

**Ontario Osteoporosis Strategy -
Provincial Performance Data for
Osteoporosis Management**

Technical Report

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Acknowledgements & Disclaimers

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Abbreviations

AHRQ	Applied Health Research Questions
BMD	Bone Mineral Densitometry
CCRS	Continuing Care Reporting System (chronic care)
CCRS-LTC	Continuing Care Reporting System – Long-Term Care
CIHI	Canadian Institute for Health Information
DAD	Discharge Abstract Database
DIN	Drug Identification Number
ICES	Institute for Clinical Evaluative Sciences
LHIN	Local Health Integration Network
LTC	Long Term Care
MOH	Ministry of Health
MLTC	Ministry of Long Term Care
NACRS	National Ambulatory Care Reporting System
NRS	National Rehabilitation Reporting System
ODB	Ontario Drug Benefit database
OHIP	Ontario Health Insurance Plan Claims Database
OACCAC	Ontario Association of Community Care Access Centre
OOS	Ontario Osteoporosis Strategy
RPDB	Registered Persons Database

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Executive Summary

The Ontario Ministry of Health launched the Ontario Osteoporosis Strategy (OOS), a population-based initiative to improve quality of care for osteoporosis in Ontario, in 2005 and it became a Program in 2011.¹ The Ontario Osteoporosis Strategy represents the vision and coordinated efforts of many groups, including the Ministry of Health (MOH), Osteoporosis Canada, and health care and research professionals.

Ontario Osteoporosis Strategy Mandate²

To reduce morbidity, mortality and costs from osteoporotic fractures using a patient-centred, multi-disciplinary approach that is integrated across healthcare sectors.

A number of performance indicators for osteoporosis management were developed to monitor the Ontario Osteoporosis Strategy from a health system perspective.³ For the purpose of this report, indicators using available administrative data are presented.⁴ Analyses were conducted by the Institute for Clinical Evaluative Sciences (IC/ES) as part of their Applied Health Research Questions (AHRQ) program.

Evaluation Objectives

- 1) To describe trends over time in fracture rates, bone mineral density (BMD) testing and osteoporosis treatment in Ontario since the launch of the Osteoporosis Program (2005/06 through 2019/20); and,
- 2) To evaluate, inform and guide the direction and continued delivery of the Osteoporosis Program.

Report Overview

In this report, we provide an update to the existing data for indicators related to fracture rates, bone mineral density (BMD) testing and osteoporosis treatment in Ontario, and data for new indicators for Long-Term Care (LTC) residents.

This report should replace previous Ontario Osteoporosis Program Reports as the results may not be comparable to previous findings due to refinements to case definitions, updated drug identification number (DIN) list of osteoporosis medications and treatment adherence definitions, the age categories used, and follow up time periods. The current report emphasizes hip fracture trends; fracture rates and management among seniors (80+) and in LTC; and, variability in osteoporosis management by Local Health Integration Network.

¹ Jaglal SB, Hawker GA, Cameron C, Canavan J, Beaton DE, Bogoch E, Jain R, Papaioannou A, ORMEW working group. The Ontario Osteoporosis Strategy: implementation of a population-based osteoporosis action plan in Canada. *Osteoporos Int.* 2010 Jun;21:903-8.

² Strategic Plan 2013-2016 Ontario Osteoporosis Strategy April 2013

³ Where appropriate, indicators and algorithms were aligned with other national and provincial initiatives on musculoskeletal disorders including: POWER; PHAC's Osteoporosis Surveillance Working Group; Canadian Chronic Disease Surveillance System; and, Pharmaco-Epidemiology Group, ICES

⁴ Data sources include: Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS); Ontario Health Insurance Plan Claims database (OHIP); Ontario Drug Benefit database (ODB) (65 years and older); Registered Persons Database (RPDB); Continuing Care Reporting System-LTC (CCRS-LTC); Continuing Care Reporting System (CCRS: chronic care); Corporate Provider Database, Home Care Database (OACCAC and MOH); ICES Physician Database; National Rehabilitation Reporting System (NRS)

Main Messages

(1) Hip Fracture

Rates of Hip Fracture

- There has been a **14.6% decrease⁵** in age standardized rate of hip fracture (from 24.6 per 10,000 in 2005/06 to 21.0 per 10,000 in 2019/20)
- The rate of hip fracture (per 10,000) has also dropped in all age groups from 2005/06 to 2019/20: **-12.9% in 50-64 year olds, -25.1% in 65-79 year olds, and -20.8% in 80+**
- There was a drop in standardized hip fracture rate from 2005/06 to 2019/20 for both women and men but the decrease was greatest in **women (-20.4%) compared to men (-11.9%)**

Cost of Hip Fracture

- The total cost of treatment in 2018/19, for adults aged 66+, was estimated to be **\$280,056,277** based on direct utilization costs (during inpatient hospitalization and/or inpatient rehabilitation). The total cost of hip fracture remained relatively stable accounting for inflation.
- The median cost **per single episode of care** was **\$26,380** for direct utilization costs
- The impact of hip fractures is also significant when total costs incurred one-year pre-fracture (\$198,082,582) are compared to total costs incurred one year post-fracture (\$382,762,589) – **an increase of \$184,680,007** which is expected to be largely due to the impact of the hip fracture

BMD Testing and/or Treatment following Hip Fracture

- From 2014/15 to 2018/19 the proportion of adults 66+ who were investigated or treated for osteoporosis within 12 months after discharge from a hip fracture increased from 34% to 41%
- 44.4% of women and 39.3% of men were investigated or treated for osteoporosis within 12 months of their hip fracture in 2018/19

Key Messages

- Hip fracture rates have decreased and absolute numbers of hip fractures appear to be leveling despite the aging of the population
- However, the impact of hip fractures on health system utilization and cost remains significant
- Males continue to be undertreated compared to females despite being at high risk for fractures

(2) Variation by Local Health Integration Network

Fracture Rates

- Standardized hip fracture rates (per 10,000) for those 50+ in 2019/20 ranged from a high of 24.7 in Erie St. Clair to a low of 16.7 in Mississauga Halton
- There was a reduction in hip fracture rate from 2005/06 to 2019/20 for all LHINs but there was considerable variation from -32.9% in Mississauga Halton to -2.8% in Erie St. Clair

BMD Testing and/or Treatment following Hip Fracture

- There is significant variation by LHIN, with the highest rate of follow up 12 months after hip fracture in Waterloo Wellington (57.2% receiving follow up) to South East LHIN (26.7% receiving follow up)

⁵ Using a rolling average for the first 3 years (24.5% for 05/06/07) and the last 3 years (21.6% for 17/18/19) the change in hip fracture rate was 11.8%

Key Messages

- There is considerable variation between LHINs across indicators

(3) Long-Term Care (LTC)

Fracture Rates

Community to Community

- There was a **15.1% decrease** in overall age standardized rate of hip fractures among adults 66+ living in the community and discharged back to the community (from 31 per 10,000 in 2014/15 to 27 per 10,000 in 2018/19)
- The standardized hip fracture rate decreased for both women (-23%) and men (-21.5%) from 2014/15 to 2018/19
- The hip fracture rate (per 10,000) decreased from 2014/15 to 2018/19 by **-1% in adults 66-79 years and -33% in 80+ years**
- There was a **17.3% decrease** in the standardized hip fracture rate (per 10,000) in **rural settings** and a **23.4% decrease in urban settings**

Long-Term Care to Long-Term Care

- There has been a **41.2% increase** in the age standardized rate of hip fracture (from 223.6 per 10,000 in 2014/15 to 315.7 per 10,000 in 2018/19)
- The standardized hip fracture rate increased for both women and men, but the increase was greatest in **men (+56.5%) compared to women (+47.0%)** from 2014/15 to 2018/19
- The hip fracture rate (per 10,000) increased from 2014/15 to 2018/19 by **+63.8% in adults 66-79 years and +28.5% in 80+ years**
- There was an **85.6% increase** in the standardized hip fracture rate (per 10,000) in **rural settings** and a **44.7% increase in urban settings**

Community to Long-Term Care

- The rate of hip fracture in adults 66+ living in community at time of fracture and discharged to LTC was higher compared to the other cohorts (community-to-community, LTC-to-LTC)
- The overall standardized rate of hip fracture **increased by 7.9%** between 2014/15 and 2018/19 from 509.2 to 549.4 per 10,000
- The standardized hip fracture rate (per 10,000) was **higher among females compared to males** (566 per 10,000 for females vs. 407 per 10,000 males in 2018/19). However, there was a greater increase in the hip fracture rate for **men (+27.3%)** compared to **women (+21.2%)** from 2014/15 to 2018/19
- The hip fracture rate (per 10,000) **increased by 41.2% in adults 66-79 years but decreased by 3.7% in adults 80+** from 2014/15 to 2018/19
- In **rural and urban** settings, the standardized hip fracture (per 10,000) **increased by 58% and 17%**, respectively

BMD Testing and/or Treatment following Hip Fracture⁶

Community to Community

- From 2014/15 to 2018/19 the proportion of community adults 66+ who were not investigated or treated for osteoporosis within 6 months after discharge from a hip fracture **decreased by 5%** (66.5 per 100 in 2014/15 to 63.1 per 100 in 2018/19)
- The standardized rate also **decreased** among males and females; however there was a greater decrease in **males (-9.5%)** compared to **females (-1.5%)** from 2014/15 to 2018/19
- The proportion of adults who were not investigated or treated for osteoporosis **decreased by 5.8% in adults 66-79 and 3.8% in adults 80+** between 2014/15 and 2018/19

Long-Term Care to Long-Term Care

- The proportion of LTC residents 66+ who were not investigated or treated for osteoporosis within 6 months after discharge from a hip fracture **decreased from 83% to 73%** between 2014/15 to 2018/19
- **71.5% of women and 70.8% of males** were not investigated or treated for osteoporosis within 6 months after discharge for a hip fracture in 2018/19
- Treatment or BMD testing rates **for LTC residents** within 6 months after discharge from a hip fracture are lower compared to other cohorts (community-to-community, community-to-LTC)

Community to Long-Term Care

- From 2014/15 to 2018/19 the proportion of adults 66+ who were not investigated or treated for osteoporosis within 6 months after discharge from a hip fracture **decreased by 3.9%** (69.0 per 100 in 2014/15 to 66.3 per 100 in 2018/19)
- The standardized rate also **decreased** among males and females; however there was a greater decrease in **males (-13%)** compared to **females (-3%)** from 2014/15 to 2018/19
- The proportion of adults not investigated or treated for osteoporosis **decreased by 18% in adults 66-79 and was relatively stable in adults 80+** between 2014/15 and 2018/19

Fracture Risk Scale in Long-Term Care

- The overall rate of osteoporosis treatment among LTC residents at high-risk of fracture (Fracture Risk Scale score 4+) **increased by 8.7%** (23.3% in 2014/15 to 25.4% in 2018/19)
- Among LTC residents at high fracture risk (FRS score 4+), **females were treated more than males** (31.2% for women compared to 11.6% for men in 2018/19)
- Among LTC residents with an FRS score 4+, the **treatment rate is higher for adults 80+ compared to adults 66-79** (19.3% for 66-79 age group, 26.3% for 80+ in 2018/19)
- Lower prescribed treatment rates were evident in smaller LTC homes compared to medium and large sized facilities (11.5% for small, 22.1% for medium, 26.2% for large, in 2018/19)

Key Messages

- In the frail elderly living in the community there is an increase in hip fracture rates which may precipitate admission to LTC
- Residents in LTC are at very high risk for fracture and need individualized treatment. Care needs to be patient centred and individualized based on goals of care and life expectancy.
- Fracture Risk Scale score should be used to identify those at high risk for fracture in LTC

⁶ Since 2018, the Fracture Risk Scale (FRS) has been available to LTC homes within the Electronic Medical Record to assess fracture risk and use of BMD has not been encouraged; high FRS scores and/ or previous fracture (prior hip, spine, or two or more fractures) is the indication for treatment.

