Deliverable D11
Musculoskeletal Health in Europe

TABLE OF CONTENTS

Introduction

Musculoskeletal conditions (MSC) are the most common cause of severe long term pain and disability in the EU and lead to significant healthcare and social support costs. As a major cause of work absence and incapacity they also have a major economic cost through lost productivity. They can seriously impact the quality of life of those with the conditions, their families, friends and carers and impinge on all aspects of their lives. Despite the significant impact of these conditions on the health and well being of populations and individuals across the EU there is a lack of awareness of musculoskeletal conditions. This together with a lack of routinely collected indicators that are specifically relevant to musculoskeletal conditions means that musculoskeletal conditions do not receive the attention commensurate with their impact. This report, which has been prepared as part of the eumusc.net project, aims to provide an up to date picture of the health, social, employment and economic impacts of musculoskeletal conditions across EU Member States. It doing so it draws on many sources of data and information including health and labour force surveys, national statistics, reports and peer reviewed literature.

The prevalence of many MSC and their associated disability increases with ageing, obesity and lack of physical activity. All these determinants are increasing across Member States and without action the burden of MSC will grow. Understanding the impact of these common, disabling but usually non-fatal conditions will provide the evidence to support the development of strategies and policies for their effective prevention and management.

Incidence and prevalence

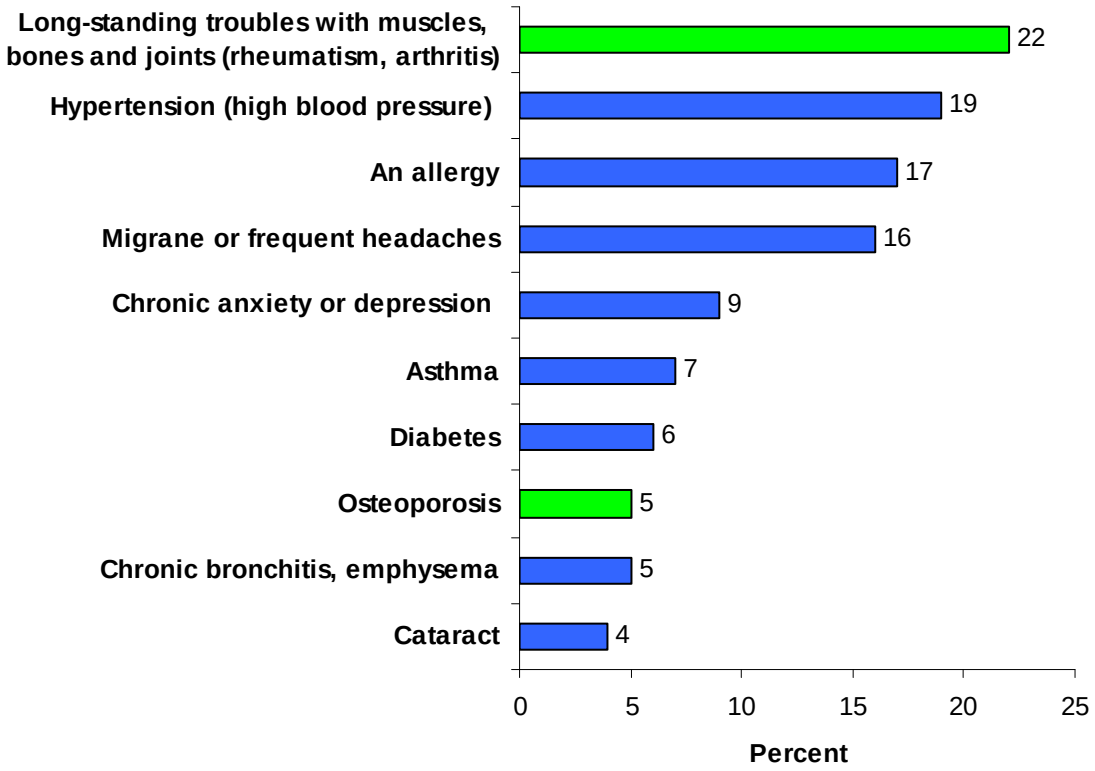
The musculoskeletal system provides form, support, stability, and movement to the body. It is made up of bones, muscles, cartilage, tendons, ligaments and other connective tissues. Musculoskeletal conditions are a diverse group of conditions which affect the musculoskeletal system and are associated with pain and impaired physical function. They range from those that arise suddenly and are short lived to life long disorders. They include:

- Joint conditions—for example, rheumatoid arthritis (RA), osteoarthritis (OA)
- Bone conditions—for example, osteoporosis and associated fragility fractures
- Spinal disorders—for example, low back pain
- Regional and widespread pain disorders
- Musculoskeletal injuries—for example, high-energy limb fractures, strains and sprains often related to occupation or sports
- Genetic, congenital and developmental childhood disorders
- Multisystem inflammatory diseases which commonly have musculoskeletal manifestations such as connective tissue diseases and vasculitis

Those problems and conditions not related to injuries or traumas are sometimes called rheumatic diseases and those predominantly affecting joints are collectively called arthritis. “Musculoskeletal problems” is a useful term to describe symptoms affecting the musculoskeletal system, whereas “musculoskeletal conditions” can be used when a cause is known.

Musculoskeletal problems are very common. For example, in a 2007 EU survey it was found that 22% of the population currently had, or had experienced long-term muscle, bone and joint problems such as rheumatism and arthritis.

Figure Eurobarometer 2007 – percentage of respondents reporting health conditions (current or ever had).



Source: European Commission 2007.

This chapter describes the following conditions and gives data on their incidence & prevalence, co-morbidities and mortality rates:

- Musculoskeletal pain
- Osteoarthritis (OA)
- Rheumatoid Arthritis (RA)
- Low back pain
- Osteoporosis & fragility fractures
- Gout
- Juvenile Idiopathic Arthritis (JIA)

It draws on a number of sources of data including surveys such as the European Health Interview Survey (EHIS), Eurobarometer and national health surveys; literature (including Global Burden of Disease systematic review); national statistics

and registers. Health interview surveys offer comprehensive data on the health status and the health-related behaviours of a population based on a series of personal household interviews. The EHIS is implemented and managed by Eurostat. The survey is conducted every five years and includes information from all European Union (EU) Member States. The questions in EHIS relevant to MSC include:

Do you have or have you ever had any of the following diseases or conditions?

- Osteoarthritis (arthrosis, joint degeneration)
- Rheumatoid arthritis
- Low back disorder or other chronic back defect
- Neck disorder or other chronic neck defect

Was this disease/condition diagnosed by a medical doctor?

Have you had this disease/condition in the past 12 months?

(http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Glossary:European_health_interview_survey_(EHIS).)

The WHO Global Burden of Disease project draws on a wide range of data sources to quantify global and regional effects of diseases, injuries and risk factors on population health. Its' analysis provides a comprehensive and comparable assessment of mortality and loss of health due to diseases, injuries and risk factors for all regions of the world. The overall burden of disease is assessed using the disability-adjusted life year (DALY), a time-based measure that combines years of life lost due to premature mortality and years of life lost due to time lived in states of less than full health. (http://www.who.int/topics/global_burden_of_disease/en/)

Musculoskeletal pain

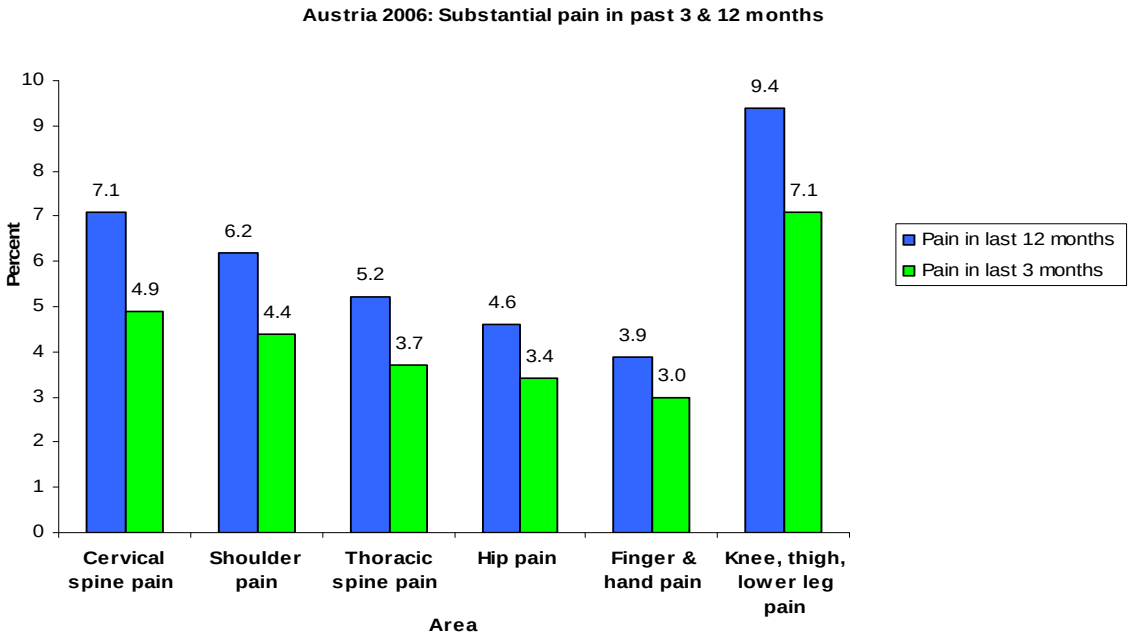
The most common musculoskeletal pain experienced is back pain; pain is the most prominent symptom in most people with arthritis and is the most important determinant of disability in patients with osteoarthritis. Respondents often report having more than one musculoskeletal complaint (Jzelenberg et al 2004) and musculoskeletal pain is often widespread. For example, a substantial proportion of patients with chronic back pain also have chronic widespread pain (Natvig 2001). Chronic widespread pain (CWP) is a symptom of fibromyalgia syndrome.

Musculoskeletal pain incidence and prevalence

Musculoskeletal pain is very common. A review of prevalence studies indicated that in adult populations almost one fifth reported widespread pain, one third shoulder pain, and up to one half reported low back pain in a 1-month period (McBeth & Jones 2007).

Data from the Austrian National Health Survey (2006) shows the percentage of respondents who reported substantial pain in the last 3 and 12 months. Substantial pain most often occurs in the knee and back.

Figure Substantial pain in the last 3 & 12 months, Austria 2006.



Source: Austria National Health Survey 2006.

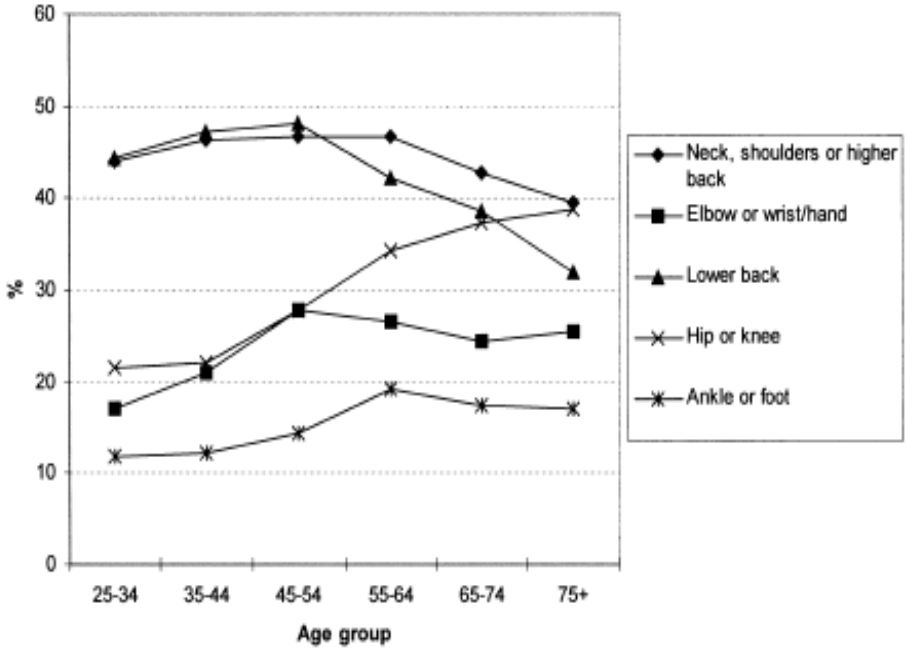
A study of international differences in the prevalence of CWP (MacFarlane et al 2009) showed that there were significant differences between centres in 8 different European countries. It found that there was an excess prevalence in countries of Eastern Europe. This excess was associated with poorer psychological and physical health as well as adverse psychosocial factors (life events).

A national study conducted in the Netherlands presents estimates of the prevalence of musculoskeletal pain of five different anatomical areas and ten anatomical sites, and their consequences and risk groups in the general Dutch population (Picavet & Shouten 2003). It used cross-sectional data from a population-based study of a sex-age stratified sample of Dutch inhabitants of 25 years and older. A postal questionnaire data was used to assess musculoskeletal pain, associated characteristics of the pain and general socio-demographic characteristics. 74.5% of respondents reported any musculoskeletal pain during the past 12 months; 53.9% reported musculoskeletal pain during survey (point prevalence) and 44.4% reported musculoskeletal pain lasting longer than 3 months.

It found a one year prevalence of low back pain of 44%, neck complaints 31%, shoulder complaints 30%, wrist complaints 18% and elbow complaints 18%. In most

cases the pain was described as continuous or recurrent and mild. Musculoskeletal pain was found to be common in all subgroups of the population and to have far-reaching consequences for health, work and the use of health care.

Figure Prevalence of musculoskeletal pain The Netherlands 2003



Source: Picavet 2003.

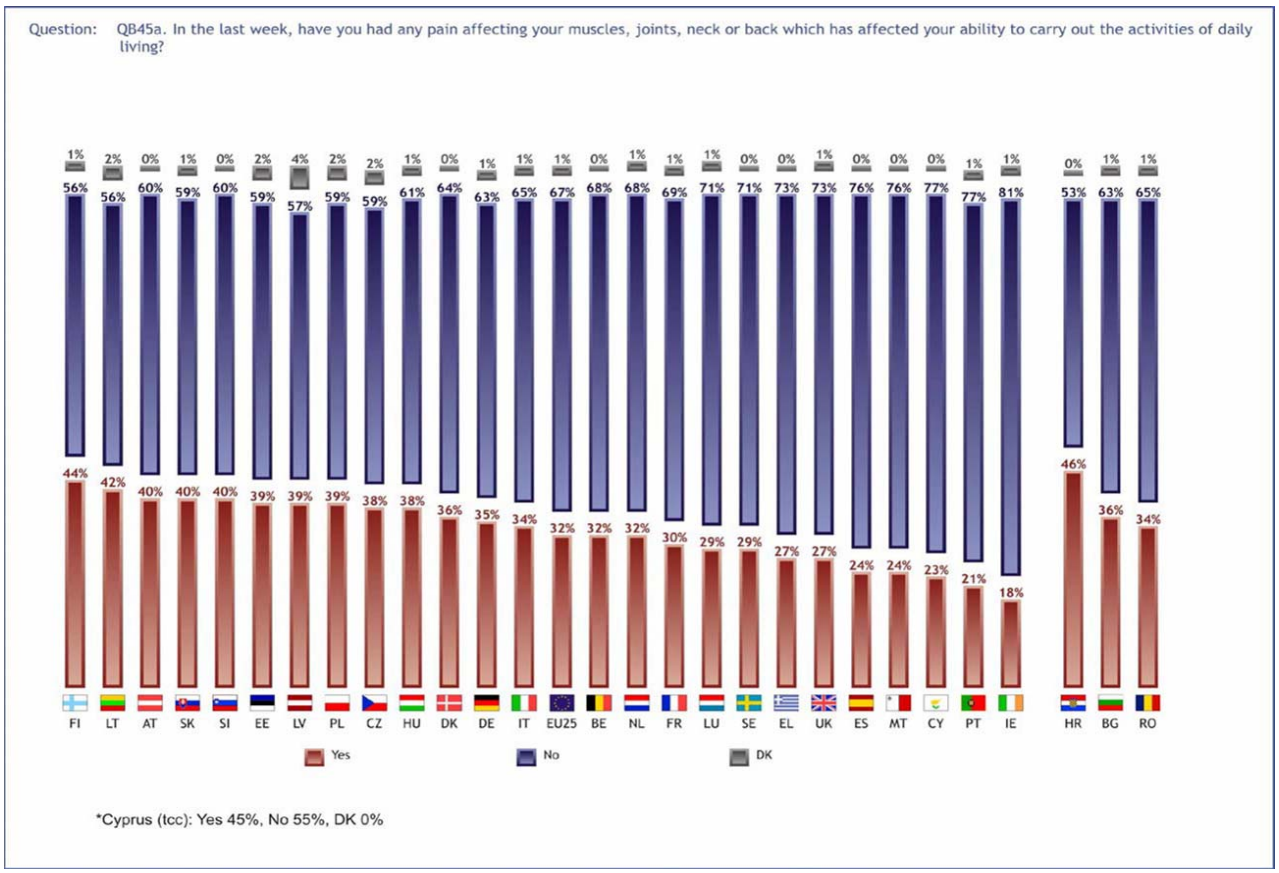
As musculoskeletal pain often goes undiagnosed and it is difficult to quantify severity, an important widely used measure is that of musculoskeletal pain which restricts activities of daily living. In the Picavet study (2003) in three out of ten cases the complaints about pain were accompanied by limitations in daily living.

The Eurobarometer Report on Health in the European Union included the question: "**In the last week**, have you had any pain affecting your muscles, joints, neck or back which has affected your ability to carry out the activities of daily living? If yes, which part of the body did you have such pain."
32% of all respondents and 44% of those 55 years and over said that in the preceding week they experienced muscle, joint, neck or back pain which affected their daily activities. Those ending their education at 15 were more likely to have had a problem with activity limiting pain (43% vs. 27% of those continuing education to 20 and

beyond) and women were more likely than men to experience this pain (37% vs. 27%).

Countries reporting particularly high levels of reduced activities due to pain were Finland (44%) and Lithuania (42%). The lowest proportions reporting activity reducing pain were Ireland (18%) and Portugal (21%).

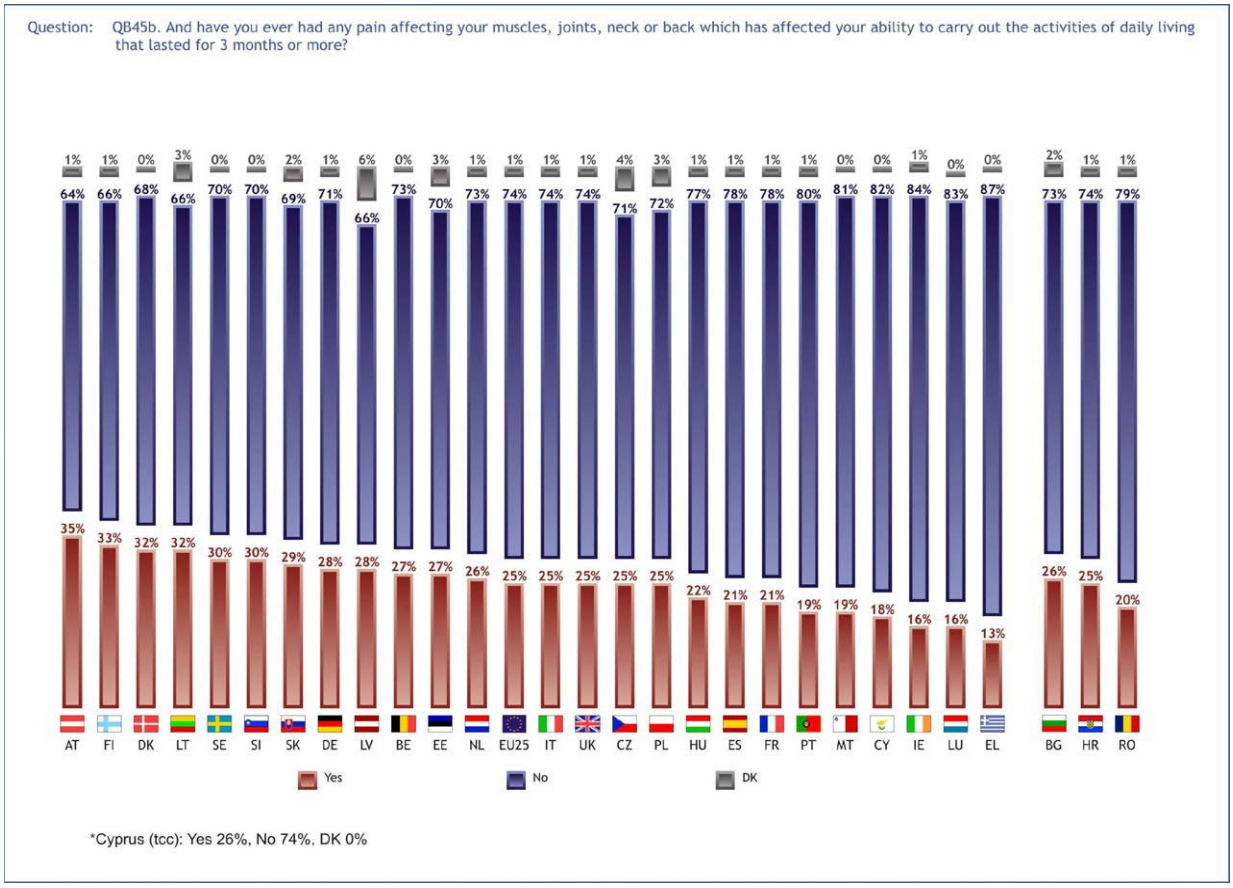
Figure Activity restricting musculoskeletal pain in past week



Source: European Commission 2007.

The Eurobarometer survey also asked about musculoskeletal pain in the last 3 months or more (chronic pain). 25% of all respondents say that at some point in their life they have experienced chronic restrictive musculoskeletal pain.The highest levels of reported activity limiting musculoskeletal pain were in Austria (35%) and Finland (33%). The lowest were in Greece (13%), Ireland and Luxembourg (both 16%).

Figure Activity restricting musculoskeletal pain in 3 months or more



Source: Eurobarometer 2007

Osteoarthritis

Osteoarthritis (OA) is the most common joint disorder and accounts for more disability among the elderly than any other disease. It is characterised by changes to the structure of the entire joint. Osteoarthritis case definition can be based on pathological changes seen on x-ray, by the presence of joint symptoms or both. It can also be related to the joints affected. The preferred definition for OA includes both x-ray findings and the presence of joint pain on most days (Altman et al, 1986).

- **Pathological:** focal areas of loss of articular cartilage within synovial joints, associated with hypertrophy of bone (osteophytes and subchondral bone sclerosis) and thickening of the capsule
- **Clinical:** by joint pain, tenderness, limitation of movement, crepitus, occasional effusion, and variable degrees of local inflammation
- **Radiological:** loss of joint space, osteophytes, subchondral sclerosis and cysts

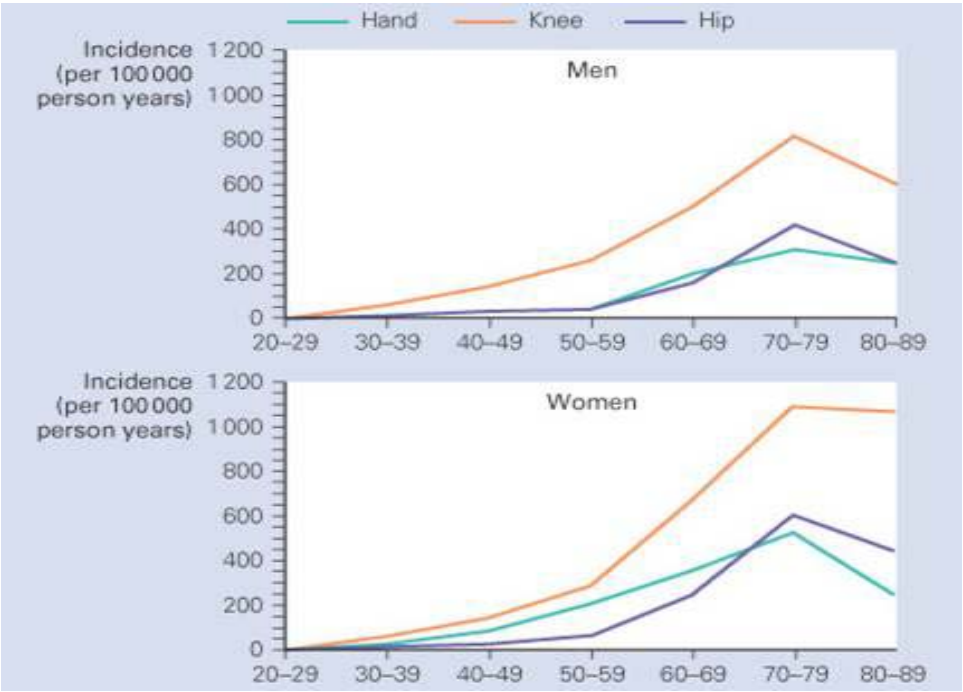
Osteoarthritis is characterised by focal areas of fibrillation, fissures, ulceration and full thickness loss of articular cartilage within synovial joints, associated with hypertrophy of bone (osteophytes and subchondral bone sclerosis) and thickening of the capsule. OA can affect any joint, but is most common in the hand, the spine, knee, foot and hip. Clinically, the condition is characterized by joint pain, tenderness, limitation of movement, crepitus (grating, cracking or popping sounds in the joint), stiffness after immobility and limitation of movement with occasional effusion and variable degrees of local inflammation. The pathological change, when severe, results in radiological changes (loss of joint space, subchondral sclerosis, cysts and osteophytes). These radiological changes can be graded, usually by Kellgren & Lawrence scores. A Kellgren & Lawrence score of 2-4 is the most widely used definition of radiological osteoarthritis in epidemiological studies to estimate prevalence of OA at different joint sites (Kellgren and Lawrence, 1958). Radiographic changes are not always accompanied by symptoms of pain, stiffness or loss of function and conversely joint pain is not always associated with radiological abnormalities. Therefore the preferred definition for epidemiological studies of

osteoarthritis includes both X-ray findings (≥grade 2) and the presence of joint pain on most days, as either finding alone leads to over-estimates.

Osteoarthritis incidence and prevalence

The incidence of osteoarthritis is problematic to estimate because of its gradual progressive development and the problems of definition of a new case. Therefore there is little data. It is estimated, from surveys mostly confined to developed countries, that 1 in 10 of the population who are 60 years or older have significant clinical problems that can be attributed to osteoarthritis. For both males and females the incidence of osteoarthritis rises steeply after the age of 50 peaking in the 70-79 age group. The incidence of osteoarthritis in the knee is high in both sexes with women experiencing particularly high levels.

Figure Incidence of symptomatic hand, hip, and knee osteoarthritis by age and gender USA 1995.



Source: Olivera et al 1995.

Prevalence studies are difficult to directly compare because of differences in age group included, inclusion and diagnostic criteria. For similar age groups and using

radiographic diagnosis the prevalence of osteoarthritis hip was 9.90 % in the Netherlands and 3.8% in Sweden. The tables below show standardised prevalence rates for osteoarthritis of the hip, knee hand and unspecified osteoarthritis which were derived from data collected in the current round of the Global Burden of Disease project (GBD 2010).

Table Standardised prevalence rate OA hip per 100 population

Country	Data collection date**	Diagnosis	Age	Prevalence
Denmark	1993	Radiographic	20-99	4.20
Finland	1979	Symptomatic	30-99	5.12
Greece	1998	Symp/Radiographic	19-99	0.94
Hungary	2003	Self reported pain	14-69	20.29
Italy	2000*	Symptomatic	65-99	7.70
	2004*	Symptomatic	18-91	1.61
Netherlands	1992	Self reported	55-95	13.11
	1992	Symp/Radiographic	55-95	3.90
	1998	Self reported	25-99	6.80
	2001	Radiographic	55-99	9.90
Spain	2003	Symp/Radiographic	60-89	51.29
	2003	Symptomatic	60-90	25.72
	2003	Self reported	60-90	24.93
Sweden	1983	Radiographic	45-94	3.88
UK	1986	Self reported	16-99	5.01
	2002	Self reported	45-84	8.92
	2002	Symptomatic	65-99	26.28

* Not standardised, ** Mid point data collection period

Table Standardised prevalence rate OA knee per 100 population

Country	Data collection date**	Diagnosis	Age	Prevalence
Estonia	2005*	Radiographic	34-55	3.74
Greece	1998	Symp/Radiographic	19-99	6.55
Hungary	2003	Self-reported pain	14-69	28.30
Italy	2000*	Symptomatic	65-99	29.80
	2004*	Symptomatic	18-91	5.39
Netherlands	1977	Radiographic	67-92	43.01
	1992	Self reported	55-95	17.93
	1992	Symp/Radiographic	55-95	6.95
	1998	Self reported	25-99	11.90
	2001	Radiographic	55-99	18.80
Spain	2000	Symptomatic	20-99	11.72
	2003	Symp/Radiographic	60-89	71.10
	2003	Symptomatic	60-90	40.39
	2003	Self reported	60-90	35.12
Sweden	1981	Radiographic	67-92	53.87
UK	1986	Self reported	16-99	9.84
	1987	Symptomatic	16-99	6.50

* Not standardised, ** Mid point data collection period

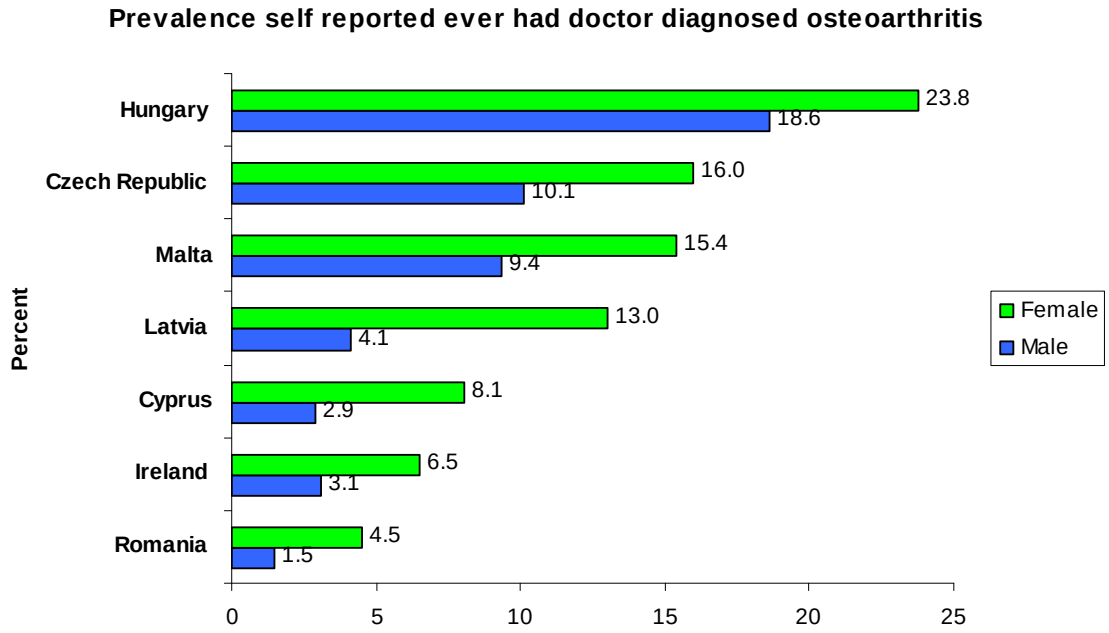
Table Standardised prevalence rate OA not specified & hand per 100 population

Country	Region	Data collection date**	Diagnosis	Age	Prevalence
Finland	Not specified	1979	Symptomatic	30-99	15.80
France	Not specified	2005	Sym/Radiographic	40-75	6.30
Greece	Not specified	1998	Symp/Radiographic	19-99	2.42
	Hand	1998	Symp/Radiographic	19-99	2.08
Italy	Not specified	2000	Self reported	18-99	21.91
	Hand	2000*	Symptomatic	65-99	14.90
Netherlands	Not specified	1995	Symptomatic	55-99	24.50
Sweden	Not specified	1977	Self reported	16-74	2.75

* Not standardised, ** Mid point data collection period

Radiographs will only detect those with severe osteoarthritis pathology and tell us little about the patients' symptoms or disability. Data from the European Health surveys in 7 countries show a wide variation in the prevalence of self-reported doctor diagnosed osteoarthritis. This ranges from less than 5% of respondents reporting ever having osteoarthritis in Romania to nearly 25% in Hungary reporting ever having had this condition. In all countries females have a higher prevalence of self reported OA than males.

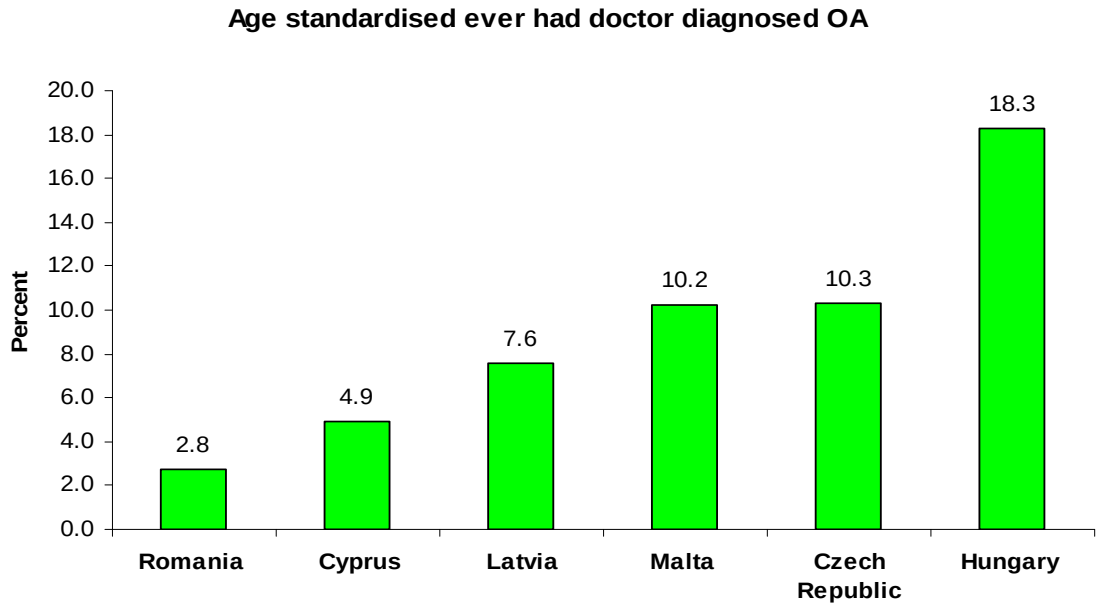
Figure Prevalence of self-reported ever had doctor diagnosed osteoarthritis



Source: EHIS. All surveys are from 2008 except Ireland 2007 and Hungary 2009.

