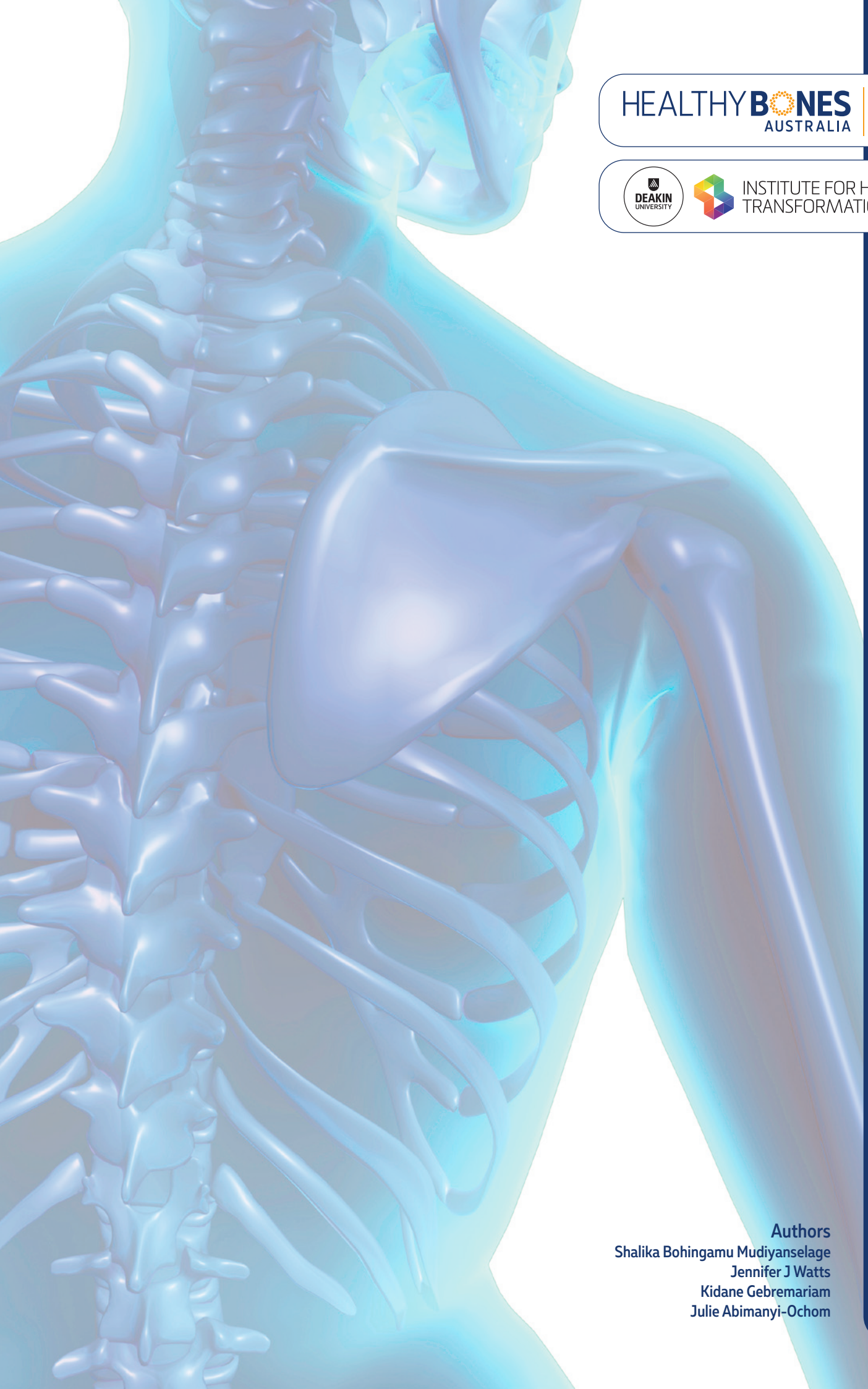

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Osteoporosis and fractures in Australia. A burden of disease analysis 2023–2033

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Healthy Bones Australia report project manager, Melita Daru

Forewords

Professor Peter Ebeling AO

Chair, Healthy Bones Australia

This burden of disease analysis provides important insights, and highlights the need for action from policy makers, healthcare professionals and the community. The topline estimates demonstrate a major health issue in Australia over the next decade.

- Currently 6.2 million Australians with poor bone health (osteoporosis or osteopenia) with an increase of 23% over the coming decade to 2033.
- Estimated fractures of 2.1 million over 10 years, representing a fracture every 2.2 minutes by 2033.
- Economic burden of osteoporosis and osteopenia estimated to increase to $8.3 billion per annum (2033).

Australians have access to effective medications. Healthy Bones Australia provides consumer programs to identify and explain risks. There are evidence-based clinical guidelines to inform general practitioners regarding osteoporosis management. However, the pace of change is falling behind the impact of this disease. We must work collectively to improve bone health nationally.

Professor Peter Wong

Medical Director, Health Bones Australia

Any 'minimal trauma' fracture (fracture following a fall from a standing height) due to poor bone health is a serious medical event. The focus must remain on prevention... whether that is preventing osteoporosis in individuals at-risk, preventing a first fracture or capturing undiagnosed osteoporosis following a fracture.

There are multiple opportunities to improve osteoporosis prevention across Australia. This report is a clear warning our healthcare system will be impacted even more if we do not focus on prevention and early diagnosis.

Greg Lyubomirsky

Chief Executive Officer, Healthy Bones Australia

We hear clearly from our consumers impacted by osteoporosis – nobody wants a fracture. Fractures cause pain, recovery time can be long, it changes quality of life and reduces independence, it impacts work life and requires support from family, carers and of course the healthcare system. In severe cases fractures can be fatal.

The cost burden is one dimension of this report, the impact on individuals and communities is another. We work with consumer advocates who willingly share their personal stories to raise awareness and improve diagnosis. However to stop unwanted fractures we must also break through the walls of apathy and ensure doctors make bone health a priority. A cumulative effort will result in significantly fewer broken bones in Australia.

Professor Jennifer Watts

Head of School of Health & Social Development, Deakin University

The burden of osteoporosis will continue to increase given an aging Australian population. Most of the burden is attributed to the cost of 'minimal trauma' fractures.

On the current trajectory the burden will continue to grow. Osteoporosis remains an under-diagnosed and under-treated chronic disease; therefore the baseline population rates and costs within this report represent a conservative estimate. The data present policy makers and health professionals with an opportunity to improve on projected trends and reduce the burden. There is an opportunity to prioritise prevention of osteoporosis through promoting healthy diet and exercise; regular bone health checks by general practitioners; early diagnosis of osteopenia through bone density testing adults with risk factors; and initiation and support for treatment of people at risk of osteoporosis or fracture.

2 Executive Summary

This report updates the previous burden of disease analysis undertaken in 2012. The 2023 report shows an increase in the disease prevalence and associated costs. If current disease prevention, management, and treatment strategies continue, future disease prevalence and costs are estimated to be high.

Key Findings

Poor bone health

- 6.2 million, or 67%, Australians aged 50 years and older have poor bone health in 2023. This is a 34% increase from 2012.
- Of the 6.2 million Australians with poor bone health, 77% had osteopenia, and 23% had osteoporosis in 2023.
- In 2023, men and women aged 50-69 years have high risk of having osteopenia.
- By 2033, 7.7 million Australians aged 50 years and older are predicted to have osteoporosis and osteopenia. An increase of 23% from 2023 and 69% since 2012.

High fracture rates

- In 2023, there were an estimated 193,482 osteoporosis and osteopenia-related fractures.
- By 2033, this number of fractures is projected to increase by 24%, resulting in 237,632 fractures.
- By 2033 there will be a fracture every 2.2 minutes.
- The estimated total number of fractures over the next ten years, including new fractures and re-fractures, is over 2.1 million.

High economic burden

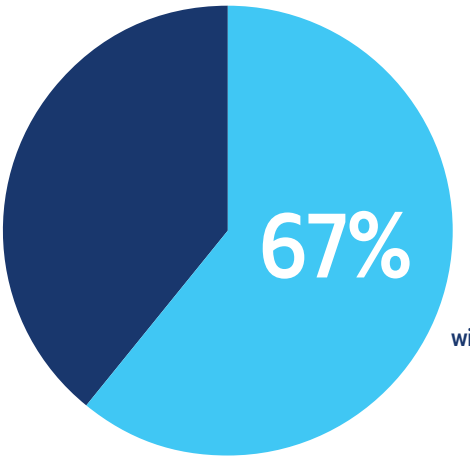
- In 2023, the total costs of osteoporosis and osteopenia in Australians aged 50 years and older were estimated at $4.8 billion.
- In 2033, the costs of osteoporosis and osteopenia are predicted to increase above $8.3 billion.
- In 2023, the annual total fracture cost was $3.5 billion (91% direct costs) and is estimated to be $4.9 billion by 2033. This is a 38% increase in fracture costs over a ten-year period.
- The total fracture cost over ten years is $46.8 billion. The highest cost was contributed to managing hip fractures (50%) followed by 'other' (33%), vertebral (11%) and wrist (6%) fractures.
- The main cost contributor of fractures was acute care related to hip fractures, (including ambulance, hospital emergency, inpatient and outpatient care). The length of hospital days due to hip fractures changed from 6.9 days to 10.3 days (for people aged 50-69 years) from 2012 to 2023, at an average cost of $31,965 per episode.
- The total cost of osteoporosis and osteopenia over the next ten years is estimated at $67.9 billion. (Include ambulance, hospital, rehabilitation, aged care and community care and community services).

Recommendations

- Active investigation targeting at-risk groups.
- Early diagnosis of both men and women, with osteoporosis or osteopenia, age 50 years and older.
- Encourage inclusion of bone mineral density checks in regular General Practitioner health check-ups for high-risk groups.
- Fracture prevention should target both men and women aged 50 years and older with low bone mineral density.
- Initiate osteoporosis treatment for women and men, aged 50 years and older, with proven minimal trauma fracture. Treatment is recommended for women and men (50 years and older) diagnosed with osteoporosis (no fracture history). Refer to national guidelines for osteoporosis risk assessment, diagnosis and management.
- Consider reimbursement of bone mineral testing for high-risk groups.
- Increase funding towards public awareness and education programs on osteoporosis and osteopenia prevention.

a fracture every 2.2 minutes

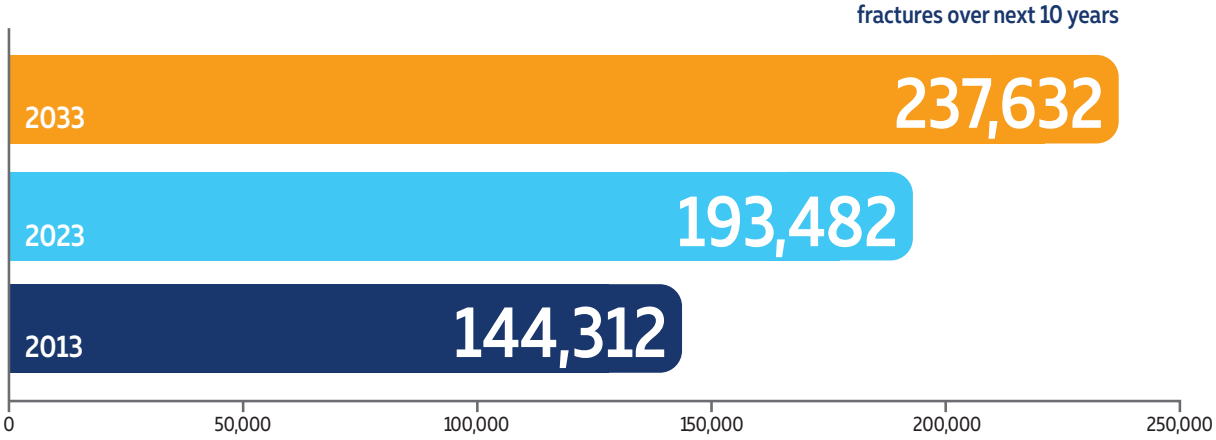
Australians with poor bone health



6.2 million
Australians over 50
with osteoporosis and osteopenia (2023)

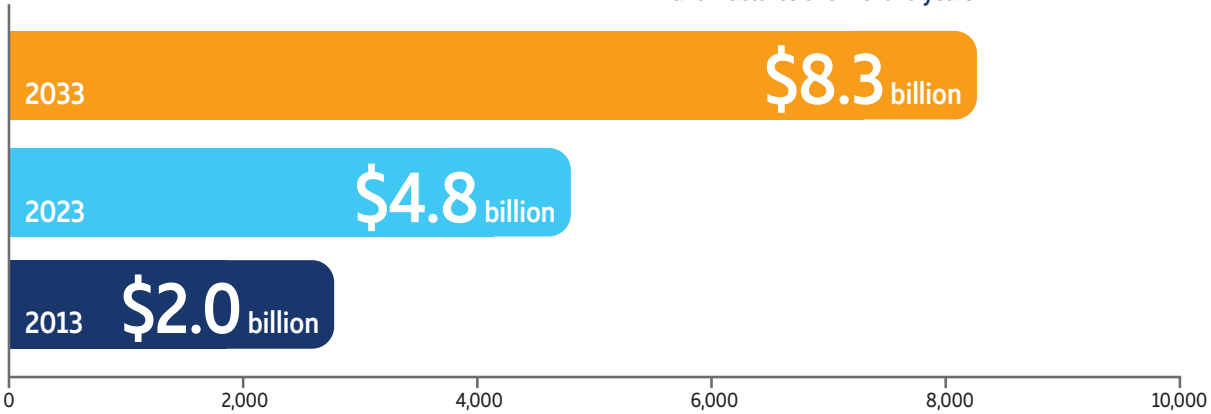
Fractures due to osteoporosis and osteopenia

2.1 million
fractures over next 10 years



Total direct and indirect costs

$67.9 billion
total cost of osteoporosis, osteopenia
and fractures over next 10 years



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List of Abbreviations

ABS	Australian Bureau of Statistics
AIHW	Australian Institute of Health and Welfare
AUD	Australian Dollars
AusICUROS	The Australian Study of Cost and Utilities Related to Osteoporotic Fractures
BMD	Bone Mineral Density
DXA	Dual-energy X-ray Absorptiometry
ED	Emergency Department
GP	General Practitioner
IHACPA	Independent Health and Aged care Pricing Authority
MBS	Medicare Benefits Schedule
PBS	Pharmaceutical Benefits Scheme
RPBS	Repatriation Pharmaceutical Benefit Scheme

Background

Background Summary

- **People aged 50 years and older have a high prevalence for poor bone health. Poor bone health is the primary risk factor for minimal trauma fractures.**
- **The Australian population aged 50 years and older is growing. In 2023 the population of people 50 years and older increased by 24% compared to the original report in 2012.[1]**
- **According to AIHW, 3.4% of Australians were living with osteoporosis and osteopenia in 2022. However, the true prevalence is likely to be higher due to underdiagnosis.**
- **The burden of disease is significant and mainly attributed to fracture related healthcare and non-healthcare utilisation (acute, subacute, and community care).**
- **The risk of fracture in the population 50 years and older is underestimated or underprioritised, hence a significant gap in osteoporosis (bone active) treatment.**

What is the new evidence on osteoporosis and osteopenia and fracture risk?