Background

The Ministry of Health launched the Ontario Osteoporosis Strategy (OOS), a population-based initiative to improve quality of care for osteoporosis in Ontario, in 2005 and it became a Program in 2011.⁷ The Ontario Osteoporosis Strategy represents the vision and coordinated efforts of many groups, including the Ministry of Health (MoH) and Ministry Long-Term Care (MLTC), Osteoporosis Canada, and health care and research professionals.

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⁸ Strategic Plan 2013-2016 Ontario Osteoporosis Strategy April 2013

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the age categories used, and follow up time periods. The current report emphasizes hip fracture trends; fracture rates and management among seniors (80+) and in LTC; and, variability in osteoporosis management by Local Health Integration Network (LHIN).

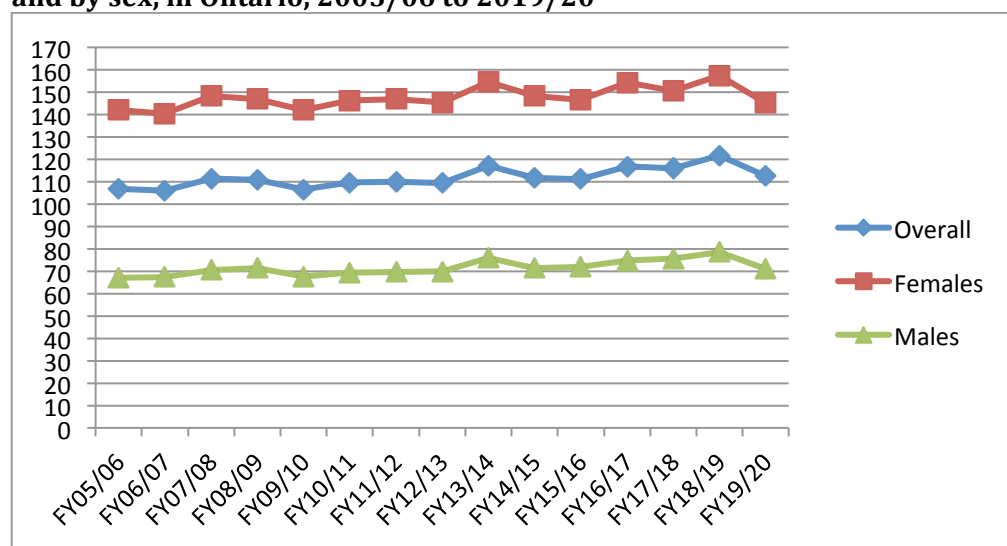
Section 1: Trends in Fracture Rates and Numbers

Indicator: Age-standardized fracture rate (per 10,000) in adults, aged 50 years and older, overall and by fracture type for fractures probably due to high risk/high future risk (i.e. not from trauma)

Overall Fracture Rates

- There was no evidence of change over time in overall age-standardized rates of fracture between 2005/06 and 2019/20 (see Figure 1).
- Overall fracture rates are approximately two times higher in women than men.
- Overall fracture rate increases dramatically with age (e.g. from 58/10,000 in 50-64 year olds to 368/10,000 in 80+ year olds in 2019/20).
- 38% of all fractures were in adults 80+ in 2019/20.

Figure 1: Age-standardized fracture rates (per 10,000) in adults aged 50 and older, overall and by sex, in Ontario, 2005/06 to 2019/20



Data Sources: Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS); Ontario Health Insurance Plan (OHIP)

Rates and Numbers By Fracture Type

- *Hip* – There has been a **14.6% decrease** in the standardized rate of hip fracture from 24.6 per 10,000 in 2005/06 to 21.0 per 10,000 in 2019/20¹¹ however, the

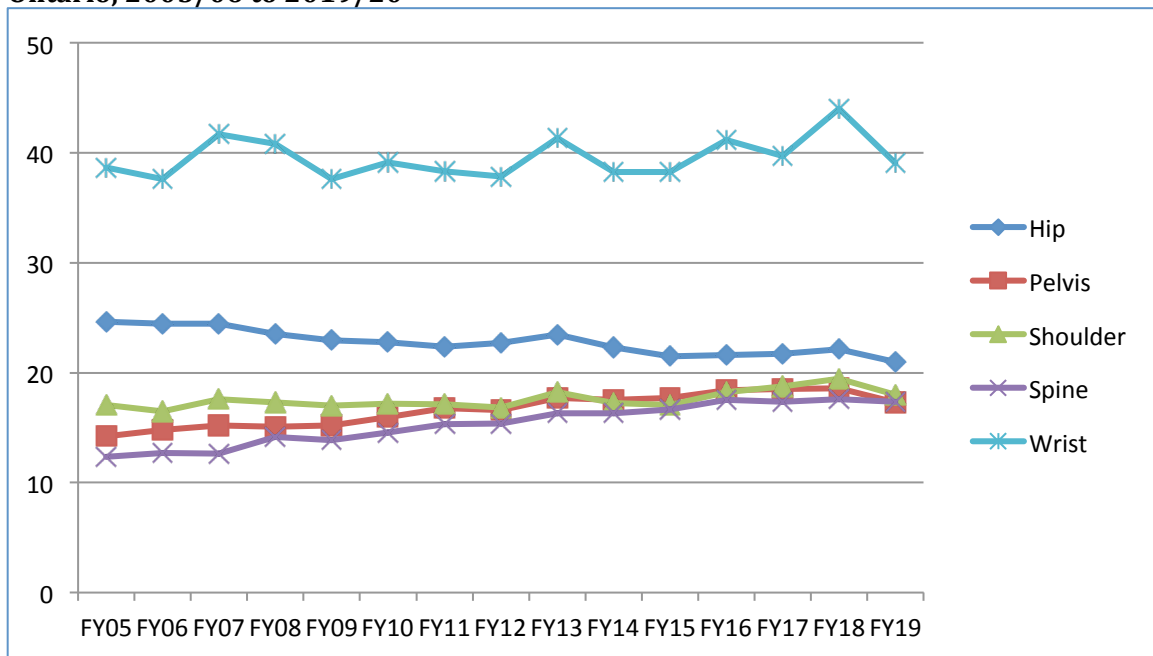
Rates of hip fracture have decreased by 14.6% between 2005/06 and 2019/20.

¹¹ Using a rolling average for the first 3 years (24.5% for 05/06/07) and the last 3 years (21.6% for 17/18/19) the change in hip fracture rate was 11.8%

number of hip fractures has increased from 9,412 in 2005/06 to 11,706 in 2019/20 but appears to be leveling off (See Figure 2 and Table 1). There was a reduction in hip fracture rate for all LHINs but there was considerable variation from a 32.9% reduction in Mississauga Halton to 2.8% in Erie St. Clair.

- *Wrist* – Rates of wrist fracture are high (wrist fractures are the most common fracture, with 21,792 in 2019/20). There is no indication of any meaningful trend over time in rates overall (38.7 per 10,000 in 2005/06 to 39.1 per 10,000 in 2019/20). There was only a 1% increase in wrist fracture rates between 2005/06 and 2019/20.
- *Pelvis* – Rates increased from 14.2/10,000 in 2005/06 to 17.3/10,000 in 2019/20. Numbers also increased from 5,429 in 2005/06 to 9,662 in 2019/20.
- *Spine* – The rate of spine fractures increased appreciably between 2005/06 (12.3 per 10,000) and 2019/20 (17.3 per 10,000) which may suggest better detection.
- *Shoulder* – There is no meaningful trend in rate of shoulder fractures. Overall numbers are increasing from 6,526 in 2005/06 to 10,031 in 2019/20.

Figure 2: Age-standardized rate (per 10,000) by fracture type, in adults aged 50 and older, in Ontario, 2005/06 to 2019/20



Data Sources: Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS); Ontario Health Insurance Plan (OHIP)

Table 1: Number of fractures by fracture type among adults aged 50 and older, 2005/06 to 2019/20

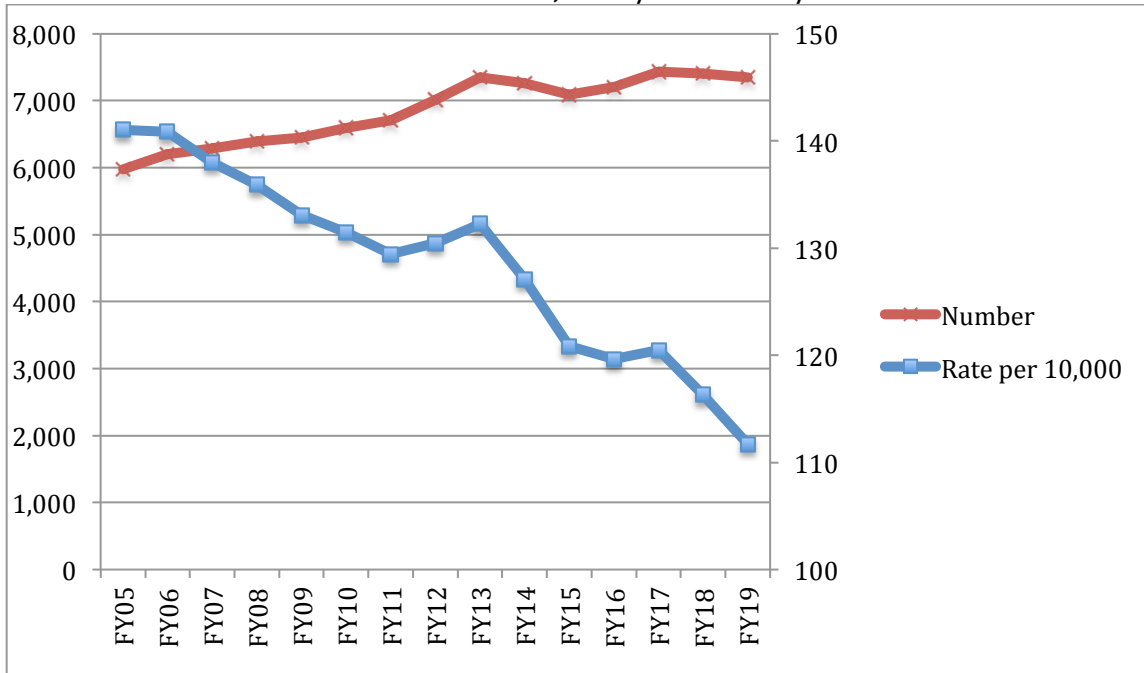
	Wrist	Hip	Shoulder	Pelvis	Spine
2005/06	14,786	9,412	6,526	5,429	4,705
2006/07	14,818	9,622	6,481	5,816	4,981
2007/08	16,910	9,907	7,144	6,152	5,114
2008/09	17,071	9,829	7,234	6,308	5,889
2009/10	16,215	9,886	7,315	6,539	5,949
2010/11	17,384	10,099	7,639	7,086	6,455
2011/12	17,553	10,228	7,852	7,672	7,011
2012/13	17,869	10,712	7,952	7,833	7,234
2013/14	20,111	11,425	8,878	8,608	7,927
2014/15	19,142	11,174	8,642	8,773	8,147
2015/16	19,625	11,017	8,758	9,093	8,550
2016/17	21,580	11,330	9,551	9,666	9,186
2017/18	21,240	11,612	10,035	9,917	9,273
2018/19	24,053	12,077	10,645	10,163	9,606
2019/20	21,792	11,706	10,031	9,662	9,671

