



ARTHRITIS COMMUNITY RESEARCH & EVALUATION UNIT (ACREU)

University Health Network

ONTARIO COMMUNITY REHABILITATION: A PROFILE OF COMMUNITY REHABILITATION

TECHNICAL SUMMARY

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1 INTERPRETATION AND STRUCTURE OF THIS REPORT

This Technical Summary presents detailed information regarding the methodology used to produce the community rehabilitation profiles for Ontario and each of its 14 Local Health Integration Networks (LHIN). The profiles are intended to assist health planners make informed decisions about community rehabilitation services in terms of demand, provision, access and geographic location. It is anticipated that these profiles will augment and enhance information already produced by the LHINs and the Ministry of Health and Long-Term Care regarding the status of local health service demand and provision across Ontario.

1.1 Purpose and Objectives

The purpose of this project is to integrate existing data sources and evidenced based findings pertaining to Ontario community rehabilitation services in order to provide a snapshot of current service demand and provision for community rehabilitation services within each LHIN.

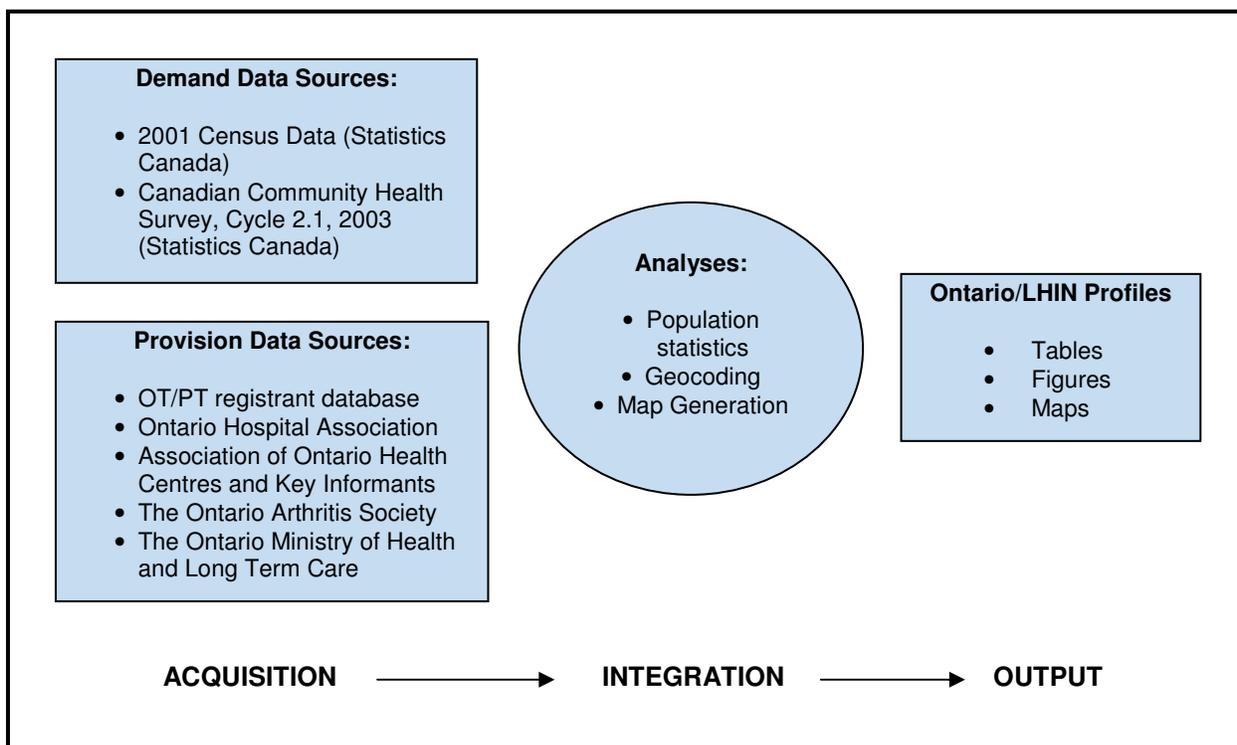
The objectives of this report are to:

