Painful Realities:

The economic impact of arthritis in Australia in 2007

Arthritis AUSTRALIA

ACCESS ECONOMICS Pty Limited

REPORT BY ACCESS ECONOMICS PTY LIMITED
FOR ARTHRITIS AUSTRALIA 31 JULY 2007

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Access Economics acknowledges with appreciation the comments, prior research and expert input from:

Professor Graeme Jones
Medical Director, Arthritis Australia
Director of Rheumatology, Royal Hobart Hospital
Head of Musculoskeletal Unit, Menzies Institute, University of Tasmania

Ainslie Cahill
Chief Executive Officer, Arthritis Australia

Jean McQuade
Manager Health, Education and Research Services
Arthritis Western Australia

Sophie Coleman
Research Programs Coordinator
Arthritis Western Australia

Jenny Bennett
Education Services Manager
Arthritis South Australia

GLOSSARY OF COMMON ABBREVIATIONS

ABS	Australian Bureau of Statistics
AF	attributable fraction
AIHW	Australian Institute of Health and Welfare
AR-DRG	Australian Refined Diagnosis Related Groups
ASH	arthritis self help
ATO	Australian Tax Office
AWE	average weekly earnings
BoD	burden of disease
BMI	body mass index
BRM	biological response modifier
BTRE	Bureau of Transport and Regional Economics (formerly BTE)
BTE	Bureau of Transport Economics
CACP	Community Aged Care Packages
CDSMP	Chronic Disease Self Management Program
CEA	cost effectiveness analysis
CPI	Consumer Price Index
DALY	Disability Adjusted Life Year
DMARD	Disease-Modifying Anti-Rheumatic Drugs
DSP	Disability Support Pension
DWL	deadweight loss
EACH	Extended Aged Care at Home
EQ-5D	EuroQol 5 dimension (a measure of quality of life) – based on mobility, self-care, usual activity, pain/discomfort, and anxiety/depression
FACSiA	Department of Families, Community Services and Indigenous Affairs
GDP	gross domestic product
HACC	Home and Community Care Program
ICD	International Classification of Diseases
ICER	incremental cost effectiveness ratio
NHPA	National Health Priority Area
NHS	National Health Survey
NPV	net present value
NSA	Newstart Allowance
NSAIDS	Non-Steroidal Anti-Inflammatory Drugs
OA	osteoarthritis
OAK	Osteoarthritis of the Knee (Program)
OECD	Organisation for Economic Cooperation and Development
QALY	Quality Adjusted Life Year

GLOSSARY OF COMMON ABBREVIATIONS

RA	rheumatoid arthritis
RCT	randomised controlled trial
SDAC	Survey of Disability, Ageing and Carers (ABS)
SF-36	Short-Form 36 Health Survey
SKA	Sickness Allowance
SLE	Systemic lupus erythematosus
TGA	Therapeutic Goods Administration
THA	total hip arthropathy
VLY	Value of a Life Year
VSL	Value of a Statistical Life
WAVES	Warm water exercise programs
WOMAC	Western Ontario and McMaster Universities Arthritis index
YLD	Years of Healthy Life Lost due to Disability
YLL	Years of Life Lost due to Premature Death

EXECUTIVE SUMMARY

This report, prepared for Arthritis Australia, assesses the economic costs to Australia of one of the country's most prevalent diseases, arthritis. There are more than 100 known types of arthritis, the most common being osteoarthritis (OA), rheumatoid arthritis (RA), systemic lupus erythematosus (SLE or lupus), gout and spondyloarthropathies.

In preparing this report, Access Economics sourced data from Australian Bureau of Statistics' *National Health Survey and Survey of Disability, Ageing and Carers*, as well as various publications and databases of the Australian Institute of Health and Welfare. Additional sources included the Commonwealth Department of Health and Ageing and the Department of Community Services and Indigenous Affairs. In areas where insufficient data were available, literature, including both local and overseas, was sourced to facilitate robust estimations.

Prevalence in Australia

Nearly one in five Australians has arthritis; indeed more Australians have arthritis than any other national health priority condition. In 2007, there are an estimated 3.85 million Australians with arthritis, including 2.4 million in the working age population (15-64 years). Arthritic conditions are more prevalent among females, with over 2 million females (19.9% of Australian females) and 1.8 million males (17.1% of Australian males) estimated to have arthritis in 2007. Rates of arthritis prevalence increase with age to the point where half of all Australians aged over 80 have some form of arthritis.

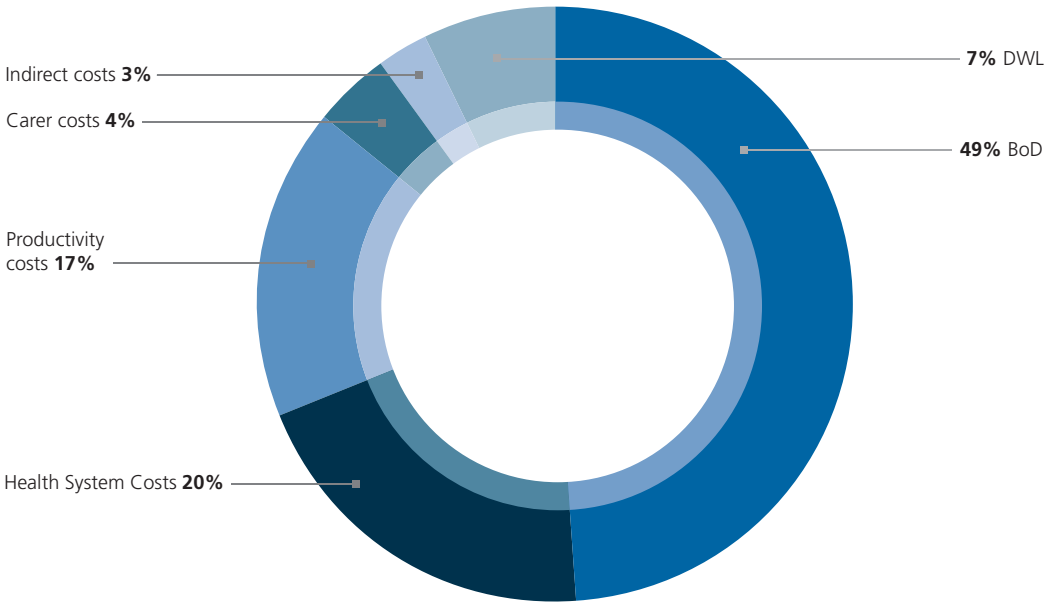
It is estimated that 78% of people with arthritis reside in New South Wales, Victoria and Queensland, indicative of the concentration of Australia's population on the eastern sea board. Given the higher prevalence of arthritis among the elderly, the states with the older populations, such as South Australia and Tasmania have higher 'raw' prevalence rates, both around 20%. Conversely, ACT and the Northern Territory, the jurisdictions with the youngest populations, have the lowest prevalence rates with 16.9 and 13.3% respectively.

By 2050, it is projected there will be 7 million Australians with arthritis - 23.9% of the projected population of 29.4 million. This is forecast to include 3.3 million males (22.5% of males) and 3.7 million females (25.2% of females). OA is projected to remain the most prevalent arthritic condition, affecting 3.1 million Australians, while the prevalence of RA is projected to be 0.9 million in 2050. In keeping with demographic trends for Australia, the number of people with arthritis is projected to grow most rapidly in the Northern Territory and Queensland, increasing by 140% and 136% respectively in these jurisdictions relative to 2007.

Total cost of arthritis in 2007

In 2007, the total cost of arthritis to the Australian economy is estimated to be $23.9 billion, an increase of more than $4 billion on the cost calculated by Access Economics in 2004. Almost half of this is due to the non-financial (burden of disease) costs, while health system costs including hospitals, pharmaceuticals and aged care account for 20%. A further 17% of total costs are productivity costs, reflecting the impact of arthritis on employment and workforce participation in Australia.

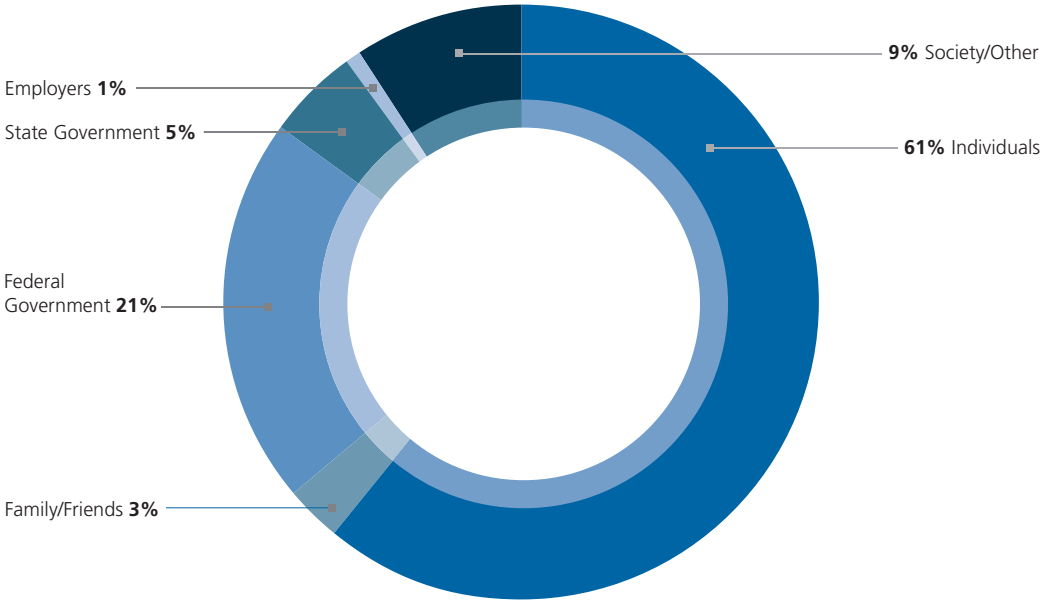
COSTS OF ARTHRITIS, BY COST TYPE, 2007 (% TOTAL)



Note: BoD = burden of disease; DWL = deadweight loss.

The main bearers of arthritis costs in Australia are the individuals with the condition themselves who, it is estimated, shoulder 61% of the total cost – largely as a result of being the bearer of the burden of disease. The Federal Government is the second biggest cost bearer, a consequence of funding the lion's share of the large health system expenditures on arthritis and also bearing the lost taxation revenues associated with the considerable productivity losses arising from the condition.

COSTS OF ARTHRITIS, BY COST BEARER, 2007 (% TOTAL)



EXECUTIVE SUMMARY

Arthritis health expenditure

Access Economics estimates that in 2007, the allocated[1] health system expenditure associated with arthritis is $4.2 billion - $1,100 per person with arthritis. $2 billion of this is estimated to have been allocated to OA, while health expenditure on RA was estimated at $422 million. The largest component of health system cost was hospitals, which accounted for 44% of total allocated expenditure. Aged care homes and pharmaceuticals were also significant components, representing 23% and 14% of allocated expenditure respectively. Health expenditure on arthritis exceeded that on coronary heart disease, depression, stroke, diabetes and asthma.

Other financial costs of arthritis

Other financial costs resulting from arthritis are estimated to be $7.6 billion in 2007. Over half of this was productivity costs, reflecting the reduced employment rates and increased absenteeism that results from arthritic conditions. The costs of informal care were estimated to be over $1 billion in 2007, indicative of arthritis' degenerative nature, and the need for individuals with the condition to be assisted and supported. People with arthritis may also require aids or devices to assist them in carrying out their daily activities, or make additions or modifications to their home to ensure safety and mobility. The cost of these is estimated to be $211 million in 2007.

The burden of disease

The financial costs of arthritis are only one aspect of the total economic costs of arthritic conditions, the other, the non-financial component, is the burden of disease. The pain and suffering that arthritis patients endure as a result of their condition can decrease their quality of life, and while mortality rates for arthritis are low, there is also a cost in terms of years of life lost. In 2007 the years of life lost due to disease is an estimated 91,479 while the years of life lost due to premature death is estimated to be 2,376. Consequently, the total disability adjusted life years (DALYs) due to arthritis is estimated to be 93,855, or in dollar terms, the net cost of loss of wellbeing is $11.7 billion in 2007.

Jurisdictional costs of arthritis

While the cost of health care delivery (per case) does vary to some degree between jurisdictions, the main driver of cost shares is prevalence, which in turn reflects Australia's demography. As such, New South Wales bears the greatest share of arthritis costs, 33%. Victoria (25%) and Queensland (19%) are the second and third largest bearers and, naturally, the ACT and NT bear only small fractions of total arthritis costs (less than 1% each).

Obesity and osteoarthritis

Obesity is one of the most preventable risk factors for OA; in fact, obese people are 2.4 times more likely to have OA than people of normal weight (Access Economics, 2006c). Access Economics undertook to model the impact of obesity on OA under three obesity scenarios, capturing what may be considered the upper and lower bounds for obesity prevalence in Australia to 2050. The findings of the analysis revealed that if obesity remains stable at current levels (around 16% of the population), projected prevalence of OA is 10.7% of the population in 2050 (baseline scenario). However, if obesity continues to grow at the rate witnessed over the last decade, such that around 47% of men and 35% of women are obese in 2050, OA is projected to increase in prevalence to 11.2% of males and 14.5% of females, affecting nearly 3.8 million Australians. Finally, if obesity were eliminated by 2050, OA would be reduced by 425,000 persons, relative to the baseline scenario in 2050.

[1] Allocated health expenditure is that proportion of health expenditure that is able to be allocated by disease.

Cost effective interventions

There is a range of treatment and management options available for arthritis and naturally the cost effectiveness (measured in dollars spent per Quality Adjusted Life Year gained) of these varies considerably. Overall, the evidence available suggests that surgical interventions appear to be very cost effective treatment for some forms of arthritis, and in fact there is evidence to suggest that some surgical interventions are even cost-saving (reducing overall financial costs and gains QALYs), suggesting priority be given to reducing waiting lists for orthopaedic surgery. The cost effectiveness of pharmacotherapy and lifestyle interventions varies significantly depending on the intervention and there is a need to evaluate the efficacy of such interventions, in light of the alternatives, to help facilitate the most efficient allocation of resources. The use of pharmacotherapy is the usual first line treatment for OA, while newer treatments for RA such as anti-TNF-alpha agents and other biologic response modifiers may also be cost effective, in particular for some target populations. In Australia, lifestyle interventions have been widely implemented, with a range of programs in place across the nation. In Western Australia, the Osteoarthritis of the Knee (OAK) Program appears, prima facie, to be relatively successful. The program is low cost in nature, and there are indications that it may facilitate both cost savings in the formal health care sector and improvements in the health and wellbeing of its participants. A full cost effectiveness analysis of the program would appear a worthwhile exercise on which to base decision-making regarding the future of the program.

Access Economics

31 July 2007

INTRODUCTION 1.

Access Economics was commissioned by Arthritis Australia to conduct an economic analysis of arthritis in Australia in 2007 covering:

- prevalence estimates of osteoarthritis, rheumatoid arthritis and other arthritis from 2007 to 2050 for Australia and each of the eight State/Territory jurisdictions;
- discussion of risk factors for arthritis including a simulation of changing prevalence of obesity and its impact on osteoarthritis prevalence projections;
- the economic impact of arthritis in terms of health expenditures, other financial costs (productivity losses, informal care, equipment and devices) and the burden of disease for Australia and the jurisdictions; and
- discussion and presentation of cost effective interventions for arthritis, including pharmacotherapies, self-management programs and orthopaedic surgery (and the associated cost of waiting in queues).

This report presents the methods and findings of this analysis.

Chapter 2 provides a snapshot overview of arthritis, its causes, disease progression, morbidity, mortality, impacts and treatment options. The focus of the chapter is on estimating the prevalence of the main forms of arthritis in Australia – osteoarthritis (OA), rheumatoid arthritis (RA) and other arthritis, based on National Health Survey data. Age-gender prevalence rates are calculated and applied to demographic data for Australia and its States and Territories, for the year 2007 and with projections to 2050.

Chapter 3 outlines the main risk factors for different types of arthritis, with a particular focus on obesity as a risk factor for OA. Projections of OA are calculated under different scenarios for future obesity prevalence and trends.

Chapter 4 investigates the economic impact of arthritis in 2007, including health system expenditure in Australia and estimates for the States and Territories. Other financial impacts are also estimated, including productivity losses, the opportunity cost of the provision of informal care for people with arthritis, out of pocket expenses for aids, home modifications and the bring-forward of funerals, and the deadweight losses associated with transfer payments (taxation revenue forgone and welfare payments).

In Chapter 5, the burden of disease (loss of wellbeing) from arthritis is calculated, comprising the years of healthy life lost due to premature mortality and, most importantly, due to disability – measured in Disability Adjusted Life Years (DALYs). Using a willingness to pay methodology for estimating the value of life and health, the net value of healthy life lost is then estimated.

Chapter 6 provides a summary of the economic impacts for Australia and the jurisdictions, including by type of cost and by who bears the cost.

Finally, in Chapter 7 comparisons are made between arthritis and other national health priority and disease areas, in terms of prevalence, health expenditure and burden of disease. The report concludes with a brief presentation of some appropriate interventions to help prevent and ameliorate the symptoms of arthritis – including lifestyle interventions, pharmacotherapy and orthopaedic surgery – with a focus on their cost-effectiveness.

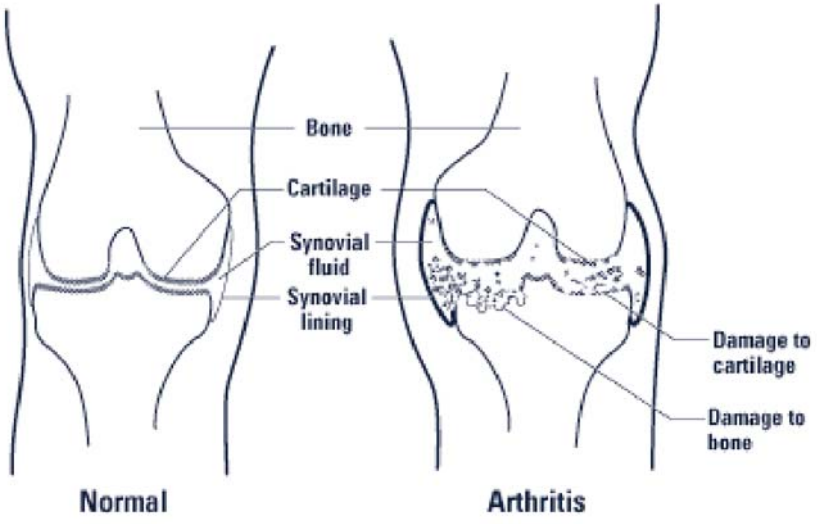
2. PREVALENCE OF ARTHRITIS

Musculoskeletal disease is the major cause of disability and handicap in Australia, and arthritis is the most prevalent form of musculoskeletal disease, accounting for over half of all musculoskeletal conditions. 'Arthritis' is a general term that refers to disorder of one or more joints. There are more than 100 known types of arthritis, of which five account for a large majority of cases—osteoarthritis (OA), rheumatoid arthritis (RA), systemic lupus erythematosus (SLE or lupus), gout and spondyloarthropathies (including ankylosing spondylitis, psoriatic arthritis, Reiters Syndrome, reactive arthritis, enteropathic arthritis, isolated acute anterior uveitis and undifferentiated spondyloarthropathy).

2.1 ARTHRITIS: A SNAPSHOT

2.1.1 OSTEOARTHRITIS (OA)[2]

Osteoarthritis is the most common form of arthritis. It develops when articular cartilage (the smooth covering over bones in the joints) starts to break down, usually as a result of trauma, ageing or failure of joint repair and maintenance mechanisms. Degradation of the cartilage can be associated with underlying bone damage, thickening and bone-on-bone friction. Symptoms include stiffness, pain and tenderness in the joints and surrounding muscles and ligaments, possibly with fatigue, reduction in motor skills and deformities. The most common pattern of joint involvement in OA involves the major weight-bearing joints such as the hips, knees or lower spine, with neck and hands also being frequently affected sites. There is no single cause for OA, with identified risk factors including: being overweight, advancing age, hereditary factors, joint trauma (such as in sports injuries) and other metabolic or inflammatory disorders. Because it is more common in women, hormones (especially oestrogen) are suspected to have a relationship to OA; however, risk factors for arthritis are discussed in more detail in Section 3 of this report.

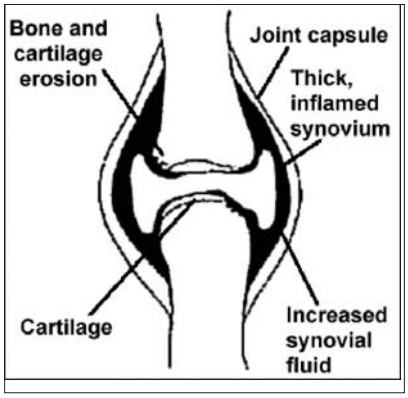


[2] Access Economics gratefully acknowledges the previous contributions of Professor Les Cleland of the University of Adelaide whose assistance with the description of arthritis, and its treatment and management have made significant contributions to this report.

[3] OA of the hands is a distinct sub-type of OA and very common in women. Unlike the gradual onset of other types of OA, this type can begin suddenly and painfully. It is progressive and causes classic deformities of the fingers with enlarged joints.

2.1.2 RHEUMATOID ARTHRITIS (RA)

Rheumatoid arthritis is the second most common form of arthritis and the most common autoimmune disease in Australia (AIHW, 2005). More prevalent among women, RA is a progressive disease with onset most likely between 25-50 years, at a time when people are active in the workplace or family care roles. RA is characterised by inflammation within joints that serves no evidently useful purpose and which damages joint structures. The synovial membrane that lines joints is thickened and an over-production of synovial (joint) fluid occurs. The joints become painful, swollen, stiff and, as the process continues, deformed from damage to the cartilage and other soft tissue.[4] Other symptoms include fatigue, interrupted sleep, weight loss, anaemia, nodules (in 30% of people), ulcers, atrophic skin, muscle weakness, impaired joint function and inflammation of the heart, lungs, eyes, nerves, blood vessels and lymph glands. There is significant morbidity and mortality (over half of patients will have to reduce significantly or stop work after ten years of the disease).



2.1.3 GOUT

Gout is caused by the reaction of defence cells in joints to the presence of uric acid crystals. Uric acid (or urate) is a by-product of the breakdown of purines in the body. (Purines are components of the genetic template (DNA) and of certain messenger substances within cells.) Gout is characterised by severe acute attacks of joint pain and swelling, which typically affect joints such as the big toe, the ankle, knee and elbow. An excess of urates can also cause kidney damage, including the formation of stones.

2.1.4 SYSTEMIC LUPUS ERYTHEMATOSUS (SLE OR LUPUS)

SLE or lupus is a chronic inflammatory autoimmune disease of the connective tissues. It affects the skin—especially in sun exposed areas such as the cheeks, which become red and scaly—and various internal organs (kidneys, heart, lungs and brain can all be affected by inflammation and subsequent scar tissue). Lupus often causes general fatigue, tiredness, loss of concentration and memory. Internal organ involvement can lead to organ failure and death.

2.1.5 ROSS RIVER VIRUS

The mosquito-transmitted Ross River virus and the similar Barmah Forest virus cause epidemic polyarthritis—ie, acute arthritis in many joints causing severe aches and pain. Viral arthritis does not usually damage the joints like RA, but the arthritis and fatigue can sometimes last for years before the joint returns to normal. Symptoms include chronic fatigue, rashes, severe headaches, impaired concentration and memory as well as depression. There is no specific treatment or vaccination, although scientists are working to develop a vaccine.

2.1.6 OTHER FORMS OF ARTHRITIS AND RELATED MUSCULOSKELETAL DISORDERS

Other types of arthritis include juvenile idiopathic arthritis, ankylosing spondylitis (which mainly affects young men), spondyloarthritis, psoriatic arthritis, scleroderma, bursitis, tendonitis, carpal tunnel syndrome, polymyalgia rheumatica, dermatomyositis, and Reiter's Syndrome.

[4] Queensland Arthritis Foundation, www.arthritis.org.au/rheuarth.html, also for RA diagram.

2.2 TREATMENT AND MANAGEMENT

2.2.1 DRUGS

There are many different types of medicines available to treat the different forms of arthritis, with the aim of reducing pain, increasing mobility, slowing the progression of inflammation and reducing the rate of joint damage.

Medicines that reduce the symptoms and inflammation include over-the-counter analgesics and NSAIDs (non-steroidal anti-inflammatory drugs). Prescription medicines include COX-2 inhibitors, a class of medicines including celecoxib (Celebrex), meloxicam (Mobic) and lumiracoxib (Prexige)*, and disease-modifying anti-rheumatic drugs (DMARDs) that can also retard the progression of the disease.

For RA, methotrexate is the mainstay of treatment with concurrent use of other DMARDs, such as hydroxychloroquine sulphate (Plaquenil), sulphasalazine (Pyralin or Salazopyrin) and leflunomide (Arava) providing additional benefit. Older DMARDs such as gold injections (Myocrisin) and penicillamine (D-Penamine) may still be used in some cases.

More recently, the development of biologic response modifiers has provided physicians with another alternative for treatment. Some of these biologics are known as anti-TNF-alpha agents (TNF is Tumour Necrosis Factor, referring to specific chemicals made in the body that are thought to cause inflammation and damage). Examples are infliximab (Remicade), adalimumab (Humira) and etanercept (Enbrel). TNFs are better than existing treatments but cost much more, so they may be best suited (including for public financing) to particular target populations where they are most cost effective. Other biologic response modifiers that work by different mechanisms include rituximab (Mabthera) and anakinra (Kineret). These medicines are administered by injection or intravenously and are currently only subsidised through the PBS for patients fulfilling certain specified criteria.

Corticosteroids are potent drugs that are invaluable in the management of inflammatory joint disease.

Patients vary in their responsiveness and tolerance to drugs and treatment and will often need to be individualised.

There is increasing evidence that early, aggressive treatment of rheumatoid disease can significantly slow the progression of joint damage.

2.2.2 SURGERY

Orthopaedic surgery can help many patients with some forms of arthritis to increase mobility and joint function, and decrease pain. Procedures include joint replacement, arthroscopy and carpal tunnel release. Problems following joint replacement surgery can include infection (early or late) and a late inflammatory reaction to 'wear particles' (shed by implanted components) that leads to loosening of the implant and secondary joint failure. While surgical revision of failed artificial joints is possible, the procedure is more difficult than primary joint replacement.

2.2.3 PHYSIOTHERAPY AND EXERCISE

These therapies can be used to strengthen muscles, maintain joint mobility and position, improve heart and lung fitness, reduce stress, control weight, improve sleep and contribute to overall wellness and coping strategies. Exercise programs include hydrotherapy, walking, aerobics, dancing, as well as more specifically localised exercises.