Data Sources: Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS); Ontario Health Insurance Plan (OHIP)

- Hip fracture rates are coming down and numbers have also started to level off. The aging of the population appears not to be driving hip fracture as it did before.
- Figure 3 illustrates the decrease in rate and increase in number of hip fractures between 2005/06 to 2019/20 in adults 80+
- The crude rate of hip fracture (per 10,000) has dropped 12.9% from 2005/06 to 2019/20 in the 50-64 age group, 25.1% in the 65-79 age group, and 20.8% in the 80+ age group (Table 2 & Table 3).
- There was a drop in standardized hip fracture rate from 2005/06 to 2019/20 for both women and men but the decrease was greatest in women (-20.4%) compared to men (-11.9%)
- The standardized rate of hip fracture in adults 50+ decreased in all LHINs between 2005/06 – 2019/20 however there was large variation from a decrease in rate of -2.8% for Erie St. Clair to a decrease of -32.9% in Mississauga Halton (see Table 4).
- The crude rate of wrist fracture (per 10,000) increased 9% in 50-64 year olds from 2005/06 to 2019/20, dropped 4.4% in 65-79 and dropped 14.9% in 80+ year olds (see Table 5).
- Figure 4 illustrates the decrease in rate and increase in number of wrist fractures between 2005/06 to 2019/20 in adults 80+

The crude rate of hip fracture (per 10,000) dropped the most in the 65-79 age group, by 25%, from 2005/06 to 2019/20 and dropped 20.8% in the 80+ group.

Figure 3: Number and crude rate of hip fractures (per 10,000), in adults aged 80 and older, in Ontario, 2005/06 to 2019/20



Data Sources: Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS); Ontario Health Insurance Plan (OHIP)

Table 2: Change in crude rate of hip fractures (per 10,000), by age and gender, in adults aged 50 and older, in Ontario, 2005/06 to 2019/20

Age Group	Crude Hip Fracture Rate per 10,000 and Number of Hip Fracture by Age				% Change in Rate
	2005/06 (Rate)	2005/06 (N)	2019/20 (Rate)	2019/20 (N)	
50-64	3.1	674	3.5	1059	-12.9
65-79	23.1	2762	17.3	3301	-25.1
80+	141.0	5976	111.7	7346	-20.8

Gender	Standardized Hip Fracture Rate per 10,000 and Number of Hip Fracture by Gender				% Change in Rate
	2005/06 (Rate)	2005/06 (N)	2019/20 (Rate)	2019/20 (N)	
Female	30.9	6845	24.6	7938	-20.4
Male	17.6	2567	15.5	3768	-11.9

Data Sources: Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS); Ontario Health Insurance Plan (OHIP)

Table 3: Crude rate of hip fractures (per 10,000), in adults aged 50 and older, in Ontario, 2005/06 to 2019/20

Year	50-64	65-79	80+	80+ (n)	80+ (%)*
2005/06	3.1	23.1	141.0	5,976	64
2006/07	3.1	22.4	141.0	6,200	64
2007/08	3.4	22.9	138.0	6,285	63
2008/09	3.2	20.9	135.9	6,396	65
2009/10	3.2	20.3	133.1	6,451	65
2010/11	3.2	20.1	131.2	6,592	65
2011/12	3.2	19.3	129.4	6,709	66
2012/13	3.4	19.2	130.4	7,017	66
2013/14	3.7	20.2	132.3	7,352	64
2014/15	3.4	18.7	127.1	7,262	65
2015/16	3.5	17.8	120.8	7,089	64
2016/17	3.6	18.2	119.7	7,203	64
2017/18	3.6	17.8	120.5	7,438	64
2018/19	3.9	19.1	116.3	7408	61
2019/20	3.5	17.3	111.7	7346	63

Data Sources: Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS); Ontario Health Insurance Plan (OHIP)

*Percent of all fractures that are in those 80+

Table 4: Change in age standardized rate of hip fractures (per 10,000) by LHIN, in adults aged 50 and older, in Ontario, 2005/06 to 2019/20

LHIN	2005/06	2019/20	% Change Rate
Erie St. Clair	25.4	24.7	-2.8
South West	29.8	23.1	-22.5
Waterloo Wellington	26.2	22.5	-14.1
Hamilton Niagara Haldimand Brant	26.4	22.5	-14.8
Central West	22.5	16.8	-25.3
Mississauga Halton	24.9	16.7	-32.9
Toronto Central	24.4	18.4	-24.6
Central	23.2	16.9	-27.2
Central East	22.7	20.9	-7.9
South East	29.0	23.7	-18.3
Champlain	24.4	21.7	-11.1
North Simcoe Muskoka	26.2	24.5	-6.5
North East	25.6	23.8	-7.0
North West	28.8	25.8	-10.4

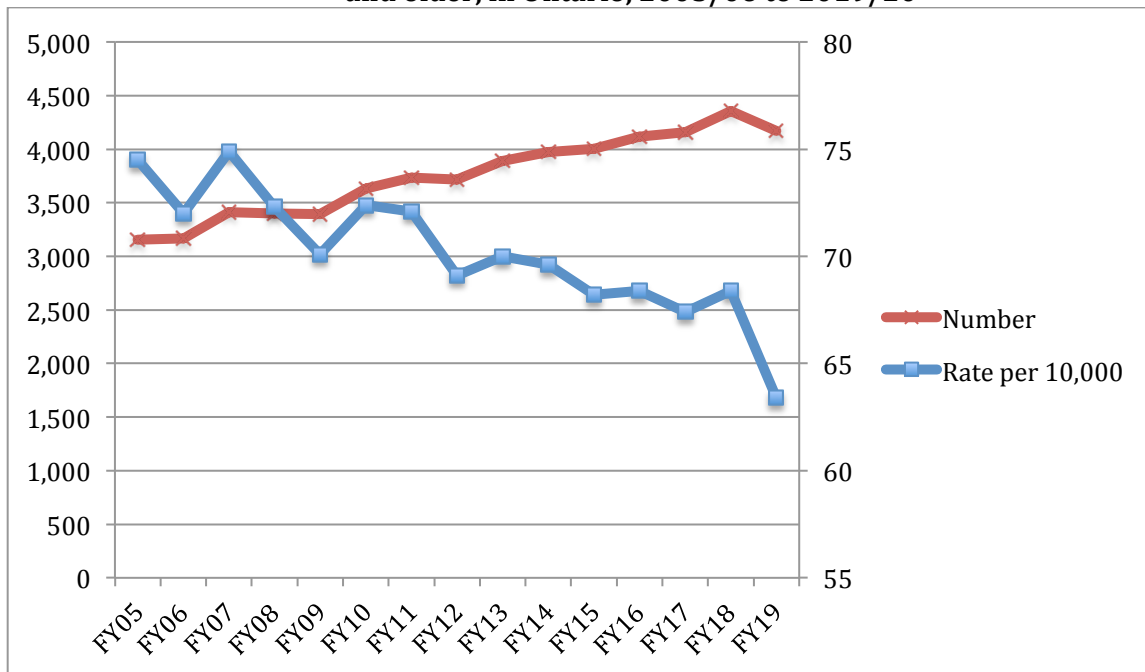
Data Sources: Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS); Ontario Health Insurance Plan (OHIP)

Table 5: Crude rate of wrist fractures (per 10,000), in adults aged 50 and older, in Ontario, 2005/06 to 2019/20

Year	50-64	65-79	80+	80+ (n)	80+ (%)*
2005/06	29.8	43.0	74.5	3,155	21
2006/07	29.3	41.6	72.0	3,168	21
2007/08	33.5	45.8	74.9	3,412	20
2008/09	33.4	44.0	72.3	3,402	20
2009/10	30.0	40.9	70.1	3,396	21
2010/11	31.4	42.2	72.4	3,631	21
2011/12	30.5	41.1	72.1	3,737	21
2012/13	30.6	40.3	69.1	3,719	21
2013/14	34.8	43.1	70.0	3,888	19
2014/15	30.8	40.5	69.6	3,975	21
2015/16	30.8	40.8	68.2	4,003	20
2016/17	34.3	43.5	68.4	4,118	19
2017/18	32.8	41.7	67.4	4,161	20
2018/19	37.3	46.6	68.4	4355	18
2019/20	32.5	41.1	63.4	4172	19

Data Sources: Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS); Ontario Health Insurance Plan (OHIP)
*Percent of all fractures that are in those 80+

Figure 4: Number and standardized rate of wrist fractures (per 10,000), in adults aged 80 and older, in Ontario, 2005/06 to 2019/20



Data Sources: Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS); Ontario Health Insurance Plan (OHIP)

Re-Fracture Rate within 2 Years

Indicator: Proportion of adults aged 50 and older who have a fracture and then a subsequent fracture within 2 years.¹²

- Refracture rates remained stable (15.1 per 100 in 2014/15 and 14.6 per 100 in 2017/18)
- Men have a lower re-fracture rate than women (13.5% in men versus 15.0% in women in 2017/18).
- The highest re-fracture rate occurred in individuals 80 years of age and older (12.3 per 100 in 50-64 year olds; 13.4 per 100 in 65-79 year olds; and 18.9 per 100 in 80+ year olds in 2017/18).
- There was also a higher refracture rate in rural (16.7 per 100) versus urban (14.4 per 100)

Fracture Rates in Long Term Care and Community

Indicator: Hip fracture outcomes for adults 66 years and older at the time of the fracture, stratified by three cohorts: (1) living in community before and after discharge; (2) living in LTC before and after discharge; (3) living in community prior to fracture then discharged to LTC

Outcomes: Fracture rate by place of residence prior to fracture and discharge destination after hip fracture by place of residence prior to fracture

Community to Community

- There was a **15.1% decrease** in overall age standardized rate of hip fractures among adults 66+ living in the community and discharged back to the community (from 31 per 10,000 in 2014/15 to 27 per 10,000 in 2018/19) (see Table 6 and Figure 5)
- The standardized hip fracture rate decreased for both women (-23%) and men (-21.5%) from 2014/15 to 2018/19 (see Figure 6)
- The hip fracture rate (per 10,000) decreased from 2014/15 to 2018/19 by **-1% in adults 66-79 years and -33% in 80+ years** (Figure 7)
- There was a **17.3% decrease** in the standardized hip fracture rate (per 10,000) in **rural settings** and a **23.4% decrease in urban settings**

Long-Term Care to Long-Term Care

- The overall age standardized rate of hip fracture **increased by 41.2%** (from 223.6 per 10,000 in 2014/15 to 315.7 per 10,000 in 2018/19) (see Table 6 and Figure 5)
- The age standardized hip fracture rate (per 10,000) **increased by 56.5% for males** (156.9 in 2014/15, 245.5 in 2018/19) and **47.0% for females** (172.8 in 2014/15, 254.1 in 2018/19) (see Figure 6)
- The hip fracture rate (per 10,000) increased **+63.8% in adults 66-79 years, +28.5% in adults 80+** from 2014/15 to 2018/19 (see Figure 7)
- The standardized hip fracture **increased by 85.6% in rural settings** and **by 44.7% in urban settings** (rural: 160.7 to 298.5 per 10,000, urban: 166.8 to 241.3 per 10,000) from 2014/15 to 2018/19

¹² If a person had more than one fracture during a given fiscal year they are included in the denominator more than once.