1. Examine the demand for existing community rehabilitation services, including the geospatial distribution, within Ontario and each LHIN. For the purpose of this project, ***demand*** is defined as the potential need or desire for community occupational therapy (OT) services and physiotherapy (PT) services and is based on the general population distribution (all ages), the population distribution age 65 years and older, average annual household income, OT and PT utilisation, activity and participation limitation, as well as key health variables that may be indicative of demand for community rehabilitation services.
2. Examine existing community rehabilitation provision, including the geospatial distribution, within Ontario and each LHIN. For the purposes of this study ***provision*** is defined as the availability of community OT services and community physiotherapy PT services based on geographic location, method of funding (publicly vs. privately funded services), health human resource allocation, hours of operation and the median wait time for service.
3. Integrate the above information to establish a profile for community rehabilitation services for Ontario and each LHIN.

2 METHODOLOGY

This study employed secondary data analyses to examine demand and provision for community rehabilitation services and provide a comprehensive profile for the province of Ontario and each LHIN. A model for the overall methodology is provided in Figure 1. This project was approved by the University Health Network Research Ethics Board and was funded by the Ministry of Health and Long Term Care Health Systems Link Research Grant 04166.

Figure 1: Model of methodology



2.1 DATA ACQUISITION-Demand Data Sources

Data to describe the demand for rehabilitation services were obtained from the 2001 Canadian Census and the Canadian Community Health Survey (CCHS) Cycle 2.1 (2003). The Canadian Census public access file was obtained through the University of Toronto Data Library. The geographic distribution by dissemination area for the general population, the population age 65 years and older, and income distributions were examined. Population projections for 2004 were used for general population estimates, age-sex standardisation and rate generation. These projections were obtained from Statistics Canada.

Data pertaining to demand were also extracted from the CCHS, Cycle 2.1. The CCHS “is a cross-sectional survey that collects information related to health status, health care utilization and health determinants for the Canadian population. The CCHS collects responses from persons aged 12 or older, living in private occupied dwellings. Excluded from the sampling frame are individuals living on First Nations Reserves and on Crown Lands, institutional residents, full-time members of the Canadian Armed Forces, and residents of certain remote regions”¹. CCHS data collection did not include LHIN level data as this geographic boundary did not exist at the time of the Cycle 2.1 data collection (2003). In order to examine these data at the LHIN level, a new variable was derived from dissemination area level data to reflect LHIN boundaries². Data specific to Ontario dissemination area level was obtained through the CCHS master file located at Statistics Canada Research Data Centre, at the University of Toronto. Permission to access the CCHS master file was obtained through Statistics Canada.

2.2 DATA ACQUISITION-Provision Data Sources

Several existing data sources were used to describe the provision of community rehabilitation for Ontario and each LHIN. Data regarding occupational therapists' and physiotherapists' primary place of employment and type of setting were obtained from each rehabilitation profession's regulatory body for the province of Ontario (the College of Occupational Therapists of Ontario and the College of Physiotherapists of Ontario). Information pertaining to publicly and privately funded community rehabilitation settings was accessed through public channels and included the following:

Hospital Outpatient Rehabilitation Departments (OPD)

A listing of Ontario hospitals that provide outpatient rehabilitation services (OT and/or PT) was obtained from previous research conducted by ACREU³. Specifically, hospital contact information was downloaded from the Ontario Hospital Association website⁴. All hospitals, excluding mental health hospitals and children's hospitals, were contacted by telephone to identify if outpatient rehabilitation services were provided at the institution. There were 208 hospitals that provided outpatient rehabilitation (June, 2005).

Community Health Centres (CHC)

At the commencement of this project, there were 54 CHCs⁵ throughout the province of Ontario of which there were only three CHCs that provide OT services and six CHCs that provide PT services^{6,7}. Location information for these settings was obtained from the Association of Ontario Health Centres⁸.

Designated Physiotherapy Clinics (DPC)

Information pertaining to Designated Physiotherapy Clinic address and location were accessed through the MOHLTC website⁹.