In 2023, an Australian study found that in an older population (77-86 years old) with a higher risk of osteoporosis, only 17% of women and 7% of men were referred for a DXA scan, and 22% of women and 14% of men were prescribed osteoporosis medication after experiencing a fracture. The study population was relatively healthy and highlighted that the impact of multimorbidity on osteoporosis management may have been underestimated. The study concluded that in Australia, *"multimorbidity was associated with a significant gap in osteoporosis treatment." The study suggested that "fracture risk is either underestimated or underprioritised in the context of multimorbidity and highlighted the need for extra vigilance and improved fracture care in this setting."*[4]

In 2019, a global burden of disease study reported a rapid growth in hip fractures in older adults over the last three decades, indicating a large burden. Hip fractures were higher in women, and fracture incidences increased with age. An interesting study finding was that the male-to-female ratio of hip fracture incidences for people aged 55 years and older increased from 0.577 in 1990 to 0.612 in 2019. The study highlighted the underestimated risk and burden of hip fractures in males.[2]

In 2018, Australia's statewide study revealed that of the cohort of people who had a first hip fracture, the majority were women, and nearly half were 85 years old. The annual incidence of first hip fractures increased by 20%, while the age and sex-adjusted incidence remained relatively stable. The study highlighted that 8% of patients died within 30 days of the fracture and 25% within one year.[3]

Objectives

The primary aim of this report is to determine the annual burden of disease (2023) and determine the future annual burden (2024-2033) due to osteoporosis and osteopenia. This is an updated report to the "Osteoporosis Costing All Australians 2012-2023 Report".[1] The objectives of the 2023-2033 analysis were:

1. To estimate the burden (prevalence and cost) of minimal trauma fractures including routine management of osteoporosis and osteopenia in Australia in 2023
2. To predict the burden (prevalence and cost) of minimal trauma fractures including routine management of osteoporosis and osteopenia in the next ten years from 2024 to 2033 including both new fractures and re-fractures

Method Summary

- The current method follows the method of the previous report, "Osteoporosis Costing All Australians 2012-2022 Report."[1]
- The 2023-2033 osteoporosis prevalence was predicted based on the ABS population data by gender, age group (50-69 years and 70 years and older), and BMD (osteoporosis, osteopenia, normal BMD).
- The fracture incidences were estimated based on Geelong Osteoporosis Study, Figure 1 & 2.
- Burden of osteoporosis and osteopenia attributed from:
  - Fracture management and treatment
  - Fracture prevention, Figure 3
- The costs were estimated from a societal perspective, a bottom-up costing approach to determine the total burden attributable to fractures based on health and non-health services. All costs are reported in 2023 Australian Dollars.
- The total resource utilisation cost was calculated using the total resources utilised by the population and the 2023 unit cost, Appendix B.
- Hospital inpatient services, ambulance services, emergency department, hospital outpatient clinics, rehabilitation, general practitioners, medical specialists, Vitamin D tests, pathology tests, DXA scans, physiotherapy, and pharmaceuticals were used to manage osteoporosis and osteopenia.
- Primary pharmaceuticals used in osteoporosis and osteopenia management were *Alendronate, Risedronate, Denosumab, Raloxifene, Teriparatide, Zoledronic acid,* and *Romosozumab (new drug).*

Prevalence and Cost of Minimal Trauma Fractures Due to Osteoporosis and Osteopenia in Australia in 2023

2023 Australian Population Data

2023 Australian population data were the estimated resident population for Australia on June 30,2023 based on the Australian Bureau of Statistics (ABS) 2022 census.[5] The 2023 ABS population data were collapsed by gender and into age groups 50-69 and 70 and older (Figures 1 and 2).

Prevalence of Osteoporosis and Osteopenia

The population numbers by gender, age groups, and Bone Mineral Density (BMD): osteoporosis, osteopenia, and normal BMD, were determined using standardised prevalence rates of osteoporosis and osteopenia and 2023 Australian population data.[1] The standardised prevalence rates of osteoporosis and osteopenia were based on the Geelong Osteoporosis Study from the 2012 report.[1,6]

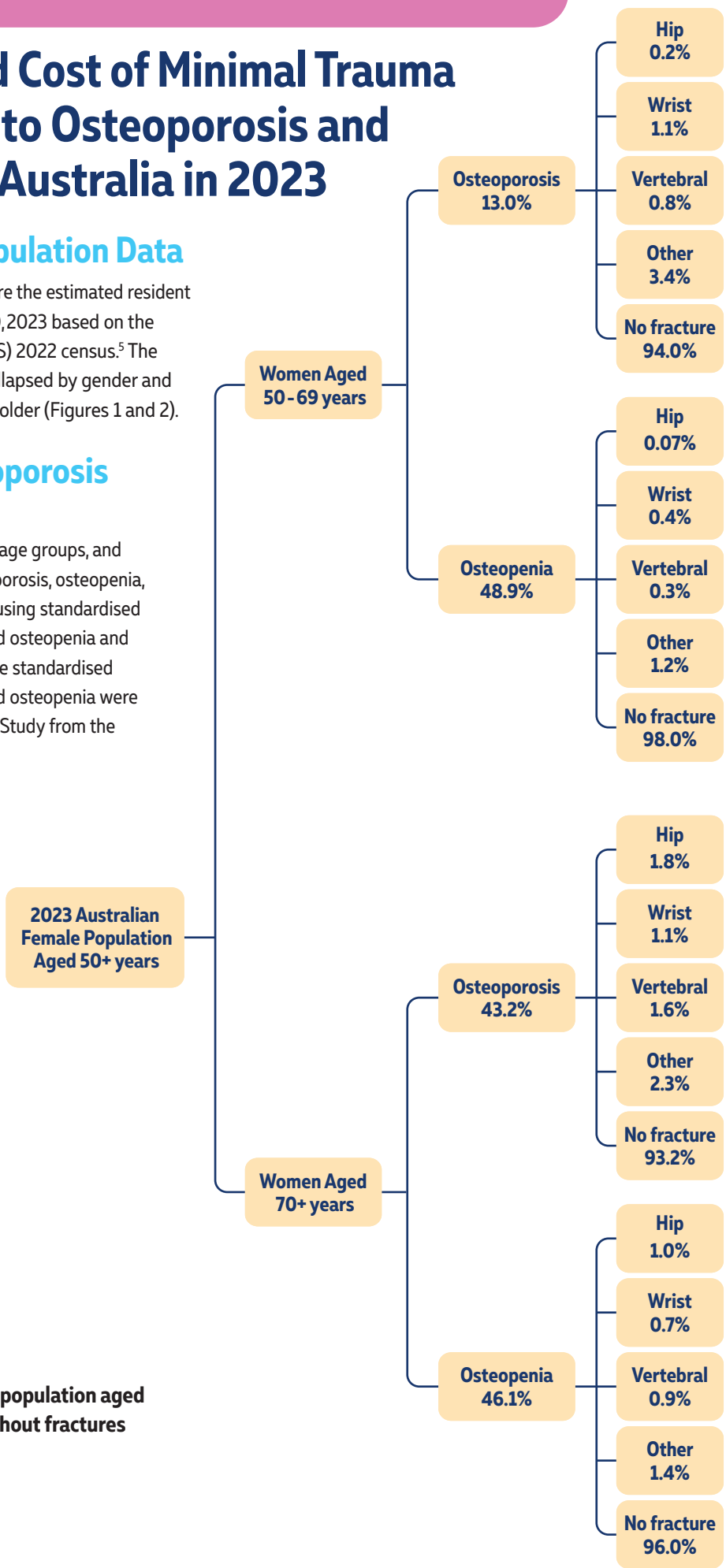


Figure 1: Distribution of female population aged 50 years and older with and without fractures

Fracture Incidence with Osteoporosis and Osteopenia

The proportion of people predicted to have hip, wrist, vertebral, and 'other' fracture types was stratified by gender and age using the osteoporosis and osteopenia-associated fracture distribution rates (Figures 1 and 2).[1,7,8] The 'Other' fractures included humerus, ankle, lower limb, rib, pelvic, forearm (not classified as wrist), patella, foot, and hand fractures.[7] Skull and facial fractures were not included.

Mortality

The deaths that occurred during the first 12 months due to the fracture (following hospitalisation) were accounted for in the burden of osteoporosis and osteopenia.[1] The mortality rate was 0.01 for all fractures for 50–69-year-olds. The mortality rate for adults aged 70 years and older differed between hip and non-hip fractures (hip 0.08; non-hip 0.05).[1]

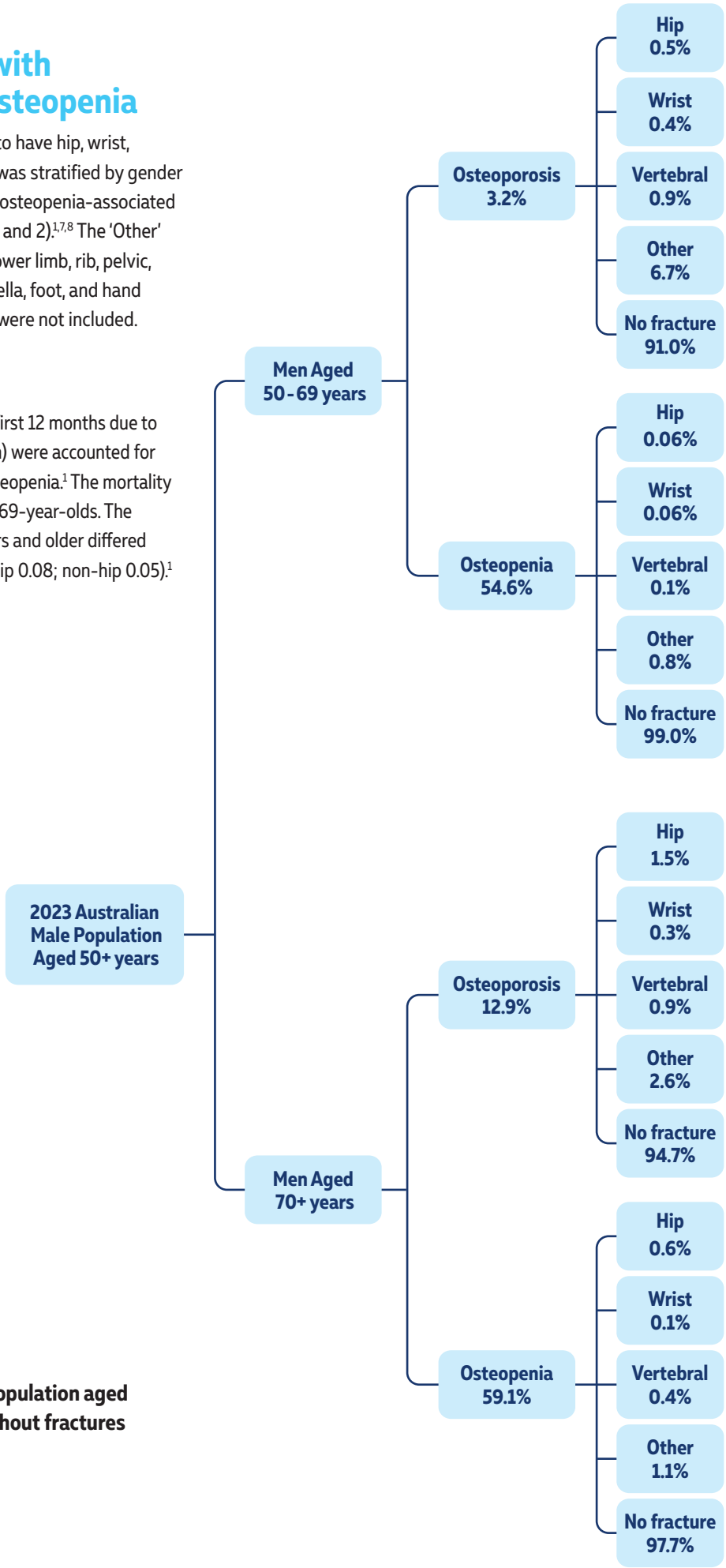


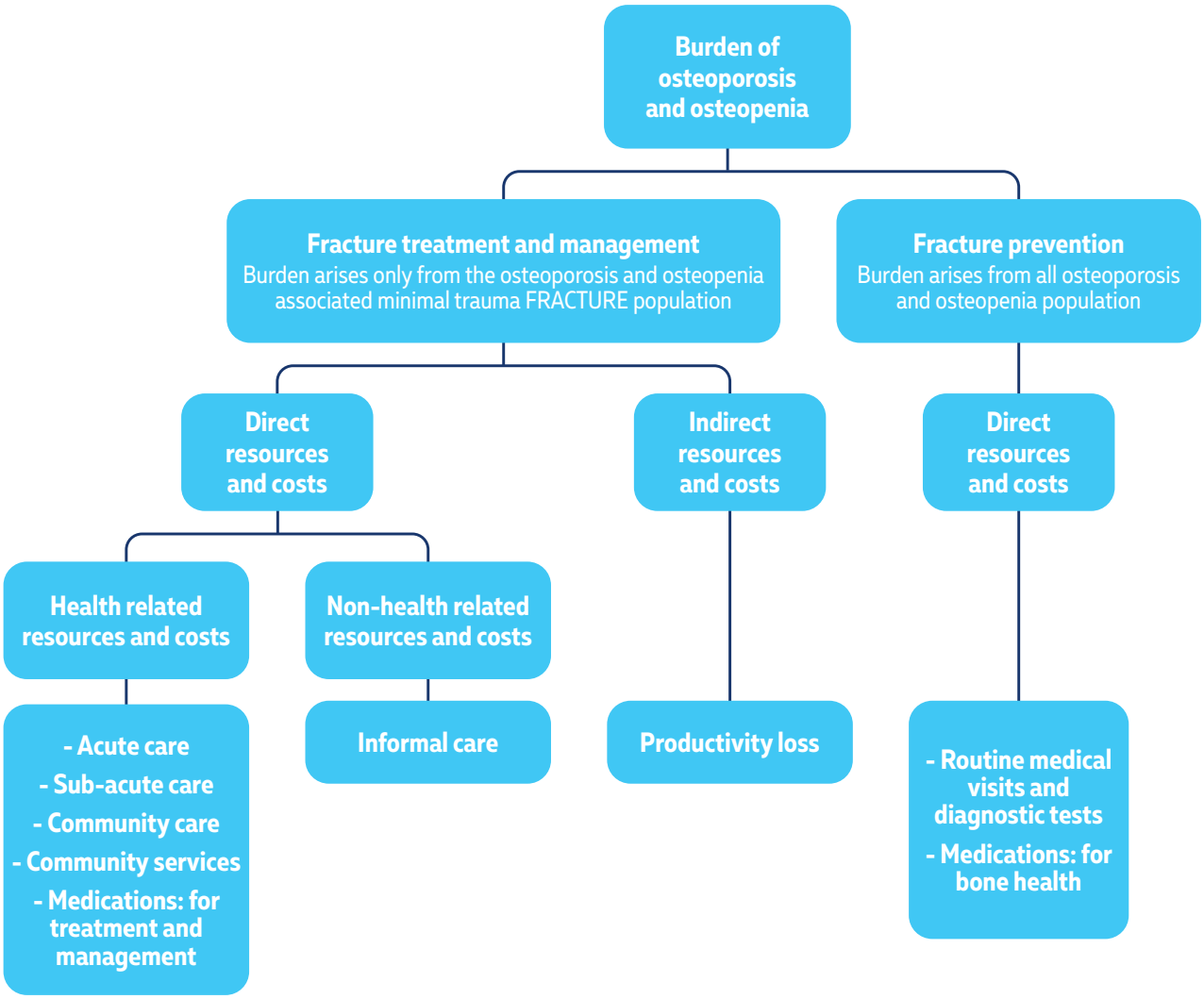
Figure 2: Distribution of male population aged 50 years and older with and without fractures