Age standardised self reported doctor diagnosed osteoarthritis varies from 2.8% in Romania to 18.3% in Hungary.

Figure Age-standardised self reported doctor diagnosed osteoarthritis



Source: EHIS All surveys are from 2008 except Hungary 2009.

The prevalence of osteoarthritis increases indefinitely with age, because the condition is not at present reversible. Radiographic surveys show that osteoarthritis changes are uncommon in those under the age of 40 but are seen in most over the age of 70. Men are affected more often than women among those aged less than 45 years, whereas women are affected more frequently among those aged 45 years and over (Pettersson 2002). Given that there are currently very few preventive and therapeutic options for OA, with the aging of the European population, the burden of OA is set to rise.

Osteoarthritis co-morbidities and mortality

Depression and obesity have been shown in population studies to be associated with osteoarthritis and chronic joint pain (Davis et al 1990; Von Korff et al 1996). Gastro-intestinal consultations in primary care are more prevalent in those with osteoarthritis; this may be due to the use of non-steroidal anti-inflammatory drugs (Griffin 1998).

Mortality has not been a major area of investigation in osteoarthritis. A systematic review found moderate evidence of increased mortality among persons with osteoarthritis compared with the general population. Possible explanations for the excess mortality included reduced levels of physical activity among persons with osteoarthritis due to involvement of lower limb joints and the presence of comorbid conditions, as well as adverse effects of medications used to treat symptomatic osteoarthritis, particularly non-steroidal anti-inflammatory drugs (Hochberg et al 2008).

Rheumatoid arthritis

Rheumatoid arthritis (RA) is the most common inflammatory disease of the joints. It usually presents with pain, stiffness and symmetrical swelling of the small joints of the hands and feet. Symptoms of fatigue, weight loss and malaise can occur and there can also be systemic involvement such as vasculitis (inflammation of blood vessels). It is usually progressive over time affecting further joints. The destructive disease process causes irreversible changes to the bone and the joints become deformed, with long-term pain and disability. The most widely used criteria are that from the American College of Rheumatology (Arnett et al 1988). At least 4 of the following criteria must be met:

- AM stiffness lasting > 1 hour
- Swelling of ≥ 3 joints
- Swelling of hand joints
- Symmetric joint involvement
- Radiographic changes
  (erosion or bony decalcification)
- Presence of rheumatoid nodules
- Rheumatoid factor in serum

A more recent up date to this is the EULAR/ACR 2010 classification criteria for Rheumatoid Arthritis (Aletaha et al 2010):

Target population (Who should be tested?) 1) have at least 1 joint with definite clinical synovitis (swelling) 2) with the synovitis not better explained by another disease	
Add score of categories A–D; a score of 6/10 is needed for classification of definite RA)	
A. Joint involvement	
1 large joint	0
2-10 large joints	1

1-3 small joints (with or without involvement of large joints)	2
4-10 small joints (with or without involvement of large joints)	3
>10 joints (at least 1 small joint)	5
B. Serology (at least 1 test result is needed for classification)	
Negative RF *and* negative ACPA	0
Low-positive RF *or* low-positive ACPA	2
High-positive RF *or* high-positive ACPA	3
C. Acute-phase reactants (at least 1 test result is needed)	
Normal CRP *and* normal ESR	0
Abnormal CRP *or* abnormal ESR	1
D. Duration of symptoms	
< 6 weeks	0
>= 6 weeks	1

Rheumatoid arthritis incidence and prevalence

Estimating the incidence of RA is problematic due to the delay between patients experiencing symptoms and seeking medical help for these symptoms. This is a problem as the ACR criteria depends on the time elapsed between symptom onset and assessment of RA criteria, and on how the criteria are applied. The use of different case definitions makes the estimates vary as widely as 25 to 115 per 100 000 (Carmona et al 2010). The annual incidence rate of RA recorded in studies varies between 20 and 50 cases per 100,000 in Northern European countries but there are indications that it may be lower in Southern European countries (Carbonell et al 2008, Pedersen et al 2009).

Studies of the incidence and prevalence of RA suggest variations between different populations even within the same country. Possible explanations include regional variation in behavioural factors, climate, environmental exposures, RA diagnosis, and genetic factors (Carmona et al 2010). There is conflicting evidence as to whether the incidence of RA is decreasing however there does appear to be a decline in its severity.

The tables below show standardised incidence and prevalence rates for rheumatoid arthritis which were derived from data collected in the Global Burden of Disease project (GBD 2010). The annual incidence rate of RA for adults up to age 99 ranges from 22 cases per 100,000 in the UK to 35 per 100,000 in Finland.

Table Standardised annual incidence rate of RA per 100,000 population

Country	Data collection date**	Age	Incidence
Czech Republic	**2003**	**19-90**	**34.5 (urban)** **30.21 (rural)**
Denmark	**1998**	**15-99**	**29.56**
Finland	**1995**	**16-99**	**31.92**
	2000	**16-99**	**35.78**
	1983*	**16-99**	**39.00**
France	**1988**	**20-70**	**8.73**
Sweden	**2000**	**18-99**	**23.61**
Spain	**2008**	**18-99**	**8.34**
UK	**1991**	**15-99**	**23.26**
	1996	**16-99**	**22.11**

* Not standardised, ** Mid point data collection period

The standardised prevalence rates in studies for adults up to age 99 range from 0.32% in France to 0.83% in the UK. The prevalence rates for females tend to be considerably higher than the rate for males.

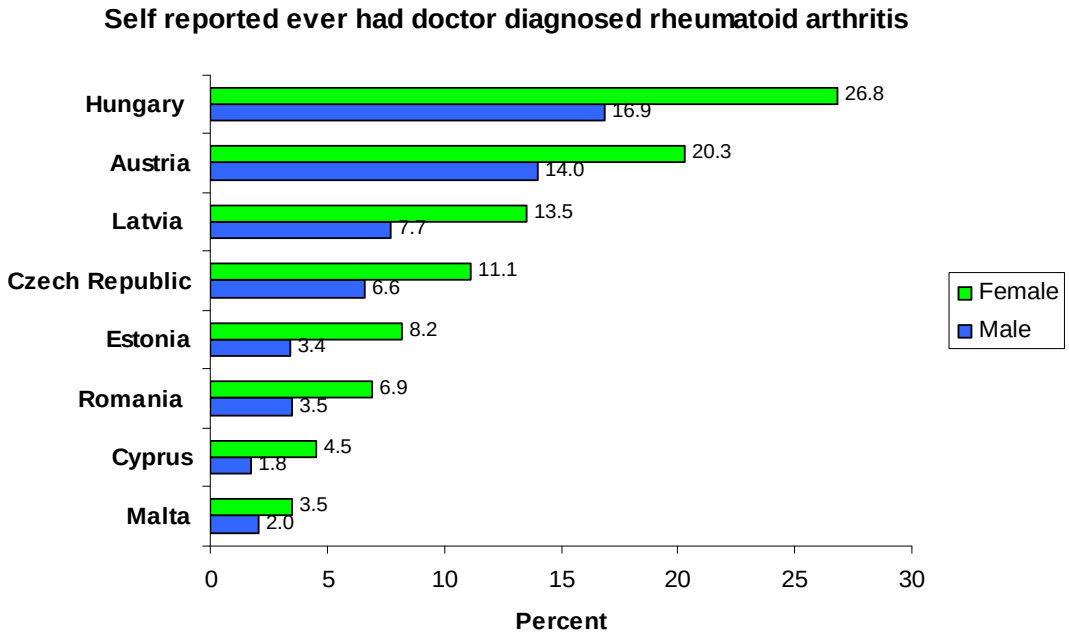
Table Standardised prevalence rate RA per 100 population

Country	Data collection date**	Age	Prevalence
Czech Republic	2003	16-99	0.64 (urban) 0.70 (rural
France	2005	16-99	0.20*
	2002	18-99	0.32
	2001	30-79	0.31
Greece	2008	0-99	0.76
	1983	19-99	0.66
Hungary	2002	14-65	0.36
Ireland	1995	18-99	0.49
Italy	2004	18-91	0.46*
	1992	16-99	0.33
Lithuania	2004	18-99	0.55
The Netherlands	2000	25-99	3.14
Spain	1998	20-99	0.52
Sweden	2006	20-99	0.66
	1995	20-74	0.51*
	1985	50-70	0.50*
	1975	16-74	0.70
UK	1999	16-99	0.83
	1994	23-68	0.30*

* Not standardised, ** Mid point data collection period

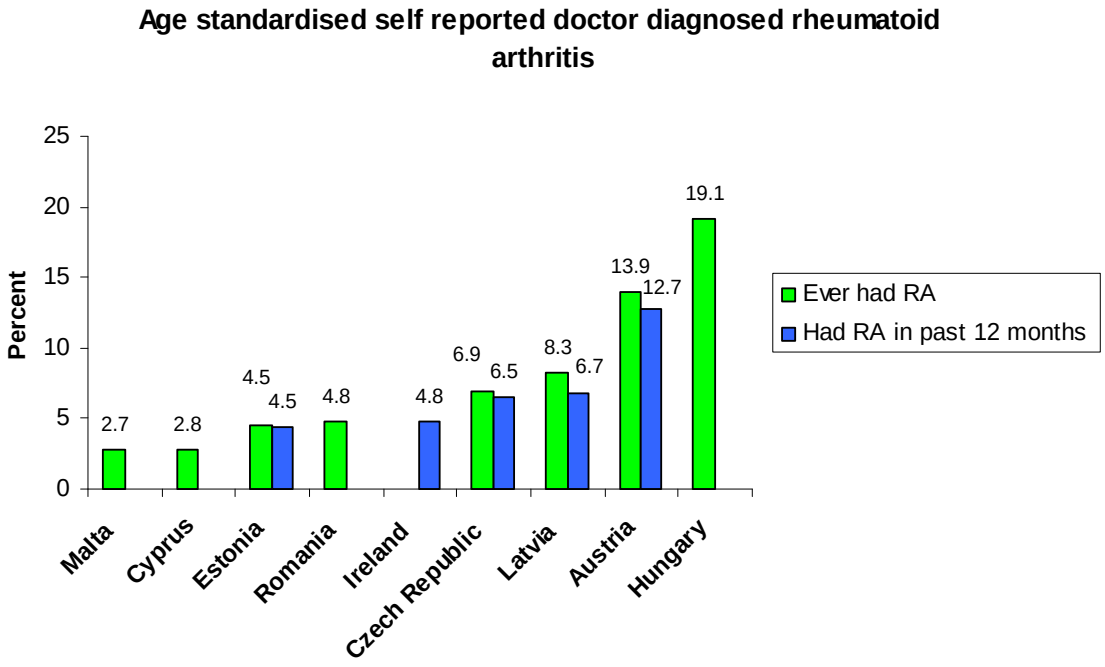
Data from the European Health surveys for 8 countries show a wide variation in the prevalence of self-reported rheumatoid arthritis. This ranges from less than 4% of female respondents reporting ever having doctor diagnosed rheumatoid arthritis in Malta to over 26% in Hungary. In all countries females have higher prevalence of self reported RA than males.

Figure Self-reported rheumatoid arthritis by gender



Source: EHIS. All surveys are from 2008 except Estonia 2006, Hungary 2009

Figure Age-standardised self reported doctor diagnosed rheumatoid arthritis, ever, past 12 months.



Source: EHIS. All surveys are from 2008 except Estonia 2006, Hungary 2009

Rheumatoid arthritis co-morbidities and mortality

Infections

The rate of infections in general is increased in RA compared to other diseases. For tuberculosis there is a 4-fold and for herpes zoster twice the risk. This is related to both the immunosuppressant drugs used in the treatment of RA, and the level of systemic inflammation (Carmona et al 2010).

Cardiovascular disease

Patients with RA show a higher risk of major adverse cardiovascular events than controls, and RA activity appears as a predictor of major adverse cardiovascular events independent of other risk factors (Carmona et al 2010).

Lymphoma

The risk of lymphoma is increased in RA, and closely related to the degree of inflammation, even in early RA. There is an increased risk of haematopoietic and lung cancers in RA patients compared with the general population (Carmona et al 2010).

Depression and schizophrenia

Most studies show an increase of depression in RA. Schizophrenia shows the opposite pattern: its occurrence is reduced in RA (Carmona et al 2010).

In the past 10 years there have been an increasing number of studies of mortality associated with RA. Research has consistently shown evidence of increased mortality in patients with RA compared to the expected rates in the general population. Possible causes of higher mortality include increased risk from cardiovascular, respiratory and infectious diseases. The effects of treatments such as non-steroidal anti-inflammatories may also be a contributor (Gabriel & Michaud 2009).

Low back pain

Low back pain is a major health and socioeconomic problem in Europe. Many people will experience one or more episodes of low back pain in their lives. Low back pain is usually defined as pain localised below the line of the 12th rib and above the inferior gluteal folds, with or without leg pain. It is usually classified as being "specific" (that is, associated with a known underlying pathology) or "non-specific".

Specific back pain is defined as symptoms caused by a specific pathophysiologic mechanism. Such specific causes account for about 10% of cases. Causes include:

degenerative conditions (e.g. herniated disc disease);
inflammatory conditions (e.g. ankylosing spondylitis);
infective causes (e.g. osteomyelitis);
neoplastic causes (e.g. metastases, primary benign or malignant tumours);
metabolic bone disease (e.g. vertebral fracture related to osteoporosis);
referred pain (e.g. from duodenal ulcer);
psychogenic pain (originating in the mind rather than the body);
trauma (e.g. fractures)
congenital (e.g. severe scoliosis, spina bifida).

Non-specific low back pain is defined as symptoms when there is no clearly defined pathophysiologic cause. Non-specific low back pain accounts for about 90% of cases. It is usually classified according to duration and recurrence:

- Acute back pain is of less than 6 weeks duration;
- Subacute is between 6 weeks and 3 months duration
- Chronic when it lasts more than 3 months.
- Frequent episodes are described as recurrent back pain.

Low back pain incidence and prevalence

Epidemiological data for spinal disorders in general is often reported as low back pain regardless of the diagnosis or cause which makes it difficult to make accurate

assessments of the incidence of specific or non-specific back pain. Only few studies report incidence data and there are often problems in comparing studies due to differences in methodology and definitions used (Hoy et al 2010).

Table Incidence of low back pain

Citation	Country	Age range (years)	Inclusion criteria at baseline	Incidence (unadjusted) (%)
Biering-Sorensen	Denmark	30 to 60	Never had low back pain	6.3
Croft et al	United Kingdom	18 to 75	Never had low back pain	15.4
Croft et al	United Kingdom	18 to 75	No low back pain at baseline	36.0
Hestbaek et al	Denmark	30 to 50	No low back problems over past year	19.3

* Case definition =low back pain/problem over past year
Source: Adapted from Hoy et al 2010.

In relation to prevalence it is estimated that 12-30% of adults have low back pain at any time and the lifetime prevalence varies between 60% and 85%. The prevalence of specific causes is much lower than the prevalence of non- specific back pain and is estimated in most industrialised countries as ranging between 2% and 8% (Hoy et al 2010).
Table shows standardised prevalence rates for low back pain which were derived from data collected in the Global Burden of Disease project (GBD 2010).

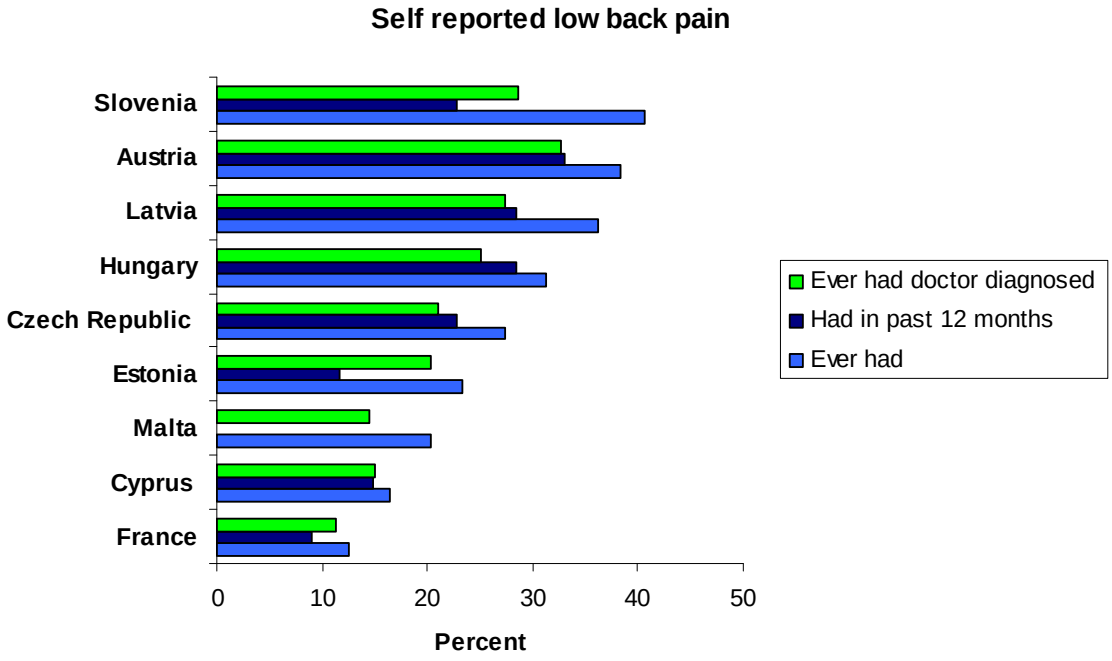
Table Standardised period prevalence rate of low back pain per 100 population

Country	Data collection date*	Age	Prevalence
Belgium	2001	17-99	41.6 (LBP > 1 day)
Czech Republic	2000	0-99	64.2 (back pain)
Denmark	1995	14-41	49.2
Finland	2003	14-18	36.4
France	2003	30-64	55.4
Germany	2003	18-99	61.8 (back pain)
Greece	2000	15-99	32.3
Italy	1999	65-99	58.9 (back pain)
Netherlands	2003	12-16	7.5 (LBP > 4 days)
Spain	2004	65-99	43.7 (LBP>1 day)
Sweden	1997	35-45	45.6
UK	1993	25-64	28.4 (LBP/ache > 1 day)

* Mid point data collection period

Data from the European Health surveys show a wide variation in the prevalence of self-reported low back pain. This ranges from less than 12% of respondents reporting ever having doctor diagnosed low back pain in France to nearly 33% in Austria reporting ever having had this condition. There is quite a large variation between countries as to the percentage of those with self-reported low back pain that have had their condition diagnosed by a doctor. The highest proportion of people reporting ever having had low back pain (including not diagnosed by a doctor) is in Slovenia (40.7%).

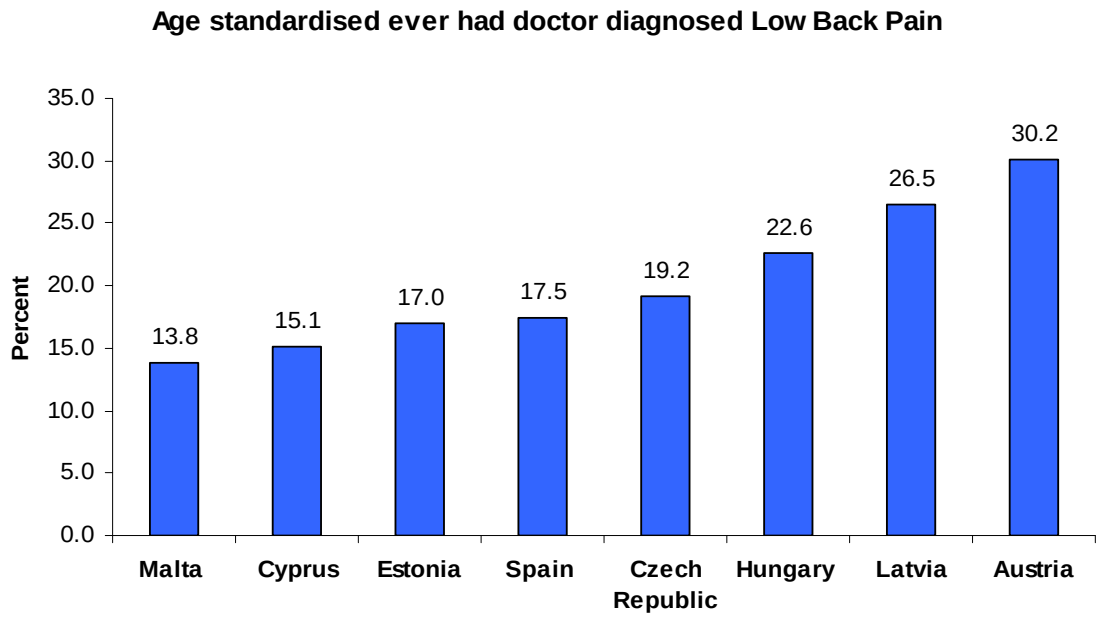
Figure Prevalence of self-reported low back pain



Source: EHIS. All surveys are from 2008 except Estonia 2006, Slovenia 2007 and Hungary 2009

The prevalence of age standardised self reported doctor diagnosed low back pain varies from 30.2% in Austria to 13.8% in Malta.

Figure Age standardised self reported ever had doctor diagnosed low back pain



Source: EHIS. All surveys are from 2008 except Estonia 2006 and Hungary 2009.

Low back pain and co-morbidities

A study carried out using the German National Health Survey found that orthopaedic conditions such as rheumatoid arthritis, osteoarthritis and osteoporosis are the most common comorbidities associated with back pain, followed by cardiovascular and cerebrovascular morbidities (Schneider et al 2007).

Osteoporosis

Osteoporosis is a disease in which the density and quality of bone are reduced, leading to weakness of the skeleton and increased risk of fracture, particularly of the spine, wrist, hip, pelvis and upper arm. Osteoporosis and associated fractures are an important cause of morbidity and mortality.

Osteoporosis is defined as "a systemic skeletal disease characterized by low bone mass and micro-architectural deterioration of bone tissue, leading to enhanced bone fragility and a consequent increase in fracture risk" (WHO 1994i). Clinically, osteoporosis is recognised by the occurrence of characteristic low-trauma fractures, the best documented of these being hip, vertebral and distal forearm fractures.
The diagnostic criteria based on measurement of bone mineral density (BMD) are:

- Osteoporosis: a BMD value more than –2.5 standard deviations (SD) below the mean BMD of young adult women (BMD T-score < -2.5).

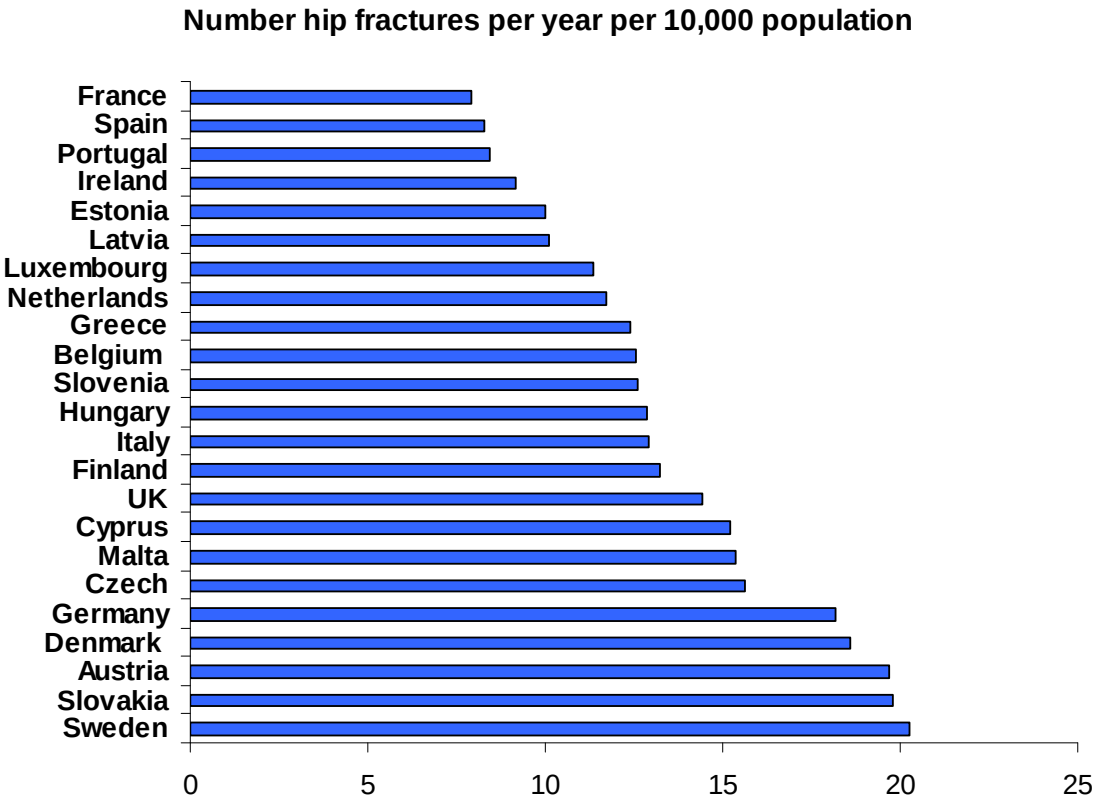
- Established Osteoporosis: a BMD value T score <-2.5 and the presence of one or more fragility fractures.

- Osteopenia (low bone mass): A BMD value between –1 and –2.5 SD below the mean BMD of young adult women (-2.5 < BMD T-score < -1).

Osteoporosis incidence and prevalence

The incidence of osteoporosis is best measured as the incidence of fractures that are the consequences of osteoporosis.

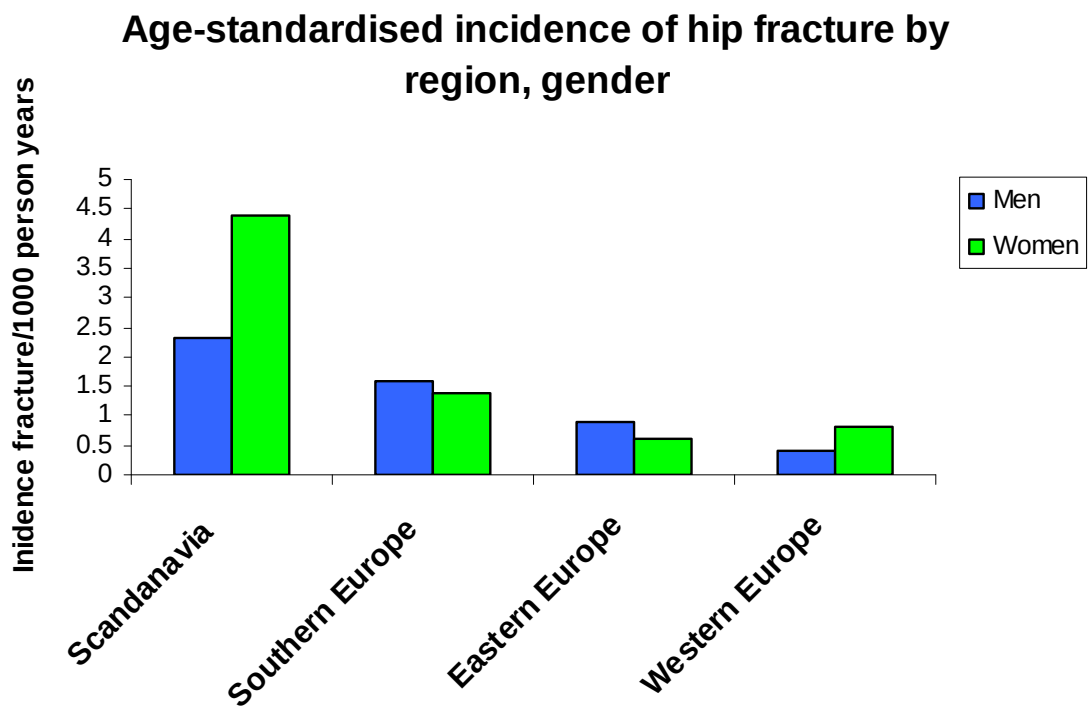
Figure Number of hip fractures per year per 10,000 population - EU



Source: International Osteoporosis Foundation: http://www.osteofound.org
(Based on latest available annual data, ranging from 2000-2003).

The European Prospective Osteoporosis Study (EPOS) is a population-based prospective study to determine the incidence of limb fracture by site and gender in different regions of Europe. Men and women aged 50-79 years were recruited from population registers in 31 European centres. The age-adjusted incidence of any limb fracture was 7.3/1000 person-years [pyrs] in men and 19 per 1000 pyrs in women, equivalent to a 2.5 times excess in women.

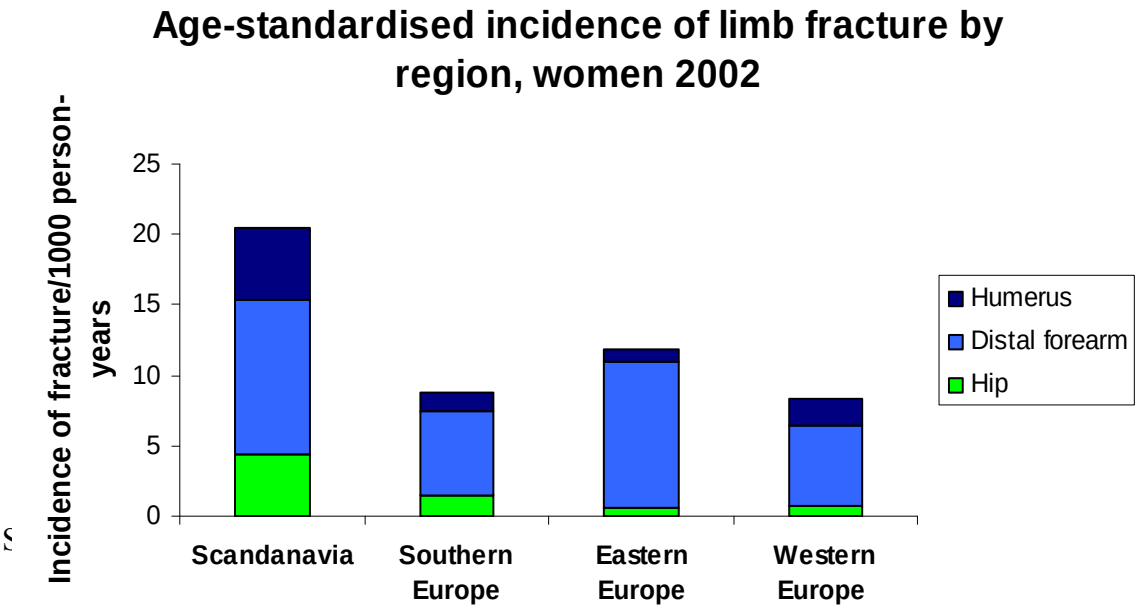
Figure Age-standardised incidence of hip fracture by region and gender – EPOS



Source: Ismail et al 2002.

In women, the incidence of hip, humerus and distal forearm fracture increased with age. In men only the incidence of hip and humerus fracture increased with age. In women there was evidence of significant variation in the occurrence of hip, distal forearm and humerus fractures across Europe, with incidence rates higher in Scandinavia than in other European regions, though for distal forearm fracture the incidence in east Europe was similar to that observed in Scandinavia. Among men, there was no evidence of significant geographic variation in the occurrence of these fractures (Ismail et al 2002).

Figure Age-standardised incidence of limb fracture by region, women -EPOS



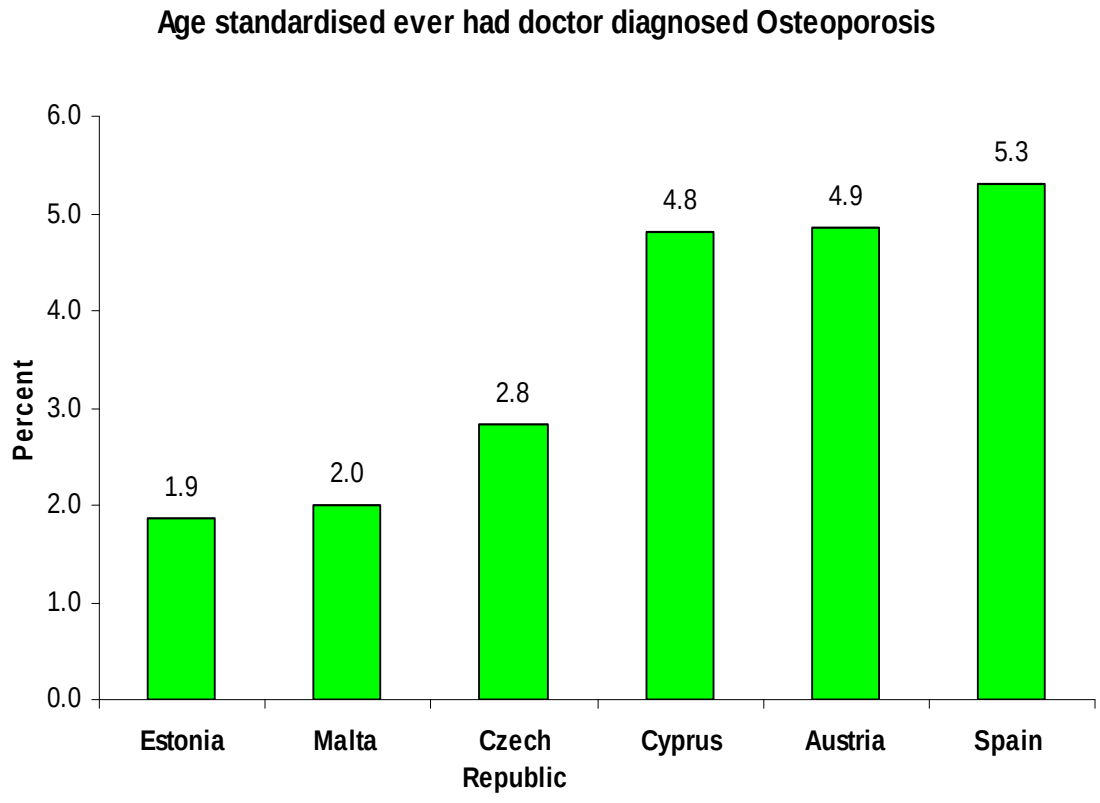
The incidence of osteoporosis varies by age and gender. In western populations, hip fracture incidence rates increase exponentially with age. Above 50 years of age there is a female to male incidence ratio of approximately 3:1. In the year 2006 in Vilnius city the incidence of hip fractures was 205.61 for men and 375.45 for women in 100 000 of residents over the age of 50, standardized by age and sex (Tamulaitiene et al 2010). Data of the Lithuanian Osteoporosis Foundation are available for Vilnius, the capital of Lithuania. In 2009, the number of hip fractures in the population aged over 50 years was 433 (320 cases in women and 113 in men). The hip fracture rate in Vilnius was 24.7 cases per 10,000 population over 50 years and 29.5 hip fractures per 10,000 women aged over 50 years and 17 hip fractures per 10,000 men over 50 (Lithuanian Osteoporosis Foundation 2011) .

