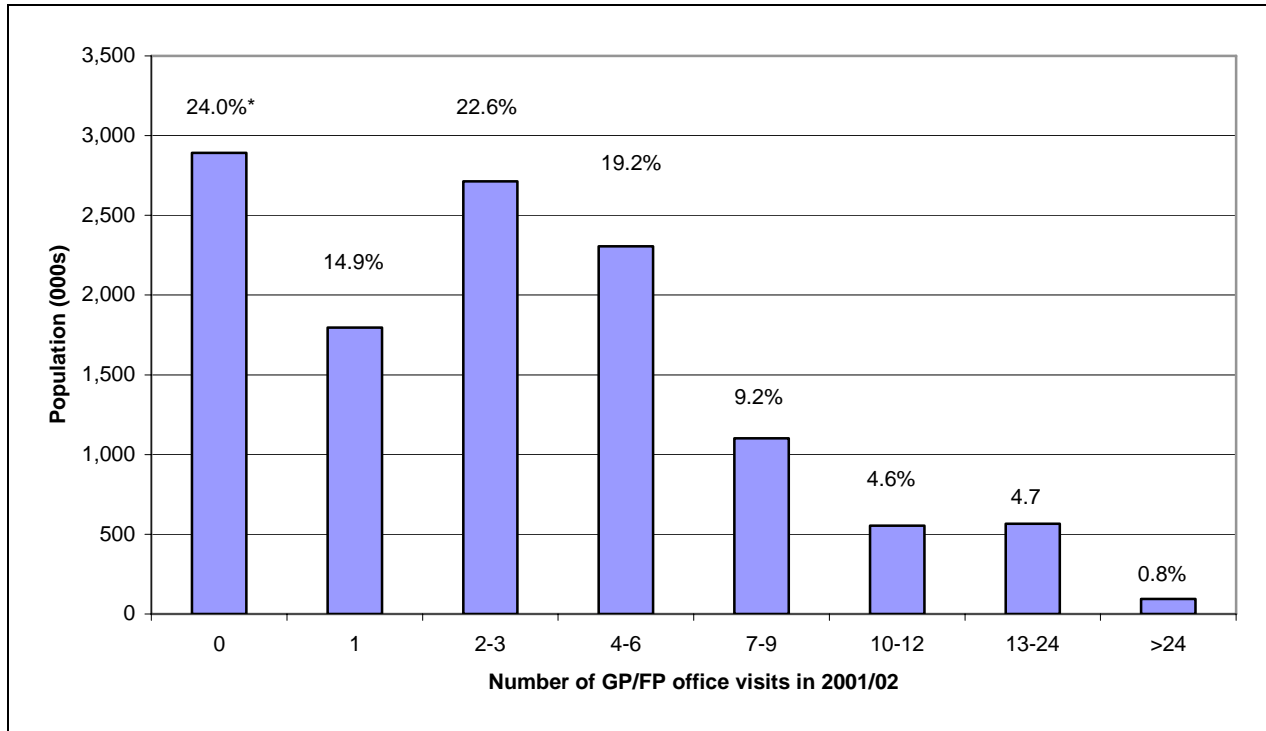
<sup>1</sup>Standardized to the 1991 Canadian population

Data sources: Ministry of Health and Long-Term Care—Ontario Health Insurance Plan and Registered Persons Database; Statistics Canada—*Annual Demographic Statistics*, Cat. No. 91-213-XMP

- The age/sex-adjusted proportion of Ontario residents with no GP/FP visits rose from 21.4% in 1993/94 to 24.6% in 2001/02, a proportional increase of 15%.
- During this period, the proportion of doctors practicing in community health centres (CHCs) and health service organizations (HSOs) was stable (1.3% in 1993/94; 1.6% in 2001/02). Thus, the trend cannot be attributed to a shift in physicians working in non-fee-for-service settings.



**Exhibit 4. Frequency of GP/FP office visits, in Ontario, 2001/02**

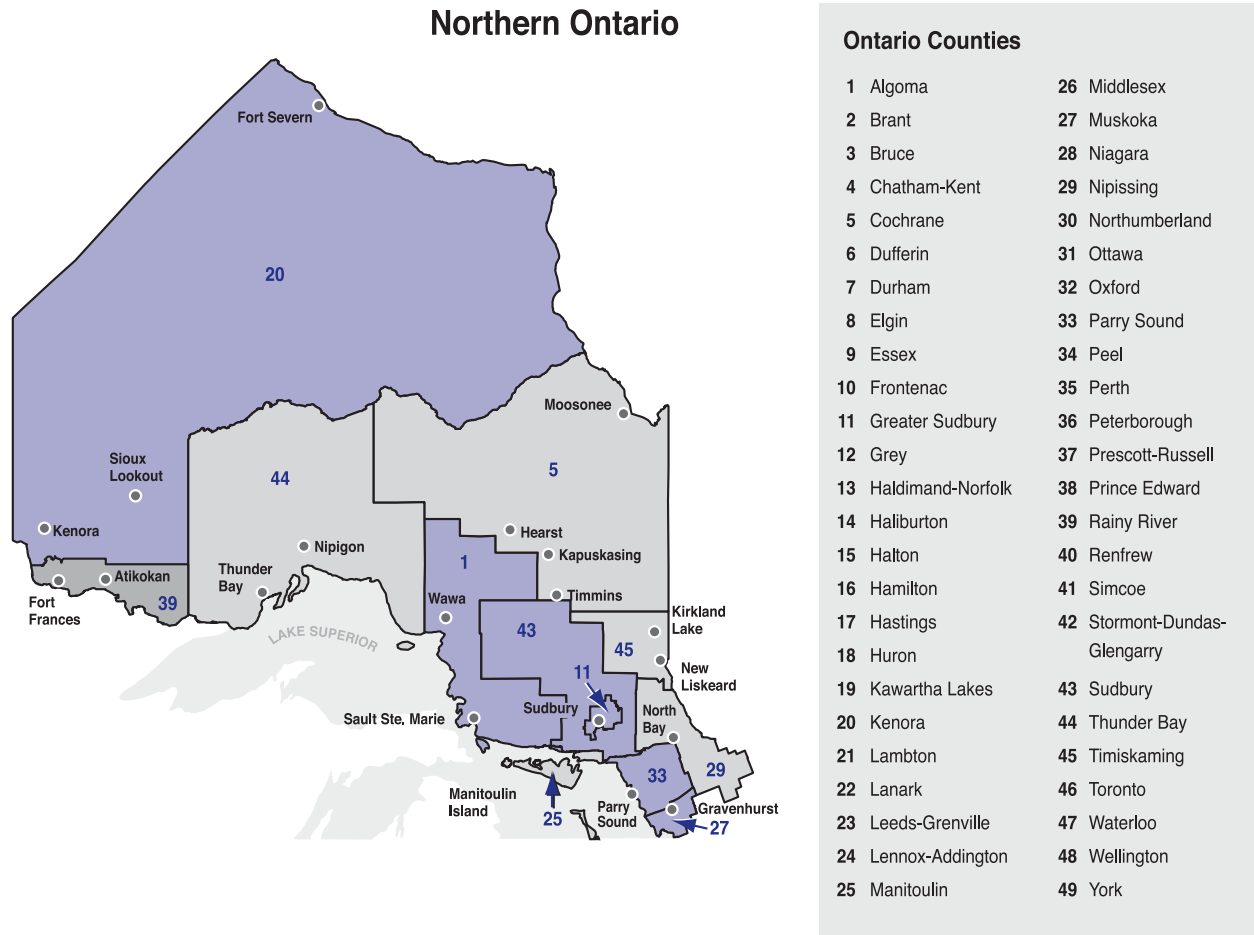


\*The percentage of the Ontario population in each category

Data sources: Ministry of Health and Long-Term Care—Ontario Health Insurance Plan and Registered Persons Database; Statistics Canada—*Annual Demographic Statistics*, Cat. No. 91-213-XMP

- More than 60% of Ontario residents had two or more visits to a GP/FP in one year, while 5.5% visited a GP/FP more than once a month.

**Exhibit 5. Age/sex-adjusted average number of GP/FP office visits per person per year, by county, in Ontario, 2001/02**

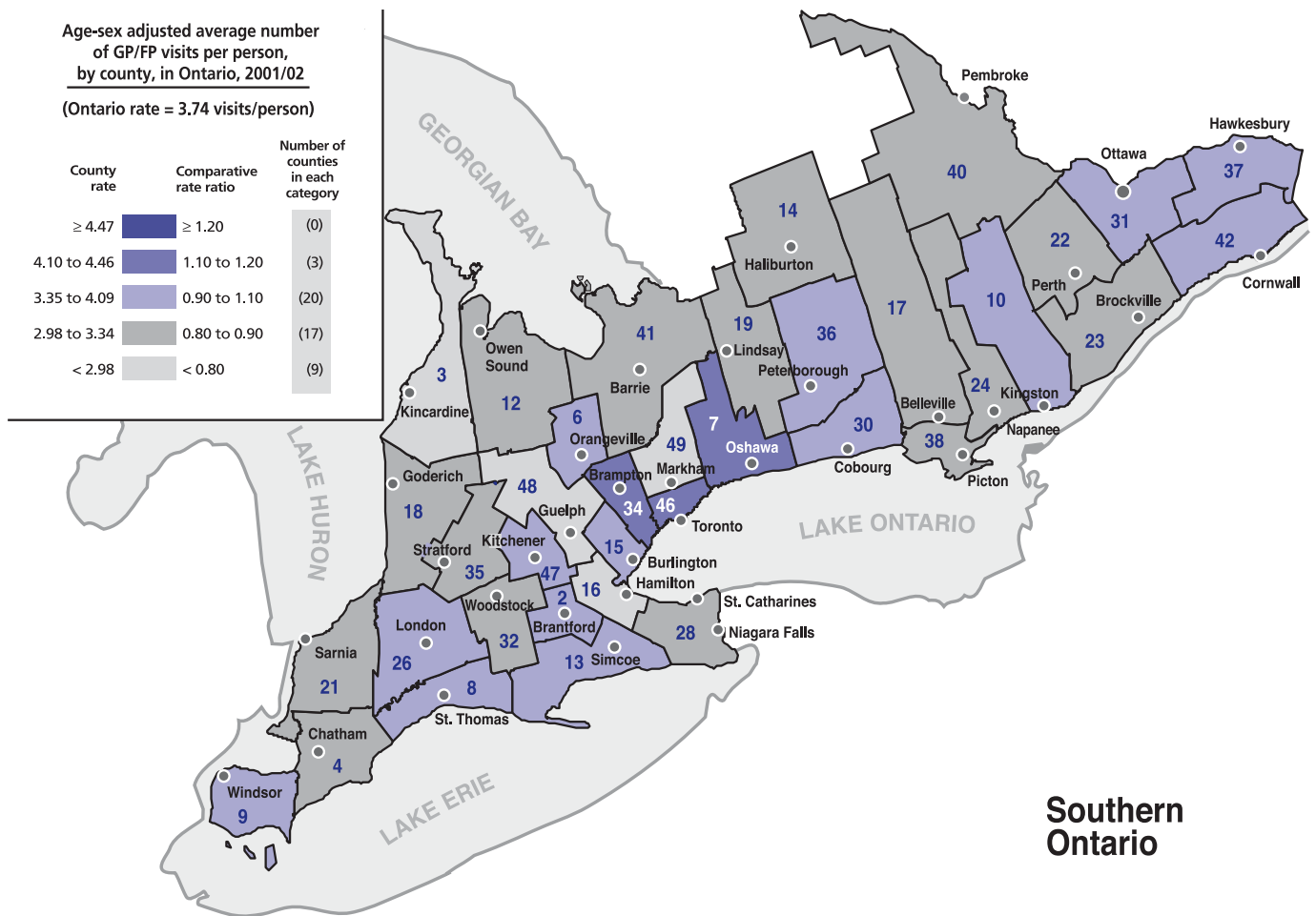


<sup>1</sup>Age/sex-standardized to the 1991 Canadian population

Data sources: Ministry of Health and Long-Term Care—Ontario Health Insurance Plan and Registered Persons Database; Statistics Canada—*Annual Demographic Statistics*, Cat. No. 91-213-XMP

- The average Ontario resident made 3.7 visits to a GP/FP in 2001/02.
- However, this figure varied widely among counties. For example, residents of Toronto and Peel Region visited a GP/FP twice as often as residents in Cochrane and Nipissing.
- Results for Hamilton, Waterloo and Algoma are underestimated in this analysis, as a large proportion of the GP/FPs in these areas are part of HSOs and data is unavailable. See Appendix E for actual numbers.

**Exhibit 5. Age/sex-adjusted average number of GP/FP office visits per person per year, by county, in Ontario, 2001/02 cont'd.**



*Purpose of visits to GP/FPs*

**Exhibit 6. Age/sex-specific distribution of GP/FP office visits, by diagnostic category, in Ontario, 2001/02**

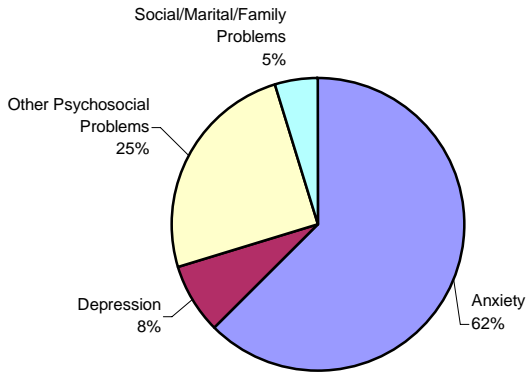
Diagnosis	Age 0–18		Age 19–64		Age 65+		All Ages	
	Women	Men	Women	Men	Women	Men	Women	Men
	%	%	%	%	%	%	%	%
<b>Respiratory disorders</b>	31.8	34.7	13.9	14.4	10.1	11.1	15.8	17.9
<b>Cardiovascular disease</b>	0.8	0.8	7.9	12.2	28.3	30.3	11.2	13.7
<b>Psychosocial problems</b>	3.5	3.8	13.3	13.2	8.2	6.1	10.8	9.7
<b>Musculoskeletal disorders</b>	2.1	2.4	7.7	9.0	11.8	8.2	7.7	7.4
<b>Accidents, poisoning, violence</b>	4.8	6.6	6.6	10.6	5.1	4.8	6.0	8.5
<b>Endocrine disorders</b>	1.2	1.0	6.4	8.7	10.0	12.2	6.4	7.8
<b>Health maintenance</b>	15.4	13.6	7.5	3.9	2.1	2.4	7.5	5.6
<b>Nervous system/sensory organs</b>	11.1	11.9	5.8	5.9	4.9	5.0	6.4	7.0
<b>Skin disorders</b>	8.6	8.6	4.9	5.7	3.6	3.9	5.2	5.9
<b>Genitourinary disorders</b>	4.0	1.2	9.6	2.5	3.7	3.4	7.5	2.4
<b>Gastrointestinal disorders</b>	4.3	3.8	5.6	5.9	5.6	5.4	5.4	5.4
<b>Infectious disease</b>	8.1	7.8	2.9	3.9	1.4	1.3	3.3	4.1
<b>Other medical</b>	3.4	3.5	3.4	3.3	3.2	3.0	3.3	3.3
<b>Pregnancy-related</b>	0.6	NA	3.4	NA	0.0	NA	2.3	0.0
<b>Cancer, neoplasms, hematologic disorders</b>	0.3	0.3	1.1	0.9	2.0	3.1	1.2	1.3
<b>Not stated/other</b>	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Data sources: Ministry of Health and Long-Term Care—Ontario Health Insurance Plan and Registered Persons Database

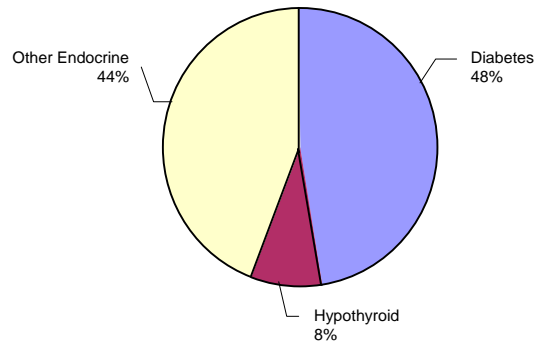
- Diagnoses were recorded for approximately 99% of GP/FP visits in 2001/02. For the population as a whole, a respiratory disorder was the most common reason for visiting a GP/FP, accounting for one in six visits.
- In the 0–18 year age group, the top diagnoses were respiratory disorders, health maintenance (e.g., well baby checks), and nervous system/sensory organ disorders (including otitis media [middle ear infection]).
- In the 19–64 age group, the most common diagnoses were respiratory conditions and psychosocial disorders, followed by genitourinary conditions (third among women) and cardiovascular disease (third among men).
- Among those aged 65 years and older, the top diagnoses were cardiovascular disease, followed by endocrine, musculoskeletal and respiratory disorders, with some variation among males and females in the order of the latter three.
- Prevalence of respiratory conditions, nervous system/sensory organ disorders, health maintenance, skin disorders, and infectious diseases decreased with age, while cardiovascular, musculoskeletal, and endocrine disorders increased with age.
- Psychosocial conditions were most prevalent in the age category 19–64 years.

**Exhibit 7. Distribution of GP/FP office visits by major diagnostic categories and subcategories, in Ontario, 2001/02**

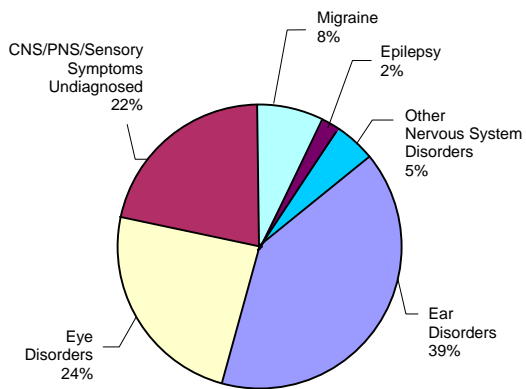
**Psychosocial Disorders**



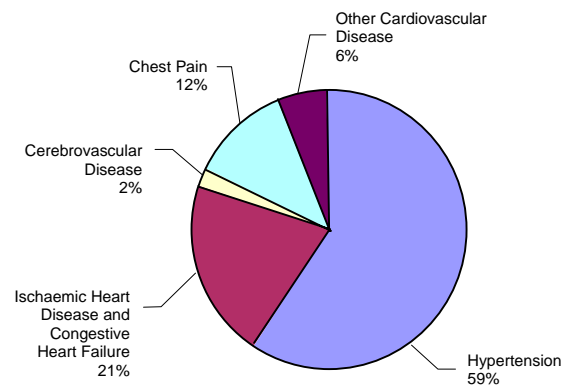
**Endocrine Disorders**



**Disorders of the Nervous System and Sensory Organs**

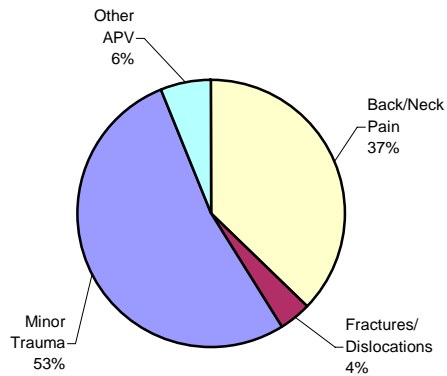


**Cardiovascular System Disorders**

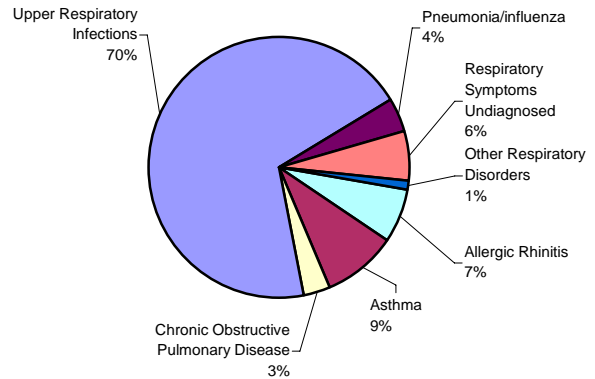


**Exhibit 7. Distribution of GP/FP office visits by major diagnostic categories and subcategories, in Ontario, 2001/02 cont'd.**

**Accidents, Poisonings and Violence (APV)**



**Respiratory Disorders**



Data source: Ministry of Health and Long-Term Care—Ontario Health Insurance Plan

- Anxiety comprises 62% of psychosocial diagnoses, hypertension comprises 59% of visits for cardiovascular conditions, and upper respiratory infections comprise 70% of visits for respiratory disorders.