The Arthritis Rehabilitation and Education Program (AREP)

Contact information for the clinic locations where The Arthritis Society Rehabilitation services are offered was obtained from the Senior Director of Client Programs¹⁰. It is important to note that The Arthritis Society uses a "primary therapist model" where "assessment, treatment and case-management (physical, functional and psychosocial) is provided by a therapist in consultation with, or with referral to, peers or other services as necessary"^{5,11}. Using this model of care, the first available therapist, regardless of the service requested, whether OT or PT, becomes the service provider. Categorising service provision into OT or PT is not appropriate for this provider of rehabilitation services. Thus, provision data relating to the Arthritis Society is shown for both OT and PT, but represents the primary therapist model. Furthermore, services offered through The Arthritis Society Rehabilitation and Education Programme can be provided at client homes, local community centres and other locations that may not be reflected by the clinic location, thus these settings may provide services over larger geographic regions than indicated.

Private Rehabilitation Services

Information pertaining to private clinic location for occupational therapy and physiotherapy was obtained from each rehabilitation profession's regulatory body^{12,13}. The clinic locations were derived from the list of registered occupational therapists and physiotherapists employed at private clinics.

In addition to the above information, estimates for hours of operation, wait times and number of full time equivalent (FTE) staff for hospitals and Designated Physiotherapy Clinics were obtained from the 2005 Wait Time Survey conducted by ACREU and were added to the rehabilitation profile for Ontario and each LHIN. Information pertaining to these provision variables are presented in aggregate form for each LHIN. Cell sizes less than five are not shown due to concerns pertaining to confidentiality of respondents, as well as issues pertaining to external validity. These data were only available for the publicly funded rehabilitation sector. Full details of the methods used for this survey can be found elsewhere³. The standard error for FTE estimates for hospital outpatient clinics and Designated Physiotherapy Clinics are found in Appendix A. Estimates regarding the number of full time equivalent staffing for the Arthritis Society Arthritis Rehabilitation and Education Clinics and Community Health Centres were obtained from key contacts working within these settings^{6,7,10}.

Community Care Access Centres (CCAC) were not included in the analyses due to the recent reorganisation to realign the CCAC geographic boundaries according to each of the LHIN borders. In addition, community rehabilitation services provided through mental health institutes or institutes that provide rehabilitation to children and/or adolescents, as well as, specialty ambulatory programs (such as amputee programs or hand clinics) were excluded from the provision analyses.

2.3 DATA ACQUISITION-Spatial Data Sources

In order to map the geographic distribution of public and private rehabilitation clinic locations, shapefiles were required for the province of Ontario, its LHINs, major road networks, and major water bodies. A shapefile stores geometry and attribute information for the spatial features in a data set and is stored as a shape comprising a set of vector coordinates¹⁴. The Ontario LHIN version 11 shapefiles were acquired from the Ontario Ministry of Health and Long Term Care's Geographic Information Services unit. The shapefiles for the major road networks and water bodies were obtained from the University of Toronto Map, Air Photo and GIS Collection¹⁵.

Table 1 presents a summary of all data sources used to establish the community rehabilitation profiles for Ontario and each LHIN.

Table 1: Description of data sources used in this report

Demand Data
<ul style="list-style-type: none"> ▪ <i>Population Data.</i> 2001 Census, Statistics Canada for all mapped data including population distribution, population over the age of 65 years and average annual household income. 2004 population estimates (obtained from Statistics Canada) were used for population totals, proportion of population over the age of 65 years, the generation of age-sex adjusted prevalence, and OT and PT provision rates per population. ▪ <i>Rehabilitation Utilisation.</i> Canadian Community Health Survey, Cycle 2.1 [2003], Statistics Canada, Master File, Research Data Centre, University of Toronto. ▪ <i>Selected Conditions/Demand Indicators.</i> Canadian Community Health Survey, Cycle 2.1 [2003], Statistics Canada, Master File, Research Data Centre, University of Toronto.