A recent article by Cooper et al (2011) looked at secular trends in the incidence of hip and other osteoporotic fractures. It showed that in Scandinavia there were increases in the incidence of hip fracture from 1950 to the early 1990s. Since this time rates appear to have declined particularly in women. In the UK there appeared to be a stabilisation of age standardised hip fracture incidence rates between 1989 and 1998. In the Netherlands, Austria, Germany and Hungary there has been a stabilisation of hip fracture incidence rates. Between 2000 and 2005 in Germany and Austria there

appeared to be a decline in age-adjusted rates. In Italy incidence rates for men rose significantly between 1980 and 1991. Spain also saw an increase in the incidence of high fractures in both men and women (Cooper et al. 2011). In the period 1997 to 2006 the incidence of hip fractures in Denmark declined by approximately 20% in both men and women aged 60 and over. The decrease in hip fracture rates was much too large to be explained by the extent of anti-osteoporotic medication used in the country (Abrahamsen & Vestergaard 2010).

The age standardised prevalence of self reported doctor diagnosed osteoporosis varies from 5.3% in Spain to 1.9% in Estonia. It should be noted that since osteoporosis does not manifest itself clinically except by presenting as a fragility fracture, there may be varying degrees of under reporting depending use of availability of bone density assessment.

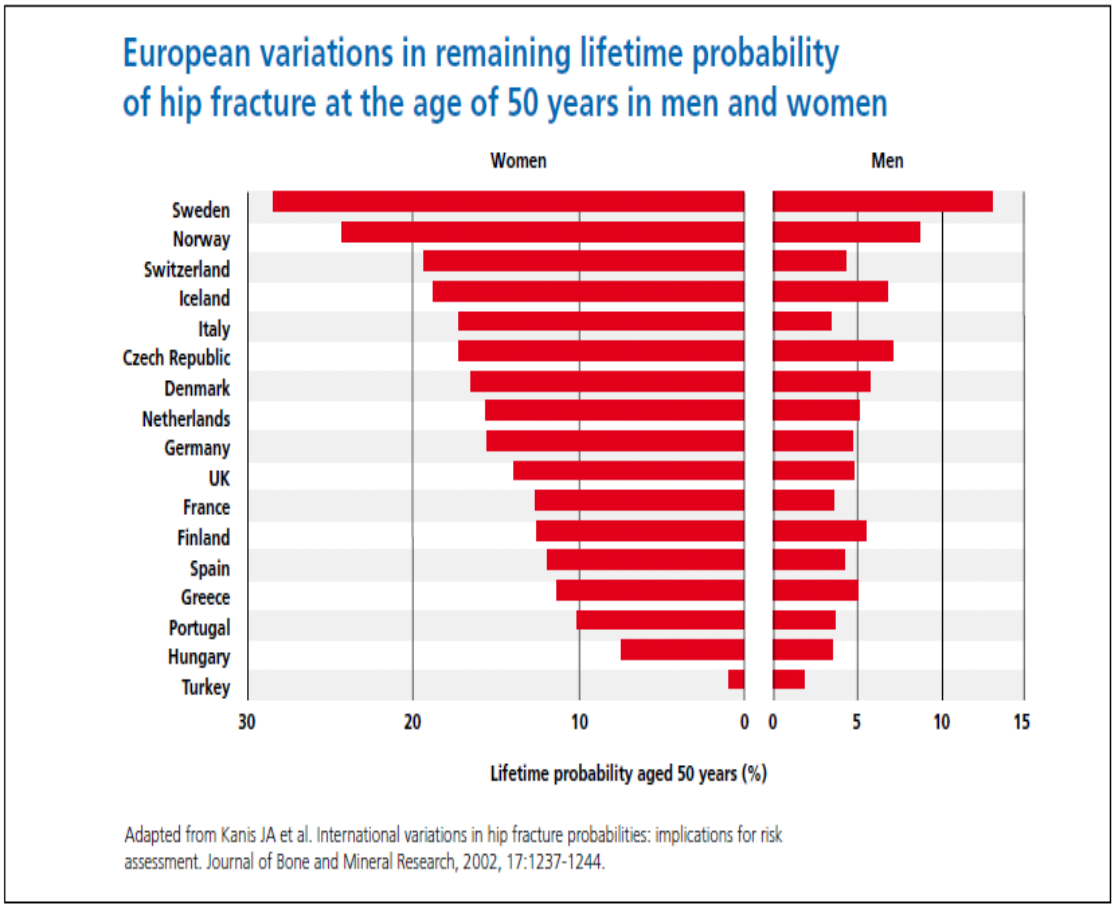
Figure Prevalence of age standardised self-reported ever had doctor diagnosed osteoporosis



Source: EHIS. All surveys are from 2008 except Estonia 2006.

Low bone density itself does not cause pain or deformity; its importance lies in the fact that it greatly increases the risk of fracture, notably forearm, hip and vertebral fracture. After the age of fifty the risk of sustaining one of these fractures is 40% in women and 15% in men. This is termed the 'lifetime fracture risk'. The combined lifetime risk for hip, forearm and vertebral fractures coming to clinical attention is around 40%, equivalent to the risk for cardiovascular disease (Kanis 2002).
The estimated lifetime probability of hip fracture at 50 years varies considerably being highest in Sweden and Norway and lowest in Hungary, Portugal and Greece. In all EU countries the probability is substantially higher in women than men.

Figure Lifetime probability of hip fracture at 50 years



Source: IOF 2008.

Osteoporosis co-morbidities and mortality

Osteoporosis can lead to pain either as a direct result of the fracture or later from secondary osteoarthritis and deformities. These include kyphosis (curvature of the spine), loss of height and abdominal protrusion. Osteoporosis can result in increased mortality. Mortality is increased by 20% in the first year after a hip fracture and also after vertebral fracture, possibly as a result of diseases that increase the risk of fractures and death. A prospective study of men and women aged 60 and over in Australia (Bliuc et al 2009) showed that mmortality was increased for all ages for all fractures except minor fractures where mortality only increased in those older than 75 years. Increased mortality risk persisted for 5 years for all fractures and up to 10 years for hip fractures. Increases in absolute mortality that were above expected, for 5 years after fracture, ranged from 1.3 to 13.2 per 100 person-years in women and from 2.7 to 22.3 per 100 person-years in men, depending on fracture type. Predictors of mortality after any fragility fracture for both men and women included age, quadriceps weakness, and subsequent fracture but not comorbidities. Low bone mineral density, having smoked, and sway were identified as predictors for women and less physical activity as a predictor for men.

Gout

Gout is a common type of arthritis. The symptoms of gout include painful swelling and inflammation in one or more of the joints. Gout usually affects the big toe, but it can develop in any joint in the body. Gout is caused by a build-up of uric acid (monosodium urate) in the body. Uric acid is a waste product that is produced during the process of metabolism (when the body breaks down food to use as energy). Usually, uric acid is excreted by the kidneys. People whose kidneys do not excrete uric acid properly, or those who produce too much uric acid, can have high levels of uric acid in their blood. If the level becomes very high, crystals form in the joints. The crystals cause the joints to become inflamed and painful. Acute gout will typically manifest itself as an acutely red, hot, and swollen joint with excruciating pain. These acute gouty flare-ups respond well to treatment with oral anti-inflammatory medicines and may be prevented with medication and diet changes. Recurrent bouts of acute gout can lead to a degenerative form of chronic arthritis called gouty arthritis.

Gout can be viewed in four stages:

- **Asymptomatic tissue deposition** occurs when people have no overt symptoms of gout, but do have hyperuricemia and the asymptomatic deposition of crystals in tissues. The deposition of crystals, however, is causing damage.
- **Acute flares** occur when urate crystals in the joint(s) cause acute inflammation. A flare is characterized by pain, redness, swelling, and warmth lasting days to weeks. Pain may be mild or excruciating. Most initial attacks occur in lower extremities. The typical presentation in the metatarsophalageal joint of the great toe (podagra) is the presenting joint for 50% of people with gout. About 80% of people with gout do have podagra at some point. Uric acid levels may be normal in about half of patients with an acute flare. Gout may present differently in the elderly, with many joints affected.
- **Intercritical segments** occur after an acute flare has subsided, and a person may enter a stage with clinically inactive disease before the next flare. The person with gout continues to have hyperuricemia, which results in continued

deposition of urate crystals in tissues and resulting damage. Intercritical segments become shorter as the disease progresses.

- **Chronic gout** is characterized by chronic arthritis, with soreness and aching of joints. People with gout may also get tophi (lumps of urate crystals deposited in soft tissue)—usually in cooler areas of the body (e.g., elbows, ears, distal finger joints).

The gold standard for diagnosing gout is aspiration and microscopic analysis for urate crystals in joint fluid or a tophus. Urate crystals are negatively birefringent under polarized light. Infection must be ruled out.

Gout can affect women, although men are three to four times more likely to develop it. In men, the symptoms of gout usually begin between the ages of 40 and 60. In women, the symptoms begin later, usually between 60 and 80 years of age.

Risk factors for gout include:

- Obesity
- Alcohol (particularly beer)
- Diet that is high in purines (chemicals found in certain foods, such as red meat and seafood)

Treatment for gout involves relieving the symptoms of pain and trying to prevent further episodes. This is done using a combination of medication and lifestyle changes. Over time, many people reduce their uric acid levels sufficiently so that they no longer experience any symptoms.

Frequent and recurring attacks of gout may eventually damage the joints permanently. If untreated subsequent attacks may become more frequent and prolonged, and the likelihood of developing permanent joint damage will be increased. Sometimes, the crystals of uric acid can build up, causing small white lumps (tophi) to form underneath the skin. Tophi are usually harmless and painless, but they can form in awkward places, such as at the ends of fingers. It usually takes at least 10 years after the first attack of gout for tophi to develop. They commonly develop on the fingers,

forearms, ears and toes, but can occur anywhere in the body, including the spinal canal or vocal cords. In rare cases, tophi can become inflamed, which can cause the surrounding bone and tissue to become damaged. If tophi are large or painful, they may result in difficulty doing everyday tasks, such as preparing food or dressing.

Occasionally, the uric acid crystals that cause gout can collect in the urinary tract, resulting in kidney stones. Around 10-25% of people with gout develop kidney stones. As well as affecting the patient physically, gout can also affect mood and work and home life. The severe pain that gout causes can make it difficult to get around, which can sometimes lead to feelings of depression or anxiety.

Gout incidence and prevalence

Gout is one of the most common types of arthritis that affects men. Data on the incidence and prevalence of gout in Europe is limited. Arromdee et al (2002) studied the US Rochester Epidemiology Project computerized medical record system and found that the incidence of gout has increased over 2 decades. From 1977-1978, 18 cases of primary gout were newly diagnosed versus the 60 new cases between 1995-1996. When adjusting the annual incidence rate for age and sex, it was found that the rate of primary gout had significantly increased greater than 2-fold over the past 20 years. The age-adjusted annual incidence for all gout increased from 45/100,000 to 62.3/100,000. The incidence of secondary gout did not change.

A study in the UK demonstrated the overall prevalence of gout to be 1.4%. Gout prevalence increased with age and was much higher among men (Mikuls et al 2005). Consistent with this data a more recent study found the prevalence of gout in general practice in UK and Germany (2000–5) was 1.4% (Annemans et al 2008). Table shows the standardised prevalence of gout per 100 population from a review of studies conducted by the Global Burden of Disease project (unpublished).

Table Standardised prevalence of gout per 100 population

Country	Data collection date*	Age	Prevalence
Czech Republic	2003	16-99	0.30
Germany	2003	18-99	1.44
Greece	1998	19-99	0.85 (urban) 0.48 (rural)
Italy	2004	18-99	0.46
Netherlands	1998	25-99	2.98
Spain	1985	40-50	7.03 (Hyperuricemia) 0.79
Sweden	1981	79	1.28
UK	1999	0-99	1.40

Gout co-morbidities and mortality

Patients with hyperuricemia, gout, or both, often experience high rates of comorbidities (Riedel et al 2004). Gout and hyperuricemia are associated with insulin resistance syndrome, obesity and hypertension. Patients with gout frequently suffer hypertension, partly due to the common antecedent of chronic kidney failure. Evidence suggests that hyperuricemia, even in the absence of gout, may directly promote hypertension (Ouppatham et al 2008). Hyperuricemia would appear to have a small but independent on cardiovascular disease (Johnson et al 2003). A prospective study of gout and mortality found that men with gout have a higher risk of death from all causes. Among men without preexisting coronary heart disease, the increased mortality risk is primarily a result of an elevated risk of cardivascular death, particularly from coronary hear disease (Choi & Curhan 2007).

Juvenile Idiopathic Arthritis

Juvenile idiopathic arthritis (JIA) is arthritis of unknown aetiology that begins before the 16th birthday and persists for at least 6 weeks, other known conditions are excluded (Petty et al 2004).

JIA incidence and prevalence

There is a north-south gradient in incidence of JIA. The incidence has been estimated as 23 per 100,000 in Finland and 7 per 100,000 in Spain. Prevalence estimates range from 140 per 100,000 in the Czech Republic and 16 per 100,000 in France.

Table summarizes the European studies on incidence of JIA. All studies are practitioner- or register-based. The estimated incidence rates do not differ relevantly from those published for juvenile chronic arthritis or juvenile rheumatoid arthritis in older studies (for example, the incidence of juvenile chronic arthritis was found to be 10/100 000 in a population-based study from the U.K)

Practitioner or register based study	**Incidence per 100,000**
Savolainen, Finland, 2003	23
Pruunsild, Estonia, 2007	22
Berntson, Norway, Finland, Sweden, Denmark, Iceland, 2003	15
Riise, Norway, 2008	14
Hanova, Czech Republic, 2006	13
Modesto, Spain, 2010	7
Danner, France, 2006	3

The table below summarizes the European studies on prevalence of JIA. All studies were practitioner or register-based.

Practitioner or register based study	Prevalence per 100,000
Pruunsild, Estonia, 2007	84
Hanova, Czech Republic, 2006	140
Modesto, Spain, 2010	40
Danner, France, 2006	20
Solau-Gervais, France, 2010	16

JIA co-morbidities and mortality

Patients with JIA may have a higher risk of malignancy. Two recent studies observed a higher number of malignancies in JIA cohorts (the Swedish study for the patients identified during the last 20 years) than in reference groups (Bernatsky et al 2011; Simard et al 2010). The risk was even more evident regarding lymphoproliferative malignancies. Both, the study from Sweden and that from the U.S (Beukelman et al 2010) estimated risks of lymphoproliferative disorders in JIA, being regardless of treatment received, up to fourfold higher than in the reference groups.

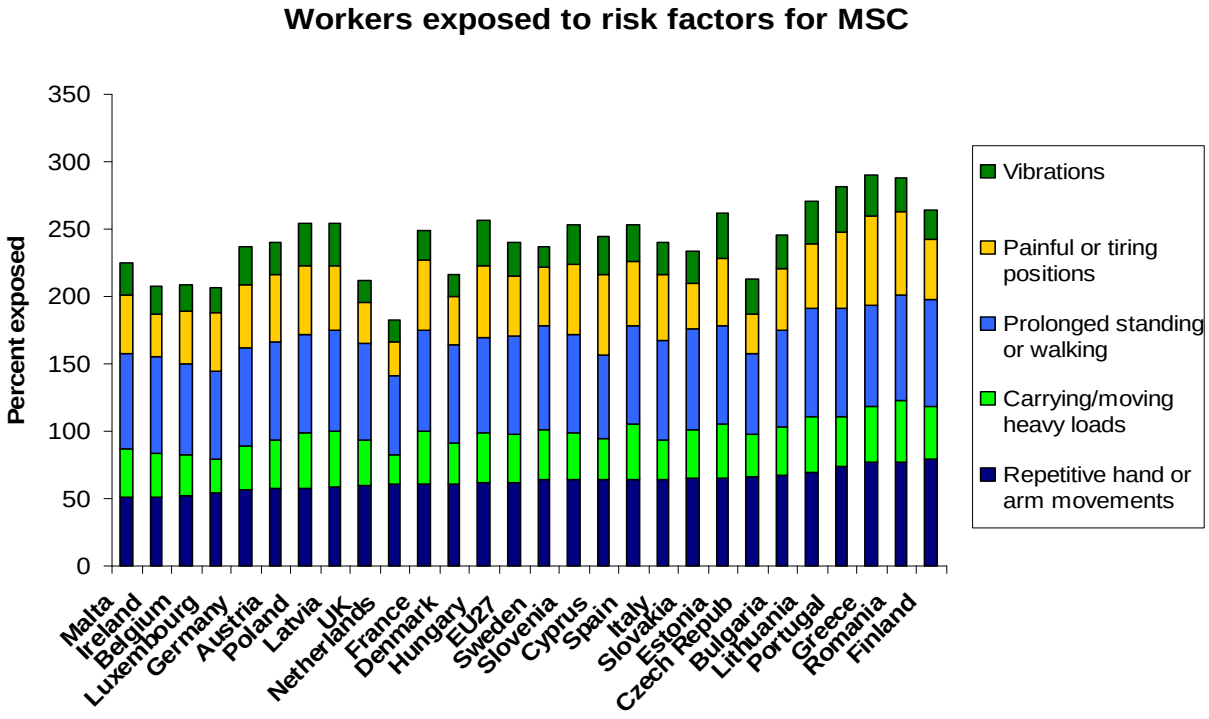
The JIA mortality rate has considerably decreased since the 1950s. The mortality rate is far below 1%, with the highest rate still among the patients with systemic JIA. Hashkes and colleagues (2010) showed recently, that the global mortality rate of children with JIA no longer differs significantly from the mortality rate of the general population.

Work related musculoskeletal disorders and trauma

Musculoskeletal problems relating to occupational disease and accidents at work are commonly referred as Musculoskeletal Disorders (MSD). Work related MSDs include "all musculoskeletal disorders that are induced or aggravated by work and the circumstances of its performance" (WHO 2003). Most MSDs are chronic and only occur after exposure to work based risk factors over a period of time. It is difficult to obtain comparable comprehensive European data on MSDs due to differences in definitions and the way work-related health disorders are recorded (WHO 2003i). Sources of data include national statistics, insurance figures, national and European surveys such as the European Working Conditions Survey, the Labour Force Survey and the European Occupational Diseases Statistics (EODS).

The European Working Conditions asks respondents about exposure in the workplace to risk factors for the development of MSC. Workers in the EU are most commonly exposed to repetitive hand or arm movements and prolonged standing or walking.

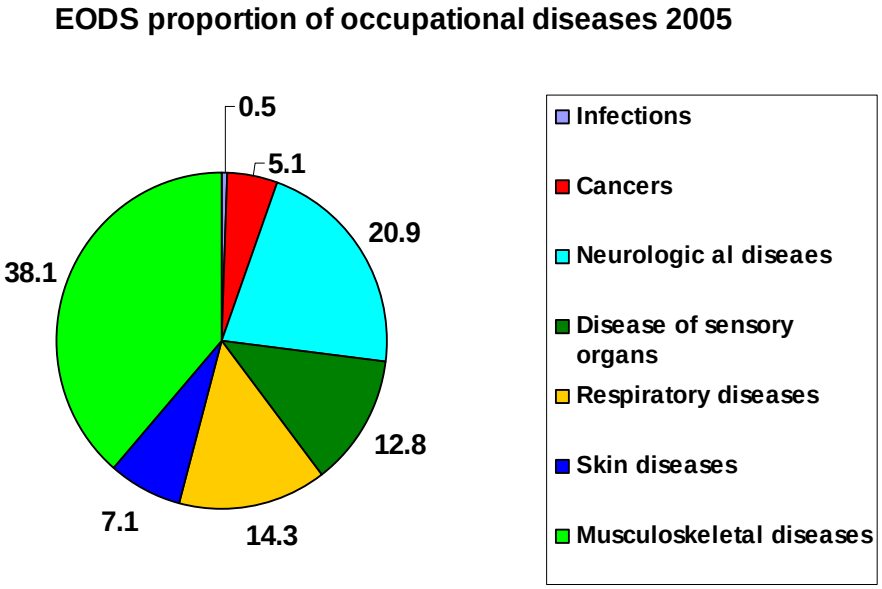
Figure Workers exposure to risk factors for development of MSC



Source: European Working Conditions Survey 2005
http://www.eurofound.europa.eu/surveys/ewcs/2005/index.htm

MSDs form a high proportion of occupational diseases. In 2005 they constituted 38% of the total occupational diseases recorded by the European Occupational Disease Statistics in 12 Member States.

Figure Proportional distribution of occupational diseases in EU, EODA 2005

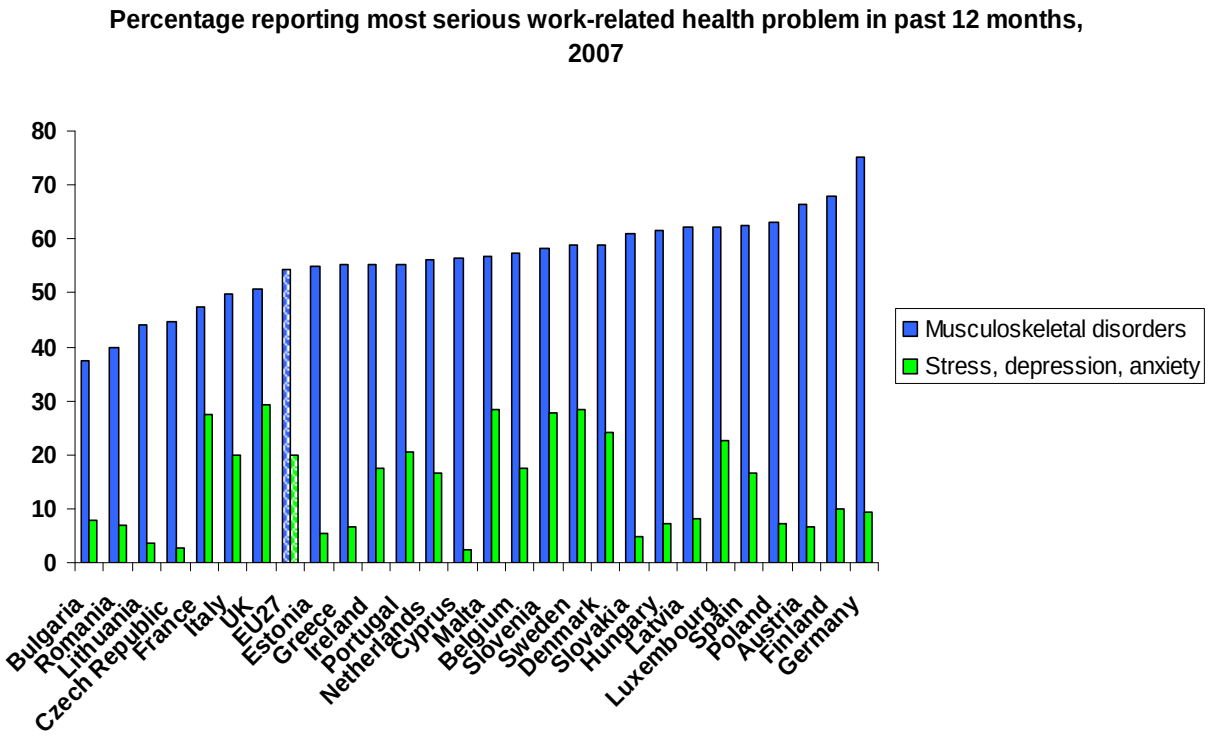


Source: European Occupational Disease Statistics 2005.
http://circa.europa.eu/Public/irc/dsis/hasaw/library

A good comparative source of data for estimating the scale of work related musculoskeletal disorders in the European working population is the Self-reported Work-related Illness (SWI) questionnaire module in the national Labour Force Survey (LFS). In the 2007 Labour Force Survey conducted in the EU27, 8.6% of those aged 15-64 who worked (or had worked previously) reported a work-related health problem in the past 12 months. Sixty percent of these were musculoskeletal problems. In those with musculoskeletal problems of the hip, legs or feet 54% reported some limitations in the ability to carry out daily activities and 19% reported considerable limitations. In those with back problems 56% reported some limitations and 15% considerable limitations.

Across the EU27 the average proportion of persons reporting musculoskeletal disorders as their most serious work-related health problem was 54%, the lowest proportion was in Bulgaria (37%) and highest in Germany (75%).

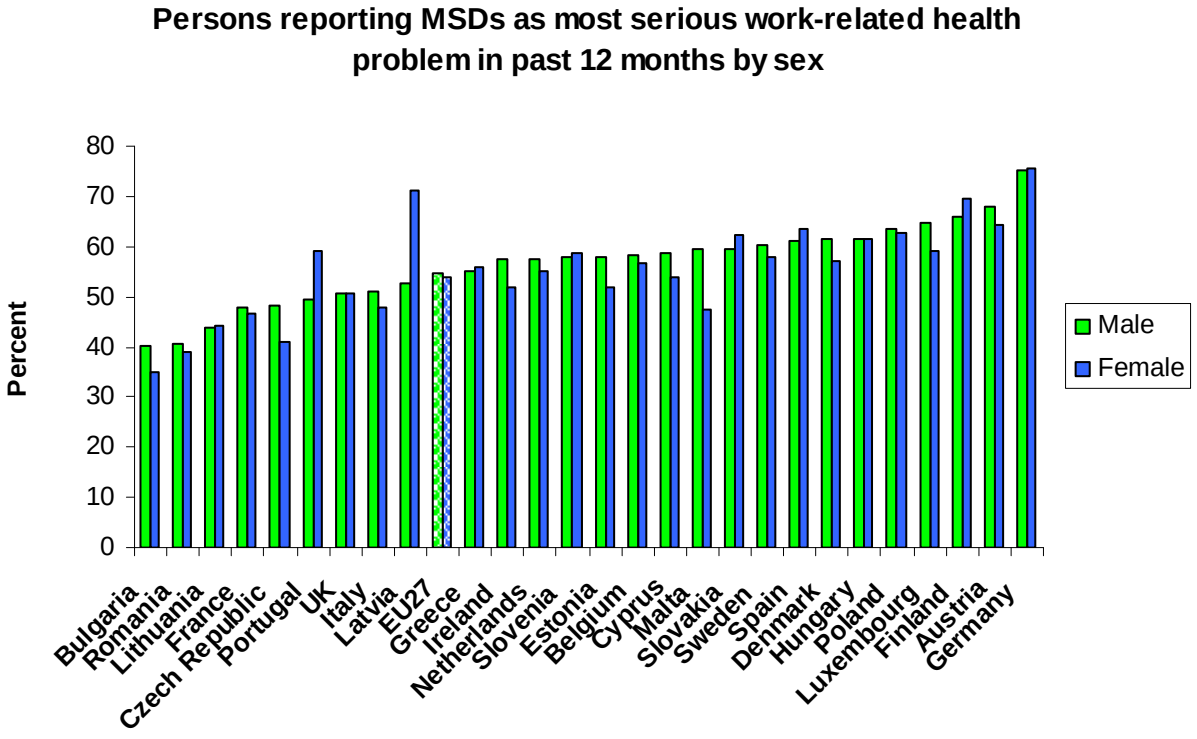
Figure Percentage reporting most serious work related health problem in past 12 months to be MSD or stress, depression, anxiety, LFS 2007.



Source: Labour Force Survey 2007
http://epp.eurostat.ec.europa.eu/portal/page/portal/health/health_safety_work/data/database

With the exception of Latvia, Portugal, Greece, Slovenia, Slovakia, Spain and Finland the proportion of those reporting MSDs in the past 12 months is higher in males than females. The largest gender differences are in Latvia (18%), Malta (12%), Portugal (9%) and Czech Republic (7%).

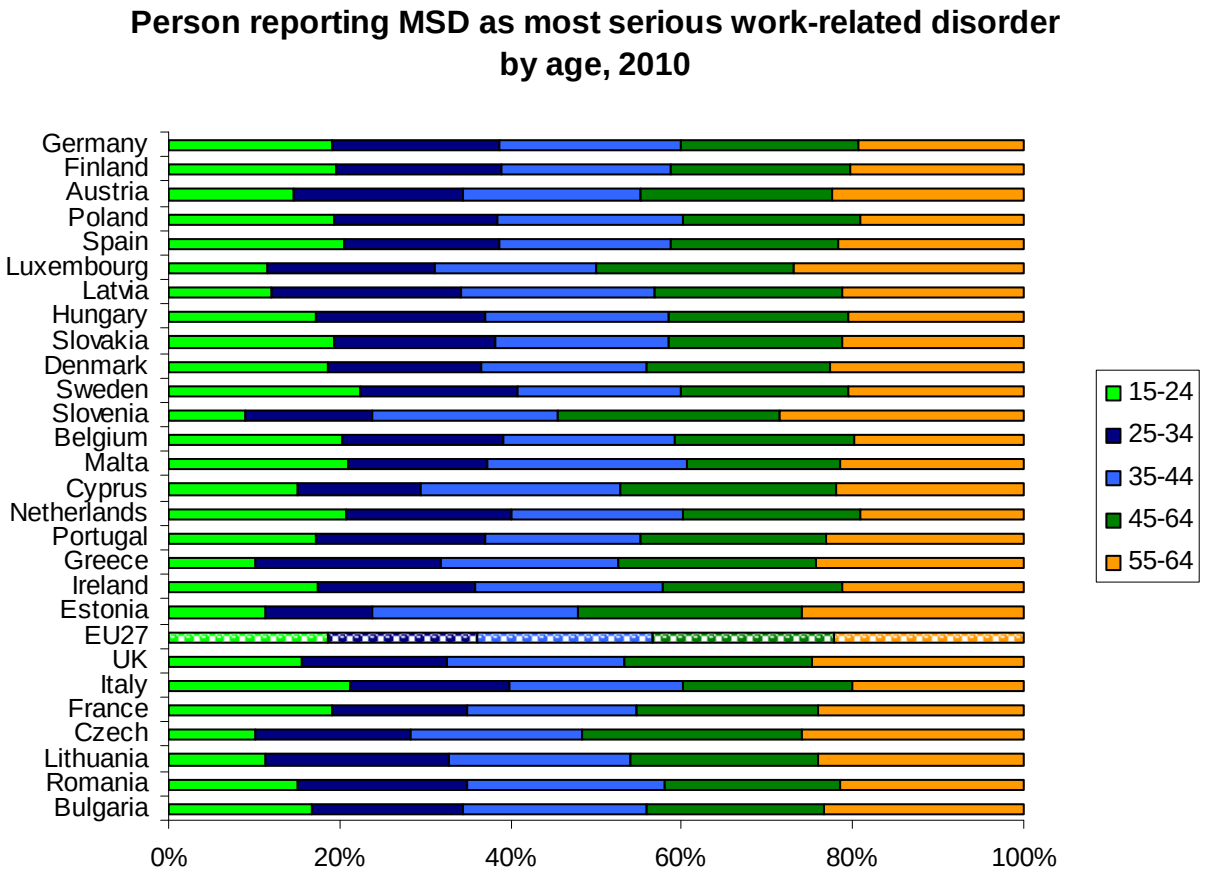
Figure Percentage persons reporting MSDs as most serious work-related health problem in past 12 months by sex



Source: Labour Force Survey 2007
http://epp.eurostat.ec.europa.eu/portal/page/portal/health/health_safety_work/data/database

Work-related problems increased with age, the increase slowed in workers aged 55 to 64 which may be because unhealthy workers leave the workforce early (Eurostat 2010). This pattern is also true of those with MSD. The proportion of persons reporting MSD as their most serious work-related disorder varies by age between different countries. For example in Slovenia, Luxembourg well over 20% of those affected is in the older 55-65 year age group. Sweden has the highest proportion in the 15-24 year age group.

Figure Persons reporting MSD as most serious work related disorder by age, EUROSTAT 2010

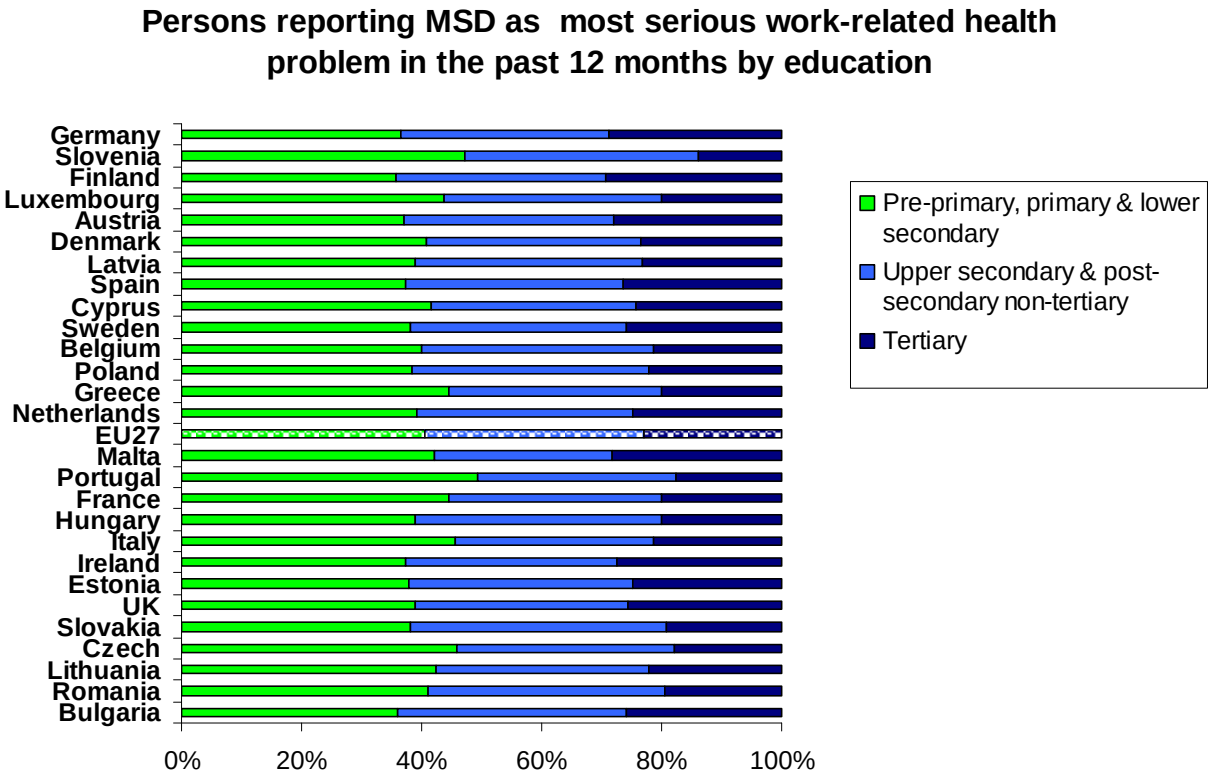


Source: EUROSTAT 2010. http://epp.eurostat.ec.europa.eu/portal/page/portal/health/health_safety_work/data/database

Low educated workers reported work-related problems more often and were more likely to report MSDs as the most serious work-related problem. In 68% of those with low educational level with a work-related health problem MSD was the main problem. For those in the high level of education classification this was true for 44%. With the exception of Bulgaria, Slovakia, Hungary and Poland in all countries the proportion of those reporting MSD is higher in those with lower education levels. In all countries those with tertiary education have lower levels of reported MSDs. MSDs are most

often reported as the main work related health problem in manual workers and is least reported in highly skilled non-manual workers.