**Exhibit 8. Number and proportion of GP/FP visits of probable low acuity, by diagnosis, in Ontario, 2001/02**

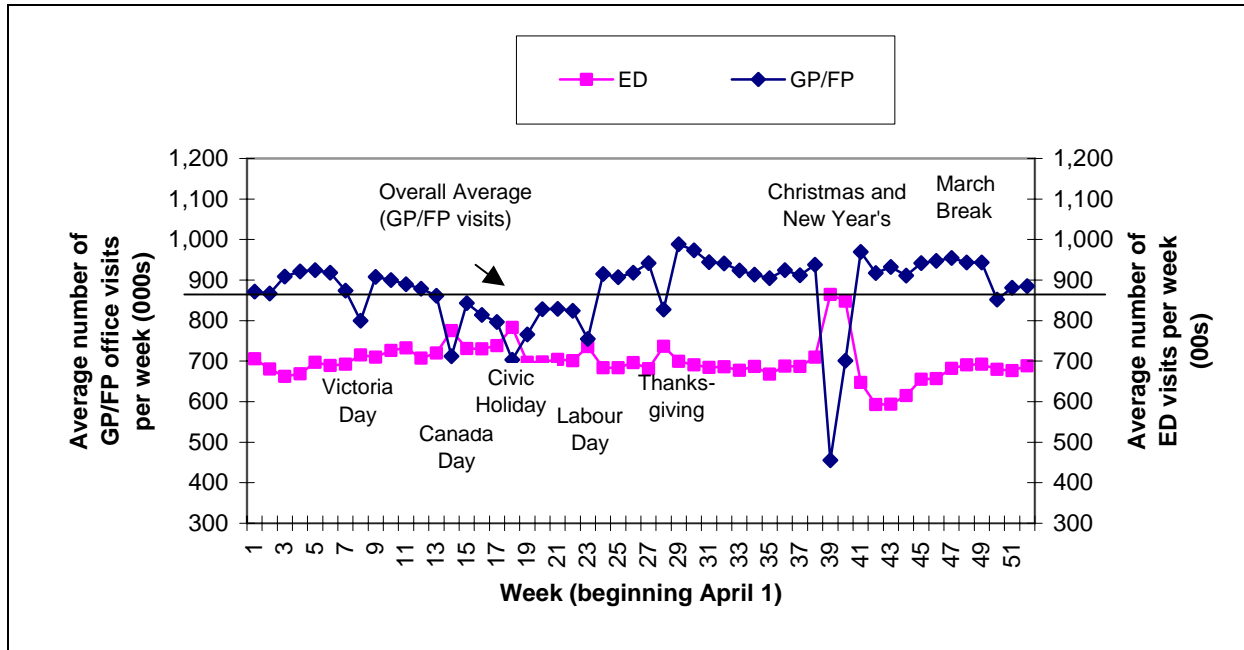
Diagnosis	2001/02		1993/94	
	Number of Visits	Percent of all GP/FP Visits	Number of Visits	Percent of all GP/FP Visits
<b>Probable Low Acuity</b>				
Cold, sinusitis	3,329,403	7.3	3,982,618	8.9
Hypertension (under 65 years)	1,654,766	3.6	1,288,110	2.9
Hypertension (over 65 years)	1,580,304	3.5	1,131,479	2.5
Annual physical	1,247,039	2.7	744,118	1.7
Back/neck pain	1,196,565	2.6	1,232,316	2.8
Dermatitis	1,066,935	2.3	1,103,526	2.5
Acute bronchitis	1,021,345	2.2	1,335,155	3.0
Otitis externa/media	699,588	1.5	943,563	2.1
Well baby	658,928	1.5	782,577	1.8
Hay fever	501,960	1.1	494,592	1.1
Urinary tract infection	375,747	0.8	349,248	0.8
Cellulitis, boil, impetigo	332,656	0.7	307,616	0.7
Gastroenteritis	322,622	0.7	367,755	0.8
Acne	314,721	0.7	337,481	0.8
Conjunctivitis	305,727	0.7	295,402	0.7
Tonsillitis	268,869	0.6	344,771	0.8
Ear wax	196,465	0.4	170,884	0.4
Normal pregnancy	152,000	0.3	254,112	0.6
Corns	24,551	0.1	26,962	0.1
<b>Not Low Acuity</b>	<b>30,338,257</b>	<b>66.6</b>	<b>29,333,090</b>	<b>65.4</b>

Data sources: Ministry of Health and Long-Term Care—Ontario Health Insurance Plan and Registered Persons Database

- Using the diagnoses noted in this table, 33.4% of all GP/FP office visits in 2001/02 are probable low acuity, a slight decline from 1993/94 (34.6%).
- Hypertension may be considered low acuity if it occurs in isolation, but in the elderly if it occurs among other chronic conditions, it can be complex to manage. One-quarter of GP/FP office visits would still be considered probable low acuity if a more stringent definition were adopted excluding hypertension.

Seasonality of visits to GP/FPs

**Exhibit 9. Seasonal variation in GP/FP and emergency department (ED) utilization, in Ontario, 9-year average, 1993/94–2001/02**



Data source: Ministry of Health and Long-Term Care—Ontario Health Insurance Plan

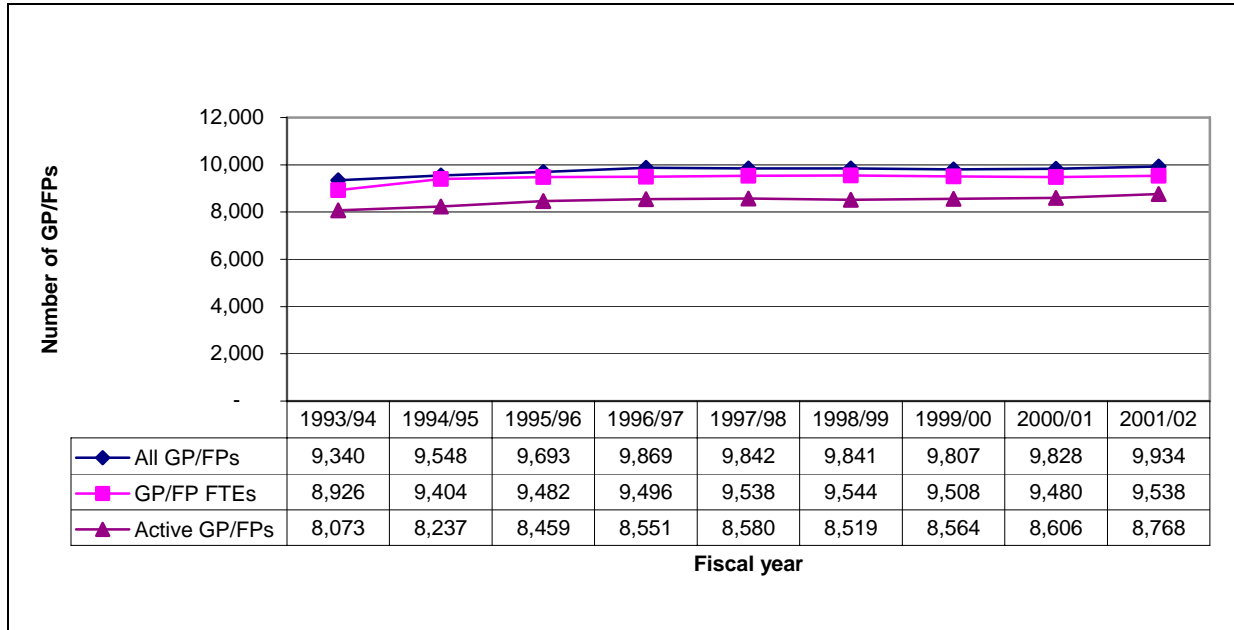
- The number of visits per week is higher during the fall and winter and lower in the summer.
- Downward spikes are evident in the weeks containing statutory holidays, when physicians' offices are traditionally closed.
- These downward spikes in GP/FP office volume coincide with upward spikes in emergency department volume.



## Physician supply and workload

### Number of GP/FPs

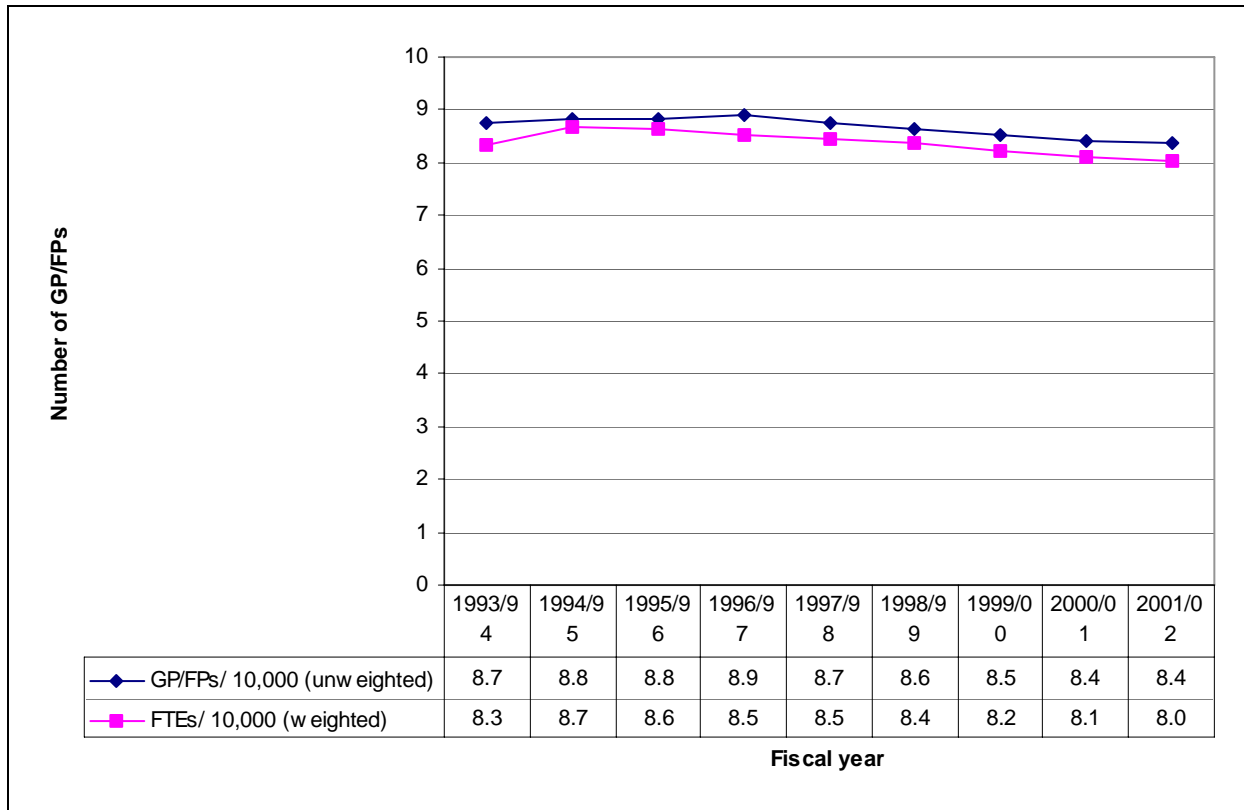
Exhibit 10. Total number of GP/FPs, in Ontario, 1993/94–2001/02



Data source: Institute for Clinical Evaluative Sciences—ICES Physician Workforce Database

- At 9,340 in 1993/94, the total number of GP/FPs in Ontario rose to almost 10,000 in 1996/97, and since then, has remained relatively constant.
- The number of full-time equivalents (FTEs) has also remained almost constant since 1995/96.

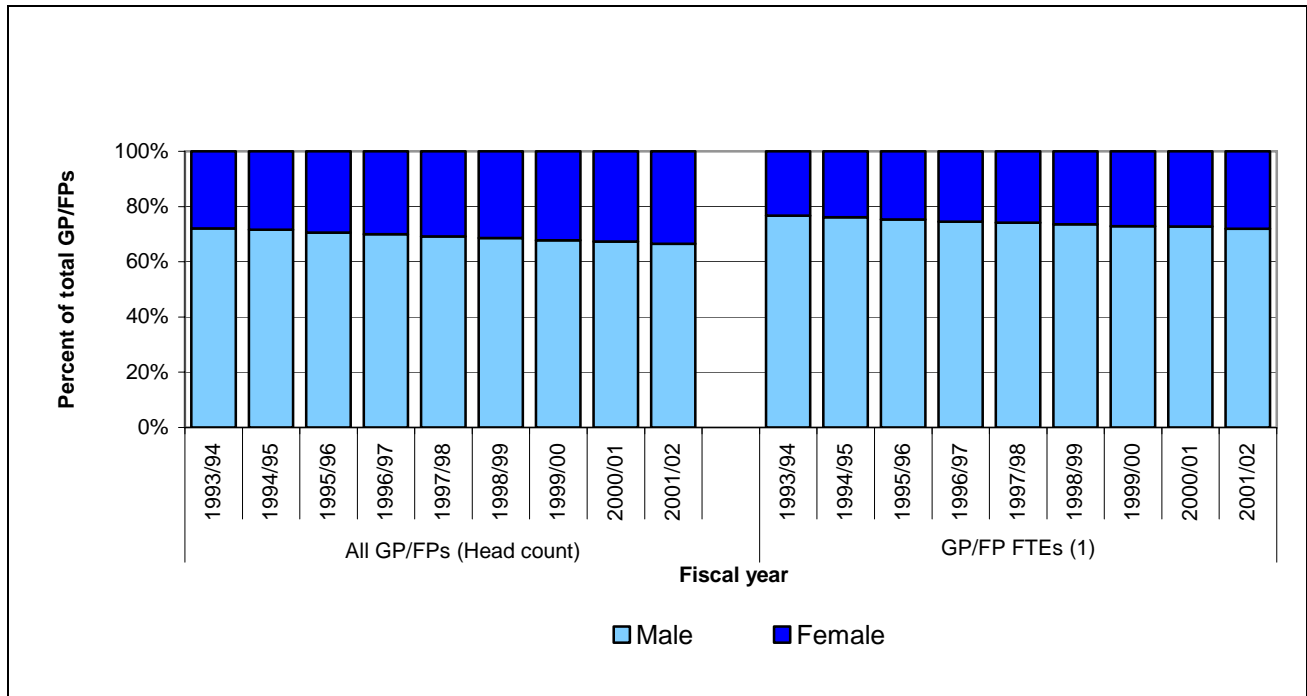
**Exhibit 11. Number of GP/FPs (headcount and FTE) per 10,000 population, in Ontario, 1993/94–2001/02**



Data sources: Institute for Clinical Evaluative Sciences—ICES Physician Workforce Database; Statistics Canada—*Annual Demographic Statistics*, Cat. No. 91-213-XMP

- While the number of GP/FPs has remained constant in recent years, the Ontario population has grown. From 1994/95 to 2001/02, there was a 5% decline in GP/FP to population ratio (unweighted).
- A larger decline of 8% in the FTE to weighted population ratio can be attributed to more females and older physicians in the workforce who may have a reduced workload, as well as to increased demand of an aging population.

**Exhibit 12. Supply of GP/FPs, by sex as a proportion of the total, in Ontario, 1993/94–2001/02**

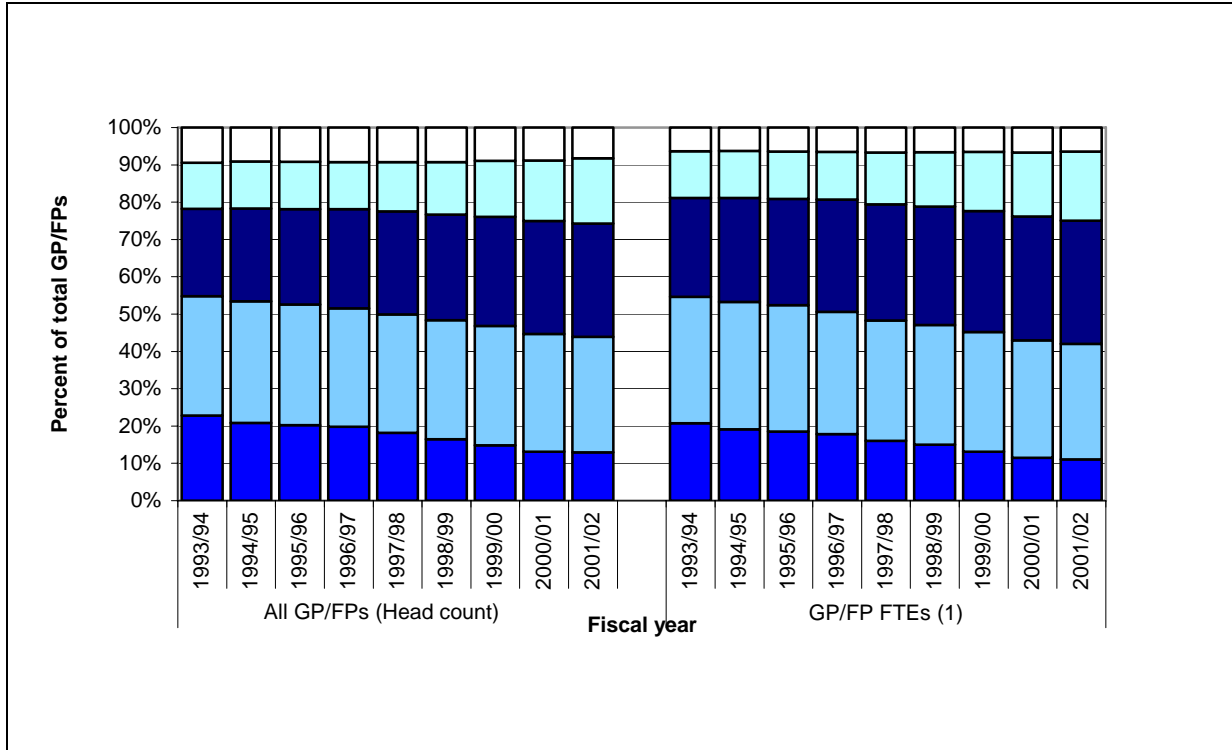


<sup>1</sup>Full-time equivalent (see Appendix C for how this is calculated)

Data source: Institute for Clinical Evaluative Sciences—ICES Physician Workforce Database

- The proportion of female GP/FPs has increased steadily, although it is greater in head counts than in FTEs.
- Women now make up 33% of the GP/FP workforce.

**Exhibit 13. Supply of GP/FPs, by age group as a proportion of the total, in Ontario, 1993/94–2001/02**



Full-time equivalent (see Appendix C for how this is calculated)

Data source: Institute for Clinical Evaluative Sciences—ICES Physician Workforce Database

- The physician population continues to age, with the proportion of FTEs below the age of 35 falling, while the proportion aged 55–64 years, rose.
- In 2001/02, one in four GP/FPs was 55 years of age or older.