Resource Utilisation and Associated Costs

From a societal perspective, a bottom-up costing approach was used to determine the total burden attributable to fractures based on health and non-health services. All the health and non-health service utilisation rates were based on the 2012 report,[1] Appendix A. The number of people who had utilised the resources were estimated using resource utilisation rates and the fracture or no-fracture population. Figure 3 illustrates the health and non-health service utilisation attributed to people with osteoporosis and osteopenia.

The unit cost data were derived from publicly available cost data (Appendix B). Where recent unit costs could not be identified, unit costs in 2012 report[1] were inflated using the 2023 health inflation rate for Australia.[9] All costs are reported in 2023 Australian Dollars ($). The resource utilisation cost was estimated using the population predicted to use services and the unit cost for each service.

Figure 3: Burden of osteoporosis and osteopenia



Fracture Treatment and Management

Direct Healthcare Costs

Acute hospital care

Pre-hospital care: Ambulance

Hip fractures were the most likely to utilise ambulance services, and wrist fractures were the least likely. All patients transported by ambulance were assumed to have been taken to a hospital emergency department. The cost of ambulance transfer is $1,358 per transport in 2023.[10] The utilisation rates were based on the 2012 report and illustrated in Appendix A.

Hospital admissions

In general, women were more likely to be admitted to hospital than men in the same age group, except for vertebral fractures in the younger age group.[1] The average hospital episode cost included emergency department care, pathology, imaging, and allied health costs, which were assumed to occur during the hospital stay. The hip fracture-related hospital admissions had a higher length of stay, and the older age group stayed longer in hospital compared to the younger age group, Table 1. The Hospital length of stay was based on the 2012 report[1] for all fractures except hip fractures, for which an updated 2023 data was collected from the New South Wales (NSW) Hip Fracture Registry.[11]

Table 1: Acute hospital episodes and length of stay

	Men and Women 50-69 years old		Men and Women 70+ years old	
	Mean hospital cost $	Mean LOS, days	Mean hospital cost $	Mean LOS, days
Hip	$31,965	10.3	$25,357	10.4
Wrist	$9,128	1.6	$8,598	2.4
Vertebral	$8,347	5.43	$8,347	5.4
Other	$12,717	4.5	$14,492	11.1

Non-admitted hospital services (Emergency Department and Outpatient Services)

All people with a fracture transported by ambulance were assumed to go to a hospital emergency department, and people who required continued hospital care were admitted. The remainder were assumed to have been managed in the emergency department and then discharged and managed in the community or by the outpatient healthcare team. Emergency department costs were attributed to non-admitted patients. The unit costs attributed to emergency department attendance were based on the Independent Health and Aged Care Pricing Authority (IHACPA).[12] The unit cost per emergency department presentation was $410 for wrist fractures and $550 for non-wrist/ hip fractures.[12]

Outpatient clinic fracture management occurs following a hospital admission or emergency department without an admission. It was assumed that all outpatient department attendees had three visits for fracture management, irrespective of fracture type, age, and gender. The cost of visiting an outpatient clinic was $394 in 2023.[12]

Subacute care (rehabilitation)

A certain proportion of fracture-related hospital admissions are admitted to a subacute care facility for inpatient rehabilitation. Thirty-nine percent of people with a hip fracture aged 50-69 years and 32% of those aged over 70 years were discharged from acute care to a rehabilitation facility, Appendix A. For non-hip fractures, the rates were 18% and 14%, respectively, Appendix A. The rehabilitation rate after a fracture hospitalisation differed for hip and non-hip fractures. However, the rehabilitation episode cost ($15,453) was assumed to be the same. The mean rehabilitation length of stay was 22.45 days and was collected from the New South Wales (NSW) Hip Fracture Registry.[11]

Community care

General practitioner

Community fracture management occurred in the community for people who did not have a hospital admission. Community fracture management was assumed to be managed first by a general practitioner (GP). Attributed resource use was assumed to be three general practitioner visits and one radiological examination. The cost assumed for each general practitioner visit was $41,[13] and the cost of radiological examination was specific to the fracture site.

Medical specialist

People with a fracture may visit an orthopaedic medical specialist following discharge to the community from either a hospital emergency department or acute or subacute care ward. It was assumed that this was a private medical specialist and that these people did not also attend a hospital outpatient clinic. The rates varied for fracture type but were not significantly different by age or gender. The average number of visits was 2.5, and the cost attributed was $96 per visit.[13]

Physiotherapy

People with a fracture may visit a physiotherapist post-discharge from hospital. It was assumed that this was a private physiotherapist, and the person did not also attend an hospital outpatient clinic. The attributed rate was an average for each fracture type, with no differentiation for age group or gender. People post discharge from a subacute facility or in conjunction with a private medical specialist or general practitioner fracture management may have attended private physiotherapy sessions. The cost attributed per physiotherapy session was $67,[13] and an average of nine sessions following a hip fracture, five sessions following a wrist fracture, four sessions following a vertebral fracture, and six following 'other' fractures.

Community services

Residential aged care

Eleven percent of people with a fracture moved to residential aged care following a hip fracture[14] and 1% for non-hip fractures in the 70 years and older age group only. The average length of stay over 12 months in a residential aged care facility following a fracture was assumed to be six months. It was assumed that once admitted to a residential aged care facility, the person would reside there for the remainder of the year. As fractures occurred throughout the year, a length of stay of six months was chosen as a midpoint. It was assumed that once admitted to residential aged care, no further healthcare service was used specific to the fracture. However, management costs for osteoporosis or osteopenia whilst in residential aged care were assumed to continue. The cost of residential aged care was assumed to be $203 per day, Appendix B.

Home help and Meals on Wheels

The weighted mean hours of home help[1] over the 12 months, differed by fracture, age group, and gender, Appendix A. The mean hourly cost of home help in 2023 was $36 per hour.[15] Meals provided by Meals on Wheels cost $31 per day and $10.25 per meal.[16] It was assumed that people would use the service for 12 months. The age group 70 years and older only used the Meals on Wheels service.[1]

Bone active medications following fracture

The cost of dispensed scripts by the Pharmaceutical Benefits Scheme (PBS) and the Repatriation Pharmaceutical Benefits Scheme (RPBS) Item Reports were collected from Services Australia.[17] The cost method does not take into account any additional co-payment made by the patient. Bone active medications, used in osteoporosis management and treatment were *Alendronate, Risedronate, Denosumab, Raloxifene, Teriparatide, and Zoledronic acid,* based on the 2012 report,[1] (Appendix C). New medication, Romosozumab, was added to the 2023 disease burden model.

Direct Non-Healthcare Costs

Informal care

The average number of informal care hours over the 12 months varied by fracture, age group, and gender.[1] The hourly pay rate for informal care in 2023 was $36 per hour,[15] irrespective of whether formal care was provided by a paid carer or by a family.

Indirect Costs

Production Loss

Productivity loss was estimated for the total number of days spent in acute and subacute care because of the fracture. This was estimated for anyone who fractured aged 50 years and older. This method assumes that all adults have some kind of productivity irrespective of their age, employment status or labour force participation. These costs were calculated by multiplying the mean acute and subacute length of stay as days by the average daily Australian earnings of $280. The average daily earnings were calculated from the 2023 average weekly ($1,958) total earnings[18] divided by seven to account for hospitalisation that may extend beyond a normal five-day working week. A seven-day week also does not differentiate paid or unpaid work. The lost productivity cost has not been attributed to those who died.

Fracture Prevention

Routine Medical Services

Routine general practitioner visits

The average number of routine GP visits was 2.4 per year, attributed to the entire population with osteoporosis or osteopenia regardless of a fracture.[1] The assumption was based on the need for likely follow-up investigations and/or pharmacological scripts to manage osteoporosis/osteopenia.

Routine diagnostic imaging

The relevant diagnostic imaging procedure for osteoporosis/osteopenia is Dual-energy X-ray Absorptiometry (DXA). The total cost for DXA scan in 2023 was collected from the MBS Item Reports from Services Australia[17] on Item Numbers 12306, 12312, 12315, 12321, and 12322. The assumption for this was that the majority of DXA scans are undertaken for osteoporosis and osteopenia. To determine the total cost of screening, the patient gap contributions of 15% were added to the total expenditure reported in the Medicare statistics.

Routine pathology

The Vitamin D test was assumed to be one every two years for the entire population with osteoporosis or osteopenia. The other relevant pathology test was a general blood test for renal function and serum calcium, and it was assumed that the entire population with osteoporosis or osteopenia would have this test twice per year. The type and number of pathology tests were based on expert opinion, similar to the 2012 report. The MBS schedule fee in 2023 was $39 per test, and the scheduled fee for a routine pathology test (based on three tests from one blood sample) was $14 per test.[13]

Pharmaceutical medications for fracture prevention

Calcium and Vitamin D are considered to contribute to the prevention of fractures in people with osteoporosis or osteopenia and are available as over-the-counter medications. These preparations may or may not be specifically recommended by a medical practitioner. It was assumed that 39% of people take calcium and vitamin D supplements regularly and use the recommended dose over 12 months. The inflated cost of calcium and vitamin D supplements over 12 months was $239 per person.[1]

Future Prevalence and Cost of Minimal Trauma Fractures Due to Osteoporosis and Osteopenia in Australia from 2024 to 2033

Australian Population 2024 – 2033

Using the ABS annual population projection series B[i] for the Australian population from 2024 to 2033, and rates from the Geelong Osteoporosis Study, the annual prevalence and incidence of osteoporosis and osteopenia by age group and gender were predicted.[6]

In each year, the previous year's osteoporosis and osteopenia population (alive at the end of the period) was carried forward (by age group, gender and fracture type) with associated assumptions concerning osteoporosis (bone active) medications:

1. Osteoporosis or osteopenia with previous fracture – 100% on osteoporosis (bone active) medications, in the first year of the model.
2. Osteoporosis or osteopenia with previous fracture[ii] – 60% on osteoporosis (bone active) medications, in the second year of the model.
3. Osteoporosis or osteopenia with previous fracture – 40% ceased osteoporosis (bone active) medications, in the second year of the model.
4. Osteoporosis no fracture – 35% on osteoporosis (bone active) medications.[iii]
5. Osteoporosis no fracture – 65% not on osteoporosis (bone active) medications.
6. Osteopenia no fracture – 100% not on osteoporosis (bone active) medications.

Medication Effects Over the Years

The effect of the osteoporosis (bone active) medications is to reduce the fracture and re-fracture rates attributable to osteoporosis and osteopenia. The reduction in fracture risk assumed was based on the rates of the 2012 report.[1,20]

In the first year (2024) of the model, it was assumed that everyone on osteoporosis (bone active) medications had the benefit of the medication for one year (Year 1 relative risk reduction in fractures) attributed to the re-fracture rate (for those who had a fracture from 2023) and to the osteoporosis fracture rate (for those who had not fractured in 2023). In the second year of the model (2025) 40% of the fracture group from 2023 had ceased medication, so resumed the fracture risk without medication, and the remaining 60%, as well as all the osteoporosis group without a fracture from 2023, had the benefit of the medication for two years (Year 2 relative risk reduction in fracture). No further decline in osteoporosis (bone active) medication use was assumed, so both groups had the benefit of medication use in the 3rd year. This method for determining the total number of fractures (first fractures and re-fractures) in each population group (age, gender, and BMD) was carried forward for each year of the model, for ten years from 2024 to 2033.

The effects of osteoporosis (bone active) medications were able to be attributed according to each population cohort, carried forward through each year. From these assumptions the number of new fracture and re-fractures could be determined (with and without bone active medication).

New Fracture and Re-Fracture Incidence

For each year (2024 – 2033) the number of fractures was determined by fracture site, BMD, gender and age group (as 'first fracture' and 're-fracture'). The predicted number of first fractures was determined for each year of the model based on the same assumptions used in 2023 and described above, with the benefit assumed from bone active medication (also described above).

To determine the number and type of re-fractures, the relative risk of re-fracture rates applied were 1.97 for women and 3.47 for men, irrespective of age group and BMD.[20,21] These were adjusted for bone active medication accordingly. The distribution of fracture type was assumed the same as for first fracture.

For each year, the number of first fractures and re-fractures was determined according to gender, age group (5-year age groups for new fractures; and 50 – 69 years and 70 years and older for re-fractures), BMD (osteoporosis and osteopenia), whether on (bone active) medication or not, and by the type of fracture (hip, wrist, vertebral, and 'other').