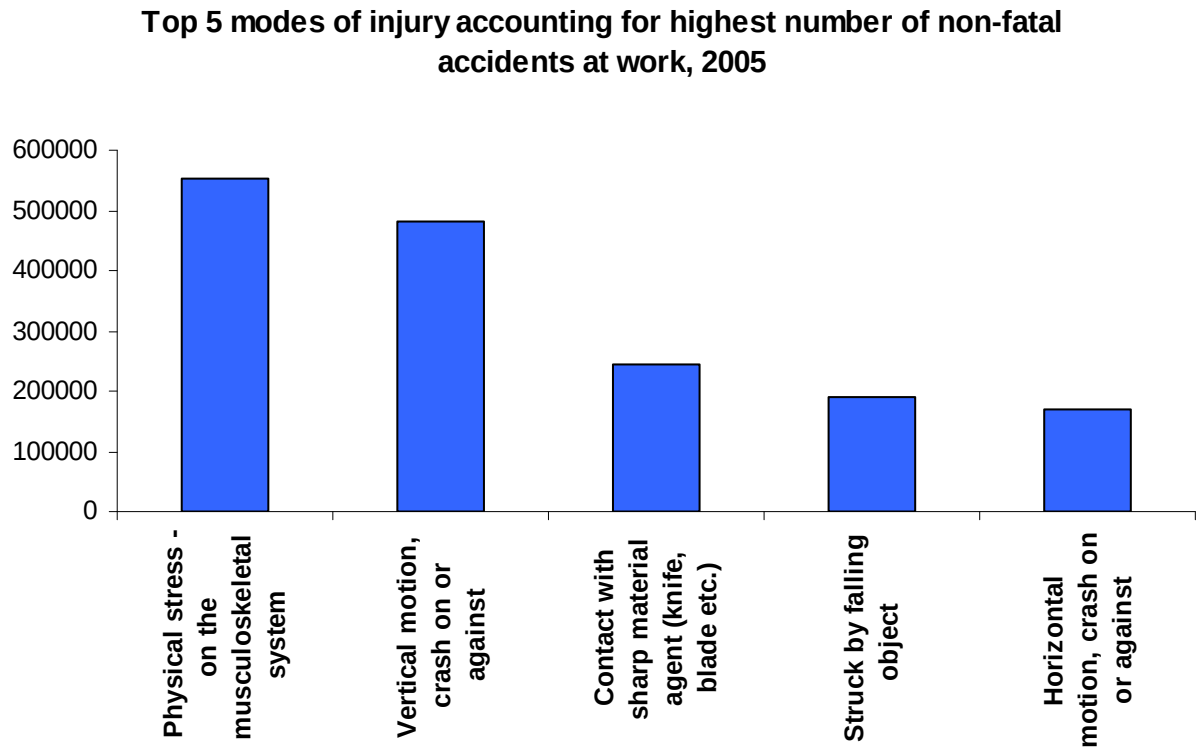
Figure Persons reporting MSD as most serious work-related health problem in the past 12 months by education, EUROSTAT 2010



Source: EUROSTAT 2010. http://epp.eurostat.ec.europa.eu/portal/page/portal/health/health_safety_work/data/database

In 2005 18.1% of non-fatal accidents reported to European work statistics were attributable to “physical stress on the musculoskeletal system.” Non-fatal accidents arising from “physical stress on the musculoskeletal system” occurred mostly frequently in the construction industry (18.2 % of occurrences) and in health and social work (10%).

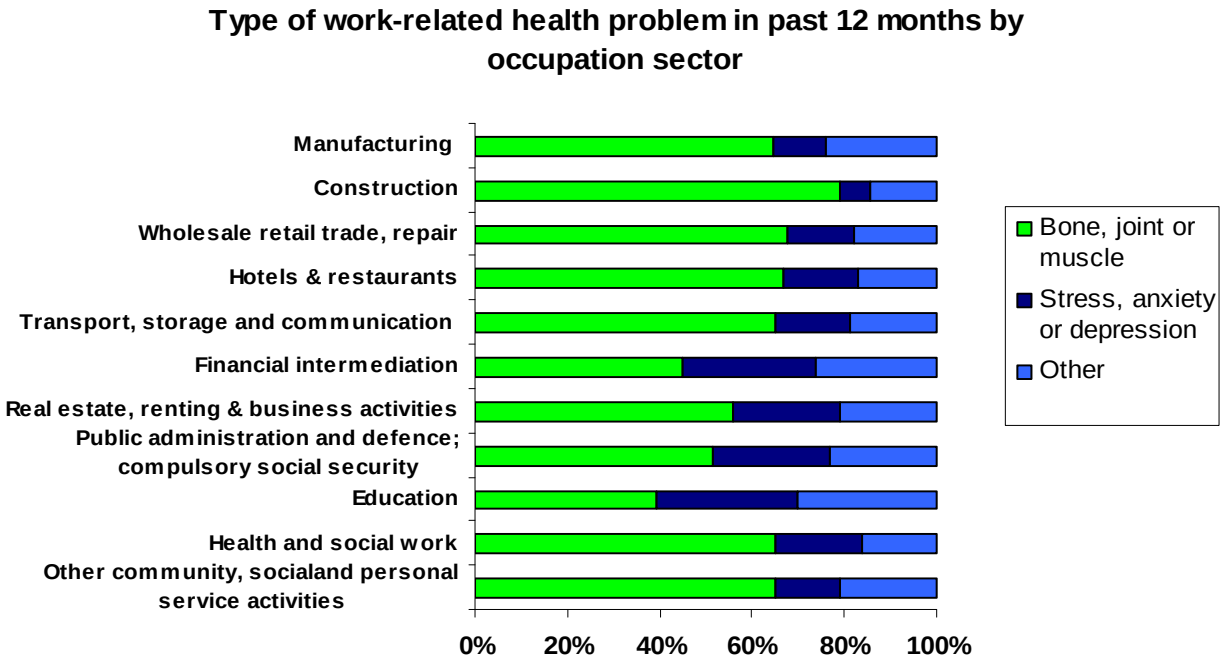
Figure Top 5 modes of injury accounting for highest number of non-fatal accidents at work, 2005



Source: European Commission. Causes and circumstances of accidents at work in the EU 2008. Luxembourg 2009

The proportion of work related health problems that are related to the bone, joint and muscle are highest in the construction industry and lowest in education.

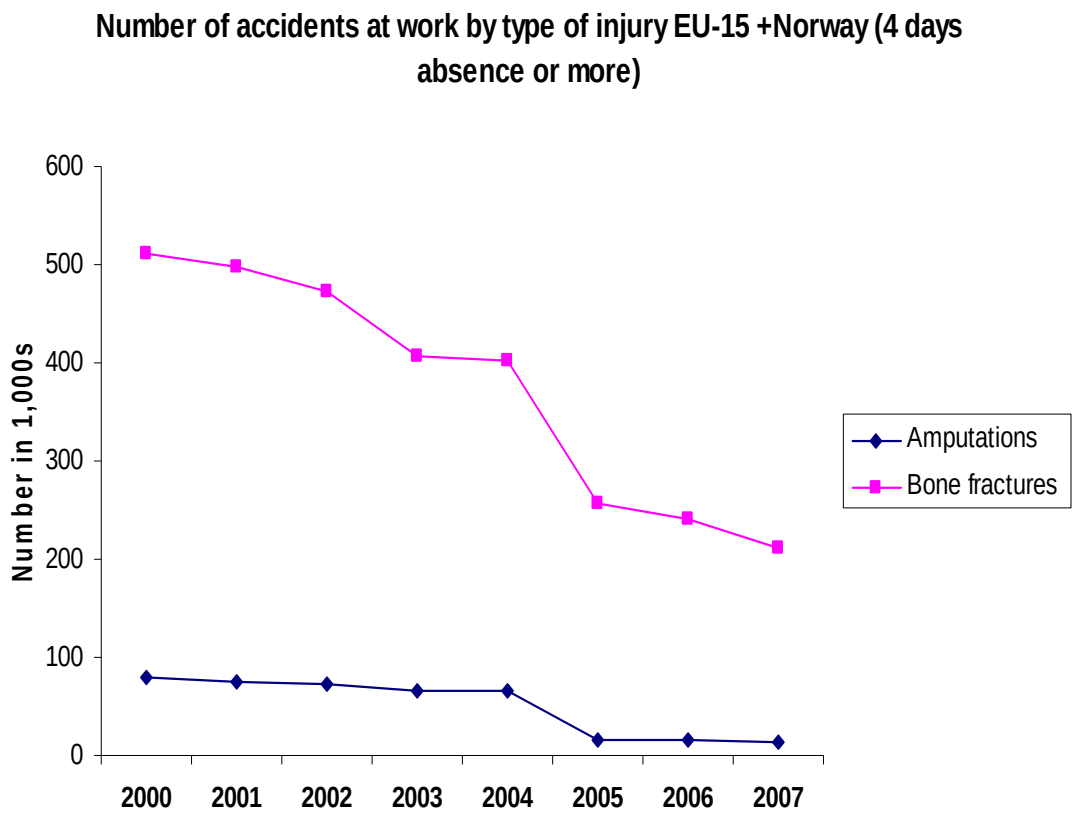
Figure Type of health related problem in past 12 months by occupation sector, 2007



Source: EUROSTAT 2010. http://epp.eurostat.ec.europa.eu/portal/page/portal/health/health_safety_work/data/database

The Labour Force Survey data shows that there has been a rapid fall in the number of bone fractures in the EU-15 & Norway in the period 2000-2007. Amputations have seen a fall in more recent years.

Figure Number of accidents at work by type of injury EU-15 + Norway (4 days absence or more)



Source: EUROSTAT 2010.
http://epp.eurostat.ec.europa.eu/portal/page/portal/health/health_safety_work/data/database

Impact on population health - disability and mortality

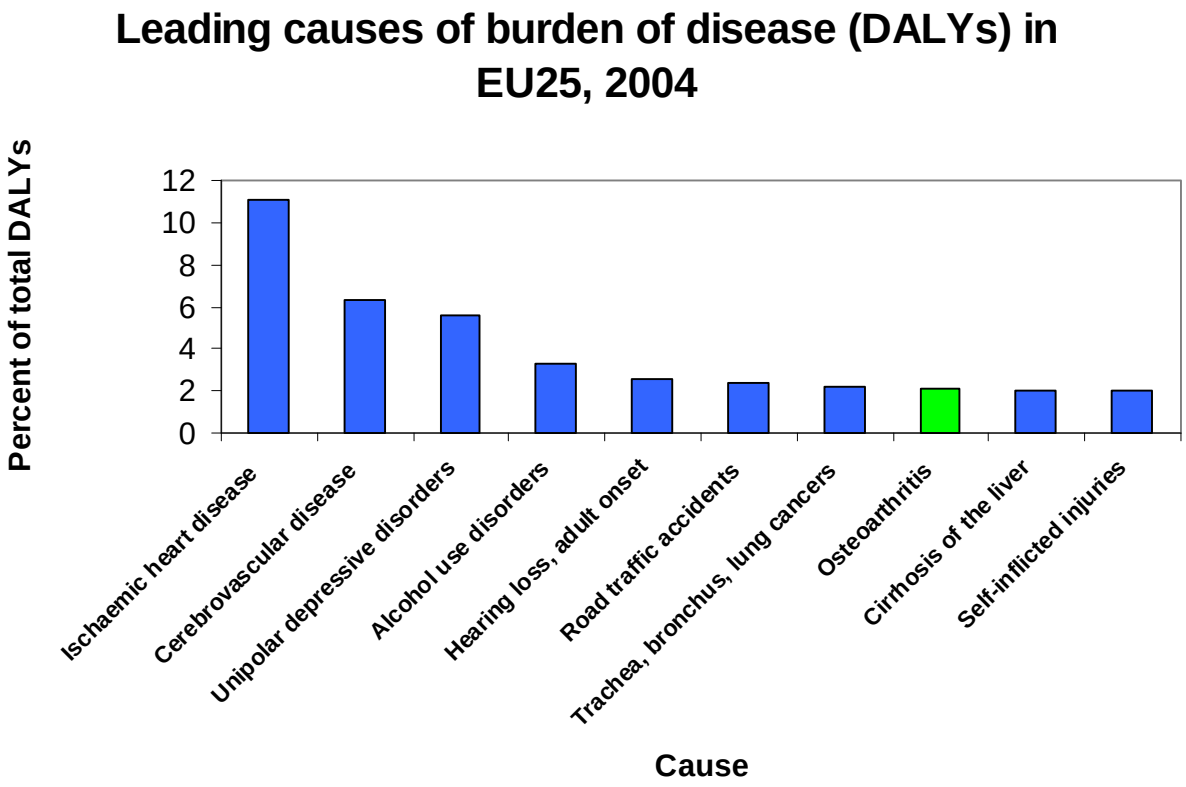
Musculoskeletal conditions are the primary cause of disability in Europe. These conditions affect people of all ages. In most musculoskeletal conditions, people pass from having normal health to being at risk and then developing clinical manifestations. They then may recover spontaneously or following treatment, or persist in a state of long term impaired health. Many musculoskeletal conditions are persistent and progressive and the person will move from an early and/or mild stage to a late and/or severe stage. Some die prematurely as a result of the condition or co-morbidities, although mortality is low in these conditions. The nature of the impact on the individual will vary at each stage and this is described by the health state. A summary measure of the burden of musculoskeletal conditions requires a model of the condition encompassing the numbers of people within and moving between the different stages as well as their health state at each stage of the condition.

The principal measurement of the burden of disease, Disability Adjusted Life Years (DALYs), is a summary measure of disease related morbidity and mortality. The DALY combines in one measure the time lived with disability and the time lost due to premature mortality. One DALY can be thought of as the loss of 1 year of "healthy" life. DALYs used in burden measurement are the gap between current health status and an ideal situation where everyone lives into old age free of disease and disability. DALYs are calculated as the sum of the years of healthy life lost owing to premature mortality (YLL) in the population and the years lived with disability (YLD) for incident cases of the health condition. The YLL basically correspond to the number of deaths multiplied by the standard life expectancy at the age at which death occurs. The disability weight is derived from preferences shown by the general population for different health states (Murray & Lopez 1996).

MSC & Disability Adjusted Life Years

Using DALYs as a measure osteoarthritis is ranked 8th in the leading causes of disease burden in the EU25 Countries.

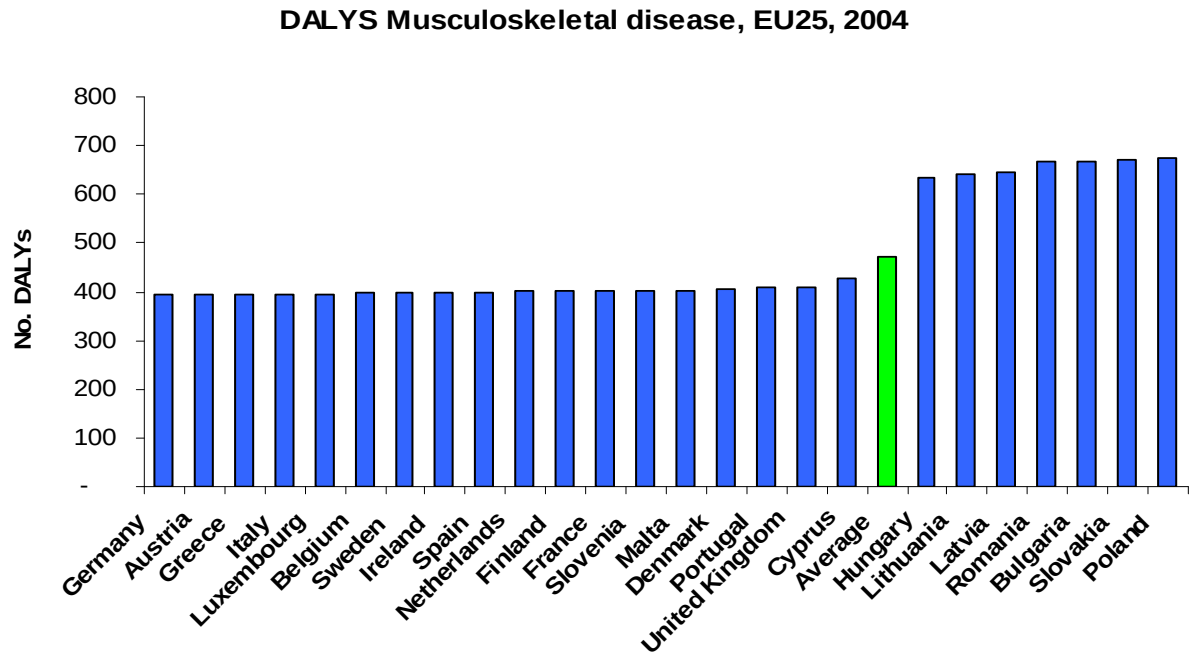
Figure Leading causes of burden of disease expressed in DALYs in EU25, 2004.



Source: WHO Global Burden of Disease 2009. http://www.who.int/healthinfo/global_burden_disease/estimates_country/en/index.html

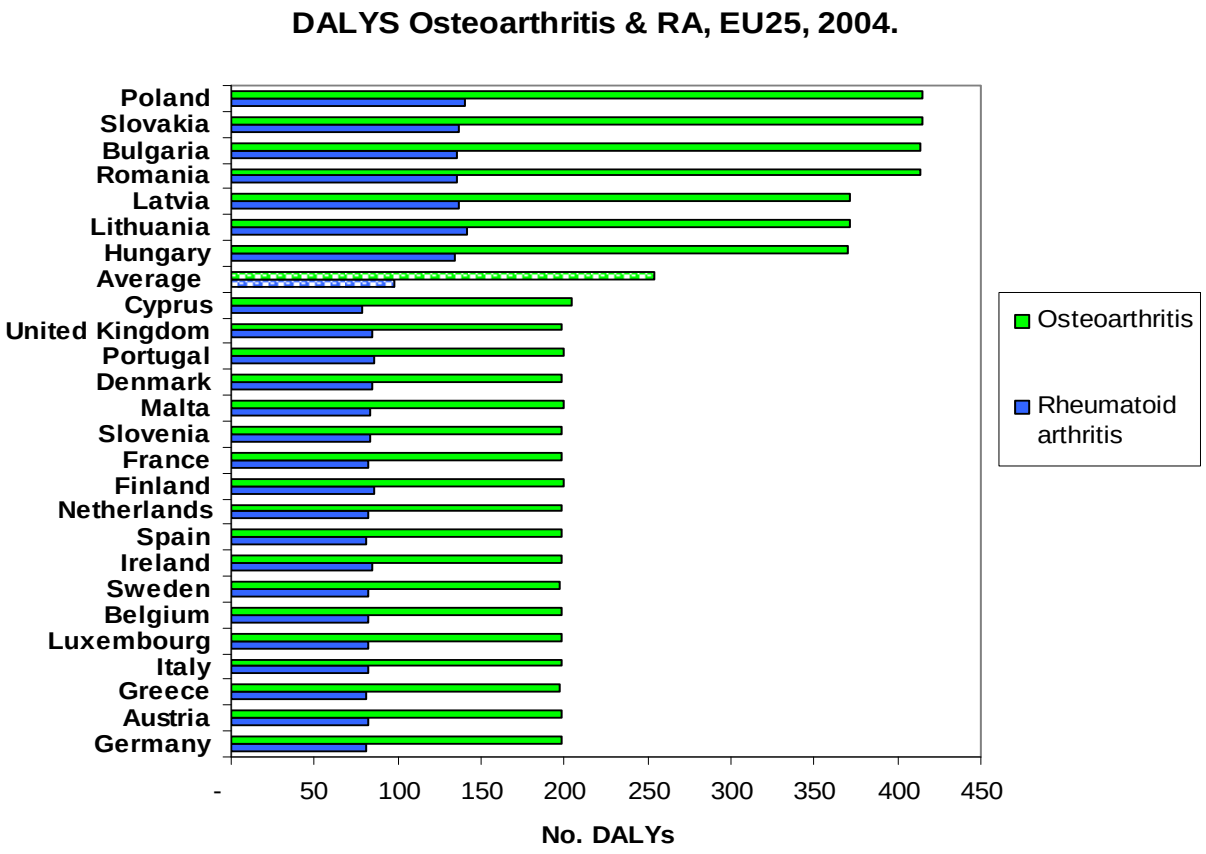
Using age standardised DALYs Poland, Slovakia, Bulgaria, Romania, Latvia, Lithuania and Hungary all show a relatively high burden of musculoskeletal disease including rheumatoid arthritis and osteoarthritis. These countries have the lowest GDP per capita in the EU27. This is compatible with the evidence that there is a correlation between osteoarthritis, rheumatoid arthritis and socioeconomic conditions (Sokka 2009; Young et al 2000).

Figure Age standardised DALYs Musculoskeletal disease, EU25, 2004



Source: WHO Global Burden of Disease 2009.
http://www.who.int/healthinfo/global_burden_disease/estimates_country/en/index.html

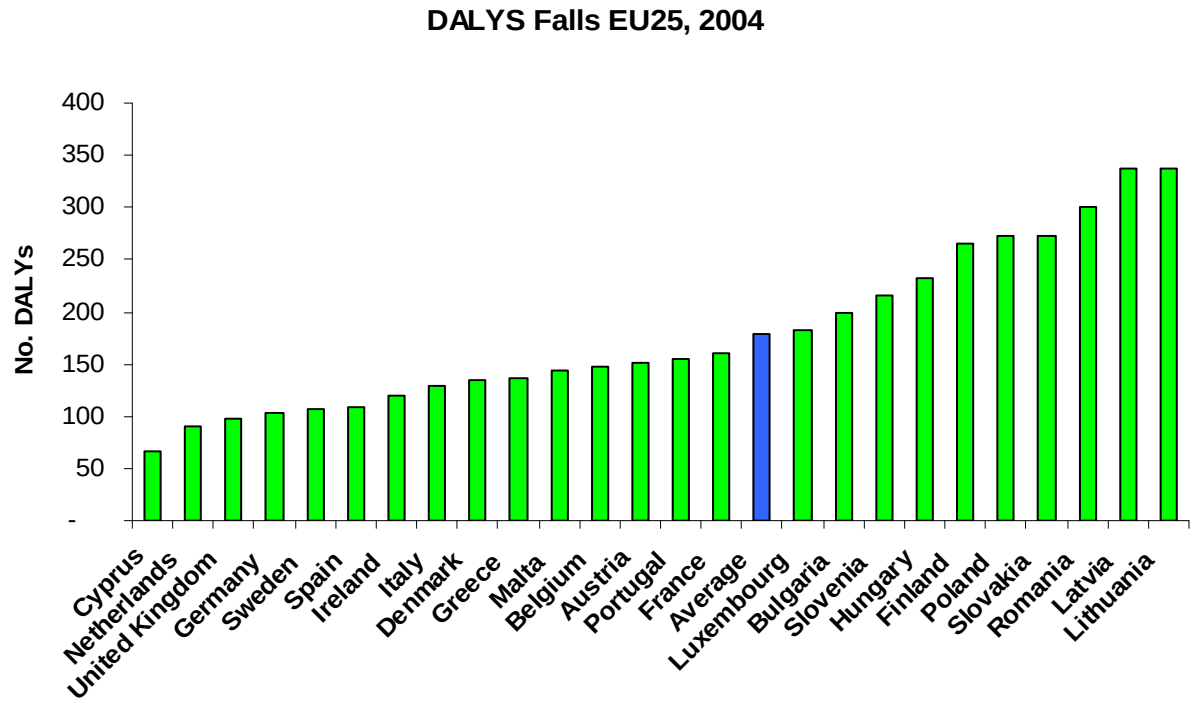
Figure DALYs Osteoarthritis, Rheumatoid Arthritis EU25, 2004



Source: WHO Global Burden of Disease 2009. http://www.who.int/healthinfo/global_burden_disease/estimates_country/en/index.html

Many falls, particularly in the elderly are caused by or lead to musculoskeletal conditions. Age is a major risk factor for fall injury. 30% of people over 65 and 50% of those over 80 years fall each year (Skelton and Todd 2004). For women over 55 and men over 65 years, the age specific death and hospital admission rates for injury increase exponentially with age. Over one third of women sustain one or more osteoporotic fractures in their lifetime, the majority caused by a fall (WHO 1994). Central and Eastern European countries have a higher than average number of DALYS due to falls, this is true also of Luxembourg and Finland. Countries with the lowest number of DALYS due to this cause include the UK, Netherlands and Cyprus.

Figure DALYs due to falls EU25, 2004



Source: WHO Global Burden of Disease 2009. http://www.who.int/healthinfo/global_burden_disease/estimates_country/en/index.html

MSC & Years Lived with Disability

The burden of a disease due to morbidity is expressed in the Global Burden of Disease project as years lived with disability (YLDs), calculated as the incidence multiplied by the average time spent with a disease, weighted for the extent of associated disability caused by the disease (Murray & Lopez 1996). YLD data for individual countries and specific conditions is not easily obtainable however there is some data available through the WHO which is classified according to European regions A, B and C.

The countries in each region are as follows:

EUR A

Andorra, Austria, Belgium, Croatia, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Luxembourg, Malta, Monaco, Netherlands, Norway, Portugal, San Marino, Slovenia, Spain, Sweden, Switzerland, United Kingdom

EUR B

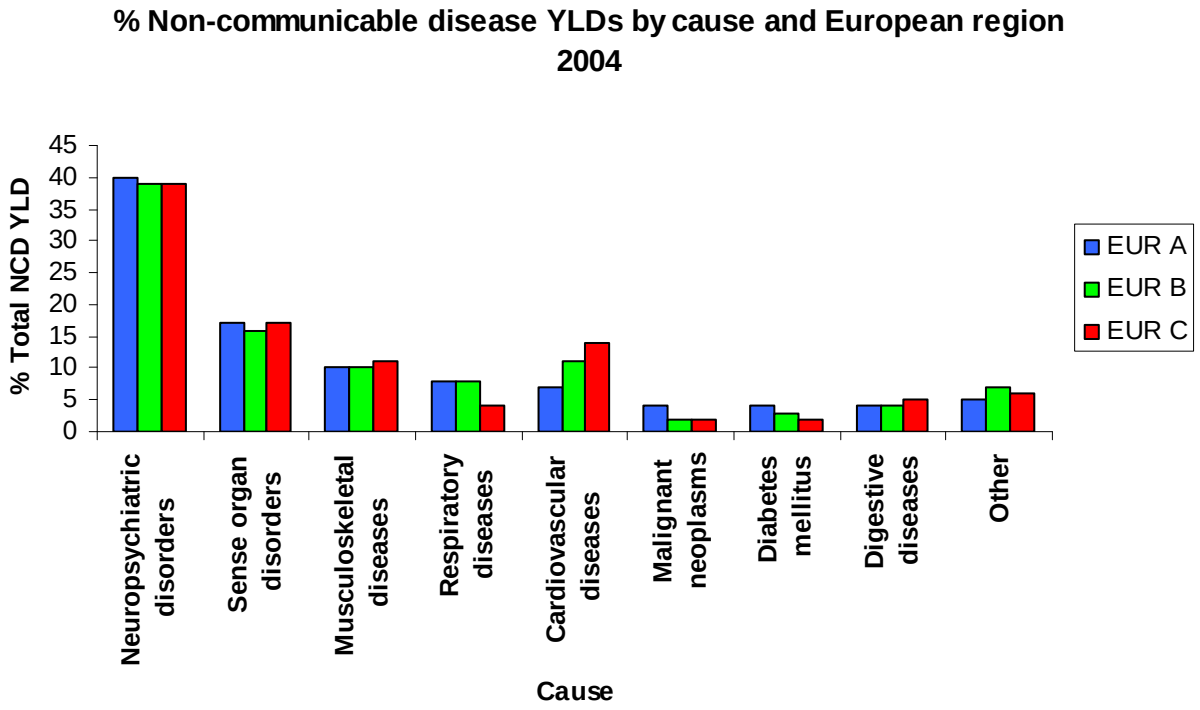
Albania, Armenia, Azerbaijan, Bosnia and Herzegovina, Bulgaria, Georgia, Kyrgyzstan, Poland, Romania, Serbia and Montenegro, Slovakia, Tajikistan, The former Yugoslav Republic of Macedonia, Turkey, Turkmenistan, Uzbekistan

EUR C

Belarus, Estonia, Hungary, Kazakhstan, Latvia, Lithuania, Moldova, Russian Federation, Ukraine

In European A region musculoskeletal diseases are the third largest cause of disability from non-communicable diseases after neuropsychiatric disorders and sense organ disorders. For regions B and C musculoskeletal diseases rank fourth after cardiovascular disease.

Figure Percentage of non-communicable disease YLDs by cause and European region 2004.

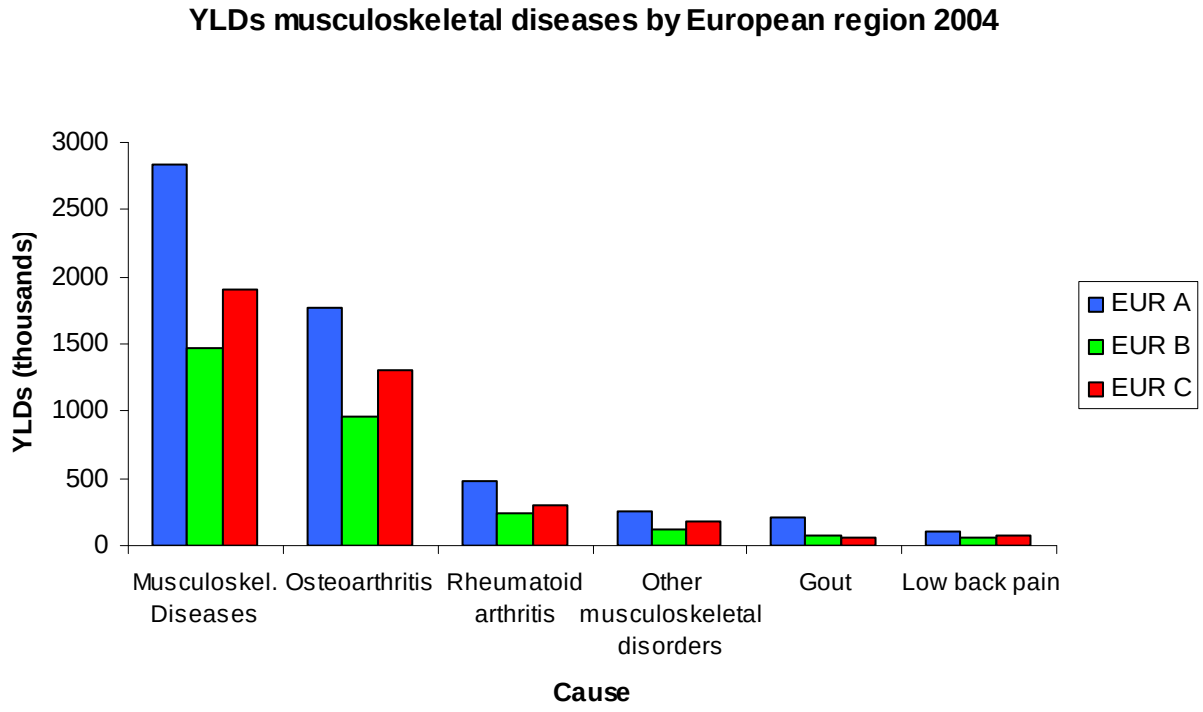


Source: WHO Global Burden of Disease 2004

http://www.who.int/healthinfo/global_burden_disease/YLD14_30_2004.xls

The burden of musculoskeletal diseases as measured by YLDs is highest in the European A region and European C region. This is true for all conditions except gout where European C region has the lowest levels of gout related disability.