**Exhibit 14a. Population by region and county, in Ontario, 2001/02**

Region and County	2001 Population <sup>1</sup>	Weighted Population Adjusted for Patient Flow <sup>2</sup>	Population Older than Average?	Net Visit Inflow (%)
<b>EAST</b>	<b>1,594,394</b>	<b>1,623,388</b>	<b>yes</b>	<b>0.9</b>
Frontenac	140,877	149,760	yes	3.9
Hastings	124,547	130,195	yes	1.5
Lanark	63,740	70,324	yes	7.3
Leeds-Grenville	101,033	90,246	yes	-14.7
Lennox-Addington	40,917	39,722	yes	-5.2
Ottawa	800,525	824,857	no	3.6
Prescott-Russell	79,990	74,773	no	-4.9
Prince Edward	26,429	28,510	yes	0.9
Renfrew	100,999	102,927	yes	-0.5
Stormont-Dundas-Glengarry	115,337	112,073	yes	-5.3
<b>CENTRAL EAST</b>	<b>1,998,511</b>	<b>1,821,390</b>	<b>no</b>	<b>-7.8</b>
Durham	523,013	457,019	no	-9.6
Haliburton	16,425	14,571	yes	-22.9
Northumberland	87,474	77,757	yes	-15.4
Peterborough	129,732	128,250	yes	-6.6
Simcoe County	389,221	386,522	yes	-1.0
Kawartha Lakes	74,354	69,584	yes	-12.0
York Region	778,292	687,688	no	-8.6
<b>TORONTO</b>	<b>2,562,235</b>	<b>2,898,062</b>	<b>yes</b>	<b>11.7</b>
Toronto	2,562,235	2,898,062	yes	11.7
<b>CENTRAL WEST</b>	<b>2,138,731</b>	<b>1,978,917</b>	<b>no</b>	<b>-4.7</b>
Dufferin	51,586	43,364	no	-12.3
Halton	387,388	383,650	yes	-1.2
Peel	1,047,097	929,011	no	-6.9
Waterloo	456,767	438,682	no	-1.8
Wellington	195,893	184,210	no	-5.1
<b>CENTRAL SOUTH</b>	<b>1,166,923</b>	<b>1,170,645</b>	<b>yes</b>	<b>-1.9</b>
Brant	127,238	121,803	yes	-4.8
Haldimand-Norfolk	109,730	96,088	yes	-13.3
Hamilton	503,043	528,126	yes	3.4
Niagara	426,912	424,627	yes	-4.4
<b>SOUTH WEST</b>	<b>1,536,058</b>	<b>1,550,791</b>	<b>yes</b>	<b>-0.1</b>
Bruce	66,408	68,127	yes	-1.8
Elgin	84,775	75,488	yes	-11.0

Region and County	2001 Population <sup>1</sup>	Weighted Population Adjusted for Patient Flow <sup>2</sup>	Population Older than Average?	Net Visit Inflow (%)
Essex	391,736	378,567	no	-3.0
Grey	91,880	87,615	yes	-9.8
Huron	60,616	62,589	yes	-0.4
Kent	112,032	117,553	yes	3.5
Lambton	132,010	120,702	yes	-11.4
Middlesex	417,477	458,505	yes	9.8
Oxford	103,150	102,045	yes	-2.3
Perth	75,974	79,598	yes	3.7
<b>NORTH</b>	<b>877,584</b>	<b>859,415</b>	<b>yes</b>	<b>-3.8</b>
Algoma	123,396	120,022	yes	-6.7
Cochrane	90,088	75,337	no	-15.1
Kenora	68,826	64,093	no	-2.9
Manitoulin	13,064	11,974	yes	-11.6
Muskoka	55,376	60,567	yes	3.4
Nipissing	84,365	87,768	yes	2.0
Parry Sound	42,338	34,558	yes	-25.8
Rainy River	22,975	22,567	yes	-3.5
Sudbury	25,342	15,207	yes	-42.1
Greater Sudbury	160,198	170,724	yes	5.3
Thunder Bay	156,047	155,941	yes	-1.0
Timiskaming	35,569	40,657	yes	10.8
<b>ONTARIO</b>	<b>11,874,436</b>	<b>11,902,609</b>	<b>***</b>	<b>***</b>

<sup>1</sup>Statistics Canada Population Estimate

<sup>2</sup>Population adjusted for differential physician utilization rates by age group and sex and for flow of patients between counties

Data sources: Ministry of Health and Long-Term Care—Ontario Health Insurance Plan and Registered Persons Database; Statistics Canada—*Annual Demographic Statistics*, Cat. No. 91-213-XMP; Institute for Clinical Evaluative Sciences—ICES Physician Workforce Database

In the estimates of physician supply by region (Exhibit 14b), the unadjusted population estimates obtained from Statistics Canada, and the age-sex weighted population adjusted for patient flow (shown in Exhibit 14a), were used for each health region and county. The weighting mechanism is based on differences in service utilization between patients in different age-sex groups. The flow adjustment accounts for patients seeking care outside the county of residence (see Appendix C for details of these calculations).

- Toronto's adjusted population was 13% higher than its actual population, indicating that Toronto's physicians service a much larger population than that which actually resides within the city boundaries.
- In contrast, neighbouring areas had adjusted populations smaller than their actual populations (Peel, 11% less; York, 12%; Durham, 13%). Physicians in these areas provide services to a population smaller than the number of residents of the region.
- Middlesex, which contains the city of London, was similar to Toronto in that it had a net inflow of patients; its adjusted population was 10% greater than actual.

**Exhibit 14b. Supply of GP/FPs, by region and county, in Ontario, 2001/02**

Region and County	Number of GP/FPs (Head Count)	Number of GP/FPs (FTE)	Number of GP/FPs Excluding Quasi-Specialists <sup>1</sup> (FTE)	Number of GP/FPs per 10,000 Population	Rank	Number of FTEs per 10,000 Population <sup>2</sup>	Rank	Number of FTEs per 10,000 Population <sup>3</sup>	Rank
<b>EAST</b>	<b>1,627</b>	<b>1,371.9</b>	<b>1,138.6</b>	<b>10.2</b>		<b>8.5</b>		<b>7.0</b>	
Frontenac	197	154.5	108.8	14.0	1	10.3	2	7.3	20
Hastings	92	90.4	83.6	7.4	29	6.9	38	6.4	34
Lanark	70	65.3	55.7	11.0	6	9.3	5	7.9	6
Leeds-Grenville	72	68.1	58.1	7.1	30	7.5	28	6.4	33
Lennox-Addington	38	31.8	27.5	9.3	12	8.0	16	6.9	27
Ottawa	890	716.9	588.9	11.1	5	8.7	10	7.1	22
Prescott-Russell	67	58.6	55.6	8.4	19	7.8	19	7.4	13
Prince Edward	26	22.0	19.9	9.8	10	7.7	24	7.0	26
Renfrew	88	83.2	75.7	8.7	16	8.1	14	7.4	15
Stormont-Dundas-Glengarry	87	81.1	64.8	7.5	27	7.2	32	5.8	48
<b>CENTRAL EAST</b>	<b>1,345</b>	<b>1,394.9</b>	<b>1,287.8</b>	<b>6.7</b>		<b>7.7</b>		<b>7.1</b>	
Durham	311	349.9	323.0	5.9	41	7.7	26	7.1	23
Haliburton	14	11.4	11.5	8.5	18	7.8	20	7.9	7
Northumberland	56	57.2	54.4	6.4	37	7.4	30	7.0	25
Peterborough	114	107.0	99.9	8.8	15	8.3	12	7.8	9
Simcoe County	298	308.6	282.0	7.7	26	8.0	17	7.3	19
Kawartha Lakes	47	50.2	45.8	6.3	39	7.2	33	6.6	32
York Region	505	510.6	471.2	6.5	36	7.4	29	6.9	28
<b>TORONTO</b>	<b>2,795</b>	<b>2,684.6</b>	<b>2,236.2</b>	<b>10.9</b>		<b>9.3</b>		<b>7.7</b>	
Toronto	2,795	2,684.6	2,236.2	10.9	7	9.3	6	7.7	12
<b>CENTRAL WEST</b>	<b>1,463</b>	<b>1,487.8</b>	<b>1,377.8</b>	<b>6.8</b>		<b>7.5</b>		<b>7.0</b>	
Dufferin	26	29.1	25.9	5.0	48	6.7	42	6.0	44
Halton	305	299.7	270.0	7.9	25	7.8	21	7.0	24
Peel	670	730.1	686.6	6.4	38	7.9	18	7.4	14
Waterloo	323	303.0	279.8	7.1	32	6.9	39	6.4	38
Wellington	139	125.9	115.5	7.1	31	6.8	40	6.3	40
<b>CENTRAL SOUTH</b>	<b>842</b>	<b>790.8</b>	<b>710.5</b>	<b>7.2</b>		<b>6.8</b>		<b>6.1</b>	
Brant	86	86.9	80.6	6.8	35	7.1	34	6.6	30
Haldimand-Norfolk	59	66.9	60.9	5.4	45	7.0	37	6.3	39
Hamilton	435	370.6	316.1	8.6	17	7.0	36	6.0	43
Niagara	262	266.4	252.9	6.1	40	6.3	48	6.0	45

Region and County	Number of GP/FPs (Head Count)	Number of GP/FPs (FTE)	Number of GP/FPs Excluding Quasi-Specialists <sup>1</sup> (FTE)	Number of GP/FPs per 10,000 Population	Rank	Number of FTEs per 10,000 Population <sup>2</sup>	Rank	Number of FTEs per 10,000 Population <sup>3</sup>	Rank
<b>SOUTH WEST</b>	<b>1,090</b>	<b>1,097.2</b>	<b>1,005.8</b>	<b>7.1</b>		<b>7.1</b>		<b>6.5</b>	
Bruce	45	45.3	43.7	6.8	34	6.6	44	6.4	35
Elgin	50	51.2	44.7	5.9	43	6.8	41	5.9	46
Essex	217	243.8	222.6	5.5	44	6.4	46	5.9	47
Grey	82	77.9	69.4	8.9	14	8.9	8	7.9	5
Huron	50	45.8	42.6	8.2	21	7.3	31	6.8	29
Kent	57	66.7	64.1	5.1	47	5.7	49	5.5	49
Lambton	69	75.9	73.4	5.2	46	6.3	47	6.1	42
Middlesex	402	371.5	330.6	9.6	11	8.1	13	7.2	21
Oxford	61	66.0	63.8	5.9	42	6.5	45	6.3	41
Perth	57	53.1	50.9	7.5	28	6.7	43	6.4	37
<b>NORTH</b>	<b>768</b>	<b>706.3</b>	<b>640.3</b>	<b>8.8</b>		<b>8.2</b>		<b>7.5</b>	
Algoma	100	92.5	79.2	8.1	23	7.7	25	6.6	31
Cochrane	74	71.8	67.7	8.2	22	9.5	4	9.0	2
Kenora	71	48.9	46.8	10.3	9	7.6	27	7.3	18
Manitoulin	18	12.6	10.2	13.8	2	10.5	1	8.5	4
Muskoka	66	62.2	55.2	11.9	3	10.3	3	9.1	1
Nipissing	77	76.4	68.3	9.1	13	8.7	9	7.8	10
Parry Sound	29	26.7	26.7	6.8	33	7.7	23	7.7	11
Rainy River	24	20.9	19.6	10.4	8	9.3	7	8.7	3
Sudbury	11	11.8	11.9	4.3	49	7.8	22	7.8	8
Greater Sudbury	127	137.6	125.0	7.9	24	8.1	15	7.3	17
Thunder Bay	130	109.9	99.8	8.3	20	7.0	35	6.4	36
Timiskaming	41	35.0	29.9	11.5	4	8.6	11	7.4	16
<b>ONTARIO</b>	<b>9,930</b>	<b>9,533.5</b>	<b>8,397.0</b>	<b>8.4</b>		<b>8.0</b>		<b>7.1</b>	

<sup>1</sup>Quasi-specialists are GP/FPs who have more than 50% of their billings in one focused area of practice such as, obstetrics, psychotherapy or surgery.

<sup>2</sup>Population weighted, flow-adjusted

<sup>3</sup>Population weighted, flow-adjusted, quasi-specialists excluded

Data sources: Ministry of Health and Long-Term Care—Ontario Health Insurance Plan and Registered Persons Database; Statistics Canada—*Annual Demographic Statistics*, Cat. No. 91-213-XMP; Institute for Clinical Evaluative Sciences—ICES Physician Workforce Database

Exhibit 14b shows physician counts and FTEs for year 2001/02 and three measures of physician supply: the physician-population ratio without any adjustments, the FTE-weighted population ratio adjusted for patient flow, and this same measure but excluding quasi-specialists.

- Across all three measures, Toronto consistently had the highest physician supply compared to the other six regions.
- The Central South and South West regions also had consistently lower than average physician supply.



- The Central East region appeared to have a lower than average physician supply, according to the unadjusted physician-population ratio. However, after accounting for the net outflow of patients to Toronto, the Central East region had a physician supply similar to the provincial average.
- In the East region, the unadjusted physician-population ratio would suggest that this region had a physician supply well above average. However, the East had the widest discrepancy between head count and FTEs, suggesting that it had a higher proportion of physicians working part-time than other regions. Furthermore, it had a higher proportion of physicians that are quasi-specialists. When all adjustments are considered, the East's physician supply appears similar to the provincial average.
- The North region, which has traditionally been considered the most underserved, had an above average physician supply, consistent across all three measures.

**Exhibit 14c. Change in GP/FP supply, by region and county, in Ontario, 1993/94 and 2001/02**

Region and County	Percent change from 1993/94		
	GP/FPs per 10,000 Population	FTEs per 10,000 Population <sup>1</sup>	FTEs per 10,000 Population <sup>2</sup>
<b>EAST</b>	<b>5.2</b>	<b>3.3</b>	<b>-0.3</b>
Frontenac	8.8	21.9	-0.4
Hastings	-12.6	-14.0	-13.9
Lanark	17.5	6.7	-5.9
Leeds-Grenville	-3.4	-7.8	-4.9
Lennox-Addington	23.0	-0.5	4.8
Ottawa	2.1	4.5	3.0
Prescott-Russell	44.2	14.0	14.0
Prince Edward	7.1	-24.8	-20.9
Renfrew	3.9	-4.2	-4.3
Stormont-Dundas-Glengarry	16.7	7.1	2.2
<b>CENTRAL EAST</b>	<b>-8.0</b>	<b>-7.6</b>	<b>-7.5</b>
Durham	2.2	-3.8	-3.1
Haliburton	-6.4	-21.3	-20.6
Northumberland	-7.5	-9.8	-12.3
Peterborough	-6.0	-1.6	-2.2
Simcoe County	-8.6	-7.1	-6.3
Kawartha Lakes	-2.4	-8.5	-7.3
York Region	-14.1	-10.7	-10.6
<b>TORONTO</b>	<b>-3.4</b>	<b>-2.1</b>	<b>-4.3</b>
Toronto	-3.4	-2.1	-4.3
<b>CENTRAL WEST</b>	<b>-8.1</b>	<b>-7.0</b>	<b>-6.9</b>
Dufferin	-41.8	-24.8	-26.9
Halton	-11.3	-6.9	-7.9
Peel	-4.2	-8.0	-8.5
Waterloo	-5.1	-2.2	-0.3
Wellington	-10.7	-12.2	-11.7
<b>CENTRAL SOUTH</b>	<b>-9.8</b>	<b>-9.9</b>	<b>-10.6</b>
Brant	-10.8	-1.6	-3.3
Haldimand-Norfolk	-6.8	-10.9	-14.2
Hamilton	-4.6	-7.7	-9.5
Niagara	-17.8	-15.2	-13.0
<b>SOUTH WEST</b>	<b>-9.7</b>	<b>-5.9</b>	<b>-4.9</b>
Bruce	-0.9	-4.8	-3.3

Region and County	Percent change from 1993/94		
	GP/FPs per 10,000 Population	FTEs per 10,000 Population <sup>1</sup>	FTEs per 10,000 Population <sup>2</sup>
Elgin	-9.5	-9.9	-17.2
Essex	-17.6	-11.5	-10.2
Grey	-11.6	-7.9	-10.3
Huron	5.7	-3.6	-3.2
Kent	-21.3	-15.4	-11.3
Lambton	-3.6	0.0	1.8
Middlesex	-7.8	-0.2	2.5
Oxford	1.6	2.4	4.0
Perth	-11.5	-18.2	-17.7
<b>NORTH</b>	<b>12.4</b>	<b>4.9</b>	<b>6.2</b>
Algoma	6.0	7.2	0.9
Cochrane	8.0	-1.0	5.2
Kenora	18.1	-10.4	-7.0
Manitoulin	19.3	5.2	-14.9
Muskoka	20.4	5.3	10.4
Nipissing	10.7	0.4	2.0
Parry Sound	-22.6	4.7	6.5
Rainy River	13.1	6.8	0.2
Sudbury	17.2	9.0	10.0
Greater Sudbury	12.1	9.8	11.4
Thunder Bay	27.9	13.1	25.9
Timiskaming	2.1	-6.2	-15.5
<b>ONTARIO</b>	<b>-4.2</b>	<b>-3.7</b>	<b>-4.5</b>

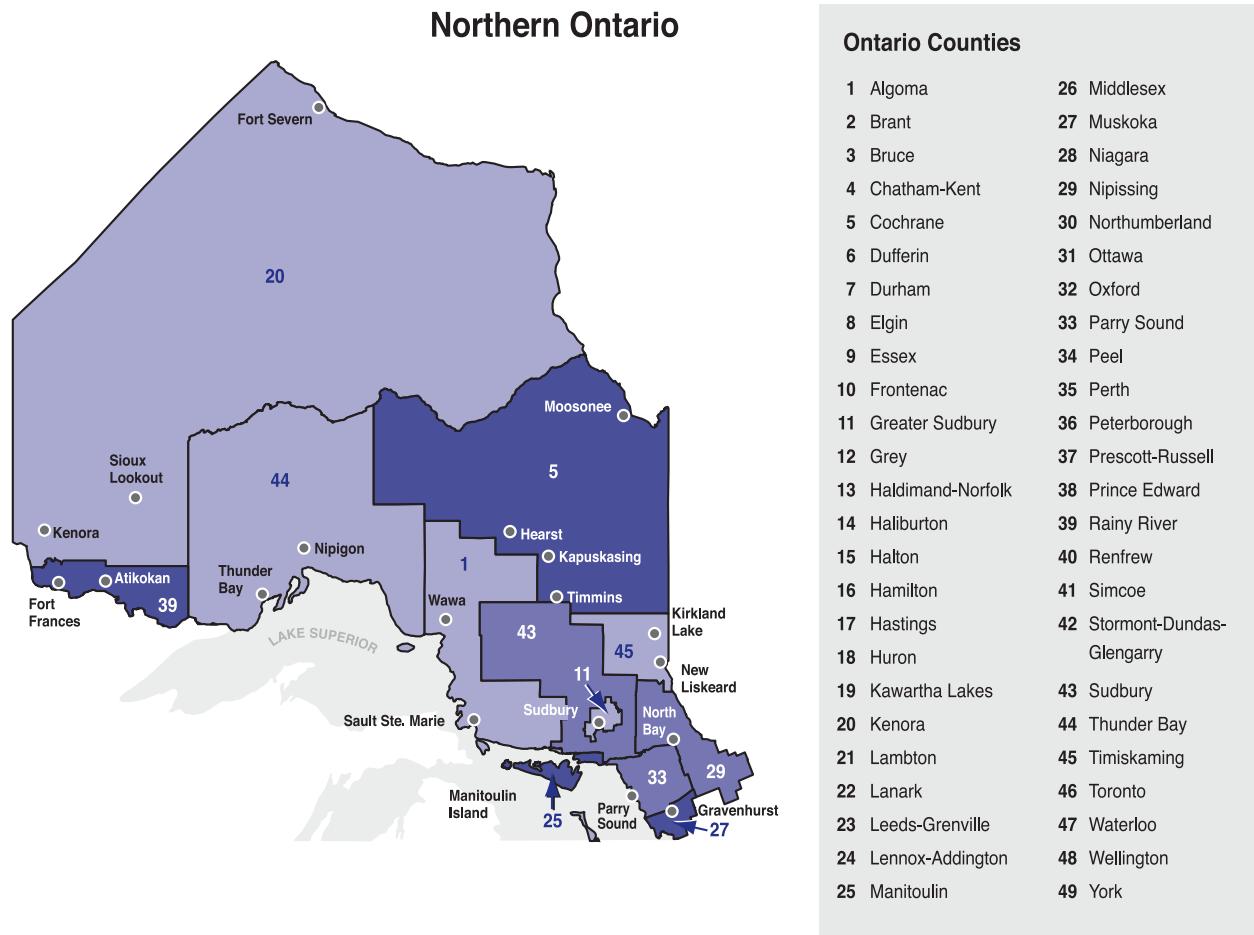
<sup>1</sup>Population weighted, flow-adjusted

<sup>2</sup>Population weighted, flow-adjusted, quasi-specialists excluded

Data sources: Ministry of Health and Long-Term Care—Ontario Health Insurance Plan and Registered Persons Database; Statistics Canada—*Annual Demographic Statistics*; Institute for Clinical Evaluative Sciences—ICES Physician Workforce Database

- Across all three measures of physician supply, there has been a province-wide decline of 3.7%–4.5% from 1993/94 to 2001/02.
- There was an increase in GP/FP supply in Northern Ontario consistent across all physician supply measures.
- Physician supply was relatively constant in Eastern Ontario.
- The Central South region had the greatest decline in GP/FP supply; this was consistent across all three measures.