Additional analysis was also undertaken on the assumption of 'no (bone active) medication' and the consequent number of first fracture and re-fractures (by gender, age group, BMD and type of fracture) that would be expected to occur. Each year the difference between the (bone active) medication and no (bone active) medication assumptions were calculated as the potential fractures avoided because of bone active medication.

[i] Series B reflects current population trends for life expectancy, birth rates, migration and mortality.
[ii] This was based on the fractures first observed in 2023, and then increased by fractures occurring in each year thereafter.
[iii] This 35% is the assumed prevalence of osteoporosis (bone active) medications in the community based on AusICUROS study.

Cost of Osteoporosis, Osteopenia, 2024-2033

The average annual direct and indirect costs of a fracture (by gender, age group and fracture type) determined from 2023 were attributed to the fractures that occurred each year. The annual average direct cost included residential aged care in the year of the fracture as well as community services related to the fracture. The average annual indirect cost assumed lost productivity due to the fracture. The same total fracture costs were assumed for both first fractures and for re-fractures. The total cost (direct and indirect) for each year was determined by fracture site, age and gender.

For the community management of osteoporosis or osteopenia (irrespective of fracture) the following assumptions were made concerning medication, investigations and medical care. The total costs of bone active medication therapy as well as the total population assumed to be on medication each year from 2024 to 2033 were determined. It was assumed that everyone with a new fracture would have one DXA scan in the year of the fracture and that the rest of the population with osteoporosis or osteopenia (including the re-fracture population) would have one DXA scan every two years (an annual rate of 0.50).[iv] Pathology tests for Vitamin D were assumed once every two years for the entire population with osteoporosis or osteopenia, and routine pathology tests were based on the same assumption as for 2023 (i.e. two routine tests annually). General practitioner visits were assumed at a rate of 2.4 visits annually for the population with osteoporosis or osteopenia irrespective of fracture, similar to the 2012 model.[1]

Residential aged care costs were included in the average annual direct cost of a fracture determined from 2023 in the year that the fracture occurred. For each subsequent year the annual cost of a residential aged care was attributed to those in residential care, with a 10% annual attrition rate assumed. The costs of subsequent residential care each year were also determined.

All costs were determined in 2023 dollars for comparability, and then an annual inflation rate of 2.4% was applied to the total annual cost for each year (2024 – 2033).[9] The total cost for each year from 2024 to 2033 was determined. To compare with the total costs from 2023, the total cost less residential aged care and re-fracture costs was used, as these costs were not included in the 2023 total cost.

[iv] The total cost of DXA in 2023 was determined from the MBS expenditure data and not attributed to individuals.

Results Summary

- Rapid increase in osteoporosis and osteopenia cases. In 2023, the total population of Australians aged 50 years and older is estimated to be 9.3 million. Of this population, 67%, approximately 6.3 million individuals are estimated to have osteopenia or osteoporosis. By 2033, this number will rise to 7.7 million, with 69% of those 50 years and older estimated to have osteopenia or osteoporosis. This is an increase of 23% over ten years.
- In 2023, the estimated economic cost of osteoporosis and osteopenia is $4.8 billion, and this is projected to rise to $8.3 billion by 2033, representing a significant increase in annual cost. The total estimated cost over the next 10 years is estimated to be $72.0 billion.
- In 2023, the estimated number of fractures is 193,482, which is 3% of the total population with osteoporosis or osteopenia. By 2033, the estimated total number of fractures will be 237,632.
- The average healthcare cost per:
  - hip fracture ranges from $40,251 to $45,290;
  - wrist fractures from $6,559 to $10,027;
  - vertebral fractures from $8,775 to $13,923;
  - 'other' fractures from $10,344 to $18,695.

  The average cost differs by gender and age group.
- Hospitalisation costs are a significant contributor to osteoporosis and osteopenia. The average cost of fracture-related hospitalisation ranges from $25,357 to $31,965 per episode.
- In 2023, there were $44.4 million of MBS benefits paid for DXA scans. This is estimated to increase by 144% by 2033.
- In 2023, there were $299.2 million of PBS and RPBS benefits paid for osteoporosis and osteopenia medications. This is estimated to increase by 20% by 2033.
- Annually, between 18,284 and 22,432 fractures are estimated to be averted directly due to bone active medications. The cost savings from averted fractures due to bone active medications are predicted to range from $289.9 million in 2024 to $378.2 million in 2033. Over a 10-year period, the total cost savings from averted fractures are estimated to be $3.3 billion.

Minimal Trauma Fractures due to Osteoporosis and Osteopenia in Australia in 2023

Australian Population in 2023

In 2023, out of 9.3 million Australians aged 50 years and older 52% were females, while those aged 70 and older accounted for 35% of this population (Table 2).

Table 2: Australian resident population 2023

	Age Groups 50-69 years	% Total	70+ years	% Total	Total ages 50+ years	% Total
Women	3,119,949	33%	1,748,907	19%	**4,868,856**	**52%**
Men	2,971,669	32%	1,501,909	16%	**4,473,578**	**48%**
Total	**6,091,618**	**65%**	**3,250,816**	**35%**	**9,342,434**	**100%**

Prevalence of Osteoporosis and Osteopenia

In 2023, 67% of the Australian population aged 50 years and older had osteoporosis or osteopenia. Of this, 77% had osteopenia, and 23% had osteoporosis. Both osteoporosis and osteopenia were prominent in females, Table 3. Consistent with the 2012 report, osteoporosis prevalence was high in the older age group, and osteopenia prevalence was higher in the younger age group.

Table 3: 2023 Australian populations by gender, age group, and BMD category

	Osteoporosis				Osteopenia				Normal BMD				Total Population					
Age Group	Women		Men		Women		Men		Women		Men		Women		Men		Both	
50-69 years	406,171	4%	95,551	1%	1,525,201	16%	1,623,384	17%	1,188,577	13%	1,252,734	13%	3,119,949	33%	2,971,669	32%	6,091,618	65%
70+ years	756,326	8%	193,868	2%	806,582	9%	887,009	9%	185,999	2%	421,033	5%	1,748,907	19%	1,501,909	16%	3,250,816	35%
Totals	**1,162,497**	**12%**	**289,419**	**3%**	**2,331,783**	**25%**	**2,510,393**	**27%**	**1,374,576**	**15%**	**1,673,766**	**18%**	**4,868,856**	**52%**	**4,473,578**	**48%**	**9,342,434**	**100%**

Fracture Incidence and Mortality of Osteoporosis and Osteopenia

Of the total population with osteoporosis and osteopenia aged 50 years and older in 2023, 3% had fractures, of which 17% had a hip fracture, with the remainder sustaining non-hip fractures (14% wrist, 18% vertebral, and 50% with 'other' fracture types). Due to the higher prevalence of osteopenia compared to osteoporosis, fracture numbers were highest among those with osteopenia in each age and gender subgroup except for women aged 70 years and older, where 61% more fractures occurred in women with osteoporosis compared to osteopenia, Table 4. There were twice as many fractures in men with osteopenia compared to men with osteoporosis. In women, the fracture numbers were more balanced due to the combination of a higher population in the older age group and the very high fracture rate among these older women (and men) with osteoporosis. Fracture numbers were consistently higher in women than men (ratio of women to men: 2.4 hip; 7.9 wrist; 3.4 vertebral and 1.8 'other' fracture sites).

There were 5,108 deaths resulting from fractures attributable to osteoporosis or osteopenia in 2023, of which the vast majority (90%) occurred in those aged 70 years and older (n=4,605), with 2,542 (50%) associated with a fracture of the hip. 71% of these deaths occurred in women aged 70 years and older. Within the fracture population, 97.4% were alive at the end of 2023.

Table 4: 2023 Populations by gender, age group BMD category and fracture type

	Women					Men					All
	50-69 years		70+ years		Total	50-69 years		70+ years		Total	
Population	Osteoporosis	Osteopenia	Osteoporosis	Osteopenia	All Women	Osteoporosis	Osteopenia	Osteoporosis	Osteopenia	All Men	Total
Total Population	**406,171**	**1,525,201**	**756,326**	**806,582**	**3,494,280**	**95,551**	**1,623,384**	**193,868**	**887,009**	**2,799,812**	**6,294,092**
Population with fracture (Total)	**22,409**	**30,665**	**51,542**	**32,559**	**137,176**	**8,190**	**17,471**	**10,287**	**20,358**	**56,306**	**193,482**
Hip											
Starting population	834	1,141	13,273	8,384	**23,631**	483	1,030	2,882	5,704	**10,099**	**33,730**
Hospitalised	750	1,027	12,344	8,384	**22,505**	483	1,030	2,882	5,704	**10,099**	**32,604**
Died	10	14	1,096	693	**1,814**	6	13	238	471	**728**	**2,542**
Residential aged care	-	-	1,460	922	**2,382**	-	-	317	627	**944**	**3,327**
Alive at year end	823	1,126	12,176	7,692	**21,818**	477	1,017	2,644	5,233	**9,371**	**31,189**
Wrist											
Starting population	4,403	6,026	8,539	5,394	**24,362**	428	913	575	1,137	**3,052**	**27,414**
Hospitalised	1,981	2,712	5,379	3,398	**13,471**	167	356	287	569	**1,379**	**14,849**
Died	25	34	254	161	**474**	2	4	14	27	**47**	**521**
Residential aged care	-	-	70	44	**114**	-	-	4	7	**11**	**125**
Alive at year end	4,379	5,992	8,284	5,233	**23,888**	426	908	561	1,110	**3,005**	**26,893**
Vertebral											
Starting population	3,370	4,611	12,072	7,626	**27,679**	1,822	1,829	1,822	3,606	**8,115**	**35,794**
Hospitalised	1,112	1,522	8,088	5,109	**15,831**	429	914	911	1,803	**4,058**	**19,889**
Died	14	19	383	242	**657**	5	11	43	85	**145**	**802**
Residential aged care	-	-	105	66	**172**	-	-	12	23	**35**	**207**
Alive at year end	3,356	4,592	11,689	7,384	**27,022**	852	1,818	1,779	3,521	**7,970**	**34,992**
Other											
Starting population	13,803	18,888	17,659	11,155	**61,504**	6,422	13,700	5,008	9,910	**35,039**	**96,544**
Hospitalised	8,005	10,955	12,714	8,032	**39,707**	2,761	5,891	3,355	6,640	**18,647**	**58,354**
Died	100	137	393	380	**1,010**	35	74	42	83	**233**	**1,243**
Residential aged care	-	-	165	104	**270**	-	-	44	86	**130**	**400**
Alive at year end	13,702	18,751	17,266	10,775	**60,494**	6,387	13,626	4,966	9,827	**34,806**	**95,300**
Population without fracture	**383,762**	**1,494,536**	**704,784**	**774,023**	**3,357,104**	**87,361**	**1,605,913**	**183,581**	**866,651**	**2,743,506**	**6,100,609**

Fracture Treatment and Management

Direct Healthcare Costs

Acute care

Pre-hospital: Ambulance paramedic

The cost of pre-hospital ambulance paramedic care for people with a fracture caused by osteoporosis or osteopenia in 2023 was $139.4 million, Table 5. Ambulance transport for people aged 70 years and older was $98.8 million, representing 71% of total ambulance costs. Although people with a hip fracture were more likely to use an ambulance the 'other' fracture category represented 43% of total ambulance costs, with hip fractures 31% of total costs and vertebral fractures 19% of the total ambulance costs.

Table 5: Pre-hospital ambulance/paramedic costs following fracture

	Women				Men				All	
Ambulance	50-69 years	% Total	70+ years	% Total	50-69 years	% Total	70+ years	% Total	**Total Cost**	**% Total**
Hip	$2,413,009	2%	$27,351,410	20%	$2,054,946	1%	$11,659,703	8%	**$43,479,068**	**31%**
Wrist	$1,982,743	1%	$5,865,365	4%	$236,658	<1%	$836,824	1%	**$8,921,590**	**6%**
Vertebral	$7,261,983	5%	$14,177,236	10%	$2,115,835	2%	$2,948,958	2%	**$26,504,012**	**19%**
Other	$14,205,856	10%	$20,738,725	15%	$10,383,480	7%	$15,193,898	11%	**$60,521,959**	**43%**
Sub-total	**$25,863,592**	**19%**	**$68,132,735**	**49%**	**$14,790,919**	**11%**	**$30,639,383**	**22%**	$139,426,628	100%

Hospital admissions, non-admitted hospital services (Emergency Department and Outpatient Services)

The total cost of acute hospital care for fractures associated with osteoporosis or osteopenia in 2023 was $2.1 billion, of which the total for acute inpatient hospitalisation was $1.9 billion (92% of total hospital costs), Table 6.

Hip fractures represented 45% of total acute hospital costs. People aged 70 years and older accounted for 72% of total acute hospital inpatient costs, and costs for women were 71% of the total. The highest single category was acute inpatient care for women aged 70 years and older with a hip fracture, with a total cost of $549.2 million, representing 28% of total hospital costs.

Table 6: Hospital (admitted and non-admitted) costs for fracture management

	Women				Men				All	
	50-69 years	% Total	70+ years	% Total	50-69 years	% Total	70+ years	% Total	**Total Cost**	**% Total**
Hospital Inpatient	**$369,055,315**	**19%**	**$1,035,429,640**	**53%**	**$174,385,448**	**9%**	**$392,575,368**	**20%**	$1,971,445,771	100%
Hip	$63,108,733	3%	$549,160,404	28%	$48,369,711	2%	$217,715,798	11%	**$878,354,647**	**45%**
Wrist	$42,839,419	2%	$75,466,291	4%	$4,772,371	0%	$7,358,353	0%	**$130,436,433**	**7%**
Vertebral	$21,983,962	1%	$110,154,470	6%	$11,210,772	1%	$22,656,363	1%	**$166,005,567**	**8%**
Other	$241,123,201	12%	$300,648,475	15%	$110,032,595	6%	$144,844,853	7%	**$796,649,125**	**40%**
Hospital (Non-admitted services)	**$33,750,399**	**37%**	**$41,125,736**	**45%**	**$17,893,688**	**20%**	**$16,526,029**	**18%**	$91,402,165	100%
Hip	$768,701	1%	$7,115,793	8%	$654,635	0%	$3,033,410	3%	**$10,917,905**	**12%**
Wrist	$6,149,519	7%	$6,981,994	8%	$771,899	0%	$969,116	1%	**$14,100,629**	**15%**
Vertebral	$6,321,340	7%	$11,631,137	13%	$1,893,545	0%	$3,789,430	4%	**$21,741,907**	**24%**
Other	$20,510,839	22%	$15,396,812	17%	$14,573,609	0%	$8,734,073	10%	**$44,641,724**	**49%**
All Hospital	**$402,805,715**	**19%**	**$1,143,606,849**	**53%**	**$192,279,137**	**9%**	**$409,101,397**	**19%**	$2,147,793,098	100%
Hip	$63,877,434	3%	$556,276,197	26%	$49,024,346	2%	$220,749,208	10%	**$889,927,187**	**41%**
Wrist	$48,988,938	2%	$82,448,285	4%	$5,544,270	<1%	$8,327,468	<1%	**$145,308,961**	**7%**
Vertebral	$28,305,303	1%	$121,785,606	6%	$13,104,317	1%	$26,445,793	1%	**$189,641,019**	**9%**
Other	$261,634,040	12%	$383,096,760	18%	$124,606,204	6%	$153,578,927	7%	**$922,915,931**	**43%**

Subacute care (rehabilitation)

Rehabilitation or subacute care for managing fractures relating to osteoporosis or osteopenia cost $460.3 million in 2023, Table 7. The cost of rehabilitation for people aged 70 years and older was $321.4 million (70% of total) of which more than three quarters (78%) was the cost of rehabilitation care for women. Women in both age groups accounted for $350.3 million or 76% of the total costs of rehabilitation. The highest costs were associated with rehabilitation for hip fractures ($193.1 million or 42%), with the cost of rehabilitation following 'other' fractures $171 million or 37% of total rehabilitation costs.