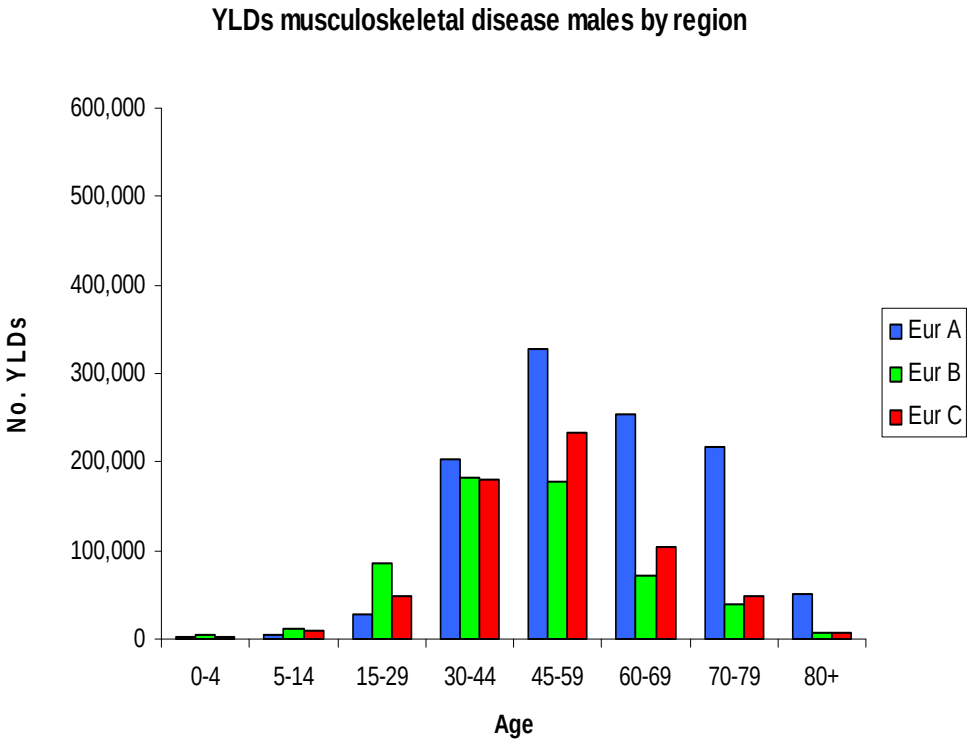
Figure YLDs due to musculoskeletal conditions by European region WHO 2004

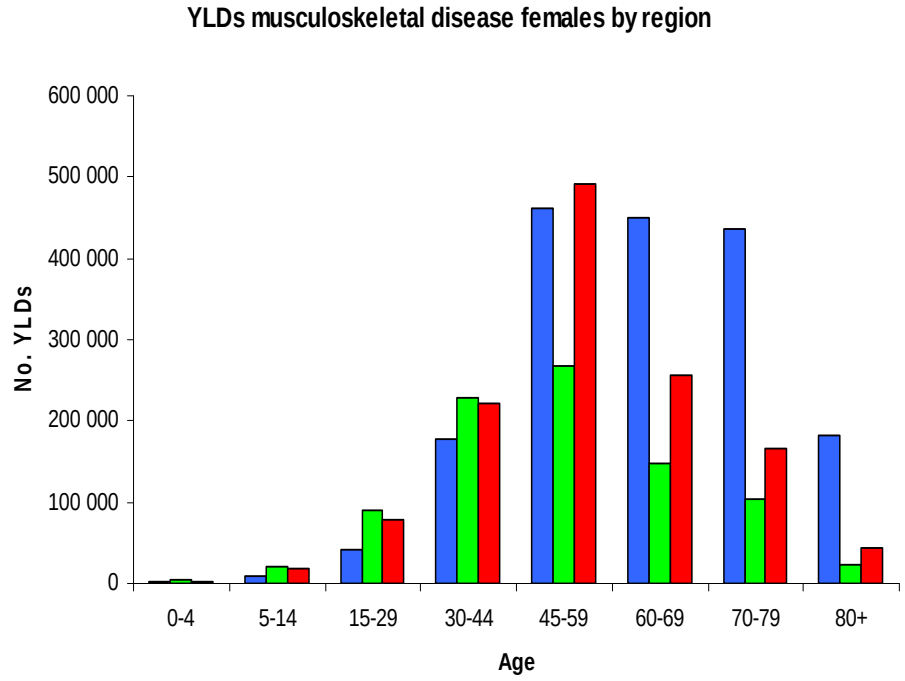


Source: WHO Global Burden of Disease 2004
http://www.who.int/healthinfo/global_burden_disease/YLD14_30_2004.xls

The burden of disability as measured by YLDs is higher in females than males across all ages in all 3 regions except in the 0-4 age group and in the 30-44 year age group for Region A. For both males and females the burden increases with age up to age 45-59 when it starts to decline. The exception to this is in males in European region B where there is a slight decline in the age 45-59 year age group. For males the burden in young people (under 30) is highest in European region B. In females the burden rises dramatically in the 45-59 age group in regions A and B. For both males and females the burden is significantly higher in European region A for the older age groups.

Figure YLDs musculoskeletal disease by age, sex & European region





Source: WHO Global Burden of Disease 2004

http://www.who.int/healthinfo/global_burden_disease/YLD14_30_2004.xls

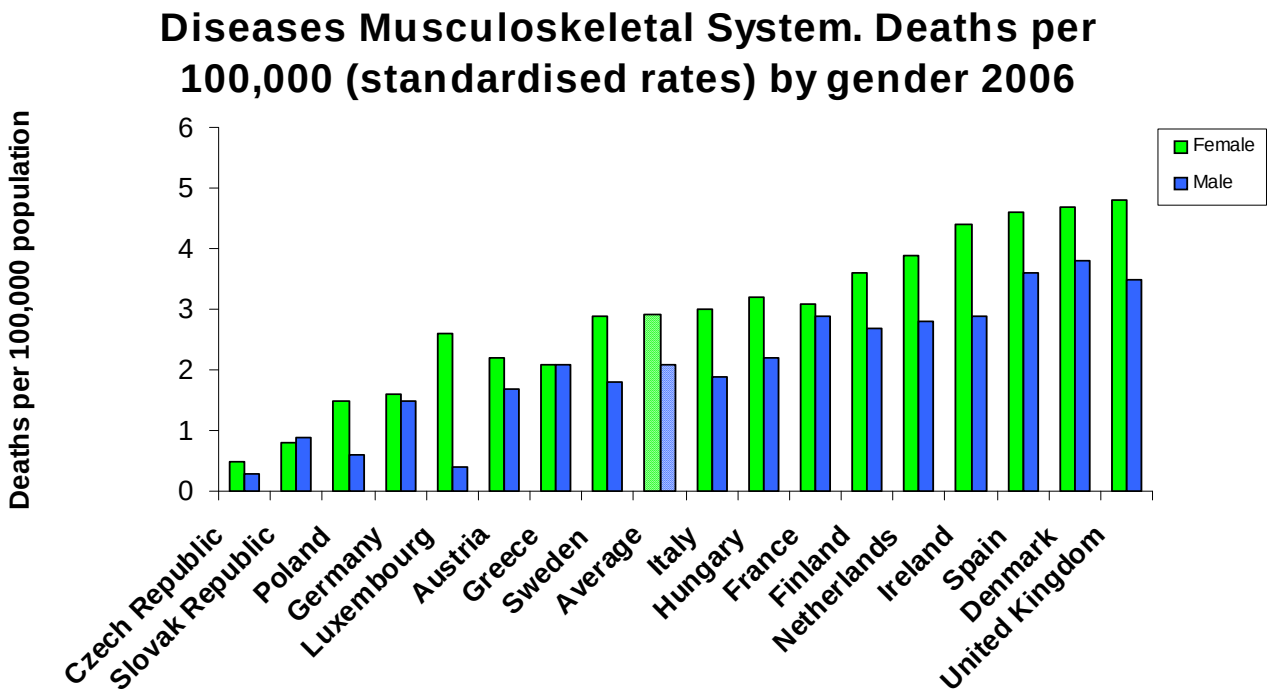
MSC related mortality

Despite the widespread prevalence of musculoskeletal conditions and their significant detrimental impact on the well-being of individuals and society they have not been included among the top ten non-communicable diseases identified for action by the WHO. This is primarily due to the low mortality from musculoskeletal conditions in comparison with other health conditions. There is evidence however of increased mortality associated with musculoskeletal conditions. Osteoarthritis and rheumatoid arthritis are associated with increased mortality due to an increased risk of co-morbidities and the adverse effects of medication. Mortality rates are up to 20-24% in the first year after a hip fracture and the greater risk of dying may persist for at least 5 years afterwards.

Data on mortality from musculoskeletal conditions is available from the WHO Mortality database. Mortality data comes from the cause of death form which is completed nationally for each death and used exclusively for statistical purpose. WHO guidelines are used to classify and code causes of death. Accuracy in diagnosing causes of death still varies from one country to another. The main reasons for this are incorrect or systematic biases in diagnosis, incorrect or incomplete death certificates, misinterpretation of ICD rules for selection of the underlying cause, and variations in the use of coding categories for unknown and ill-defined causes.

The data shows that with the exception of the Slovak Republic the mortality rate from musculoskeletal conditions is higher in females than males. The lowest mortality rates for both men and women are in the Czech Republic. The highest rates for males are in Denmark and for females are in the UK. The largest difference between males and females is in Luxembourg (2.2) and the UK (1.3).

Figure Deaths per 100,000 (standardized rates) diseases musculoskeletal system by gender 2006.

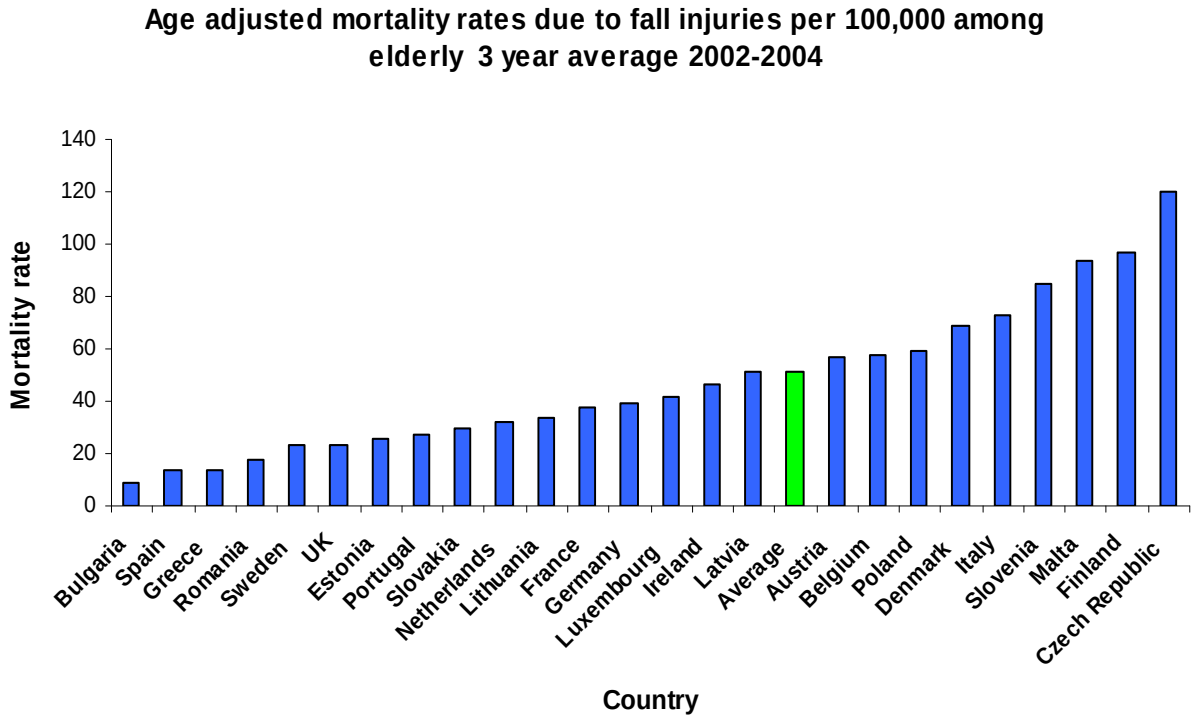


Source: OECD Health Data 2009 derived from WHO Mortality Database. http://www.who.int/healthinfo/morttables/en/index.html.

The data is for 2006 except for Hungary, Luxembourg, Slovak Republic, and Spain where the data is for 2005.

The same data has been used to examine mortality rates due to fall injuries among the elderly. People aged 80 and over have 6-fold higher mortality compared to elderly 65-79 years, as they are not only more likely to fall but also more frail than others (Sethi et al 2006). The variation in mortality rates due to falls is the high with Bulgaria, Spain and Greece having the lowest rates (less than 15) and Hungary, Czech Republic and Finland the highest (over 100). This variation indicates a potential for prevention of mortality arising from falls.

Figure Age adjusted mortality rates due to fall injuries per 100,000 among elderly, 3 year average 2002-2004.



Source: WHO mortality database 3 year average (2002-2004) adjusted by CEREPRI (Centre for Research and Prevention of Injuries www.euroipn.org/cerepri. Cited in Prevention of Falls Among Elderly by European Network for Safety Among Elderly http://www.capic.org.uk/documents/FS_Falls.pdf

Determinants of Musculoskeletal Health

The musculoskeletal health of an individual is determined by the occurrence of diseases and other health conditions, by lifestyle factors, by contextual factors (both environmental and personal), and by the interaction of these. Environmental factors include health and social interventions. These determinants influence the risk of a person having a musculoskeletal condition and may influence the outcome of such a condition. The determinants of musculoskeletal health are common to other major non-communicable diseases therefore modifying these risk factors will not only benefit musculoskeletal health but will have a much broader impact on the health of individuals and the population. Influencing the determinants of musculoskeletal health is central to strategies for the prevention and control of musculoskeletal conditions to ensure optimal musculoskeletal health.

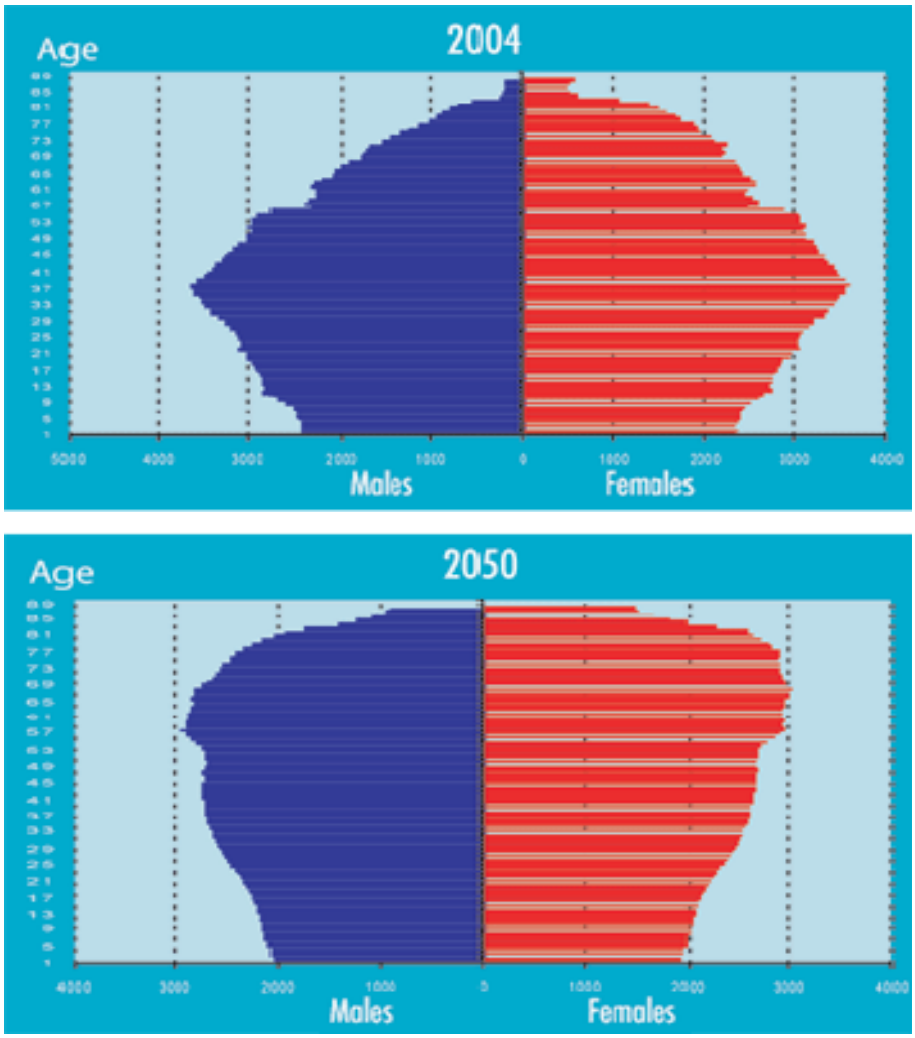
Examples of determinants of musculoskeletal health include:

Conditions and problems	**Personal Intrinsic**	**Personal Extrinsic**	**Environmental**
Osteoarthritis Rheumatoid arthritis Osteoporosis Back pain Musculoskeletal trauma and injuries	Age Gender Genetics Diet BMI Alcohol Smoking Exercise Co-morbidities Education Psychological assets	Housing Work type Personal transport	Natural environment Man-made physical environment Pollution, sanitation, water, air Health, social, education systems Health, social, educational interventions

Age

Europe's population is ageing due to falling birth rates and an increasing life expectancy. Eurostat projections indicate that while the total population of the EU-25 will fall only slightly by 2050, the age structure will change dramatically. By 2050, the EU will have 48 million less people of aged 15- to 64-year-olds and 58 million more people aged 65 and over.

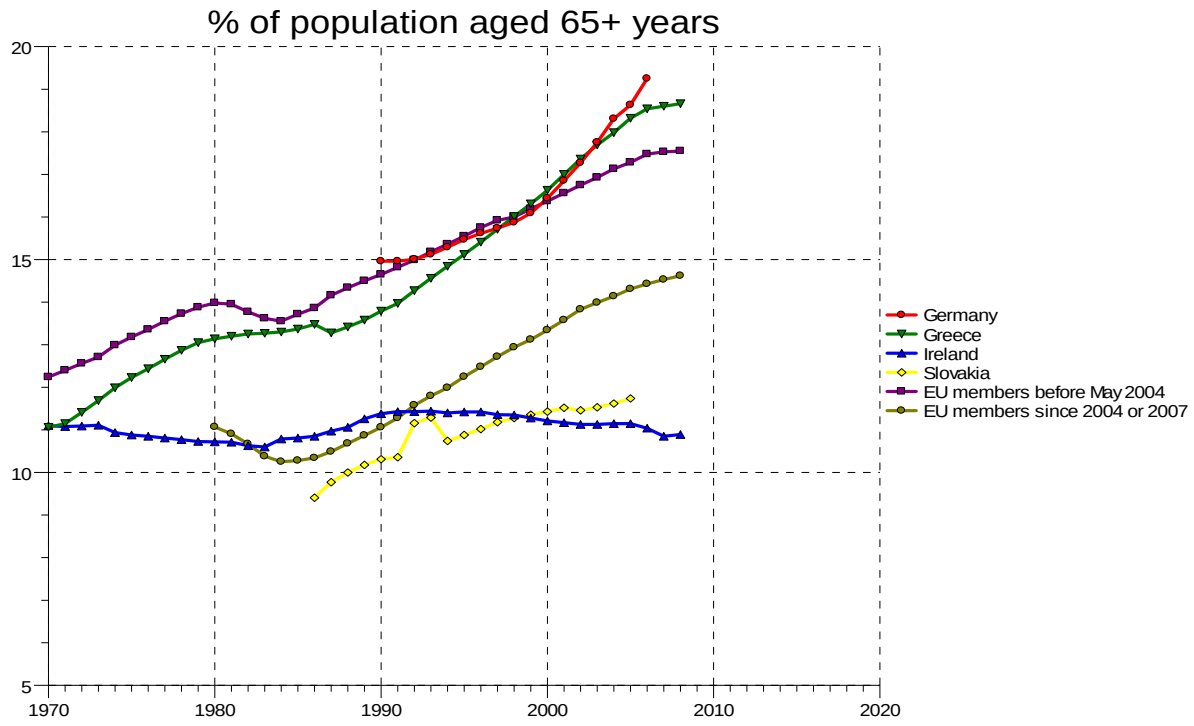
Figure Population pyramids EU-25 2004 and 2050



Source: EUROSTAT (http://ec.europa.eu/economy_finance/een/001/article_3624_en.htm)

Across Europe the proportion of the population aged 65 years and over has increased significantly in recent decades and continues to rise however the degree to which the population is ageing varies. The proportion aged 65 and over is higher in those Member States which joined the EU before May 2004 compared to those that joined after that date. The oldest populations are in Germany and Greece, the youngest in Ireland and Slovakia (WHO Health for All Database 2010).

Figure Percentage of population aged 65 years and over, Germany, Greece, Ireland, Slovakia, EU Members before and since 2004



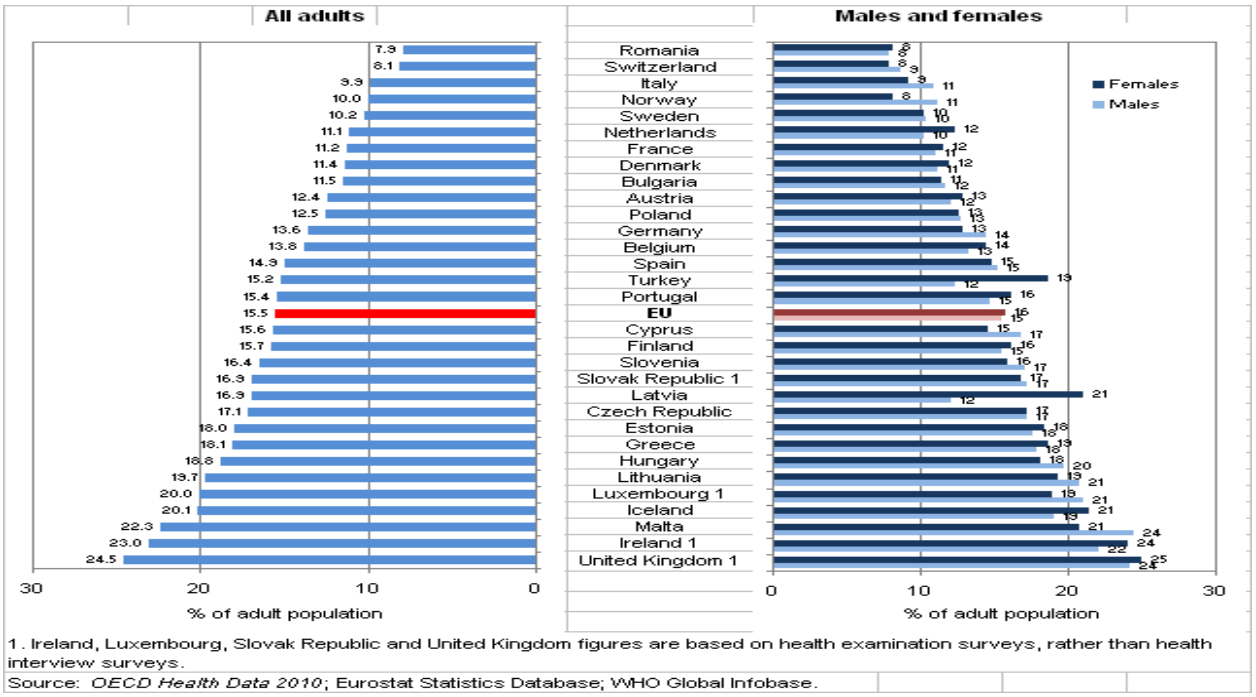
Source: WHO Health for All Database 2010 http://www.euro.who.int/en/what-we-do/data-and-evidence/databases/european-health-for-all-database-hfa-db2

Obesity

There is growing evidence of the association between obesity and musculoskeletal conditions (Woolf et al 2006). Obesity is associated with a range of disabling conditions in adults and there is evidence that childhood obesity can have a significant effect on a child's musculoskeletal system (Anandacoomarasamy et al 2008, Shiri et

al 2010, Tsiros et al 2011). Obesity rates vary substantially across the EU with the lowest adult rate in Romania and the highest in the UK. Across all EU countries the prevalence of obesity is higher in women than men (OECD 2010).

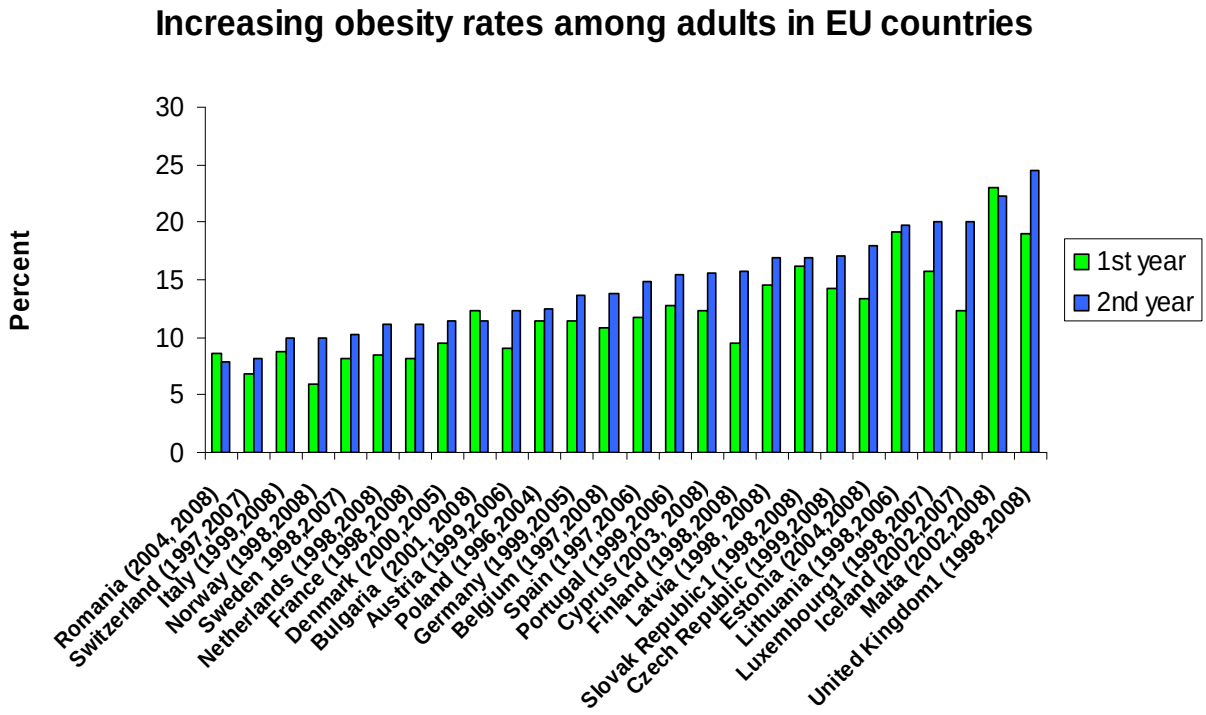
Figure Obesity rates among adults, 2008 (or nearest year available)



Source: OECD Health at a Glance: Europe 2010; OECD Publishing. http://ec.europa.eu/health/reports/docs/health_glance_en.pdf

The percentage of people who are overweight or obesity has increased in the EU and across the majority of Member States obesity rates in adults have been increasing (OECD Health Database 2010). In many EU-countries there is a strong inverse association between obesity and socio-economic status, this is particularly true for women. (Hulshof et al, 2003; Molarius 2003).

Figure Percentage adults obese EU, various years, 1st year, 2nd year.



Source: OECD Health Data 2010; Eurostat Statistics Database; WHO Global Infobase. Luxembourg, Slovak Republic (2008) and United Kingdom figures are based on health examination surveys, rather than health interview surveys.

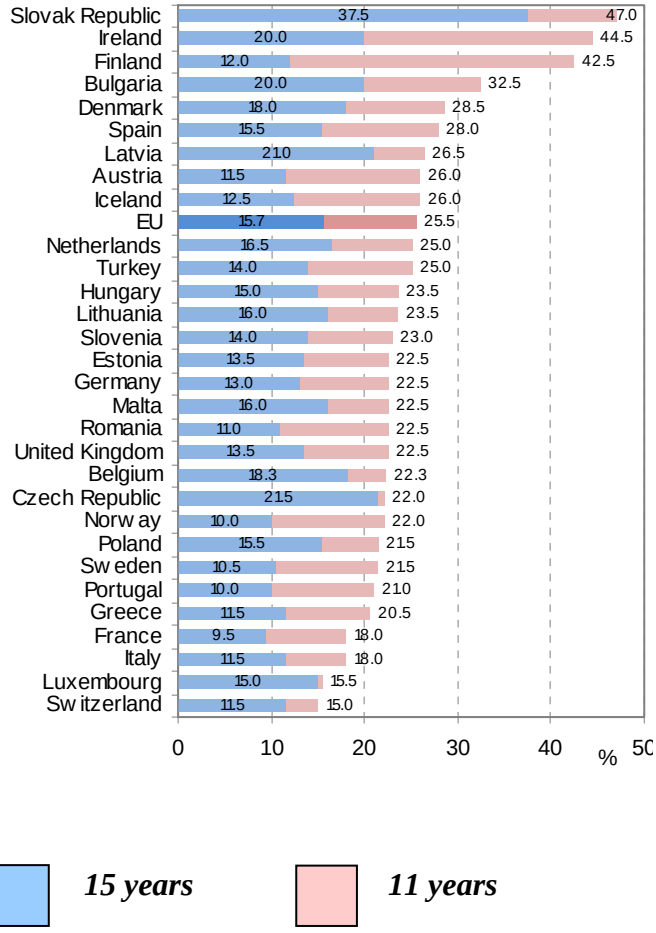
Physical activity and exercise

Physical activity is essential for good musculoskeletal health. It can increase bone density in adolescents, maintain it in adults and slow its decline in old age. Physical activity is defined as any bodily movement produced by skeletal muscles that result in energy expenditure above resting level.

The average proportion of people in the EU 27 who say they never do any exercise or do so very rarely is 24%. However this varies widely from 51% in Lithuania to 14% in Germany. With the exception of Slovenia all the countries of Central and Eastern Europe have higher than average levels of inactivity (European Commission 2007*).* The degree to which children aged 11 and 15 undertake physical exercise varies

significantly across Europe with Italy and France showing much lower levels of physical activity in 11 and 15 year olds than the EU average (OECD 2009).

Figure Children age 11 and 15 years doing moderate to vigorous physical activity in the past week 2005-06



Source: OECD Health at a Glance 2009; OECD Publishing. http://ec.europa.eu/health/reports/docs/health_glance_en.pdf

Diet and nutrition

An adequate intake of calcium and Vitamin D is essential for bone formation and the maintenance of musculoskeletal health. As the body is unable to produce calcium it must be obtained from the diet. Low calcium intake is associated with low bone mineral density. Vitamin D is required to help the body to absorb the calcium and

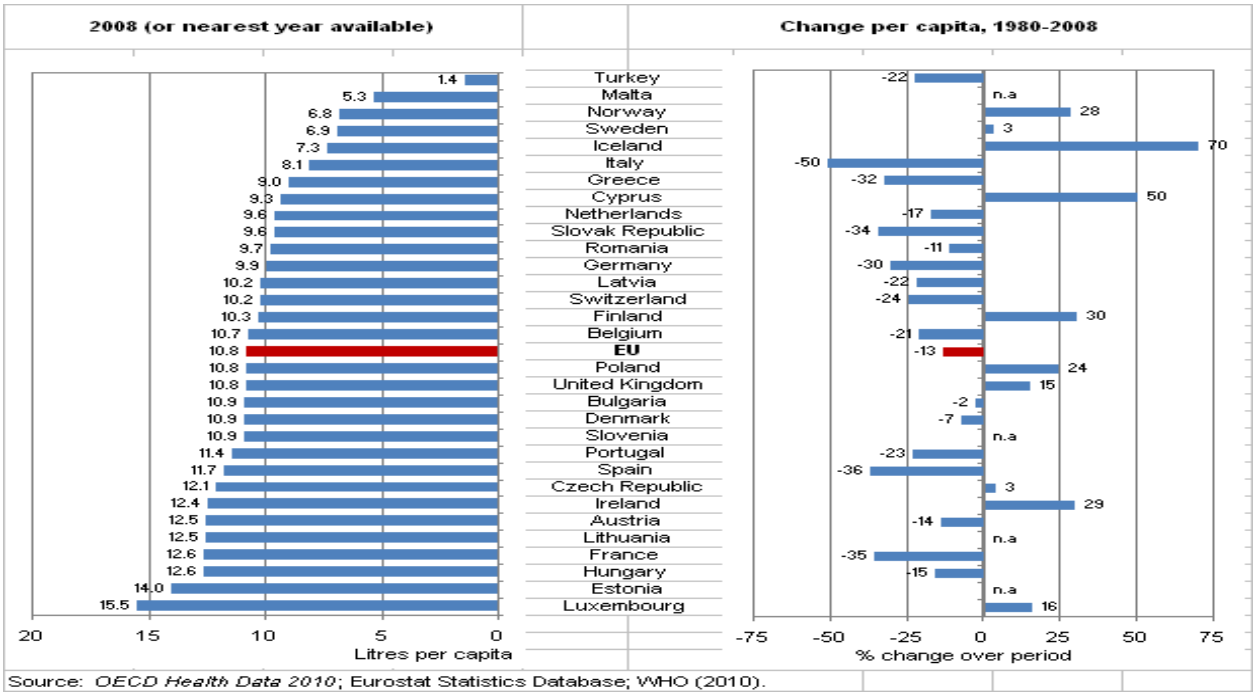
regulate bone formation. Small amounts of vitamin D can be obtained through diet, the majority is synthesised by the body via exposure of the skin to sunlight. Inadequate vitamin D can cause rickets, prevent children from attaining their genetically programmed peak bone mass, contribute to and exacerbate osteoporosis in adults, and cause osteomalacia. Adequate vitamin D is also important for proper muscle functioning. Recent results from the European Male Ageing study (McBeth 2010) indicated that musculoskeletal pain is associated with very low levels of Vitamin D in men. Recent epidemiological data indicate the high prevalence of vitamin D inadequacy among elderly patients and especially among patients with osteoporosis. The prevalence of low 25(OH)D levels (<20 ng/mL [50 nmol/L]) in Europe has been estimated as (28%-100% of healthy and 70%-100% of hospitalized adults) (Isaia et al 2003, McKenna 1992). Vitamin D inadequacy is particularly common among patients with osteoporosis. A global study of vitamin D status in postmenopausal women with osteoporosis showed that 24% had 25(OH)D levels less than 10 ng/mL (25 nmol/L), with the highest prevalence reported in central and southern Europe (Lips et al 2001). A study of Asian adults in the United Kingdom showed that 82% had 25(OH)D levels less than 12 ng/mL (30 nmol/L) during the summer , with the proportion increasing to 94% during the winter months (Pal 2003).

Alcohol

Consumption of alcohol is related to over 60 medical conditions, including the increased risk of some skeletal conditions, such as fractures and muscle diseases (Anderson & Baumberg, 2006). There is some evidence that women with low levels of alcohol intake have higher bone density than women with higher levels of alcohol intake (Lu et al 2010) and that moderate alcohol consumption may decrease the risk for RA and RA progression (Lu et al 2010). This may be because moderate alcohol consumption may be associated with reduced levels of some systemic markers of inflammation. Indirectly alcohol consumption influences prognosis in musculoskeletal patients due to an increased risk of comorbidity (i.e. cardiovascular diseases, impaired immune system).

Consumption of alcohol varies considerably across the EU. In the EU an average of 11 litres of pure alcohol is consumed per adult each year. (Anderson & Baumberg, 2006). Over three quarters of European citizens drink alcohol (Anderson & Baumberg, 2006). Whilst most drinkers drink at low risk levels an estimated 15% of those that consume alcohol are hazardous drinkers. Within Europe drinking patterns traditionally show a north-south gradient with low consumption countries in Nordic countries, the high consumption in Mediterranean countries (Leifman 2002). With changes over the past decade this pattern is less clear cut. Whilst some countries e.g. Italy, Spain and France have seen large decreases in the per capita consumption of alcohol, other countries e.g. Iceland, Cyprus and Finland have seen large increases.