* lumiracoxib (Prexige) withdrawn from Australian market 11 August 2007

2.2.4 ALTERNATIVE AND ADJUNCTIVE THERAPIES

Many 'natural' treatments are marketed and used by arthritis sufferers. Some have been well tested in clinical trials such as fish oil in RA and glucosamine in OA. Numerous other 'natural' therapies are used, such as capsaicin, wintergreen and other herbal remedies, acupuncture, yoga, tai chi, and magnet therapy. While they are generally harmless, benefit has not always been rigorously demonstrated and can often be costly.

2.2.5 DIET

Being overweight is associated with OA, while RA sufferers tend to be underweight. Maintaining a healthy balanced diet can be complicated by medications, difficulty in preparing meals, and metabolic changes associated with the disease for which some foods must be avoided (eg, foods high in purines in gout) while others are recommended (eg, fish containing omega 3 fatty acids with RA). Supplements and referral to dieticians are sometimes useful.

2.2.6 AIDS AND MODIFICATIONS

People living with arthritis can purchase a variety of tools specifically designed to maximise independence and quality of life, from kitchen gadgets and exercise aids to walking frames and wheelchairs. Houses may need to be modified as the disease progresses, or nursing home accommodation sought.

2.2.7 PSYCHOLOGICAL SUPPORT AND OCCUPATIONAL THERAPY

Daily pain, stress and fatigue can lead to anger and depression, as well as relationship difficulties. A spouse, partner or care giver is often a vital support. Referral to a psychologist or counsellor can help, as can group therapy or occupational therapy. Arthritis Self Help Programs and Chronic Disease Self Management Programs allow people with arthritis to acquire skills and knowledge and to manage their condition. Studies show those who took the programs compared with those who did not demonstrated significant improvements in exercise, cognitive symptom management, communication with physicians, self reported general health, health distress, fatigue disability and social/role limitations. They also spent fewer days in hospital, and there was a trend toward fewer outpatient visits and hospitalisations. The data (from the USA) show the programs yield a cost to savings ratio of approximately 1:10 and many of these results persist for three years (Lorig et al, 1999). These programs are available from Arthritis Foundations throughout Australia (Phone: 1800 011 041).

2.3 PREVALENCE OF ARTHRITIS IN AUSTRALIA

This report follows previous work undertaken by Access Economics for Arthritis Australia, *"The Prevalence, Cost and Disease Burden of Arthritis in Australia"* (Access Economics, 2001) and *"Arthritis – the bottom line: The economic impact of arthritis in Australia",* (Access Economics, 2005a). In the 2001 report, Access Economics estimated that there were 3.1 million Australians living with arthritis, approximately 16.5% of the population. In the 2005 report, this figure was estimated to have grown to 3.4 million, or approximately 16.7% of the population, demonstrating an increase in both the absolute number of people with arthritis as well as an increase in the overall prevalence rate.

2.3.1 DATA SOURCES

As in Access Economics (2001 and 2005), age-gender prevalence rates have been based on evidence from the Australian Bureau of Statistics (ABS) *National Health Survey (NHS)*. While the 2001 report relied on data from the 1995 NHS and the 2005 report relied on data from the 2001 NHS, the more recent 2004-05 NHS provides more up-to-date data from which prevalence rates in 2007 and future prevalence projections can be estimated. Based on the findings of past expert consultation by Access Economics, arthritis is defined to include the NHS categories 'osteoarthritis', 'rheumatoid arthritis', 'other arthritis' and 'other arthropathies'. While there may potentially be conditions residing in 'other arthropathies' not strictly attributable to arthritis, the estimates calculated here remain conservative as other cases of arthritis, which cannot be disentangled from categories such as 'other musculoskeletal conditions' or 'back pain', for example, are not captured in the present definition. The official release of findings from the NHS reports prevalence rates and provides an overall gender breakdown and age distribution. However, in order to ensure most robust prevalence estimates, a specific data request was submitted to the ABS to ascertain the precise age-gender breakdown of arthritis from the survey. Based on these data and Australian demographic data also from the ABS, Access Economics has estimated the prevalence of arthritis in Australia and the results of this analysis are presented below.

2.3.2 NHS PREVALENCE TRENDS

The findings of the 2004-05 NHS suggest that there were nearly 6.1 million Australians with a musculoskeletal disorder in that year, 30% of the population. Of this, 3.7 million people reported having arthritis including 'other arthropathies' (18.1% of the population).[5] Based on these data, and incorporating demographic changes that have occurred since, **Access Economics has estimated the prevalence of arthritis in 2007 to be 3.85 million Australians, or 18.5% of the population.**

The increasing prevalence of arthritis in Australia can be observed in Table 2—1, which shows that, between 1995 and 2007, the prevalence of arthritis has increased from 55% (14.7/26.5) to 61% (18.5/30.4) of musculoskeletal disorders. There have been some minor changes to the methods used in the NHS and it is possible that some portion of the increase in the prevalence of arthritis between 2001 and 2004-05 results from these changes. Better diagnosis may also account for some of the increase, as well as 'real' increases from an ageing population and the rising prevalence of risk factors (eg, numbers of obese people).

[5] 'Other arthropathies' comprise ABS NHS CURF code 23139 that, in turn, comprises input from codes 139 (shoulder symptom/complaint), 141 (arm symptom/complaint), 142 (wrist symptom/complaint), 143 (hand/finger symptom/complaint), 144 (hip symptom/complaint), 158 (leg/thigh symptom/complaint), 159 (knee symptom/complaint), 160 (ankle symptom/complaint), 161 (foot/toe symptom/complaint), 412 (joint symptom/complaint not otherwise specified), 458 (acquired deformity of the limb) and 485 (other endocrine, metabolic or nutritional disease).

TABLE 2.1: ARTHRITIS PREVALENCE RATES 1995-2007

Prevalence Rates	1995[a]	2001[b]	2004-05[c]	2007(d)
All musculoskeletal disorders	26.5%	31.2%	30.0%	30.4%
All arthritic conditions	14.7%	15.6%	18.1%	18.5%
Osteoarthritis	6.4%	7.2%	7.6%	7.8%
Rheumatoid arthritis	2.6%	2.3%	2.4%	2.5%

Source: (a) 1995 NHS, (b) 2001 NHS, (c) 2004-05 NHS, (d) Access Economics calculations. The estimates for 1995 and 2001 differ slightly from those reported in previous Access Economics reports due to revisions to demographic data in the meantime.

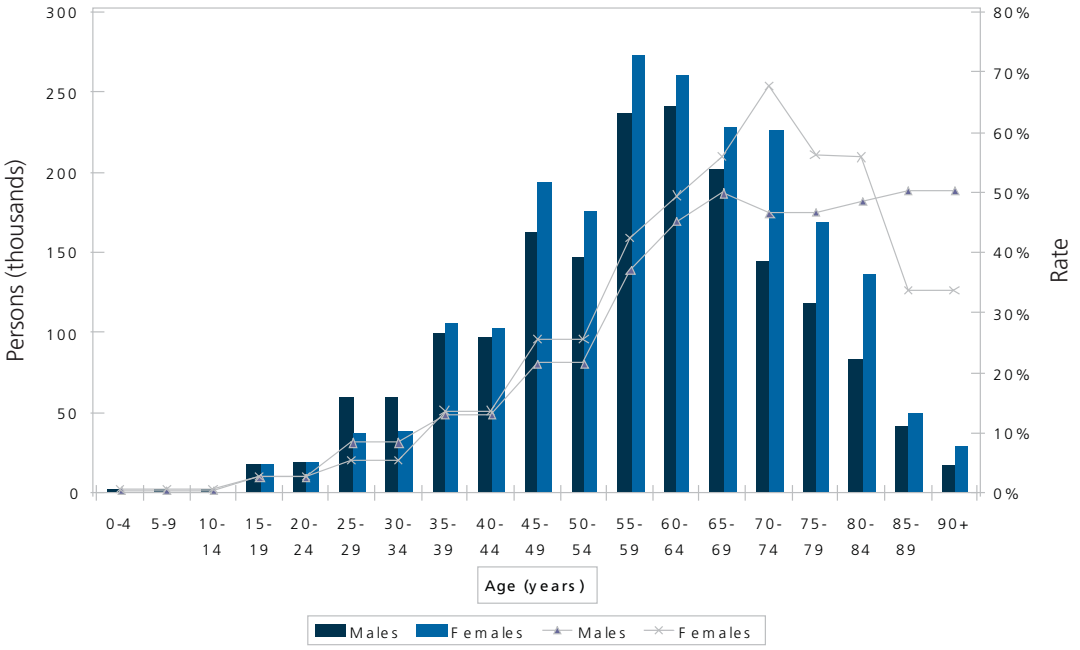
While there are inconsistencies in the data in Table 2.1 due to revisions, it seems that the fairly large and growing proportion of arthritis prevalence is due to conditions other than OA and RA. 'Other arthropathies' increased substantially between the 2001 NHS and 2004-05 NHS, now higher than the prevalence of RA in the Australian population.

2.3.3 PREVALENCE AMONG THE AUSTRALIAN POPULATION

In 2007, Access Economics estimates that there are 3.85 million Australians with arthritis, including 1.62 million with OA and 0.51 million with RA.

- Overall, arthritis was more prevalent among women, with 19.9% of women estimated to have some form of arthritis in 2007 compared to 17.1% of men.
- An estimated 61.3% of people with OA and 57.1% of people with RA are women.
- 62% or 2.4 million of those with arthritis are in the working age population (15-64).
- Prevalence rates among men are broadly correlated with age, peaking at 50% for the 85+ cohort.
- Prevalence rates follow a similar trend for women, although there is decline in prevalence among women over 75 – this may reflect lower reporting and sample size issues in the oldest populations (eg, from nursing home settings) since the impact of mortality seems unlikely to account for such a sharp decline.

FIGURE 2.1: PREVALENCE OF ARTHRITIS IN AUSTRALIA BY AGE, 2007



Source: Access Economics estimates based on ABS National Health Survey 2004-05.

Table 2.2 on page 20 shows a detailed breakdown of arthritis prevalence in the Australian population in 2007. It depicts the greater prevalence in women, except in the case of 'other arthritis' where the predominance of men afflicted by 'other arthropathies' shifts the gender balance. The low prevalence of arthritis among younger Australians can also be observed, with only around 1.4% of people under the age of 25 reporting the condition. While all types of arthritis are more prevalent in older age cohorts, this is clearly most evident in osteoarthritis.

TABLE 2.2: PREVALENCE OF ARTHRITIS, BY AGE, GENDER AND CONDITION, 2007

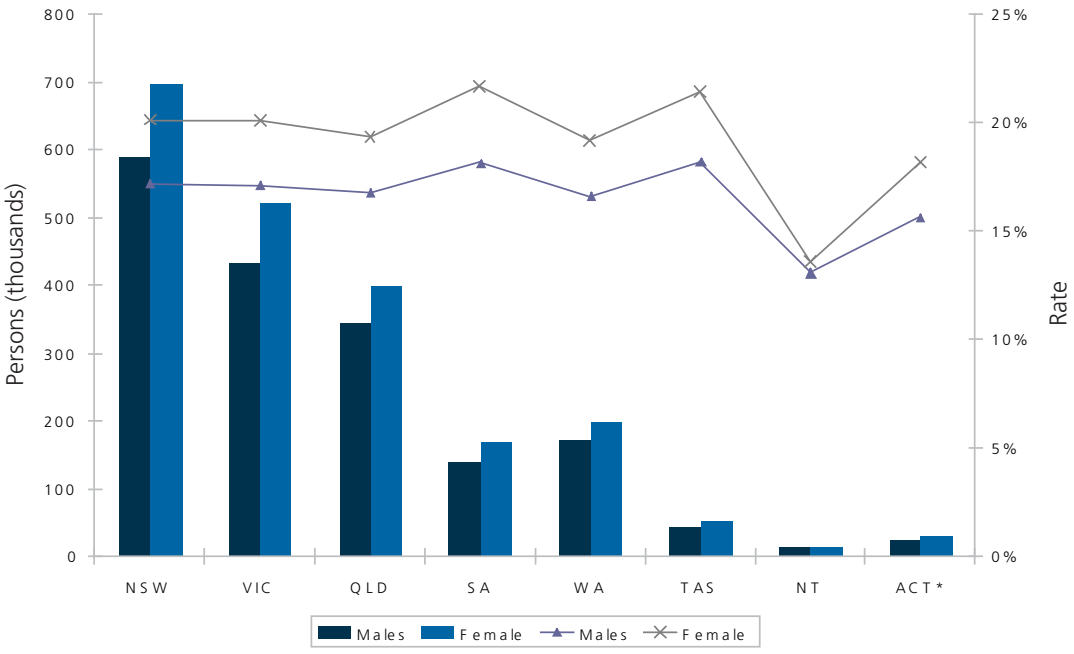
	Males	%	Females	%	Persons	%
Osteoarthritis						
0-24	717	0.0%	6,560	0.2%	7,277	0.1%
25-34	19,609	1.4%	19,942	1.4%	39,552	1.4%
35-44	51,476	3.4%	63,856	4.2%	115,332	3.9%
45-54	106,457	7.4%	162,012	11.1%	268,470	9.3%
55-64	190,501	16.2%	283,636	24.2%	474,137	20.2%
65-74	134,219	18.7%	237,469	31.9%	371,688	25.4%
75+	125,797	23.0%	220,700	28.2%	346,496	26.0%
Total	628,776	6.1%	994,175	9.5%	1,622,951	7.8%
Rheumatoid Arthritis						
0-24	1,944	0.1%	7,277	0.2%	9,221	0.1%
25-34	7,304	0.5%	8,433	0.6%	15,737	0.6%
35-44	24,676	1.6%	39,974	2.6%	64,649	2.2%
45-54	32,796	2.3%	62,614	4.3%	95,410	3.3%
55-64	74,195	6.3%	63,935	5.5%	138,130	5.9%
65-74	47,811	6.7%	72,770	9.8%	120,581	8.2%
75+	31,985	5.8%	37,546	4.8%	69,532	5.2%
Total	220,711	2.1%	292,550	2.8%	513,261	2.5%
Other Arthritis						
0-24	44,600	1.3%	36,395	1.1%	80,994	1.2%
25-34	95,446	6.6%	49,508	3.5%	144,954	5.1%
35-44	129,852	8.6%	116,581	7.6%	246,433	8.1%
45-54	178,153	12.4%	169,865	11.7%	348,018	12.0%
55-64	243,182	20.7%	226,419	19.3%	469,601	20.0%
65-74	179,898	25.1%	178,349	23.9%	358,247	24.5%
75+	117,279	21.4%	160,984	20.6%	278,262	20.9%
Total	988,410	9.6%	938,100	9.0%	1,926,510	9.3%
All Arthritis						
0-24	46,648	1.3%	49,652	1.5%	96,300	1.4%
25-34	121,359	8.4%	76,792	5.4%	198,150	6.9%
35-44	197,711	13.1%	209,077	13.7%	406,788	13.9%
45-54	310,165	21.6%	370,727	25.5%	680,892	23.6%
55-64	478,873	40.8%	534,294	45.6%	1,013,167	43.2%
65-74	347,877	48.5%	456,173	61.2%	804,050	55.0%
75+	263,197	48.1%	385,759	49.3%	648,956	48.8%
Total	1,765,830	17.1%	2,082,474	19.9%	3,848,304	18.5%

Source: Access Economics based on ABS NHS 2004-05 special data request.
Note: Other arthritis includes other arthropathies.
Totals may not sum due to rounding and 'all arthritis' is less than the sum because individuals may have multiple conditions.

2.3.3.1 PREVALENCE IN THE STATE AND TERRITORIES

Data on the prevalence of arthritis available from the NHS are not disaggregated to jurisdictional level. Access Economics has thus applied the national age-gender rates for each type of arthritis from the 2004-05 NHS to demographic data for each State and Territory to estimate OA, RA and other arthritis in each jurisdiction. Consequently, differences in prevalence primarily reflect demographic differences between the six states and two territories.

FIGURE 2.2: PREVALENCE OF ARTHRITIS IN THE STATES AND TERRITORIES, 2007



Source: Access Economics based on ABS National Health Survey 2004-05.

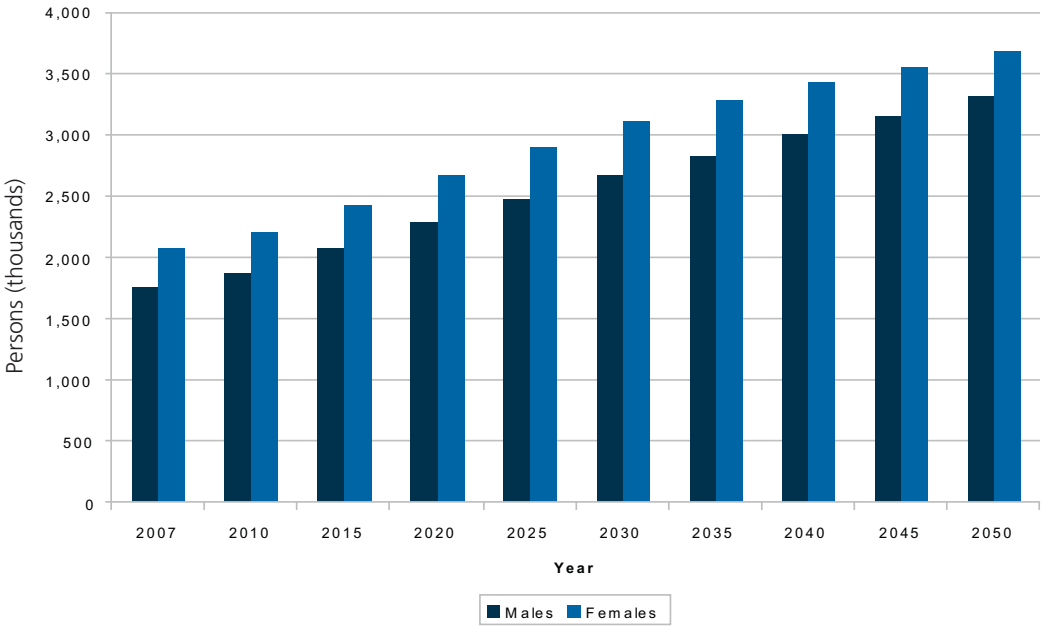
Prevalence of arthritis in the states and territories is illustrated in Figure 2 2.

- Reflecting population share, 78% of people with arthritis reside in NSW, VIC and QLD.
- States with relatively older populations, such as South Australia and Tasmania have higher 'raw' prevalence rates, with 19.9% and 19.8% respectively.
- ACT and the Northern Territory have the youngest populations and, accordingly, the lowest prevalence rates with 16.9% and 13.3% respectively.

2.3.4 PREVALENCE PROJECTIONS TO 2050

Prevalence rates from the 2004-05 NHS were combined with demographic projections of Australia's population based on Access Economics' demographic model to estimate the likely prevalence of arthritis in Australia to 2050. While these estimates incorporate likely demographic changes over this period such as fertility, mortality and migration trends, they do not include any interventions that may delay or reduce the onset of arthritis nor any other factors that may increase the age-gender prevalence rates of arthritis. Notably, obesity is an important risk factor for osteoarthritis, and the potential impact of possible changes in obesity rates on these baseline projections is considered in more detail in section 3.2.1.3.

FIGURE 2.3: ARTHRITIS PREVALENCE TO 2050 BY GENDER

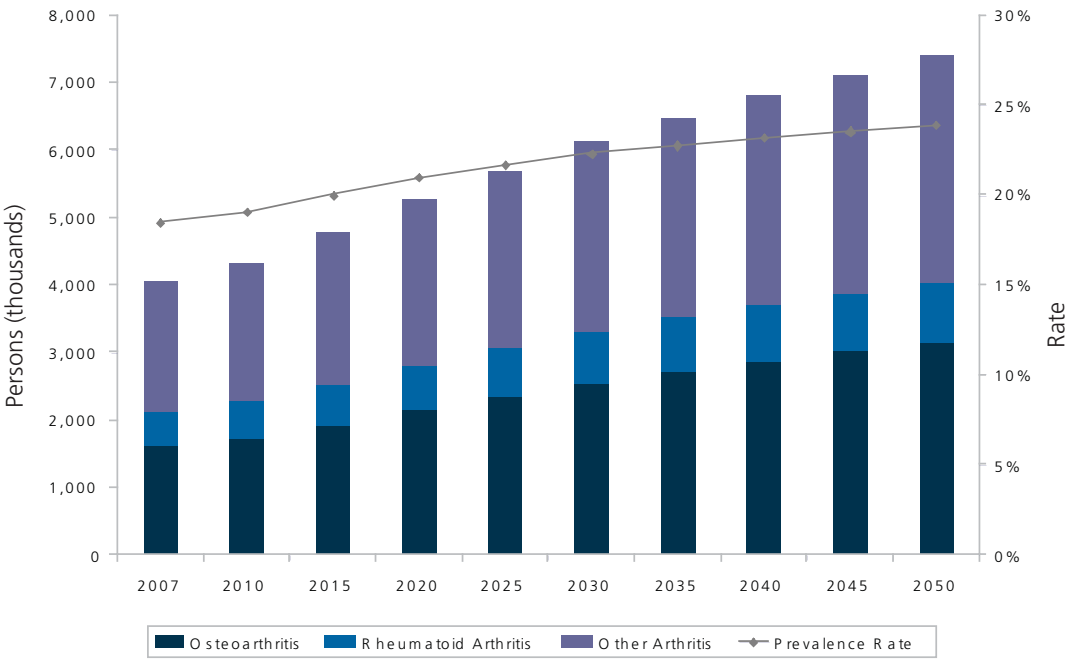


Source: Access Economics projections.

Figure 2.3 above shows the projected prevalence of arthritis by gender from 2007 to 2050. It depicts a narrowing of the gap between arthritis prevalence among males and females, reflecting prevalence growth of 97% and 85% for males and females respectively over this period.

In 2050, it is estimated that there will be 7 million Australians with arthritis including 3.3 million males (22.6% of males) and 3.7 million females (25.2% of females).

FIGURE 2.4: ARTHRITIS PREVALENCE TO 2050 BY CONDITION



Source: Access Economics projections. Sum of arthritic conditions greater than arthritis total as some individuals have multiple arthritic conditions.

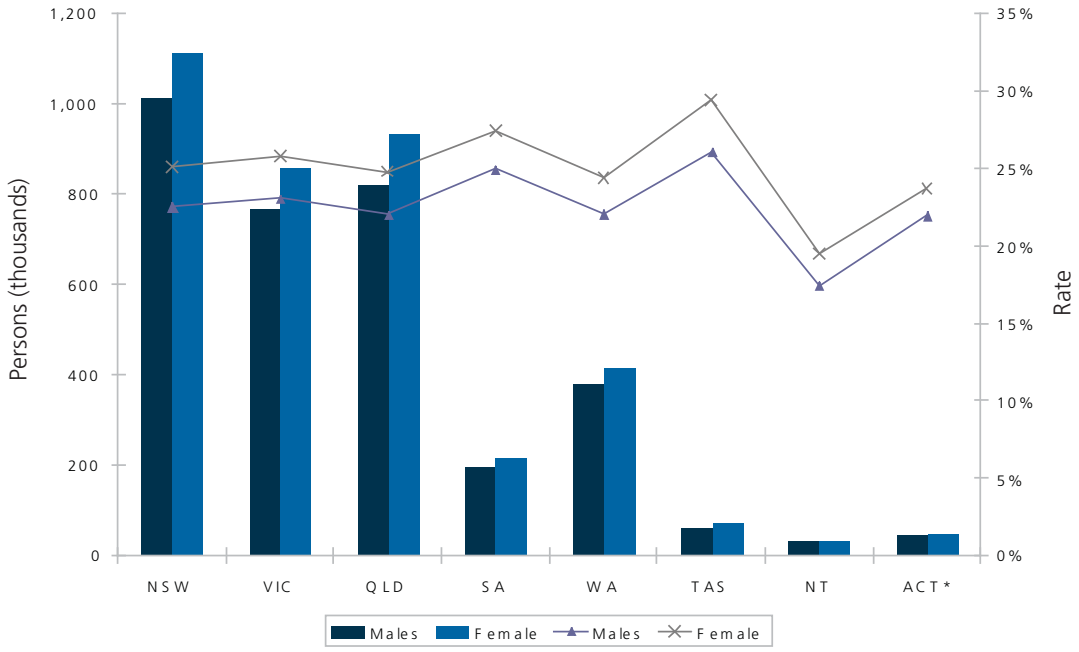
- Reflecting the ageing of the Australian population, overall arthritis is projected to increase from 18.5% to 23.9% of the population by 2050, an increase of nearly 30%.
- Prevalence of OA is projected to increase to 3.14 million Australians or 10.7% of the 2050 population; increasing both absolutely and as a proportion of total arthritis.
- RA is projected to increase to 3.1% of the population by 2050, affecting 904,000 Australians.

2.3.4.1 PREVALENCE PROJECTIONS FOR STATES AND TERRITORIES

Figure 2.5 on page 24 depicts the projected prevalence of arthritis in the states and territories in 2050. As with the 2007 jurisdictional estimates, the results primarily reflect demographic differences. The most notable difference between the 2007 distribution and the 2050 projection is the rising share of Australia's arthritis population in Western Australia (WA) and Queensland (QLD) – reflecting migration and ageing patterns, with QLD surpassing Victoria to become the state with second highest prevalence of arthritis. It is projected that in 2050, the prevalence of arthritis will be 23.4% and 23.2% in QLD and WA respectively.

The collective share of Australia's arthritis in the three most populous states, NSW, VIC and QLD, is projected to remain relatively stable at around 78% of the national total. As in 2007, arthritis is expected to be least prevalent in the Northern Territory and the ACT, where prevalence is projected to be 18.4% and 22.8% respectively, in 2050.

FIGURE 2.5: PREVALENCE OF ARTHRITIS IN THE STATES AND TERRITORIES, 2050



Source: Access Economics projections.

2.3.4.2 SUMMARY OF PREVALENCE PROJECTIONS

Arthritis prevalence projections for Australia and its states and territories to 2050 are presented in Table 2.3. Between 2007 and 2050, the number of people in Australia with arthritis is projected to increase by 83%. There is considerable variation between the jurisdictions, reflecting forecast differences in demographic factors across the nation. The number of people with arthritis is projected to grow most rapidly in the NT and QLD, where the increase is estimated to be 140% and 136% respectively. South Australia and Tasmania are projected to experience the lowest growth in the number of people with arthritis – 34% and 39% respectively.