Table 1: Description of data sources used in this report (cont'd)

Provision Data
<ul style="list-style-type: none"> ▪ <i>Community Health Centres (CHC)</i>. The Association of Ontario Health Centres, in addition to personal communication with key contacts ^{6,7,10}, were used to establish the location and staffing for CHCs that provide occupational therapy services and/or physiotherapy services. ▪ <i>Designated Physiotherapy Clinics (DPC)</i>. The Ministry of Health and Long-Term Care public listing of DPCs was used to establish clinic location. Estimates for staffing and hours of operation were obtained from the 2006 Ontario Community Rehabilitation Wait Time Survey. ▪ <i>The Arthritis Society Rehabilitation and Education Program (TAS AREP)</i>. Clinic location and staffing was obtained directly from the Senior Director of Arthritis Programs for the Ontario Division. ▪ <i>Hospital Outpatient Occupational Therapy and Physiotherapy</i>: Location of hospital outpatient occupational therapy and physiotherapy was obtained from the Ontario Hospital Association. A listing of hospitals providing outpatient rehabilitation services and estimates for staffing and hours of operation were obtained from the 2006 Ontario Community Rehabilitation Wait Time Survey. ▪ <i>Private Occupational Therapy and Physiotherapy community clinic location</i>: The College of Occupational Therapists of Ontario, May 2006; The College of Physiotherapists of Ontario, May 2006 ▪ <i>Rate of Occupational Therapists and Physiotherapists per population</i>: The number of registered occupational therapists and physiotherapists was obtained from the College of Occupational Therapists of Ontario (May 2006) and the College of Physiotherapists of Ontario (May 2006) respectively. All active registrants were used to calculate the provision rate, irrespective of their employment status (full time, part time or casual). Population estimates for 2004 from Statistics Canada were used as the denominator for rate generation. It was not possible to select only those therapists working in community settings due to limitations with the data collection processes of each regulatory college.
Shape Files for GIS analyses
<ul style="list-style-type: none"> ▪ <i>Ontario LHINs</i>. Ontario Ministry of Health and Long-Term Care, Geographic Information Services Unit, Version 11. ▪ <i>Ontario major road networks and water bodies</i>. University of Toronto Map, Air, Photo and GIS collection

Table 2 and Table 3 provide a summary of the definitions for variables used to establish the community rehabilitation profiles for Ontario and each LHIN.

Table 3: Provision Variables

Variable	Definition
Rehabilitation health human resource allocation	Number of occupational therapists per 100 000 population Number of physiotherapists per 100 000 population
Community rehabilitation settings	Community Health Centres Designated Physiotherapy Clinics Hospital Outpatient PT Clinics The Arthritis Society AREP Private clinics
Funding*	Classified as either publicly funded (funding obtained from the Ministry of Health and Long Term Care) or privately funded (may include extended health care benefits, motor vehicle insurance, Workplace Safety Insurance Board or out of pocket funding)
Full Time Equivalent Staffing Allocation	Number of Full Time Equivalent staff who are involved with direct patient care for community rehabilitation services.
Wait Time*	The average number of days people are waiting for community rehabilitation from the date the referral is received to the date a client attends his/her first appointment or as “other” (respondent specific)
Service Availability*	Days of the week (Monday-Sunday) that rehabilitation service is available. Hours of the day services is available (daytime hours=7:00am to 5:00pm; evening hours=after 5:00pm)

* Variables may be indicative of access

2.4 DATA INTEGRATION: Population Statistics

Descriptions of central tendency and frequency counts were used to estimate demand and provision for community rehabilitation services. Direct standardisation was used to provide age-sex standardised estimates of selected demand variables when LHINs were compared across Ontario ². Weighting and assessment of the coefficient of variation of demand variables obtained from the CCHS Cycle 2.1 were performed according to the guidelines set out by Statistics Canada ¹⁶. SAS Version 9.1 was used for all descriptive analyses.

2.5 DATA INTEGRATION: Geocoding

Geocoding refers to a process whereby data are imported into geographic information system software in order to identify its geographic properties. Coordinate positions are assigned to the data in order to be used to display the location of pertinent variables ¹⁷. For the purposes of this project geocoding was based on two geographic variables.

- Geocoding of *demand* data was based on dissemination area for all LHIN level analyses. A dissemination area (DA) is a small, relatively stable geographic unit composed of one or more blocks with a population of 400 to 700 persons ¹⁸. It is the smallest standard geographic area for which all census data are disseminated. For Ontario level data, DAs were rolled up to their corresponding LHIN using a conversion file obtained from the Institute of Clinical Evaluative Sciences. It should be noted that at the DA geographic level, counts are subject to random rounding of the last digit and suppression in the case where too few cases are available for reporting ².
- Geocoding of *provision* data was based on postal code. These data were facilitated using the Canada Unique Enhanced Postal Codes Version 2005.3, created by DMTI Spatial, and available from the University of Toronto Map, Air Photo and GIS Collection.