Figure Alcohol consumption among population aged 15 years and over

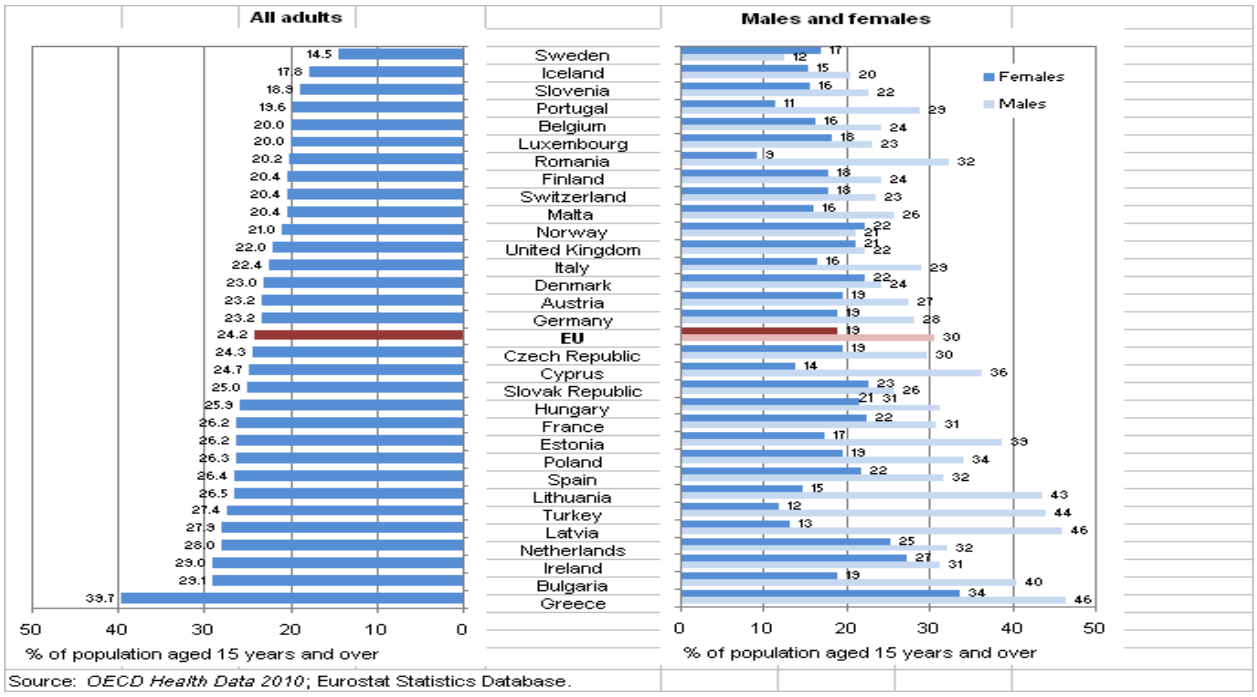


Source: OECD Health at a Glance: Europe 2010; OECD Publishing. http://ec.europa.eu/health/reports/docs/health_glance_en.pdf

Smoking

Smoking is a well-established environmental risk factor for the development of rheumatoid arthritis (RA). Some studies have suggested that smoking also influences RA disease severity but this remains controversial. There is evidence of an overall negative association between smoking and osteoarthritis. In general across Europe smoking prevalence is higher among men than women. In Cyprus, Romania, Portugal and the three Baltic states this difference is more than two-fold. In the UK, Ireland and Slovenia, the rates are approximately equal for both sexes. Over recent decades the differences in smoking prevalence between men and women have been declining. In Sweden the smoking prevalence among women is higher than among men. The overall prevalence of smoking is higher among younger people than older generations. Deprivation, including poverty and lower educational levels are related to higher rates of smoking in the population (ASPECT, 2004).

Figure Daily smoking rates, 2008 (or nearest year available)



Source: OECD Health at a Glance: Europe 2010; OECD Publishing.
http://ec.europa.eu/health/reports/docs/health_glance_en.pdf

Accidents and injuries - sport, occupational, RTAs, falls

There is a wide spectrum of trauma and injuries that affect the musculoskeletal system. Injuries often occur in the workplace or are sports related. These injuries have not only short term but also long term effects, for example they may increase the risk of osteoarthritis in later life.

The majority of sports injuries are similar to injuries that normally occur in non-athletes. Injuries occurring in sports and physical activities are usually mild and many are never reported. More severe injuries may either be acute, chronic or overuse injuries. The incidence of sports injuries has increased as levels of participation in sport at recreational and professional levels increase. A large proportion of these injuries are preventable.

The incidence and types of sports injuries vary greatly depending on the sport, the number of people participating and the hours played. In some sports where high speeds and forces are encountered, there is a much higher risk of serious injury. The potential risks for injuries in sports seem to increase for all levels of athletes, with increasing participation, intensity and demands, as well as longer training periods.

In the EU injuries related to sports activities accounted for 18% of all home and leisure injuries that needed medical treatment in hospitals in 2010, almost 5.2 million cases a year. Statistics on the incidence of sports injuries are inadequate and difficult to compare as the majority of patients with sports injuries that attend medical facilities do not have the sport or the mechanism of injury recorded. Insurance claims in some countries give some indication (Eurosafe 2006).

Occupational injuries

Occupational injuries can be subdivided into trauma resulting from an acute or sudden events (e.g., slips or falls) and musculoskeletal disorders (MSD) which result from small, but additive damage to the musculoskeletal system caused by the performance of repetitive tasks.

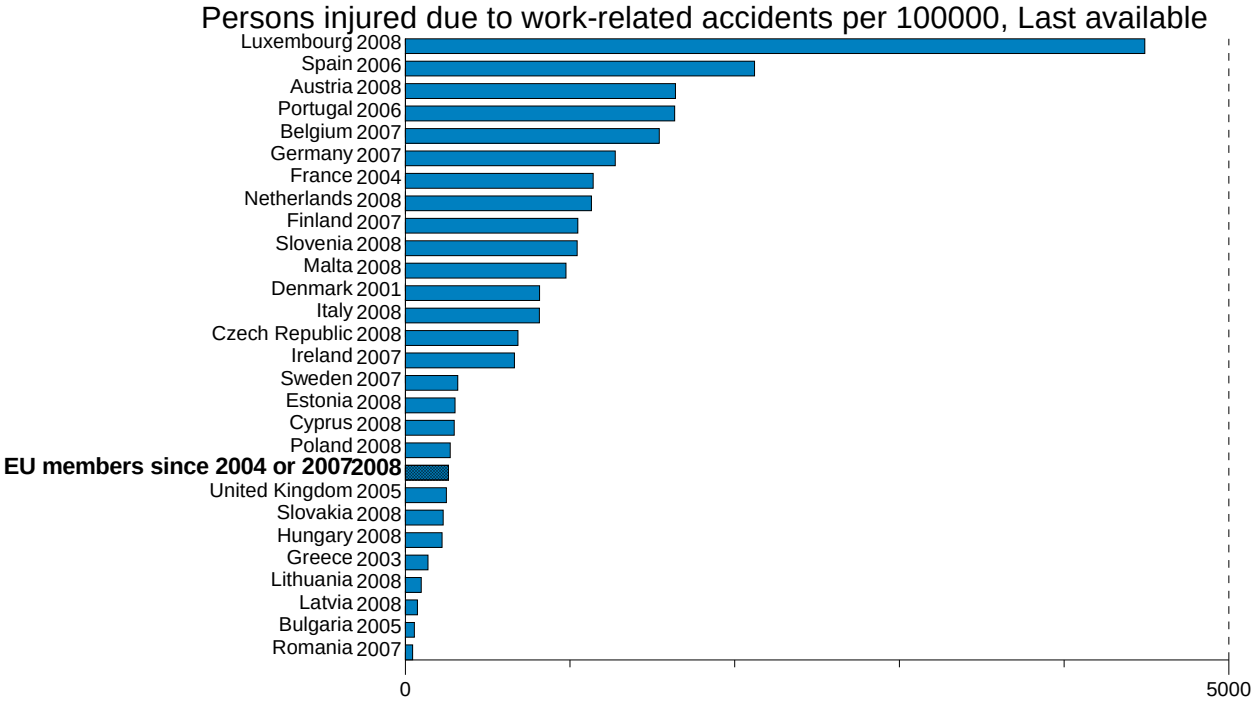
Work-related MSDs account for the majority of all occupational illnesses. MSDs related to occupation are predominately known as cumulative trauma disorders (CTD). They may also be referred to as repetitive strain injuries (RSI). RSI is a catch-all term for symptoms and signs, which are located in the neck, upper back, shoulder, arm, elbow, hand, wrist and fingers. The symptoms may include pain, stiffness, tingling, clumsiness, loss of co-ordination, loss of strength, skin discoloration, and temperature differences (Bongers 2002).

Key risk factors, which have been identified for the development of occupational injuries, are repetition, high force, awkward joint posture, direct pressure, vibration, and prolonged restricted position (Leclerc 2004). For example, certain occupations with forceful and repetitive use of the hands and arms such as electricians and meat packers are associated with CTDs of the upper extremity such as tendinitis or nerve entrapments. Psychological factors such as the psychological distress experienced by workers exposed to a high level of physical stress and a low level of job control also play a role.

There are large differences in the rate of work-related injuries across Europe. Some of the factors that may influence the rate of work related accidents include the age structure of the population and the work force, the types of industry, occupations and systems for recording injuries. There are difficulties in establishing specific diagnoses for many musculoskeletal disorders and difficulties in establishing whether a CTD diagnosis is work-related or not however figures are useful for identifying high-risk occupations.

Data from the WHO Health For All database indicates that with the exception of Estonia and Slovenia, Eastern European countries have a lower than average proportion of persons injured due to work related accidents. UK and Greece also have lower than average injuries. Those countries with the highest levels of injury are Luxembourg, Spain, Austria and Portugal. Again it must be emphasised that caution needs to be taken in interpreting these figures due to differences in definitions and reporting.

Figure Persons injured due to work-related accidents per 100,000, last available data



Source: WHO Health For All Database 2010 http://www.euro.who.int/en/what-we-do/data-and-evidence/databases/european-health-for-all-database-hfa-db2.

Road traffic accidents

Road traffic injuries are the leading cause of death and disabilities among young people in Europe. Vulnerable road users such as pedestrians, motorcyclists and cyclists constitute 41% of all road deaths in the European Union. High vehicle speeds, roads and urban design place these road users at increased risk. Prevention initiatives include developing and enforcing legislation on key risk factors: limiting speed, reducing drink-driving, and increasing the use of seatbelts, child restraints and motorcycle helmets (Eurosafe 2011).

Road traffic accidents are a common cause of musculoskeletal injury. These injuries are caused by both direct trauma and, in the case of 'whiplash', the acceleration / deceleration associated with a road traffic accident. These injuries are often very debilitating and require early assessment and treatment. Any area of the body can be injured and the severity is often dependent on the size and direction of the impact received. Common conditions caused by road traffic accidents are:

- Whiplash
- Back pain
- Thoracic (chest) pain

- Shoulder pain
- Knee pain
- TMJ (jaw) pain

Changing lifestyles and the prevention of musculoskeletal conditions

Prevention of musculoskeletal conditions is strongly associated with good nutrition and exercise. To reduce the enormous impact on the quality of life of individuals and socio-economic impact on society related to musculoskeletal conditions, people at all ages should be encouraged to follow a healthy lifestyle and to avoid the specific risks related to musculoskeletal health. Lifestyles to optimise musculoskeletal health include:

- Physical activity to maintain physical fitness
- Maintaining an ideal weight
- A balanced diet that meets the recommended daily allowance for calcium and vitamin D
- The avoidance of smoking
- The balanced use of alcohol and avoidance of alcohol abuse

Management of Musculoskeletal Conditions

This section considers the principles of management of MSC and the human and physical resources required. This will enable an understanding of data on health utilisation and the availability and access to resources related to the management of musculoskeletal conditions which is considered in Chapter x.

The aim of the management of musculoskeletal conditions is to ensure that people with these conditions can actively participate in their own care and manage their problems themselves whenever possible. The aim is to provide tools and strategies for people to control symptoms, manage the disease process, achieve optimum function and to reduce the psychological and social consequences of the condition so that they can participate as fully as possible in normal activities.

Education of patient

The aim of patient education is to enable them to:

- understand their disease, possible outcomes and treatment options
- know what they can do themselves to manage their problems such as healthy lifestyle and problem-solving strategies
- make knowledge based decisions regarding the management of their disease.

Education is of particular importance in the management of musculoskeletal conditions as many are recurrent or persistent and progressive and they have a pervasive effect on people's lives. Education can range from leaflets, web-based information, educational sessions with a healthcare professional to the use of cognitive behavioural strategies. The method needs to be tailored to the needs of the individual to ensure it achieves its objective.

Lifestyle advice

Lifestyle factors are important in the causation and outcome of musculoskeletal conditions. Physical activity, an ideal body weight, a balanced diet with adequate

calcium and vitamin D, avoidance of smoking and a balanced use of alcohol are recommended. Improving these lifestyle risk factors will improve musculoskeletal health.

Drugs

Pharmacological therapies are important as part of controlling the common symptoms of musculoskeletal conditions such as pain and stiffness and in managing the disease process.

Analgesics and nonsteroidal anti-inflammatory drugs along with non-pharmacological interventions such as physiotherapy and coping strategies are important in enabling control of pain. There have been major advances in the last decade in the development of drugs and strategies that can effectively control the disease process in many people with conditions such as rheumatoid arthritis and osteoporosis. The treatment of rheumatoid arthritis involves the early use of disease modifying drugs such as methotrexate and targeted "biological" drugs such as antiTNF alpha is required to achieve remission or low disease activity state. Bisphosphonates and other drugs can reduce the risk of fracture by 50% in those at high risk.

Surgery

Surgical interventions can be very effective in controlling symptoms and improving activities and participation. They can be used to:

- modify: e.g. tendon transfer, soft tissue procedures around a joint, spinal fusion, osteotomy
- repair: e.g. fracture fixation, bone grafting, ligament repairs
- remove: e.g. menisectomy, discectomy, excision arthroplasty; and
- replace: e.g. arthroplasty (cemented, uncemented, unipolar, bipolar, total, different surfaces etc).

Rehabilitation

Rehabilitative interventions are important to treat any impairments, compensate for any impairments and to recognise and address personal factors. Interventions may be

educational, behavioural or psychological. They may include physical fitness, exercises, physical therapies, aids and devices.

Strategies to prevent MSC

The ***European Action Towards Better Musculoskeletal Health*** (BJD 2005) has developed evidence-based strategies to prevent musculoskeletal problems and to ensure that people with musculoskeletal conditions enjoy a life with fair quality as independently as possible. The strategies bring together the evidence-based interventions that have been identified for the different musculoskeletal conditions. They are based on a review of the evidence from existing guidelines and systematic reviews, along with the opinion of experts from across Europe in the areas of rheumatology, orthopaedics, trauma, public health, health promotion and policy implementation. In addition the views of people with musculoskeletal conditions have been taken into account. The strategies are aimed at:

- the whole population to prevent these conditions where possible
- those individuals at highest risk of developing these conditions
- those who already have these conditions to reduce the impact that they have upon them.

The strategies focus on recommendations that will maintain or improve musculoskeletal health whatever the underlying condition. They combine what can be achieved from evidence-based interventions with what those with musculoskeletal conditions, their carers and representatives; and health care providers want to be achieved. The full report, which includes the supporting evidence for these recommendations, is available at http://europa.eu.int/comm/health/ph_projects/2000/promotion/fp_promotion_2000_frep_15_en.pdf

For whole population

Everyone is at risk of developing musculoskeletal conditions, but to reduce the enormous impact on the quality of life of individuals and socio-economic impact on

society related to musculoskeletal conditions, people at all ages should be encouraged to follow a bone and joint healthy lifestyle and to avoid the specific risks related to musculoskeletal health.

These risk factors are common for many other non-communicable diseases and their modification will therefore have a greater a broader benefit on health of the individual and of the population.

- Physical activity to maintain physical fitness
- Maintaining an ideal weight
- Recommended daily allowance for calcium and vitamin D
- The avoidance of smoking
- The balanced use of alcohol and avoidance of alcohol abuse
- The promotion of accident prevention programmes for the avoidance of musculoskeletal injuries
- Health promotion at the workplace and related to sports activities for the avoidance of abnormal and overuse of the musculoskeletal system
- Greater public and individual awareness of the problems that relate to the musculoskeletal system.

The At Risk Population

Those at greatest risk must be identified and encouraged to adopt measures taken to reduce their risk. This requires a case finding approach for the different musculoskeletal conditions aimed at identifying those who are most at risk.

Osteoarthritis

Those deemed most at risk, who include people aged 50+ years, the obese, and those with abnormal biomechanics, a history of joint injury, intense sporting activities or certain occupations

Rheumatoid arthritis

Those with early inflammatory arthritis should be identified and assessed as soon as possible, as many will progress to develop rheumatoid arthritis.

Back pain

All adults should be considered at risk. "Yellow flags" for persistence or recurrence need to be looked for ("Red flags" are clues to significant pathology; "Yellow flags" are predictors of poor outcome and are mainly psychosocial factors).

Osteoporosis

Assessment of fracture probability should be performed using risk factor profiling (e.g. older people (65 years and over), men and women with strong risk factors such as untreated hypogonadism, previous low trauma fracture, glucocorticoid therapy, MI <19 kg/m2, maternal history of hip fracture, excess alcohol and smoking) and, where indicated, bone density assessment.

Early Disease

Those with earliest features of a musculoskeletal condition should receive an early and appropriate assessment of the cause of their problem. Once their needs have been identified they should receive early and appropriate management and education in the importance of self-management. This requires methods to ensure that those who have the earliest features of the different musculoskeletal conditions are assessed by someone with the appropriate competency and that the person should have timely access to care that is appropriate to their needs.

Osteoarthritis

The strategies outlined for those at risk should be undertaken including education programs to encourage self management. This should include information on the condition, lifestyle and its treatment. There should be pain management including the use of topical analgesics, simple analgesics and NSAIDs. Normal biomechanics should be restored, including osteotomy, ligament and meniscal surgery where indicated. Environmental adaptations in the home and workplace and the use of aids,

braces or devices should be considered. The use of glucosamine sulphate, chondroitin sulphate or hyaluronic acid and of I/A therapies (including corticosteroids, hyaluronic acid and tidal irrigation) should be considered.

Rheumatoid arthritis

For those with the early stages of rheumatoid arthritis it is important that a correct diagnosis is made by expert assessment within 6 weeks of onset of symptoms. Disease modifying anti-rheumatic drug (DMARD) treatment should be started in addition to symptomatic therapy and rehabilitative interventions as soon the diagnosis of rheumatoid arthritis is established. The choice of treatment should take into account the presence of prognostic indicators supporting the use of more aggressive therapy. Treatment should be closely monitored to ensure ideal disease control. There should be education programmes to encourage self management. These should include information on the condition, lifestyle and its treatment. Treatment should consider all aspects of the effect of the condition on the person. People with rheumatoid arthritis should be enabled to participate as fully as possible through rehabilitation and modification of the work, home and leisure environment.

Back pain

There should be a strategy to encourage the population to change behaviour and beliefs about back pain and on the importance of maintaining physical activity and employment by those with acute or subacute back pain. On a background of public awareness, health care professionals should learn to follow the appropriate guidelines which recommend staying active; avoiding bed rest; using paracetamol, NSAIDs or manual therapy and addressing “red” and “yellow” flags.

Osteoporosis

For the population with osteoporosis (BMD T score $\leq$ -2.5) there should be educational and lifestyle advice programmes. For those identified as having a high risk of fracture there should be appropriate pharmacological interventions. For older people at high risk of falling there should be in addition a falls prevention programme.

Major musculoskeletal injuries

There should be immediate accurate diagnosis and appropriate treatment on the scene. In addition there should be stabilisation of basic life functions; systemic pain management; consideration of immobilisation, if unstable; early transportation to centre with appropriate experience and equipment. Consider operative or non-operative stabilisation of fractures; immediate operative treatment if further deterioration is expected; adequate fluid and nutrition management; pulmonary, cardiovascular and neurological complications. Prevent complications (infection, thrombosis, embolism, heterotopic ossifications). Start early mobilisation and rehabilitation.

Occupational musculoskeletal injuries

There should be early accurate diagnosis and treatment. In addition there should be pain management including systemic and topical analgesics; partial work restriction. Consider short-term immobilisation and the use of aids, braces or devices. Maintain physical fitness during rehabilitation. Understand the mechanism of injury and prevent future injuries by considering adaptation work place, transferring the patient to another job or distinct job modification. Return to work early.

Sports injuries

There should be early accurate diagnosis and treatment. RICE - rest, ice, compression and elevation. Pain management including systemic and topical analgesics. Consider immobilisation, if unstable – early mobilisation, if stable; the use of aids, braces or devices; immediate operative treatment if further deterioration is expected; operative reconstruction of tendons, capsule and ligaments; operative or non-operative stabilisation of fractures. Maintain physical fitness during rehabilitation. Return to sport when pain free and able to carry out all skills required by the sport. Understand the mechanism of injury and prevent future injuries. Consider adaptation of special technique in sport.

Established Conditions

Those with a musculoskeletal condition should have fair (considers equity, timeliness and ethics) opportunity of access to appropriate care which will reduce pain and the

consequences of musculoskeletal conditions, with improvement in functioning, activities and participation. These outcomes should be achieved in the most cost-effective way possible for the appropriate environment. This requires that those who have musculoskeletal conditions have access to appropriate health and social care, and support in the home and workplace.

Most outcomes are best achieved with good pain management, disease management and disease rehabilitation. These outcomes should be achieved in the most cost effective way possible for the appropriate environment. This should be on the basis of enabling people to recognise the early features of musculoskeletal conditions and to know what to do, either managing the problem themselves or knowing when to seek appropriate professional help. In addition people should be enabled to access the skills necessary to manage and take responsibility for their own condition in the long term and to be able to lead full and independent lives. The following approaches are recommended from evidence and expert opinion for assessment and management to achieve the best outcomes:

Osteoarthritis

The strategies outlined for those at risk should be undertaken including education programs to encourage self management. These should include information on the condition, lifestyle and its treatment. There should be pain management including the use of topical analgesics, simple analgesics and anti-inflammatory analgesics (NSAIDs). The use of glucosamine sulphate, chondroitin sulphate or hyaluronic acid and of I/A therapies (including corticosteroids, hyaluronic acid and tidal irrigation) should be considered. Normal biomechanics should be restored, including osteotomy, ligament and meniscal surgery where indicated. Joint replacement surgery should be considered for end-stage joint damage that is causing unacceptable pain or limitation of function. Surgery should be timely. There should be rehabilitation programmes to improve function, activities and participation. The use of aids, braces or devices should be considered. Environmental adaptations in the home and workplace should be considered.

Rheumatoid arthritis

DMARD treatment should be continued in addition to symptomatic therapy and rehabilitative interventions. Treatment should be expertly monitored to ensure ideal disease control. The choice of treatment should take into account the presence of prognostic indicators supporting the use of more aggressive therapy. Surgery should be considered for end-stage joint damage that is causing unacceptable pain or limitation of function. Those with late stage rheumatoid arthritis may have greater surgical needs and a co-ordinated approach is required. Surgery should be timely. Treatment should consider all aspects of the effect of the condition on the person. There should be rehabilitation programmes and modification of the work, home and leisure environment to enable people with rheumatoid arthritis to participate as fully as possible.

Back pain

Effective treatments for subacute and chronic non-specific back pain are exercise therapy, behavioural therapy including pain management or a combination of these. Multi-disciplinary programs should be delivered for non-specific back pain if there is no improvement with exercise or behavioural therapy. It is as yet unclear what the optimal content of these programs is. Rehabilitation should be undertaken with consideration and involvement of the workplace. Back pain of known cause (specific back pain) needs specific management.

Osteoporosis

For those with established osteoporosis there are a number of key strategies that depend on the severity and stage of the disease. The appropriate strategy will consist of one or a combination of the following: education and lifestyle advice (as above), analgesia when indicated, physiotherapy when indicated, pharmacological intervention with bone active drugs, falls prevention programme in older people at high risk of falling calcium and vitamin D supplementation in frail older people, orthopaedic management of fracture when indicated, multi-disciplinary rehabilitation, nutritional support, hip protectors for frail older people in residential care or nursing homes

Major musculoskeletal injuries

Pain management including systemic and topical analgesics. Consider definitive operative treatment, including stabilisation, reconstruction of biomechanics, arthroplasty, reattachment of limbs, amputation, and plastic surgery. Consider definitive non-operative treatment, including use of aids, braces or devices or prosthetic devices. Start early mobilisation and rehabilitation. Consider reintegration into the workplace and society.

Occupational musculoskeletal injuries

Pain management including systemic and topical analgesics. Partial work restriction. Consider the use of aids, braces or devices. Maintain physical fitness during the rehabilitation. Understand the mechanism of injury and prevent future injuries by considering modification of task and work organisation, transferring the patient to another job or distinct job modification. Return to work early.

Sports injuries

Pain management including systemic and topical analgesics. Consider in depth diagnosis, incl. MRI, diagnostic arthroscopy etc. Consider operative reconstruction of tendons, capsule and ligaments. Consider operative or non-operative stabilisation of fractures. Active rehabilitation with joint specific exercises. Maintain physical fitness during the rehabilitation process. Return to sport when pain free and able to carry out all skills required by the sport. Multi-disciplinary approach for the care of athletes should involve coach, physiotherapist, physician, physiologist, psychologist, nutritionist, podiatrist and biomechanics. Evaluate the mechanism of injury and training errors to prevent future injuries. Based on understanding the rules, the physiological stresses and the injury mechanism consider adaptation of training and technique.

Multidisciplinary, multiprofessional team involved in the management of musculoskeletal conditions

People with a musculoskeletal condition require a continuum of health services that includes all levels, from the community in which they live, primary, secondary care and sometimes specialist tertiary care (Woolf et al 2007). Services need to centre on the needs of the individual with the musculoskeletal condition. These

multidisciplinary and multiprofessional services need to be co-ordinated and integrated so that the management of a musculoskeletal problem is seamless. In order to achieve the best outcome for the individual it is important that a musculoskeletal problem is assessed and managed by those with an appropriate level of expertise. The management of any problem needs to be centred on the needs of the individual with the musculoskeletal problem.

A range of practitioners manage musculoskeletal problems. Many conditions are managed in primary care by general practitioners. Some conditions also need specialist advice or care, such as rheumatologists, orthopaedic surgeons and rehabilitation specialists. In addition physical therapists (physiotherapists, chiropractors and osteopaths), occupational therapists, community pharmacists, behavioural therapists (counsellors, psychologists and psychotherapists) and complementary medicine practitioners (for example, acupuncturists and aromatherapists) are often involved in the management of these problems. Specialist nurses play an important role in rheumatology departments in some countries, providing patient education and other expertise. Patient support groups also provide a lot of information, usually written or on the web. The role of carers is also important to recognise in the more persistent, progressive musculoskeletal conditions and they need education to enable them to provide support.

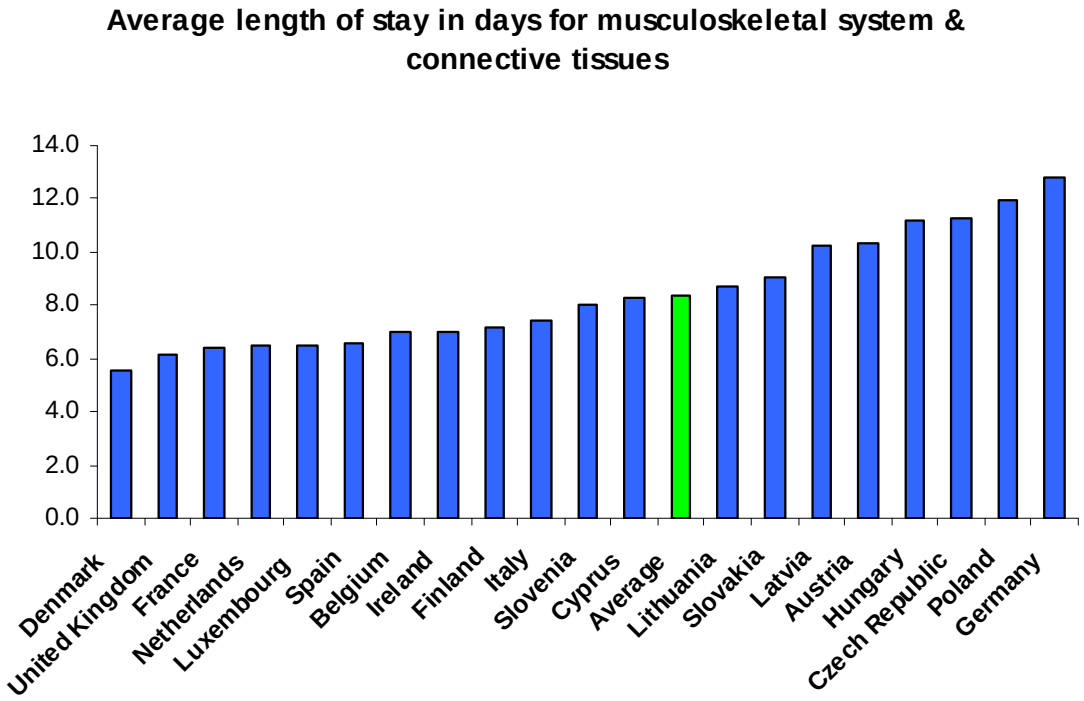
Health Services Utilisation

Musculoskeletal conditions are managed both in the community by primary and other community-based healthcare services as well as in secondary care. They are a common reason for primary care consultations. In secondary care they are mainly managed as outpatients (ambulatory care). Inpatient care is required for complex musculoskeletal conditions such as complicated rheumatoid arthritis or complicated connective tissue diseases. Inpatient care is also required for intensive rehabilitation programmes, for orthopaedic surgery and most commonly for arthroplasty and fracture repair. In some Member States musculoskeletal conditions make up to 12% of all hospital discharges. There are various indicators that can be used to measure and monitor health care resource utilisation related to musculoskeletal conditions. In this section variations and trends in health service utilisation for MSC across the EU are described. The difficulties in obtaining comparative health service data across the EU are also discussed.

Hospital services utilisation – average length of stay

Over the past 10 years in all European countries the average length of stay in hospital for all causes has fallen from 8.3 to 7.2 days. Factors leading to this decline include the use of less invasive surgical procedures, expansion of early discharge programmes and changes in hospital payment methods (OECD 2010). Caution must be used in interpreting average length of stay figures. For example in Finland the average length of stay is high but this is because a large proportion of beds is allocated for convalescent patients and long term care, for acute care the average length of stay is relatively low (OECD 2010). There is a wide variation in the average length of stay for musculoskeletal conditions across the EU. The longest average length of stay is in Germany (12.8 days) and the shortest in Denmark (5.6 days). Countries in Eastern and Central Europe tend to have longer average length of stay than those in Northern or Southern Europe.

Figure Average length of stay in days for MSC, 2007 or latest available



Source: WHO European Hospital Morbidity database 2010.
http://data.euro.who.int/hmdb/index.php.
Data from 2007 except Spain & Netherlands (2005), Italy Denmark (2006), Latvia, Lithuania (2008).

Hospital services utilisation – hospital discharges

Data on hospital discharges is used widely as a measure of health services utilisation. A hospital discharge is the formal release of a patient from a hospital after a procedure or course of treatment. A discharge occurs whenever a patient leaves because of finalisation of treatment, signs out against medical advice, transfers to another health care institution or on death. A discharge can refer to in-patients or day cases. Discharges by diagnosis refer to the principal diagnosis, i.e. the main condition diagnosed at the end of the hospitalisation or day treatment. The main condition is the one primarily responsible for the patient's need for treatment or investigation (for

additional details, see http://epp.eurostat.ec.europa.eu/cache/ITY_SDDS/Annexes/hlth_care_esms_an9.pdf).

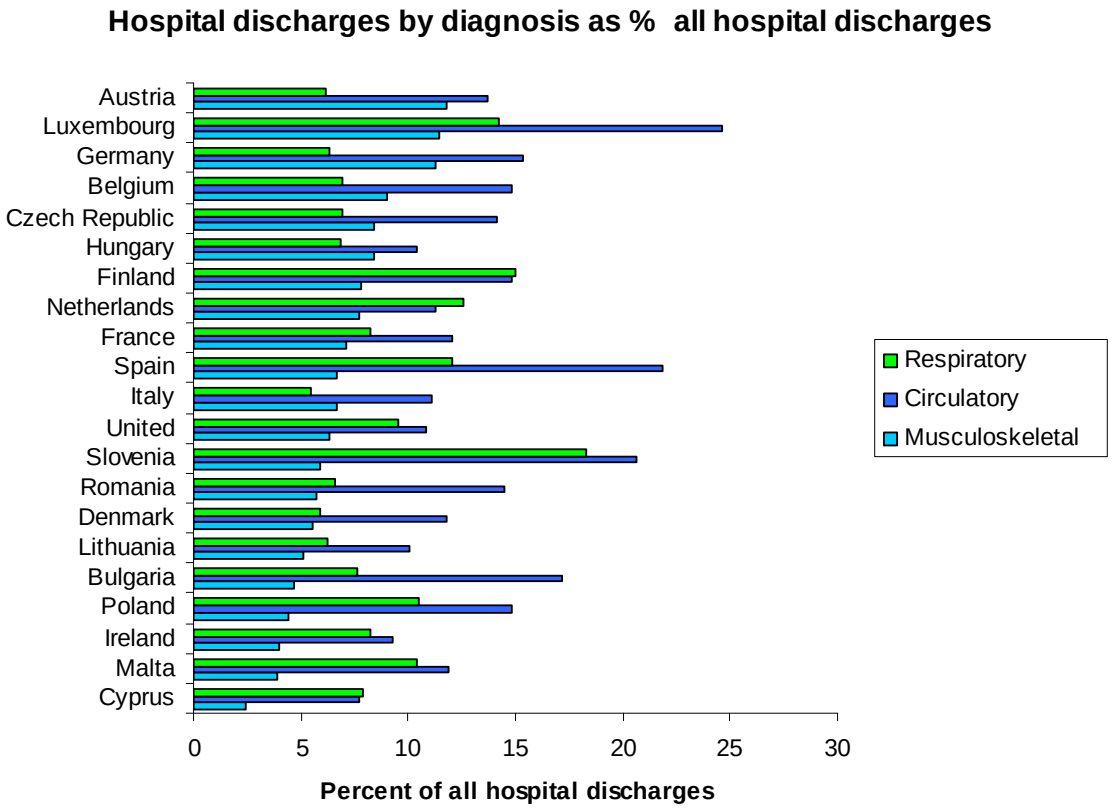
Making international comparisons of hospital discharge statistics is complicated because hospital activities are affected by a number of diverse factors including the demand for hospital services, the capacity of hospitals to treat patients, the ability of primary care to prevent avoidable hospital admissions and the availability of post-acute care to provide rehabilitative and long-term care (OECD 2010). Differences in national health information systems also affect the collection of these statistics.

Trends in hospital discharge rates vary widely across EU Member States. In some countries such as Austria, Germany and Greece they have increased over the past 10 years, in some (e.g. Belgium, UK) they have remained stable and in others (e.g. Denmark, Finland, Italy) they have declined. The reasons for these trends are complex and include demographic change and changes in medical technologies and procedures (OECD 2010).