Arthritis prevalence rates are projected to increase by around 29% between 2007 and 2050, again with considerable variation across jurisdictions. In Tasmania, with the smallest population in Australia, arthritis prevalence rates are forecast to increase by 40% - the highest of any state, due to its older population. The rate in NT is projected to grow by around 38%, while WA and NSW are projected to experience the lowest increase in the rate of arthritis, indicative of demographic projections for these states.

TABLE 2.3: PROJECTED PREVALENCE OF ARTHRITIS IN THE STATES AND TERRITORIES, 2007-2050

	2007		2050		2007- 2050	
	People with arthritis ('000)	% of population	People with arthritis ('000)	% of population	% increase (persons)	% increase (rates)
ACT	57	16.9%	97	22.8%	72.4%	34.9%
NSW	1,288	18.7%	2,130	23.8%	65.4%	27.5%
NT	28	13.3%	67	18.4%	140.3%	38.2%
QLD	744	18.1%	1,755	23.4%	135.8%	29.7%
SA	309	19.9%	415	26.2%	34.4%	31.5%
TAS	98	19.8%	136	27.8%	39.1%	39.9%
VIC	953	18.6%	1,630	24.4%	70.9%	31.2%
WA	372	17.9%	799	23.2%	114.7%	29.8%
Total	**3848**	**18.5%**	**7029**	**23.9%**	**82.7%**	**28.9%**

Totals may not sum due to rounding.

RISK FACTORS FOR ARTHRITIS 3.

3.1 RISK FACTORS FOR DIFFERENT TYPES OF ARTHRITIS

The pathogenesis (development) of arthritis is multifactorial, bridging biomechanics and biochemistry and incorporating genetic and environmental factors. The precise nature of its origins remains somewhat uncertain, although as research continues, the picture becomes clearer. Numerous risk factors contribute to the development of the various arthritic conditions and this section provides a brief outline of these.

3.1.1 OSTEOARTHRITIS

In their 2005 report, *Arthritis and musculoskeletal conditions in Australia* (AIHW, 2005b), the Australian Institute of Health and Welfare (AIHW) noted that in addition to predisposing factors such as age, sex and genetics, biomedical factors such as obesity, body misalignment, meniscus (cartilage) tears and injury contribute to the underlying cause of OA.

While osteoarthritis may begin at any age, it usually affects older people, with the average age of onset around 45 years (AIHW, 2005b). Two thirds of Australians with arthritis are aged 55 and over and 40% are over 65. This appears to be explained by the fact that as a person ages, the water content of the cartilage decreases due to reduced proteoglycan content, causing cartilage to be less resilient and hence more prone to OA.

Females are at higher risk of developing OA than males, suggesting the involvement of sexual hormones in the pathogenesis of the disease. Reflecting this, prevalence rates among women in Australia are around 9.3%, while prevalence rates among men are estimated to be only 5.9%.

Genetics are also an important risk factor; with defects of a structural protein such as collagen, or modification of the metabolism of bone and cartilage thought to be involved in the genetic basis of OA (Cimmino and Parodi, 2005). Genetic factors account for at least 50% of the cases of hand and hip OA (Wright et al, 1996), and an even greater proportion of knee OA. Genetic abnormalities could also act indirectly on well known risk factors for OA such as obesity.

OA also appears linked to the level of physical activity, particularly that which demands high intensity acute, direct joint impact with other participants, playing surfaces or equipment (Sarzi-Puttini et al 2005). Supporting this hypothesis, a US study found that patients in the highest quartile of physical activity at the baseline examination had 3.3 times the odds of developing OA (95% CI 1.4-7.5) compared with those in the lowest quartile of physical activity (Felson et al, 1997:731).

Obesity is a significant risk factor for osteoarthritis and a detailed analysis of its implications is provided in Section 3.2.

3.1.2 RHEUMATOID ARTHRITIS

Like other forms of arthritis, the pathogenesis of RA is multi-faceted, encompassing both genetic and environmental factors.

From a genetic perspective, the inheritability of RA appears to be high, with the genetic contribution to susceptibility estimated to be around 60% (MacGregor et al, 2000). Further evidence of a genetic element can be found in the fact that if one member of a pair of identical twins has RA then the other member has a 15% chance of developing the disease – considerably higher than the risk in the general population (Silman et al, 1993). The genetic link is not a straightforward one though, as no single gene is identifiable as the cause of RA. People with a specific group of genes called HLA-DRB1 are known to have an increased risk of developing RA and a 2005 study published in the American Journal of Human Genetics revealed that carrying a gene called PTPN22 also increases the risk of developing RA (Plenge et al, 2005)

Although genetic factors are an important contributor in developing RA, the presence of high-risk genes alone is insufficient for development of the disease and environmental factors appear to play a pivotal, but uncertain role. A number of studies have shown that the risk of developing RA, particularly among seropositive men, is higher among smokers (Albano et al, 2001) with a 2006 study in the US finding that smokers had 6.0 times the odds of developing RA compared to non-smokers (Criswell et al, 2006).

RA is more prevalent among women than men – 57% of Australians with RA are women. This suggests that, as with OA, hormonal factors may play a role in the development of the disease.

3.1.3 GOUT

Gout is a condition in which uric acid in the blood rises above normal levels (hyperuricaemia) which can result in the formation of microscopic crystals in the joint and the development of gout. There are indications that some medications, especially fluid tablets, may prevent uric acid from leaving the body, initiating this rise. Genetic factors appear to be implicated and many people who develop gout also have other family members with the disease. As with other forms of arthritis, environmental factors are also pathogenically implicated, with excessive alcohol consumption and obesity important factors in this regard. Gout is also significantly more prevalent among men than women.

3.1.4 SYSTEMIC LUPUS ERYTHEMATOSUS (SLE OR LUPUS)

The precise reason for the abnormal autoimmunity that causes SLE or lupus is not known. Inherited genes, viruses, ultraviolet light and drugs may all play some role. A number of medications have been reported to trigger SLE, although drug-induced SLE is infrequent (accounting for less than 5% of SLE among all patients with SLE) and usually resolves when the medications are discontinued. Some women with SLE experience worsening of symptoms prior to menstrual periods which, together with the female predominance of SLE, suggest that female hormones play an important role in the expression of SLE, and the hormonal relationship is an active area of ongoing study by scientists. Recent research also provides evidence that the failure of the enzyme DNase1 to dispose of dying cells contributes to SLE. Thus, a genetic mutation that disrupts the body's cellular waste disposal may be involved in the beginning of SLE.

3.2 OBESITY AS A RISK FACTOR FOR OSTEOARTHRITIS

Obesity is one of the most preventable risk factors for OA due to extra weight placing pressure on joints, particularly knee and hip joints, which increases the stress on the cartilage and hence the chances of developing OA. In addition, obese patients have a higher bone mass, which may increase stiffness in the subchondral bone and facilitate cartilage breakdown (Cimmino and Parodi, 2005:29). Factors other than mechanical stress may also be at play as indicated by correlation between obesity and arthritis of the hand.

Obesity refers to the accumulation of excessive fat in the body, defined here in terms of Body Mass Index (BMI) - the ratio of weight in kilograms to the square of height in metres. In these terms, obesity is defined as BMI over 30 for adults although these weight classifications are not necessarily suitable for all ethnic groups. For children and adolescents aged 2 to 18 years, a set of age-gender specific BMI-thresholds are used (see appendix A). 'Overweight' is generally defined as BMI between 25 and 30.

Access Economics has undertaken previous modelling in this area, including two public reports showing the impacts:

- of obesity in Australia – *The Economic Cost of Obesity*, a report for Diabetes Australia, (Access Economics, 2006c); and
- of obesity on OA in New Zealand – *The Economic Cost of Arthritis in New Zealand*, a report for Arthritis New Zealand (Access Economics, 2005b).

The first report showed that not only are obese people around 2.4 times as likely to have OA as people of normal weight (an odds ratio of 2.4) but that overweight people are 35% more likely to have osteoarthritis (an odds ratio of 1.35). A reduction in adiposity rates could therefore potentially greatly reduce the prevalence of OA and hence reduce associated health impacts and costs of OA in Australia relative to the baseline projections. Conversely, if the prevalence of obesity continues to increase, the prevalence and costs of OA would be likely to increase even more than on the basis of demographic ageing alone.

3.2.1 OSTEOARTHRITIS PROJECTIONS FOR DIFFERENT OBESITY SCENARIOS

3.2.1.1 OBESITY AND OSTEOARTHRITIS IN AUSTRALIA

The baseline prevalence projections estimated in Section 2.3.4 show that the number of Australians with OA is projected to increase to 3.1 million or 10.7% of the population by 2050. These projections assume that prevalence rates remain constant for each age-gender cohort and, as noted previously, they do not include any interventions that may delay or reduce the onset of OA nor any other factors that may increase the prevalence rates of OA. As outlined above, obesity is known to be a significant and preventable risk factor for OA and in this section the implications of different obesity scenarios for the future prevalence of OA among the Australian population are modelled.

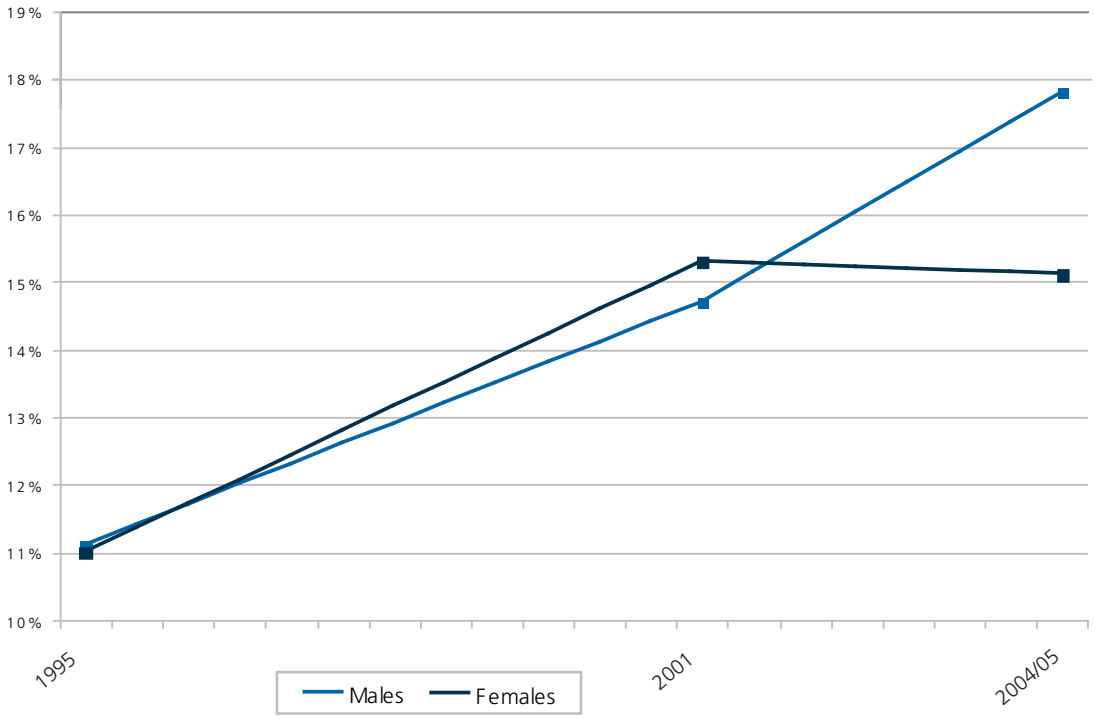
Access Economics (2006c) found that in 2005, 3.24 million Australians were estimated to be obese – 1.52 million or 15.1 % of males, and 1.72 million or 16.8% of females. It also reported that, like those in many developing countries, prevalence rates in Australia appear to be increasing for both adults and children, although it is unclear at exactly what rate.

The NHS collects self-reported anthropomorphic data including height and weight for adults aged 18 years and above, and reported BMI category (underweight, normal range, overweight, obese) by ten year age groups. The NHS data provide the most recent indicator of trends in adult obesity prevalence and data from the surveys conducted in 1995, 2001 and 2004-05 are presented in Figure 3 1.

The trend in the prevalence rate for self-reported obesity over the period 1995 to 2001 was for an annual increase in prevalence rates of 0.6% for males and 0.7% for females. For men, these figures contradict those found in the data for measured obesity over a similar period[6] (+0.6% per annum compared to -0.1% per annum measured). For women the figures are consistent (0.7% per annum compared to 0.6% per annum measured). Over the 9.5 years between the 1995 and 2004-05 NHS, self-reported obesity prevalence rates increased by 6.7% for males (from 11% to nearly 18%) and 4.1% for females (from 11% to 15%) and the annual average change in obesity prevalence rates was 0.7% for men and 0.4% for women.

[6] 1995-2000 vs 1995-2001.

FIGURE 3.1: SELF-REPORTED OBESITY PREVALENCE (% POPULATION), 1995 TO 2004-05



Source: NHS data.

While self-reported data for BMI have been consistently shown to under-estimate BMI (because individuals tend to over-estimate their height and under-estimate their weight), this is unlikely to substantially affect the *trend* in the data as the surveys use consistent methodology.[7]

NHS data provide only three data points, from which it is difficult to be confident of trends. While obesity in males accelerated considerably over the period 2001 to 2004 relative to 1995 to 2001, growth in obesity rates among women appear to have been negative between 2001 and 2004-05 – a stark contrast to the period 1995-2001 when obesity among women grew by around 40%.

[7] It is noted that there are a number of characteristics of self-reported BMI data that could influence the trend. For example in the ABS 1998 How Australians Measure Up, (a document comparing differences in findings of the National Nutrition Survey and NHS in relation to BMI measures), it was found that heavier people generally under-report their weight more than lighter people – suggesting that as the population gets heavier, self-report data may get even less accurate.

In *The Economic Costs of Obesity*, Access Economics estimated a baseline prevalence projection (ie, with no change in age-gender prevalence rates, such that all further increases in obesity were due to demographic ageing alone), forecasting that by 2025, a total of 4.2 million Australians (16.7% of the population) may be obese. This was caveated, however, with the observation that if prevalence continues to increase at historical rates, there could be as many as 7.2 million obese Australians by 2025 (28.9% of the population).

Such uncertainty pervades forecasting of social issues such as future obesity levels, and the impact of obesity on osteoarthritis is thus also uncertain, depending in large part on policy and other measures introduced over coming years. To account for this uncertainty, Access Economics has modelled a number of possible scenarios which present the range of possible outcomes depending on the success of public health interventions.

3.2.1.2 SCENARIOS MODELLED

Access Economics modelled three potential obesity scenarios, capturing what may be considered the upper and lower bounds for obesity prevalence in Australia to 2050. Scenarios for prevalence projections are not intended to indicate what is considered likely to happen but rather a range of what could happen. The three scenarios modelled were as follows.

1. **Baseline:** obesity remains stable at current levels (around 16 % of the population) to 2050.
2. **Growth:** Obesity continues to grow at an average rate of around 0.7 percentage points per year for men and around 0.4 percentage points per year for women, so that around 47% of men and 35% of women are obese in 2050.
3. **Elimination:** Obesity is eliminated by 2050, with obesity falling as a percentage of the population by 0.34 percentage points for females and 0.37 percentage points for males until then. While this scenario is unlikely, it does provide a useful lower bound.

Access Economics (2006c) found that the odds ratio of OA associated with obesity is around 2.4, which implies that 13.4% of OA in males and 13.6% of OA in females is attributable to obesity. These percentages are known as the "attributable fraction" for males and females.

3.2.1.3 OBESITY SCENARIO RESULTS

This section presents projections of OA prevalence to 2050 under the three obesity scenarios modelled, as outlined above. Table 3.1 depicts the impact of changing obesity rates on arthritis prevalence, based on the attributable fraction calculated above.

- The baseline scenario shows the prevalence of OA under the scenario where obesity prevalence rates remain at their 2005 level to 2050. **The projected prevalence of OA under the base case is 10.7% of the population in 2050** – 8.8% of males and 12.6% of females.
- If obesity continues to grow at the rates witnessed over the last ten years, by 2050, 46.6% of men and 34.8% of women will be obese. **Under this scenario, OA is projected to increase in prevalence to 11.2% of males and 14.5% of females, affecting nearly 3.8 million Australians** – 632,000 more than under the baseline case.
- **Eliminating obesity by 2050 is projected to reduce OA by 425,000 persons, relative to the baseline scenario, in 2050.** This suggests that if all obesity were eliminated by 2050, overall prevalence of OA would be 2.7 million Australians in 2050, and prevalence rates would be 7.6% and 10.9% for males and females respectively. Relative to the growth scenario, there would be over 1 million fewer Australians with OA, if obesity were eliminated by 2050.

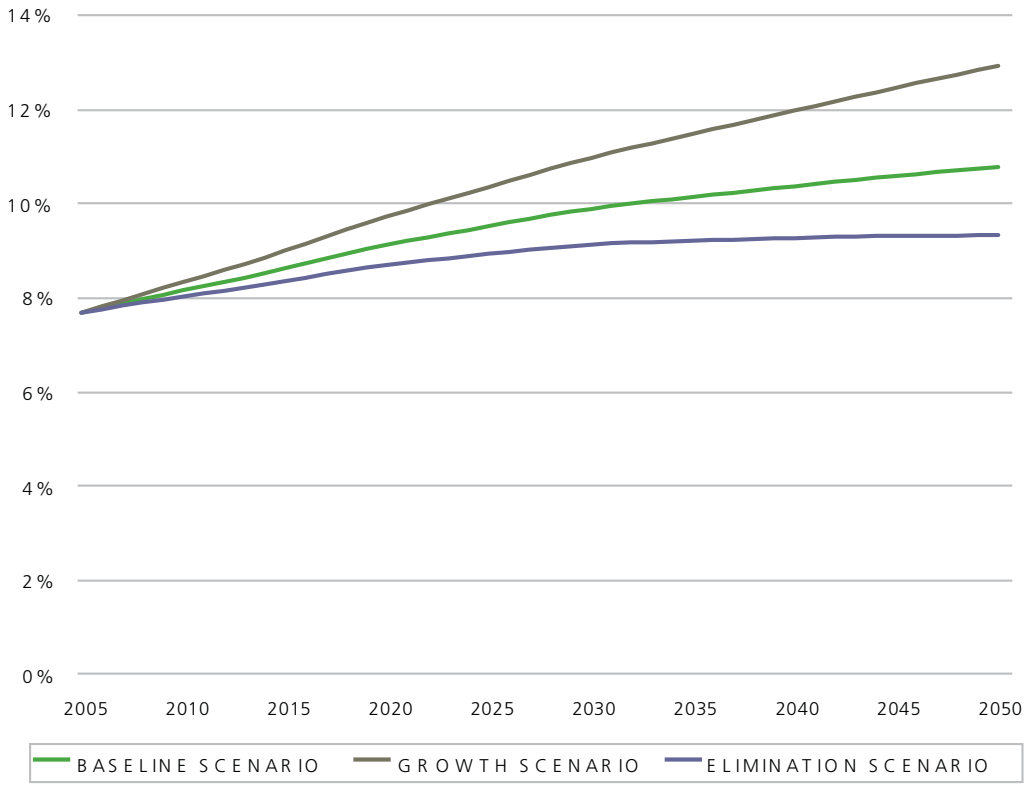
TABLE 3.1: IMPACTS OF CHANGING OBESITY RATES ON OSTEOARTHRITIS PREVALENCE

Scenario	% obese 2005		% obese 2050		OA prevelance rate 2005		OA prevelance rate 2050		Prevalence of OA 2050 ('000)	
	M	F	M	F	M	F	M	F	M	F
1. Base Case	15.1%	16.8%	15.1%	16.8%	5.9%	9.3%	5.9%	9.3%	1,293	1,849
2. Growth	15.1%	16.8%	46.6%	34.8%	5.9%	9.3%	11.2%	14.5%	1,655	2,118
3. Obesity Elimination	15.1%	16.8%	0.0%	0.0%	5.9%	9.3%	7.6%	10.9%	1,120	1,597

Source: NHS (various), Access Economics analysis.

The impact of the different obesity scenarios on OA prevalence rates (expressed as a percent of the Australian population) is presented in Figure 3.2. The baseline scenario, as detailed above, captures demographic changes over the period and the influence of these on OA prevalence among the Australian population, assuming fixed prevalence rates for each age-gender cohort. The concave shape of this curve, and indeed all three scenarios, captures fundamental trends forecast to prevail in the Australian population over the model period – namely that, once the current period of 'baby-boomer'-driven population ageing peaks, expected around 2025, the ageing of the population and also overall population growth rates, will slow. The growth and elimination scenarios reflect these demographic trends as well as the influence of continued obesity growth and obesity elimination respectively. OA prevalence in 2050, relative to the baseline scenario, is around 13.5% lower under the elimination scenario and around 20% higher under the growth scenario.

FIGURE 3.2: OSTEOARTHRITIS PREVALENCE UNDER DIFFERENT OBESITY SCENARIOS, 2005-2050



ECONOMIC IMPACT OF ARTHRITIS 4.

Particularly in view of the prevalence of arthritis, its economic impact is of considerable magnitude and this section estimates the extent and nature of these impacts. Health system expenditure, other financial costs and the 'burden of disease' (the loss of wellbeing) are quantified, with cost allocations jurisdictionally and by bearer.

4.1 HEALTH SYSTEM EXPENDITURE

4.1.1 METHODOLOGY

Health system expenditure associated with arthritis was calculated based on data contained in the AIHW's revised edition of *Health System Expenditure by Disease and Injury 2000-01*, released April 2005 (AIHW 2005a). Figures in this report were extrapolated to 2007 on the basis of the most recent health cost inflation data from *Health Expenditure Australia* (AIHW, 2006c), and taking into account demographic changes that have occurred over this period.

As noted previously by Access Economics in *Arthritis costs states and territories*, a report for Arthritis Australia released November 2005, definitive classification of arthritis is a complex task as there are over 100 known forms of arthritis, bridging up to 43 individual ICD-10 codes. Few reported classifications of arthritis truly capture the complexity of the disease, often leaving vast proportions in broad categories such as 'other musculoskeletal diseases', hence underreporting the true figures. To overcome this, Access Economics consulted with a panel of specialist rheumatologists (two from New Zealand, one from Australia), to devise a list of agreed conditions deemed to be arthritis from ICD-10 codes. In some cases, proportions of each category were allocated as arthritic, in accordance with the clinical experience of the experts (Access Economics, 2005b).

In *Arthritis – the bottom line*, a specific data request was placed with the AIHW for disaggregated data from their publication *Health system expenditure on disease and injury*. Coupled with the agreed definitions from the consultation process, this comprehensive data set enabled allocated expenditure for arthritis to be estimated at $2,986 million in 2004. This represented 54% of the total expenditure allocated to all musculoskeletal conditions

With the release of the revised edition of *Health system expenditure by disease and injury* in April 2005, total expenditure allocated to all musculoskeletal conditions was revised down slightly from $4,684 million to $4,634 million.

Over the same period (2001 to 2005), arthritis prevalence, as reported in the NHS, increased as a share of total musculoskeletal conditions from 48.6% to 60.5 %. While prima facie this would seem to suggest a genuine increase in arthritis relative to other musculoskeletal conditions, changes to survey methodology cannot be ruled out as the cause. For example, in the 2001 NHS, inadequately specified back disorders such as 'bad back' were classified together as a single category. In the 2004-05 NHS, respondents who reported such conditions were asked to provide further information where possible and, as a result, some of these cases were able to be classified to other condition categories (ABS, 2006). The net result was a reduction in cases classified as 'back pain/problems neck, disc disorders' of over 900,000 persons between 2001 and 2004-05. While it is likely that some such conditions were reclassified as arthritic, sufficient data are unavailable. Consequently, the approach taken here has once again been a conservative one, assuming the share of musculoskeletal expenditure allocated to arthritis remained stable at 54%.

4.1.2 HEALTH SYSTEM EXPENDITURE IN 2007

Incorporating health cost inflation over the period from 2001 to 2007[8] and demographic changes that have occurred over this time, **Access Economics estimates that in 2007 the allocated health system expenditure associated with arthritis is $4.2 billion - $1,100 per person with arthritis.**

Access Economics (2001) reported that allocated health expenditure on arthritis in 2000 was $2.24 billion; by 2004, this figure had increased to an estimated $2.99 billion (Access Economics, 2005) (Table 4.1).

Over the period 2000-2004, allocated health expenditure on arthritis grew by 33% or 7.4% per year, while over the period 2004-2007, it grew by 42% or 12.4% per year, reflecting faster growth in prevalence over this period.

TABLE 4.1: ARTHRITIS, ALLOCATED HEALTH EXPENDITURE, 2000-2007, $M (CURRENT PRICES)

	2000(a)	2004(b)	2007(c)
Rheumatoid arthritis	172.8	297.1	405.5
Osteoarthritis	837.9	1,426.7	1,948.0
Other arthritis	1,230.0	1,262.3	1,886.1
Total arthritis	**2,240.7**	**2,986.1**	**4,239.6**

(a) Access Economics (2001). (b) Access Economics (2005). (c) Access Economic current estimates.

Table 4.2 on page 34 shows the distribution of this expenditure across different types of arthritis in 2007. OA is the leading source of health expenditure on arthritis, accounting for $2.03 billion or just under half of total allocated expenditure on arthritis in 2007. RA accounts for a further 10% of allocated arthritis expenditure with $422 million. The expenditure shares closely reflect relative prevalence, although there are variations reflecting treatment pathways.

- OA accounts for 63% of hospital inpatient expenditure and RA just 3.5%;
- 30% of hospital outpatient expenditure is attributable to OA, while 16.3% is attributable to RA;
- OA accounts for 75% of aged care expenditure, considerably above its prevalence share of 42%, but indicative of the greater impact it has on older Australians.

[8] The most recent health cost inflation release is 2005, consequently, 2005-06, and 2006-07 figures have been estimated based on the 2000-01 to 2004-05 average

TABLE 4.2: ARTHRITIS, ALLOCATED HEALTH EXPENDITURE, BY TYPE, 2007

$ million	In-patients	Out-patients	Aged Care	Out-of hosp. medical services	OPS#	Pharma-ceuticals	Research	Total
RA	53.9	55.0	161.6	41.5	36.1	78.7	5.0	431.7
OA	978.1	100.4	727.0	134.1	70.4	248.2	24.1	2,282.3
Other*	513.6	182.8	75.6	298.8	181.2	251.7	21.3	1,525.0
Total	**1,545.7**	**338.2**	**964.2**	**474.7**	**287.8**	**578.5**	**50.4**	**4,239.6**
$/person^								
RA	101	103	302	78	67	147	9	807
OA	578	59	430	79	42	147	14	1,350
Other*	256	91	38	149	90	125	11	760
Total	**385**	**84**	**240**	**118**	**72**	**144**	**13**	**1,057**

Source: Access Economics based on AIHW 2005a, totals may not sum due to rounding.
*Includes all other forms of arthritis. # Other professional services. ^ Per person with the condition (adjusted to take account of co-morbidity of different types of arthritis).