**Exhibit 15. Number of full-time equivalent (FTE) GP/FPs per 10,000 population<sup>1</sup>, by county, in Ontario, 2001/02**

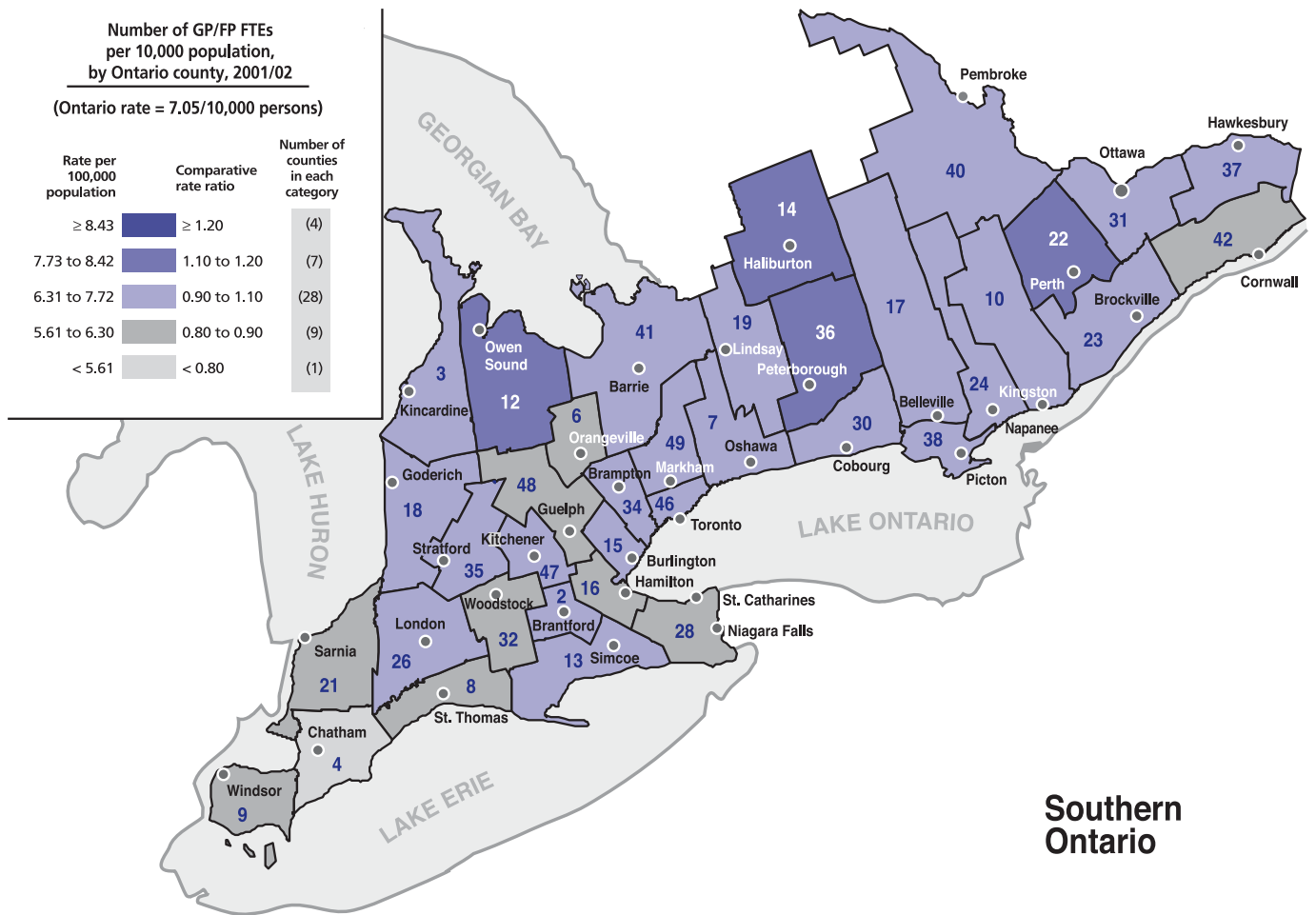


<sup>1</sup>Population weighted by age and sex and adjusted for population flow across county boundaries (see Appendix C)

Data sources: Ministry of Health and Long-Term Care—Ontario Health Insurance Plan; Institute for Clinical Evaluative Sciences—ICES Physician Workforce Database; Statistics Canada—*Annual Demographic Statistics*, Cat. No. 91-213-XMP

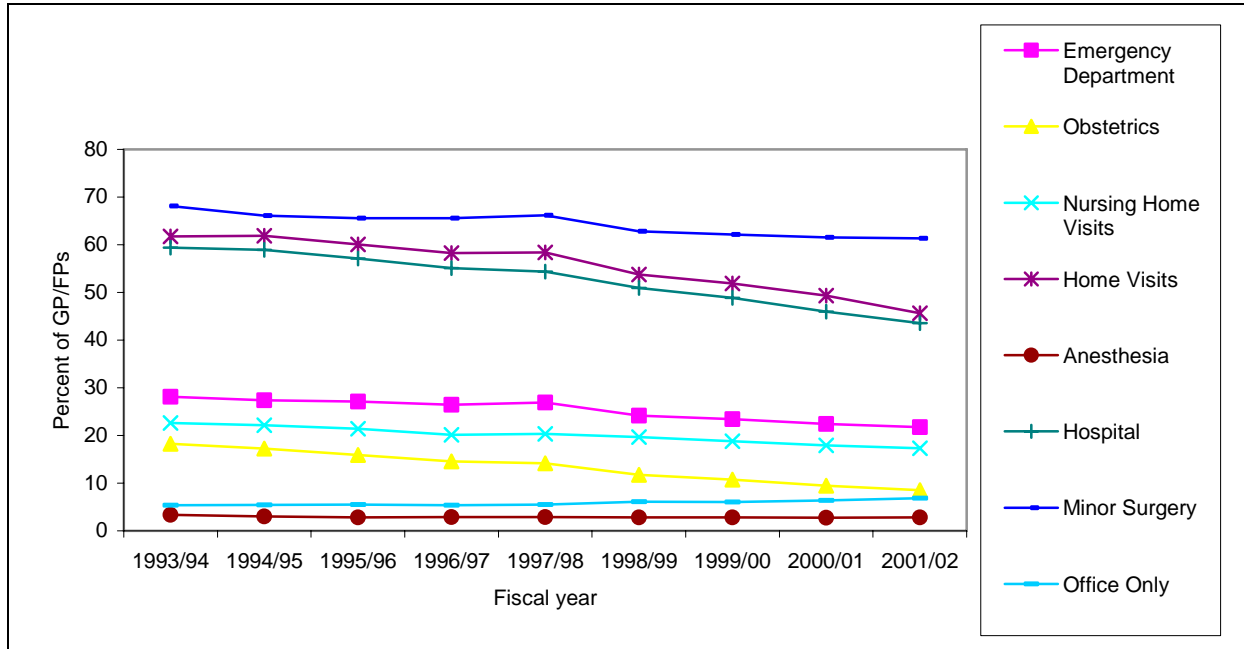
- This map represents a graphical illustration of the results shown in column 9, Exhibit 14b.

**Exhibit 15. Number of full-time equivalent (FTE) GP/FPs per 10,000 population, by county, in Ontario, 2001/02 cont'd.**



Services provided by Ontario GP/FPs

**Exhibit 16. Trends in the comprehensiveness of physician services: percent of active<sup>1</sup> GP/FPs performing selected services, in Ontario, 1993/94–2001/02**



<sup>1</sup>Active physicians are those billing at least \$35,000 during the fiscal year

Data sources: Ministry of Health and Long-Term Care—Ontario Health Insurance Plan; Institute for Clinical Evaluative Sciences—ICES Physician Workforce Database

- The proportion of GP/FPs serving emergency departments, inpatient hospital wards, long-term care facilities, or performing obstetrical deliveries, house calls or minor surgical procedures, has declined steadily from 1993/94 to 2001/02.
- The proportion of GP/FPs providing only office visits has increased.

**Exhibit 17. Comprehensiveness of physician services: percent of active<sup>1</sup> fee-for-service GP/FPs performing selected services, by county, in Ontario, 2001/02**

Region and County	Total Number of Active Physicians	Emergency Department (%)	Obstetrics (%)	Nursing Home Visits (%)	Home Visits (%)	Anesthesiology (%)	Hospital Visits (%)	Minor Surgery	Office Only (other billings below threshold <sup>2</sup> levels) (%)
<b>EAST</b>	<b>1,398</b>	<b>22.3</b>	<b>6.2</b>	<b>19.6</b>	<b>48.0</b>	<b>3.2</b>	<b>33.5</b>	<b>59.5</b>	<b>19.5</b>
Frontenac	148	9.5	7.4	12.2	48.0	0.0	15.5	43.9	31.8
Hastings	86	26.7	3.5	32.6	58.1	4.7	64.0	69.8	10.5
Lanark	61	62.3	9.8	37.7	67.2	14.8	88.5	83.6	3.3
Leeds-Grenville	63	49.2	1.6	41.3	49.2	4.8	60.3	82.5	4.8
Lennox-Addington	34	26.5	14.7	29.4	64.7	2.9	29.4	64.7	11.8
Ottawa	752	11.3	4.3	10.5	41.9	0.9	16.8	51.7	25.0
Prescott-Russell	71	26.8	16.9	29.6	63.4	5.6	43.7	77.5	4.2
Prince Edward	24	66.7	16.7	41.7	41.7	8.3	75.0	79.2	20.8
Renfrew	79	58.2	11.4	41.8	55.7	8.9	82.3	73.4	3.8
Stormont-Dundas-Glengarry	80	38.8	3.8	32.5	52.5	10.0	61.3	76.3	10.0
<b>CENTRAL EAST</b>	<b>1,296</b>	<b>25.5</b>	<b>10.2</b>	<b>19.4</b>	<b>49.4</b>	<b>4.0</b>	<b>53.1</b>	<b>67.3</b>	<b>12.6</b>
Durham	303	19.8	9.6	18.8	44.6	4.0	59.7	70.6	9.6
Haliburton	14	85.7	7.1	28.6	64.3	0.0	78.6	92.9	0.0
Kawartha Lakes	46	19.6	15.2	52.2	67.4	6.5	60.9	76.1	4.3
Northumberland	56	50.0	16.1	42.9	55.4	10.7	76.8	71.4	7.1
Peterborough	105	54.3	11.4	21.0	41.0	0.0	80.0	61.9	10.5
Simcoe County	290	38.6	21.0	22.8	51.4	10.0	77.9	79.0	6.2
York Region	482	10.8	2.7	11.4	50.2	0.4	23.9	57.3	20.5
<b>TORONTO</b>	<b>2,483</b>	<b>10.0</b>	<b>4.8</b>	<b>8.1</b>	<b>43.4</b>	<b>0.6</b>	<b>17.2</b>	<b>46.5</b>	<b>29.0</b>
Toronto	2,483	10.0	4.8	8.1	43.4	0.6	17.2	46.5	29.0
<b>CENTRAL WEST</b>	<b>1,374</b>	<b>16.5</b>	<b>8.6</b>	<b>12.7</b>	<b>39.8</b>	<b>2.0</b>	<b>55.0</b>	<b>64.5</b>	<b>15.3</b>
Dufferin	25	20.0	28.0	20.0	52.0	4.0	72.0	68.0	8.0
Halton	293	21.2	9.9	16.4	44.4	1.7	68.9	67.6	10.9
Peel	654	12.1	8.3	9.3	37.0	0.9	49.2	63.8	17.4
Waterloo	273	14.7	4.4	11.0	28.9	2.9	43.2	57.5	21.6
Wellington	129	31.8	12.4	23.3	64.3	6.2	74.4	75.2	2.3
<b>CENTRAL SOUTH</b>	<b>761</b>	<b>21.3</b>	<b>8.5</b>	<b>22.9</b>	<b>51.6</b>	<b>2.1</b>	<b>53.5</b>	<b>61.4</b>	<b>14.2</b>
Brant	89	22.5	4.5	23.6	59.6	0.0	74.2	71.9	6.7
Haldimand-Norfolk	62	35.5	19.4	41.9	64.5	9.7	74.2	75.8	3.2
Hamilton	348	15.5	8.3	16.1	48.0	0.3	28.7	50.3	21.3
Niagara	262	25.2	7.6	27.1	50.8	3.4	74.4	69.1	9.9

Region and County	Total Number of Active Physicians	Emergency Department (%)	Obstetrics (%)	Nursing Home Visits (%)	Home Visits (%)	Anesthesiology (%)	Hospital Visits (%)	Minor Surgery	Office Only (other billings below threshold <sup>2</sup> levels) (%)
<b>SOUTH WEST</b>	<b>1,061</b>	<b>30.4</b>	<b>11.9</b>	<b>28.7</b>	<b>50.3</b>	<b>4.7</b>	<b>58.2</b>	<b>73.1</b>	<b>11.3</b>
Bruce	45	84.4	35.6	46.7	66.7	22.2	95.6	91.1	2.2
Elgin	46	17.4	2.2	45.7	50.0	0.0	71.7	76.1	2.2
Essex	223	17.5	1.3	12.1	30.5	4.5	40.4	63.2	16.1
Grey	83	57.8	20.5	41.0	54.2	7.2	89.2	83.1	7.2
Huron	49	65.3	28.6	42.9	69.4	12.2	91.8	81.6	2.0
Kent	59	27.1	20.3	32.2	62.7	1.7	88.1	93.2	1.7
Lambton	68	30.9	8.8	44.1	36.8	2.9	83.8	72.1	5.9
Middlesex	375	14.1	8.5	18.4	51.7	1.9	33.1	65.1	17.6
Oxford	60	61.7	23.3	51.7	55.0	6.7	81.7	88.3	5.0
Perth	53	58.5	20.8	60.4	84.9	7.5	94.3	92.5	1.9
<b>NORTH</b>	<b>707</b>	<b>52.2</b>	<b>15.6</b>	<b>25.3</b>	<b>31.3</b>	<b>7.8</b>	<b>76.2</b>	<b>75.1</b>	<b>6.5</b>
Algoma	76	64.5	17.1	23.7	39.5	5.3	81.6	78.9	2.6
Cochrane	68	63.2	23.5	30.9	27.9	5.9	82.4	82.4	7.4
Kenora	61	80.3	42.6	34.4	34.4	4.9	88.5	85.2	1.6
Manitoulin	16	87.5	12.5	31.3	31.3	6.3	75.0	93.8	0.0
Muskoka	62	51.6	14.5	27.4	51.6	9.7	80.6	74.2	8.1
Nipissing	73	42.5	4.1	23.3	32.9	1.4	82.2	76.7	4.1
Parry Sound	29	58.6	27.6	37.9	44.8	24.1	72.4	89.7	0.0
Rainy River	24	87.5	33.3	58.3	29.2	0.0	91.7	87.5	0.0
Sudbury	11	81.8	9.1	9.1	27.3	0.0	63.6	81.8	0.0
Greater Sudbury	128	20.3	5.5	14.8	27.3	16.4	53.1	66.4	10.9
Thunder Bay	121	43.0	9.1	20.7	16.5	3.3	78.5	63.6	9.1
Timiskaming	38	68.4	15.8	26.3	31.6	10.5	84.2	73.7	13.2
<b>ONTARIO</b>	<b>9,093</b>	<b>21.8</b>	<b>8.3</b>	<b>17.2</b>	<b>45.0</b>	<b>3.0</b>	<b>43.0</b>	<b>60.8</b>	<b>18.0</b>

<sup>1</sup>Active physicians are those billing at least \$35,000 in 2001/02

Data sources: Ministry of Health and Long-Term Care—Ontario Health Insurance Plan; Institute for Clinical Evaluative Sciences—ICES Physician Workforce Database

- Provision of services other than office visits varies widely between regions and counties.
- Physicians in the North region had the highest participation of any region in emergency, obstetrics, in-patient care, anesthesia and minor surgery.
- Toronto physicians were less likely than average to provide emergency department and obstetrics care, nursing home visits, anesthesia, hospital visits and minor surgery.
- Physicians in the Central East and South West regions generally had higher than average levels of participation in these non-office services.
- Many rural counties had high levels of participation in non-office services. For example, Bruce, Manitoulin, Rainy River and Haliburton each had more than 80% participation in emergency department services, while Bruce, Huron, Perth and Rainy River counties had more than 90% participation in hospital care.