In-patient care is used variably across Europe for the management of active or complicated rheumatoid arthritis. In-patient care may also be used for arthroplasty, (most commonly of hip or knee for osteoarthritis) and fragility fractures (typically of the hip as a consequence of osteoporosis and a fall). In general, hospital discharge data is of limited relevance to most musculoskeletal problems and conditions as they are managed predominantly in primary care or as outpatients (ambulatory patients), here indicators of outpatient, day case and GP care are more relevant.

Hospital discharges in the EU per 100,000 inhabitants are highest for circulatory, respiratory and musculoskeletal conditions. Discharges as a percentage of all discharges range from 8% (Cyprus) to 25% (Luxembourg) for circulatory conditions, 5% (Italy) to 18% (Slovenia) for respiratory conditions and 2% (Cyprus) to 12% (Austria) for musculoskeletal conditions.

Figure Hospital discharges by diagnosis per 100,000 population as percentage of all discharges 2007



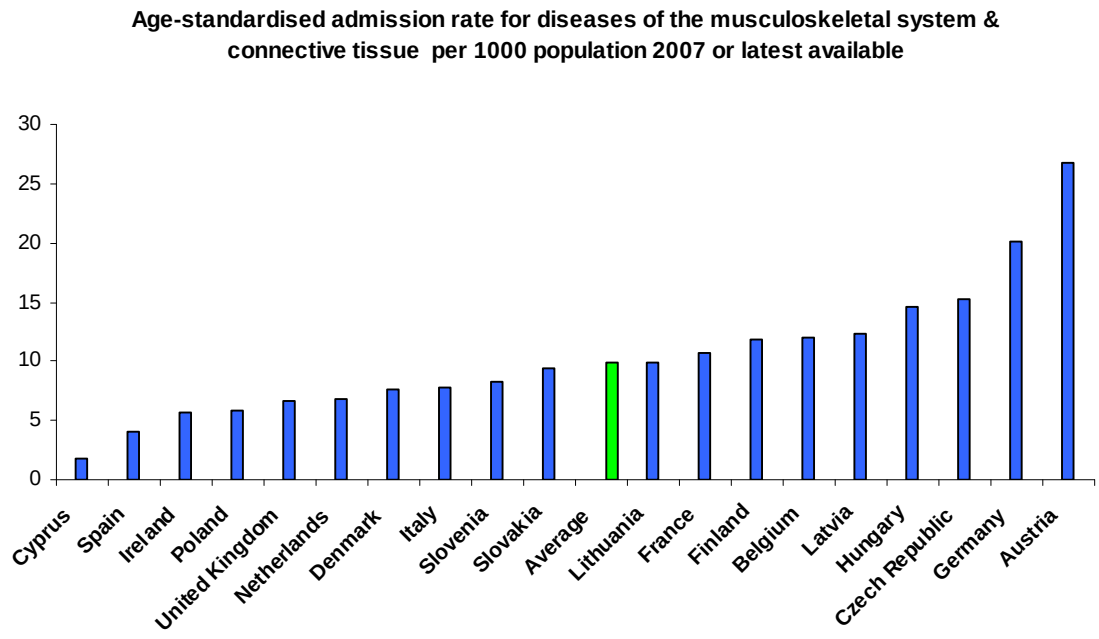
Source: EUROSTAT 2011

http://epp.eurostat.ec.europa.eu/portal/page/portal/health/public_health/data_public_health/database

Hospital services utilisation - Age-standardised admission rates

Age standardised hospital admission rates allow for a comparison of hospital services utilisation between countries taking into account differing population age structures. There is a wide range in the age-standardised admission rates for musculoskeletal conditions across EU Member States from a low of 1.8 in Cyprus to a high of 26.8 in Austria.

Figure Age-standardised admission rate for MSC per 1,000 population, 2007 or latest available

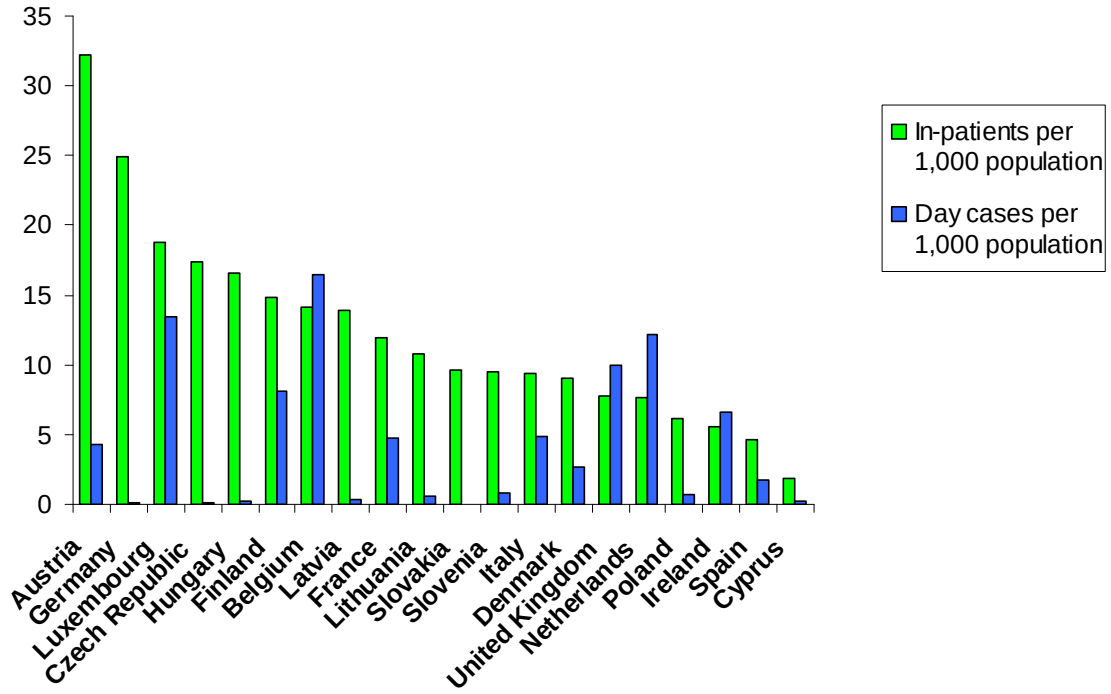


Source: WHO European Hospital Morbidity database 2010.
http://data.euro.who.int/hmdb/index.php.
Data from 2007 except Spain & Netherlands (2005), Italy Denmark (2006), Latvia, Lithuania (2008).

Hospital services utilisation - day cases

The number of day cases for musculoskeletal conditions varies widely across EU Member States. Eurostat defines day case as: medical and paramedical services delivered to patients who are formally admitted for diagnosis, treatment or other types of health care with the intention of discharging the patient on the same day. An episode of care for a patient who is admitted as a day care patient and subsequently stays overnight is classified as an overnight stay or other inpatient case (http://epp.eurostat.ec.europa.eu/cache/ITY_SDDS/Annexes/hlth_care_esms_an9.pdf) The highest number of day cases is in Belgium (16.5) and the lowest is in Germany (0.1).

Figure In-patients and day cases for MSC per 1,000 population, 2007 or latest available



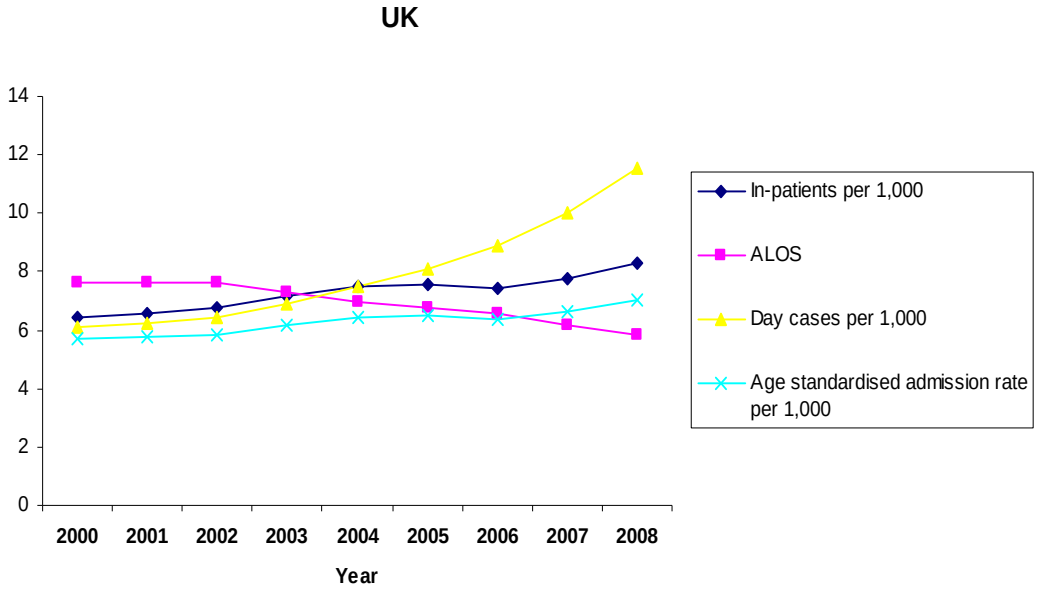
Source: WHO European Hospital Morbidity database 2010.
http://data.euro.who.int/hmdb/index.php.
Data from 2007 except Spain & Netherlands (2005), Italy Denmark (2006), Latvia, Lithuania (2008).

Variation in utilisation of hospital services for MSC

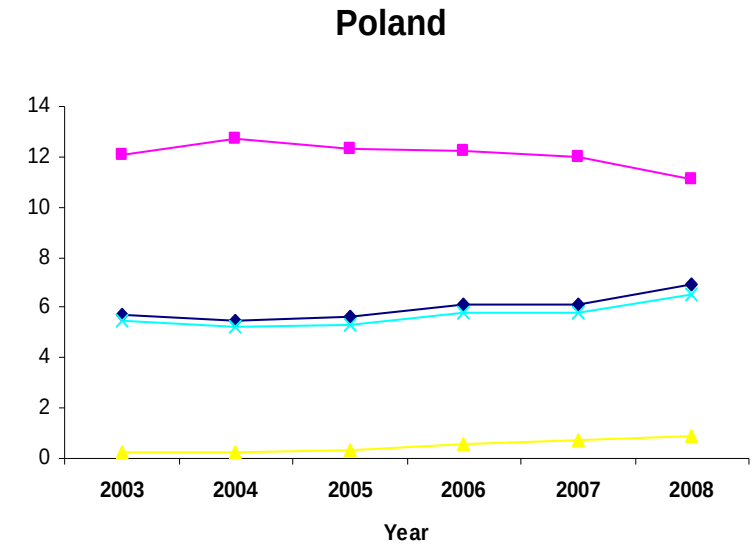
In order to interpret the data on admissions rates, average length of stay, in-patients and day cases presented earlier it is useful to see how they relate to one another. The utilisation of hospital services for musculoskeletal conditions varies considerably between countries. There has been an overall trend for the number of day cases to increase and the average length of stay to decrease over recent years. This is consistent with trends in hospital services utilisation as a whole. In Europe between 1195 and 2008 the average number of hospital beds per 1,000 population fell from 7.3 to 5.7. This was accompanied by a fall in the average length of stays (OECD 2010).

Across all member states progress in medical technologies has facilitated a move towards more day surgery. Another factor in the increase in day cases is the implementation of health cost containment policies in many countries (OECD 2010). These trends are shown in the following graphs. Compared to the UK and the Netherlands, the number of day cases is substantially less in Poland and Finland. Please note that data provided by countries may contain some coding errors or be affected by specific national practices of applying ICD codes for certain reasons of hospitalisation. Within countries there may also be changes in coverage which affect the apparent trend.

Figure Variation in utilisation of hospital services for MSC



Source: WHO European Hospital Morbidity database 2010. http://data.euro.who.int/hmdb/index.php.


Poland
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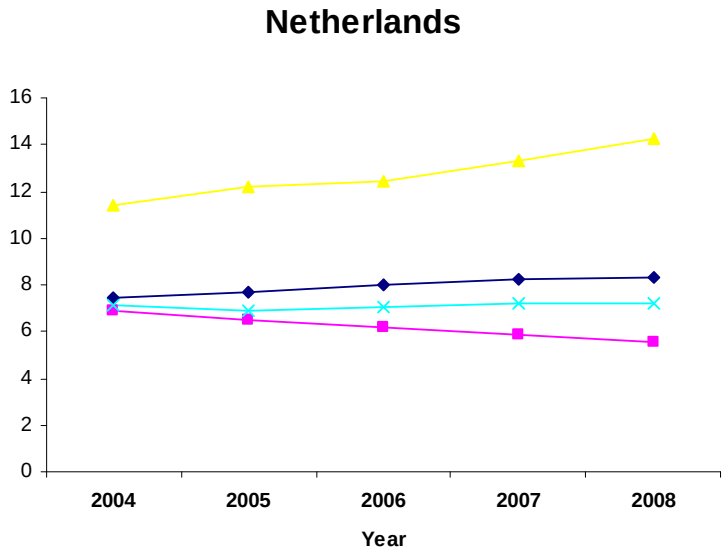
Netherlands
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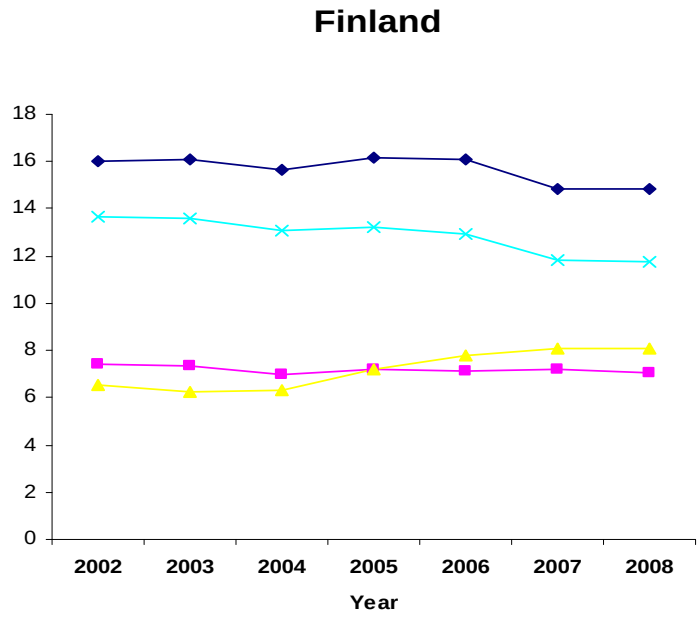
Finland
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Hospital services utilisation - Number of surgeries hip and knee arthroplasty

Data that is of direct relevance to MSC and has good availability is that relating to arthroplasty. Data is available from the OECD on specific surgical procedures including hip replacement (ICD-9-CM 81.51-81.53) and knee replacement (8 ICD-9-CM 1.54-81.55). Other important sources are the European joint replacement register (EAR) and national registers of joint replacement surgery. These can be accessed via the European Federation of National Associations of Orthopaedic and Traumatology (EFORT) website (http://www.efort.org/E/05/01-50.asp).

Hip replacement is usually a consequence of osteoarthritis or osteoporotic fracture. The number of hip replacement procedures differ significantly across EU Member States. The volume of surgeries is a product of:

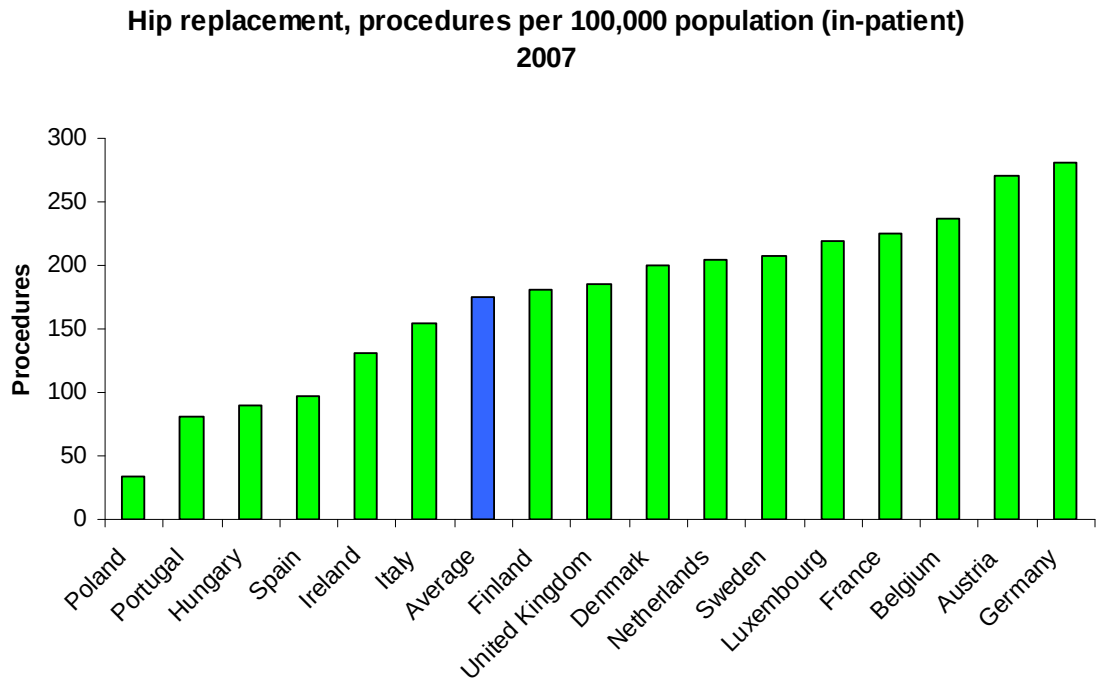
- prevalence of the condition
- availability of appropriate medical resources
- Differences in clinical treatment guidelines and practices
- International mobility across EU borders

Low rates may point to under-treatment or may be due to good control of the underlying systemic disease.

Scandinavia has the highest reported incidence of hip fracture worldwide (Cooper et al 2011) so it would be expected that they would have a higher than average number of hip replacements. The incidence of hip fracture tends to be lower in Southern Europe so the lower than average number of hip replacement procedures in Spain and Portugal is to be expected. Merx et al (2003) suggest that the substantial international variation in hip replacement rates may be due not only to differences in the incidence of hip fracture but also to differences in population age structure, health care systems, expenditure on health per capita and different indication criteria for total hip arthroplasty. Over the period 1998-2008 the number of hip replacements has

increased rapidly in most European countries. On average the number of hip replacements has increased by one third (OECD 2010).

Figure Hip replacement procedures



Source: Surgical procedures by ICD-9-CM, Hip replacement, Procedures per 100 000 population (in-patient) OECD Health Data 2009 - Version: November 09

The data in Table is from the Swedish hip register for the period 1992-2005. It shows that primary osteoarthritis is the chief diagnosis for total hip replacement (THR) across all age groups with over 75% of the total share peaking in the age group 60-75 years. Fracture as a diagnosis for THR increases with age, rising dramatically in the over 75 year age group. Inflammatory arthritis as a cause for THR is high in the under 50 age group at over 17%.

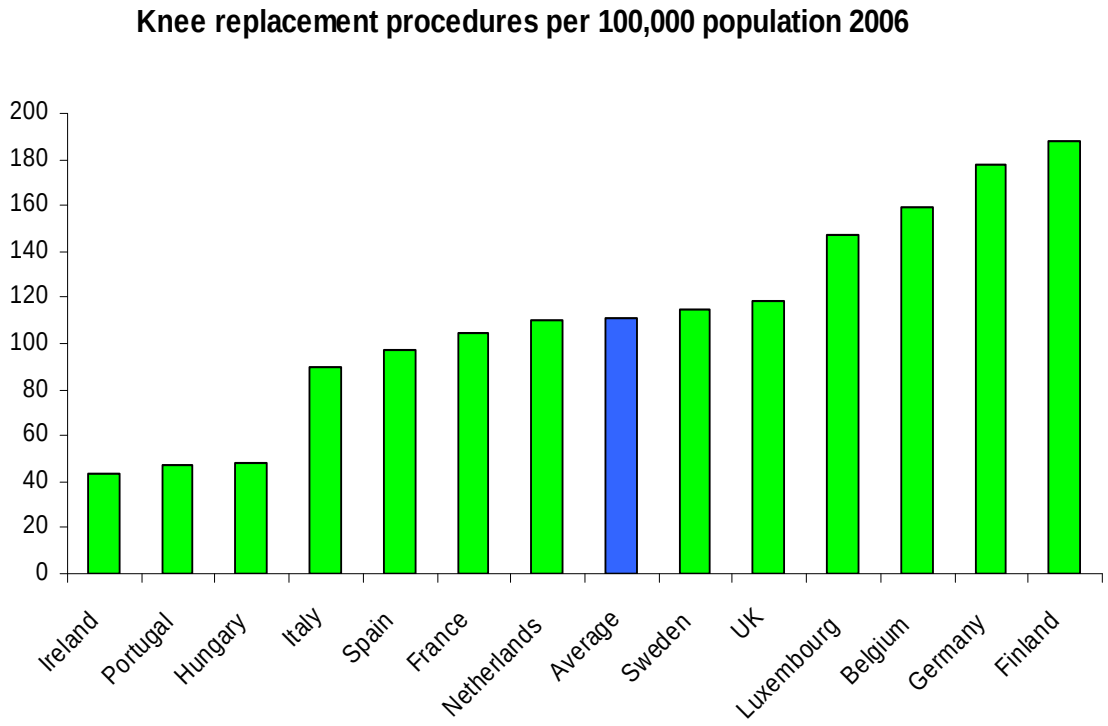
Table Number of Primary Total Hip Replacements per Diagnosis and Age Swedish Hip Register 1992-2005

Diagnosis	< 50 years	50-59 years	60-75 years	> 75 years	Total Share
Primary osteoarthritis	53.5%	79.5%	81.6%	68.1%	75.7%
Fracture	3.5%	4.3%	8.2%	21.4%	11.7%
Inflammatory arthritis	17.3%	6.6%	4.2%	2.2%	4.5%
Idiopathic femoral head necrosis	6.3%	2.7%	2.0%	3.8%	2.9%
Childhood disease	13.7%	4.0%	0.8%	0.3%	1.7%
Secondary osteoarthritis	1.5%	0.6%	0.7%	1.4%	0.9%
Tumor	1.1%	0.8%	0.4%	0.3%	0.5%
Secondary arthritis					
After trauma	0.8%	0.3%	0.2%	0.3%	0.3%
(missing)	2.3%	1.3%	1.9%	2.2%	1.9%
Total	100%	100%	100%	100%	100%

Source: Swedish Hip Arthroplasty Register

Knee replacement is usually a consequence of osteoarthritis. Considering data from 16 EU Member States (not including those in eastern and Central Europe), the number of knee replacement procedures is highest in Finland and lowest in Ireland. As in hip replacement there are a higher than average number of procedures in the Scandinavian countries, Germany and the UK and lower in Italy and Portugal. Those factors affecting knee replacements are likely to be similar to those raised by Merx et al (2003) in relation to hip replacements. The number of knee replacement procedures undertaken in Europe doubled in the period 1998-2008 (OECD 2010).

Figure Knee replacement procedures



Source: Surgical procedures by ICD-9-CM, Knee replacement, Procedures per 100 000 population (in-patient) OECD Health Data 2009 - Version: November 09

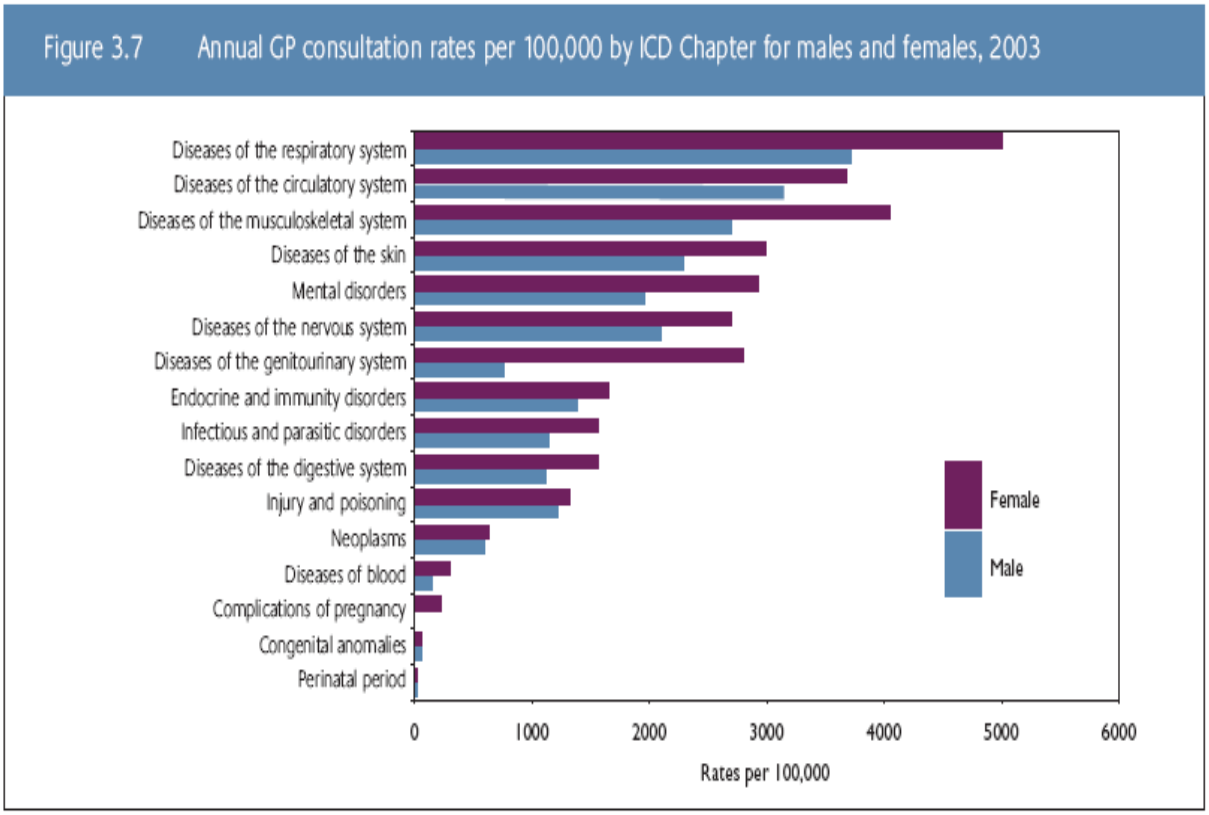
Health Services Utilisation - Primary & Community Care

People with musculoskeletal complaints are frequent visitors to primary health care centres, hospitals, and paramedical institutions (e.g. physiotherapy and chiropractic). Comparison of GP utilisation between countries is limited because in some countries the GP has much more of a gatekeeping function than in others. In Spain, Portugal, Italy, Finland, Denmark, Norway, United Kingdom, Ireland and the Netherlands the GP has an explicit gatekeeping role (Kroneman et al 2006). In Luxemburg, Belgium, Germany, Austria, France, Sweden and Greece direct access to most other services is possible (Kroneman et al 2006).

Statistics from the Netherlands health service for 2009 showed that 13.3 % of patients attending a GP for one or more episode of care do so for a musculoskeletal condition. Data from the second Dutch national survey of general practice indicate neck and upper extremity symptoms are common in Dutch general practice with GPs consulted approximately seven times per week for a complaint relating to the neck or upper extremity (Bot et al 2005). In Italy the frequency of visits to GPs for musculoskeletal conditions ranges between 10% and 18% of total consultations (Cimmino 2007).

In the UK diseases of the musculoskeletal system are third behind diseases of the respiratory and circulatory systems as causes for GP consultations by men. In women they rank second after the respiratory system.

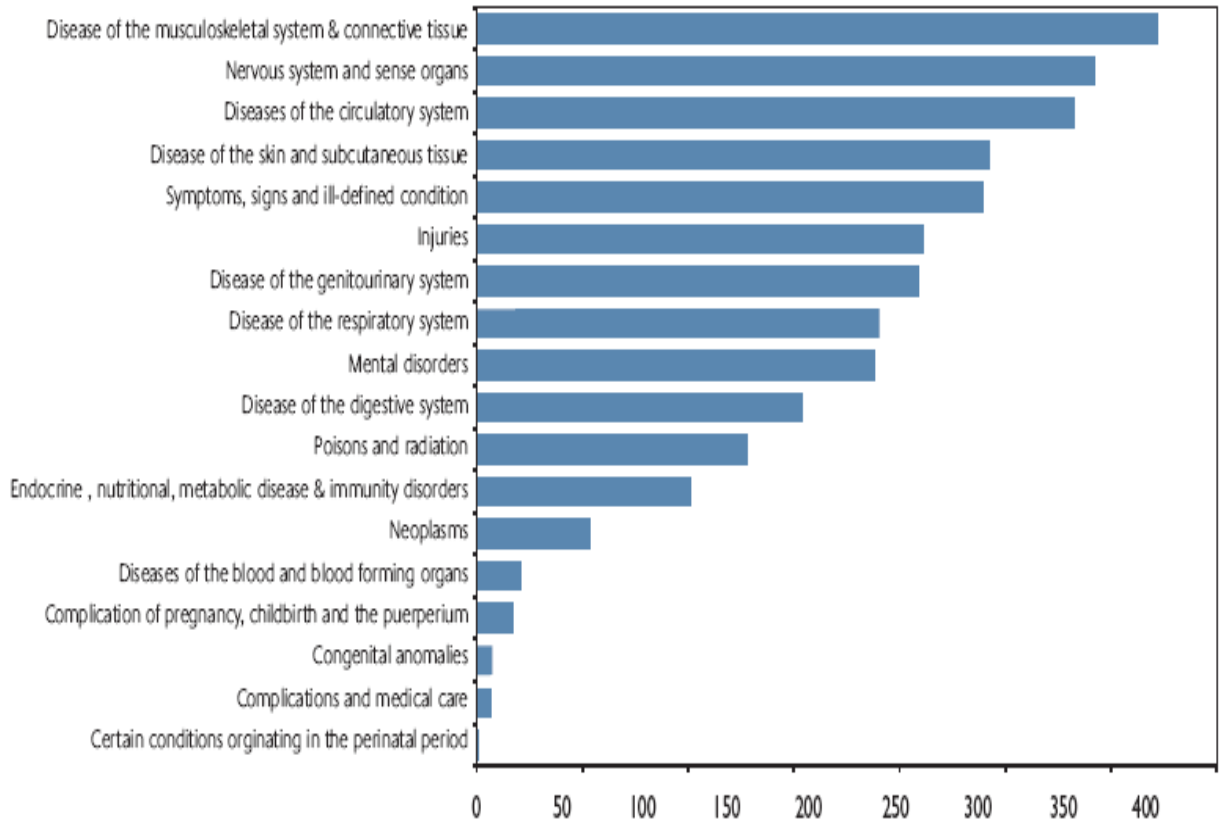
Figure The burden of MSC on primary care in the UK – consultation rates 2003



Source: Health Protection Agency. Health Protection in the 21st Century. London: 2005

If infectious diseases are excluded musculoskeletal problems and conditions were the commonest reason for GP consultation in the UK in 2003.

Figure The burden of MSC on primary care in the UK – consultation rates for non-infectious disease 2003 per 100,000 population

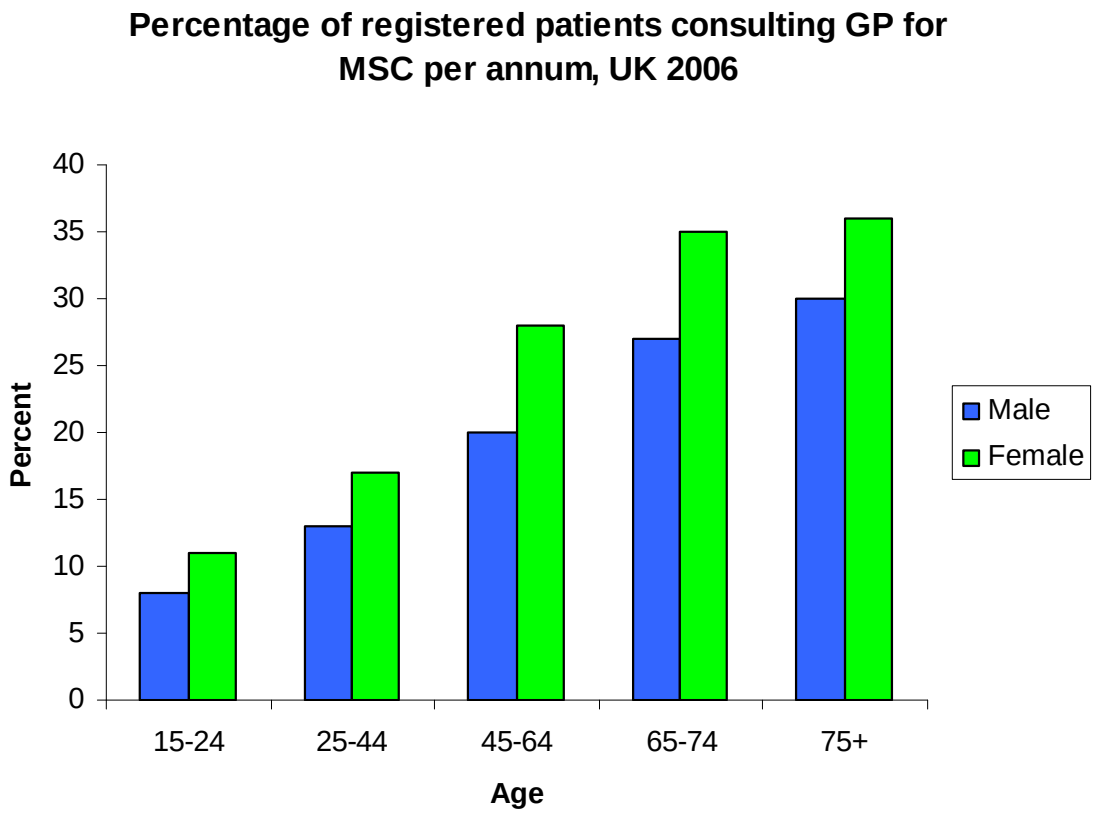


Source: Health Protection Agency. Health Protection in the 21st Century. London: 2005

In the UK, in 2006,10.1 million patients consulted their GP at least once for MSC. and one in seven of all recorded primary care consultations during 2006 were for a musculoskeletal problem. One in four of the registered population consulted for a musculoskeletal problem in that year, rising to more than one in three of older adults. The back was the most common reason for consultation, followed by the knee, chest and neck (Jordan et al 2010).

In the UK across all age groups a higher percentage of women than men consult their GP for MSC. In the 75 year age group over 35% of female registered patients consulted their GP for a MSC in 2006.

Figure GP consultations for MSC by age and gender, UK 2006



Source: Royal College of Practitioners, Birmingham Research Unit. Annual Prevalence Report 2006.