Community to Long-Term Care

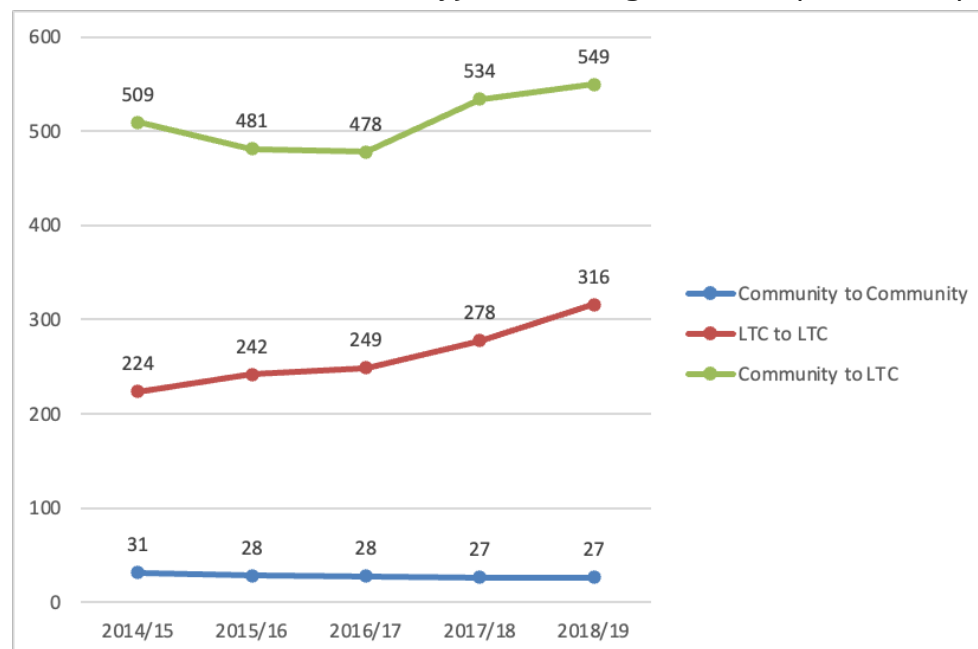
- The overall standardized rate of hip fracture **increased by 7.9%** between 2014/15 and 2018/19 from 509.2 to 549.4 per 10,000 (see Table 6 and Figure 5)
- From 2014/15 to 2018/19 the hip fracture rate among females **increased by 21.2%** (467.7 to 566.9 per 10,000) and **by 27.3% for males** (319.8 to 407.2 per 10,000) (see Figure 6)
- The hip fracture rate also increased **41% in adults 66-79 years** (332.3 to 469.4 per 10,000) and **decreased by 3.7% in adults 80+** (640 to 616.0 per 10,000) (see Figure 7)
- In **rural and urban** settings, the standardized hip fracture (per 10,000) **increased by 58% and 17% respectively** (rural: 358.9 to 566.0; urban: 413.9 to 486.2) from 2014/15 to 2018/19

Table 6: Number and age-standardized hip fracture rate (per 10,000) for adults 66 years or older, by place of residence and discharge destination (community or LTC), 2014/15 to 2018/19

Year	Community to Community Rate (#)	LTC to LTC Rate (#)	Community to LTC Rate (#)
2014/15	31.5 (5090)	223.6 (1630)	509.2 (1171)
2015/16	28.4 (4974)	241.7 (1715)	481.3 (1127)
2016/17	27.8 (5212)	249.1 (1661)	477.9 (1052)
2017/18	26.8 (5342)	277.7 (1648)	534.0 (1083)
2018/19	26.7 (5654)	315.7 (1587)	549.4 (996)

Data Source: Ontario Health Insurance Plan (OHIP), CIHI Discharge Abstract Database (DAD), National Ambulatory Care Reporting System database (NACRS), Continuing Care Reporting System

Figure 5: Hip Fracture rates (per 10,000) by place of residence and fracture destination (LTC or community) for adults age 66+, 2014/15 to 2018/19



Data sources: Discharge Abstract Database (DAD), National Ambulatory Care Reporting System database (NACRS), Ontario Health Insurance Plan Claims database (OHIP), Registered Persons Database, Continuing Care Reporting System

Figure 6: Hip Fracture rates (per 10,000) by sex and place of residence and fracture destination (LTC and Community) for adults age 66+, 2014/15 to 2018/19

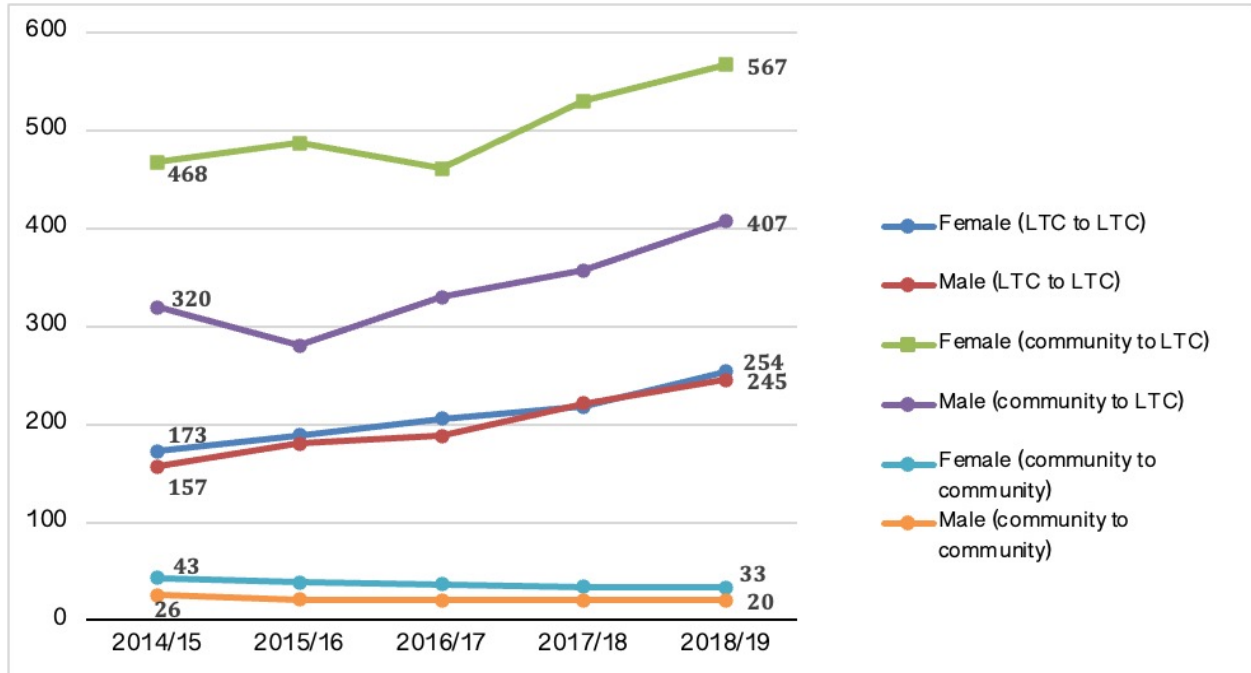
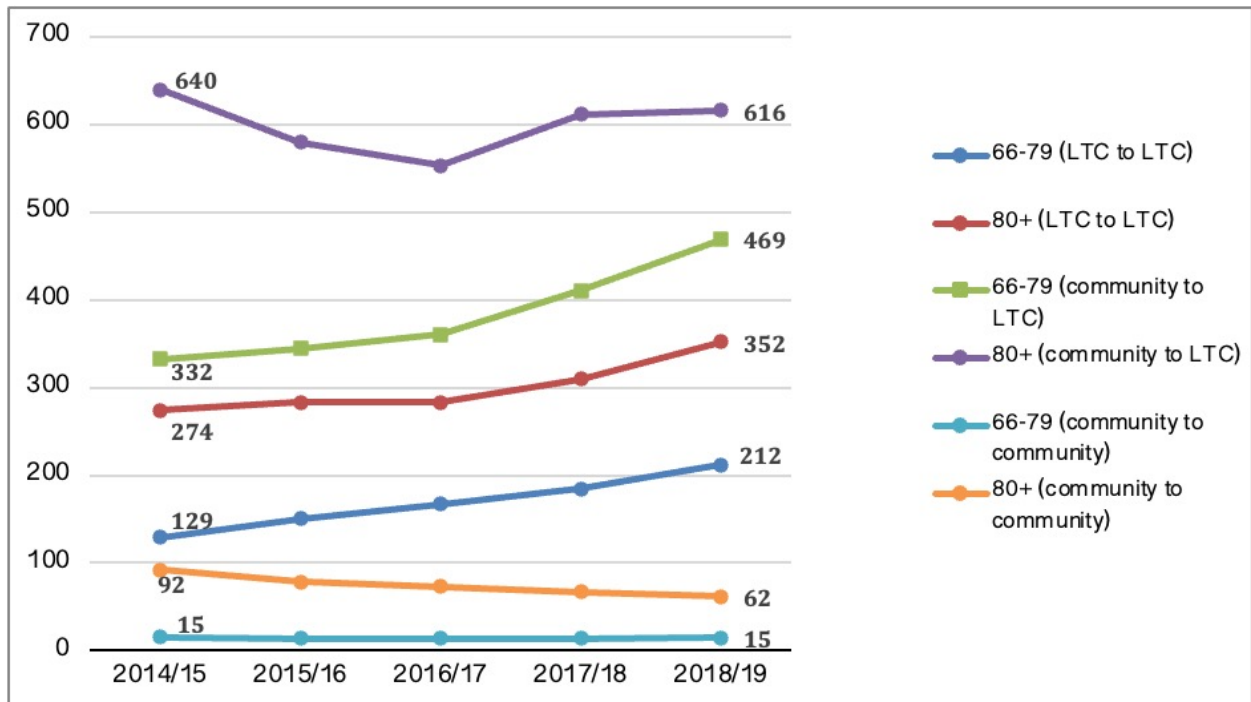


Figure 7: Hip Fracture rates (per 10,000) by age group and place of residence and fracture destination (LTC and Community) for adults age 66+, 2014/15 to 2018/19



Section 2: Trends in BMD Testing following Wrist Fracture

BMD Testing Following Wrist Fracture

Indicator: Rate (per 100) of adults, 50 years and older, who have a fracture that is possibly due to osteoporosis and receive a BMD test within 12 months of wrist fracture.^{13,14}

- Age standardized rates for BMD follow up after wrist fracture was 29.2% in 2018/19 which is a 6% increase in the rate of BMD testing following a wrist fracture compared to 2014/15
- There was a difference between BMD follow up after wrist fracture by females (33.5%) and males (17.3%) in 2018/19
- The crude rate was 41.6% after wrist fracture for women 65-79 years
- There was also a difference between BMD follow up by rural (21.9%) and urban (29.2%)
- There is significant variation by LHIN, with an almost two-fold difference between highest and lowest rates for standardized BMD testing one year following a wrist fracture (from a low of 19.7% in South East to a high of 37.9% in Waterloo Wellington LHIN, 2018/19)

Section 3: Follow up and Treatment after Fracture in Seniors

Indicator: Rates (per 100) of identification (using BMD testing) and/or treatment (medication) of osteoporosis in adults age 66 and older who had a fracture and were not already taking osteoporosis medication¹⁵, in the 6 month and 12 months following their fracture. The indicator focuses on the percentage of fractures that were NOT followed by a BMD test or a prescription for medication and was conducted for all fractures and hip fractures.