**Exhibit 18. Supply of GP/FPs, by region and quasi-specialty,<sup>1</sup> in Ontario, 2001/02**

Region	Number of Standard GP/FPs	Number of GP/FP Psychotherapists	Number of Surgery-Related Quasi-Specialist GP/FPs	Number of Diagnostic and Treatment Quasi-Specialist GP/FPs	Total Active GP/FPs
East	1,195	74	54	32	1,355
Central East	1,180	23	41	13	1,255
Toronto	2,113	188	66	51	2,416
Central West	1,229	43	34	14	1,319
Central South	666	16	37	9	728
South West	948	27	38	7	1,018
North	628	11	27	9	674
<b>Ontario</b>	<b>7,959</b>	<b>382</b>	<b>297</b>	<b>135</b>	<b>8,765</b>

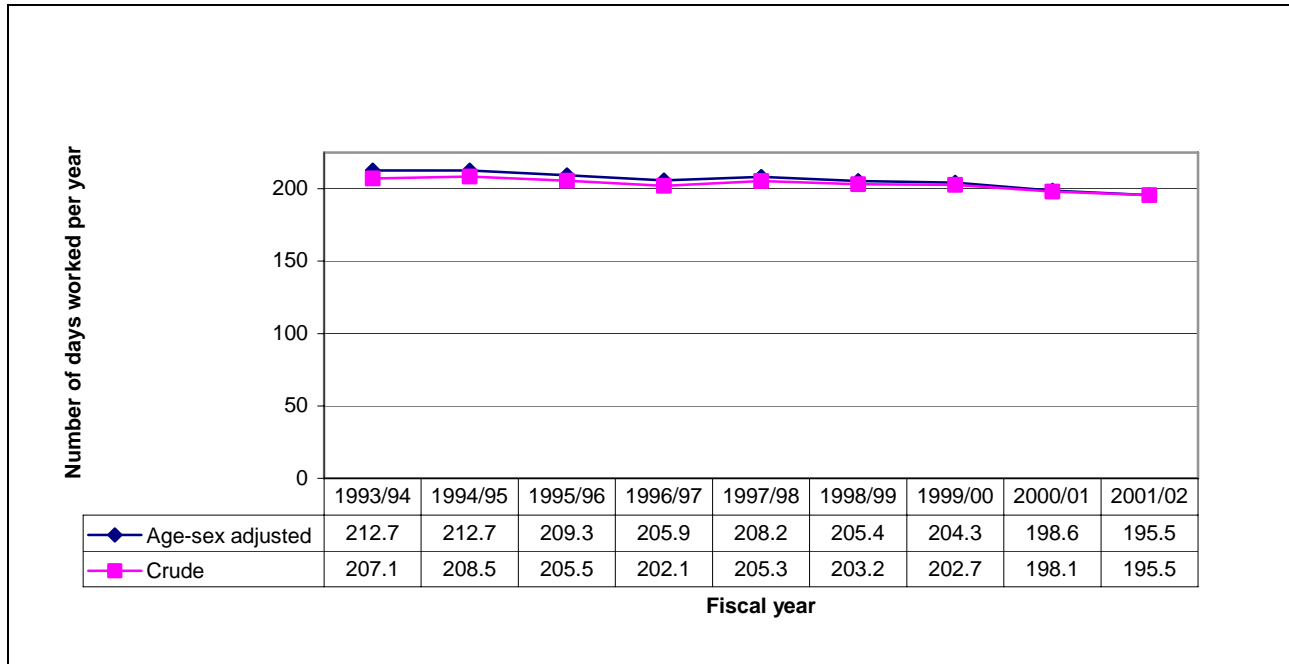
<sup>1</sup>Quasi-specialists are GP/FPs who have more than 50% of their billings in one focused area of practice such as, obstetrics, psychotherapy or surgery.

Data sources: Ministry of Health and Long-Term Care—Ontario Health Insurance Plan; Institute for Clinical Evaluative Sciences—ICES Physician Workforce Database

- Quasi-specialists account for 9.2% of active GP/FPs in Ontario.
- The majority of these were GP/FP psychotherapists.

Changes in GP/FP workload

**Exhibit 19. Age/sex adjusted<sup>1</sup> average number of office days worked per year by GP/FPs,<sup>2</sup> in Ontario, 1993/94- 2001/02**



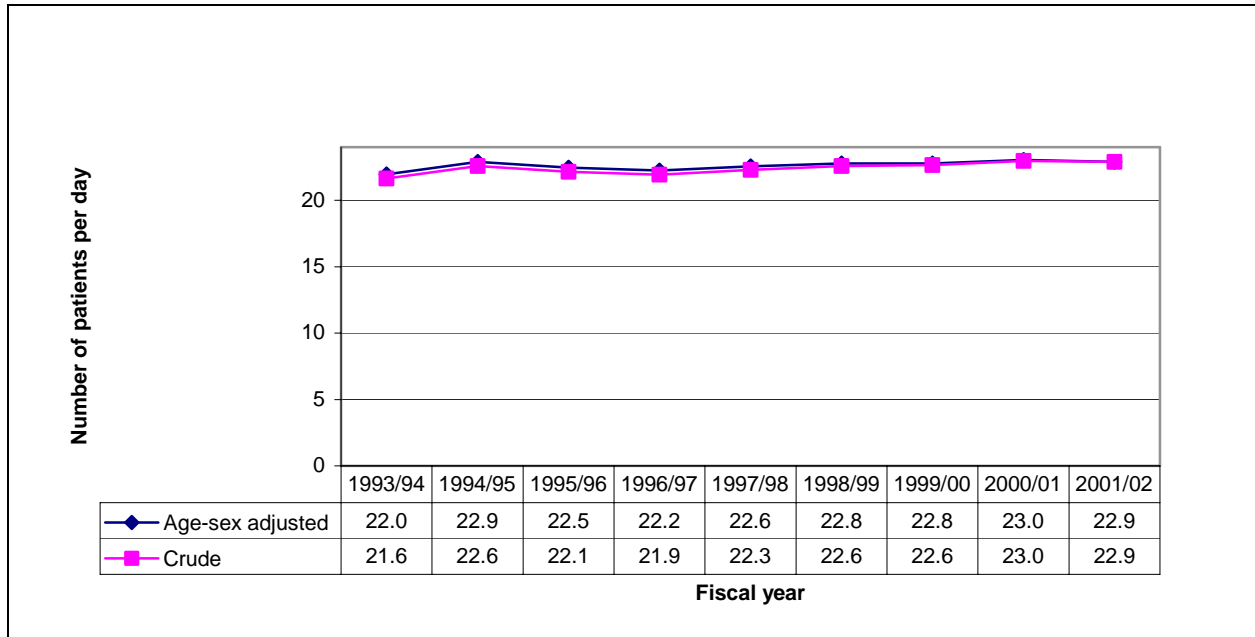
<sup>1</sup>Standardized to 2001/02 physician population

<sup>2</sup>Includes only physicians who are primarily fee-for-service

Data sources: Ministry of Health and Long-Term Care—Ontario Health Insurance Plan; Institute for Clinical Evaluative Sciences—ICES Physician Workforce Database

- The average number of days worked per year by a GP/FP in Ontario fell by 10%, from 222 days per year in 1993/94, to 201 in 2001/02.

**Exhibit 20. Age/sex adjusted<sup>1</sup> average number of office patients seen per day by GP/FPs,<sup>2</sup> in Ontario, 1993/94-2001/02**



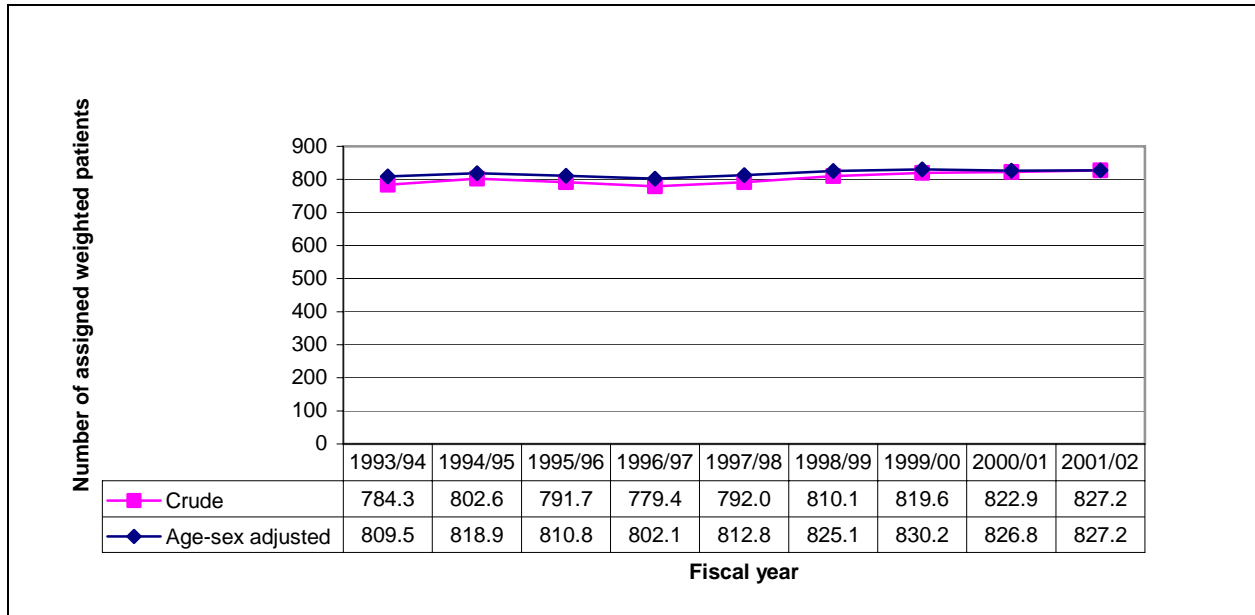
<sup>1</sup>Standardized to 2001/02 physician population

<sup>2</sup>Includes only physicians who are primarily fee-for-service

Data sources: Ministry of Health and Long-Term Care—Ontario Health Insurance Plan; Institute for Clinical Evaluative Sciences—ICES Physician Workforce Database

- The average number of patients seen per day has remained about the same.

**Exhibit 21. Age/sex-adjusted<sup>1</sup> average number of assigned<sup>2</sup> weighted<sup>3</sup> patients per GP/FP,<sup>4</sup> in Ontario, 1993/94-2001/02**



<sup>1</sup>Standardized to 2001/02 physician population

<sup>2,3</sup> See Appendix C for details about how patients are assigned and weighted

<sup>4</sup>Includes only physicians who are primarily fee-for-service

Data sources: Ministry of Health and Long-Term Care—Ontario Health Insurance Plan; Institute for Clinical Evaluative Sciences—ICES Physician Workforce Database

- The average number of assigned patients per physician in Ontario has fluctuated from year to year but, overall, has changed little.

**Exhibit 22. Physician office practice workload, active<sup>1</sup> GP/FPs, by county, 2001/02**

Region and County	Average Number of Patients per Active GP/FP (unweighted)	Average Number of Patients per Active GP/FP (weighted)	Average Number of Days Worked by Active GP/FPs (office)	Average Number of Patient Office Visits per Day, Active GP/FPs	Ranking (by number of weighted patients)
<b>EAST</b>	<b>867.9</b>	<b>881.1</b>	<b>191.1</b>	<b>19.7</b>	
Frontenac	764.3	784.0	182.9	19.4	43
Hastings	1,165.8	1,214.0	185.3	27.5	9
Lanark	782.3	822.1	190.2	18.2	39
Leeds-Grenville	877.2	915.1	193.2	20.2	32
Lennox-Addington	874.1	907.7	201.2	18.5	34
Ottawa	848.2	845.4	192.6	18.6	38
Prescott-Russell	851.7	849.9	195.2	21.8	37
Prince Edward	781.6	820.9	186.8	18.5	40
Renfrew	914.4	954.7	195.9	20.6	31
Stormont-Dundas-Glengarry	994.5	1,044.0	185.8	21.9	18
<b>CENTRAL EAST</b>	<b>1,108.7</b>	<b>1,097.3</b>	<b>205.4</b>	<b>25.0</b>	
Durham	1,279.7	1,242.6	215.8	28.3	8
Haliburton	671.6	733.3	178.9	16.6	46
Kawartha Lakes	970.3	1,035.4	208.1	24.1	22
Northumberland	1,056.0	1,102.6	203.7	23.9	14
Peterborough	967.1	1,010.3	184.9	21.1	25
Simcoe	1,036.0	1,038.8	189.7	24.5	20
York	1,108.9	1,076.9	213.4	24.7	16
<b>TORONTO</b>	<b>969.9</b>	<b>974.9</b>	<b>212.3</b>	<b>23.2</b>	
Toronto	969.9	974.9	212.3	23.2	29
<b>CENTRAL WEST</b>	<b>1,152.1</b>	<b>1,120.0</b>	<b>205.7</b>	<b>25.6</b>	
Dufferin	1,338.3	1,318.4	206.6	29.1	5
Halton	1,047.5	1,037.9	199.8	23.3	21
Peel	1,263.0	1,210.7	217.8	28.5	11
Waterloo	1,066.9	1,042.9	189.4	22.8	19
Wellington	953.1	955.1	190.5	20.6	30
<b>CENTRAL SOUTH</b>	<b>1,133.8</b>	<b>1,160.1</b>	<b>194.7</b>	<b>23.6</b>	
Brant	1,076.7	1,094.7	196.3	24.7	15
Haldimand-Norfolk	1,272.4	1,283.9	211.9	27.7	7
Hamilton	1,043.3	1,056.0	189.6	20.9	17
Niagara	1,244.7	1,296.0	197.2	26.0	6
<b>SOUTH WEST</b>	<b>1,146.3</b>	<b>1,166.0</b>	<b>198.2</b>	<b>25.3</b>	
Bruce	974.0	1,027.8	199.4	20.0	23

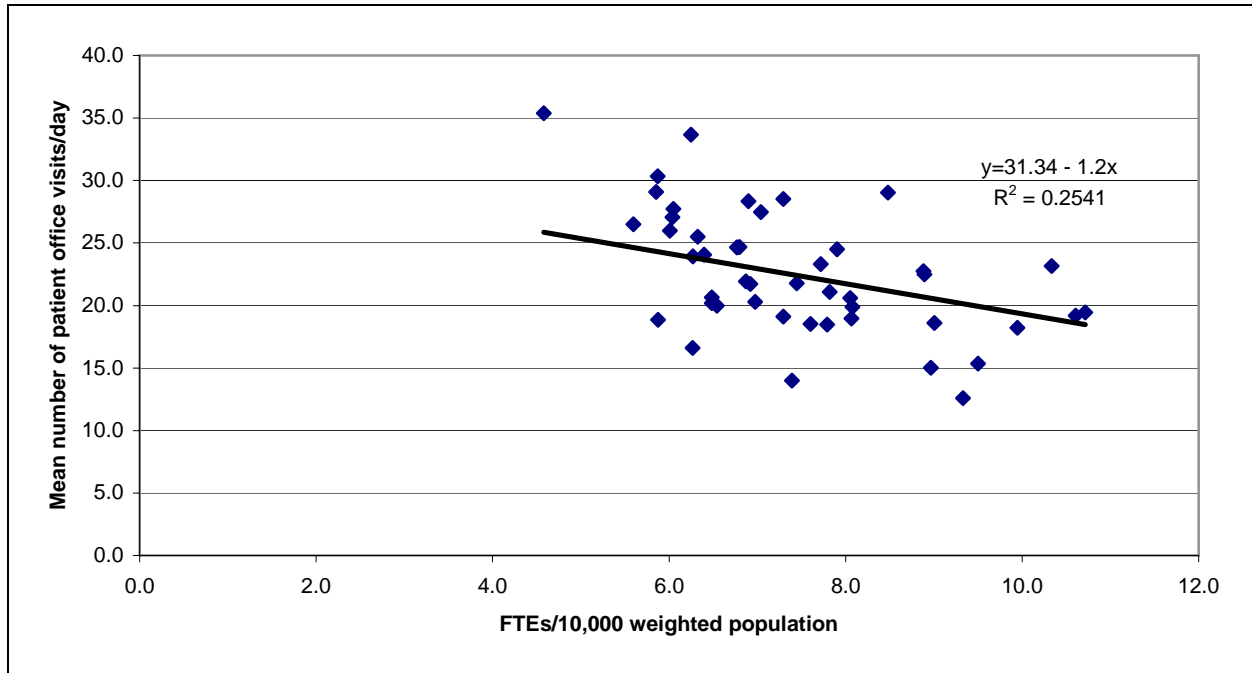
Region and County	Average Number of Patients per Active GP/FP (unweighted)	Average Number of Patients per Active GP/FP (weighted)	Average Number of Days Worked by Active GP/FPs (office)	Average Number of Patient Office Visits per Day, Active GP/FPs	Ranking (by number of weighted patients)
Elgin	1,198.3	1,213.6	205.7	27.1	10
Essex	1,425.2	1,421.1	197.5	33.7	2
Grey	856.1	915.0	188.0	19.0	33
Huron	844.9	884.7	192.6	19.1	36
Kent	1,528.0	1,569.5	216.3	30.3	1
Lambton	1,323.4	1,371.7	192.9	26.5	3
Middlesex	990.1	995.1	197.3	22.5	27
Oxford	1,297.1	1,341.2	194.7	25.5	4
Perth	1,122.6	1,153.5	210.6	21.7	13
<b>NORTH</b>	<b>880.2</b>	<b>903.2</b>	<b>179.2</b>	<b>20.6</b>	
Algoma	774.9	813.2	182.7	16.8	41
Cochrane	798.1	811.9	183.2	19.9	42
Kenora	651.0	663.9	166.3	14.0	48
Manitoulin	438.1	477.2	125.9	12.6	49
Muskoka	745.0	776.5	184.1	19.2	44
Nipissing	978.3	996.2	194.4	22.8	26
Parry Sound	830.1	890.2	204.1	18.9	35
Rainy River	671.7	693.8	178.4	15.0	47
Sudbury	985.0	1,016.7	170.5	35.4	24
Greater Sudbury	1,198.6	1,206.9	179.1	29.0	12
Thunder Bay	959.4	979.5	169.6	20.3	28
Timiskaming	712.8	751.4	185.1	15.4	45
<b>ONTARIO</b>	<b>1,028.8</b>	<b>1,031.5</b>	<b>201.4</b>	<b>23.3</b>	

<sup>1</sup>Active GP/FPs are those who billed \$35,000 or more in 2001/02

Data sources: Ministry of Health and Long-Term Care—Ontario Health Insurance Plan and Registered Persons Database; Institute for Clinical Evaluative Sciences—ICES Physician Workforce Database; Statistics Canada—*Annual Demographic Statistics*, Cat. No. 91-213-XMP

- On average, GP/FPs in the South West region had the most assigned patients, while physicians in the North had the fewest.
- On average, Toronto physicians were in their offices most frequently, in 2001/02.
- GP/FPs in the Central West and South West saw the most patients per day.

**Exhibit 23. Relationship between GP/FP supply (FTEs per 10,000<sup>1</sup>) and workload (mean number of patient visits per day), by county, in Ontario, 2001/02**

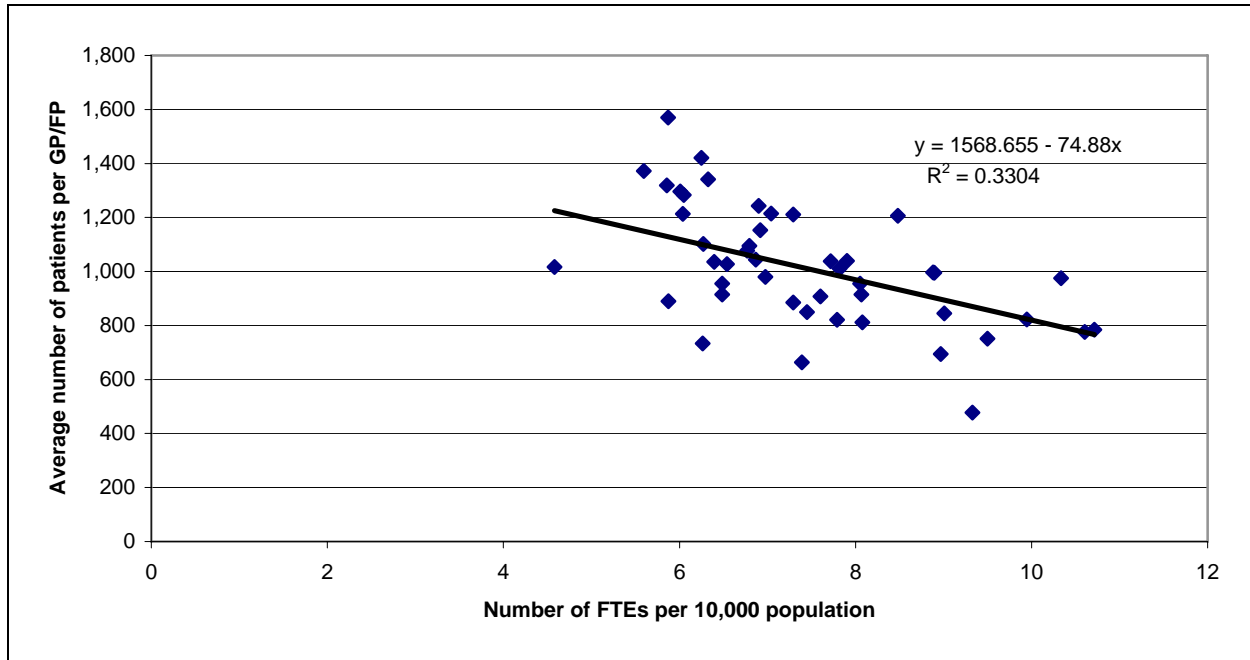


<sup>1</sup>Weighted for age and sex

Data sources: Ministry of Health and Long-Term Care—Ontario Health Insurance Plan; Institute for Clinical Evaluative Sciences—ICES Physician Workforce Database; Statistics Canada—*Annual Demographic Statistics*, Cat. No. 91-213-XMP

- The number of patient visits per day decreased as the supply of physicians rose.
- On average, each additional FTE per 10,000 population is associated with a decrease in the mean number of office visits of about 1.