Table 7: Subacute care (rehabilitation) costs following fracture

Subacute care (rehabilitation)	Women 50-69 years	% Total	70+ years	% Total	Men 50-69 years	% Total	70+ years	% Total	All Total Cost	% Total
Hip	$14,222,997	3%	$127,792,883	28%	$9,061,343	2%	$42,112,866	9%	**$193,190,088**	**42%**
Wrist	$15,486,467	3%	$23,286,319	5%	$1,434,037	0%	$1,887,321	0%	**$42,094,144**	**9%**
Vertebral	$8,691,519	2%	$35,012,043	8%	$3,684,195	1%	$5,985,810	1%	**$53,373,568**	**12%**
Other	$62,567,207	14%	$63,264,219	14%	$23,732,666	5%	$22,040,787	5%	**$171,604,880**	**37%**
Sub-total	**$100,968,190**	**22%**	**$249,355,464**	**54%**	**$37,912,241**	**8%**	**$72,026,785**	**16%**	$460,262,680	100%

Community care

Community fracture management included the management of fractures by general practitioners (where people were not admitted to the hospital); radiological examination of fractures; ongoing management of fractures by GPs or medical specialists post discharge from acute or subacute care; physiotherapy and pharmaceutical management of fractures (analgesia), Table 8. The total cost of community fracture management was $34 million.

Table 8: Community healthcare service costs for fracture management
(GPs, Imaging, Physiotherapy, Drugs)

Community healthcare	Women 50-69 years	% Total	70+ years	% Total	Men 50-69 years	% Total	70+ years	% Total	All Total Cost	% Total
Hip	$664,470	2%	$2,588,892	9%	$509,283	2%	$555,674	2%	**$4,318,319**	**13%**
Wrist	$2,246,289	8%	$2,812,333	10%	$273,585	1%	$328,670	1%	**$5,660,877**	**17%**
Vertebral	$1,257,044	4%	$1,789,658	6%	$415,070	1%	$427,079	1%	**$3,888,851**	**11%**
Other	$7,142,310	25%	$6,028,334	21%	$4,041,413	14%	$2,984,630	10%	**$20,196,688**	**59%**
Sub-total	**$11,310,113**	**39%**	**$13,219,217**	**46%**	**$5,239,352**	**18%**	**$4,296,052**	**15%**	$34,064,734	100%

Community services

Residential aged care

The total cost of residential aged care due to osteoporosis in 2023 was estimated at $65.6 million. Females contributed the greatest cost, which was 72% of the total cost, Table 9. Relating to the fracture type, hip fractures contributed the greatest cost to residential aged care, accounting for 95% of the total residential aged care costs (28% and 72% of the total residential aged care following hip fracture for males and females respectively).

Table 9: Residential aged care costs for adults aged 70 years and older

Fracture Type	Women 70+ years	% Total	Men 70+ years	% Total	All Total Cost	% Total
Hip	$44,594,524	68%	$17,679,593	27%	**$62,274,117**	**95%**
Wrist	$650,099	1%	$63,388	0%	**$713,487**	**1%**
Vertebral	$733,090	1%	$150,781	<1%	**$883,871**	**1%**
Other	$1,152,406	2%	$555,200	1%	**$1,707,606**	**3%**
Sub-total	**$47,130,119**	**72%**	**$18,448,962**	**28%**	$65,579,081	100%

Home help

The total cost of home help in 2023 was estimated at $68.9 million, Table 10. 80% of the home help cost was for those 70 years and older; women accounted for 88% of all home help costs. Considering fracture type, vertebral fractures had the highest cost of home help (37%), followed by 'other' fractures (32%), hip (27%), and wrist (4%).

Table 10: Home help costs

Fracture Type	Women 50-69 years	% Total	70+ years	% Total	Men 50-69 years	% Total	70+ years	% Total	All Total Cost	% Total
Hip	$138,005	<1 %	$12,779,932	19%	-	-	$5,755,433	8%	**$18,673,371**	**27%**
Wrist	$194,036	<1 %	$2,804,961	4%	-	-	$64,631	<1%	**$3,063,628**	**4%**
Vertebral	$4,738,149	7 %	$20,065,724	29%	-	-	$491,959	1%	**$25,295,832**	**37%**
Other	$8,749,371	13%	$11,426,102	17%	$301,197	<1%	$1,712,403	2%	**$21,887,876**	**32%**
Sub-total	**$13,819,561**	**20%**	**$47,076,720**	**68%**	**$301,197**	**<1%**	**$8,024,426**	**12%**	$68,920,707	100%

Meals on Wheels

The total cost of Meals on Wheels was estimated at $39.4 million, Table 11. Females accounted for 65% of the total Meals on Wheels cost. Vertebral fractures were the most costly with 46% of the total cost for Meals on Wheels followed by other fractures (35%), hip (17%) and wrist (2%).

Table 11: Meals on Wheels costs for adults 70 years and older

Fracture Type	Women 70+ years	% Total	Men 70+ years	% Total	All Total Cost	% Total
Hip	$6,692,460	17%	-	-	**$6,692,460**	**17%**
Wrist	$848,706	2%	-	-	**$848,706**	**2%**
Vertebral	$18,129,960	46%	-	-	**$18,129,960**	**46%**
Other	-	-	$13,679,690	35%	**$13,679,690**	**35%**
Sub-total	**$25,671,126**	**65%**	**$13,679,690**	**35%**	$39,350,815	100%

Direct Non-Healthcare Costs

Informal care

The total cost of informal community care due to osteoporosis in 2023 was estimated at $396.9 million. Females accounted for most of the cost (76%), with females aged 70 years and older with osteoporosis having the largest cost at $142.1 million, Table 12. Males aged 50-69 years with osteoporosis had the least cost, which was 2% of the total informal community care cost. Considering the fracture type, the 'other' fractures contributed the highest informal care cost (44%), followed by vertebral (26%), hip (26%), and wrist (5%) fractures.

Table 12: Informal community care cost

	Women						Men						All	
	50-69 years			70+ years			50-69 years			70+ years				
Fracture Type	Osteoporosis	Osteopenia	% Total	Osteoporosis	Osteopenia	% Total	Osteoporosis	Osteopenia	% Total	Osteoporosis	Osteopenia	% Total	**Total Cost**	**% Total**
Hip	$205,689	$281,468	<1%	$55,935,239	$35,334,361	23%	$34,164	$72,879	<1%	$3,440,029	$6,807,780	3%	**$102,111,610**	**26%**
Wrist	$2,118,298	$2,898,711	1%	$8,288,033	$5,235,561	3%	$14,421	$30,763	<1%	$21,696	$42,935	<1%	**$18,650,417**	**4%**
Vertebral	$7,828,636	$10,712,824	5%	$44,789,115	$28,293,340	18%	$2,071,605	$4,419,211	2%	$1,525,903	$3,019,745	1%	**$102,660,378**	**26%**
Other	$19,642,575	$26,879,195	12%	$33,161,068	$20,693,139	14%	$7,530,489	$16,064,272	6%	$16,626,428	$32,903,524	12%	**$173,500,690**	**44%**
Sub-total	**$29,795,199**	**$40,772,198**	**18%**	**$142,173,454**	**$89,556,401**	**58%**	**$9,650,678**	**$20,587,124**	**8%**	**$21,614,054**	**$42,773,985**	**16%**	$396,923,095	100%

Indirect Costs

Production loss

The cost associated with time lost from work due to hospitalisation for minimal trauma fractures in acute and subacute care in 2023 was estimated at $425.4 million, Table 13. Females aged 70 years and older contributed the highest cost (55% of total production loss) while younger males aged 50-69 years with osteoporosis had the least production loss (8% of the total production loss). Higher production loss was mostly associated with 'other' fractures and hip fractures (45% and 38% of total production loss respectively).

Table 13: Production loss due to hospitalisation

	Women		All Women	Men		All Men	All	
Fracture Type	50-69 years	70+ years	% Total	50-69 years	70+ years	% Total	**Total Cost**	**% Total**
Hip	$9,923,486	$103,463,229	27%	$8,041,826	$42,089,717	12%	**$163,518,258**	**38%**
Wrist	$7,250,096	$13,650,919	5%	$807,671	$1,331,035	1%	**$23,039,720**	**5%**
Vertebral	$6,905,411	$31,747,004	9%	$3,521,430	$6,529,664	2%	**$48,703,508**	**12%**
Other	$44,618,302	$85,384,099	31 %	$20,360,826	$39,811,355	14%	**$190,174,582**	**45%**
Sub-total	**$68,697,295**	**$234,245,251**	**71 %**	**$32,731,752**	**$89,761,771**	**29%**	$425,436,068	100%

Fracture Prevention

Routine Medical Services

Routine general practitioner visits

The total cost of general practitioner services for the management of osteoporosis in 2023 was estimated at $624.9 million, representing 67% of the total osteoporosis & osteopenia management costs Table 14. The cost attributed to females for GP services was $346.8 million, accounting for 55% of total GP costs. Considering those who fractured, their GP costs represented only 3% of the total GP costs.

Routine diagnostic imaging

According to MBS services utilisation data, 484,299 DXA scans were performed in 2022/23 at a total cost of $44 million.[22]

Routine pathology tests

The total cost associated with routine vitamin D pathology tests was estimated at $122.7 million, 13% of the total osteoporosis and osteopenia management costs, Table 14. The cost associated with routine pathology tests was estimated at $171.6 million, which is 19% of the total osteoporosis and osteopenia management costs.

Table 14: Community care costs for the management of osteoporosis and osteopenia

	Women				Men				All	
	50-69 years		70+ years		50-69 years		70+ years			
Type	Fracture	No Fracture	Fracture	No Fracture	Fracture	No Fracture	Fracture	No Fracture	Total Cost	% Total
GP	$5,238,417	$186,627,612	$7,998,467	$146,934,218	$2,535,829	$168,243,681	$2,957,299	$104,351,044	**$624,886,567**	**68%**
Routine Vitamin D Blood Test	$1,029,389	$36,673,753	$1,514,403	$28,873,698	$498,310	$33,061,170	$581,132	$20,505,778	**$122,737,633**	**13%**
Routine Pathology Test	$1,439,299	$51,277,514	$2,117,449	$40,371,419	$696,741	$46,226,374	$812,543	$28,671,332	**$171,612,670**	**19%**
Sub-total	**$7,707,105**	**$274,578,879**	**$11,630,318**	**$216,179,335**	**$3,730,880**	**$247,531,224**	**$4,350,974**	**$153,528,154**	$919,236,870	100%

Osteoporosis prevention – calcium and vitamin D supplements

The total cost associated with calcium and vitamin D supplementation for osteoporosis prevention in 2023 was estimated at $15.2 million, Table 15 and $569.6 million for individuals who had low bone density but with no fracture, Table 16. The overall cost was $587.2 million. Considering those who fractured, 43% of this cost was accounted for by females 70 years and older with osteoporosis, while males from the same age group and BMD accounted for the least cost (14%). In terms of fracture type, hip, wrist and vertebral fractures represented 15%, 19% and 22% of the total cost respectively. 'Other' fractures made up the highest cost of $6 million, which was 44% of the total cost of supplements for osteoporosis prevention for individuals that fractured. Ninety seven percent of the total costs of calcium and Vitamin D supplements were in the osteoporosis or osteopenia population with no fracture.

Table 15: Calcium and vitamin D supplement costs by fracture type

	Women		All Women	Men		All Men	All	
Fracture Type	50-69 years	70+ years	% Total	50-69 years	70+ years	% Total	Total Cost	% Total
Hip	$222,009	$1,531,439	12%	$96,644	$490,067	4%	**$2,243,515**	**15%**
Wrist	$911,449	$1,360,805	15%	$446,646	$592,252	7%	**$2,864,506**	**19%**
Vertebral	$995,079	$1,820,443	18%	$437,018	$599,415	7%	**$3,414,937**	**22%**
Other	$2,794,760	$2,821,686	37%	$1,402,065	$1,097,391	16%	**$6,713,837**	**44%**
Total	**$4,923,297**	**$7,534,373**	**82%**	**$2,382,373**	**$2,779,125**	**34%**	$15,236,794	100%

Table 16: Calcium and vitamin D supplement costs by fracture and no fracture

	Women 50-69 years	70+ years	All Women % Total	Men 50-69 years	70+ years	All Men % Total	All Total Cost	% Total
No-fracture	$175,383,516	$138,081,604	53%	$158,107,196	$98,064,016	44%	**$569,636,332**	**97%**
Fracture	$4,922,808	$7,516,569	2%	$2,383,048	$2,779,125	1%	**$17,601,551**	**3%**
Total	**$180,306,325**	**$145,598,172**	**55%**	**160,490,244**	**$100,843,141**	**45%**	$587,237,883	100%

Osteoporosis management and treatment – bone active medications

According to PBS services utilisation data, the cost for bone active medications was $299 million in 2022/23.[17]

The Annual Total Cost of Osteoporosis and Osteopenia in 2023

The total cost of osteoporosis in Australia in 2023 was $4.8 billion, of which $4.3 billion (91%) are direct costs, Table 17. This included the direct costs of managing fractures (health and non-healthcare), as well as the non-fracture costs relating to the management of osteoporosis and osteopenia. These include the costs of bone active medications, DXA scans, and routine pathology tests (including Vitamin D tests). Other direct (non-healthcare) costs included in fracture management were for informal care in the community. The informal care costs were $288.3 million (7% of direct costs). The indirect costs from productivity losses associated with fractures due to hospitalisation (acute and rehabilitation) were $425.4 million, representing 9% of the total cost.