BMD Testing and/or Treatment Following Overall Fracture

- The proportion investigated or treated for osteoporosis within 12 months for overall fracture improved from 32.0% in 2014/15 to 36.3% in 2018/19

BMD Testing and/or Treatment Following Hip Fracture

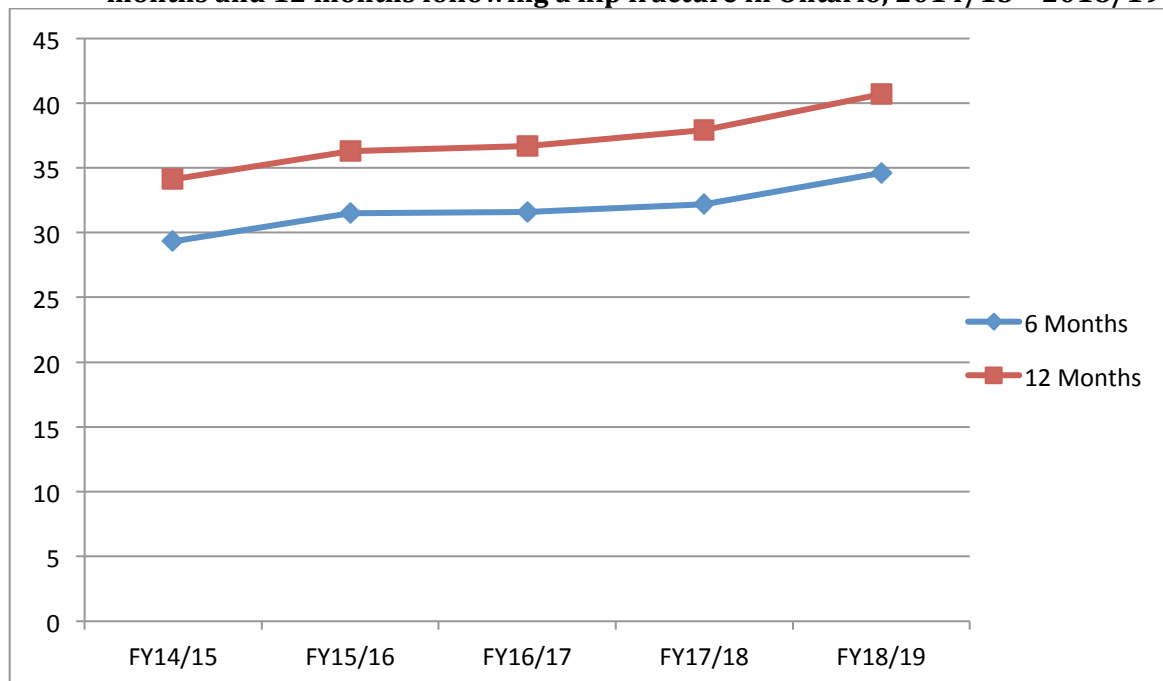
- The proportion of this high-risk population that were investigated or treated for osteoporosis within 12 months of their hip fracture has improved from 34.1% in 2014/15 to 40.7% in 2018/19 (see Figure 8)
- 44.4% of women and 39.3% of men were investigated or treated for osteoporosis within 12 months of their hip fracture in 2018/19

¹³ Individuals were excluded if they had a BMD test in the 12 months before their fracture.

¹⁴ Focused on wrist fracture as individuals with hip fracture could be put on treatment right away i.e. would not necessarily receive a BMD test. Also did not focus on 80+ for this indicator as again this group may be put on treatment directly versus having a BMD.

¹⁵ Seniors are excluded if they had already received a BMD test within 12 months of their fracture or were already taking medication. People need to be at least 66 years old when they have their fracture, because we needed a one-year look-back period to see if they were already taking prescription medication for osteoporosis.

Figure 8: Percent of adults 66 and older, who received a BMD test OR treatment in the 6 months and 12 months following a hip fracture in Ontario, 2014/15 - 2018/19



Data Sources: Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS); Ontario Health Insurance Plan (OHIP), Ontario Drug Benefit Program

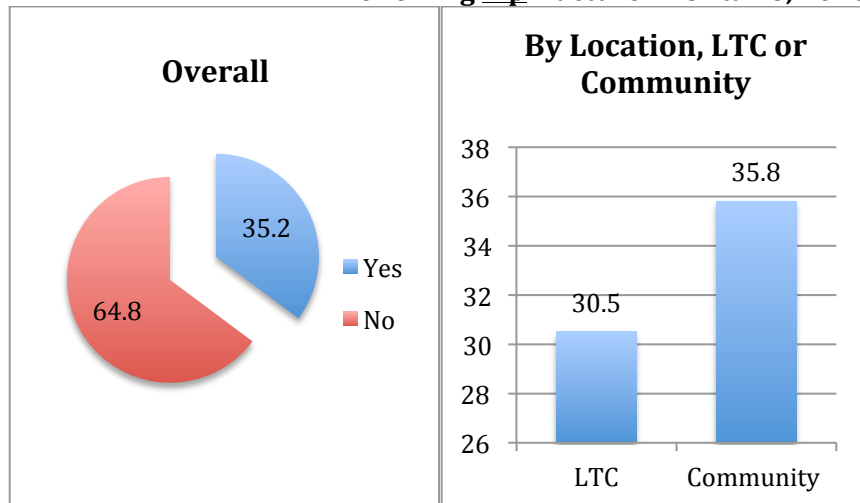
- There is significant variation by LHIN, with the highest rate of follow up 12 months after hip fracture in Waterloo Wellington (57.2% receiving follow up) to South East (26.7% receiving follow up)

Treatment Initiation after Hip Fracture, Overall and By Location

Indicator: Rates (per 100) of pharmacological treatment for osteoporosis in adults 66 years and older within 12 months of hip fracture, for individuals who were not on treatment at the time of their fracture or in the one year prior to the fracture.

- In 2018/19, 35.2% of adults 66+ were newly initiated on pharmacological treatment in the 12 months following hip fracture (see Figure 9)

Figure 9: Percent of adults 66 and older, newly initiated on drug treatment 12 months following hip fracture in Ontario, 2018/19



Data Sources: Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS); Ontario Health Insurance Plan (OHIP), Ontario Drug Benefit Program (ODB)

BMD Testing and Treatment Following Hip Fracture for Adults 66+ by Location of Residence

Indicator: Hip fracture outcomes for adults 66 years and older at the time of the fracture stratified by 2 cohorts: (1) in LTC both prior to and after their hip fracture; (2) in community at time of fracture and discharged to LTC.

Treatment outcome – proportion not treated (osteoporosis medication) or tested (BMD test) within 6 months after discharge (i.e., no BMD, no drug).

Community to Community (see Table 9)

- From 2014/15 to 2018/19 the proportion of community adults 66+ who were not investigated or treated for osteoporosis within 6 months after discharge from a hip fracture **decreased by 5%** (66.5 per 100 in 2014/15 to 63.1 per 100 in 2018/19)
- The standardized rate also **decreased** among males and females; however there was a greater decrease in **males (-9.5%)** compared to **females (-1.5%)** from 2014/15 to 2018/19
- Among age groups, the proportion of adults who were not investigated or treated for osteoporosis **decreased by 5.8% in adults 66-79 and 3.8% in adults 80+** between 2014/15 and 2018/19

Long-Term Care to Long-Term Care (see Table 9)

- The proportion of LTC residents who were not investigated or treated for osteoporosis within 6 months after discharge from a hip fracture **decreased from 83% to 73%** from 2014/15 to 2018/19
- There was a **17% decrease in the standardized rate for male LTC residents** not receiving a BMD test or osteoporosis treatment following a hip fracture (85.4% in 2014/15, 70.8% in 2018/19) and a **10% decrease for females** (79.7% in 2014/15, 71.5% in 2018/19)
- The proportion of LTC residents who were not investigated or treated within 6 months of a hip fracture **decreased by 13.2% and 11.6%** in adults 66-79 and 80+ respectively

- There was also a **decrease** in the standardized rate in rural and urban settings (**-15% in rural** and **-13% in urban**) from 2014/15 to 2018/19

Community to Long-Term Care (see Table 9)

- From 2014/15 to 2018/19 the proportion of adults 66+ who were not investigated or treated for osteoporosis within 6 months after discharge from a hip fracture **decreased by 3.9%** (69.0 per 100 in 2014/15 to 66.3 per 100 in 2018/19)
- The standardized rate also **decreased** among males and females, however there was a larger decrease in **males (-13%)** compared to **females (-3%)** from 2014/15 to 2018/19
- By age group, the proportion of adults who were not investigated or treated for osteoporosis **decreased by 18% in adults 66-79** (72.2 per 100 in 2014/18, 59.3 per 100 in 2018/19), **and was relatively stable in adults 80+** (67.8 per 100 in 2014/15, 68.1 per 100 in 2018/19)
- In **rural** setting there was a **2% increase** in the standardized rate (78.7 per 100 in 2014/18, 80.6 per 100 in 2018/19) compared to **urban setting, 8% decrease** in standardized rate (68.1 per 100 in 2014/15, 62.3 per 100 in 2018/19)

Table 9: Percent of hip fracture patients aged 66 and older who were neither tested nor treated within 6 months after discharge, by discharge destination, 2014/15 to 2018/19

Year	Community to Community Rate (#)	LTC to LTC Rate (#)	Community to LTC Rate (#)
2014/15	66.5 (2067)	83.2 (680)	69.0 (528)
2015/16	64.1 (1935)	81.9 (708)	70.2 (523)
2016/17	64.7 (2092)	80.4 (692)	68.1 (482)
2017/18	64.9 (2129)	75.4 (608)	72.1 (497)
2018/19	63.1 (2223)	73.0 (587)	66.3 (445)

Figure 10: Overall Percent of hip fracture patients aged 66 and older who were neither tested nor treated within 6 months after discharge, by discharge destination, 2014/15 to 2018/19