As captured in Table 4.2 and represented graphically in Figure 4.1 below, hospital services account for the lion's share of health expenditure allocated to arthritis – 44%, with inpatient services contributing 36% and outpatients 8%. Aged care is also a significant component, representing 23% or $964.2 million of allocated health expenditure. Per capita expenditure is highest for OA, reflecting greater per capita inpatient costs.

FIGURE 4.1: ARTHRITIS, ALLOCATED HEALTH EXPENDITURE, 2007

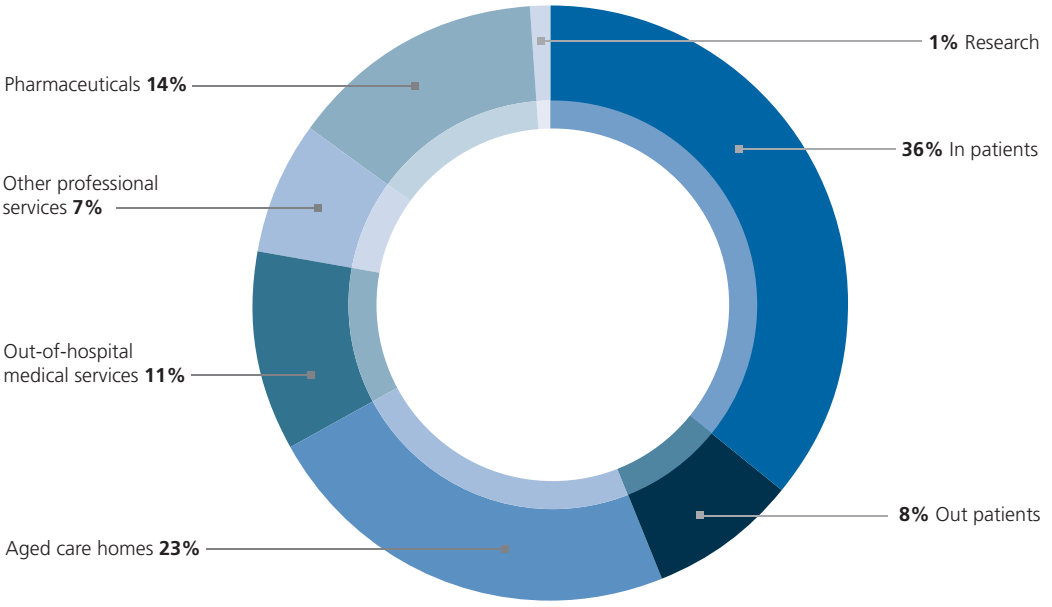
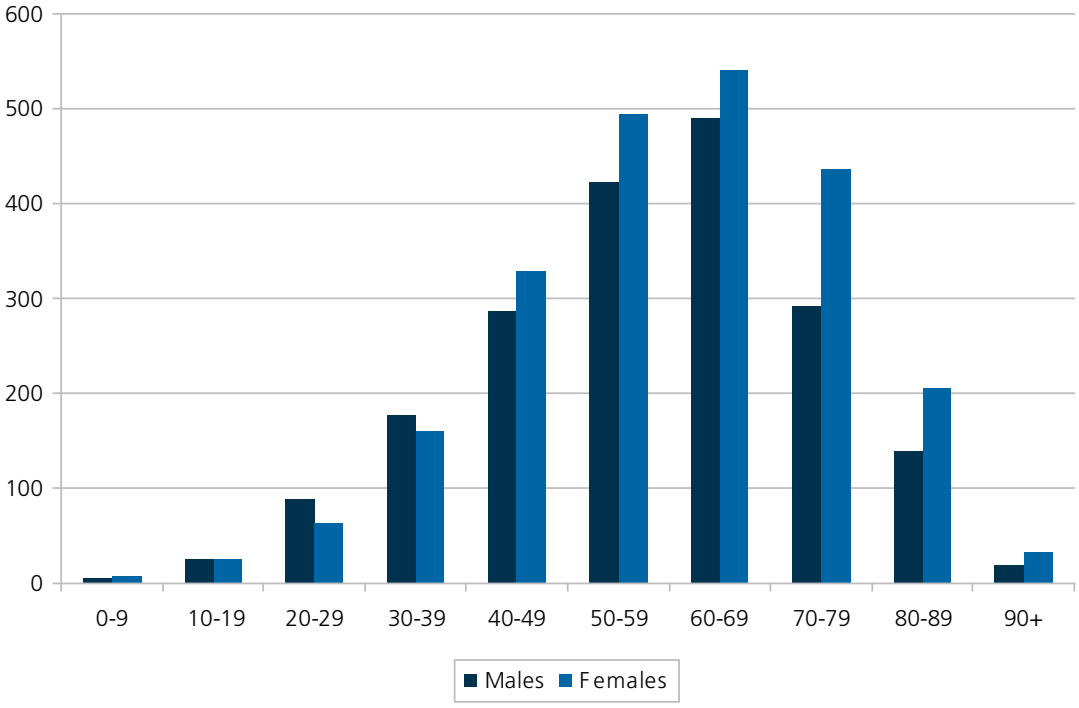


Figure 4.2 illustrates the age-gender distribution of allocated arthritis expenditure in 2007. Reflecting the greater prevalence in women, health expenditure for all age cohorts except age 20-40 years is greater in total dollar terms for women than men. Similarly, the distribution of expenditure across age-groups reflects the combined pattern in prevalence and demography, with the middle-aged cohorts accounting for a large proportion of overall expenditure.

FIGURE 4.2: ARTHRITIS, ALLOCATED HEALTH EXPENDITURE BY AGE AND GENDER, 2007 ($M)



Source: Access Economics based on ABS National Health Survey 2004-05.

Only 87.5% of total recurrent health expenditure is able to be allocated to particular disease and injury groups by the AIHW. The 'unallocated' remainder includes capital expenditures, expenditure on community health (excluding mental health), public health programs (except cancer screening), health administration and health aids and appliances (Table 4.3).

TABLE 4.3: ARTHRITIS, TOTAL HEALTH EXPENDITURE, 2007, $M

	Allocated expenditure	Unallocated expenditure	Total health expenditure
Rheumatoid Arthritis	421.7	60.2	481.9
Osteoarthritis	2025.6	289.4	2315.0
Other Arthritis	1792.1	256.0	2048.1
Total Arthritis	**4239.6**	**605.7**	**4845.3**

Total expenditure per capita by age (including unallocated expenditures) is shown in Table 4.4. Expenditures are higher for younger people, with per capita expenditure slightly higher on younger males than on younger females, but slightly higher in older females than in older males. This evens out over all age groups, however.

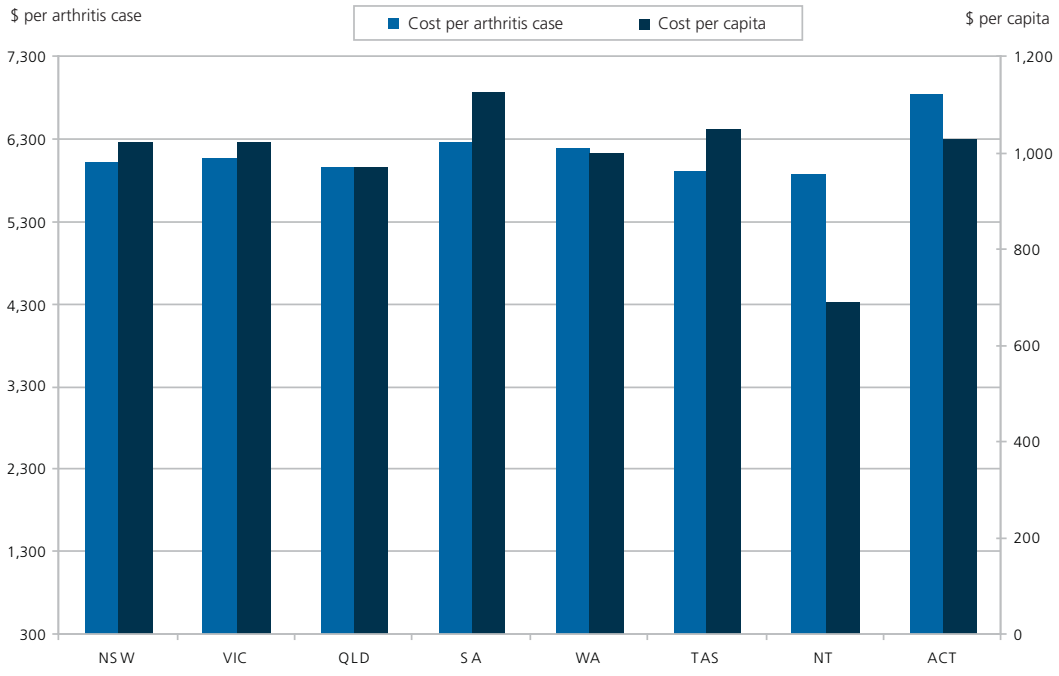
TABLE 4.4: ARTHRITIS, TOTAL HEALTH EXPENDITURE BY AGE, 2007, $/CAPITA

	Males	Females	Persons
0-4	7,288	7,098	7,178
5–14	7,288	7,098	7,178
15–24	3,115	1,868	2,335
25–34	1,950	1,338	1,655
35–44	1,334	1,355	1,344
45–54	1,188	1,195	1,192
55–64	1,123	1,158	1,141
65–74	1,128	1,160	1,146
75-84	1,062	1,191	1,137
85+	1,102	1,141	1,124
Average all ages	**1,208**	**1,208**	**1,208**

4.1.3 EXPENDITURE BY STATE

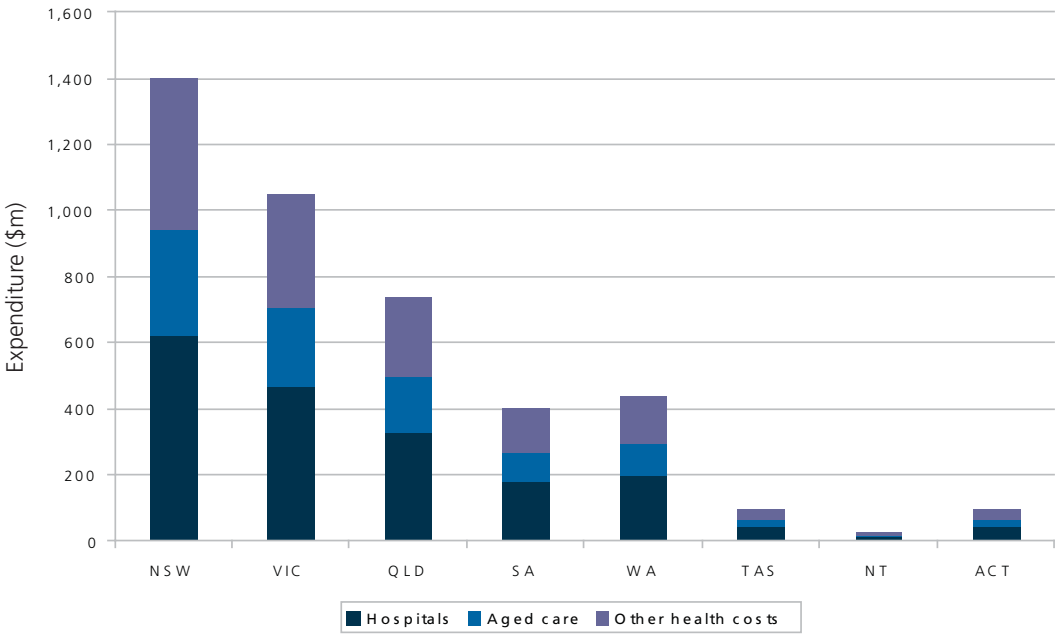
Access Economics (2005c) undertook rigorous analysis to model jurisdictional differences in health system costs in Australia. The average cost per person with arthritis, and the cost per capita, derived from that report for each state/territory is presented in Figure 4.3. Again the demographic drivers are evident, eg, for the NT, as well as individual differentials in health system costs.

FIGURE 4.3: ARTHRITIS HEALTH COST PER CASE & COST PER CAPITA, STATES/TERRITORIES, 2004



Given the comprehensiveness of these calculations, coupled with the absence of more recent jurisdictional data (the states/territories no longer undertake to provide such data), expenditure shares derived from this analysis have been used to apportion the 2007 cost estimates by state/territory (Figure 4.4). Reflecting the relatively higher cost per case in South Australia, Western Australia and particularly the ACT, these states/territories represent a greater share of expenditure than prevalence.

FIGURE 4.4: ARTHRITIS, ALLOCATED HEALTH EXPENDITURE BY STATE/TERRITORY, 2007



4.2 OTHER FINANCIAL COSTS

Other financial costs are all those that are not direct health system costs (Section 4.1) nor intangible costs – the loss of health and wellbeing (detailed in Section 5). These include productivity losses resulting from absenteeism and reduced labour force participation, carer costs, out of pocket expenses, the deadweight efficiency losses from transfers and funeral costs.

It is important to make the economic distinction between real and transfer costs.

- **Real costs** use up real resources, such as capital or labour, or reduce the economy's overall capacity to produce goods and services.
- **Transfer payments** involve payments from one economic agent to another that do not use up real resources, for example, a disability support pension, or taxation revenue.

Transfer costs are important when adopting a whole-of-government approach to policy formulation and budgeting. Measurement of indirect costs remains a matter of some debate and controversy. In this report, we estimate two types of indirect costs of arthritis.

- Financial costs (this section) include lost production from arthritis-related morbidity and the associated deadweight taxation losses, and other financial costs eg, carers, aids and home modifications for those disabled.
- Non-financial costs (Section 5) derive from loss of healthy life—the pain, premature death and loss of life quality that result from arthritis. These are more difficult to measure, but can be analysed in terms of the years of healthy life lost, both quantitatively and qualitatively, known as the 'burden of disease', with an imputed value of a 'statistical' life so as to compare these costs with financial costs of arthritis.

4.2.1 PRODUCTIVITY LOSSES

Access Economics measures the lost earnings and production due to health conditions using a 'human capital' approach. The lower end of such estimates includes only the 'friction' period until the worker can be replaced, which would be highly dependent on labour market conditions and un(der)employment levels. In an economy operating at near full capacity, as Australia is at present, a better estimate includes costs of temporary work absences plus the discounted stream of lifetime earnings lost due to early retirement from the workforce, reduced working hours (part-time rather than full-time) and premature mortality, if any. In this case, it is likely that, in the absence of the disease, people with arthritis would participate in the labour force and obtain employment at the same rate as other Australians, and earn the same average weekly earnings. The implicit and probable economic assumption is that the numbers of such people would not be of sufficient magnitude to substantially influence the overall clearing of the labour market.

4.2.1.1 EMPLOYMENT IMPACTS

Arthritis can have an impact on a person's capacity to work. If employment rates are lower for people with arthritis, this loss in productivity represents a real cost to the economy.

The NHS provides data on self-reported labour force status and the 2004-05 survey provides the most recent data on the impact of arthritis on employment in Australia. In order to ensure the most robust estimates, a special data request was placed with the ABS for data pertaining to the labour force status of individuals with RA, OA and other arthritis, by age and gender. Analysis of these data enabled comprehensive estimation of the impact of arthritis on individual's workforce participation, and accurate extrapolation of these findings to 2007.

Unemployment rates for people with arthritis do not appear to differ considerably from those of the overall population. In fact, if anything, unemployment rates are marginally lower among those with arthritis compared to the overall Australian population. This pattern is common among people with chronic disease, who tend to participate less in the workforce, resulting in lower unemployment rates.

Consistent with this, the rate of labour force participation for people with arthritis is considerably lower than that of the total population. Of the 1.8 million Australians in the working age population (15-64) as of June 2005, only 62.7% were actively participating in the labour force (employed or unemployed looking for work). The comparable figure for the overall population was 75.4%. However, the arthritis group has an older age distribution.

Productivity losses, however, are based on differences in the employment rate, calculated as the proportion of the working age population (15-64) who are employed. In 2005, the employment rate among the working age Australian population was 71.2%. **After standardising for age and gender, the difference between employment rates for those with arthritis and the overall population was estimated to be 5.5% for men and 3.75% for women.**

Given average weekly earnings for each respective age group, the annual cost of lost **earnings due to workplace separation and early retirement due to arthritis is estimated as $3.7 billion in 2007.**

4.2.1.2 ABSENTEEISM

Based on self-reported data from the 2004-05 NHS, it is estimated that 224,000 Australians aged between 15 and 64 take time off work each year due to arthritis including 125,000 males and 99,000 females. Given this, it is estimated that of those with arthritis who are in the working age population and currently employed, 16% will take time off work due to their condition. No data are available in Australia in relation to the average number of days of work missed by people with arthritis, so findings from the literature form the basis of these estimates. A recent study conducted in the United States and published in the Journal of the American Medical Association investigated lost productive time due to common pain conditions, including arthritis (Stewart et al, 2003). 28,902 working age adults were surveyed about their health status, health-related causes of work absence and reduced performance at work. Using statistical analysis, the research found that, on average, of those with arthritis who were absent from work, the average hours of absence per worker per week was 0.7. Assuming an 8-hour day and a 48 week working year, this equates to 4.2 working days per worker per year.

In the absence of recent Australian data and given the demographic similarities between Australia and the United States, Access Economics has adopted this estimate for calculating the costs of absenteeism resulting from arthritis in Australia.

Based on these parameters and the average weekly earnings (AWE) of each age-gender group, **Access Economics estimates that in 2007, the total cost of absenteeism due to arthritis is $304 million.** This includes $258 million in absences from paid work and $46 million in reduced productivity at home.

4.2.1.3 PREMATURE DEATH

OA is a disease of low mortality and most deaths, of the few that do occur, result from complications and co-morbidities. Similarly, RA is seldom an underlying cause of death, but may be an associated cause of death for conditions such as cardiovascular disorders, respiratory disorders and cancer. Based on the AIHW's national mortality data, Access Economics has calculated case mortality rates for arthritis in Australia. Based on these calculations, and incorporating employment rates and estimates of average lifetime earnings for different age groups, the present value of lost earnings due to mortality among those whom would otherwise have been employed has been estimated.

For people age 15-64 with arthritis, the estimated annual cost due to lost productivity from premature death is $7.5 million in 2007.

Premature death also leads to additional search and hiring costs for replacement workers. These are estimated as the number of people who die prematurely (by age and gender) multiplied by their chance of being employed multiplied by the search and hiring cost brought forward three years (the search and hiring cost is estimated as 26 weeks at AWE and the 3 year bring forward reflects average turnover rates).

In 2007, additional search and hiring costs are estimated as $18,400 for people with arthritis, based on the present value of bringing forward three years of average cost of staff turnover (26 weeks at AWE).

4.2.1.4 TAXATION REVENUE

Reduced earnings due to reduced workforce participation, absenteeism and premature death will also have an effect on taxation revenue collected by the Government. As well as forgone income (personal) taxation, there will also be a fall in indirect (consumption) tax, as those with lower incomes spend less on the consumption of goods and services.

Personal income tax forgone is a product of the average personal income tax rate and the forgone income. With arthritis and lower income, there will be less consumption of goods and services, estimated up to the level of the disability pension. Without arthritis, it is assumed that consumption would comprise 90% of income. This is a conservative estimate and, in fact, the savings rate may well be lower. The indirect tax forgone is estimated as a product of the forgone consumption and the average indirect tax rate, derived from the Access Economics macroeconomic model.

Access Economics estimates that in 2007, **$1.31 billion of potential taxation revenues will be lost due to the reduced participation of people with arthritis in the paid workforce.**

Lost taxation revenue is considered a transfer payment, rather than an economic cost per se. However, raising additional taxation revenues does impose real efficiency costs on the Australian economy, known as deadweight losses (DWL). Administration of the taxation system costs around 1.25% of revenue raised (derived from total amounts spent and revenue raised in 2000-01, relative to Commonwealth department running costs). Even larger deadweight losses arise from the distortionary impact of taxes on workers' work and consumption choices. These distortionary impacts are estimated to be 27.5% of each tax dollar collected (Lattimore, 1997 and used in Productivity Commission, 2003:6.15-6.16, with rationale).

Access Economics estimates that **$0.36 billion in additional deadweight loss is incurred in 2007**, due to the additional taxation required to replace that forgone due to lost productivity of people with arthritis.

Welfare payments made to people who are no longer working must, in a budget-neutral setting, also be funded by additional taxation. The DWLs associated with welfare transfers are calculated in Section 4.2.8.

TABLE 4.5: LOST EARNINGS AND TAXATION REVENUE DUE TO ARTHRITIS, 2007

Potential earnings lost	$billion
Average personal income tax rate*	18.4%
Potential personal income tax lost	$0.74
Average indirect tax rate*	14.1%
Potential indirect tax lost	$0.57
Total potential tax revenue lost	$1.31
Deadweight loss from additional taxation	**$0.36**

* Source: Access Economics macroeconomic model (2007).

4.2.2 CARERS

Carers are people who provide informal care to others in need of assistance or support. For example, carers may take time off work to accompany people with arthritis to medical appointments, stay with them in hospital, or care for them at home. Carers may also take time off work to undertake many of the unpaid tasks that the person with arthritis would do if they did not have arthritis and were able to do these tasks.

Informal care is distinguished from services provided by people employed in the health and community sectors (formal care) because the care is generally provided free of charge to the recipient and is not regulated by the government. Most informal carers are family or friends of the person receiving care.

While informal care is provided free of charge, it is not free in an economic sense, as time spent caring is time that cannot be directed to other activities such as paid work, unpaid work (such as housework or yard work) or leisure. As such, informal care is a use of economic resources.

4.2.2.1 METHODOLOGY

There are three potential methodologies which can be used to place a dollar value on the level of informal care:

- **Opportunity cost:** the value of lost wages forgone by the carer;
- **Replacement valuation:** the cost of buying a similar amount of services from the formal care sector; and
- **Self-valuation:** what carers themselves feel they should be paid.

Access Economics has adopted the opportunity cost method in this report as it provides the most accurate estimate of carer costs and sufficient demographic data on providers of care for people with arthritis are available.

Data from the 2003 ABS Survey of Disability, Ageing and Carers (SDAC) sourced specifically for this report identified 55,200 carers who reported themselves as the primary carer of a person whose main condition was arthritis. Of these, 39% were providing less than 20 hours of care per week on average, 24% between 20 and 40 hours and 37% more than 40 hours. In addition, there were 164,200 carers who identified themselves as the non-primary carer of a person with arthritis. Based on previous work by Access Economics (Access Economics 2005c), it is assumed that on average, non-primary carers spend five hours per week caring for people with arthritis. While there were also

estimates of care and carers for people who reported arthritis, but not as their main condition, and since it is not known whether any of that care would have been required in the absence of the arthritis (they still may have required some or all of the care for their main condition), the costs of care provide to these individuals has been conservatively excluded.

Based on these findings and incorporating age-gender average weekly earnings in Australia, **Access Economics estimates that in 2007 the total cost of informal care for people with arthritis is $1.01 billion.** This equates to $262 per person with arthritis in 2007.

4.2.3 FUNERAL COSTS

The 'additional' cost of funerals borne by family and friends of patients is based on the likelihood of death in the "x" years due to arthritis. However, some patients (particularly older patients) would have died during this time anyway. Eventually everyone must die and thus incur funeral expenses – so the true cost is the cost brought forward (adjusted for the likelihood of dying anyway in a given year). The BTRE (2000) calculated a weighted average cost of a funeral across all States and Territories, to estimate an Australian total average cost of $3,200 per person for 1996, or **$4,154 per person in 2007.**

In 2007, total funeral costs associated with premature death due to arthritis are estimated at $1.24 million.

4.2.4 WELFARE PAYMENTS

Transfer payments represent a shift of resources from one economic entity to another. The act of taxation and redistribution creates distortions and inefficiencies in the economy, so transfers also involve real net costs to the economy.

Data regarding the number of people on employment support benefits was sourced from Centrelink Australia, specifically for this report. For people who reported having arthritis, the most commonly received Centrelink work related benefit was the Disability Support Pension (DSP), which Access Economics estimates 113,523 people living with arthritis were receiving in February 2007. There were also 6,401 people with arthritis receiving Newstart Allowance (NA), including nearly 4,000 with OA and 400 with RA, and 163 people receiving Sickness Allowance (SA).

The value of these payments in 2007 is estimated to be $1.37 billion[9]. However, some of these people would have ordinarily received welfare payments which must be netted out to estimate the additional welfare payments due to arthritis, using a Melbourne University study (Tseng and Wilkins, 2002) about the 'reliance' of the general population (aged 15-64 years) on income support of 12%. Factoring down the $1.37 billion by 12% gives a **cost of welfare reliance on DSP, NA and SA due to arthritis of $1.20 billion per annum in 2007.**

4.2.5 COSTS OF AIDS AND HOME MODIFICATIONS

Arthritis can impede an individual's ability to conduct their daily activities and this may result in the need to acquire aids and devices to assist them in carrying out these tasks. People with arthritis may also need to make modifications to their homes, such as adding handrails and ramps in order to ensure they can safely conduct their lives.

[9] Based on a payment rate of $438.50 per fortnight for DSP, and $424.30 for SA and NSA.

Results from the Survey of Disability, Ageing and Carers reveal that of those who reported arthritis as their main condition, 561,300 had some level of disability in 2003 – 17% of those with arthritis. Applying this proportion to the prevalence of arthritis in 2007, Access Economics estimates that around 656,000 of those with arthritis in 2007 have some level of disability.

SDAC also reveals that of those who reported arthritis as their main condition:

- 16.3% used self care aids;
- 19.6% used mobility aids;
- 22.5% used communication devices;
- 14.3% made modification to their home as a result of arthritis; and
- 51.8% used some form of aid or have made some form of modification.

Cost estimates for various products are based on prices provided by the Independent Living Centre NSW, the Victorian Aids and Equipment Program and previous studies undertaken by Access Economics. While some equipment and modifications require large outlays but are amortised over a number of years, other devices need to be replaced more regularly. It was assumed that devices in heavy use (eating, dressing and continence aids and batteries) need to be replaced on an annual basis, while most other devices – with a cost range of between $30 and $200 (showering and toileting aids and most mobility aids such as canes, crutches, walking sticks and frames) – have a lifespan of three years, and larger expenses such as wheelchairs ($5,000) and hearing aids ($2,500) were depreciated over five years. Home modifications ($7,500) tend to be one-off investments, so their lifespan was assumed to be 20 years (Table 4.6).