Some clinics were associated with postal codes that could not be matched in the Canada Unique Enhanced Postal Code reference file. These postal codes were double checked online using references such as the Canada Post Postal Code Locator or the Yellow Pages. If the proper postal code could not be found, the clinic was left ungeocoded, and therefore not spatially represented in the mapping software. In total, 2.9% of all community rehabilitation clinical settings were not geocoded, and therefore not mapped for the profiles (See Appendix B for a breakdown of the ungeocoded clinics for each LHIN).

2.6 DATA INTEGRATION: Map Generation

ArcMap Version 9.1 was used to create a series of maps to show the relationship between demand and provision for community rehabilitation services. Dot density was used to illustrate the spatial patterning of the general population distribution and also the population age 65 years and older. These points represented no fewer than 100 persons per point in order to maintain respondent anonymity. Choropleth mapping techniques were used to display health human resource rates for the number of occupational therapists and physiotherapists per 100 000 population for each LHIN and the distribution of the population 65 years and older. Classification of these variables was based on Natural Breaks (Jenks) that categorise the data based on the natural groupings inherent in the dataset¹⁹. Choropleth mapping was also used to map average annual household income. Due to regional economic variation between LHINs, categorisation of income variables were based on manually set categories. The lowest category was set from \$0 to the low income cut-off for a household of four people for the most populated municipality within each LHIN as outlined by Statistics Canada²⁰. The remaining categories were based on the 50th, 90th and 100th percentiles of average household income.

A visual depiction of the integration of demand and provision data for each LHIN was achieved through a layering process. Figure 2 illustrates the layering involved with the maps to profile community rehabilitation for Ontario and each LHIN.

Figure 2: Layering of demand and provision data for GIS

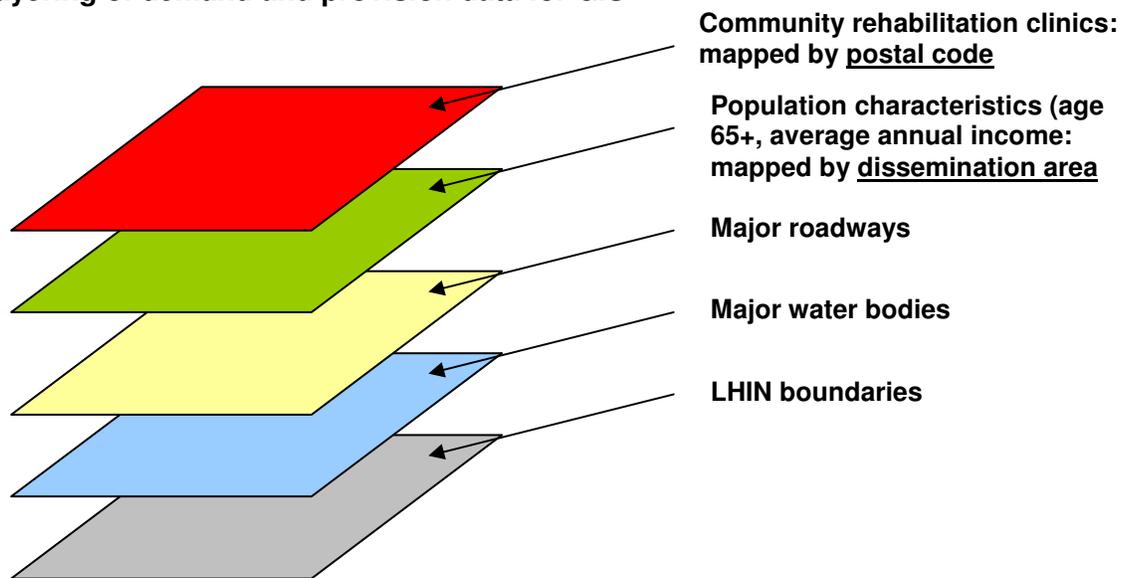


Figure layout adapted from Heywood I, Cornelius S, Carver S. An introduction to geographical information systems, 2 ed. Harlow: Pearson Prentice Hall, 2002; p.65.