Table 17: Direct and indirect costs of osteoporosis and osteopenia, 2023

Costs	Hip Fractures	Wrist Fractures	Vertebral Fractures	Other Fractures	Total cost	% of Total direct cost
DIRECT healthcare fracture cost						
1. Acute care	$932,986,706	$152,904,005	$223,627,002	$933,647,978	**$2,243,165,690**	**51%**
hospital admissions	$878,354,647	$130,436,433	$166,005,567	$796,649,125	**$1,971,445,771**	
hospital non-admissions : outpatient and ED	$11,152,991	$13,545,982	$31,117,423	$76,476,894	**$132,293,290**	
hospital pre-admission: ambulance	$43,479,068	$8,921,590	$26,504,012	$60,521,959	**$139,426,628**	
2. Subacute care: Rehabilitation	$169,221,035	$35,550,179	$45,997,399	$150,367,394	**$401,136,007**	**9%**
3. Community care	$4,318,319	$5,660,877	$3,888,851	$20,196,688	**$34,064,734**	**1%**
4. Community services	$40,194,869	$11,937,716	$44,309,662	$37,530,381	**$133,972,629**	**3%**
Residential aged care	$3,144,566	$699,943	$883,871	$1,661,619	**$6,389,998**	
Home help	$30,357,844	$10,389,067	$25,295,832	$22,189,073	**$88,231,815**	
Meals on Wheels	$6,692,460	$848,706	$18,129,960	$13,679,690	**$39,350,815**	
DIRECT non-healthcare fracture cost						**<1%**
1. Informal care	$76,745,780	$14,738,082	$59,234,586	$137,631,928	**$288,350,376**	
DIRECT fracture cost					$3,100,689,435	**71%**
DIRECT non-fracture cost					$1,263,263,029	**29%**
1. Routine medical & pathology (includes Vitamin D tests)					**$919,236,870**	
2. DXA scans					**$44,775,540**	
3. Pharmaceuticals – bone active medication					**$299,250,619**	
Total DIRECT COST					**$4,363,952,464**	100%
INDIRECT fracture cost						
1. Productivity loss	$163,518,258	$23,039,720	$48,703,508	$190,174,582	**$425,436,068**	
Total DIRECT and INDIRECT COST					**$4,789,388,532**	**91%**

The Average Cost of Minimal Trauma Fractures

Hip fractures have the highest average total direct cost for both males and females, ranging from $35,349 to $40,265, and are highest in the 50-69 years age group for both genders, Table 18. Wrist fractures in males aged 50-69 years (mean cost $5,956) had the lowest average annual direct total cost. When productivity losses are considered the fracture group with the highest total cost were women aged 50-69 years with a hip fracture (mean annual total cost $40,265).

Table 18: Average annual direct and indirect healthcare cost of fractures

Fracture Type		Women 50-69 years	Women 70+ years	Men 50-69 years	Men 70+ years
Hip	Cost Category:				
	- Average Direct Total Cost	$40,265	$38,320	$40,216	$35,349
	- Average Indirect Cost (Productivity Loss)	$5,026	$4,777	$5,314	$4,902
	- Average Total Cost (Direct and Indirect)	$45,291	$43,098	$45,530	$40,251
Wrist	Cost Category:				
	- Average Direct Total Cost	$6,908	$9,047	$5,956	$7,064
	- Average Indirect Cost (Productivity Loss)	$695	$980	$603	$778
	- Average Total Cost (Direct and Indirect)	$7,603	$10,027	$6,559	$7,842
Vertebral	Cost Category:				
	- Average Direct Total Cost	$7,968	$12,311	$9,772	$7,572
	- Average Indirect Cost (Productivity Loss)	$865	$1,612	$1,311	$1,203
	- Average Total Cost (Direct and Indirect)	$8,833	$13,923	$11,083	$8,775
Other	Cost Category:				
	- Average Direct Total Cost	$11,758	$15,732	$9,333	$16,420
	- Average Indirect Cost (Productivity Loss)	$1,365	$2,963	$1,012	$2,669
	- Average Total Cost (Direct and Indirect)	$13,123	$18,695	$10,344	$19,089

Osteoporosis and Osteopenia in Australia from 2024 to 2033

Population Trends

There will be a 23% increase in osteoporosis and osteopenia by 2033 compared to 2023, highlighting 7.7 million people with poor bone health (low BMD), Table 19. Osteoporosis and osteopenia in women 70 years and older are predicted to increase by 41%, followed by 39% predicted growth in men 70 years and older. The annual growth within the next ten years is from 1.9 to 2.4%, representing an average annual growth rate of 2.1%. The largest single population group by 2033 will be men aged 50 - 69 years with osteopenia (16%), followed by women aged 50 - 69 years with osteopenia (15%).

Table 19: Projected Australian population, 2023 - 2033

	Women					Men					All	
	50-69 years		70+ years		Total	50-69 years		70+ years		Total		
Year	Osteoporosis	Osteopenia	Osteoporosis	Osteopenia	All Women	Osteoporosis	Osteopenia	Osteoporosis	Osteopenia	All Men	Total Women and Men	Annual growth
2023	406,171	1,525,201	756,326	806,582	3,494,280	95,551	1,623,384	193,868	887,009	2,799,812	6,294,092	
2024	412,116	1,547,525	784,004	836,099	3,579,744	96,890	1,646,136	200,779	918,629	2,862,434	6,442,178	**2.4%**
2025	417,123	1,566,324	812,696	866,698	3,662,841	98,022	1,665,356	207,870	951,072	2,922,319	6,585,160	**2.2%**
2026	421,379	1,582,308	842,308	898,277	3,744,272	98,954	1,681,198	215,367	985,375	2,980,894	6,725,166	**2.1%**
2027	425,241	1,596,811	872,531	930,509	3,825,092	99,750	1,694,720	222,816	1,019,459	3,036,745	6,861,836	**2.0%**
2028	428,682	1,609,732	903,602	963,645	3,905,661	100,448	1,706,577	230,357	1,053,961	3,091,344	6,997,005	**2.0%**
2029	432,224	1,623,031	935,078	997,212	3,987,546	101,143	1,718,383	238,067	1,089,234	3,146,826	7,134,372	**2.0%**
2030	435,718	1,636,150	966,876	1,031,123	4,069,868	101,873	1,730,788	245,764	1,124,454	3,202,879	7,272,747	**1.9%**
2031	439,535	1,650,483	999,770	1,066,203	4,155,991	102,712	1,745,049	253,829	1,161,351	3,262,941	7,418,931	**2.0%**
2032	443,731	1,666,239	1,031,781	1,100,340	4,242,091	103,671	1,761,342	261,716	1,197,439	3,324,169	7,566,259	**2.0%**
2033	448,642	1,684,682	1,063,091	1,133,731	4,330,146	104,818	1,780,830	269,337	1,232,306	3,387,292	7,717,438	**2.0%**
% change 2024 to 2033	**10%**	**10%**	**41%**	**41%**	**24%**	**10%**	**10%**	**39%**	**39%**	**21%**	**23%**	**2.1%**

Fractures Incidence 2024 – 2033

The total fracture population will increase by 24% by 2033 compared to 2024, Table 20. Fracture numbers are the highest for in women aged 70 years and older and are lowest for men aged 50-59 years. Fractures in women aged 70 years and older will increase by 35% by 2033 compared to 2024; this trend will be followed by men aged 70 years and older (34% increase over the 10-year period). Re-fractures[v] are higher in women. However, a 9-year increase in re-fractures is highest in men (12% in age 50-69 years and 31% in 70 years and older) compared to women (4% in age 50-69 years and 25% in 70 years and older). Re-fracture is predicted to be 6% of total fractures.

The total cost of all fractures in 2033 is predicted to be $4.9 billion, and the majority is predicted to occur from the prevention, treatment, and management of hip fracture (51%), followed by 33% for 'other' fractures, 11% for vertebral fractures and 5% for wrist fractures, Table 21. The total fracture cost for prevention, treatment, and management represents an increase of 28% from 2024 to 2033 (in constant dollars). Although women aged 70 years and older experience less than half of the total fractures (36%), they continue to have the highest fracture-related costs (56% of total costs), which are predicted to increase by 36% to $2.7 billion in 2033.

[v] Re-fractures were not included in the 2023 annual burden but have been carried forward from the 2023 fracture cohort and new fractures added each year.

Table 20: Annual number of all fractures (new and re-fractures), 2024-2033

Year	All Fractures	Number of Fractures				
		Women		Men		Total
		50-69 years	70+ years	50-69 years	70+ years	All Fractures
2024	New Fractures	49,070	76,530	24,033	29,504	179,137
	Re-fractures	2,147	5,885	1,795	2,161	11,987
	Total all Fractures	**51,217**	**82,415**	**25,828**	**31,665**	**191,125**
2025	New Fractures	49,782	79,622	24,336	30,561	184,300
	Re-fractures	2,077	5,605	1,857	2,176	11,714
	Total all Fractures	**51,859**	**85,227**	**26,192**	**32,737**	**196,015**
2026	New Fractures	50,281	82,534	24,558	31,667	189,040
	Re-fractures	2,089	5,737	1,897	2,216	11,938
	Total all Fractures	**52,369**	**88,271**	**26,455**	**33,883**	**200,979**
2027	New Fractures	50,737	85,490	24,752	32,759	193,738
	Re-fractures	2,120	5,991	1,924	2,324	12,359
	Total all Fractures	**52,857**	**91,480**	**26,676**	**35,084**	**206,097**
2028	New Fractures	51,142	88,531	24,922	33,866	198,463
	Re-fractures	2,140	6,205	1,940	2,404	12,689
	Total all Fractures	**53,282**	**94,736**	**26,863**	**36,271**	**211,151**
2029	New Fractures	51,566	91,606	25,095	34,999	203,266
	Re-fractures	2,157	6,425	1,954	2,485	13,021
	Total all Fractures	**53,723**	**98,032**	**27,049**	**37,484**	**216,287**
2030	New Fractures	51,982	94,711	25,276	36,128	208,097
	Re-fractures	2,174	6,649	1,968	2,568	13,359
	Total all Fractures	**54,156**	**101,360**	**27,244**	**38,696**	**221,457**
2031	New Fractures	52,441	97,934	25,487	37,314	213,176
	Re-fractures	2,192	6,874	1,982	2,651	13,700
	Total all Fractures	**54,633**	**104,808**	**27,469**	**39,966**	**226,875**
2032	New Fractures	52,945	101,043	25,727	38,469	218,184
	Re-fractures	2,211	7,108	1,998	2,738	14,056
	Total all Fractures	**55,156**	**108,151**	**27,725**	**41,207**	**232,240**
2033	New Fractures	53,539	104,087	26,015	39,584	223,225
	Re-fractures	2,233	7,334	2,017	2,823	14,407
	Total all Fractures	**55,771**	**111,422**	**28,032**	**42,407**	**237,632**
% change 2024 to 2033		**9%**	**35%**	**9%**	**34%**	**24%**

The highest fractures type was "other" fractures (45%) followed by hip (23%), vertebral (19%) and wrist fracture (13%). Over the next 10 years, the greatest fracture prevalence is from non-hip fractures which is 77%, compared to 23% from hip fractures. Percentages consistent across table and derived based on fracture type distribution.

Table 21: Annual total cost of all fractures – direct and indirect costs 2024–2033 ($2023)

Year	All Fractures	Total Cost of All Fractures ($2023) Women 50-69 years	Women 70+ years	Men 50-69 years	Men 70+ years	Total All Fractures
2024	Total Direct Costs	$643,409,671	$1,810,351,502	$288,237,060	$660,739,150	$3,402,737,383
	Total Indirect Costs	$72,308,546	$209,120,628	$33,372,803	$75,734,465	$390,536,442
	Total Cost – All Fractures	**$715,718,216**	**$2,019,472,130**	**$321,609,863**	**$736,473,615**	**$3,793,273,825**
2025	Total Direct Costs	$653,663,436	$1,882,093,473	$292,260,773	$685,861,113	$3,513,878,795
	Total Indirect Costs	$73,486,821	$217,477,444	$33,825,391	$82,598,074	$407,387,730
	Total Cost – All Fractures	**$727,150,257**	**$2,099,570,917**	**$326,086,165**	**$768,459,187**	**$3,921,266,524**
2026	Total Direct Costs	$660,210,162	$1,949,967,654	$295,126,480	$710,072,433	$3,615,376,729
	Total Indirect Costs	$74,224,122	$225,324,430	$34,153,622	$85,515,739	$419,217,912
	Total Cost – All Fractures	**$734,434,284**	**$2,175,292,083**	**$329,280,101**	**$795,588,172**	**$4,034,594,641**
2027	Total Direct Costs	$666,372,520	$2,020,928,844	$297,577,226	$735,249,285	$3,720,127,875
	Total Indirect Costs	$74,917,065	$233,525,767	$34,436,495	$88,549,866	$431,429,192
	Total Cost – All Fractures	**$741,289,584**	**$2,254,454,611**	**$332,013,721**	**$823,799,151**	**$4,151,557,067**
2028	Total Direct Costs	$671,729,029	$2,092,860,365	$299,659,257	$760,128,205	$3,824,376,855
	Total Indirect Costs	$75,519,301	$241,837,859	$34,677,236	$91,546,342	$443,580,737
	Total Cost – All Fractures	**$747,248,329**	**$2,334,698,223**	**$334,336,493**	**$851,674,546**	**$4,267,957,592**
2029	Total Direct Costs	$677,283,952	$2,165,669,483	$301,731,987	$785,565,137	$3,930,250,560
	Total Indirect Costs	$76,143,808	$250,251,609	$34,917,024	$94,609,918	$455,922,359
	Total Cost – All Fractures	**$753,427,761**	**$2,415,921,093**	**$336,649,011**	**$880,175,055**	**$4,386,172,919**
2030	Total Direct Costs	$682,752,489	$2,239,208,770	$303,909,889	$810,962,907	$4,036,834,054
	Total Indirect Costs	$76,758,614	$258,749,750	$35,169,020	$97,669,015	$468,346,399
	Total Cost – All Fractures	**$759,511,103**	**$2,497,958,520**	**$339,078,909**	**$908,631,921**	**$4,505,180,453**
2031	Total Direct Costs	$688,755,918	$2,315,383,654	$306,413,632	$837,572,744	$4,148,125,947
	Total Indirect Costs	$77,433,535	$267,551,999	$35,458,708	$100,873,593	$481,317,835
	Total Cost – All Fractures	$766,189,453	**$2,582,935,653**	**$341,872,339**	**$938,446,337**	**$4,629,443,782**
2032	Total Direct Costs	$695,357,832	$2,389,257,278	$309,273,837	$863,596,102	$4,257,485,050
	Total Indirect Costs	$78,175,739	$276,089,535	$35,789,658	$104,008,282	$494,063,215
	Total Cost – All Fractures	**$773,533,572**	**$2,665,346,813**	**$345,063,495**	**$967,604,384**	**$4,751,548,264**
2033	Total Direct Costs	$703,106,305	$2,461,521,353	$312,694,846	$888,736,284	$4,366,058,787
	Total Indirect Costs	$79,046,828	$284,440,815	$36,185,479	$107,036,610	$506,709,731
	Total Cost – All Fractures	**$782,153,133**	**$2,745,962,167**	**$348,880,324**	**$995,772,894**	**$4,872,768,519**
% change 2024 to 2033		**9%**	**36%**	**8%**	**35%**	**28%**

The highest fractures cost was from hip fracture (50%) followed by "other" fractures (33%), vertebral (11%) and wrist fractures (6%). Percentages consistent across years and derived based on fracture type distribution.