**Exhibit 24. Relationship between GP/FP supply (number of FTEs per 10,000<sup>1</sup> population) and workload (number of patients per physician), by county, in Ontario, 2001/02**



<sup>1</sup>Weighted for age and sex

Data sources: Ministry of Health and Long-Term Care—Ontario Health Insurance Plan; Institute for Clinical Evaluative Sciences—ICES Physician Workforce Database; Statistics Canada—*Annual Demographic Statistics*, Cat. No. 91-213-XMP

- The number of patients per physician and decreased as the supply of physicians rose.
- On average, each additional FTE per 10,000 population is associated with a decrease in the mean number of patients of approximately 75.



*Overall trends by health region*

**Exhibit 25. Overall trends in GP/FP supply, by region, in Ontario, 2001/02**

	<b>Patient Visitation Rate</b>	<b>GP/FP Supply</b>	<b>Office Workload</b>	<b>Non-Office Responsibilities</b>
<b>North</b>	Low	High	Low	High
<b>Toronto</b>	High	High	Medium	Low
<b>East</b>	Low	Medium	Low	Medium
<b>Central East</b>	Medium	Medium	High	High
<b>Central West</b>	Medium	Medium	High	Medium
<b>Southwest</b>	Low	Low	Medium	High
<b>Central South*</b>	Indeterminate*	Low	Medium	Medium

\*Interpret with caution due to high proportion of non-fee-for-service physicians

Data sources: Ministry of Health and Long-Term Care—Ontario Health Insurance Plan and Registered Persons Database; Institute for Clinical Evaluative Sciences—ICES Physician Workforce Database; Statistics Canada—*Annual Demographic Statistics*, Cat. No. 91-213-XMP

This exhibit provides an overall, qualitative interpretation of general trends in physician supply by health region.

- Northern patients appear relatively well served by their GP/FPs. While the visit rates are relatively low, the North region has a high GP/FP supply, and GP/FPs provide services in non-office areas of practice.
- Toronto patients are also relatively well served, although Toronto physicians are much more likely to work exclusively in their offices.

## Discussion

### Key finding #1

#### *Fewer children visiting physicians while elderly maintain visit rates*

The use of GP/FP services in Ontario, as measured by the per capita visit rate, declined from 1993/94 to 2001/02. Most of this decline was the result of a large drop in utilization among children and young adults. There was a slight shift in care to pediatricians, but this accounted for only 6% of the decrease in GP/FP visits. Further, these findings cannot be explained by a shift to the emergency department (ED), as ED visits by children and young adults also fell during the 1990s.<sup>16</sup> It appears that young Ontarians are simply visiting GP/FPs less.

The exact cause of this trend is unclear. One possibility is that decreased physician supply may lead to increased wait times such that an otherwise healthy adult or child with a minor acute self-limiting condition may be less likely to seek care. It is somewhat reassuring that the group with the greatest decrease in utilization (young children) tends to have fewer chronic conditions, and that the proportion of probable low acuity visits has decreased slightly. Nonetheless, there is also the possibility that access to care in appropriate circumstances may be hindered. This hypothesis deserves further study.

The fact that the elderly are maintaining visits to GP/FPs is encouraging. These individuals have the most chronic diseases and, hence, are the most vulnerable. It appears that the health care system and the physician community are attempting to protect access to care for these groups through some form of implicit or explicit triaging.

### Key finding #2

#### *More Ontarians with no GP/FP visits*

The proportion of the population with no GP/FP visits in a year rose from 21.4% to 24.6%. This measure may represent people who cannot find a family doctor, or those who have no need to see one because they are otherwise healthy. One possible explanation for this trend is that an increasing number of Ontarians cannot find a family doctor due to the global decline in physician supply. However, the 2001 Statistics Canada Health Services Access Survey suggests that only 5.7% of Ontarians report not having a family physician, and only one-half of these individuals stated that it was because they could not contact one.<sup>17</sup> This evidence tends to refute this potential explanation.

Another possible explanation is that more patients are engaging in self-care for minor conditions. Further research is needed to see if this hypothesis is true. A third possibility is that more patients are seeking care from non-fee-for-service physicians. In 2001/02, 17% of GP/FPs were working at least part of the time in non-fee-for-service settings, compared with only 9% in 1993/94. The proportion of GP/FPs practising in CHCs or HSOs (office settings that not required to submit shadow billings) was relatively stable at less than 2%.

### Key finding #3

#### *High proportion of probable low acuity visits*

One-third to one-quarter of all GP/FP visits was of probable low acuity, depending on the definition used. This suggests there may be important opportunities for delegation to other health professionals. Enacting such steps, however, will require careful negotiation, because the transfer of these relatively simpler cases within the fee-for-service system could lead to a significant decrease in physician compensation.

Alternatively, there may be opportunities to increase patient education on how to self-manage some of these low acuity conditions.

In this study, a very slight decrease in probable low acuity visits was observed. One possibility is that patients are more knowledgeable than before and thus visit GP/FPs less often for minor complaints. A second possibility is that because physician supply is decreasing, such patients may elect not to see their physician if there are longer queues. Nonetheless, the decrease in probable low acuity visits was modest and the significance of this finding should not be overstated.

## **Key finding #4**

### *Inverse relationship between GP/FP visits and ED visits*

GP/FP visits appear to have a predictable seasonal rhythm. Visit volumes are higher in the winter months and lower in the summer months. One possible explanation is that physicians take vacations in the summer. Another possibility is that respiratory infections and other viral illnesses are more common in the winter. Not surprisingly, decreases in visits also occur during weeks with statutory holidays. The main implication of these findings is that ED managers have the opportunity to anticipate and plan for the fluctuations in demand that appear to be related to fluctuations in GP/FP visits.

## **Key finding #5**

### *Global decline in physician supply*

GP/FP supply continues to decline. While the number of physicians is relatively constant, the population is growing. Consequently, the workforce is not increasing at a rate to match population growth. This scenario may contribute to perception of a physician shortage through a phenomenon known as the hysteresis effect. Expectations for access to care may be set at a previous point in time when physician supply was at its greatest. If the availability of health human resources is subsequently reduced, with no concurrent efforts to better manage utilization, then patients and providers may perceive that access to services has been cut.

Policymakers essentially have two options for responding to the global decline in GP/FP supply:

1. Increase the supply of GP/FPs; or,
2. Change the manner in which GP/FPs are deployed, thereby decreasing demand for their time.

These options are not mutually exclusive. GP/FP supply can be augmented by:

- Creating more medical school and FP residency positions;
- Increasing intake of foreign physicians;
- Providing relocation incentives for physicians from outside Ontario; or,
- Providing incentives to retain physicians approaching retirement.

As noted previously, increasing the supply of FPs through residency training will require, in the short term, steps to bolster the popularity of family medicine among medical students, given recent concerns about unfilled residency positions in family medicine and declining interest.<sup>7,8</sup>

Several initiatives were implemented to bolster physician supply. In 2000/01, medical school enrolment was increased by 40 places, followed by 120 places phased in during 2001/02 and 2002/03. Recently, the government added 104 more positions to be phased in from 2005/06 to 2008/09, along with additional training opportunities for foreign graduates.<sup>28</sup> However, the impact of these changes on GP/FP supply will not be immediately realized.

The second option, to alter the deployment and use of GP/FPs, is considerably more complex. This may entail the use of more non-physician providers to oversee lower acuity cases, and routine aspects of preventive care and chronic disease management, thereby saving the GP/FP's time for more complex tasks. Licensed nurse practitioners have been entering practice in Ontario since 1998<sup>12</sup> and have been deployed in many non-fee-for-service primary care practices such as CHCs and HSOs. Only 11% of nurse practitioners, however, work in fee-for-service environments,<sup>12</sup> a finding, which underscores the difficulty of orchestrating placements that could result in decreased remuneration for the physician. The province's recently introduced telephone triage system could potentially increase self-management of simple medical conditions, but could also increase demand for services; its precise impact on demand for GP/FP services has not been fully evaluated.

## **Key finding #6**

### *Aging physician workforce*

In 1995/96, the GP/FP workforce had begun to show signs of aging.<sup>5</sup> Now, several years later, this trend continues. The steady decline in the proportion of physicians aged 35 years and under has been matched with an increase in physicians aged 55–64 years. The latter group may be considered as approaching retirement, a trend signaling that health system planners must prepare for a major exodus from the workforce within the next decade.

There are several possible explanations for the aging of the physician workforce. In previous research, the following contributing factors were identified: increased length of training; a reduction in residency positions targeted for family practice; and reductions in medical school enrolment.<sup>4</sup> In 1993, the rotating internship program was eliminated, which ended output of future GPs. Newly graduated physicians wishing to work in primary care were subsequently required to complete two years of family medicine residency training. This step led to the permanent elimination of the equivalent of one year of young GPs from the physician pool. At the same time, four provinces, including Ontario, decided to target the ratio of FP to specialist residency positions at 40:60, instead of the previous 50:50 ratio.<sup>18</sup> The policy was intended to be a temporary measure to reduce what was perceived to be a slight excess of GP/FPs compared with specialists. However, the policy was not reviewed or readjusted, ultimately becoming a de facto planning standard, leading to a reduced number of newly graduated family physicians in Ontario, and contributing to the aging of the GP/FP workforce.

The 1990 Barer Stoddart report noted that physician supply had increased dramatically in the 1980s without any specific policy justification, and recommended a 10% cut in medical school enrolment.<sup>19</sup> The Conference of Deputy Health Ministers enacted the policy in 1993.<sup>20</sup> The impact would have been first appreciated in 1999, given that it usually takes four years for medical school and two years for FP training. Many physician leaders specifically blame Canada's declining physician supply on this recommendation.<sup>2</sup> Previous research on a national level, however, has suggested that this factor had a more minor role in the overall decline in physician supply, compared to the elimination of the rotating internship and increased length of postgraduate training and the change in FP-specialist residency allocation to 40:60.<sup>4</sup>

## **Key finding #7**

### *Declining comprehensiveness of care*

This report documents a continuation of a previously reported trend,<sup>10</sup> which is the declining comprehensiveness of care in several areas of primary care practice that lie outside office visitations. Decreased participation in ED, obstetrics and inpatient care, suggests that GP/FPs are increasingly becoming disconnected from the hospital environment. Such a trend raises concerns about continuity of care.

Engagement in the hospital environment may provide GP/FPs with opportunities to interact directly with specialists, other family physicians and other health care providers about care issues related to their patients, and learn first-hand how hospital policies affect their practice. Hospitals may also offer local continuing education opportunities and rounds. Furthermore, involvement in hospital care may have possible benefits by requiring the physician to maintain the higher skill levels needed to work in more demanding, higher acuity settings. Alternatively, the potential negative impact of less comprehensive practice may offset the potential benefit of greater specialization in the GP/FP workforce. The impact of these trends on overall quality of care warrants further research.

The reasons for declining comprehensiveness of care are not fully understood. One possibility is that the general decline in physician supply has encouraged GP/FPs to relinquish certain components of their practice to avoid an excessive increase in workload. In doing so, GP/FPs have transferred some of their workload and responsibilities to specialists. Another possibility is that administrators, in some instances, have been encouraging less involvement by GP/FPs in hospital care. A third possibility is that GP/FPs are adjusting their workload in favour of a lifestyle without on-call or after hours contact. A fourth possibility is that the training environment has evolved such that FPs do not receive sufficient opportunity to develop skills in non-office practice. Alternatively, the recent increase in opportunities for FPs to develop special expertise in emergency medicine may be sending a tacit message to those without additional training to focus on office practice only.

The role of financial incentives in comprehensiveness of care is unclear. In the case of hospital inpatient services, the fee code for hospital rounds (C002) is priced at 37% less than the most commonly used fee code for office visits (A007).<sup>21</sup> Hence, low remuneration may, in this instance, have contributed to declining participation. Just after the end of this study period (April 1, 2002), a fee code for the most responsible physician billed at the time of admission was introduced to encourage greater participation in hospital care (A993). Future research should examine the impact of this incentive on provision of hospital services. In obstetrics, however, the decline in participation occurred despite the fact that the fee for a basic obstetrical delivery rose by 34%, from \$245 in 1992/93 to \$329 in 2001/02, compared to only 9% for office visits during the same period.<sup>22,23</sup> Similarly, for emergency department care, remuneration increased significantly in the 1990s. The Scott Sessional Fee was introduced in 1996, paying GP/FPs \$70 per hour for after hours ED coverage in rural communities,<sup>25</sup> a major increase compared to the fee-for-service system. Alternate funding plans were introduced in numerous emergency departments in 1999,<sup>16</sup> also increasing remuneration. Despite these incentives, overall participation in ED care has declined. It is possible that had these fee increases for emergency and obstetrical care not occurred, the decline in participation may have been greater than observed. Nonetheless, it appears that factors other than remuneration have a greater influence on physician practice choices.

The decline in obstetrical care raises concern about the future availability of personnel to handle deliveries. Past research has demonstrated that obstetrician-gynecologists are also decreasing their participation in obstetrics.<sup>25</sup> If this trend continues, policymakers may need to consider an increased supply of midwives, as well as policies, such as tort reform for medical malpractice, to keep GP/FPs and obstetricians involved in obstetrics.

The key question for policymakers to consider is whether the declining comprehensiveness of care is desirable or not, given the pros and cons outlined. If the trend is not desirable, policymakers need to develop incentives to reverse it (e.g., better training, hospital policy changes, addressing obstetrical malpractice, or possibly, financial incentives). Alternatively, policymakers may want to allow the trend to continue if it is believed that greater specialization improves quality. If so, in light of a continuing transfer of clinical responsibilities to specialists, policymakers will need to re-examine their availability.

## **Key finding #8**

### *Rising physician supply in the North*

The North was the only region with a consistent increase in physician supply over the past decade. The North has benefited from policies targeted towards increasing physician supply. The long-standing Underserved Area Program offers incentive grants for establishment of physicians, return-of-service loans, and locum programs. Northern Ontario also has two family practice postgraduate training programs, established in Thunder Bay, in 1991, and Sudbury, in 1992. These programs provide FPs with the necessary skills to adapt to life in northern areas, and opportunities to learn, and develop social and professional networks, in the communities in which they might work. While this study cannot identify which recruitment policies may have been the most decisive, the observed improvement in physician supply strongly suggests that, together, they have indeed achieved the intended effect. Policymakers in regions, such as the South West and Central South areas of the province, which lost significant physician resources over the past decade, may wish to consider implementing similar policies. In doing so, however, care must be taken not to inadvertently reverse the gains made in the North.

## Policy Implications

The table lists the policy issues identified in this report and potential policy responses to each. The policy responses are not intended as specific recommendations but as options for consideration. The chosen solution will depend on cost, legislative constraints, impact on stakeholders, and the ability to get their buy-in. It is beyond the scope of this report to identify all of the implementation issues, thus, the purpose of listing these options is to inform the policymaking process by identifying possible avenues of action.

**Table 1. Policy options for addressing GP/FP supply and utilization issues**

Issue	Policy Options
GP/FP supply is experiencing a global decline; workforce is aging.	<ol style="list-style-type: none"> <li>1. Implement new model of care, involving more non-physician providers.</li> <li>2. Decrease demand for GP/FP services (e.g., teletriage, patient education).</li> <li>3. Increase supply of GP/FPs by:               <ol style="list-style-type: none"> <li>a. More family practice residency positions and medical school graduates;</li> <li>b. More programs to assess, train and license international medical graduates;</li> <li>c. More recruitment (e.g., of ex-patriate Canadians in the United States); and,</li> <li>d. Retaining physicians approaching retirement.</li> </ol> </li> </ol>
GP/FPs are decreasing their involvement in non-office care.	<ol style="list-style-type: none"> <li>1. Incentives to encourage more involvement in non-office care (training, hospital policies, tort reform for obstetrical malpractice, possibly financial incentives).</li> <li>2. Increase deployment of midwives in system.</li> <li>3. If this trend is allowed to continue, then consider adjusting estimates of specialist needs given this continuing transfer of clinical responsibilities to specialists.</li> </ol>
Central South and South West regions with relatively low GP/FP supply are experiencing largest decline in physician supply.	<ol style="list-style-type: none"> <li>1. Consider deploying similar policies used with some apparent success in Northern Ontario (e.g., rural family practice training, financial incentives, locum programs, loans and bursaries with return-of-service requirements, etc.).</li> </ol>
One-quarter to one-third of visits are probable low acuity.	<ol style="list-style-type: none"> <li>1. Consider new models of care, involving more non-physician providers.</li> <li>2. Consider opportunities for better self-management of low acuity conditions (e.g., telephone triage, patient education).</li> </ol>

## Conclusion

The face of family medicine has changed substantially during the past several years. Young patients are visiting doctors less. Physician supply has decreased, the workforce is aging, more women are in the workforce, and the comprehensiveness of care continues to decline. While physician supply is improving in the North, it declines elsewhere.

Collectively influencing change are policy decisions made a decade ago, evolving trends in physicians' practice and lifestyle preferences, and patient approach to interaction with primary care physicians. Health human resource planners need to regularly monitor the impact of their policies, as well as the evolution of social trends. As new information becomes available, constant revision of policies governing the workforce (physician entry/exit), models of care, and numbers of physicians targeted for the system, is essential. Thus, a planning and delivery system that is more responsive to patient needs and better at optimizing resources, can be achieved.



## Appendix A. How the Research was Done

### Data sources

Data was obtained from several sources including the Ministry of Health and Long-Term Care Ontario—Health Insurance Plan (OHIP) physician billings database and the Registered Persons Database (RPDB). Information about physician age, sex, practice location, and workload came from the Institute for Clinical Evaluative Sciences (ICES) Physician Workforce Database (IPWD), which comprises information from the OHIP Corporate Provider Database (CPDB), the Ontario Physician Human Resources Data Centre (OPHRDC) database, and OHIP physician billings. Data from Statistics Canada included the Postal Code Conversion File (PCCF), annual population estimates for Ontario by age, sex, and county, for the years 1993 to 2001, and population estimates for Canada for 1991.

OHIP contains information about each service provided by each physician, including the date, diagnosis, fee code, amount paid and health card number of the patient. The RPDB documents the age, sex and residence postal code of the holder of each valid health card number in the province. The CPDB and OPHRDC databases track each physician's specialty, age, and postal code of practice. The PCCF was used to assign each Ontario resident and physician to a county, based on the postal code.

A common identifier (physician's billing number) linked the OHIP, CPDB and OPHRDC datasets. Patient health card numbers linked the OHIP and RPDB datasets. To protect confidentiality, names and addresses were removed from all databases and key identifiers, such as the patient's health card number and physician's billing number, were encrypted.

This report includes data for fiscal years 1993/94 to 2001/02. Yearly rates reported are for fiscal years. A fiscal year begins on April 1, and ends on March 31 of the following calendar year.