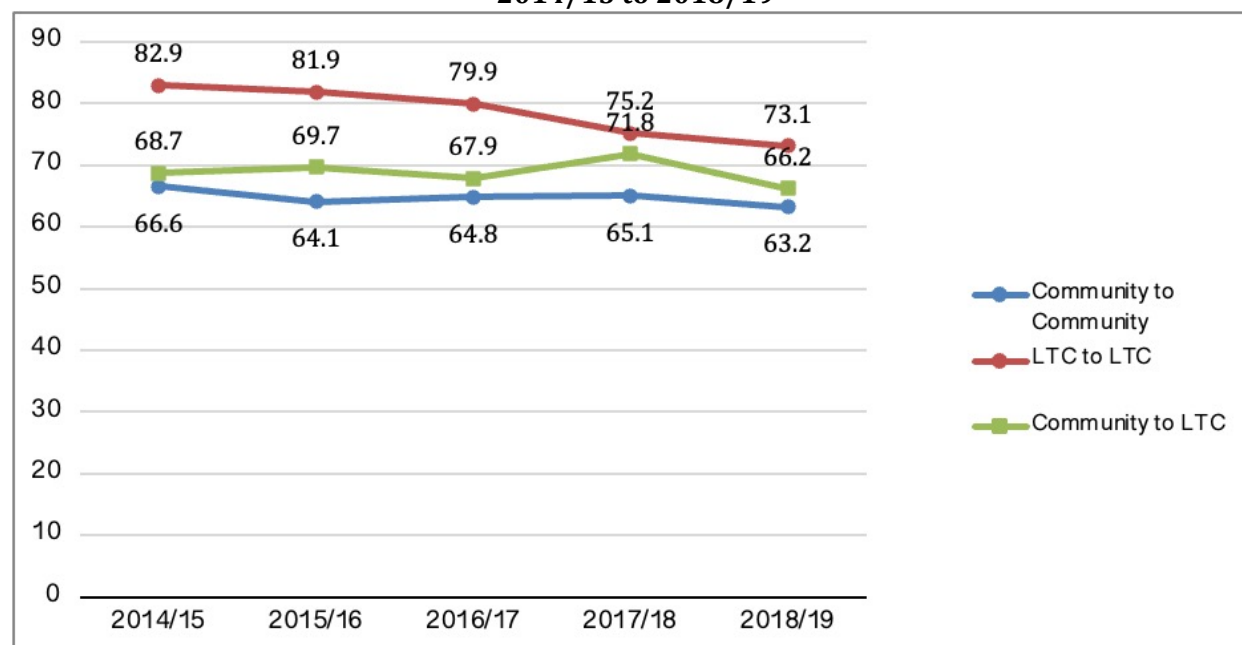
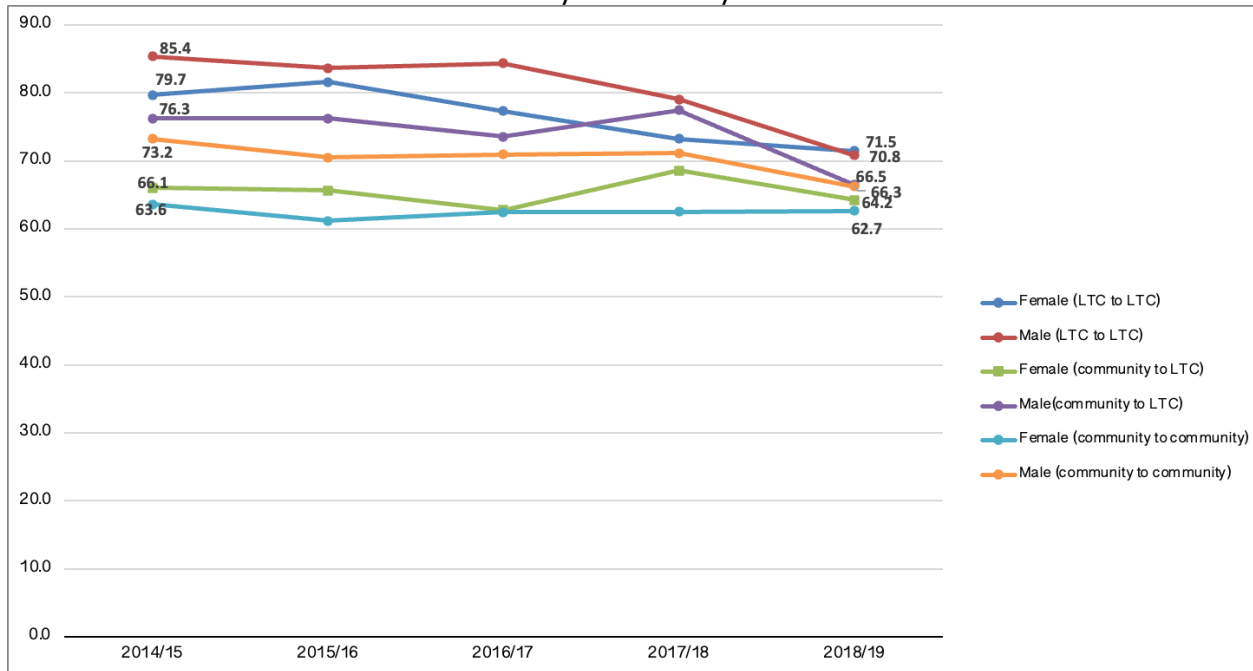


Figure 11: Percent of hip fracture patients aged 66 and older who were neither tested nor treated within 6 months after discharge, by sex and discharge destination, 2014/15 to 2018/19



Section 4: Treatment Persistence

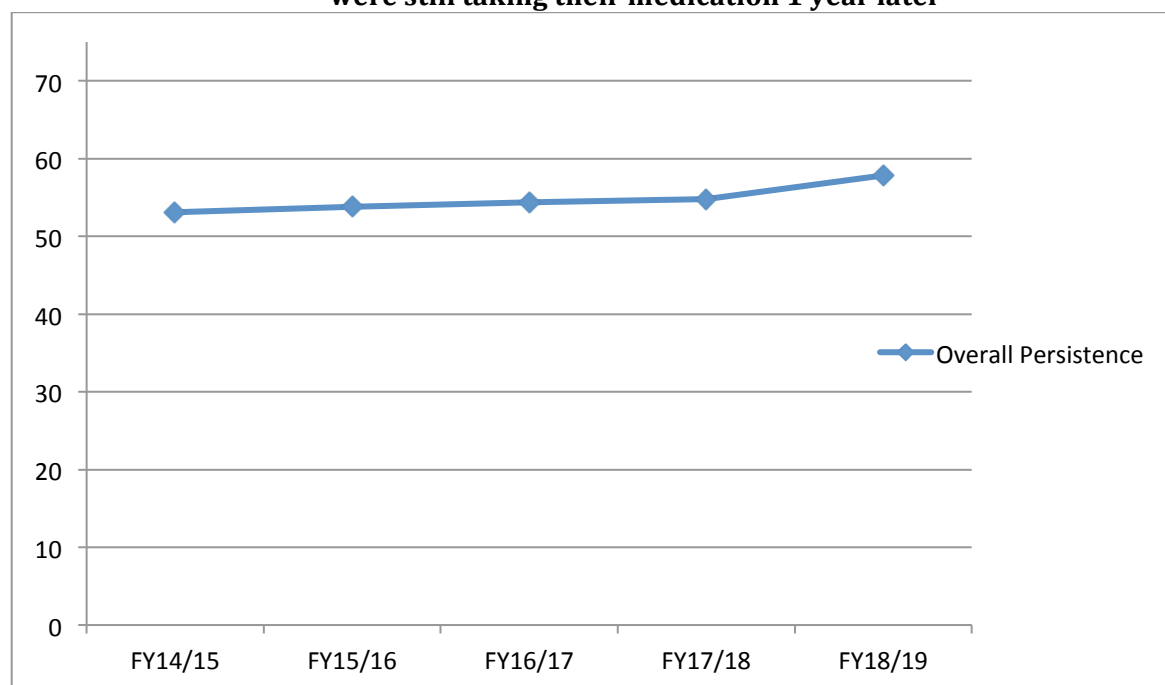
Indicator: Rate (per 100) of adults, 66 years and older, in each fiscal year, who were newly initiated on pharmacological treatment for osteoporosis during the year and were still taking their medication 1 year later^{16,17}

- Overall treatment persistence has improved from 2014/15 to 2018/19 (53.1% to 57.8%)
- There was a slightly higher persistence rate in the 80+ age group (59.2%) compared to the 66-79 age group (57.1%) in 2018/19.

¹⁶ Some OP medications are taken only once a week, once a month or once per year (for this drug once they take it once they are automatically considered to be on the drug for a full year). Adjustments have been made in the programming to account for these different dosing patterns.

¹⁷ People were examined if they filled a new prescription at any time during a given fiscal year. The first prescription filled during the year was called the 'index prescription' and it was said to be 'new' if the person had not filled a prescription for any of the osteoporosis medications in the year prior to the index date. People were followed for one year past the index date to see if they persisted in filling prescriptions for the next year. Look back period is 12 months prior to index date.

Figure 12: Rate (per 100) of adults, 66 and older, years and older, in each fiscal year, who were newly initiated on pharmacological treatment for osteoporosis during the year and were still taking their medication 1 year later



Data Source: Ontario Drug Benefit Program (ODB)

Section 5: Long Term Care Indicators by Fracture Risk Score

Indicator: Rate of treatment (medication) of osteoporosis in LTC residents 66 years and older stratified by fracture risk score – calculated according to the Fracture Risk Scale (FRS).

Treatment Rate in Long-Term Care

- The overall rate of osteoporosis treatment among LTC residence at high-risk of fracture (FRS score 4+) **increased by 8.7%** (23.3% in 2014/15 to 25.4% in 2018/19)
- The **greatest change** in the rate of treatment was seen among LTC residents at highest fracture risk (FRS score of 8) **(+66.7%, 24.3 per 100 in 2014/15, 40.3 per 100 in 2018/19)**
- Among LTC residents at high fracture risk (FRS score 4+), **females were treated more than males** (31.2% for women compared to 11.6% for men in 2018/19)
- Among LTC residents with an FRS score 4+, **treatment rate is higher for adults 80+ compared to adults 66-79 years** (19.3% for 66-79 years, 26.3% for 80+ in 2018/19)
- Lower prescribed treatment rates were seen in smaller LTC homes compared to medium and large facilities (11.5% for small, 22.1% for medium, 26.2% for large, in 2018/19)

Figure 13: Percent of seniors in LTC prescribed osteoporosis medication, by fracture risk score, in Ontario, 2014/15 -2018/19