3 LIMITATIONS

The methodology outlines that data used to produce the provincial and LHIN profiles were obtained from a variety of sources that include Statistics Canada, the Ontario Ministry of Health and Long-Term Care, professional regulatory colleges, a number of health provider associations and other published sources. Limitations associated with these data have been carried forward with the analyses to produce these profiles. This section identifies the limitations of all data sources and analytical methods used to produce this report.

Key Limitations:

- Empty spaces on a map may not always indicate an unpopulated area, but rather may be indicative of data suppression.
- Provision data mapped by postal code may lead to the appearance that some clinics are located at exactly the same address when in actual fact they are located at different addresses within a postal code boundary.
- Counts of clinics by LHIN must be taken with caution, as facilities lying on LHIN borders may actually belong to an adjacent LHIN.
- In total, 2.9% of all community rehabilitation clinical settings were not geocoded likely due to incorrect data entry at the source of data collection.
- Differences in population distributions within each dissemination area may not be apparent.
- Presentation of aggregated data may conceal variations that exist within the individual level data.

3.1 Data Suppression:

Data collected by Statistics Canada may be suppressed for a variety of reasons. At the dissemination area level, population statistics are suppressed for populations of less than forty people in order to maintain respondent privacy. Likewise, income statistics are suppressed if the population of the dissemination area is less than 250 people. Furthermore, census data from dissemination areas lying within First Nations reservations and armed forces bases may also be suppressed. For this report, there was a total of 94 dissemination areas in Ontario that were suppressed due to population size or incomplete enumeration¹⁸. In terms of depicting the spatial distribution of population characteristics, suppression may lead to an inaccurate picture of the population in some geographic areas. For example, a First Nations reserve may appear as a void on a dot distribution map of population, which could in turn be misinterpreted as green space or another type of land use where population does not reside. Therefore, it must be noted that empty spaces on a map may not always indicate an unpopulated area, but rather may be indicative of data suppression for one of many reasons.

3.2 Postal Codes:

The Canada Unique Enhanced Postal Code (UEP) reference file used to geocode the location of the community rehabilitation clinics involves a level of assumption in terms of spatial location. The Canada UEP places one point on a map for each postal code in Ontario, however, one postal code generally encompasses a defined area, or polygon. Often the clinic locations will be mapped to the centre point of the polygon when in fact the actual location may lie elsewhere within the postal code area. Conversely, this centre-point reference for postal code polygons

may lead to the appearance that some clinics are located at exactly the same address when in reality they are located at different addresses within a postal code polygon, leading to the appearance that one street address is the site of a great number of rehabilitation facilities. Lastly, a postal code polygon may lie on a LHIN boundary, in which case there is a chance the clinic may be misclassified to the wrong LHIN. Therefore, counts of clinics by LHIN must be taken with caution, as facilities lying on the border of a LHIN may actually belong to another LHIN.

3.3 Geocoding:

While geocoding the rehabilitation facilities, it was found that some of the postal codes of these facilities did not match a postal code within the Canada Unique Enhanced Postal Code reference file. This mismatch may be attributed to incorrect data entry. Furthermore, new postal codes are frequently being added to the Canada Post mailing system and may not yet be included in the shape file used in this project. As mentioned previously, 2.9% of all community rehabilitation clinical settings obtained for this report were not geocoded, and therefore not mapped for the profiles.

3.4 Thematic Mapping:

The ideal way of displaying the spatial distribution of a population is through dot distribution thematic mapping. However, the spatial distribution of the dots in a dot distribution map is random, and therefore could misrepresent where the population actually lies. For example, a polygon which contains a large urban centre as well as a rural area could have dots evenly dispersed across the polygon, despite the fact that the majority of the population is concentrated at one point. However, the smaller the geographic area being mapped, the more accurate the distribution of the dots will be. For example, a dissemination area generally contains 400-700 people within a small geographic area, while a LHIN could contain hundreds of thousands of people, and covers a much larger geographic area. If population counts are mapped at the LHIN level, it is highly likely that the population will appear evenly distributed across the entire LHIN, which may misrepresent reality. However, by breaking each LHIN up into dissemination areas, the populations can be mapped at a much smaller geographic level, representing a more accurate distribution of the population.