Cost by fracture type across 10-years: Hip: $21.8 billion, Other: $14.4 billion, Vertebral: $4.8 billion, Wrist: $2.4 billion.

Osteoporosis and osteopenia burden overview by state and territory presented in Appendix D.

Community Service Costs for Osteoporosis and Osteopenia

Irrespective of fracture, the annual cost of community care and services is predicted to be $1.8 billion by 2033, and this is a 40% increase compared to 2024, Table 22. The cost of community care and services represents 38% of the total direct costs of osteoporosis and osteopenia in 2033. Total cost over the next ten years is predicted to be $15.8 billion which is a 46% increase in cost compared to the last ten years ($10.8 billion). 44% of total community costs are for GP management. Assuming there is no change in the pattern of use for DXA scan, vitamin D tests, routine pathology, and GPs, this cost is predicted to increase by 20% by the year 2033.

Table 22: Annual cost of community services for osteoporosis and osteopenia, 2024–2033 ($2023)

Community Healthcare Service	Annual Total Cost ($2023)									
	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Bone active Medication	$258,537,932	$289,345,530	$302,401,113	$310,355,824	$318,327,408	$326,414,392	$334,565,867	$343,041,201	$351,483,577	$359,914,041
DXA scan	$83,158,486	$85,928,599	$88,711,229	$91,526,930	$94,391,582	$97,300,143	$100,230,314	$103,279,614	$106,262,624	$109,199,415
Vitamin D Test	$125,783,521	$128,575,254	$131,307,071	$133,977,353	$136,616,516	$139,298,622	$142,000,380	$144,854,636	$147,731,216	$150,682,970
Routine Pathology Test	$175,871,453	$179,774,876	$183,594,522	$187,328,131	$191,018,228	$194,768,368	$198,545,986	$202,536,828	$206,558,884	$210,686,047
Community GP Visits	$640,094,783	$654,301,525	$668,203,360	$681,792,053	$695,222,384	$708,871,247	$722,620,116	$737,145,027	$751,783,541	$766,804,603
Residential Aged Care – previous fracture	$24,887,665	$53,838,018	$81,123,998	$106,872,898	$131,247,364	$154,414,380	$176,512,287	$197,655,947	$217,992,462	$237,560,386
All Total Annual Cost	**$1,308,333,841**	**$1,391,763,803**	**$1,455,341,293**	**$1,511,853,189**	**$1,566,823,482**	**$1,621,067,153**	**$1,674,474,951**	**$1,728,513,253**	**$1,781,812,304**	**$1,834,847,462**

Table 23 provides an annual summary of total direct and indirect costs inflated to future dollars using an inflation rate of 2.04%.[9] For the 2023 comparison, the total direct and indirect costs ranged from $4.1 billion (in $2023) to almost $7.1 billion (in $2033). The cost is predicted to increase to $8.3 billion with the inclusion of re-fractures and residential care. The total increase in cost is 58% by 2033 compared to 2023.

Table 23: Annual direct and indirect costs (inflated) for osteoporosis and osteopenia, 2023–2033

Total Cost ($)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
TOTAL DIRECT and INDIRECT COST (for 2023 comparison)	$4,120,326,671	$4,662,599,649	$4,924,831,261	$5,169,015,140	$5,414,791,023	$5,669,731,427	$5,935,113,480	$6,209,949,705	$6,501,018,007	$6,798,707,493	$7,105,692,243
TOTAL DIRECT and INDIRECT COST (with re-fractures & residential care)*		$5,315,806,652	$5,644,866,101	$5,951,810,238	$6,265,132,679	$6,586,387,304	$6,919,395,231	$7,263,197,569	$7,625,207,006	$7,995,417,132	$8,376,124,811

* Total direct cost (with re-fracture costs and residential care is not comparable with 2023 costs). Inflation rate=2.04% for each year, therefore these costs are in current dollars.

Fractures Averted Due to Osteoporosis (Bone Active) Medication

Relatively conservative assumptions were made concerning the use of osteoporosis bone active medications in the 2024-2033 population. Yet despite these assumptions, the prediction is that between 18,284 and 22,432 fractures will be averted annually directly attributable to osteoporosis bone active medication, Table 24. The annual savings in direct healthcare costs attributable to averted fractures are predicted to range from $289.9 million in 2024 to $378.2 million in 2033. Over the 10-year period, the total number of fractures averted is predicted to be 201,208, and the total averted cost is predicted to be $3.3 billion.

The model assumes that osteoporosis (bone active) medications are prescribed to all individuals with osteoporosis or osteopenia who have experienced a fracture in the year of the fracture, and those with osteoporosis without a fracture. However, the base year assumption of 100% osteoporosis (bone active) medication initiation in the year of a fracture may lead to overestimation of fracture risk reduction in the following year.

Table 24: Avoided fractures and cost savings due to bone active medications, 2024–2033

Year	Fracture Type	Number of Fractures Avoided					Direct Healthcare Cost of Fractures Avoided ($2023)				
		Women		Men		Total Fractures Avoided	Women		Men		Total Cost Savings
		50-69 years	70+ years	50-69 years	70+ years		50-69 years	70+ years	50-69 years	70+ years	
2024	Hip	198	2,248	100	592	3,138	$7,963,371	$79,464,989	$4,127,947	$23,286,337	$114,842,644
	Wrist	983	1,769	137	150	3,038	$5,855,838	$12,508,438	$978,300	$1,396,731	$20,739,307
	Vertebral	393	1,207	116	243	1,959	$3,842,778	$9,137,113	$946,766	$3,067,999	$16,994,656
	Other	2,833	3,820	2,021	1,474	10,148	$26,442,326	$62,730,946	$24,416,705	$23,738,622	$137,328,599
	Total	**4,408**	**9,043**	**2,373**	**2,460**	**18,284**	**$44,104,313**	**$163,841,486**	**$30,469,718**	**$51,489,689**	**$289,905,207**
2025	Hip	244	2,572	113	691	3,619	$9,812,983	$90,901,151	$4,668,923	$27,163,437	$132,546,495
	Wrist	953	1,638	129	125	2,845	$5,678,229	$11,580,927	$923,528	$1,166,319	$19,349,004
	Vertebral	471	1,392	145	287	2,295	$4,601,644	$10,543,369	$1,183,380	$3,617,734	$19,946,127
	Other	2,634	3,615	1,878	1,389	9,516	$24,582,210	$59,370,965	$22,691,832	$22,366,726	$129,011,733
	Total	**4,302**	**9,217**	**2,265**	**2,492**	**18,276**	**$44,675,067**	**$172,396,411**	**$29,467,663**	**$54,314,217**	**$300,853,358**
2026	Hip	250	2,683	115	721	3,768	$10,036,230	$94,833,455	$4,768,421	$28,334,955	$137,973,061
	Wrist	965	1,696	130	129	2,921	$5,749,703	$11,994,336	$934,145	$1,201,141	$19,879,325
	Vertebral	478	1,429	141	293	2,340	$4,666,427	$10,822,996	$1,148,750	$3,690,581	$20,328,754
	Other	2,665	3,746	1,898	1,436	9,746	$24,870,739	$61,525,997	$22,933,017	$23,124,607	$132,454,359
	Total	**4,357**	**9,554**	**2,285**	**2,578**	**18,775**	**$45,323,099**	**$179,176,784**	**$29,784,332**	**$56,351,284**	**$310,635,499**
2027	Hip	252	2,782	116	747	3,897	$10,144,341	$98,328,047	$4,815,454	$29,370,183	$142,658,025
	Wrist	975	1,758	132	133	2,998	$5,808,242	$12,432,560	$943,641	$1,244,509	$20,428,953
	Vertebral	483	1,482	142	303	2,409	$4,716,213	$11,218,524	$1,158,523	$3,823,007	$20,916,267
	Other	2,692	3,883	1,917	1,488	9,981	$25,123,182	$63,775,466	$23,164,221	$23,964,506	$136,027,375
	Total	**4,402**	**9,904**	**2,307**	**2,672**	**19,286**	**$45,791,978**	**$185,754,597**	**$30,081,840**	**$58,402,205**	**$320,030,620**
2028	Hip	255	2,882	117	773	4,026	$10,237,897	$101,860,742	$4,854,499	$30,389,355	$147,342,493
	Wrist	984	1,821	133	138	3,076	$5,861,228	$12,878,371	$951,260	$1,287,448	$20,978,308
	Vertebral	487	1,535	143	314	2,479	$4,760,000	$11,621,947	$1,167,774	$3,956,141	$21,505,862
	Other	2,717	4,023	1,933	1,540	10,212	$25,352,307	$66,062,511	$23,350,785	$24,792,004	$139,557,608
	Total	**4,442**	**10,260**	**2,326**	**2,764**	**19,793**	**$46,211,432**	**$192,423,572**	**$30,324,318**	**$60,424,948**	**$329,384,271**
2029	Hip	257	2,984	118	799	4,158	$10,321,068	$105,489,245	$4,888,802	$31,419,098	$152,118,213
	Wrist	992	1,886	134	143	3,154	$5,908,353	$13,336,795	$957,864	$1,330,964	$21,533,976
	Vertebral	491	1,590	144	324	2,549	$4,799,058	$12,036,192	$1,176,111	$4,090,442	$22,101,803
	Other	2,738	4,166	1,946	1,592	10,442	$25,556,137	$68,414,118	$23,512,775	$25,630,075	$143,113,105
	Total	**4,478**	**10,625**	**2,342**	**2,858**	**20,303**	**$46,584,617**	**$199,276,349**	**$30,535,552**	**$62,470,579**	**$338,867,097**
2030	Hip	259	3,088	119	826	4,292	$10,406,309	$109,166,297	$4,922,647	$32,471,184	$156,966,436
	Wrist	1,000	1,951	135	147	3,234	$5,957,223	$13,800,745	$964,497	$1,375,478	$22,097,943
	Vertebral	495	1,645	145	335	2,621	$4,838,604	$12,456,598	$1,184,231	$4,227,549	$22,706,981
	Other	2,761	4,311	1,960	1,645	10,676	$25,767,523	$70,794,065	$23,675,563	$26,487,284	$146,724,434
	Total	**4,515**	**10,995**	**2,358**	**2,953**	**20,822**	**$46,969,659**	**$206,217,704**	**$30,746,937**	**$64,561,496**	**$348,495,795**
2031	Hip	261	3,193	120	853	4,426	$10,490,472	$112,881,337	$4,958,049	$33,522,778	$161,852,636
	Wrist	1,008	2,018	136	152	3,314	$6,005,322	$14,269,366	$971,493	$1,419,859	$22,666,041
	Vertebral	499	1,701	146	346	2,693	$4,877,811	$12,881,417	$1,192,694	$4,364,953	$23,316,875
	Other	2,783	4,457	1,974	1,698	10,912	$25,975,572	$73,197,976	$23,847,297	$27,341,940	$150,362,785
	Total	**4,552**	**11,369**	**2,375**	**3,049**	**21,345**	**$47,349,177**	**$213,230,096**	**$30,969,533**	**$66,649,530**	**$358,198,337**
2032	Hip	263	3,302	121	881	4,566	$10,582,177	$116,721,736	$4,998,458	$34,622,107	$166,924,478
	Wrist	1,017	2,086	137	157	3,397	$6,058,132	$14,754,845	$979,598	$1,466,491	$23,259,066
	Vertebral	503	1,759	147	357	2,767	$4,920,181	$13,319,577	$1,202,248	$4,507,829	$23,949,836
	Other	2,808	4,609	1,990	1,754	11,161	$26,203,994	$75,688,355	$24,046,240	$28,239,910	$154,178,499
	Total	**4,592**	**11,756**	**2,395**	**3,149**	**21,892**	**$47,764,484**	**$220,484,514**	**$31,226,544**	**$68,836,337**	**$368,311,879**
2033	Hip	266	3,408	122	908	4,703	$10,682,964	$120,465,734	$5,044,635	$35,700,614	$171,893,947
	Wrist	1,027	2,153	138	162	3,480	$6,116,200	$15,225,471	$988,851	$1,511,907	$23,842,429
	Vertebral	508	1,816	149	369	2,842	$4,966,745	$13,749,333	$1,213,195	$4,649,103	$24,578,376
	Other	2,835	4,756	2,009	1,808	11,408	$26,455,160	$78,102,565	$24,273,391	$29,114,493	$157,945,609
	Total	**4,636**	**12,132**	**2,418**	**3,247**	**22,432**	**$48,221,069**	**$227,543,103**	**$31,520,072**	**$70,976,116**	**$378,260,361**
Total 2024 to 2033		**44,684**	**104,856**	**23,446**	**28,222**	**201,208**	**$462,994,895**	**$1,960,344,617**	**$305,126,510**	**$614,476,401**	**3,342,942,423**

Summary

Over the Next 10 Years

- A significant increase in the population predicted to have osteoporosis or osteopenia.
- Osteoporosis and osteopenia contribute a significant financial burden to the Australian health system and the community.
- Bone active medications will avert fractures in people with osteoporosis and osteopenia and can provide substantial cost savings in osteoporosis and osteopenia-related fracture prevention.
- Initiate osteoporosis treatment for women and men, aged 50 years and older, with proven minimal trauma fracture. Treatment is recommended for women and men (50 years and older) diagnosed with osteoporosis (no fracture history). Refer to national guidelines for osteoporosis risk assessment, diagnosis and management.
- The burden of disease in poor bone health is underestimated and under-prioritised.
- Prevention programs should target both men and women aged 50 years and older.
- There is an unrecognised fracture risk in the male population aged 50 years and older.