Overall, **the cost for aids and equipment for people with arthritis was an estimated $220 million in 2007 – $57 per person with arthritis.**

As it is not known how much of this cost is subsidised by governments, paid for by the person with arthritis or their family and friends, or paid for through community programs, the amount is allocated to the individual with arthritis.

TABLE 4.6: ARTHRITIS, AIDS AND EQUIPMENT PRICES, ESTIMATED PRODUCT LIFE AND TOTAL COSTS, 2007

Device	Base price ($)	Product life (years)	Unit cost ($ per annum)	Number of devices	Total cost ($ per annum)
Self care					
Eating aids[1]	$107	1	$107	7,479	$797,340
Showering or bathing aids[2]	$91	3	$30	83,675	$2,527,403
Dressing aids[1]	$21	1	$21	18,815	$401,162
Toileting aids[2]	$85	3	$28	51,537	$1,465,113
Managing incontinence[1]	$1,279	1	$1,279	30,735	$39,318,845
Total Self care[6]			**$401**	**107,048**	**$44,509,863**
Mobility aids					
Canes[2]	$32	3	$11	15,426	$164,451
Walking stick[2]	$32	3	$11	69,301	$738,786
Crutches	$53	3	$18	9,115	$161,960
Walking frame[1]	$320	3	$107	46,980	$5,008,294
Wheelchair or scooter[1]	$5,330	5	$1,066	25,009	$26,661,067
Other mobility aids[4]	---	3	$201	24,542	$5,247,081
Total Mobility aids[6]			**$327**	**122,942**	**$37,981,639**
Communication aids					
Communication aids (electronic, non-electronic and other hearing and communication aids)[3]	$2,665	5	$533	147,250	$78,488,188
Batteries[3]	$146	1	$146	147,250	$21,505,764
Total Communication aids			**$679**	**147,250**	**$99,993,952**
Home modifications					
Home modifications (incl structural changes, ramps, bath modifications, doors widened, handrails, etc)[5]	$7,995	20	$400	94,076	$37,608,924
Total Home modifications			**$400**		**$37,608,924**
People using Aids and Equipment			**$661**	**340,037**	**$220,094,377**
People not using Aids and Equipment				315,926	
People with disability				**655,962**	

Sources: ABS (2003);[1] Victorian Aids and Equipment Program; [2] Independent Living Centre NSW; [3] Access Economics (2006a); [4] average of mobility aids; [5] Access Economics (2006b); [6] average. Note: People may use multiple devices.

4.2.6 TRAVEL COSTS

Arthritis may result in individuals and their families incurring additional travel expenses as a result of their condition. These costs are particularly burdensome for regional and remote patients travelling to metropolitan areas for treatment. However, even if the medical treatment is available locally, travel costs can still be substantial in terms of both distance and time. Potential costs include petrol, road tolls, additional car maintenance, taxi, train, bus and air fares, accommodation costs for both the patient and/or family at hotels/hostels near the treatment facility (although some out-of-town patients may be able to stay with friend/family), additional meal costs; and item duplication[10] , luggage and clothing.

In 1999, Walsh and Chappell (1999) conducted a study on behalf of the Department of Family and Community Services, surveying 409 recipients of Disability Support Pension who had musculoskeletal impairment. Based on these findings, Access Economics (2005a) estimated that in 2004, the cost of travel associated with their condition for people with arthritis in Australia was $88.1 million or around $26 for every person with arthritis.

In the absence of more recent analysis of the transport costs incurred by those with arthritis as a result of their condition, Access Economics has estimated the 2007 costs based on Walsh and Chappell's unit costs, allowing for inflation.

The Australian Bureau of Statistics (ABS) publishes official CPI data, with specific values reported for numerous sectors including transportation. Based on this data, it is estimated that transport-related inflation, over the period 2004 to the present, has been 12.48% or around 4% per annum on average.

Coupling this with the growth in arthritis prevalence, **Access Economics estimates that the cost incurred by people with arthritis as a result of travel associated with their condition is $113 million in 2007.**

4.2.7 COSTS OF PROGRAMS

A number of community care programs are conducted in Australia to support the elderly and disabled in conducting their daily lives. Examples include the Extended Aged Care at Home (EACH) packages, the Home and Community Care Program (HACC) and Community Aged Care Packages (CACP).

While published data pertaining to these programs do not detail the primary condition of program participants, it is possible to estimate the proportion of these programs that is relevant to arthritis. The results of the 2003 Survey of Disability Ageing and Carers reveal that of those who reported having some level of disability, 14% reported their main condition as arthritis or related disorders. This has been taken as a proxy for use of disability and aged care programs to estimate the proportion of the costs associated with programs for the disabled and elderly which is likely be attributable to arthritis. Table 4.7 summarises these findings.

[10] Some people who need to travel frequently to health services may find it more efficient to keep a set of toiletries or other products in the second location, rather than transporting, packing and unpacking them frequently.

TABLE 4.7: ARTHRITIS-RELATED PROGRAM COSTS, 2007

PROGRAM	Number of recipients (2006)	Total Program Expenditure (2005-06) $m	Estimated arthritis share of total program costs ($m)
EACH	3,368	$65.3	$9.1
CACP	355,574	$356.6	$49.9
HACC	750,000*	$1,409.0	$197.3
TOTAL	**1,108,942**	**$1,830.9**	**$256.3**

Source: Department of Health and Ageing (2006).

*DoHA estimate http://www.health.gov.au/internet/wcms/publishing.nsf/Content/hacc-index.htm

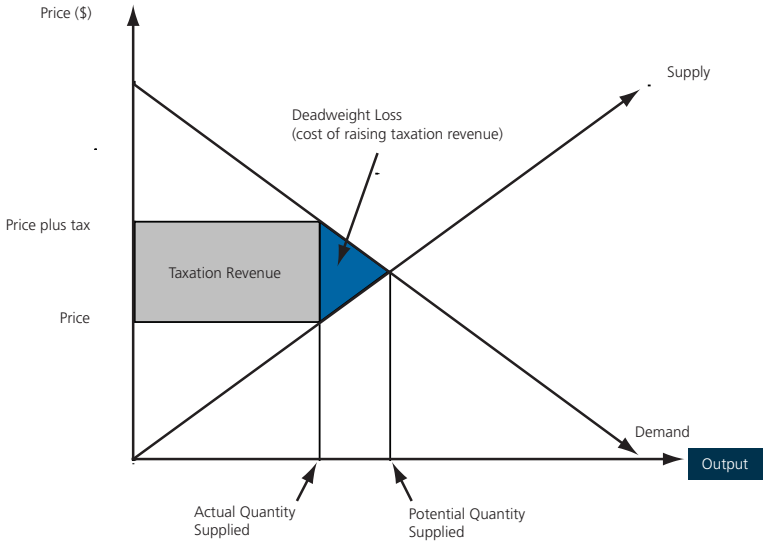
Access Economics estimates that in 2007, the cost of government programs attributable to arthritis is estimated as $256 million.

4.2.8 DEADWEIGHT LOSS

As discussed earlier, transfer payments (Government payments/services and taxes) are not a net cost to society, as they represent a shift of consumption power from one group of individuals to another in the community. If the act of taxation did not create distortions and inefficiencies in the economy, then transfers could be made without a net cost to the community. However, through these distortions taxation does impose a deadweight loss (DWL) on the economy.

Deadweight loss is the loss of consumer and producer surplus, as a result of the imposition of a distortion to the equilibrium (society preferred) level of output and prices. Taxes alter the price and quantity of goods sold compared to what they would be if the market were not distorted, and thus lead to some diminution in the value of trade between buyers and sellers that would otherwise be enjoyed. The principal mechanism by which a deadweight loss occurs is the price induced reduction in output, removing potential trades that would benefit both buyers and sellers. In a practical sense, this distortion reveals itself as a loss of efficiency in the economy, which means that raising $100 of revenue requires consumers and producers to give up more than $100 of value.

FIGURE 4.5: DEADWEIGHT LOSS OF TAXATION



The rate of deadweight loss used in this report is 0.275 per $1 of tax revenue raised, based on Productivity Commission (2003), plus 0.0125 per $1 of tax revenue raised for Australian Taxation Office (ATO) administration (Access Economics 2004: Part II, 66).

The total extra tax dollars required to be collected include:

- the calculation for the loss of income tax from people with arthritis, carers and employers;
- the additional induced social welfare payments required to be paid; and
- the value of Government services provided (eg. health system costs, counselling etc).

Thus for people with arthritis in 2007, the expected total DWL is $1.68 billion.

4.2.9 SUMMARY OF OTHER (NON-HEALTH) FINANCIAL COSTS

In 2007, other (non-health) financial costs for people with arthritis are estimated to be $7.37 billion.

TABLE 4.8: SUMMARY OF OTHER (NON-HEALTH) FINANCIAL COSTS OF ARTHRITIS, 2007

	$million
Productivity costs	
Employment impacts	$3,764.6
Absenteeism	$304.4
Premature death	$7.5
Hiring costs	$0.02
Total productivity costs	$4,076.5
Carer costs	$1,014.8
Funeral costs	$1.2
Aids and modifications	$220.1
Travel costs	$113.3
Program costs	$256.3
Deadweight loss	$1,684.9
Total other financial costs	$7,367.1

BURDEN OF DISEASE 5.

To those experiencing arthritis, less tangible costs such as loss of quality of life, loss of leisure, physical pain and disability are often as or more important than the health system costs or other financial losses. This chapter measures the burden of suffering and premature death from arthritis.

5.1 VALUING LIFE AND HEALTH

Since Schelling's (1968) discussion of the economics of life saving, the economic literature has properly focused on willingness to pay (willingness to accept) measures of mortality and morbidity risk. Using evidence of market trade-offs between risk and money, including numerous labour market and other studies (such as installing smoke detectors, wearing seatbelts or bike helmets etc), economists have developed estimates of the **value of a 'statistical' life (VSL).**

> The willingness to pay approach estimates the value of life in terms of the amounts that individuals are prepared to pay to reduce risks to their lives. It uses stated or revealed preferences to ascertain the value people place on reducing risk to life and reflects the value of intangible elements such as quality of life, health and leisure. While it overcomes the theoretical difficulties of the human capital approach, it involves more empirical difficulties in measurement (BTE, 2000:20-1).

Viscusi and Aldy (2002) summarise the extensive literature in this field, most of which has used econometric analysis to value mortality risk and the 'hedonic wage' by estimating compensating differentials for on-the-job risk exposure in labour markets, in other words, determining what dollar amount would be accepted by an individual to induce him/her to increase the possibility of death or morbidity by x%. They find the VSL ranges between US$4 million and US$9 million with a median of US$7 million (in year 2000 US dollars), similar but marginally higher than the VSL derived from US product and housing markets, and also marginally higher than non-US studies, although all in the same order of magnitude. They also review a parallel literature on the implicit value of the risk of non-fatal injuries.

> A particular life may be regarded as priceless, yet relatively low implicit values may be assigned to life because of the distinction between identified and anonymous (or 'statistical') lives. When a 'value of life' estimate is derived, it is not any particular person's life that is valued, but that of an unknown or statistical individual (Bureau of Transport and Regional Economics, 2002:19).

Weaknesses in this approach, as with human capital, are that there can be substantial variation between individuals. Extraneous influences in labour markets such as imperfect information, income/wealth or power asymmetries can cause difficulty in correctly perceiving the risk or in negotiating an acceptably higher wage.

Viscusi and Aldy (2002) include some Australian studies in their meta-analysis, notably Kniesner and Leeth (1991) of the Australian Bureau of Statistics (ABS) with VSL of US2000 $4.2 million and Miller et al (1997) of the National Occupational Health and Safety Commission (NOHSC) with quite a high VSL of US2000$11.3m-19.1 million (Viscusi and Aldy, 2002:92-93, Table 4). Since there are relatively few Australian studies, there is also the issue of converting foreign (US) data to Australian dollars using either exchange rates or purchasing power parity and choosing a period.

Access Economics (2003) presents outcomes of studies from Yale University (Nordhaus, 1999) – where VSL is estimated as $US2.66m; University of Chicago (Murphy and Topel, 1999) – US$5m; Cutler and Richardson (1998) – who model a common range from US$3m to US$7m, noting a literature range of $US0.6m to $US13.5m per fatality prevented (1998 US dollars). These eminent researchers apply discount rates of 0% and 3% (favouring 3%) to the common range to derive an equivalent of $US 75,000 to $US 150,000 for a year of life gained.

5.1.1 DALYs and QALYs

In an attempt to overcome some of the issues in relation to placing a dollar value on a human life, in the last decade an alternative approach to valuing human life has been derived. The approach is non-financial, where pain, suffering and premature mortality are measured in terms of Disability Adjusted Life Years (DALYs), with 0 representing a year of perfect health and 1 representing death (the converse of a QALY or "quality-adjusted life year" where 1 represents perfect health). This approach was developed by the World Health Organization, the World Bank and Harvard University and provides a comprehensive assessment of mortality and disability from diseases, injuries and risk factors in 1990, projected to 2020 (Murray and Lopez, 1996). Methods and data sources are detailed further in Murray et al (2001).

The DALY approach has been adopted and applied in Australia by the Australian Institute for Health and Welfare (AIHW) with a separate comprehensive application in Victoria. Mathers et al (1999) from the AIHW estimate the burden of disease and injury in 1996, including separate identification of premature mortality (YLL) and morbidity (YLD) components. In any year, the disability weight of a disease (for example, 0.18 for a broken wrist) reflects a relative health state. In this example, 0.18 would represent losing 18% of a year of healthy life because of the inflicted injury.

The DALY approach has been successful in avoiding the subjectivity of individual valuation and is capable of overcoming the problem of comparability between individuals and between nations, although nations have subsequently adopted variations in weighting systems. For example, in some countries DALYs are age-weighted for older people although in Australia the minority approach is adopted – valuing a DALY equally for people of all ages.

The main problem with the DALY approach is that it is not financial and is thus not directly comparable with most other cost measures. In public policy making, therefore, there is always the temptation to re-apply a financial measure conversion to ascertain the cost of an injury or fatality or the value of a preventive health intervention. Such financial conversions tend to utilise "willingness to pay" or risk-based labour market studies described above.

The Department of Health and Ageing (based on work by Applied Economics) adopted a very conservative approach to this issue, placing the value of a human life year at around A$60,000 per annum, which is lower than most international lower bounds on the estimate.

> *"In order to convert DALYs into economic benefits, a dollar value per DALY is required. In this study, we follow the standard approach in the economics literature and derive the value of a healthy year from the value of life. For example, if the estimated value of life is A$2 million, the average loss of healthy life is 40 years, and the discount rate is 5 per cent per annum, the value of a healthy year would be $118,000.*[11] *Tolley, Kenkel and Fabian (1994) review the literature on valuing life and life years and conclude that a range of US$70,000 to US$175,000 per life year is reasonable. In a major study of the value of health of the US population, Cutler and Richardson (1997) adopt an average value of US$100,000 in 1990 dollars for a healthy year.*
>
> *Although there is an extensive international literature on the value of life (Viscusi, 1993), there is little Australian research on this subject. As the Bureau of Transport Economics (BTE) (in BTE, 2000) notes, international research using willingness to pay values usually places the value of life at somewhere between A$1.8 and A$4.3 million. On the other hand, values of life that reflect the present value of output lost (the human capital approach) are usually under $1 million.*

[11] In round numbers, $2,000,000 = $118,000/1.05 + $118,000/(1.05)2 + … + $118,000/(1.05).40 [Access Economics comment: The actual value should be $116,556, not $118,000 even in round numbers.]

The BTE (2000) adopts estimates of $1 million to $1.4 million per fatality, reflecting a 7 per cent and 4 per cent discount rate respectively. The higher figure of $1.4 million is made up of loss of workforce productivity of $540,000, loss of household productivity of $500,000 and loss of quality of life of $319,000. This is an unusual approach that combines human capital and willingness to pay concepts and adds household output to workforce output.

For this study, a value of $1 million and an equivalent value of $60,000 for a healthy year are assumed.[12] *In other words, the cost of a DALY is $60,000. This represents a conservative valuation of the estimated willingness to pay values for human life that are used most often in similar studies.*[13]*" (DHA, 2003:11-12)."*

As the citation concludes, the estimate of $60,000 per DALY is very low. The Viscusi (1993) meta-analysis referred to reviewed 24 studies with values of a human life ranging between $US 0.5 million and $US 16m, all in pre-1993 US dollars. Even the lowest of these converted to 2003 Australian dollars at current exchange rates, exceeds the estimate adopted ($1m) by nearly 25%. The BTE study tends to disregard the literature at the higher end and also adopts a range (A$1-$1.4m) below the lower bound of the international range that it identifies (A$1.8-$4.3m).

The rationale for adopting these very low estimates is not provided explicitly. Certainly it is in the interests of fiscal restraint to present as low an estimate as possible.

In contrast, the majority of the literature as detailed above appears to support a higher estimate for VSL, as presented in Table 5.1, which Access Economics believes is important to consider in disease costing applications and decisions. The US dollar values of the lower bound, midrange and upper bound are shown; the 'average' estimate is the average of the range excluding the high NOHSC outlier. Equal weightings are used for each study as the:

- Viscusi and Aldy meta-analysis summarises 60 recent studies;
- ABS study is Australian; and
- Yale and Harvard studies are based on the conclusions of eminent researchers in the field after conducting literature analysis.

Where there is no low or high US dollar estimate for a study, the midrange estimate is used to calculate the average. The midrange estimates are converted to Australian dollars at purchasing power parity (as this is less volatile than exchange rates) of USD=0.7281AUD for 2003 as estimated by the OECD.

Access Economics concludes the VSL range in Australia lies between $3.7m and $9.6m [14], with a mid-range estimate of $6.5m. These estimates have conservatively not been inflated to 2004 prices, given the uncertainty levels.

[12] The equivalent value of $60,000 assumes, in broad terms, 40 years of lost life and a discount rate of 5 per cent. [Access Economics comment: More accurately the figure should be $58,278.]

[13] In addition to the cited references in the text, see for example Murphy and Topel's study (1999) on the economic value of medical research. [Access Economics comment. Identical reference to our Murphy and Topel (1999).]

[14] Calculated from the non-indexed studies themselves. Converting the Access Economics average estimates from USD to AUD at PPP would provide slightly higher estimates - $3.9 million and $10.2m, with the same midrange estimate.

TABLE 5.1: INTERNATIONAL ESTIMATES OF VALUE OF STATISTICAL LIFE (VSL), VARIOUS YEARS

	US$m			A$m
	Lower	Midrange	Upper	0.7281
Viscusi and Aldy meta-analysis 2002	4	7	9	**9.6**
Australian: ABS 1991		4.2		5.8
NOHSC 1997	11.3		19.1	
Yale (Nordhaus) 1999		2.66		**3.7**
Harvard (Cutler and Richardson) 1998	0.6	5	13.7	6.9
Average*	2.9	**4.7**	7.4	**6.5**

* Average of range excluding high NOHSC outlier, using midrange if no data; conservatively not inflated.
A$m conversions are at the OECD 2003 PPP rate.

5.1.2 DISCOUNT RATES

Choosing an appropriate discount rate for present valuations in cost analysis is a subject of some debate, and can vary depending on which future income or cost stream is being considered. There is a substantial body of literature, which often provides conflicting advice, on the appropriate mechanism by which costs should be discounted over time, properly taking into account risks, inflation, positive time preference and expected productivity gains.

The absolute minimum option that one can adopt in discounting future income and costs is to set future values in current day dollar terms on the basis of a risk free assessment about the future (that is, assume the future flows are similar to the certain flows attaching to a long term Government bond).

Wages should be assumed to grow in dollar terms according to best estimates for inflation and productivity growth. In selecting discount rates for this project, we have thus settled upon the following as the preferred approach.

- Positive time preference: We use the long term nominal bond rate of 5.8% pa (from recent history) as the parameter for this aspect of the discount rate. (If there were no positive time preference, people would be indifferent between having something now or a long way off in the future, so this applies to all flows of goods and services.)
- Inflation: The Reserve Bank has a clear mandate to pursue a monetary policy that delivers 2 to 3% inflation over the course of the economic cycle. This is a realistic longer run goal and we therefore endorse the assumption of 2.5% pa for this variable. (It is important to allow for inflation in order to derive a real (rather than nominal) rate.)
- Productivity growth: The Commonwealth Government's Intergenerational Report assumed productivity growth of 1.7% in the decade to 2010 and 1.75% thereafter. We suggest 1.75% for the purposes of this analysis.

There are then two different discount rates that should be applied:

- to discount income streams of future earnings, the discount rate is:

  5.8 - 2.5 - 1.75 = 1.55%.

- to discount other future streams (healthy life, health services, legal costs, accommodation services and so on) the discount rate is:

  5.8 – 2.5 = 3.3%

While there may be sensible debate about whether health services (or other costs with a high labour component in their costs) should also deduct productivity growth from their discount rate, we argue that these costs grow significantly in real terms over time as a result of other factors such as new technologies and improved quality, and we could reasonably expect this to continue in the future.

Discounting the VSL of $3.7m from Table 5.1 by the discount rate of 3.3% over an average 40 years expected life span (the average from the meta-analysis of wage-risk studies) provides an estimate of the value of a life year of $162,561.

5.2 ESTIMATING THE BURDEN OF DISEASE FROM ARTHRITIS

5.2.1 DISABILITY WEIGHTS

The years of life lost due to disability (YLD) is estimated based on an 'implicit disability weight' of 0.024 derived from the YLD divided by the prevalence of arthritis calculated by the AIHW (Mathers et al, 1999). The AIHW disability weights are presented in Table 5.2, suggesting that a large proportion of arthritis is mild (or adjusted for co-morbidities in older people).

TABLE 5.2: DISABILITY WEIGHTS FOR ARTHRITIS

	Mild	Moderate	Severe
Rheumatoid arthritis	0.21	0.37	0.94
Osteoarthritis	0.01	0.14	0.42
Other arthritis*		0.06	

* Average based on disability weight for chronic back pain and 'other musculoskeletal disorders', since there is no distinction in the prevalence data between the severity stages of 'other arthritis'.

5.2.2 YEARS OF LIFE LOST DUE TO DISABILITY

Based on the implicit disability weight outlined above and the total number of people experiencing loss of wellbeing due to disability from arthritis, the YLD for arthritis has been calculated by gender (Table 5.3).

TABLE 5.3: ESTIMATED YEARS OF HEALTHY LIFE LOST DUE TO DISABILITY (YLD) FOR ARTHRITIS, 2007

	Implicit disability weight	Prevalence	YLD
Males	0.024	1,766,010	41,978
Females	0.024	2,082,535	49,501
Total	**0.024**	**3,848,545**	**91,479**

5.2.3 YEARS OF LIFE LOST DUE TO PREMATURE DEATH

Based on the AIHW's national mortality database, it is estimated that there are around 620 deaths a year from arthritis. The years of life lost due to premature death (YLL) have been estimated from the age-gender distribution of deaths by the corresponding YLL for the age of death in the Standard Life Expectancy Table (West Level 26) with a discount rate of 3.3% and no age weighting. For the age-gender distribution of deaths, the total YLL in 2007 was estimated as 2,376 DALYs for arthritis (Table 5.4).

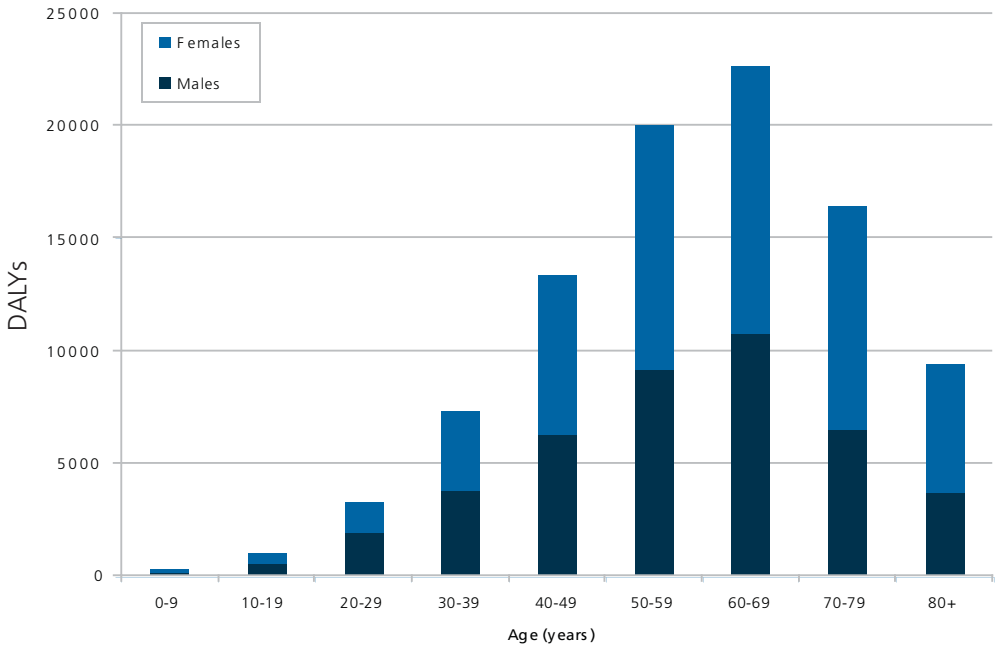
TABLE 5.4: YEARS OF LIFE LOST DUE TO PREMATURE DEATH (YLL) ASSOCIATED WITH ARTHRITIS, 2007

	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	Total
Males	0.1	0.4	3.5	1.9	17.3	74.2	159.0	230.9	267.5	755.0
Females	0.0	0.5	5.2	14.7	33.1	124.5	295.2	517.9	629.8	1620.9
Persons	**0.1**	**1.0**	**8.7**	**16.6**	**50.3**	**198.7**	**454.2**	**748.8**	**897.3**	**2375.8**

5.2.4 TOTAL DALYs DUE TO ARTHRITIS

Figure 5.1 illustrates YLD and YLL due to arthritis totalling 93,855 DALYs. The greatest impact of arthritis is in the 60-69 age group, reflecting the higher YLD due to the large number of Australians with arthritis in this cohort. Indicative of the greater prevalence and hence greater YLD, it can also be seen that the greatest loss of wellbeing due to arthritis in Australia is among women.

FIGURE 5.1: LOSS OF WELLBEING DUE TO ARTHRITIS (DALYS), BY AGE AND GENDER, 2007



Multiplying the number of DALYs by the VLY ($162,561) provides an estimate of the gross dollar value of the loss of wellbeing due to arthritis.