### Inclusion and exclusion criteria

All general practitioners (GPs), family physicians (FPs), and FPs with Emergency Medicine certification by the College of Family Physicians of Canada (CCFP(EM)), who were in active practice in Ontario in any year from 1993/94 to 2001/02, (as noted in the OPHRDC database) were included. Ontario residents were included if they had a valid OHIP health card number and their age, sex, and postal code data were complete. Patient visits were counted if the service was provided by a physician billing fee-for-service, or by a physician submitting shadow-billings to OHIP and paid on an alternate funding mechanism. Health service organizations (HSOs) and Community Health Centres (CHCs) use an information system separate from OHIP, and hence, physician visits in these settings were excluded in the analysis, although the physicians themselves were included in all estimates of physician supply.

### Limitations

Several important challenges in conducting the data analysis had to be addressed. First, the RPDB appears to overestimate the actual population. This is likely because OHIP is not notified of all instances in which an individual leaves Ontario. Also, while an effort is made to record deaths, previous studies have found undercounting of deaths by approximately 7% (Manuel and Schultz, 2002). To overcome these problems, an adjustment weight was calculated for the province and for each county based on comparison of the RPDB and Statistics Canada population estimates (see Appendix C).

Second, only data from fee-for-service (FFS) and shadow-billing physicians were available for this analysis. While the proportion of non-FFS GP/FPs is rising (from approximately 9% in 1993/94 to 17% in 2001/02), most are required to submit shadow-billings to OHIP and thus were included in this analysis. However, several counties (Hamilton, Waterloo and Algoma) have many physicians enrolled in health

service organizations (HSOs), whose activity is not captured in OHIP data. Consequently, results on GP/FP visitation rates from these counties should be viewed with caution. This has been noted in all county-level exhibits.

## Appendix B. Definitions

### Diagnostic categories

Table B1. Patient visit diagnosis categories and subgroups

Diagnosis Categories	Diagnosis Codes
<b>Accidents, poisoning, violence</b>	724; 802–894; 919–959; 970–998
Back/neck pain	724; 847
Minor trauma	840–894; 919–959
Fractures/dislocations	802–839
Other	970–998
<b>Cancer, neoplasms, hematologic disorders</b>	140–239; 280–289
<b>Cardiovascular disease</b>	390–459; 785
Chest pain	785
Hypertension	401–403
Ischemic Heart Disease (IHD) and Congestive Heart Failure (CHF)	410–429
Cerebrovascular disease	430–437
Other cardiovascular disease (CVD)	390–398; 440–459
<b>Endocrine disorders</b>	240–279
Hypothyroid	243–244
Diabetes	250
Other endocrine	240, 241, 242, 244, 245; 251–279
<b>Gastrointestinal disorders</b>	520–579; 787
<b>Genitourinary disorders</b>	580–629; 788
<b>Health maintenance</b>	960–969; 895–896; 916–917
<b>Infectious disease</b>	01–139
<b>Musculoskeletal disorders</b>	710–723; 725–739; 781
<b>Nervous system/sensory organs</b>	320–389; 780
Epilepsy	345
Migraine	346
Eye disorders	360–379
Ear disorders	380–389
Symptoms not yet diagnosed	780
Other	320–344; 347–359
<b>Other medical</b>	740–779; 790–799
<b>Pregnancy-related</b>	632–675
<b>Psychosocial problems</b>	290–319; 897–909
Anxiety	300
Depression	311
Social/marital/family	897–909
Other	290–299; 301–310; 312–319

Diagnosis Categories		Diagnosis Codes
<b>Respiratory disorders</b>		460–519; 786
	Upper respiratory infections	460–466
	Pneumonia, influenza	486, 487
	Allergic rhinitis	477
	Chronic Obstructive Pulmonary Disease (COPD)	491, 492, 496
	Asthma	493
	Respiratory symptoms not diagnosed	786
	Other	470–474; 494; 501–519
<b>Skin disorders</b>		680–709

## Probable low acuity diagnoses

Selected diagnostic codes were used to identify visits of probable low acuity (acuteness). Such GP/FP visits may require some medical attention, but could potentially be handled by a non-physician in a primary care team. Examples include visits for common colds or otitis media in individuals aged 3 and older, well baby visits, routine prenatal care and eczema. The term “probable” was used because administrative data on final diagnosis may not always reflect the acuity level at the time the patient presented to the doctor. The following criteria were used to define visits of probable low acuity:

**Table B2. Patients visits of probable low acuity**

If patient age is equal to or greater than 3 years and the diagnosis is one of the following, then the visit was considered probable low acuity	
Diagnostic Code	Diagnosis
009	Gastroenteritis
380–382	Otitis externa/media
388	Ear wax
372	Conjunctivitis
460–461	Cold, sinusitis
For patients of all ages, the following were considered probable low acuity	
Diagnostic Code	Diagnosis
477	Hay fever
650 (and fee code = 004)	Normal pregnancy
680, 682, 684	Cellulitis, boil, impetigo
690–692	Dermatitis
700	Corns
706	Acne
724, 847	Back/neck pain
916	Well baby visits
917	Annual physical
595	Urinary tract infection
401	Hypertension
All other diagnoses were considered not low acuity	

## General practitioner/family practitioner (GP/FP)

The definition of GP/FP for this study includes all physicians identified in the OPHRDC database as in active practice and having a main specialty of general practitioner (GP), family physician (FP), or family physician with emergency medicine training (CCFP(EM)). This includes both fee-for-service and non-fee-for-service physicians. A physician who was a GP/FP in year A and became a specialist in year B was considered a GP/FP in year A only.

## Office visits

### *GP/FP visits*

A GP/FP visit included patient assessments, complete physicals, consultations to GP/FPs referred by other physicians and visits for psychotherapy or counseling.

A GP/FP office visit was deemed as occurring if one of the fee codes listed in Table B3 was billed on a patient by a GP/FP on a given day. If more than one of these fee codes were billed on the same patient by the same physician on the same day, then this was counted as only one visit.

These calculations used billings by fee-for-service physicians, and shadow billings by non-fee-for-service physicians in some settings where it is mandatory to submit OHIP claims with a zero dollar amount (for the purpose of tracking utilization). It was not possible to identify office visits by non-fee-for-service GP/FPs working in non-shadow billing practices, such as CHCs and HSOs.

**Table B3. Fee codes for GP/FP office visits**

Fee Code	Description of Service
A001	Minor assessment
A003	General assessment
A004	General re-assessment
A007	Intermediate assessment/well baby care
A008	Mini assessment
A110	GP periodic oculo-visual assessment—ages 19 or below
A111	GP periodic oculo-visual assessment—ages 20–64
A112	GP periodic oculo-visual assessment—ages 65 or over
A114	GP periodic oculo-visual additional assessment—ages 20–64
A777	Minor assessment Pronouncement of Death
A888	Partial assessment Emergency Department equivalent
A901	House call assessment
A902	House call assessment to pronounce death
A903	Pre-dental general assessment GP/FP
A945	Special palliative consultation
B910	Special visit MON to FRI 7:00 am to 12 midnight 1 <sup>st</sup> patient
B914	Special visit SAT SUN HOL 7:00 am to 12 midnight 1 <sup>st</sup> patient
B916	Special visit any night of week 12 midnight to 7:00 am 1 <sup>st</sup> patient
K001	Detention with patient per full ¼ hour
K002	Interviews with relatives on behalf of patient, per ½ hour
K003	Interviews with CAS or legal guardian on behalf of patient, per ½ hour
K004	Family – psychotherapy – (2 or more) per ½ hour

<b>Fee Code</b>	<b>Description of Service</b>
K005	Primary Mental Health Care
K006	Individual – hypnotherapy – per ½ hour
K007	Individual – psychotherapy – per ½ hour/GP
K008	Diag. interview/counseling child/parent, per ½ hour
K010	Group – per member (seventh hour onward)
K011	Group – hypnotherapy (to 8) per ½ hour
K012	Group – psychotherapy – per member up to 6 hours per day
K013	Counselling – individual care – first three units
K014	Counselling – organ transplant
K015	Counselling – catastrophic on behalf of patient
K016	Genetic assessment patient or family per ½ hour
K017	Annual health exam – child after second birthday
K018	Sexual assault/exam investigation – female
K021	Sexual assault/exam investigation – male
K022	HIV primary care individual care unit ½ hour unit
K023	Palliative care individual care unit ½ hour unit
K024	Group psychotherapy with five people per half hour
K025	Group psychotherapy with six to twelve people per half hour
K026	Certification of medical eligibility for Ontario Hepatitis C Assistance Program (OHCAP) – form
K027	Certification of medical eligibility for OHCAP – completion of form only
K033	Counselling one person additional units/patient/year/unit
K040	Group counselling two or more persons
K041	Group counselling two or more persons additional
K070	Home care application
K071	Home care – supervision – acute home care
K072	Home care – supervision – chronic home care
P003	General prenatal assessment (major prenatal visit)
P004	Minor prenatal assessment
P008	Post-natal care in office

### *Pediatrician office visits*

A pediatrician office visit was deemed as occurring if one of the fee codes listed in Table B4 was billed, or shadow-billed, for a patient by a pediatrician. Consults referred by other physicians were specifically excluded, as it was assumed that these did not represent on-going primary care by the pediatrician.

**Table B4. Pediatrician billed fee codes**

<b>Fee Code</b>	<b>Description of Service</b>
A261	Minor assessment
A263	Specific assessment
A264	Specific reassessment
A007	Intermediate assessment/well baby care
K267	Annual health exam – child after 2 <sup>nd</sup> birthday
K269	Annual health exam – adolescent

### *Non-office practice settings*

A GP/FP was deemed to be working in a non-office setting if he or she performed some minimum volume of services in the setting in a given year, as shown in Table B5.

**Table B5. Criteria for GP/FPs designated as participating in non-office practice**

<b>Setting</b>	<b>Threshold</b>
Emergency department	50 visits
In-patient hospital care	50 visits
Long-term care	50 visits
House calls	10 visits
Obstetrics	2 deliveries
Anesthesia	\$1,000 in price-adjusted billings
Minor surgery	12 procedures
Office-only	Did not meet criteria for any of the above

### *Quasi-specialist GP/FPs*

Quasi-specialists are GP/FPs that spend most of their practice in some specialized area of practice (see Table B6). Using an ICES-maintained database maintained that classifies each fee code by category of service (e.g., hospital visit, obstetrics, surgery, psychotherapy and counseling, etc.), the total price-adjusted billings in selected categories was calculated for each physician. If more than 50% of price-adjusted billings or more than 50% of patient visits were focused on a specific type of service, the physician was deemed a quasi-specialist.

**Table B6. Criteria designating GP/FP as a quasi-specialist**

<b>Specialty Area</b>	<b>Definition</b>
Hospitalist	> 50% billings hospital-based
Surgery	> 50% billings for surgical procedures
Surgical Assistant	> 50% billings for assisting surgery
Anesthesia	> 50% billings for anesthesia
Obstetrics	> 50% billings for obstetrical procedures
Diagnosis and treatment	> 50% billings for diagnostic/ treatment procedures
Psychotherapy	> 50% office visits for psychotherapy or counseling

### *Standard population*

When showing trends over time, standardization is carried out to remove changes that are solely the result of shifts in the age/sex distribution of the population. In this study, the 1991 Canadian population was used as the standard population.



## Appendix C. Detailed Analytic Methods

Exhibits 1,2,4 and 5 report GP/FP visits per patient per year and differences by patient age, sex, location and over time.

### Counting physicians

#### *GP/FP head count*

The head count is simply the number of GP/FPs in a given year.

#### *Full-time equivalent (FTE)*

The full-time equivalent (FTE) measure adjusts the head count upward or downward depending on whether or not the GP/FP appears to have a heavier or lighter workload than his or her peers.

First, the total price-adjusted billings for each physician was calculated. ICES maintains a master price file, updated yearly, which has a standard price for each fee code in the OHIP schedule. In most instances, the standard price equals the total services billed for that service divided by the total number of services. (Manual adjustments are made to some of these prices, however, if a fee code represents a renumbering, splitting, or bundling of a previous fee code or set of fee codes.) Then, for each service billed or shadow billed, we calculate the price-adjusted billings for that service, equal to the number of services billed (usually 1) times the standard price. Then, for each physician, we calculate the sum of all price-adjusted billings.

The advantage of using price-adjusted billings is that they allow us to estimate the overall output of physician services by a physician, independent of price changes from year to year. Furthermore, they allow us to compare the output of physician services between physicians who are fee-for-service and those who are shadow billing.

A modified version of the formula developed by Health Canada and used by the Canadian institute for Health Information<sup>26</sup> was used to estimate FTEs. This modified formula was first used in earlier ICES Atlas on physician supply,<sup>6</sup> and is described as follows:

$$\begin{array}{ll} \text{FTE} = B / B_{40} & \text{if price-adjusted billings (B) are below the 40}^{\text{th}} \text{ percentile for the physician's} \\ & \text{specialty (B}_{40}\text{)} \\ 1 & \text{if price adjusted billings are between the 40}^{\text{th}} \text{ and 60}^{\text{th}} \text{ percentile} \\ 1+\log (B/B_{60}) & \text{if price-adjusted billings (B) are above the 60}^{\text{th}} \text{ percentile for the physician's} \\ & \text{specialty (B}_{60}\text{)} \end{array}$$

### Data adjustments and weights

#### *Person-year adjustment*

Calculations for mean GP/FP visits per patient per year (either overall or for a particular patient category), were adjusted for the fact that patients may not have been alive or had valid health insurance coverage for an entire fiscal year. In such cases, the individuals were assigned a person-year weight that corresponds to the proportion of the year that they were alive. Thus, a child who was born halfway through the year would have a person-year weight of 0.5, while an individual alive during the entire year would have a weight of 1.0.

### Registered Persons Database (RPDB) population adjustment weight

The RPDB is a database of all individuals with valid health insurance coverage in the Province of Ontario. However, as there is no failsafe mechanism for notifying the Ministry of Health and Long-Term Care when a patient leaves the province, many registrants in the RPDB are dormant. Technically, such individuals should be ineligible for coverage, but OHIP still considers them eligible. As well, previous studies have noted that the RPDB underreports deaths by approximately 7%.<sup>27</sup>

Using Statistics Canada's annual population estimates by county, age and sex as the gold standard, the initial analysis demonstrated that the RPDB contains approximately 10% more individuals than expected. Assuming that the dormant individuals that constitute this 10% are either out of the province or deceased, they would likely have no health care utilization. As a result, counting all individuals listed in the RPDB would inflate the denominator, overestimate the actual number of individuals with zero visits, and artificially lower the calculations of mean GP/FP visits per year. Furthermore, the difference between the Statistics Canada population estimates and estimates based on the RPDB varied widely from county to county. For example, the RPDB population for Toronto in 2000 was 24% higher than that of Statistics Canada, while for Prince Edward, it was 10% lower. Thus, failing to adjust for the dormant population, would also result in inaccuracies in the reported differences in GP/FP visit rates by county.

To avoid this problem, a second weighting scheme, called the population adjustment weight, was created. For ease of analysis, an adjustment method that could be applied at the level of the individual was needed, rather than a method that was dependent on some particular type of aggregation. The method involves the following steps:

1. Once the RPDB study cohort was identified (i.e. excluding those who died prior to the start of the year of interest or were born after the year end), individuals were first classified as either active or inactive. Active persons had at least 1 GP/FP office visit, or were born or died during the year of interest. Those with no visits were not born and did not die in the year, were classified as inactive.
2. All active persons were assumed to be live Ontario residents and their information was accepted as correct. They are given a population adjustment weight (PA\_wt[active]) of 1.
3. Of the inactives, an unknown proportion is dormant (no longer residents of Ontario or no longer alive). To adjust for this unknown proportion, all inactive individuals were downweighted. The weights were calculated for each age-sex-county group as follows:
  - a. First, the inactive and active persons (from the RPDB) were summed by county, sex and 5-year age group. These are the *observed* numbers.
  - b. Next, the *expected* number of inactives was estimated by subtracting the number of actives from the Statistics Canada population estimate for each age-sex-county group.
  - c. This expected number was compared to the observed number of inactives.
  - d. The population adjustment weight for each age-sex-county group is equal to the ratio of the expected to the observed. These weights were then applied to the individuals in the study population.
  - e. The formulas for this are:

$$PA\_wt(\text{active}) = 1$$

$$PA\_wt(\text{inactive})_{ijk} = E_{ijk} / O_{ijk}$$

Where:

$$O_{ijk} = \sum \text{Inactive}_{ijk}$$

$$E_{ijk} = \sum \text{Census Pop}_{ijk} - \sum \text{Active}_{ijk}$$

And:

$$i = \textit{i}^{\text{th}} \text{ age group}$$

$$j = \textit{j}^{\text{th}} \text{ sex}$$

$$k = \textit{k}^{\text{th}} \text{ county}$$

A weighted average was then used in calculating mean GP/FP visits per patient per year. Each individual had a weight equal to the person-year adjustment weight times the population adjustment weight.

### *Age-sex patient weights*

Older adults and young children see their physician much more frequently than young adults and middle-aged adults, particularly young men. To adjust for this, weights were created for each five-year age and sex group by taking the mean number of GP/FP visits for that age-sex group and dividing it by the mean number of GP/FP visits for the entire population. This weighting system is used in calculations for physician population ratio and physician workload (see below).

### *Physician-population ratios*

The physician-population ratios were calculated in several ways. For the physician numerator, either head count, total FTEs, or FTEs excluding quasi-specialists, was used. For the population denominator, two methods were used: the estimated population from Statistics Canada, and the “weighted population adjusted for patient flow”. The weighted population adjustment accounts for differences from one region to the next in the age-sex distribution. Older patients use GP/FP services more frequently and are weighted more heavily than younger patients. The weighting mechanism is based on differences in service utilization between patients in different age-sex groups. The flow adjustment accounts for patients seeking care outside the region where they live. For example, a patient living in Mississauga may see a doctor in Toronto because the clinic is close to the patient’s workplace. If there are many such patients, and if they outnumber the Toronto residents seeking care outside the city, then the patient burden on Toronto physicians would be greater than what would be expected if only the number of residents in the city was examined. Hence, the population of regions with a net influx of primary care is up-weighted.

## **Population calculations**

### *Base population*

Statistics Canada’s annual population estimates by age, sex and county (census division), were used as the base populations in this report. All estimates are for July 1 of each calendar year, and are based on data from the census, vital statistics and migration data.

### *Age/sex weighted population*

The age-sex weighted population for a given county is calculated as follows:

1. Count the number of patients in each 5-year age-sex group in the county.
2. For each age-sex group, multiply the count by the age-sex patient weights, as calculated above.
3. Sum these weighted counts across all age-sex groups.

### *Flow-adjusted age/sex weighted population*

In calculating physician-population ratios by small geographic regions such as counties, it is important to take into account the fact that many people visit physicians outside of their counties of residence. A county that receives many patients from outside its boundaries may appear to have a heavier patient burden than the unadjusted physician-population ratio would suggest. For example, a patient living in Mississauga may see a doctor in Toronto because the clinic is close to the patient’s workplace. If there are many such patients and if they outnumber the Toronto residents seeking care outside the city, then the patient burden on Toronto physicians would be greater than what would be expected if we only examined the number of residents in the city. Hence, the population of regions with a net influx of primary care patients is up-weighted.

Patient flow is adjusted as follows:

1. Calculate the net inflow of GP/FP visits into a county (number of visits by non-residents performed by GP/FPs within the county).
2. Calculate the net outflow of visits (number of visits by residents performed by GP/FPs outside the county).
3. Calculate the net inflow of visits = inflow of visits – outflow of visits.
4. The net inflow of patients = net inflow of visits/average number GP/FP visits per patient in province.
5. Add the net inflow of patients to the age-sex weighted population to get the flow-adjusted age-sex weighted population.