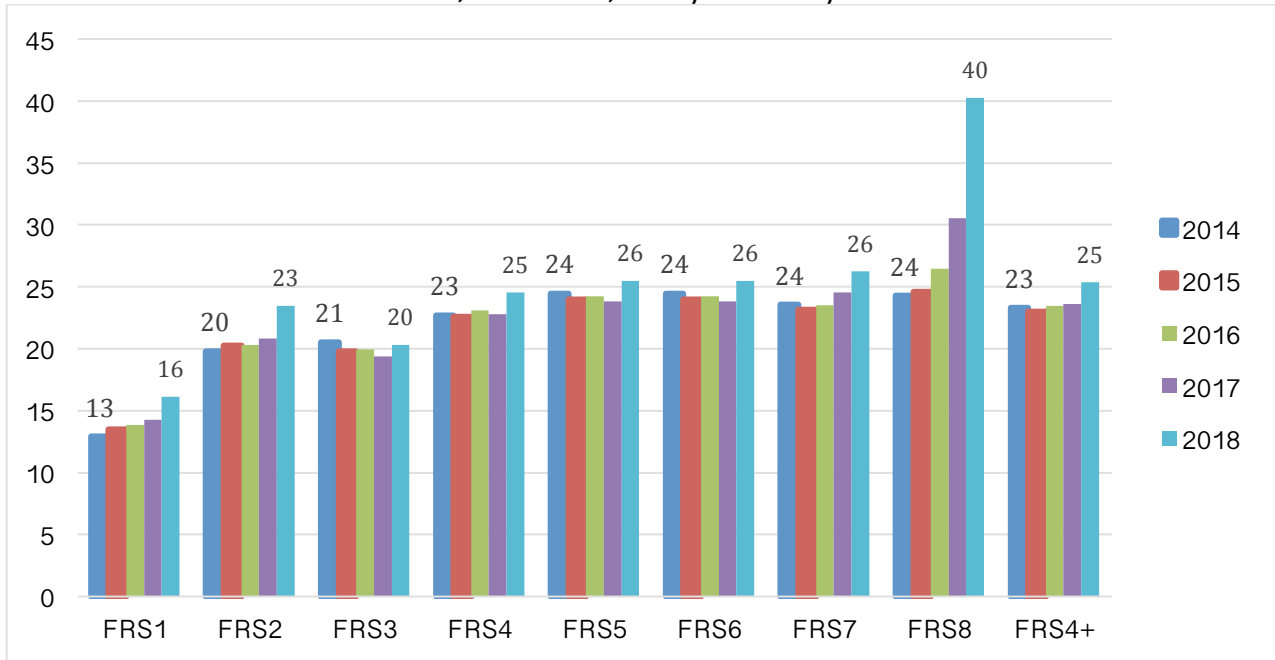


Figure 14: Percent of seniors in LTC, at high fracture risk and prescribed osteoporosis medication, by sex, in Ontario, 2014/15-2018/19

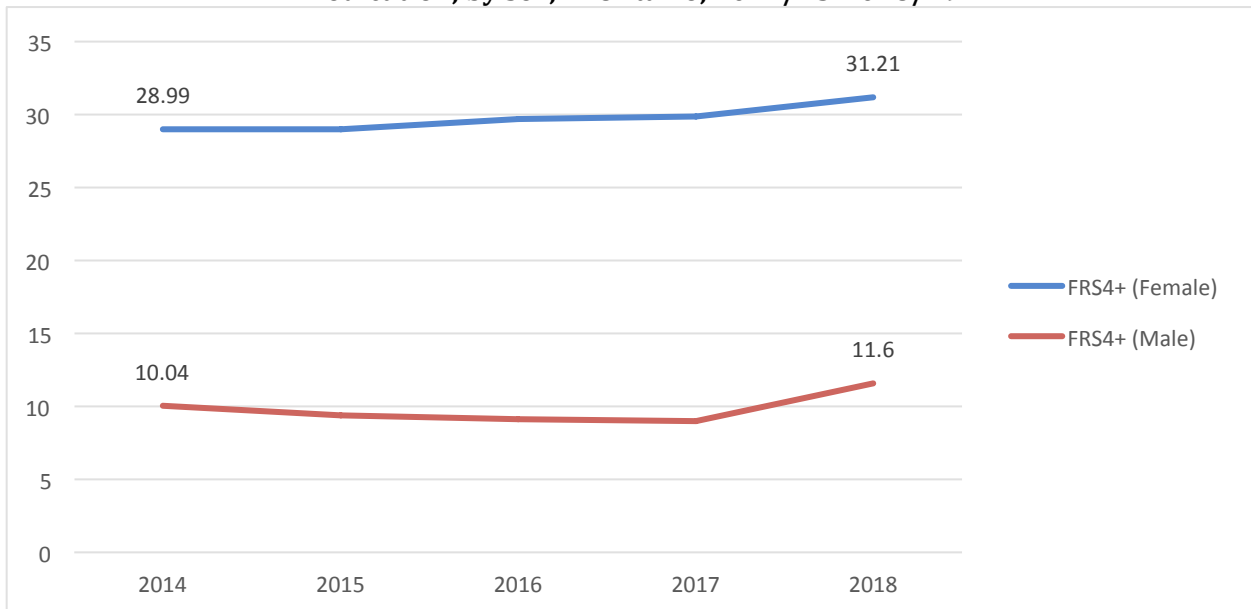


Figure 15: Percent of seniors in LTC at high fracture risk (FRS4+), prescribed osteoporosis medication, by age group, in Ontario, 2014/15 - 2018/19

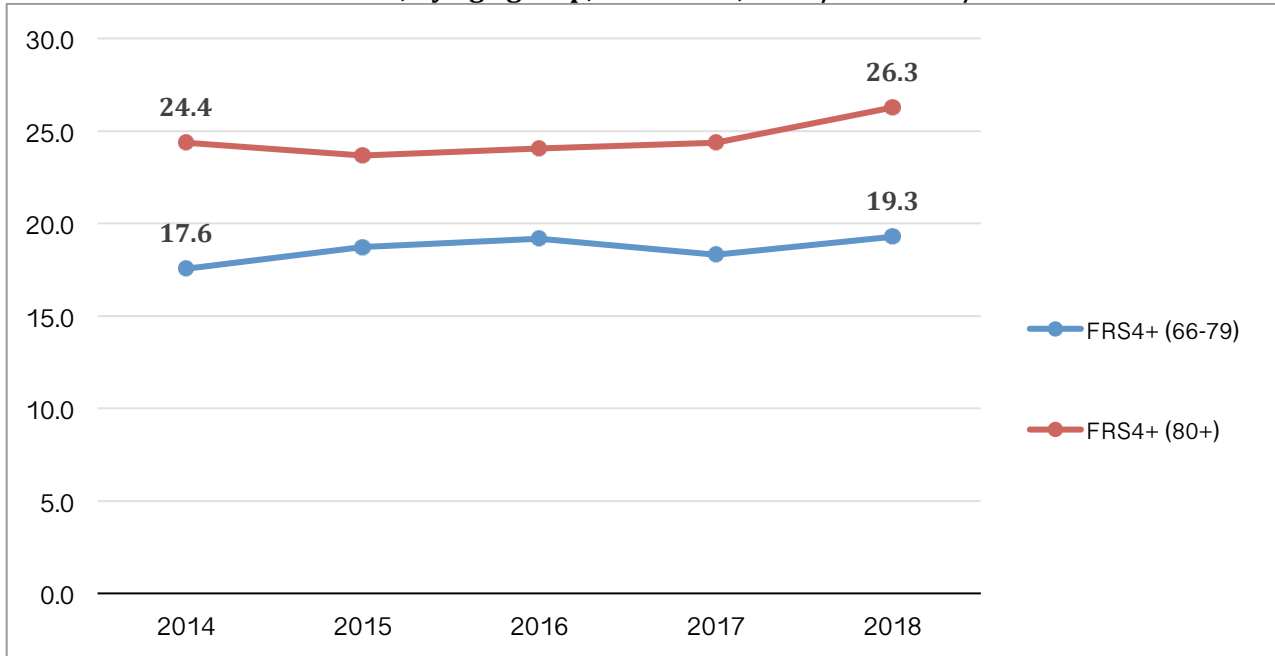


Figure 16: Percent of seniors in LTC, at high fracture risk (FRS4+), and prescribed osteoporosis medication, by setting, in Ontario, 2014/15-2018/19

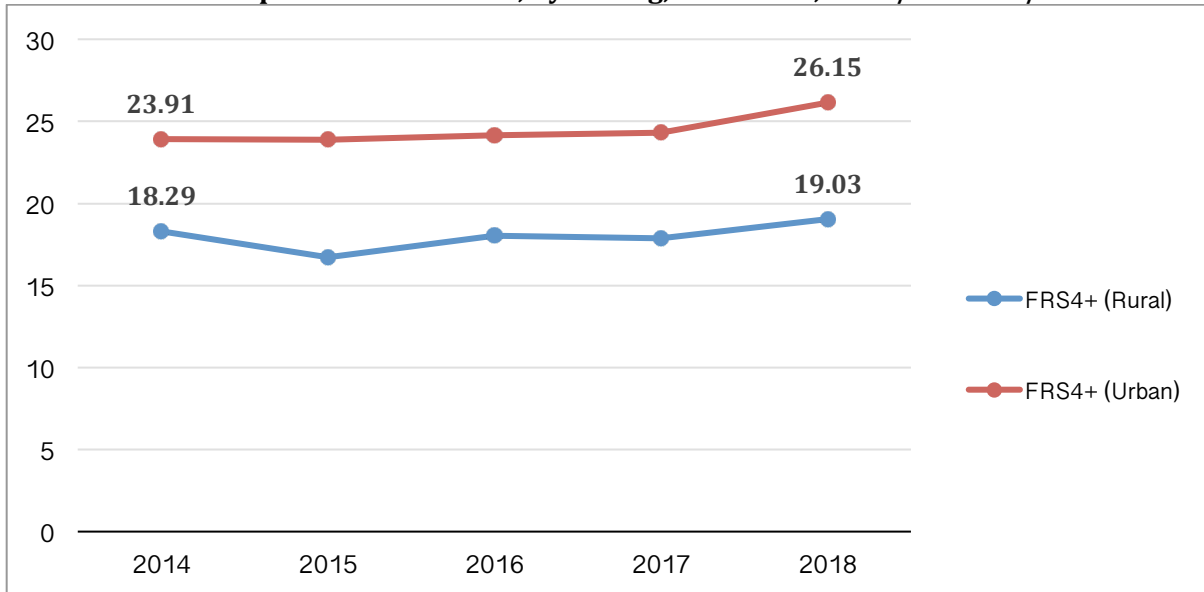
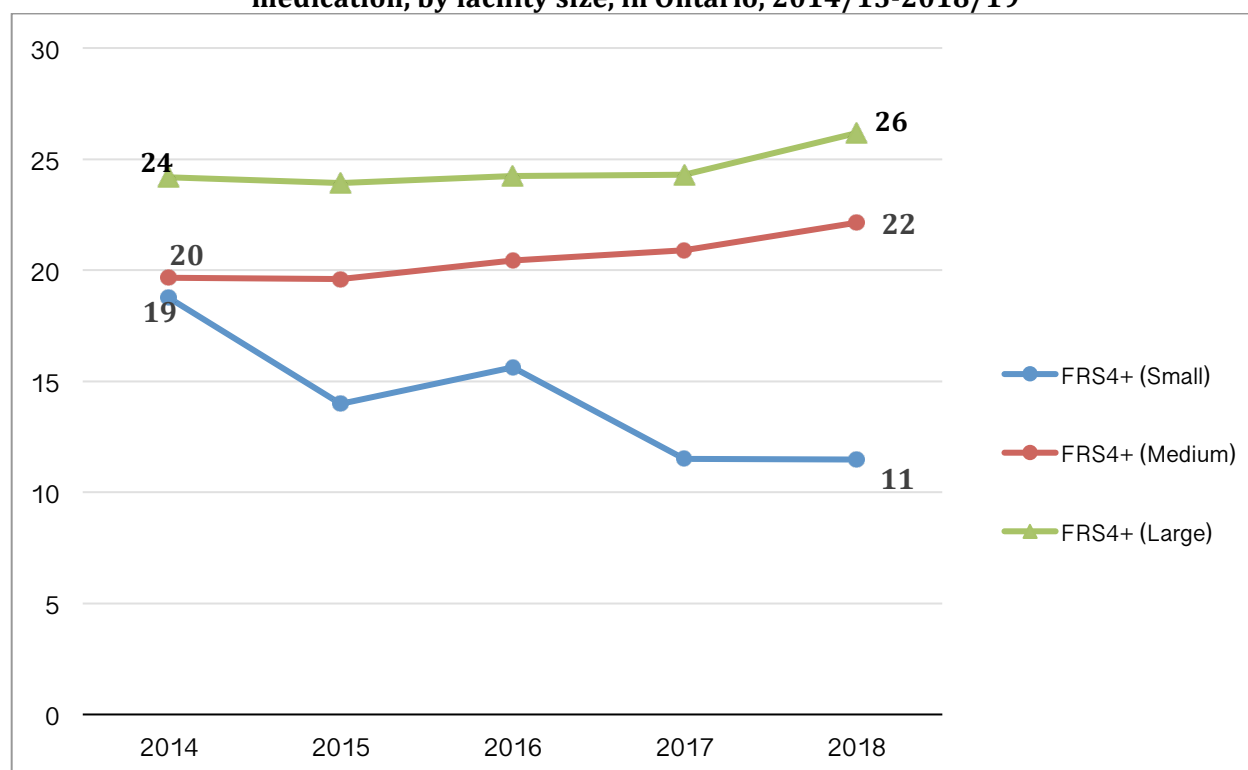