The estimated 2007 gross cost of lost wellbeing from arthritis is $15.3 billion.

5.2.5 NET VALUE OF A HEALTHY LIFE LOST

Bearing in mind that the wage-risk studies underlying the calculation of the VSL take into account all known personal impacts – suffering and premature death, lost wages/income, out-of-pocket personal health costs and so on – the estimate of $2.4 billion should be treated as a 'gross' figure. However, costs specific to arthritis that are unlikely to have entered into the thinking of people in the source wage/risk studies should not be netted out (eg, publicly financed health spending, care provided voluntarily). The results after netting out are presented in Table 5.5.

TABLE 5.5: NET COST OF LOST WELLBEING DUE TO ARTHRITS, $M, 2007

Gross cost of lost wellbeing	15,257
Minus production losses net of tax	2,619
Minus health costs borne out-of-pocket	908
Net cost of lost wellbeing	11,729

The net cost of lost wellbeing due to arthritis is estimated to be $11.7 billion in 2007.

6. SUMMARY OF ECONOMIC IMPACTS FOR AUSTRALIA

6. SUMMARY OF ECONOMIC IMPACTS FOR AUSTRALIA

6.1 ECONOMIC IMPACTS IN 2007

The estimated total cost of arthritis in 2007 is $24 billion (Table 6.1). This equates to $6,200 per person with arthritis in 2007 and is an increase of around $4.6 billion on the estimated total cost of arthritis in 2004 (Access Economics 2005).

TABLE 6.1: TOTAL COSTS OF ARTHRITIS IN 2007 ($ MILLION)

Cost Category	$million	% total
Health costs		
Hospitals	1,181.8	4.9%
Aged care	927.3	3.9%
Other health costs	2,130.5	8.9%
Total allocated health costs	4,239.6	17.7%
Unallocated health costs	605.7	2.5%
Sub-total health costs	4,845.3	20.2%
Other financial costs		
Productivity costs	4,076.5	17.0%
DWL from raising additional taxation	1,684.9	7.0%
Informal care	1,014.8	4.2%
Other indirect costs	590.9	2.5%
Sub-total other financial costs	7,367.1	30.8%
Total financial costs	**12,212.4**	**51.0%**
Net cost of suffering	**11,729.0**	**49.0%**
Total cost of arthritis	**23,941.4**	**100.0%**

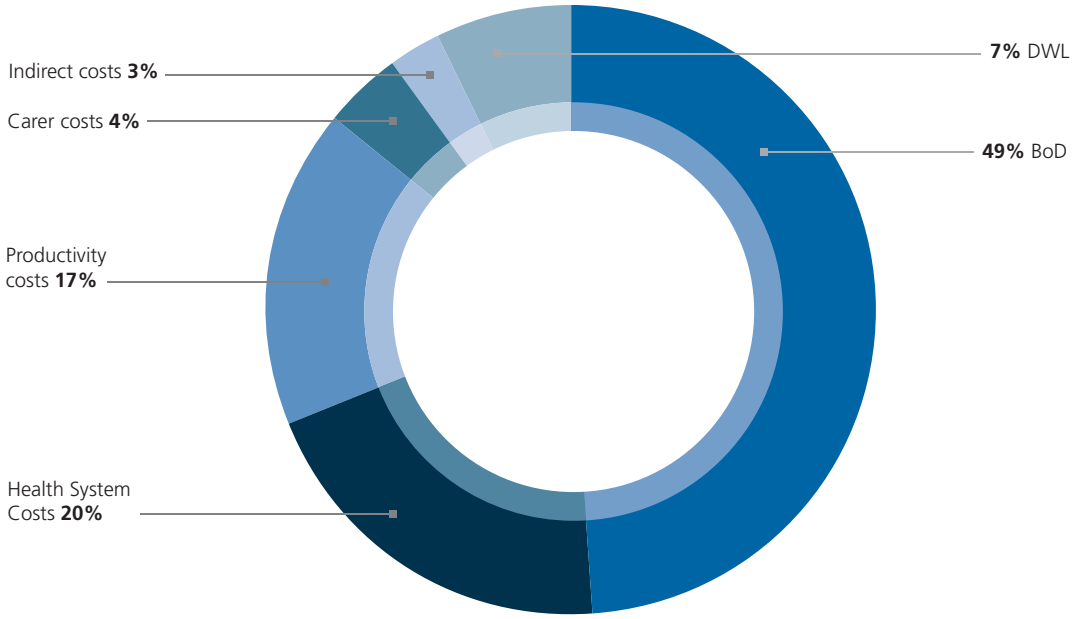
Note: Other health costs refer to out of hospital medical costs, other professional services, pharmaceuticals and research.

As Figure 6.1 depicts, the burden of disease accounts for the largest share of arthritis costs in Australia, nearly half of total costs. Health costs (20%) are the second largest component, capturing the considerable hospital, aged care and pharmaceutical costs resulting from the condition, as well as smaller costs such as out of hospital medical costs, other professional services and research. Productivity costs represent a further 17% of total arthritis costs, reflecting the effects of arthritis on individuals' employment outcomes.

SUMMARY OF ECONOMIC IMPACTS FOR AUSTRALIA

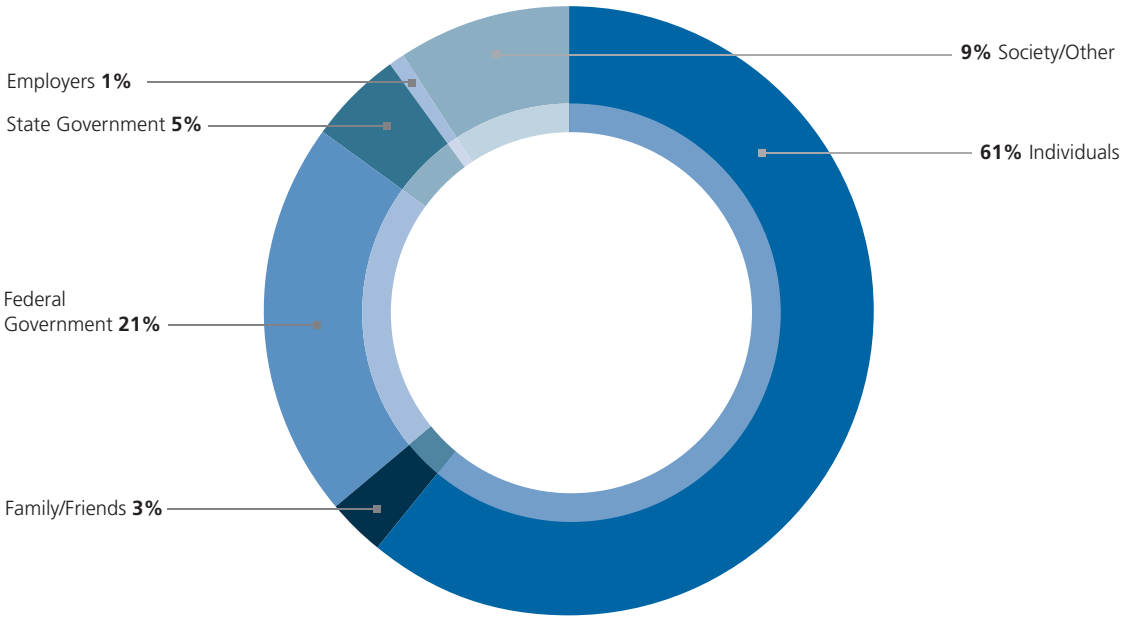
6.

FIGURE 6.1: COSTS OF ARTHRITIS, BY COST TYPE, 2007 ($ TOTAL)



The greatest share of arthritis costs in Australia is borne by the individuals with arthritis themselves who, principally due to the large burden of disease costs, bear 61% of total costs. 21% of total costs are borne by the Federal Government due to the high health system and productivity costs, while a further 9% are borne by society.

FIGURE 6.2: COSTS OF ARTHRITIS, BY COST BEARER, 2007 (% TOTAL)



6.2 ECONOMIC IMPACTS BY STATE AND TERRITORY

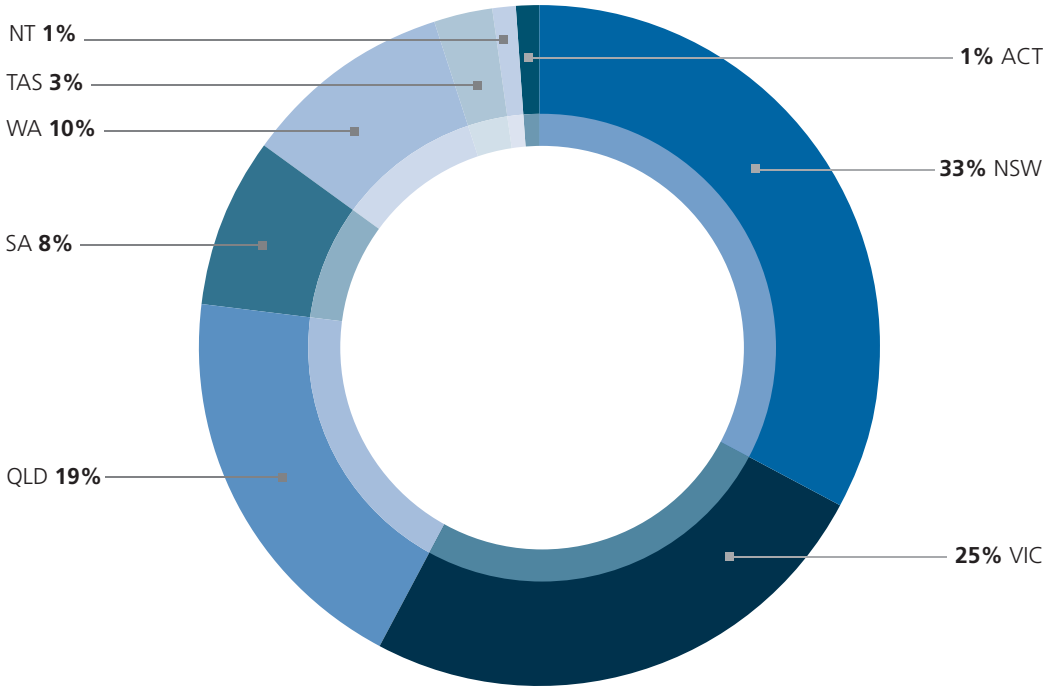
The total costs of arthritis in 2007 for each state and territory in Australia has been calculated on the basis of prevalence share (Table 6.2). While the allocation of health costs reflects fundamental differences in the cost of delivery between jurisdictions (relatively higher cost per case in NT and ACT for example), the implicit assumption underlying the allocation of indirect costs and the burden of disease is that costs per person do not vary between states/territories.

TABLE 6.2: ALLOCATION OF ARTHRITIS COSTS BY JURISDICTION, 2007 ($ MILLION)

	NSW	VIC	QLD	SA	WA	TAS	NT	ACT	Total
Health costs									
Hospitals	390.0	292.7	205.2	110.8	122.6	26.7	7.0	26.8	**1,181.8**
Aged care	306.0	229.6	161.0	87.0	96.2	20.9	5.5	21.0	**927.3**
Other health costs	703.1	527.6	370.0	199.8	221.0	48.1	12.7	48.3	**2,130.5**
Allocated health costs	1399.1	1049.9	736.2	397.6	439.8	95.6	25.3	96.1	**4,239.6**
Unallocated health costs	199.9	150.0	105.2	56.8	62.8	13.7	3.6	13.7	**605.7**
Sub-total health costs	1599.0	1199.9	841.4	454.4	502.6	109.3	28.9	109.9	**4,845.3**
Other financial costs									
Productivity costs	1365.1	1009.6	787.5	329.3	393.0	104.1	28.6	59.3	**4,076.5**
DWL from raising additional taxation	564.2	417.3	325.5	136.1	162.4	43.0	11.8	24.5	**1,684.9**
Informal care	339.8	251.3	196.0	82.0	97.8	25.9	7.1	14.8	**1,014.8**
Other indirect costs	197.9	146.4	114.2	47.7	57.0	15.1	4.1	8.6	**590.9**
Sub-total other financial costs	2466.9	1824.5	1423.2	595.1	710.3	188.2	51.7	107.2	**7,367.1**
Total financial costs	4065.9	3024.4	2264.6	1049.5	1212.9	297.5	80.6	217.0	**12,212.4**
Net cost of suffering	3927.6	2904.7	2265.9	947.4	1130.9	299.6	82.3	170.6	**11,729.0**
Total cost of arthritis	**7993.5**	**5929.1**	**4530.5**	**1996.9**	**2343.7**	**597.1**	**162.8**	**387.7**	**23,941.4**

Consistent with the method adopted for allocating total costs to the states and territories, total costs shares reflect the demographic prevalence of arthritis in Australia (Figure 6.3). New South Wales bears nearly a third of the total cost of arthritis in Australia, reflecting the fact that more people with arthritis reside there than any other state. Victoria (25%) bears the second largest share of arthritis costs and Queensland a further 19%. Despite the relatively high health system costs in the NT and ACT, these jurisdictions bear only 1% of total costs respectively, indicative of the relatively small number of people with arthritis residing in these territories.

FIGURE 6.3: JURISDICTIONAL SHARES OF TOTAL ARTHRITIS COSTS, 2007



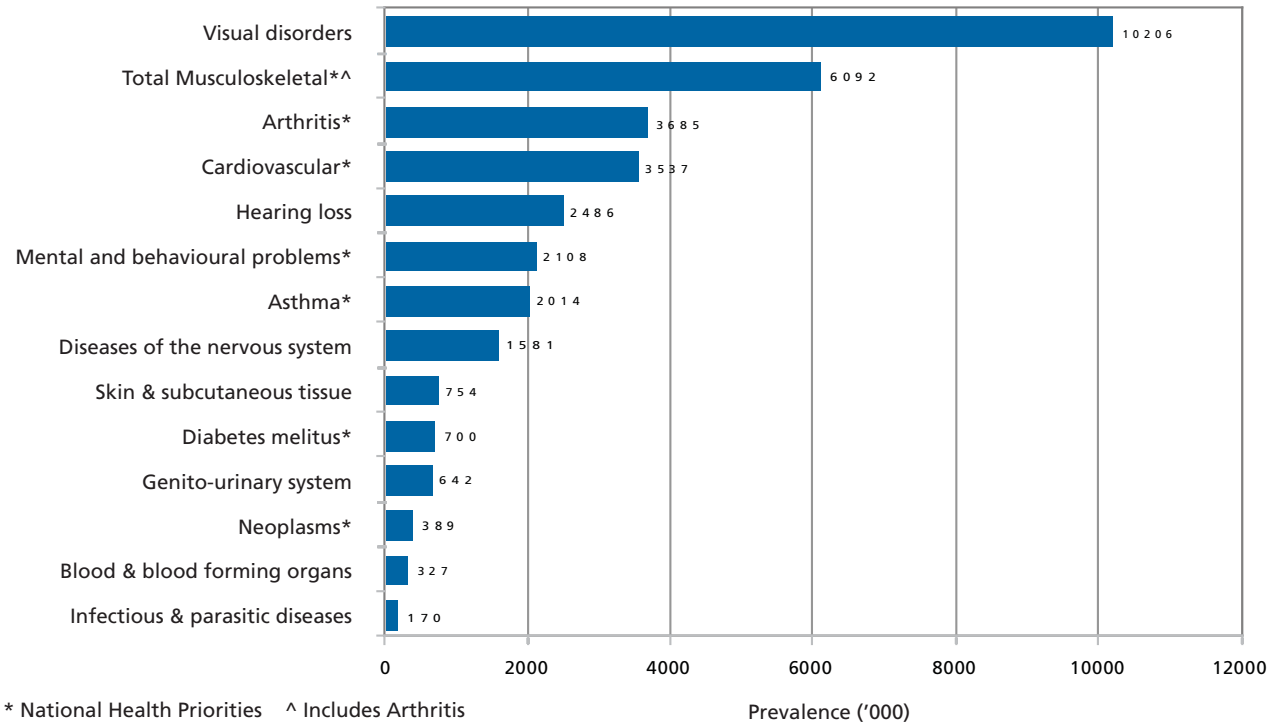
7. COMPARISONS AND COST EFFECTIVE INTERVENTIONS

7.1 COMPARISONS

7.1.1 PREVALENCE

2005 is the most recent year for which comparable prevalence data on all diseases are available and Figure 7.1 below depicts the prevalence of arthritis relative to selected other conditions. In 2005, musculoskeletal diseases were the second most common group of conditions in Australia and the most prevalent National Health Priority Area (NHPA). Arthritis (defined here to include other arthropathies), with prevalence of over 3.5 million in 2005, comprised over half of this, making it alone more common than all other NHPAs.

FIGURE 7 1: PREVALENCE COMPARISONS – ARTHRITIS AND SELECTED CONDITIONS, 2005

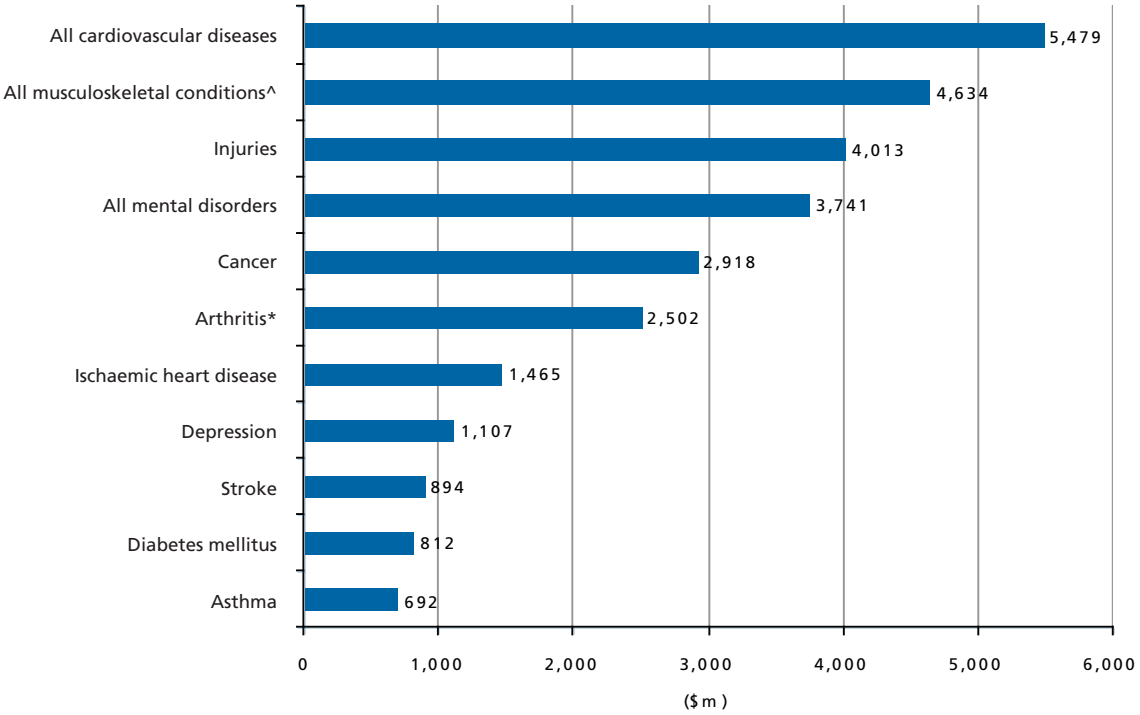


Source: Access Economics based on NHS 2004-05.

7.1.2 HEALTH EXPENDITURE

The most recent comparable data across diseases for health expenditure in Australia are for the year 2000-01, contained in the AIHW publication *Expenditure on Disease and Injury in Australia* (AIHW 2005a) (Figure 7.2)

FIGURE 7.2: HEALTH EXPENDITURE COMPARISONS, ARTHRITIS AND OTHER NATIONAL HEALTH PRIORITY AREAS (NHPAs), 2000-01



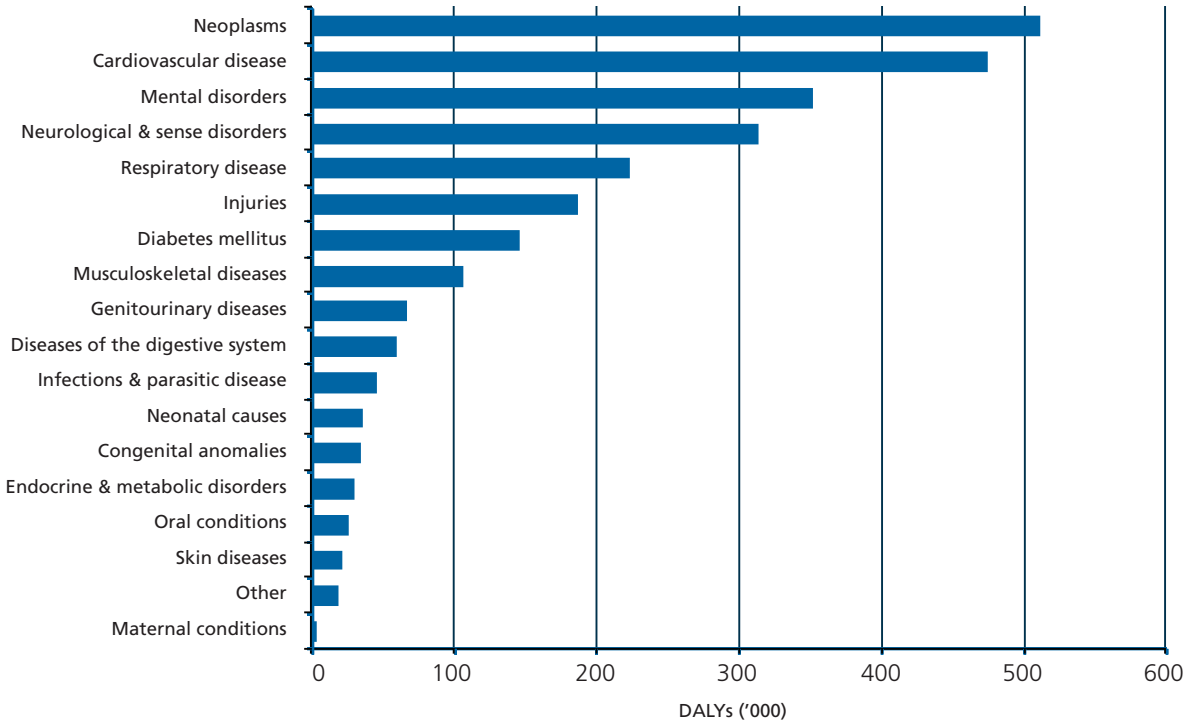
Source: Access Economics based on AIHW (2005a). ^ Includes arthritis. *Access Economics' estimate is greater than the AIHW published estimate of $1,429 million due to definitional differences.

Allocated health expenditure on musculoskeletal conditions was around $4.5 billion in 2000-01, second only to cardiovascular diseases among the NHPAs. Expenditure on arthritis, around $2.5 billion in 2001, ranked above most individual NHPAs, consistent with it being the most prevalent. In 2001, expenditure on arthritis was 11% of total recurrent health expenditure allocated to NHPAs.

7.1.3 BURDEN OF DISEASE

The most recent data available comparing the burden of diseases in Australia is that contained in the AIHW publication *The burden of disease and injury in Australia in 2003* (Begg et al, 2007). According to the findings of this report, musculoskeletal diseases were the eighth greatest cause of burden of disease and injury in Australia in 2003, responsible for 4.0% of the total disease and injury burden (Figure 7.3). Collectively, OA, back pain and RA represented over three quarters of this, accounting for 33%, 28% and 16% respectively. OA ranked seventeenth in the twenty leading causes of burden of disease for males, while for females OA ranked twelfth and RA twentieth.

FIGURE 7.3: BURDEN OF DISEASE IN AUSTRALIA IN 2003, BY BROAD DISEASE GROUP



Source: Begg et al (2007).

7.1.4 TOTAL COST COMPARISONS

Comparing the total costs of arthritis with other conditions is hampered by the fact that there are few disease cost burden analyses published in Australia. Presented in Table 7.1 on page 62 is a comparison of the total costs of a number of conditions, as estimated by Access Economics in recent studies. While direct comparison between studies is not possible due to the different base years used, Table 7.1 does provide an insight into the enormity of the costs associated with arthritis in Australia.

COMPARISONS AND COST EFFECTIVE INTERVENTIONS

7.

TABLE 7.1: TOTAL COST COMPARISONS ($ BILLION)

Year of study	Condition	Financial costs	$BoD	Total cost (current $)
2007	**Arthritis**	**12.2**	**11.7**	**23.9**
2007	GORD & PUD^	9.7	7.2	16.9
2005	Hearing loss	11.7	11.3	23.0
2005	Cancer	11.2	83.4	94.6
2004	**Arthritis**	**11.2**	**8.0**	**19.3**
2004	Cardiovascular disease	14.2	93.9	109.1
2004	Vision loss	5.0	4.8	9.9
2004	Restless legs syndrome	1.4	9.7	11.1
2004	Sleep disorders*	6.2	4.1	10.3
2003	Bipolar disorder	1.6	n/a	n/a
2002	Dementia	6.6	n/a	n/a
2002	Schizophrenia	1.8	n/a	n/a
2001	Osteoporosis	7.5	n/a	n/a
2000	**Arthritis**	**9.0**	**n/a**	**n/a**

Source: Past Access Economics reports.

^Gastro-oesophageal reflux disease and peptic ulcer disease. * Obstructive sleep apnoea, insomnia, periodic limb movement disorder and narcolepsy.

7.2 COST EFFECTIVE INTERVENTIONS

Expenditure on arthritis in Australia is growing rapidly. Over the last three years, Access Economics estimates that allocated arthritis health expenditure has grown by around 42%. Such growth is indicative of the increase in overall health and welfare spending in Australia. In 2004-05 it reached $87.3 billion, 10% above the previous year's level and more than double that of 1994-95 in nominal terms. It is also growing as a proportion of GDP, with the 2004-05 share reaching 9.8%. One dollar in every ten in the Australian economy is now produced and consumed within the health sector.

As medical technology advances, patient care and treatment is changing in many ways. However, unlike technological change in other industries, which is often cost-reducing, many technological advances in health result in increased costs. Demographic ageing is another cost driver, with health costs per person much higher in older age. Finally, health is an income-elastic good, which means that as the standard of living increases over time, Australians spend a higher proportion of household income on health.

Expenditure on health, like any form of expenditure, is subject to a binding budget constraint and this inextricably limits both the quality and the quantity of health services that can be provided. In this context, evaluating and comparing health interventions in terms of their ability to achieve their ultimate goal – effective, efficient improvements in quality of life – is vital to ensuring efficient allocation of these scarce resources.