Appendix D summarizes the county-level population estimates used in this atlas, including the post-censal estimates, population estimates weighted by the age and sex distribution of the county and then further adjusted for patient flow.

### *Proportion of population with no GP/FP visits*

This indicator appears in Exhibit 3. At the individual patient level, the numerator is whether the patient had no GP/FP visits (yes or no). The numerator is presence in the RPDB in a given year. A weighted proportion of this indicator is reported, using the person-year adjustment and population adjustment weights as described above.

## **Physician workload measures**

Three methods for measuring physician workload were identified: the number of weighted patients per physician, the number of days worked per year, and the number of patients seen per day worked.

### *Weighted patients per GP/FP*

First, each patient was “assigned” to the GP/FP who accounted for the majority of office visits. If no such GP/FP existed, then the patient was deemed unassignable. Then, for each patient, the weight corresponding to the patient’s age-sex group was applied. The total number of weighted patients was then calculated.

### *Days worked per year*

Any day in which a GP/FP billed at least one office visit was counted as one office day worked. The total number of such days were then calculated for each GP/FP.

### *Patients seen per day worked*

For each GP/FP, this indicator equals total patient visits in a given year divided by total days worked in the year.

## **Standardization method**

All standardization in this report was carried out using the direct method, in which the age/sex specific rates for the study population are applied to the standard population. The standard population used was the 1991 Canadian population.

## Appendix D. Patient Visit Flow Adjustments, 1993/94 and 2001/02

County	1993 Base Population <sup>1</sup>	Age-sex Weighted Population	Older than Average?	Visit Inflow, 1993/94	Visit Outflow, 1993/94	Net Visit Inflow, 1993/94	Patient Equivalent	Flow-adjusted Weighted Population, 1993/94
Algoma	132,070	132,078	yes	30,148	42,412	-12,264	-2,913	129,165
Brant	121,350	122,477	yes	75,924	49,667	26,257	6,237	128,714
Bruce	68,740	69,747	yes	47,014	53,224	-6,210	-1,475	68,272
Cochrane	95,940	93,878	no	13,799	81,197	-67,398	-16,009	77,869
Dufferin	43,860	43,210	no	55,865	51,330	4,535	1,077	44,288
Durham	445,000	436,865	no	199,284	508,148	-308,864	-73,364	363,501
Elgin	79,780	80,788	yes	33,136	61,911	-28,775	-6,835	73,953
Essex	343,800	345,926	yes	59,352	86,267	-26,915	-6,393	339,533
Frontenac	136,140	137,416	yes	122,023	70,698	51,325	12,191	149,607
Grey	88,130	90,643	yes	59,218	87,616	-28,398	-6,745	83,897
Haldimand-Norfolk	103,960	104,563	yes	37,744	115,326	-77,582	-18,428	86,135
Haliburton	15,370	16,479	yes	18,337	23,318	-4,981	-1,183	15,296
Halton	334,450	332,340	yes	353,692	275,234	78,458	18,636	350,977
Hamilton	468,760	476,985	yes	207,662	242,289	-34,627	-8,225	468,760
Hastings	123,090	125,476	yes	110,375	86,628	23,747	5,641	131,116
Huron	61,510	63,154	yes	37,658	39,577	-1,919	-456	62,698
Kawartha Lakes	67,920	70,537	yes	53,142	103,507	-50,365	-11,963	58,573
Kenora	65,250	63,703	no	5,823	12,870	-7,047	-1,674	62,029
Kent	112,950	114,024	yes	59,690	45,247	14,443	3,431	117,454
Lambton	134,580	135,418	yes	23,737	72,300	-48,563	-11,535	123,883
Lanark	58,860	60,329	yes	59,159	32,959	26,200	6,223	66,552
Leeds-Grenville	96,200	99,127	yes	25,695	90,518	-64,823	-15,397	83,730
Lennox-Addington	39,730	39,967	yes	36,888	59,193	-22,305	-5,298	34,669
Manitoulin	12,120	12,499	yes	3,831	6,807	-2,976	-707	11,792
Middlesex	393,500	395,458	yes	230,971	120,829	110,142	26,162	421,620
Muskoka	50,500	52,322	yes	35,559	50,744	-15,185	-3,607	48,715
Niagara	410,030	420,812	yes	88,468	112,822	-24,354	-5,785	415,027
Nipissing	88,580	88,763	yes	47,119	43,435	3,684	875	89,638
Northumberland	82,380	84,416	yes	38,750	89,103	-50,353	-11,960	72,456
Ottawa	723,940	720,265	no	267,931	173,839	94,092	22,350	742,614
Oxford	97,930	99,181	yes	58,874	69,695	-10,821	-2,570	96,611
Parry Sound	40,680	42,300	yes	39,364	48,061	-8,697	-2,066	40,234
Peel	807,300	780,099	no	635,805	1,074,780	-438,975	-104,270	675,829
Perth	73,150	74,232	yes	37,281	42,628	-5,347	-1,270	72,962

**Supply and Utilization of General Practitioner and Family Physician Services in Ontario**  
Appendix D. Patient Visit Flow Adjustments, 1993/94 and 2001/02

County	1993 Base Population <sup>1</sup>	Age-sex Weighted Population	Older than Average?	Visit Inflow, 1993/94	Visit Outflow, 1993/94	Net Visit Inflow, 1993/94	Patient Equivalent	Flow-adjusted Weighted Population, 1993/94
Peterborough	125,190	129,475	yes	78,887	78,067	820	195	129,670
Prescott-Russell	74,040	73,320	no	39,649	71,439	-31,790	-7,551	65,769
Prince	25,050	26,159	yes	25,179	29,831	-4,652	-1,105	25,054
Rainy River	23,810	24,032	yes	3,995	6,585	-2,590	-615	23,417
Renfrew	99,010	100,106	yes	31,755	42,520	-10,765	-2,557	97,549
Simcoe	317,550	320,626	yes	188,874	200,080	-11,206	-2,662	317,964
Stormont-Dundas-Glengarry	114,500	116,673	yes	23,119	55,778	-32,659	-7,757	108,915
Sudbury	26,990	26,511	no	11,163	52,969	-41,806	-9,930	16,581
Greater Sudbury	169,640	167,783	no	78,300	62,607	15,693	3,728	171,510
Thunder Bay	164,230	163,678	no	17,445	28,256	-10,811	-2,568	161,110
Timiskaming	39,850	40,278	yes	43,906	17,188	26,718	6,346	46,624
Toronto	2,363,850	2,412,372	yes	2,395,463	1,235,318	1,160,145	275,569	2,687,941
Waterloo	399,980	395,404	no	167,388	157,069	10,319	2,451	397,855
Wellington	168,590	167,926	no	105,931	124,759	-18,828	-4,472	163,454
York	561,590	543,970	no	814,922	948,649	-133,727	-31,764	512,206

**Supply and Utilization of General Practitioner and Family Physician Services in Ontario**  
Appendix D. Patient Visit Flow Adjustments, 1993/94 and 2001/02

County	2001 Base Population <sup>1</sup>	Age-sex Weighted Population	Older than Average?	Visit Inflow, 2001/02	Visit Outflow, 2001/02	Net Visit Inflow, 2001/02	Patient Equivalent	Flow-adjusted Weighted Population, 2001/02
Algoma	123,396	128,279	yes	15,390	46,764	-31,374	-8,256	120,022
Brant	127,238	127,900	yes	64,068	87,235	-23,167	-6,097	121,803
Bruce	66,408	69,304	yes	53,461	57,932	-4,471	-1,177	68,127
Cochrane	90,088	88,938	no	11,754	63,438	-51,684	-13,601	75,337
Dufferin	51,586	49,731	no	44,554	68,749	-24,195	-6,367	43,364
Durham	523,013	507,263	no	289,216	480,144	-190,928	-50,244	457,019
Elgin	84,775	84,837	yes	38,621	74,146	-35,525	-9,349	75,488
Essex	391,736	390,231	no	61,564	105,886	-44,322	-11,664	378,567
Frontenac	140,877	144,239	yes	111,446	90,465	20,981	5,521	149,760
Grey	91,880	96,600	yes	60,062	94,204	-34,142	-8,985	87,615
Haldimand-Norfolk	109,730	110,647	yes	63,915	119,240	-55,325	-14,559	96,088
Haliburton	16,425	18,331	yes	11,475	25,763	-14,288	-3,760	14,571
Halton	387,388	388,399	yes	349,148	367,194	-18,046	-4,749	383,650
Hamilton	503,043	511,129	yes	255,937	191,348	64,589	16,997	528,126
Hastings	124,547	128,384	yes	93,844	86,962	6,882	1,811	130,195
Huron	60,616	62,860	yes	46,534	47,562	-1,028	-271	62,589
Kawartha Lakes	74,354	78,542	yes	64,951	98,992	-34,041	-8,958	69,584
Kenora	68,826	66,108	no	9,721	17,378	-7,657	-2,015	64,093
Kent	112,032	113,579	yes	58,114	43,013	15,101	3,974	117,553
Lambton	132,010	135,728	yes	26,172	83,269	-57,097	-15,026	120,702
Lanark	63,740	65,692	yes	59,411	41,806	17,605	4,633	70,324
Leeds-Grenville	101,033	105,120	yes	39,082	95,604	-56,522	-14,874	90,246
Lennox-Addington	40,917	41,848	yes	46,530	54,611	-8,081	-2,127	39,722
Manitoulin	13,064	13,496	yes	3,773	9,554	-5,781	-1,521	11,974
Middlesex	417,477	417,690	yes	285,856	130,757	155,099	40,816	458,505
Muskoka	55,376	58,705	yes	51,983	44,906	7,077	1,862	60,567
Niagara	426,912	443,445	yes	97,115	168,623	-71,508	-18,818	424,627
Nipissing	84,365	86,080	yes	49,814	43,397	6,417	1,689	87,768
Northumberland	87,474	91,189	yes	45,047	96,091	-51,044	-13,433	77,757
Ottawa	800,525	795,912	no	293,346	183,354	109,992	28,945	824,857
Oxford	103,150	104,404	yes	72,961	81,927	-8,966	-2,359	102,045
Parry Sound	42,338	45,497	yes	17,952	59,520	-41,568	-10,939	34,558
Peel	1,047,097	1,001,132	no	808,864	1,082,925	-274,061	-72,121	929,011
Perth	75,974	76,789	yes	51,547	40,872	10,675	2,809	79,598



**Supply and Utilization of General Practitioner and Family Physician Services in Ontario**  
Appendix D. Patient Visit Flow Adjustments, 1993/94 and 2001/02

<b>County</b>	<b>2001 Base Population<sup>1</sup></b>	<b>Age-sex Weighted Population</b>	<b>Older than Average?</b>	<b>Visit Inflow, 2001/02</b>	<b>Visit Outflow, 2001/02</b>	<b>Net Visit Inflow, 2001/02</b>	<b>Patient Equivalent</b>	<b>Flow-adjusted Weighted Population, 2001/02</b>
Peterborough	129,732	136,861	yes	65,630	98,352	-32,722	-8,611	128,250
Prescott-Russell	79,990	78,726	no	53,900	68,922	-15,022	-3,953	74,773
Prince Edward	26,429	28,275	yes	27,213	26,322	891	234	28,510
Rainy River	22,975	23,361	yes	4,231	7,249	-3,018	-794	22,567
Renfrew	100,999	103,383	yes	42,223	43,955	-1,732	-456	102,927
Simcoe	389,221	390,418	yes	237,845	252,649	-14,804	-3,896	386,522
Stormont-Dundas-Glengarry	115,337	118,161	yes	41,286	64,419	-23,133	-6,088	112,073
Sudbury	25,342	25,887	yes	10,990	51,572	-40,582	-10,679	15,207
Greater Sudbury	160,198	162,232	yes	82,099	49,831	32,268	8,492	170,724
Thunder Bay	156,047	157,560	yes	29,469	35,624	-6,155	-1,620	155,941
Timiskaming	35,569	36,807	yes	34,104	19,475	14,629	3,850	40,657
Toronto	2,562,235	2,597,349	yes	2,502,548	1,359,839	1,142,709	300,713	2,898,062
Waterloo	456,767	447,004	no	153,516	185,140	-31,624	-8,322	438,682
Wellington	195,893	194,172	no	110,227	148,084	-37,857	-9,962	184,210
York	778,292	754,384	no	841,331	1,094,776	-253,445	-66,696	687,688

## Appendix E. Age/Sex Standardized Mean Number of GP/FP Visits, all Ages, by County and Region, in Ontario, 2001/02

Region and County		Crude Rate	Standardized <sup>1</sup> Rate	Significantly Higher (+) or Lower (-) than Ontario
<b>East</b>		3.47	3.36	-
	Frontenac	3.70	3.55	-
	Hastings	3.51	3.34	-
	Lanark	3.23	3.05	-
	Leeds-Grenville	3.25	3.06	-
	Lennox-Addington	3.43	3.28	-
	Ottawa	3.50	3.44	-
	Prescott-Russell	3.87	3.90	+
	Prince Edward	3.43	3.12	-
	Renfrew	3.30	3.15	-
	Stormont-Dundas-Glengary	3.17	2.99	-
<b>Central East</b>		3.80	3.81	+
	Durham	4.02	4.10	+
	Haliburton	3.54	3.14	-
	Kawartha Lakes	3.74	3.56	-
	Northumberland	3.69	3.53	-
	Peterborough	3.76	3.54	-
	Simcoe	3.66	3.65	-
	York	3.75	3.82	+
<b>Central South</b>		3.25	3.16	-
	Brant	3.70	3.64	-
	Haldimand-Norfolk	3.92	3.87	+
	Hamilton	2.86	2.82	-
	Niagara	3.41	3.22	-
<b>Central West</b>		3.74	3.81	+
	Dufferin	3.54	3.66	-
	Halton	3.71	3.71	-
	Peel	4.30	4.41	+
	Waterloo	2.85	2.89	-
	Wellington	2.96	2.95	-
<b>North</b>		3.32	3.22	-

**Supply and Utilization of General Practitioner and Family Physician Services in Ontario**  
Appendix E. Age/Sex Standardized Mean Number of GP/FP Visits, all Ages, by County and Region, in Ontario, 2001/02

Region and County		Crude Rate	Standardized <sup>1</sup> Rate	Significantly Higher (+) or Lower (-) than Ontario
	Algoma	2.33	2.16	-
	Cochrane	3.55	3.49	-
	Kenora	2.30	2.40	-
	Manitoulin	2.51	2.32	-
	Muskoka	4.31	4.07	+
	Nipissing	4.09	3.97	+
	Parry Sound	3.59	3.29	-
	Rainy River	3.09	3.03	-
	Sudbury	3.90	3.77	+
	Greater Sudbury	4.10	4.05	+
	Thunder Bay	2.91	2.85	-
	Timiskaming	2.81	2.66	-
<b>South West</b>				
	Bruce	2.79	2.68	-
	Elgin	3.70	3.63	-
	Essex	4.09	4.04	+
	Grey	3.58	3.34	-
	Huron	3.23	3.07	-
	Kent	3.16	3.06	-
	Lambton	3.38	3.20	-
	Middlesex	3.87	3.82	+
	Oxford	3.21	3.13	-
	Perth	3.17	3.12	-
<b>Toronto</b>				
	Toronto	4.57	4.42	+
<b>Ontario</b>				
		3.80	3.74	

<sup>1</sup>Standardized to the 1991 Canadian population

Data sources: Ministry of Health and Long-Term Care-Ontario Health Insurance Plan and Registered Persons Database; Statistics Canada – *Annual Demographic Statistics*, Cat. No. 91-213-XMP.

## References

1. Commission on the future of health care in Canada. Building on values: the future of health care in Canada. 2004.
2. Sullivan P. Concerns about size of MD workforce, medicine's future dominate CMA annual meeting. *CMAJ* 1999; 161:561–2.
3. Expert Panel on Health Professional Human Resources. Shaping Ontario's physician workforce. 2001.
4. Chan BTB. From perceived surplus to perceived shortage: what happened to Canada's physician workforce in the 1990s? Ottawa: Canadian Institute for Health Information; 2002.
5. Chan B, Anderson GM, Thériault ME. Patterns of practice among older physicians in Ontario. *CMAJ* 1998; 159(9):1101–6.
6. Chan B. Supply of physicians' services in Ontario: ICES research atlas. Toronto: Institute for Clinical Evaluative Sciences; 1999.
7. Sullivan P. This is brand new for us: FP residencies go begging as match ends. *CMAJ* 2002; 166(11):1449.
8. Wright B, Scott I, Woloschuk W, Brenneis F. Career choice of new medical students at three Canadian universities: family medicine versus specialty medicine. *CMAJ* 2004; 170:1920–1924.
9. McKendry R. Physicians in Ontario: too many, too few, for 2000 and beyond? Report of the fact-finder on physician human resources in Ontario. Toronto: Ontario Ministry of Health; 1999.
10. Chan BTB. The declining comprehensiveness of primary care in Ontario. *CMAJ* 2002; 166(4):429–34.
11. Buske L. Medical school enrolment rebounds. *CMAJ* 2001; 165(11).
12. Report on the integration of primary health care nurse practitioners in the province of Ontario. Toronto: IBM Business Consulting Services; 2003.
13. Boyle T. 369 jobs for nurse practitioners. *Toronto Star* 2002 Sept 25.
14. Giving birth in Canada: providers of maternity and infant care. Ottawa: Canadian Institute for Health Information; 2004. p. 10–11.
15. About the Ontario Family Health Network. Ontario Ministry of Health and Long-Term Care, <http://www.ontariofamilyhealthnetwork.gov.on.ca/english/about.html> (accessed 21 Jan 2005).
16. Chan BTB, Schull MJ, Schultz SE. Emergency department services in Ontario 1993–2000. ICES research atlas. Toronto: Institute for Clinical Evaluative Sciences; 2001.
17. Sanmartin C, Houle C, Berthelot JM, White K. Access to health care services in Canada, 2001. Ottawa: Statistics Canada; 2002. Catalogue no. 82-575-XIE. p. 10,11,23.
18. Report of the national coordinating committee on postgraduate medical training to the conference of deputy ministers of health; December 1994.

19. Barer ML, Stoddart GL. Toward integrated medical resource policies for Canada. Prepared for the federal/provincial/territorial conference of Deputy Ministers of Health; June 1991.
20. National action plan for Canadian physician resource management. Status report. Prepared for the conference of Deputy Ministers of Health; September 1993.
21. Schedule of benefits: physician services under the Health Insurance Act. Toronto: Ontario Ministry of Health; 2002.
22. Schedule of benefits: physician services under the Health Insurance Act. Toronto: Ontario Ministry of Health; 1992.
23. Schedule of benefits: physician services under the Health Insurance Act. Toronto: Ontario Ministry of Health; 2001.
24. Scott G. Small/rural emergency department physician services. 2<sup>nd</sup> edition. Toronto: Ministry of Health; 1995.
25. Chan BT, Willett J. Factors influencing participation in obstetrics by obstetrician-gynecologists. *Obstetrics and Gynecology* 2004; 103(3):493–8.
26. Full-time equivalent physicians report, Canada 2002–03. Ottawa: Canadian Institute for Health Information; 2004.
27. Manuel DG, Schultz SE. Diabetes health status and risk factors. In: Hux JE, Booth GL, Slaughter PM, Laupacis A (editors). *Diabetes in Ontario: ICES practice atlas*. Toronto: Institute for Clinical Evaluative Sciences; 2003. p. 4.77– 4.94.
28. Ministry of Health and Long-Term Care. McGuinty government increasing access to doctors in Ontario. *Canada News Wire*, 2005 May 16.