Key Findings

- It was predicted that 6.2 million people in Australia would be living with osteoporosis and osteopenia in 2023. This is 23% of the total population and 67% of people aged 50 years and older.
- Of the population aged 50 years and older 52% of all minimal trauma fractures were related to osteopenia.
- The highest number of fractures were in osteoporosis women aged 70 years and older.
- In 2023, there were likely to be 5,108 (3%) deaths related to minimal trauma fractures.
- In 2023, 125,696 (65%) of people who had a minimal trauma fracture were hospitalised, and the majority were due to a hip fracture. The average acute hospital length of stay for hip fracture was 10.3 days, and for rehabilitation, it was 22.45 days.
- There is an increased disease burden on men. The increase in refractures in 2024-2033 was highest among men (12% in aged 50-69 years and 31% in age 70 years and older) compared to women (4% in aged 50-69 years and 25% in age 70 years and older).
- The economic burden associated with osteoporosis and osteopenia among Australians aged 50 years and older is significant ($4.8 billion in 2023 and $8.3 billion in 2033). The costs associated with fractures is the largest component cost of the disease and total direct costs represent 91% of total costs.
- Total cost of osteoporosis, osteopenia and fractures over 10 years estimated at $67.9 billion.

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Appendix A: Utilisation Rates for Service Use Following Fractures

Post Fracture Utilisation Rates			50-69 years		70+ years	
			Men	Women	Men	Women
Hospitalisation (AusICUROS)		Hip	1.00	1.00	1.00	1.00
		Wrist	0.39	0.45	0.50	0.63
		Vertebral	0.50	0.33	0.50	0.67
		Other	0.43	0.58	0.67	0.72
Ambulance Paramedic (AusICUROS)		Hip	1.00	0.90	1.00	0.93
		Wrist	0.13	0.14	0.36	0.31
		Vertebral	0.58	0.67	0.40	0.53
		Other	0.38	0.32	0.75	0.53
ED Presentation (not admitted) (AusICUROS)		Hip	0.00	0.00	0.00	0.00
		Wrist	0.53	0.53	0.48	0.35
		Vertebral	0.48	0.58	0.48	0.31
		Other	0.55	0.40	0.31	0.26
Hospital Outpatient Fracture Clinic (AusICUROS)		Hip	0.61	0.61	0.61	0.61
		Wrist	0.35	0.35	0.35	0.35
		Vertebral	0.41	0.41	0.41	0.41
		Other	0.39	0.39	0.39	0.39
Non-admitted Fracture Management (GP, X-ray) (AusICUROS)		Hip	0.00	0.00	0.00	0.00
		Wrist	0.08	0.03	0.02	0.02
		Vertebral	0.02	0.09	0.02	0.02
		Other	0.02	0.02	0.02	0.02
Orthopaedic Specialist (AusICUROS)		Hip	0.37	0.37	0.37	0.37
		Wrist	0.30	0.30	0.30	0.30
		Vertebral	0.28	0.28	0.28	0.28
		Other	0.30	0.30	0.30	0.30
Community Physiotherapy (AusICUROS)		Hip	0.65	0.65	0.65	0.65
		Wrist	0.58	0.58	0.58	0.58
		Vertebral	0.46	0.46	0.46	0.46
		Other	0.66	0.66	0.66	0.66
Rehabilitation/Subacute Care (AusICUROS)		Hip	0.39	0.39	0.32	0.32
		Non-hip	0.18	0.18	0.14	0.14
Residential Aged Care		Hip (AIHW)	0.00	0.00	0.11	0.11
		Non-hip (AusICUROS)	0.00	0.00	0.01	0.01
Community-based Services (AusICUROS)	Home help	Hip	0.00	0.08	0.27	0.33
		Wrist	0.00	0.02	0.06	0.14
		Vertebral	0.00	0.17	0.05	0.43
		Other	0.02	0.13	0.17	0.28
	Meals on Wheels	Hip	0.00	0.00	0.03	0.06
		Wrist	0.00	0.00	0.00	0.01
		Vertebral	0.00	0.00	0.05	0.10
		Other	0.00	0.00	0.13	0.05
	Informal community care	Hip	0.02	0.05	0.08	0.28
		Wrist	0.02	0.05	0.00	0.11
		Vertebral	0.13	0.13	0.10	0.27
		Other	0.17	0.17	0.33	0.22
Mortality (post fracture) (AusICUROS)		Hip	0.01	0.01	0.08	0.08
		Non-hip	0.01	0.01	0.05	0.05

(Note that 1 assumes 100%)

Source: Osteoporosis costing all Australians

Appendix B: Unit Costs, Source and Assumptions

Parameter	Unit Cost ($2023)	Unit	Assumptions	Data Source
Ambulance	$1,358.00	per transport	Same average emergency transfer cost for both metropolitan and rural/remote regions	Ambulance Victoria fee schedule 2023-24
Emergency Department (Non-admitted)				
Wrist	$410.00	per visit	ED non admitted Triage 5 Injury	Independent Health and Aged Care Pricing Authority. 2023
Non-wrist, non-hip	$550.00	per visit	ED non admitted Triage 4 Injury	Independent Health and Aged Care Pricing Authority. 2023
Fracture or Orthopaedic Hospital Outpatient Clinic	$394.00	per visit		Independent Health and Aged Care Pricing Authority. 2023
General Practitioner	$41.40	per visit		MBS Item 23
Medical specialist	$95.60	per visit		MBS Item 104
Routine pathology test	$13.65	per group of 3 tests	Based on 3 tests for renal function (urea and creatinine) and serum calcium; 1 group of 3 tests/year per person	MBS Item 66506
Serum Vitamin D Test	$39.05	per test	Based on full blood examination; assume 1 every 2 years for everyone (fracture and non-fracture population)	MBS Item 66835
Diagnostic Imaging				
Hip	$51.05	per X-ray	Where no ED or admission, 1 X-ray	MBS Item 57712, Diagnostic imaging with referral
Hand, wrist, forearm, elbow, humerus	$32.20	per X-ray	Where no ED or admission, 1 X-ray	MBS Item 57506, Diagnostic imaging no referral
Spine (4 regions)	$119.15	per X-ray	Where no ED or admission, 1 X-ray	MBS Item 58108, Diagnostic imaging with referral
Foot, ankle, knee or femur	$35.25	per X-ray	Where no ED or admission, 1 X-ray	MBS Item 57518, Diagnostic imaging no referral
Physiotherapist (community)	$68.55	per session		MBS Item 10960
Rehabilitation costs	$15,453	per episode	Mean episode cost all fractures, both age groups. 2012 unit costs inflated to 2023 AUD	2012 Osteoporosis All Australia Report
Residential aged care	$203.47	per day	2012 unit costs inflated to 2023 AUD	2012 Osteoporosis All Australia Report
Personal Care Assistant (PCA)	$36.30	per hour	Aged care worker level 7 casual rate	Fair Work Ombudsman 2023 December
Home care (informal care)	$36.30	per hour	Cost assumed as for PCA, Aged care worker level 7 casual rate	Fair Work Ombudsman 2023 December
Meals on Wheels	$30.75	per day	The average cost/meal ranges from 8.5-12 AUD. Assumed as average cost per meal is $10.25 and per day $30.75	Meals on Wheels Australia website 2023
Adult wage	$279.71	per day	Average fulltime adult weekly wage rate (seasonally adjusted), Australia Nov 2023	Australian Bureau of Statistics (ABS)

Appendix C:
Pharmaceuticals Used for Osteoporosis and Osteopenia, 2023

Medication Group	Name, form and strength	Frequency	PBS Item Code	Unit (Script) Price ($2023)	Total services 2023	Total PBS and RPBS benefits paid
Teriparatide	Teriparatide, injection 20 microgram	Daily	**14093R**	$176.83	132	$33,537
Raloxifene	Raloxifene 60mg	Daily	**8363E**	$29.83	36,227	$949,271
Zoledronic Acid	Zoledronic acid, injection 5mg/100ml	Once a year	**9288W**	$74.52	51,967	$2,977,580
Romosozumab	Romosozumab 105 mg/1.17 ml injection	Once a month	**12301K**	$405.66	8,903	$3,492,448
Alendronate	Alendronate tablet 70mg	Weekly	**8511Y**	$16.90	284,604	$3,589,745
Risedronate	Risedronate Sodium, tablet 35mg	Weekly	**8972F**	$33.41	356,080	$10,125,544
Denosumab	Denosumab, injection 60mg/ml	6 Monthly	**5457F**	$251.50	1,083,756	$272,001,116

Appendix D: State Analysis – Osteoporosis Burden of Disease in Australia, 2025, 2029, 2033

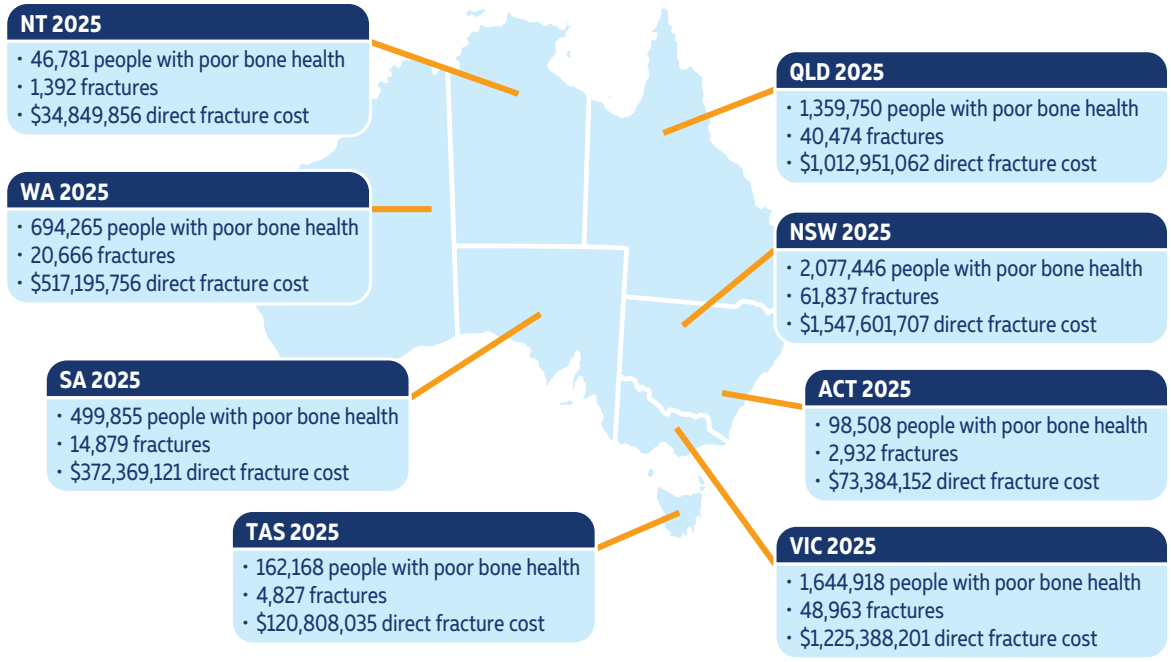
Method

The state prevalence of osteoporosis, osteopenia, and fractures was estimated using the national total disease prevalence and state population proportion. The cost of poor bone health was estimated using the state prevalence of osteoporosis and osteopenia and the average disease cost per person for the corresponding years (2025, 2029 and 2033). The average disease cost per person was calculated using the predicted direct and indirect costs of osteoporosis and osteopenia and the predicted total osteoporosis and osteopenia population in the corresponding years.

Results *Osteoporosis burden of disease by state, 2025, 2029 and 2033*

The state analysis reports estimates for osteoporosis and osteopenia prevalence, minimal trauma fracture prevalence and direct and indirect costs for the years 2025, 2029 and 2033.

2025 Burden of osteoporosis and osteopenia: State and territory overview



	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	Total
Indirect and direct cost in 2025	$79,478,319	$1,676,121,862	$37,743,953	$1,097,071,303	$403,292,411	$130,840,504	$1,327,150,224	$560,146,134	**$5,311,844,710**

2029 Burden of osteoporosis and osteopenia: State and territory overview

State	Prevalence osteoporosis/ osteopenia in 2029	Minimal trauma fracture prevalence in 2029	Direct cost in 2029	Indirect and direct cost in 2029
ACT	110,278	3,343	$85,808,327	$92,855,651
NSW	2,240,238	67,916	$1,743,149,144	$1,886,311,670
NT	50,964	1,545	$39,655,181	$42,912,009
QLD	1,474,218	44,693	$1,147,101,667	$1,241,311,605
SA	526,924	15,974	$410,004,156	$443,677,253
TAS	168,431	5,106	$131,057,652	$141,821,243
VIC	1,804,264	54,698	$1,403,913,851	$1,519,215,433
WA	757,529	22,965	$589,439,782	$637,849,689
Total	**7,132,846**	**216,241**	**$5,550,129,759**	**$6,005,954,553**

2033 Burden of osteoporosis and osteopenia: State and territory overview

State	Prevalence osteoporosis/ osteopenia in 2033	Minimal trauma fracture prevalence in 2033	Direct cost in 2033	Indirect and direct cost in 2033
ACT	122,698	3,778	$90,467,893	$106,642,722
NSW	2,414,213	74,337	$1,780,056,837	$2,098,314,665
NT	55,121	1,697	$40,641,689	$47,908,051
QLD	1,591,450	49,003	$1,173,414,098	$1,383,209,770
SA	554,601	17,077	$408,920,521	$482,031,757
TAS	174,629	5,377	$128,758,197	$151,778,981
VIC	1,978,705	60,927	$1,458,946,825	$1,719,793,130
WA	824,773	25,396	$608,125,190	$716,852,393
Total	**7,716,190**	**237,593**	**$5,689,331,250**	**$6,706,531,470**

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Osteoporosis and fractures in Australia. A burden of disease analysis 2023 – 2033

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