7. COMPARISONS AND COST EFFECTIVE INTERVENTIONS

Cost effectiveness analysis is used to assess and compare the value of interventions in terms of their ability to provide health and other benefits, relative to the cost of the intervention. The most common type of cost effectiveness analysis in health is cost utility analysis, which compares the net financial cost of the intervention with the wellbeing benefit, measured in dollars spent per Quality Adjusted Life Year (QALY) gained (ie, $/QALY).

Expensive treatments can be cost effective if they confer significant value to a person in terms of longevity and quality of life. Conversely, expensive treatments are not cost effective if they offer only small wellbeing gains relative to their costs. If an intervention reduces overall financial costs and gains QALYs, it is called *cost saving* – for example, an intervention that enhanced activities of daily living to such an extent that entry to nursing home care is delayed or averted. *Dominated* interventions, on the other hand, are both more costly and less effective than the comparator (the alternative being analysed). There is a variety of opinion on where bounds for cost effective interventions lie and, furthermore, no common thinking has emerged on thresholds for incremental cost effectiveness ratios (ICERs) that might be used in public reimbursement decision-making processes.

7.2.1 SUMMARY OF ARTHRITIS INTERVENTIONS

In Australia, Segal et al (2004) found that total hip replacement and total knee replacement surgery were highly cost-effective at A$7,500/QALY and A$10,000/QALY respectively and that other apparently highly cost-effective interventions were exercise and strength training for knee OA (<A$5,000/QALY), knee bracing, and use of capsaicin or glucosamine sulfate (<$10,000/QALY). Andrews et al (2006) found that current treatment for OA and RA averted 27% and 26% respectively of the burden of disease, with ICERs of $25,000 and $19,000 per YLD averted; however, optimal evidence-based treatment would avert 39% and 48% of the burden, with ICERs of $25,000 (unchanged) and $12,000 per YLD averted. They concluded that closing the gap between evidence and practice would be more efficient overall.

The Cost Effectiveness Analysis (CEA) Registry, maintained by the New England Medical Center's Institute for Clinical Research and Health Policy Studies provides a comprehensive database of ICERs in the published literature using standardising cost-utility ratios. Analysis of the Registry revealed numerous studies that have investigated the cost effectiveness of a variety of interventions for arthritis including surgical, pharmaceutical and lifestyle. Table 7.2 on page 64 summarises the results of recent studies of the cost effectiveness of possible interventions for arthritis based on the CEA Registry, followed by a discussion of three types of interventions in subsequent sections. (For definitions of terms in the table such as 'cost saving' and 'dominated', please see the paragraph above.)

TABLE 7.2: COST EFFECTIVENESS OF SELECTED INTERVENTIONS FOR ARTHRITIS

Year of study	Intervention	Quality score of analysis*	$/QALY in 2002 US$
	LIFESTYLE INTERVENTIONS		
2001	Aquatic exercise class at least twice a week vs no exercise/ usual care (less than 1 hour of exercise per week) in patients with osteoarthritis aged 55-75	4.5	$180,000
2002	Combined spa therapy and exercise therapy (3 weeks) in addition to standard treatment (37 weeks) vs standard treatment of anti-inflammatory drugs and weekly group physical therapy (40 weeks) in Dutch outpatients with active ankylosing spondylitis who have had the disease for < 20 years and who follow weekly group physical therapy	4.5	$11,000
	PHARMACOTHERAPY INTERVENTIONS		
2002	Treatment with leflunomide vs treatment with methotrexate in patients in Nth America with recently diagnosed definite rheumatoid arthritis	4	Cost-saving
2002	Treatment with leflunomide vs treatment with sulfasalazine in patients in the UK with recently diagnosed definite rheumatoid arthritis	4	Cost-saving
2002	Treatment with leflunomide vs treatment with methotrexate in patients in the UK with recently diagnosed definite rheumatoid arthritis	4	Dominated
2002	Leflunomide added to conventional sequence of DMARDs vs conventional sequence of DMARDS in RA patients with symptoms severe enough to require treatment with methotrexate	5.5	$79,000
2002	Methotrexate and infliximab vs methotrexate and placebo in patients with active, refractory rheumatoid arthritis	5	$10,000
2002	Appropriate care and hylan G-F 20 vs appropriate care with no hylan G-F 20 in patients in Canada with osteoarthritis of the knee – age 40+	5	$ 7,300
2003	Diclofenac vs Ibuprofen in patients with osteo- or rheumatoid arthritis with average upper gastrointestinal risk who do not need aspirin therapy for cardiovascular disease	5.5	$91,000

7. COMPARISONS AND COST EFFECTIVE INTERVENTIONS

Year of study	Intervention	Quality score of analysis*	$/QALY in 2002 US$
	LIFESTYLE INTERVENTIONS		
2003	Diclofenac with Proton Pump Inhibitor vs Celecoxib in patients with osteo- or rheumatoid arthritis with high upper gastrointestinal risk who do not need aspirin therapy for cardiovascular disease	5.5	$200,000
2003	Treatment with infliximab plus methotrexate for two years vs treatment with methotrexate alone for two years in patients in Sweden with advanced rheumatoid arthritis.	6	$15,000
2003	Treatment with infliximab plus methotrexate for one year vs treatment with methotrexate alone for one year in patients in Sweden with advanced RA	6	$ 3,100
2003	Any DMARD plus corticosteriods vs any DMARD plus NSAIDS in hypothetical cohort of patients with rheumatoid arthritis – age 50	6	Cost-saving
	SURGICAL INTERVENTIONS		
2002	Total hip replacement surgery vs no total hip replacement surgery in males undergoing hip replacement surgery – age 60-6	2	$1,500
2002	Total hip replacement surgery vs no total hip replacement surgery in females undergoing hip replacement surgery – age 60-69	2	$1,200
2002	Total hip replacement surgery vs no total hip replacement surgery in males undergoing hip replacement surgery – age 70-79	2	$2,500
2002	Total hip replacement surgery vs no total hip replacement surgery in females undergoing hip replacement surgery – age 70-79	2	$2,000
2002	Early plate fixation surgery (within 12 hours of injury) vs delayed plate fixation surgery (more than 12 hours after injury) in patients with an isolated orthopaedic injury (closed tibial shaft fracture) with surgical indications – age 17 +	5	Cost-saving
2003	Metal on metal total hip replacement vs watchful waiting followed by total hip replacement (traditional implant) in relatively younger patients requiring hip replacement – age 45-50	5	Cost-saving
2003	Metal on metal hip replacement vs total hip replacement (traditional implant) in relatively younger patients requiring hip replacement – age 45-60	5	Dominated

7.2.2 LIFESTYLE INTERVENTIONS

In recent years there has been an increase in awareness and understanding of the contribution that an individual can make to the management of their condition. The result of this has been an expansion of lifestyle or psychosocial interventions such as self management courses aimed at enhancing self-efficacy and thus health outcomes. By educating and informing the individual about how their lifestyle choices impact on their condition, patients are increasingly taking their health management into their own hands. As the individual's appreciation of their condition expands and their understanding of the impact of their everyday decisions grows, they are able to actively engage in the self-management, with the potential for reduced reliance on formal health care.

Two studies were identified from the CEA registry that evaluated the cost effectiveness of lifestyle interventions (see Table 7.2 above). The first, a 2001 US study (Patrick et al, 2001) calculated the cost effectiveness of aquatic exercise compared to usual care for older patients with arthritis to be $180,000/QALY in 2002 US dollars. The second, a 2002 European study found the cost effectiveness of combined spa therapy and exercise therapy in addition to standard treatment compared to standard treatment of anti-inflammatory drugs and weekly group physical therapy to be $11,000/QALY in 2002 US dollars, considerably more cost effective than the US aquatic monotherapy.

What is evident from these two evaluations, however, is that the cost effectiveness of lifestyle interventions can, and does, vary considerably between programs, and there is a need to carefully evaluate their efficacy relative to cost in order to increase knowledge about what works best for particular target populations.

Other literature in this field has also been inconclusive, with a number of studies finding little evidence of the efficacy of general self-management programs (Chodosh et al 2005, Warsi et al 2003 and 2004). The research has revealed only relatively small reductions in pain and disability as a result of these interventions, suggesting that the cost effectiveness of self-management programs may be marginal.

In Australia, lifestyle interventions for arthritis have been widely adopted, with a variety of programs currently conducted across the nation including:

- warm water exercise programs (WAVES);
- chronic disease self-management programs (CDSMP);
- Arthritis Self-Help (ASH) programs;
- Moving towards wellness, self management program in SA;
- Challenging Arthritis, a new self management program initiated in NSW;
- Get the most out of life, a self management program operating in WA; and
- Osteoarthritis of the knee (OAK), a disease specific self management program run in WA.

7.2.2.1 THE OSTEOARTHRITS OF THE KNEE (OAK) PROGRAM

Researched and designed by Arthritis WA, OAK is a disease-specific education program that uses the principles of self management to provide strategies for individuals with osteoarthritis to effectively manage their condition. The six week program, run for 2.5 hours a week, aims to equip participants with the knowledge and skills necessary to achieve long-term behavioural changes, focusing on exercise and healthy lifestyle choices. The sessions are designed and conducted by health professionals, whose expertise and experience with arthritis and its intricacies ensures participants receive the support and education required to actively manage their condition. Participation is free of charge to the consumer.

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The specific objectives of the program are to improve participants' welfare by:

- improving pain;
- improving physical function, and;
- improving quality of life.

ANALYSIS OF THE PROGRAM

A full cost effectiveness or cost utility analysis is both beyond the scope of this report and precluded by the lack of necessary data. Rigorously quantifying the effectiveness of such a program in terms of $/QALY is a complex task and no attempt is made here to perform such analysis. However, evaluations of the program conducted by Arthritis WA provide useful insights into its efficacy.

As part of independent research, a questionnaire regarding total knee replacement surgery was sent to all Pilot participants and 192 of the 259 responded with completed surveys. Upon commencing the OAK program, 5% of participants were on a waiting list for a knee replacement. As a result of the course, 68% reported delaying their operation.

There were significant differences in average length of hospital stay for those who had a knee replacement prior to the OAK program compared with those who had the operation following the program. For the 5% of respondents who had knee replacements prior to the OAK course, the average length of hospital stay was 12 days, while for those who had knee replacements after the OAK course, the average length of hospital stay was only 8 days. With such a small sample, and absence of control for factors such as age and co-morbidities, these figures should be interpreted cautiously and are indicative only. A study controlling for these factors would be useful to ascertain to what extent potential cost savings can be realised.

In 2005, the average cost per patient day in Australian public hospitals for knee replacement (AR-DRG V5.1 I04Z) was $1,884 (AIHW 2006b). Hence for every day that a patient's stay in hospital for knee replacement is reduced, a direct cost saving of around $1,884 per patient is possible. There are also indirect cost savings such as reduced time away from work or home duties that would also accrue. Given that there were over 10,000 knee replacements performed in Australian public hospitals in 2004-05 and nearly 20,000 in private hospitals where the costs are even higher, there is considerable potential for significant cost savings if hospital stays can be reduced.

Following the success of the pilot study, a six month randomised controlled trial (RCT) was initiated to evaluate the program. 145 participants (40 males, 105 females, mean age 67 years) with clinically confirmed OA of the knee were randomised to control or intervention groups. The control group continued their usual management program for six months, while the intervention group undertook the six week OAK self management in addition to usual medical management.

The trial revealed improvements among the intervention group on multiple aspects of recognised health surveys including Visual Analogue Scale (pain), SF-36 and the osteoarthritis-specific Western Ontario and McMaster Universities Arthritis index (WOMAC)[15]. However, the control group also experienced improvements in some outcomes, and to gain further insight into the program's efficacy, particularly over the longer term, the trial was extended for a further 12 months.

With the extension of the study, the control group from the six month trial undertook the OAK program and both this group and the original intervention group were followed for 12 months post-intervention. After the 12 months, Arthritis Western Australia, in conjunction with Curtin University of Technology, evaluated the program's effectiveness using an intention to treat analysis.

[15] See http://www.womac.org for details

COMPARISONS AND COST EFFECTIVE INTERVENTIONS

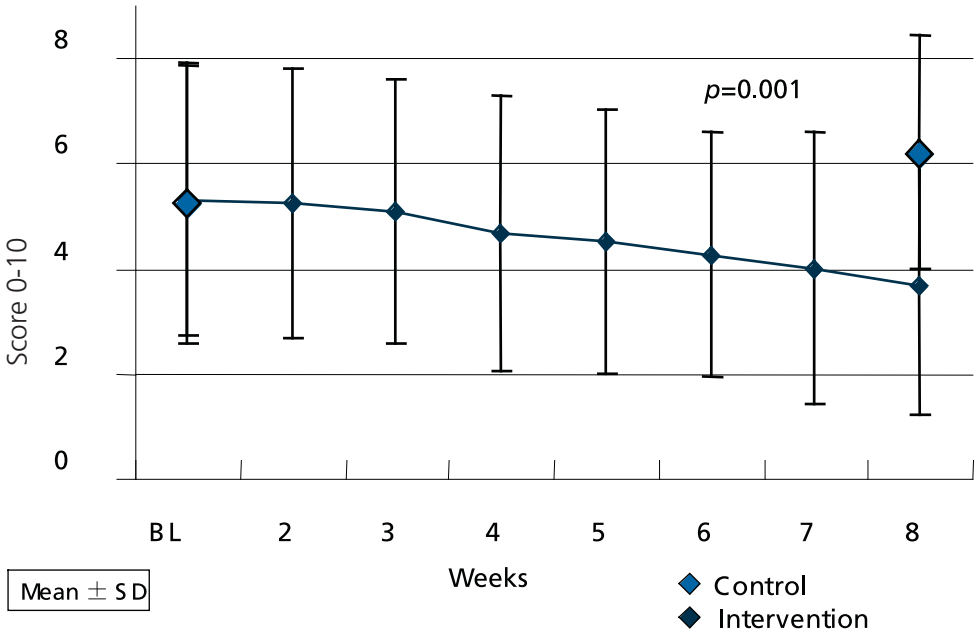
7.

The 145 participants now continued on study for long term follow up. Assessments were undertaken at the baseline, eight weeks, six months and 12 months post-intervention, with data analysed using repeated measures ANOVA (Analysis of Variance). Participants once again completed health surveys including Visual Analogue Scale, SF-36 and the WOMAC.

In response to the intervention, all subjects demonstrated clinically important improvements in all WOMAC dimensions ($p<0.001$) including pain and physical function, which decreased from 6.78 and 23.86 at baseline to 5.31 and 18.62 respectively at 12 months (greater disability is awarded a higher score). Statistically and clinically important improvements were also reported in 7 of the 8 SF 36 domains, where higher values indicate improved health status. Role physical[16] increased from 38.34 at baseline to 55.08 at 12 months ($p<0.0001$) and general health improved from 65.9 at the baseline to 70.54 at 12 months ($p=0.002$). To put this in perspective, for people with OA, an increase of 5 points in the SF-36 is considered to be clinically important (Ware and Kosinski, 2002). Furthermore, given that the average change in this age group in people with OA is a decrease of 2.1 points over 12 months (Ware and Kosinski, 2002), this is a noteworthy outcome.

Visual Analogue Scale (VAS) for pain also improved during the 6 week intervention phase, falling from 5.1 (± 2.5) to 3.5 (±2.4). This is captured in Figure 7.4, which also shows a deterioration in VAS for the control group from 5.1 to 6.15.

FIGURE 7.4: VISUAL ANALOGUE PAIN SCORE (INTERVENTION PHASE)



Source: Coleman et al (2005).

[16] Role physical measures limitations in usual role activities because of a physical health problem.

7. COMPARISONS AND COST EFFECTIVE INTERVENTIONS

While the OAK program has not reached the stage where its impact on quality of life can be comprehensively quantified, the indications from the findings thus far are positive. The program has demonstrated long-term, enduring improvements in health and quality of life as assessed by numerous recognised health surveys. This is in contrast to the evaluations of general self-management programs which have shown only marginal improvements in health and wellbeing. The OAK program is low cost in nature, and there are signs that it may facilitate both cost savings in the formal health care sector and improvements in the health and wellbeing of its participants. A full cost effectiveness analysis of the program, preferably with a larger sample size, would appear a worthwhile exercise on which to base decision-making regarding expansion of the program.

7.2.3 PHARMACOTHERAPY INTERVENTIONS

With rapid technological progress, the variety of pharmacotherapy interventions available for the treatment of arthritis has grown considerably over recent decades. Medical professionals now have a broad range of options for treating their patients pharmacologically; widely used non-steroidal anti-inflammatory drugs (NSAIDs) and disease-modifying anti-rheumatic drugs (DMARDs) are being replaced with newer treatments that, while possibly more efficacious, are generally more expensive.

The ability to make cross study comparisons has been limited in the past as the choice of comparator used to assess the cost effectiveness of interventions has not always been consistent. This is improving and, in principle, the relevant comparator is generally the next-best alternative or alternatives to the intervention of interest (Connely et al, 2006).

Comparative difficulties can be compounded by important structural differences that exist between economies, such as the competitiveness of markets for pharmaceuticals, which can impact on costs and, in turn, cost effectiveness ratios. For example, in Australia the vigorous use of monopsonistic power by Australia's health authorities has resulted in prices for pharmaceuticals that are below the average of other countries (Richardson and Segal, 2004). In 2006, the proportion of health expenditure on pharmaceuticals in Australia was among the lowest in the OECD (OECD, 2006), resulting from both lower prices and fierce PBS volume control. Idiosyncrasies between economies can also result in differing ICERs for similar trials (eg, leflunomide vs methotrexate in North America compared to the UK in Table 7.2), making overall evaluation of efficacy difficult.

The CEA registry offers valuable information on the cost effectiveness of this form of intervention, reporting a multitude of recently published studies in the area. It is important to appreciate the relative nature of cost effectiveness. As Connelly et al (2006) notes, whether a particular intervention is considered cost effective depends on the efficiency of other interventions.

Findings from the CEA registry were analysed against those in the wider literature, providing numerous insights into the cost-effectiveness of pharmacotherapy interventions.

- Leflunomide (LEF) appears to be more cost effective than alternative DMARDs including methotrexate (MTX) and sulfasalazine (SLF), although findings in the UK and the US have been inconsistent. While LEF is considerably more expensive than both MTX and SLF, the cost of the medication itself is only one component of the total cost of an intervention. A recent study published in the *Journal of Pharmacoeconomics* found that the cost of the medication itself accounted for 17% total MTX costs, but 72% of total LEF costs, while 'adverse drug reaction treatment costs' represented 13% of the total cost of LEF and 40% of total MTX costs (Schadlich et al, 2005). There is an important distinction to be made between least costly and cost-effective, with adverse drug reactions, and resultant complications important considerations in this regard.

- Infliximab (INF), a biological response modifier, when combined with MTX, has been demonstrated to be very cost effective relative to alternatives including methotrexate alone. A recent economic evaluation (Barbieri et al, 2005) found that although INF is considerably more expensive, combined with MTX it is more effective and indeed more cost effective than MTX alone (for severe, treatment-resistant RA). The study also found that when life-long INF treatment is assumed, incremental costs per QALY are even lower, a finding confirmed by recent New Zealand research (Lysneg-Williamson et al, 2004). Health benefits, as well as the potential economic impact of treatments that affect the progression of chronic disease will be most evident in the longer term, hence the cost of treatment must be analysed in relation to the long-term benefit.
- Other biological disease modifiers (such as adalimumab and etanercept) may be as or more cost effective because of the ability to defer or reverse damage. Chen et al (2006) conducted a systematic review of the effectiveness of adalimumab, etanercept and infliximab for the treatment of RA in adults, including submissions to the National Institute for Health and Clinical Excellence (NICE), meta-analyses of effectiveness data were for each agent and evaluation using the Birmingham Rheumatoid Arthritis Model (BRAM), a simulation model used to produce an ICER analysis. Chen et al (2006:iii-iv) concluded that:

  Adalimumab, etanercept and infliximab are effective treatments compared with placebo for RA patients who are not well controlled by conventional DMARDs, improving control of symptoms, improving physical function, and slowing radiographic changes in joints. The combination of a TNF inhibitor with methotrexate was more effective than methotrexate alone in early RA… TNF inhibitors are most cost-effective when used as last active therapy… The ICER for etanercept used last is £24,000 per QALY, substantially lower than for adalimumab (£30,000 per QALY) or infliximab (£38,000 per QALY). First line use as monotherapy generates ICERs around £50,000 per QALY for adalimumab and etanercept. Using the combination of methotrexate and a TNF inhibitor as first line treatment generates much higher ICERs, as it precludes subsequent use of methotrexate, which is cheap. The ICERs for sequential use are of the same order as using the TNF inhibitor alone… In this analysis, other things being equal, etanercept may be the TNF inhibitor of choice, although this may also depend on patient preference as to route of administration. The next most cost-effective use of TNF inhibitors is third line, as recommended in the 2002 NICE guidance. Direct comparative RCTs of TNF inhibitors against each other and against other DMARDs, and sequential use in patients who have failed a previous TNF inhibitor, are needed. Longer term studies of the quality of life in patients with RA and the impact of DMARDs on this are needed, as are longer studies that directly assess effects on joint replacement, other morbidity and mortality.
- Corticosteroids (combined with DMARDS) have been shown to be cost-saving relative to NSAIDs (combined with DMARDS).
- Compared to non-selective NSAIDS, Cox 2 inhibitors have been demonstrated to be cost effective in arthritic patients at high risk of serious upper gastrointestinal events (Schaefer et al, 2005; Maetzel et al, 2003). In average risk patients, Cox 2 inhibitors may not be cost effective, as higher costs relative to alternatives are not matched with commensurate benefits (Maetzel et al, 2003, Spiegel et al, 2003). In contrast to international cost effectiveness studies, however, in Australia cost effectiveness may be somewhat better since prices of Cox 2 inhibitors are low relative to other countries. For example, in a 2004 review, PBAC recommended that celecoxib and meloxicam were cost effective compared to traditional NSAIDs because of their better safety profile. Moreover, in Australia, the price of Celebrex has fallen a further 7% since 2004.

- Diclofenac does not appear to be cost effective, both relative to other standard NSAIDs such as ibuprofen and relative to COX-2 NSAIDs when combined with proton pump inhibitors in patients with high upper GI risk.

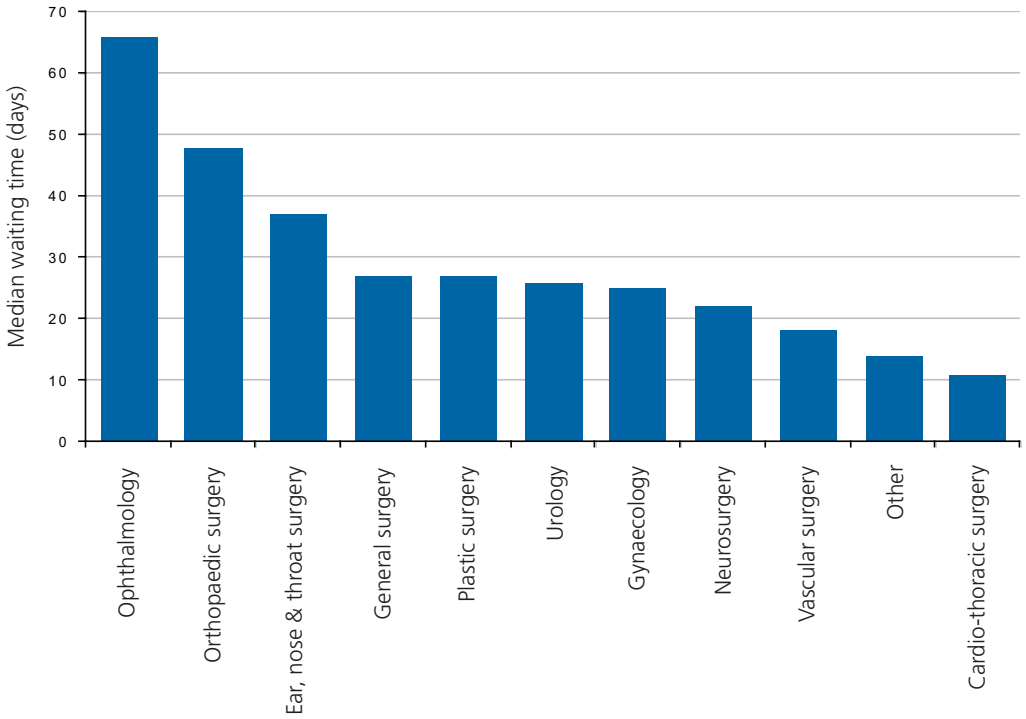
7.2.4 SURGICAL INTERVENTIONS

Given the degenerative nature of arthritis, surgical interventions are a common, but costly necessity. In Australian public hospitals alone, the cost of knee replacements and hip replacements in 2004-05 was $145 million and $186 million respectively (AIHW, 2006b), over 20% of the total $1.5 billion overall inpatient cost for arthritis in Australia (recall Section 4.1.2). With the stakes so high, evaluating the cost effectiveness of surgical interventions is an integral part of ensuring the best outcomes for patients while also ensuring the most efficient allocation of resources is achieved.

Surgical interventions are widely regarded as some of the most cost effective interventions available for arthritis and the evidence in Table 7.2 supports this. The focus of CEA with regard to surgical interventions has predominantly been on hip surgery, both relative to other interventions and between various methods of hip replacements. The studies reviewed here, where the highest ICER is US$2,500/QALY, are very cost effective. Thus, while surgical procedures may be costly in absolute dollar terms, the gains in quality of life are also substantial.

Given the demonstrated cost effectiveness of surgical interventions, there is a strong case for providing these services to meet clinical indications. Currently in Australia there are long waiting lists for orthopaedic surgery in public hospitals. In terms of the percentage of people on waiting lists who had waited more than a year for surgery at the time of admission, orthopaedic surgery (9.6%) was second only to ophthalmology (9.8%, presumably largely cataract surgery) in 2004-05 (AIHW, 2006b). The median public hospital waiting times for elective surgery are shown in Figure 7.5 on page 72. The number of days waited for orthopaedic surgery at the 50th percentile (ie the median waiting time at point of admittance) was 48 in 2004-05, again second only to ophthalmology (66). Canada now has a maximum waiting time of six months for joint replacement surgery, with a discussion of the issues underlying the cap (across all types of surgeries) provided in Sanmartin (2001), including literature evidence for an acceptable waiting time of 7.4 weeks for orthopaedic surgery (Sanmartin, 2001:400, Table 1 based on Ramsay and Walker,1998). Also in Canada, Conner-Spady et al (2004) found median maximum acceptable waiting times for knee and hip arthroplasty that ranged from 4 to 24 weeks for five levels of urgency.