3.5 Ecological Fallacy:

The concept of ecological fallacy must be addressed when discussing the limitations of this working report. Ecological fallacy is defined as “a bias that may occur because an association observed between variables on an aggregate level does not necessarily represent the association that exists at an individual level”²¹. This is relevant as a number of variables described in this report have been aggregated to the level of dissemination area or to LHIN. For example, the average annual household income for a DA may be \$62,500, however, within the DA may be individuals with very low household income (e.g. \$25,000), and other individuals with high household income (e.g. \$100,000), yet the average for the DA is \$62,500. In fact, there may not be any individuals with an average income of \$62,500, and a large disparity may exist between individual incomes within the DA. Therefore, the presentation of aggregated data may conceal variations that exist within the data presented in this report.

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5 APPENDIX

5.1 Appendix A: Estimates for Full Time Equivalent Staff at Hospital Outpatient Clinics and Designated Physiotherapy Clinics

LHIN	Hospital Outpatient Department OT					Hospital Outpatient Department PT					Designated Physiotherapy Clinics				
	n	Mean	se	Lower 95% CL for Mean	Upper 95% CL for Mean	n	Mean	se	Lower 95% CL for Mean	Upper 95% CL for Mean	n	Mean	se	Lower 95% CL for Mean	Upper 95% CL for Mean
Erie St Clair	6	0.33	0.33	-0.52	1.19	6	2.43	0.63	0.83	4.04	2	...	...	...	...
South West	18	0.21	0.09	0.02	0.39	18	1.68	0.31	1.04	2.32	3	...	...	...	...
Waterloo Wellington	2	...	...	...	...	...	...	...	...	...	2	...	...	...	...
Hamilton Niagara Haldimand Brant	13	0.05	0.04	-0.03	0.14	13	2.43	0.87	0.55	4.31	10	2.35	0.37	1.50	3.20
Central West	1	...	...	...	...	1	...	...	...	...	6	3.80	0.79	1.71	5.79
Mississauga Halton	5	4.40	3.17	-4.41	13.21	5	3.62	1.86	-1.53	8.77	1	...	...	...	...
Toronto Central	9	1.19	0.43	0.19	2.19	9	2.84	0.75	1.11	4.58	8	1.50	0.25	0.91	2.09
Central	6	1.38	0.66	-0.31	3.08	6	5.92	0.47	4.72	7.12	8	1.56	0.32	0.80	2.33
Central West	6	0.6	0.19	0.1	1.10	6	2.9	0.66	1.21	4.59	4	...	...	...	...
South West	2	...	...	...	...	2	...	...	...	...	0	...	...	...	...
Champlain	16	0.51	0.35	-0.23	1.26	16	3.42	1.12	1.04	5.80	2	...	...	...	...
North Simcoe Muskoka	2	...	...	...	...	2	...	...	...	...	2	...	...	...	...
North East	22	0.47	0.17	0.12	0.82	22	1.41	0.43	0.52	2.29	1	...	...	...	...
North West	11	0.78	0.29	0.12	1.40	11	2.55	0.47	1.49	3.6					

...Data not presented due cell size less than 5

No provision data available in LHIN

5.2 Appendix B: Ungeocoded Clinics by Local Health Integration Network

	CCAC	DPC	Hospital	Private PT	Private OT	TAS	TOTAL # Clinics
LHIN	# Clinics	# Clinics	# Clinics	# Clinics	# Clinics	# Clinics	
Erie St Clair	-	-	-	-	-	-	0
South West	-	-	-	1	-	-	0
Waterloo Wellington	-	-	-	-	-	-	0
Hamilton Niagara Haldimand Brant	-	-	-	4	-	1	5
Central West	-	1	-	3	1	-	5
Mississauga Halton	-	-	-	4	1	-	5
Toronto Central	-	-	-	4	-	-	4
Central	1	-	-	7	2	-	10
Central East	-	-	1	4	1	1	7
South East	-	-	-	2	1	-	3
Champlain	1	-	-	7	-	-	8
North Simcoe Muskoka	-	-	-	1	1	-	2
North East	-	-	1	1	-	-	2
North West	-	-	-	-	-	1	1
ONTARIO	2	1	2	38	7	3	53

* # Clinics is the number of clinics unsuccessfully geocoded

** All CHCs were successfully geocoded