Figure 17: Percent of seniors in LTC, at high fracture risk and prescribed osteoporosis medication, by facility size, in Ontario, 2014/15-2018/19



Section 6: Direct Cost of Hip Fracture Episode¹⁸

Indicator: Cost of hip fracture: total cost of treatment of all hip fractures, median cost per episode of care and post-pre change in health care costs from 1 year prior to fracture to 1 year post discharge.

- The impact of hip fractures on health system utilization and cost is significant
- The total cost of treatment for all hip fractures occurring in 2018/19 (in adults aged 66+) was estimated to be **\$280,056,277** based on direct utilization costs (during inpatient hospitalization and/or inpatient rehabilitation) for the episode of care
- The median cost **per single episode of care** was **\$26,380** for direct utilization costs (see Table 10)
- The impact of hip fractures is also significant if total costs incurred one-year pre-fracture (\$198,082,582) are compared with total costs incurred one year post-fracture (\$382,762,589) -

¹⁸ Individuals suffering a fracture believed to be related to osteoporosis were identified using an algorithm devised by PHAC. Costs are calculated for those individuals who survived 1 year following their index fracture (discharged between FY2014/15 - 2018/19). Summary statistics including the mean (standard error) and the median (IQR), were reported for the total cost in the one year prior to fracture admission, total cost in the one year after fracture discharge, the difference in total costs between the two, total cost during fracture care (including inpatient and rehab care), inpatient care cost during fracture care, and inpatient rehab cost during fracture care. Costs are standardized to 2020 to adjust for inflation and are reported overall and by age group, sex, age group/sex, and LHIN.

a difference of \$184,680,007 which is expected to be largely due to the impact of the hip fracture (see Table 10)

- Costs were highest in the 80+ age group because of the higher numbers of hip fracture in that age group.
- The total cost of inpatient rehab during hip fracture care was \$66,198,686 in 2018/19

Table 10: Cost estimates associated with hip fracture episode of care, based on direct utilization costs, in adults 66 years or older in Ontario, 2018/19

Age	1 Year Prior		Cost of Treatment		1 Year Post Discharge		Post-Pre Change	
	Cost	Median	Cost	Median	Cost	Median	Cost	Median
66-79	\$61,626,935	\$5,777	\$87,286,777	\$25,530	\$108,017,165	\$15,353	\$46,390,230	\$4,115
80+	\$136,455,647	\$9,355	\$192,769,500	\$26,961	\$274,745,424	\$32,108	\$138,289,777	\$12,498
Overall	\$198,082,582	\$7,969	\$280,056,277	\$26,380	\$382,762,589	\$25,854	\$184,680,007	\$9,171

Data Source: Ontario Health Insurance Plan (OHIP), CIHI Discharge Abstract Database (DAD), National Ambulatory Care Reporting System database (NACRS), Registered Persons Database, Ontario Drug Benefit Plan Database, Client Agency Program Enrolment (CAPE) database, National Rehabilitation Reporting System (NRS) database

Section 7: Local Health Integration Network (LHIN) Data

Table 10: Hip Fracture Rate, Change over Time and Follow up after Hip Fracture, by LHIN

Region	Local Health Integration Network (LHIN)	Standardized Hip fracture rates (per 10,000) aged 50+ years (2019/20)	Number of Hip Fractures aged 50+ years (2019/20)	Percent Change in Hip Fracture Rate 2005/06 to 2019/20 (- represents a reduction in rate)	Percent of adults 66+ years who <u>did</u> receive a BMD test OR treatment in the 12 months following a <u>hip fracture</u> (2018/19)	Percent of adults 50 years or older who had a BMD test in the 12 months following wrist fracture (2018/19)	Refracture Rate within 2 years 50+ years (2017/18)
West	Erie St. Clair	24.7	715	-2.8	43.0	20.2	15.1
	South West	23.1	1020	-22.5	37.8	26.0	15.9
	Waterloo Wellington	22.5	626	-14.1	57.2	37.9	11.9
	Hamilton Niagara Haldimand Brant	22.5	1507	-14.8	49.4	29.2	15.2
Central	Central West	16.8	462	-25.3	35.6	22.6	11.6
	Mississauga Halton	16.7	693	-32.9	51.3	29.1	15.1
	Central	16.9	1178	-27.2	47.0	33.5	12.0
	North Simcoe Muskoka	24.5	550	-6.5	42.2	28.7	13.0
Toronto	Toronto Central	18.4	927	-24.6	49.4	32.2	15.3
East	Central East	20.9	1397	-7.9	36.6	27.5	12.7
	South East	23.7	608	-18.3	26.7	19.7	16.6
	Champlain	21.7	1142	-11.1	35.6	27.6	17.6
North	North East	23.8	628	-7.0	42.9	22.9	14.9
	North West	25.8	253	-10.4	51.2	26.6	20.7
PROVINCIAL AVERAGE		21.0	11,706	-14.6	40.7	29.2	14.6

Appendix A – Methodology

The total cohort consisted of all Ontario individuals with a valid IKN (from the Registered Persons Database (RPDB)) born on or before the last day of the fiscal year of interest (FY 2005/06 - 2019/20), alive on the first day of the fiscal year of interest (FY 2005/06 - 2019/20) and ≥ 50 years old. The overall dataset is weighted based on individual contact with the healthcare system in the specified period. For indicators related to the long-term care population, a cohort was created from the Continuing Care Reporting System (CCRS). Individuals suffering a fracture believed to be related to osteoporosis were identified using an algorithm devised by the Public Health Agency of Canada, using data sources from Discharge Abstract Database (DAD), Same Day Surgery (SDS), National Ambulatory Care Reporting System (NACRS), Ontario Health Insurance Plan Claims Database (OHIP), National Rehabilitation Reporting System (NRS), and CCRS (see codes below). Crude and standardized rates of fractures, re-fractures, bone mineral density testing, and osteoporosis treatment are reported overall, by fracture types (hip, pelvis, spine, shoulder, wrist), and by additional stratifications including age group, sex, age group/sex, rurality, subregion, local health integration networks (LHIN), and residence (community / long-term care) before and after fracture. All rates were standardized with FY 2017/18 Ontario population aged 50 years and older with indicator specific exclusions applied.

Fracture Codes:

- Hip fractures (ICD-10 codes: S720, S721, S722)
- Wrist (ICD-10 codes: S52, dxcode: 813)
- Spine (ICD-10 codes: S220, S221, S320, S327, S328, dxcode: 805)
- Shoulder (ICD-10 codes: S422, dxcode: 812)
- Pelvis (ICD-10 codes: S321, S323, S324, S325, S327, S328, dxcode: 808)

Appendix B – Canadian Hip Fracture Rates, 2019-2020

Canadian Chronic Disease Surveillance System (CCDSS)

Trend Over Time
Geographic Comparison
Age Distribution
About CCDSS
Publications

Select item(s) from each list below:

Condition

Osteoporosis-related fracture

Measure

Age-standardized rate

Sex

Both sexes

Fiscal year

2019–2020

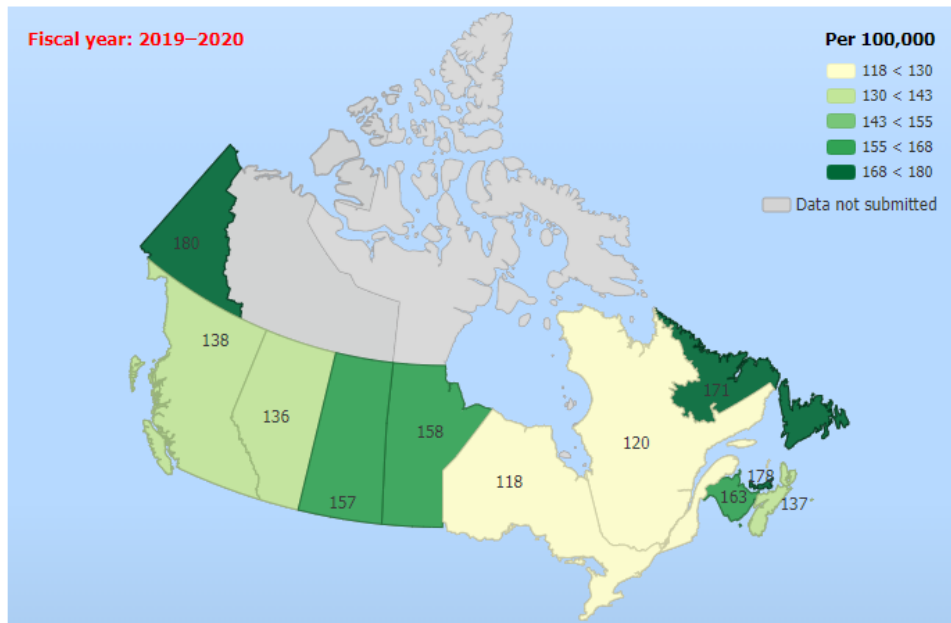
Optional:

2000–2001 2019–2020 Play

Scale

- Compare estimates between provinces and territories (scale based on selected year)
- Compare estimates over time (same scale for all years)

Osteoporosis-related fracture – hip (annual), age-standardized rate, per 100,000, both sexes, age 40 years and older, 2019–2020 (fiscal year)*



Public Health Infobase
Public Health Agency of Canada
<https://health-infobase.canada.ca>
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Canadian Chronic Disease Surveillance System data files provided by provinces and territories, as of August 2022. For more information on data interpretation see notes below.

*Nunavut data are excluded before 2005–2006.
*Nunavut data were not submitted for 2019–2020.
*Newfoundland and Labrador data are excluded before 2008–2009.
*Yukon data are excluded before 2010–2011.