FIGURE 7.5: PUBLIC HOSPITAL MEDIAN WAITING TIME BY SPECIALITY OF SURGEON, AUSTRALIA, 2004-05



Although waiting lists may be considered a health care rationing mechanism, waiting in queues for orthopaedic surgery increases the burden of arthritis. Long waiting periods for surgery increase the time that individuals have to spend incurring pain, suffering and reduced quality of life. Extended waiting periods for surgery may also impose economic costs on society as individuals in queues may consume additional medical resources such as pharmaceuticals, specialist, outpatient and primary care visits, allied health and possibly imaging services, as well as indirect costs like extended periods of reduced productivity (at work and in the home) and additional need for informal care, mobility aids and income support.

A recent study carried out by a team of New Zealand researchers aimed to prospectively describe the economic and health costs of waiting for a total hip arthroplasty (THA) (Fielden et al, 2005). The researchers recruited 153 patients from orthopaedic waiting lists of three metropolitan publicly owned hospitals and one provincial publicly owned hospital across three District Health Boards in New Zealand between April 1999 and March 2002. Participants were mailed EQ-5D (a self administered, generic quality-of-life questionnaire) and WOMAC questionnaires as well as a cost diary to complete at enrolment and every month before surgery and after THA for six months. Costs were recorded for the waiting period between when a patient was wait-listed for surgery and their operation.

7. COMPARISONS AND COST EFFECTIVE INTERVENTIONS

Mean total costs per patient incurred because of their hip condition while waiting for THA were US$688 per month (median $449) including US$491 in 'societal costs' reflecting lost income and time away from usual activities. Expectedly, longer waits led to higher cost, with patients who waited six months or more incurring a one and a half times greater cost than those waiting less than six months. Pre-operative and post-operative health status was compared using the WOMAC index, revealing that while waiting for THA, scores diminished on the physical function dimension, with no improvement in dimensions of pain and stiffness, indicating deterioration in health status while waiting. On all measures of the EQ-5D, deterioration between the initial and final preoperative assessments was evident, although only the ability to perform usual activities declined with statistical significance (Fielden et al 2005:994).

While the findings of this study provide a useful starting point for analysing the economic and quality of life impacts of waiting for orthopaedic surgery, it is acknowledged that a single study cannot provide a definitive analysis. In Australia, with a median waiting time for orthopaedic surgery of 48 days in 2004-05, and the number of admissions from waiting lists for the same period 79,064, there may be substantial costs from extended waits for orthopaedic surgery. There is also the scope to reduce costs while waiting by enhancing self-efficacy through lifestyle interventions, recalling that 68% of those waiting for surgery who undertook the OAK program reported delaying their operation (7.2.2.1).

While these indications suggest that the costs of waiting for orthopaedic surgery are potentially measurable and possibly not trivial, there is a need for further larger sample size studies of the cost of waiting in public hospital queues, including with lifestyle self management programs as a comparator.

APPENDIX A

APPENDIX A – OBESITY THRESHOLDS

AGE AND GENDER-SPECIFIC THRESHOLDS FOR OVERWEIGHT AND OBESITY IN CHILDREN AND ADOLESCENTS

	Body mass index 25 kg/m^2		Body mass index 30 kg/m^2	
Age (years)	Males	Females	Males	Females
2	18.41	18.02	20.09	19.81
2.5	18.13	17.76	19.80	19.55
3	17.89	17.56	19.57	19.36
3.5	17.69	17.40	19.39	19.23
4	17.55	17.28	19.29	19.15
4.5	17.47	17.19	19.26	19.12
5	17.42	17.15	19.30	19.17
5.5	17.45	17.20	19.47	19.34
6	17.55	17.34	19.78	19.65
6.5	17.71	17.53	20.23	20.08
7	17.92	17.75	20.63	20.51
7.5	18.16	18.03	21.09	21.01
8	18.44	18.35	21.60	21.57
8.5	18.76	18.69	22.17	22.18
9	19.10	19.07	22.77	22.81
9.5	19.46	19.45	23.39	23.46
10	19.84	19.86	24.00	24.11
10.5	20.20	20.29	24.57	24.77
11	20.55	20.74	25.10	25.42
11.5	20.89	21.20	25.58	26.05
12	21.22	21.68	26.02	26.67
12.5	21.56	22.14	26.43	27.24
13	21.91	22.58	26.84	27.76
13.5	22.27	22.98	27.25	28.20
14	22.62	23.34	27.63	28.57
14.5	22.96	23.66	27.98	28.87
15	23.29	23.94	28.30	29.11
15.5	23.60	24.17	28.60	29.29
16	23.90	24.37	28.88	29.43
16.5	24.19	24.54	29.14	29.56
17	24.46	24.70	29.41	29.69
17.5	24.73	24.85	29.70	29.84
18	25	25	30	30

i Source: Cole et al (2000)

APPENDIX B

APPENDIX B – PREVALENCE IN THE STATES AND TERRITORIES, BY AGE AND CONDITION

NEW SOUTH WALES

	Males	%	Females	%	Persons	%
Osteoarthritis						
0-24	234	0.0%	2,141	0.2%	2,375	0.1%
25-34	6,535	1.4%	6,667	1.4%	13,202	1.4%
35-44	17,043	3.4%	20,916	4.2%	37,960	3.8%
45-54	35,252	7.4%	53,131	11.1%	88,382	9.3%
55-64	62,935	16.2%	93,297	24.2%	156,232	20.2%
65-74	45,196	18.7%	80,571	31.9%	125,768	25.4%
75+	43,561	23.0%	77,201	28.2%	120,762	26.1%
Total	210,757	6.1%	333,924	9.6%	544,681	7.9%
Rheumatoid Arthritis						
0-24	636	0.1%	2,375	0.2%	3,010	0.1%
25-34	2,434	0.5%	2,819	0.6%	5,253	0.6%
35-44	8,170	1.6%	13,093	2.6%	21,264	2.1%
45-54	10,860	2.3%	20,534	4.3%	31,394	3.3%
55-64	24,520	6.3%	21,028	5.5%	45,548	5.9%
65-74	16,108	6.7%	24,650	9.8%	40,758	8.2%
75+	11,072	5.8%	13,131	4.8%	24,204	5.2%
Total	73,799	2.1%	97,631	2.8%	171,430	2.5%
Other Arthritis						
0-24	14,587	1.3%	11,897	1.1%	26,484	1.2%
25-34	31,808	6.6%	16,551	3.5%	48,359	5.1%
35-44	42,994	8.6%	38,186	7.6%	81,180	8.1%
45-54	58,992	12.4%	55,706	11.7%	114,698	12.0%
55-64	80,350	20.7%	74,344	19.3%	154,694	20.0%
65-74	60,551	25.0%	60,507	24.0%	121,059	24.5%
75+	40,615	21.4%	56,318	20.6%	96,933	20.9%
Total	329,897	9.6%	313,511	9.1%	643,407	9.3%
All Arthritis						
0-24	15,256	1.3%	16,220	1.5%	31,476	1.4%
25-34	40,444	8.4%	25,672	5.4%	66,116	6.9%
35-44	65,462	13.1%	68,484	13.7%	133,945	13.4%
45-54	102,706	21.6%	121,577	25.5%	224,283	23.6%
55-64	158,229	40.8%	175,625	45.6%	333,854	43.2%
65-74	117,141	48.4%	154,746	61.3%	271,886	55.0%
75+	91,141	48.1%	134,942	49.2%	226,083	48.8%
Total	590,377	17.2%	697,266	20.1%	1,287,644	18.7%

Totals may not sum due to rounding

APPENDIX B – PREVALENCE IN THE STATES AND TERRITORIES, BY AGE AND CONDITION

VICTORIA

	Males	%	Females	%	Persons	%
Osteoarthritis						
0-24	174	0.0%	1,599	0.2%	1,772	0.1%
25-34	4,925	1.4%	5,076	1.4%	10,001	1.4%
35-44	12,802	3.4%	16,132	4.2%	28,934	3.8%
45-54	25,832	7.4%	39,686	11.1%	65,518	9.3%
55-64	45,395	16.2%	69,231	24.2%	114,627	20.3%
65-74	32,989	18.7%	59,767	31.9%	92,756	25.5%
75+	32,028	23.0%	57,178	28.2%	89,207	26.1%
Total	154,146	6.1%	248,669	9.6%	402,815	7.9%
Rheumatoid Arthritis						
0-24	470	0.1%	1,774	0.2%	2,244	0.1%
25-34	1,834	0.5%	2,147	0.6%	3,981	0.6%
35-44	6,137	1.6%	10,099	2.6%	16,236	2.1%
45-54	7,958	2.3%	15,338	4.3%	23,296	3.3%
55-64	17,680	6.3%	15,606	5.5%	33,286	5.9%
65-74	11,757	6.7%	18,281	9.8%	30,038	8.3%
75+	8,151	5.9%	9,729	4.8%	17,880	5.2%
Total	53,988	2.1%	72,972	2.8%	126,960	2.5%
Other Arthritis						
0-24	10,793	1.3%	8,845	1.1%	19,638	1.2%
25-34	23,974	6.6%	12,601	3.5%	36,575	5.1%
35-44	32,295	8.6%	29,452	7.6%	61,747	8.1%
45-54	43,229	12.4%	41,609	11.7%	84,839	12.0%
55-64	57,949	20.7%	55,284	19.3%	113,233	20.0%
65-74	44,198	25.0%	44,883	24.0%	89,081	24.5%
75+	29,832	21.4%	41,718	20.6%	71,549	20.9%
Total	242,269	9.6%	234,393	9.0%	476,662	9.3%
All Arthritis						
0-24	11,289	1.3%	12,080	1.5%	23,369	1.4%
25-34	30,482	8.4%	19,546	5.4%	50,029	6.9%
35-44	49,172	13.1%	52,819	13.7%	101,991	13.4%
45-54	75,262	21.6%	90,812	25.5%	166,074	23.6%
55-64	114,113	40.8%	130,430	45.6%	244,543	43.2%
65-74	85,501	48.4%	114,785	61.3%	200,287	55.1%
75+	66,986	48.1%	99,942	49.3%	166,929	48.8%
Total	432,805	17.1%	520,415	20.1%	953,221	18.6%

Totals may not sum due to rounding

APPENDIX B – PREVALENCE IN THE STATES AND TERRITORIES, BY AGE AND CONDITION

QUEENSLAND

	Males	%	Females	%	Persons	%
Osteoarthritis						
0-24	146	0.0%	1,336	0.2%	1,482	0.1%
25-34	3,848	1.4%	3,913	1.4%	7,760	1.4%
35-44	10,101	3.4%	12,711	4.2%	22,812	3.8%
45-54	20,878	7.4%	31,927	11.1%	52,804	9.3%
55-64	38,407	16.2%	56,502	24.2%	94,909	20.2%
65-74	26,309	18.7%	44,591	31.8%	70,900	25.2%
75+	22,829	23.0%	38,355	28.2%	61,184	26.0%
Total	122,517	6.0%	189,335	9.2%	311,851	7.6%
Rheumatoid Arthritis						
0-24	395	0.1%	1,482	0.2%	1,877	0.1%
25-34	1,433	0.5%	1,655	0.6%	3,088	0.6%
35-44	4,842	1.6%	7,957	2.6%	12,799	2.1%
45-54	6,432	2.3%	12,339	4.3%	18,771	3.3%
55-64	14,964	6.3%	12,736	5.5%	27,700	5.9%
65-74	9,362	6.7%	13,724	9.8%	23,086	8.2%
75+	5,785	5.8%	6,532	4.8%	12,317	5.2%
Total	43,212	2.1%	56,425	2.7%	99,637	2.4%
Other Arthritis						
0-24	9,060	1.3%	7,427	1.1%	16,487	1.2%
25-34	18,728	6.6%	9,713	3.5%	28,441	5.1%
35-44	25,481	8.6%	23,206	7.6%	48,687	8.1%
45-54	34,938	12.4%	33,474	11.7%	68,412	12.0%
55-64	49,035	20.7%	45,072	19.3%	94,107	20.0%
65-74	35,293	25.1%	33,497	23.9%	68,790	24.5%
75+	21,314	21.4%	27,951	20.6%	49,266	20.9%
Total	193,848	9.4%	180,340	8.7%	374,189	9.1%
All Arthritis						
0-24	9,476	1.3%	10,124	1.5%	19,600	1.4%
25-34	23,812	8.4%	15,066	5.4%	38,878	6.9%
35-44	38,797	13.1%	41,618	13.7%	80,414	13.4%
45-54	60,827	21.6%	73,057	25.5%	133,884	23.6%
55-64	96,563	40.8%	106,405	45.6%	202,968	43.2%
65-74	68,190	48.5%	85,704	61.0%	153,894	54.8%
75+	47,781	48.1%	67,027	49.3%	114,808	48.8%
Total	345,445	16.8%	399,001	19.3%	744,447	18.1%

Totals may not sum due to rounding

APPENDIX B – PREVALENCE IN THE STATES AND TERRITORIES, BY AGE AND CONDITION

SOUTH AUSTRALIA

	Males	%	Females	%	Persons	%
Osteoarthritis						
0-24	51	0.0%	467	0.2%	518	0.1%
25-34	1,347	1.4%	1,317	1.4%	2,664	1.4%
35-44	3,767	3.4%	4,566	4.2%	8,333	3.8%
45-54	8,194	7.4%	12,529	11.1%	20,723	9.3%
55-64	15,092	16.2%	23,136	24.2%	38,228	20.3%
65-74	10,838	18.7%	19,796	31.9%	30,634	25.5%
75+	11,281	23.0%	20,330	28.1%	31,611	26.0%
Total	50,570	6.6%	82,140	10.5%	132,710	8.6%
Rheumatoid Arthritis						
0-24	139	0.1%	518	0.2%	657	0.1%
25-34	502	0.5%	557	0.6%	1,059	0.5%
35-44	1,806	1.6%	2,858	2.6%	4,664	2.1%
45-54	2,524	2.3%	4,842	4.3%	7,366	3.3%
55-64	5,880	6.3%	5,214	5.5%	11,094	5.9%
65-74	3,865	6.7%	6,051	9.8%	9,916	8.3%
75+	2,889	5.9%	3,448	4.8%	6,337	5.2%
Total	17,605	2.3%	23,489	3.0%	41,094	2.6%
Other Arthritis						
0-24	3,190	1.3%	2,583	1.1%	5,773	1.2%
25-34	6,557	6.6%	3,270	3.5%	9,827	5.1%
35-44	9,502	8.6%	8,336	7.6%	17,838	8.1%
45-54	13,712	12.4%	13,136	11.7%	26,848	12.0%
55-64	19,269	20.7%	18,425	19.3%	37,693	20.0%
65-74	14,514	25.0%	14,866	24.0%	29,379	24.5%
75+	10,459	21.4%	14,859	20.5%	25,317	20.9%
Total	77,203	10.0%	75,473	9.6%	152,676	9.8%
All Arthritis						
0-24	3,337	1.3%	3,527	1.5%	6,864	1.4%
25-34	8,337	8.4%	5,071	5.4%	13,409	7.0%
35-44	14,468	13.1%	14,950	13.7%	29,418	13.4%
45-54	23,873	21.6%	28,669	25.5%	52,542	23.6%
55-64	37,944	40.8%	43,541	45.6%	81,486	43.2%
65-74	28,090	48.4%	38,016	61.3%	66,106	55.1%
75+	23,555	48.1%	35,554	49.1%	59,108	48.7%
Total	139,605	18.2%	169,328	21.6%	308,933	19.9%

Totals may not sum due to rounding

APPENDIX B – PREVALENCE IN THE STATES AND TERRITORIES, BY AGE AND CONDITION

WESTERN AUSTRALIA

	Males	%	Females	%	Persons	%
Osteoarthritis						
0-24	75	0.0%	689	0.2%	764	0.1%
25-34	1,968	1.4%	1,979	1.4%	3,947	1.4%
35-44	5,235	3.4%	6,372	4.2%	11,607	3.8%
45-54	10,903	7.4%	16,484	11.1%	27,386	9.3%
55-64	19,141	16.2%	27,503	24.1%	46,644	20.1%
65-74	12,726	18.7%	22,235	31.8%	34,961	25.4%
75+	11,021	22.9%	18,861	28.2%	29,882	26.0%
Total	61,069	5.9%	94,122	9.1%	155,191	7.5%
Rheumatoid Arthritis						
0-24	204	0.1%	764	0.2%	968	0.1%
25-34	733	0.5%	837	0.6%	1,570	0.6%
35-44	2,509	1.6%	3,989	2.6%	6,499	2.1%
45-54	3,359	2.3%	6,371	4.3%	9,729	3.3%
55-64	7,445	6.3%	6,202	5.4%	13,647	5.9%
65-74	4,529	6.7%	6,828	9.8%	11,357	8.2%
75+	2,796	5.8%	3,209	4.8%	6,005	5.2%
Total	21,575	2.1%	28,199	2.7%	49,774	2.4%
Other Arthritis						
0-24	4,673	1.3%	3,795	1.1%	8,467	1.2%
25-34	9,580	6.6%	4,912	3.5%	14,491	5.1%
35-44	13,206	8.6%	11,634	7.6%	24,839	8.1%
45-54	18,245	12.4%	17,282	11.7%	35,528	12.0%
55-64	24,421	20.7%	22,085	19.4%	46,506	20.0%
65-74	17,070	25.1%	16,701	23.9%	33,771	24.5%
75+	10,310	21.5%	13,746	20.6%	24,056	20.9%
Total	97,505	9.4%	90,155	8.7%	187,659	9.0%
All Arthritis						
0-24	4,887	1.4%	5,192	1.5%	10,080	1.4%
25-34	12,180	8.4%	7,619	5.4%	19,799	6.9%
35-44	20,107	13.1%	20,864	13.7%	40,971	13.4%
45-54	31,765	21.6%	37,719	25.5%	69,484	23.6%
55-64	48,084	40.7%	51,927	45.5%	100,012	43.1%
65-74	32,985	48.5%	42,723	61.1%	75,708	54.9%
75+23,092	48.1%	32,964	49.3%	56,056	48.8%	
Total	173,102	16.6%	199,008	19.2%	372,110	17.9%

Totals may not sum due to rounding

APPENDIX B – PREVALENCE IN THE STATES AND TERRITORIES, BY AGE AND CONDITION

TASMANIA

	Males	%	Females	%	Persons	%
Osteoarthritis						
0-24	16	0.0%	147	0.2%	163	0.1%
25-34	380	1.4%	396	1.4%	776	1.4%
35-44	1,103	3.4%	1,437	4.2%	2,540	3.8%
45-54	2,643	7.4%	4,089	11.1%	6,732	9.3%
55-64	5,008	16.2%	7,556	24.3%	12,565	20.3%
65-74	3,666	18.7%	6,440	31.8%	10,105	25.4%
75+	3,236	22.9%	5,736	28.2%	8,972	26.0%
Total	16,052	6.6%	25,800	10.4%	41,852	8.5%
Rheumatoid Arthritis						
0-24	44	0.1%	163	0.2%	207	0.1%
25-34	142	0.5%	167	0.6%	309	0.6%
35-44	529	1.6%	899	2.6%	1,428	2.1%
45-54	814	2.3%	1,580	4.3%	2,394	3.3%
55-64	1,952	6.3%	1,703	5.5%	3,655	5.9%
65-74	1,305	6.7%	1,977	9.8%	3,282	8.2%
75+	826	5.9%	976	4.8%	1,801	5.2%
Total	5,611	2.3%	7,465	3.0%	13,077	2.7%
Other Arthritis						
0-24	1,011	1.2%	825	1.1%	1,836	1.1%
25-34	1,850	6.6%	983	3.5%	2,833	5.1%
35-44	2,783	8.6%	2,623	7.6%	5,406	8.1%
45-54	4,423	12.4%	4,287	11.7%	8,710	12.0%
55-64	6,395	20.7%	6,012	19.3%	12,406	20.0%
65-74	4,915	25.1%	4,837	23.9%	9,752	24.5%
75+	3,022	21.4%	4,182	20.5%	7,204	20.9%
Total	24,399	10.1%	23,748	9.5%	48,147	9.8%
All Arthritis						
0-24	1,058	1.3%	1,120	1.4%	2,178	1.4%
25-34	2,352	8.4%	1,524	5.4%	3,876	6.9%
35-44	4,237	13.1%	4,704	13.7%	8,941	13.4%
45-54	7,700	21.6%	9,357	25.5%	17,057	23.6%
55-64	12,593	40.8%	14,216	45.7%	26,809	43.2%
65-74	9,501	48.5%	12,373	61.1%	21,874	54.9%
75+	6,779	48.1%	10,025	49.3%	16,805	48.8%
Total	44,220	18.2%	53,319	21.4%	97,539	19.8%

Totals may not sum due to rounding

APPENDIX B – PREVALENCE IN THE STATES AND TERRITORIES, BY AGE AND CONDITION

NORTHERN TERRITORY

	Males	%	Females	%	Persons	%
Osteoarthritis						
0-24	8	0.0%	74	0.2%	83	0.1%
25-34	247	1.4%	233	1.4%	480	1.4%
35-44	598	3.4%	675	4.2%	1,273	3.8%
45-54	1,081	7.4%	1,477	11.1%	2,558	9.2%
55-64	1,605	16.1%	1,930	23.7%	3,535	19.5%
65-74	791	18.8%	998	31.2%	1,789	24.2%
75+	363	22.5%	499	29.3%	862	26.0%
Total	4,693	4.3%	5,888	5.9%	10,581	5.1%
Rheumatoid Arthritis						
0-24	23	0.1%	83	0.2%	106	0.1%
25-34	92	0.5%	99	0.6%	191	0.5%
35-44	287	1.6%	423	2.6%	709	2.1%
45-54	333	2.3%	571	4.3%	904	3.2%
55-64	621	6.2%	436	5.4%	1,057	5.8%
65-74	279	6.6%	314	9.8%	594	8.0%
75+	89	5.5%	87	5.1%	176	5.3%
Total	1,724	1.6%	2,012	2.0%	3,736	1.8%
Other Arthritis						
0-24	529	1.2%	422	1.0%	951	1.1%
25-34	1,203	6.6%	579	3.5%	1,782	5.1%
35-44	1,508	8.6%	1,233	7.6%	2,741	8.1%
45-54	1,809	12.4%	1,549	11.7%	3,358	12.1%
55-64	2,043	20.5%	1,585	19.5%	3,628	20.0%
65-74	1,068	25.4%	751	23.5%	1,819	24.6%
75+	352	21.8%	359	21.1%	711	21.4%
Total	8,513	7.8%	6,477	6.5%	14,990	7.2%
All Arthritis						
0-24	554	1.3%	570	1.4%	1,124	1.3%
25-34	1,529	8.4%	898	5.4%	2,428	7.0%
35-44	2,297	13.1%	2,210	13.7%	4,507	13.4%
45-54	3,149	21.6%	3,381	25.5%	6,530	23.5%
55-64	4,022	40.4%	3,676	45.1%	7,698	42.5%
65-74	2,050	48.8%	1,924	60.1%	3,975	53.7%
75+	772	47.8%	868	51.0%	1,641	49.4%
Total	14,373	13.1%	13,529	13.6%	27,902	13.3%

Totals may not sum due to rounding

APPENDIX B – PREVALENCE IN THE STATES AND TERRITORIES, BY AGE AND CONDITION

AUSTRALIAN CAPITAL TERRITORY

	Males	%	Females	%	Persons	%
Osteoarthritis						
0-24	12	0.0%	108	0.2%	120	0.1%
25-34	359	1.4%	362	1.4%	721	1.4%
35-44	826	3.4%	1,047	4.2%	1,873	3.8%
45-54	1,676	7.4%	2,690	11.1%	4,366	9.3%
55-64	2,916	16.2%	4,481	24.0%	7,397	20.2%
65-74	1,705	18.7%	3,070	31.8%	4,775	25.4%
75+	1,478	23.0%	2,539	28.3%	4,017	26.1%
Total	8,972	5.4%	14,297	8.5%	23,269	7.0%
Rheumatoid Arthritis						
0-24	33	0.1%	119	0.2%	152	0.1%
25-34	134	0.5%	153	0.6%	287	0.6%
35-44	396	1.6%	655	2.6%	1,051	2.1%
45-54	516	2.3%	1,040	4.3%	1,556	3.3%
55-64	1,134	6.3%	1,011	5.4%	2,144	5.8%
65-74	606	6.7%	945	9.8%	1,551	8.3%
75+	377	5.9%	434	4.8%	811	5.3%
Total	3,196	1.9%	4,357	2.6%	7,552	2.3%
Other Arthritis						
0-24	757	1.3%	601	1.1%	1,358	1.2%
25-34	1,747	6.6%	899	3.5%	2,646	5.1%
35-44	2,084	8.6%	1,911	7.6%	3,995	8.1%
45-54	2,804	12.4%	2,821	11.7%	5,625	12.0%
55-64	3,720	20.7%	3,613	19.4%	7,333	20.0%
65-74	2,289	25.1%	2,306	23.9%	4,596	24.5%
75+	1,375	21.4%	1,851	20.6%	3,226	21.0%
Total	14,777	8.9%	14,003	8.3%	28,779	8.6%
All Arthritis						
0-24	792	1.4%	818	1.5%	1,610	1.4%
25-34	2,222	8.4%	1,394	5.4%	3,616	6.9%
35-44	3,173	13.1%	3,427	13.7%	6,600	13.4%
45-54	4,882	21.6%	6,156	25.5%	11,039	23.6%
55-64	7,325	40.7%	8,473	45.4%	15,798	43.1%
65-74	4,419	48.5%	5,901	61.0%	10,320	55.0%
75+	3,090	48.1%	4,436	49.5%	7,527	48.9%
Total	25,902	15.7%	30,606	18.2%	56,509	16.9%

Totals may not sum due to rounding

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Arthritis Australia is the peak arthritis organisation in Australia and is supported by affiliate offices in every state and territory.

Services primarily involve:

- Lobbying all levels of government about issues affecting people with arthritis and other musculoskeletal conditions
- Conducting education and information sessions for the general public and health professionals
- Training leaders to run self-management courses
- Providing access to information to help people make informed choices about the management of their condition
- Facilitating and resourcing support networks for those living with arthritis
- Raising funds to support its medical research program

Contact details
1st Floor
52 Parramatta Road
Forest Lodge NSW 2037

GPO Box 121
Sydney NSW 2001

Phone: (02) 9552 6085
Fax: (02) 9552 6078

Ainslie Cahill, Chief Executive Officer

www.arthritisaustralia.com.au
info@arthritisaustralia.com.au