Occupational therapists, physiotherapists and chiropractors provide care for those with MSC. It is very difficult to obtain comparable data across the EU on consultations for MSC with these professionals. One source of data is the European Health Interview Survey (EHIS) which asks a general question about visits to physiotherapists, occupational therapists and chiropractors:

During the past 12 months, have you visited on your own behalf a…?

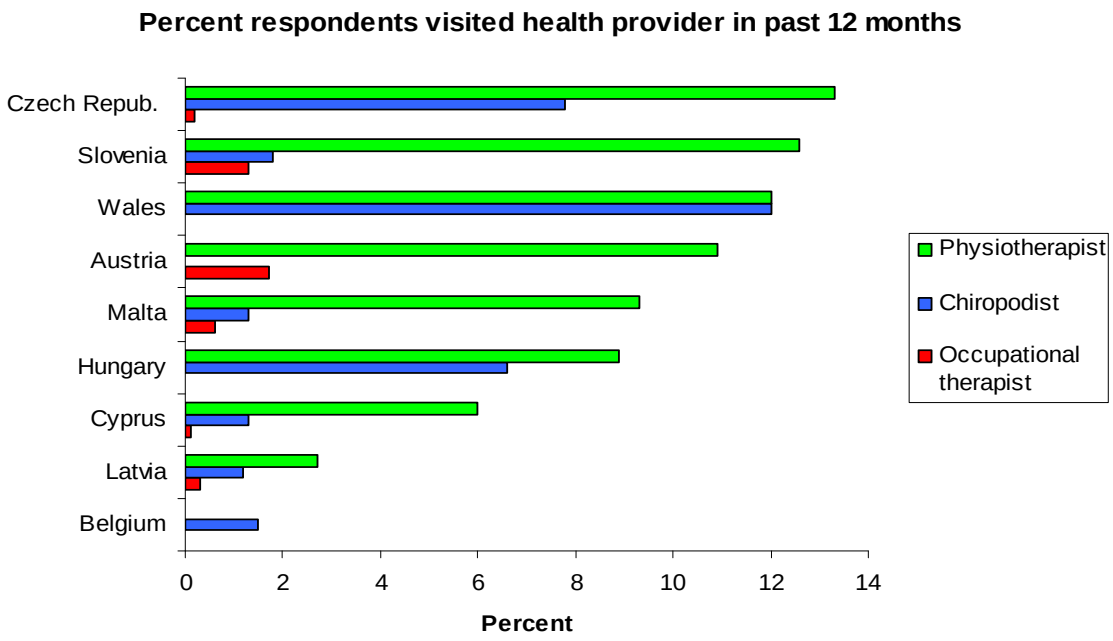
Physiotherapist

Occupational Therapist

Chiropractor

Given that the EHIS question does not relate directly to MSC caution is needed in interpretation particularly in relation to the use of Occupational Therapists. Physiotherapists work almost exclusively with MSC and therefore the data here is more useful. In the Czech Republic nearly 14% of respondents had visited a physiotherapist in the past 12 months this contrasts with Latvia where the figure was less than 4%. In Wales 12% of respondents had visited a chiropodist in the previous 12 months.

Figure Percent respondents visited health provider in past 12 months



Source: EHIS; Wales National Health Survey; Austria National Health Survey

Human resources

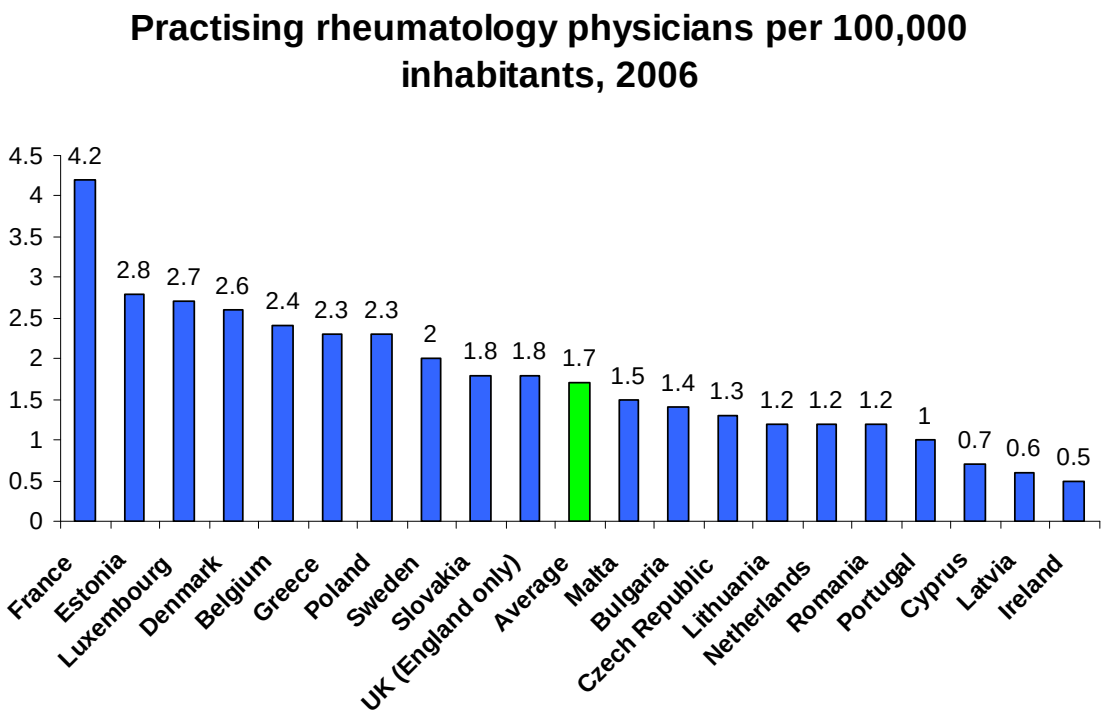
A range of practitioners manage musculoskeletal problems. These include specialists, general practitioners, community pharmacists, physical therapists (physiotherapists,

chiropractors, osteopaths), occupational therapists, behavioural therapists (counsellors, psychologists and psychotherapists) and complementary medicine practitioners (for example, acupuncturists and aromatherapists). Measuring human resources is problematic because concepts used for medical specialties differ across the EU Member States. In particular there are differences in the roles carried out by associated health professionals which makes direct comparison of human resources between countries problematic.Whilst on a national level there may be good access to health professionals there may be large regional variations. This regional variation in availability may affect the equity of access.

Rheumatologists

The number of practising rheumatologists varies widely across the EU. The highest number per 100,000 inhabitants is found in France (4.2). This compares to less than 1 per 100,000 in Cyprus, Latvia and Ireland.

Figure.. Rheumatology physicians per 100,000 inhabitants 2006



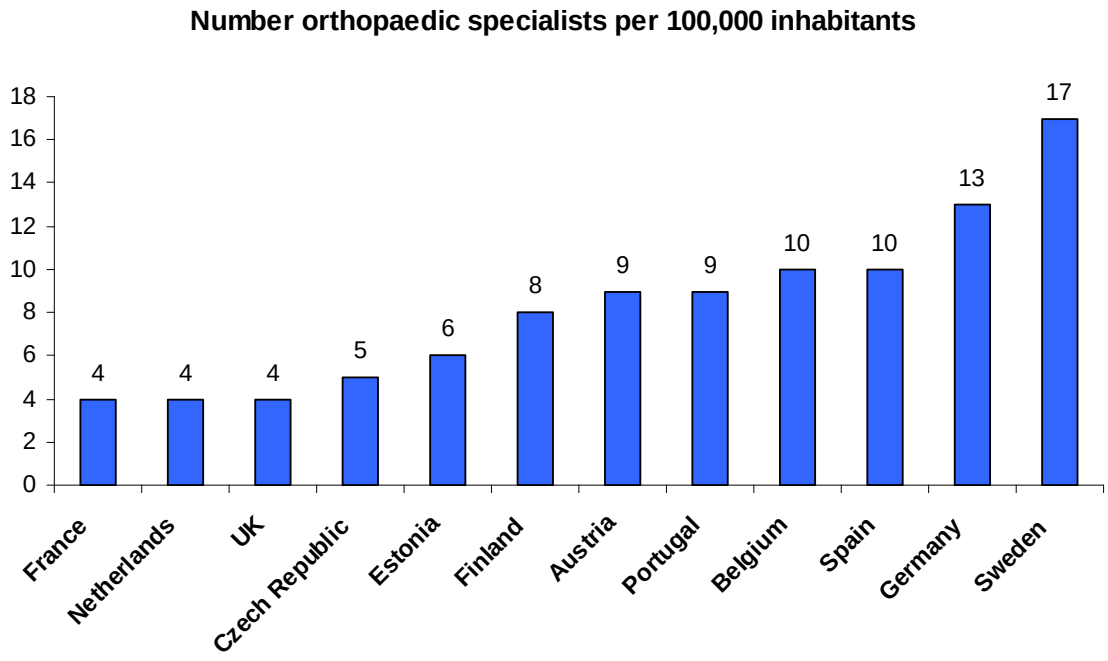
Source: Eurostat 2011

http://epp.eurostat.ec.europa.eu/portal/page/portal/health/public_health/database

Orthopaedic Specialists

There are some problems in obtaining comparable data between countries on the number of Orthopaedic specialists as some statistics refer to practising specialists, others to licensed or registered. Current EUROSTAT data on the number of surgeons is not disaggregated to allow the number of Orthopaedic surgeons per 100,000 inhabitants by country to be displayed. The figures displayed in Table must therefore be interpreted with caution. Data on the number of orthopaedic specialists was obtained from eumusc.net project collaborators in each country. Where possible the figures refer to practising rather than registered specialists and refer to 2010. Figures for the UK come from the British Orthopaedic Manpower census 2009 (http://www.boa.ac.uk/en/publications/orthopaedic-manpower-census/). Please note that figures for Sweden and Germany refer to the number of orthopaedic specialists with a specialist certificate not all of which may necessarily be practising.

Figure Orthopaedic specialists per 100,000 inhabitants 2010

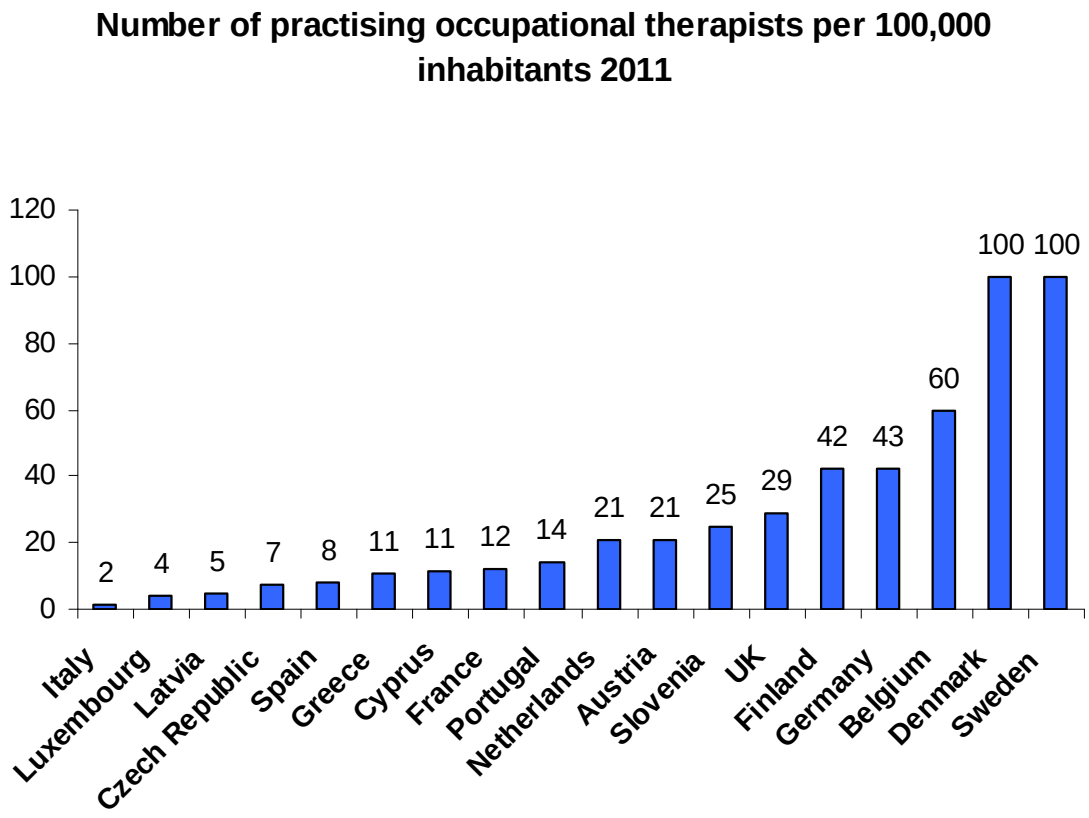


Source: Data from eumusc.net collaborators in each country. Figures for the UK come from the British Orthopaedic Manpower census 2009 http://www.boa.ac.uk/en/publications/orthopaedic-manpower-census/

Occupational Therapists

The number of practising Occupational Therapists also varies widely across the EU27. The role of the Occupational Therapist in relation to MSC varies significantly between countries. The highest number per 100,000 inhabitants is in Sweden and Denmark (100), there are less than 5 per 100,000 in Luxembourg and Italy.

Figure Number of practising Occupational Therapists per 100,000 inhabitants 2011

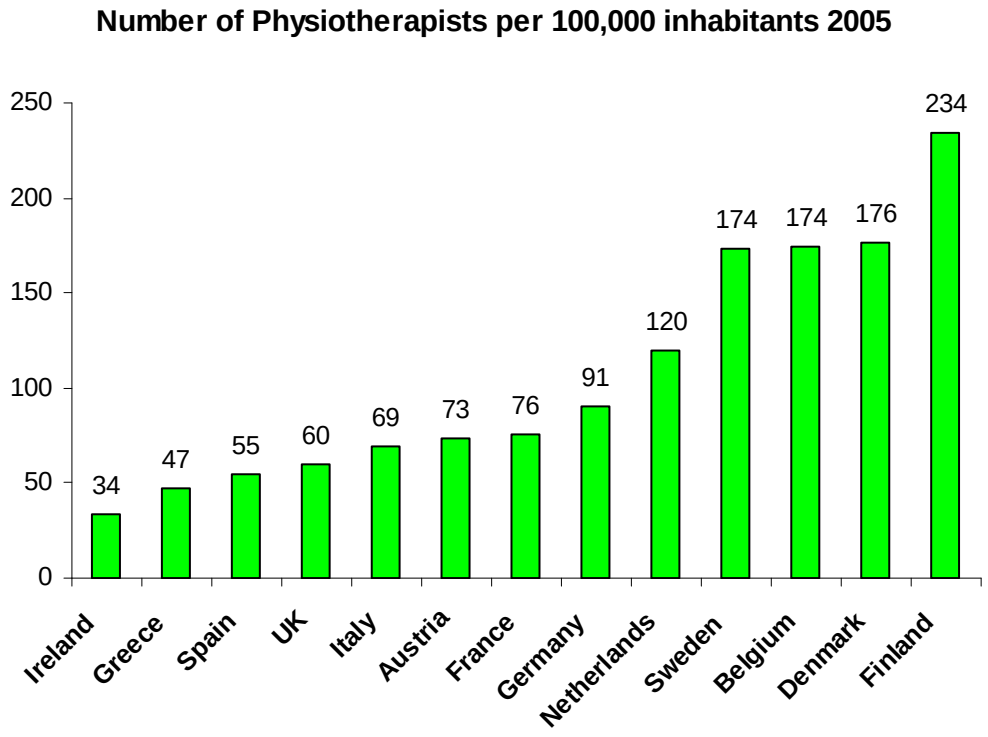


Source: Council for Occupational Therapists in the European Countries ***www.cotec-europe.org***

Physiotherapists

Again with Physiotherapists there is a large variation in the number per 100,000 inhabitants. The highest number is in Finland (234) and the lowest in Ireland (34).

Figure.. Number of Physiotherapists per 1000,000 inhabitants, 2005.



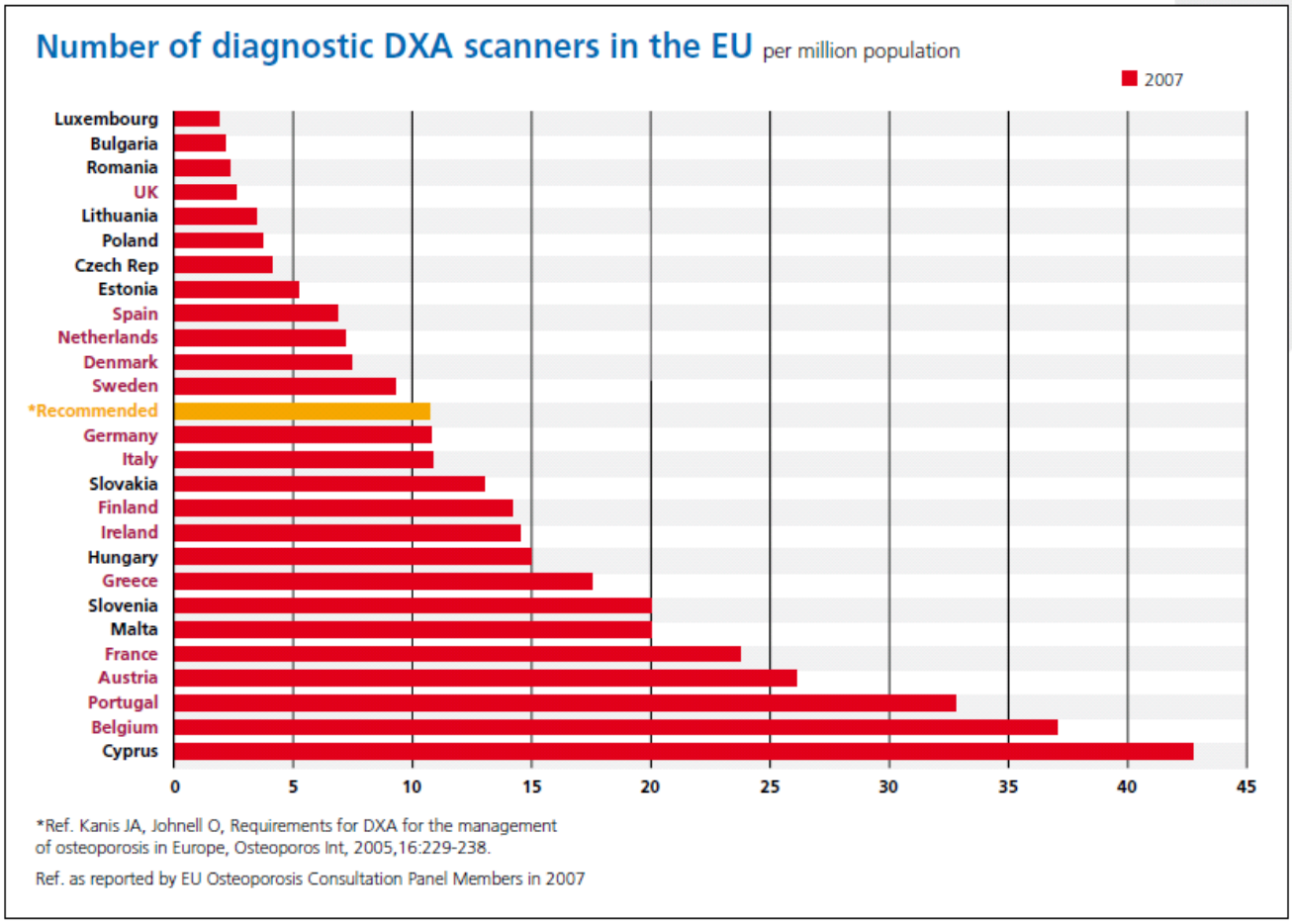
Source: European Region of the World Confederation for Physical Therapy 2005

Diagnostic equipment

There is a lack of data on equipment for diagnosing musculoskeletal conditions. There is data for the EU27 on the number of MRI and CT scanners and examinations however as these do not distinguish between their use for musculoskeletal and other conditions they are of limited use. There is some data on the number of diagnostic DXA scanners in EU.

The gold standard for assessing bone mineral density (BMD) is dual energy X-ray absorptiometry (DXA). This non-invasive technique measures the bone mineral content of the skeleton. DXA measurements are used for the diagnosis of osteoporosis and are used in assessing the probability of future fractures, the lower the bone density, the higher the risk for fracture. Diagnostic DXA are also used to monitor response to treatment. The chart in Figure is from a publication by the International Osteoporosis Foundation (IOF) and shows the estimated number of DXA scanners per country in 2007. The IOF quote the recommended number of DXA scanners per million population of 10.6 (calculated by Kanjis et al 2005). The chart indicates that almost 40% of EU member states fall below this target.

Figure Number of diagnostic DXA scanners in the EU per million population 2007.



Drug use

In recent years, for the majority of MSC, there has been considerable progress in medical and surgical management techniques leading to a reduction in the pain and disability arising from these conditions. In particular there have been significant advances in the effectiveness of treatments for RA and there is evidence to suggest that the improvement in the health status of those with RA can be attributed to the more aggressive use of and increased accessibility to, these treatments (Heiberg et al 2005;Krishnan & Fries 2003; Uhlig et al 2008).

Treatment of RA focuses on the suppression of inflammation. It is treated with non-steroid anti-inflammatory drugs (NSAIDs) usually in combination with disease modifying antirrheumatic drugs (DMARDs). In the late 1990s so called 'biologics' such as TNF inhibitors were introduced. They have a strong effect on inflammation and can prevent or slow the progression of joint erosion.

Across the EU in recent decades there has been an upward trend in expenditure on pharmaceuticals. There is a wide variation between different countries. Factors which contribute to this variation include (Lambrelli & O'Donnell 2009; Nolte et al 2010):

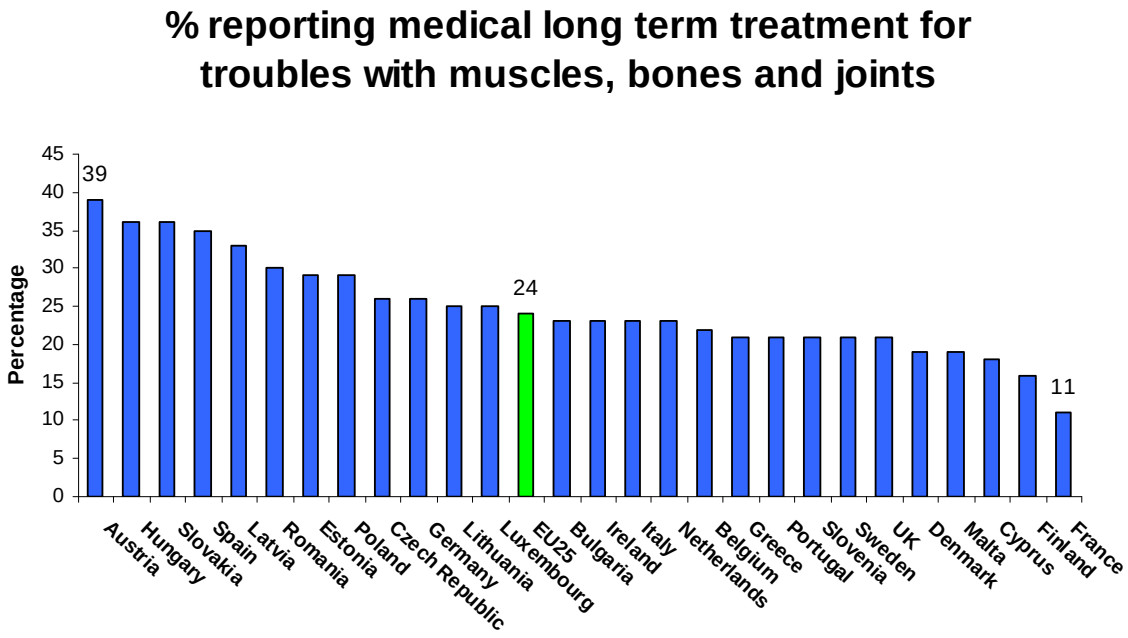
- Differences in the demography and health status of the population e.g. proportion of elderly in the population.
- Differences in organization and financing of pharmaceuticals supplies e.g. reimbursement policies.
- Cultural differences in the use of medication.
- Differences in clinical practice e.g. differences in prescribing practice.
- Differences in service organisation and delivery e.g. access to specialists.

Self-reported medication use for MSC

In a large scale pan European survey when asked about their reasons for long-term medical treatment 24% stated that it was for long standing problems with muscles, bones and joints and 8% for osteoporosis (European Commission 2007). This varies widely by country with lower levels in France, Finland and Cyprus and higher levels

in Slovakia, Hungary and Austria. With the exception of Slovenia and Bulgaria the Central and Eastern European countries had higher than average reported levels of long term treatment.

Figure Longterm treatment because of longstanding troubles with muscles, bones and joints (arthritis, rheumatism)



Source: European Commission 2007

Data on self reported medication use for MCS is available from EHIS and National Health Interview Surveys. The relevant EHIS questions are:

During the past two weeks, have you used any medicines (including dietary supplements such as herbal medicines or vitamins) that were prescribed or recommended for you by a doctor? Were they medicines for…?

F. Pain in the joints (arthrosis, arthritis)

G. Pain in the neck or back

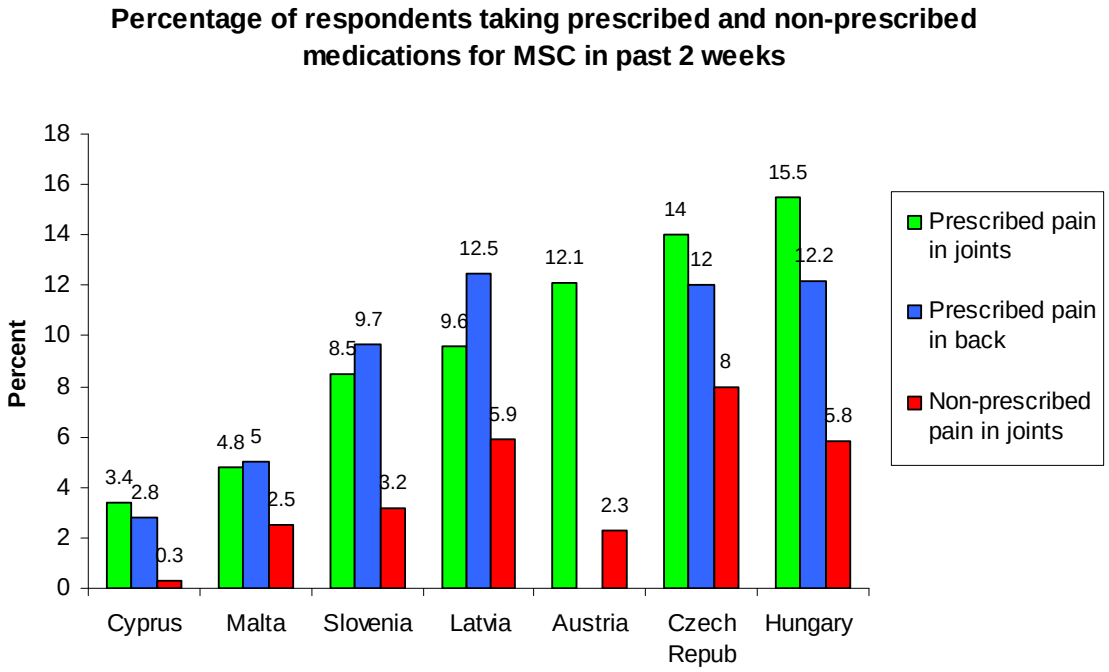
During the past two weeks, have you used any medicines or dietary supplement or herbal medicines or vitamins not prescribed or recommended by a doctor?

Were they medicines or supplements for…?

A. Pain in the joints (arthrosis, arthritis)

This data was obtained for 7 countries. In Hungary, Czech Republic and Latvia over 12% of respondents reported prescribed medicine for back pain in the past 2 weeks. Over 15% of respondents in Hungary reported taking prescribed medicine for pain in joints, the rate was also high in the Czech Republic and Austria. Cyprus and Malta showed very low levels over all.

Figure Percentage of all respondents taking medication for MSC in past 2 weeks



Source: EHIS and Austria National Health Surveys.

Austria 2006; Slovenia 2007; Czech Republic , Cyprus, Latvia, Malta 2008; Hungary 2009.

Pharmaceuticals consumption for MSC

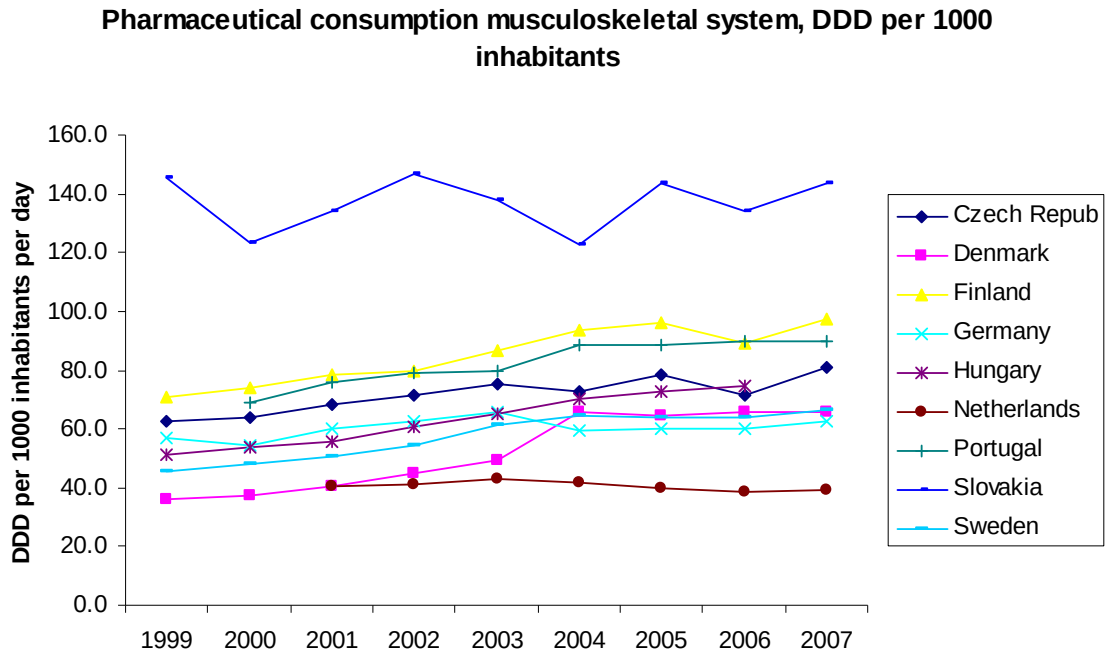
Data on the consumption of pharmaceuticals is available form the OECD Health database. This uses data obtained from national medicine sales register. There are a

number of sources of under-reporting of drug sales in different countries. Sales data may exclude drug consumption in hospitals and they may only cover drugs reimbursed by public insurance schemes. In addition drug sales may be based on ex-factory or wholesale prices rather than retail prices. Underestimates are reported for France, Germany, Luxembourg, the Slovak Republic and Spain (www.ecosante.fr/OCDEFRA; http://www.healthindicators.eu/healthindicators/object_document/o5873n28314.html). Most drugs used for MSC can also be used for different non MSC conditions and therefore data is difficult to interpret.

A common problem when comparing drugs is that different medication can be of different strengths and different potency. Simply comparing 1mg of one, with 1mg of another can be confusing, particularly if different countries use different doses. The Defined Daily Dose system (DDD) aims to solve this by relating all drug use to a standardized unit which is analogous to one day's worth. The DDD is the assumed average maintenance dose per day for a drug used for its main indication in adults. For example, paracetamol has a DDD of 3g, which means that an average patient who takes paracetamol for pain relief uses 3 gram per day. DDDs are used to standardize the comparative usage of various drugs between themselves or between different health care environments.

Figure shows that consumption of drugs for the musculoskeletal system is highest in Slovakia and lowest in the Netherlands. The irregular pattern of consumption over time in Slovakia suggests that there may be data collection issues here – this is worthy of further clarification. There has, in most countries, been an increase in consumption of pharmaceutical drugs for the musculoskeletal system over the period 1999-2007. In the Netherlands consumption has been relatively static over this period with a slight decline.

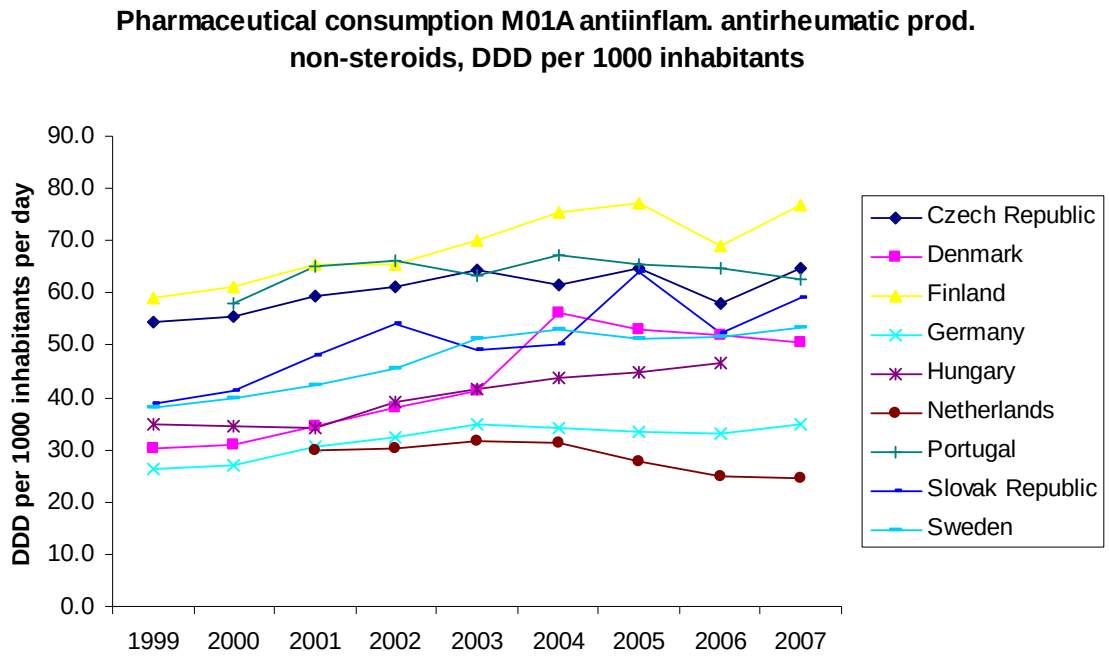
Figure Pharmaceutical consumption, Musculoskeletal System, Defined daily dosage per 1000 inhabitants per day



Source: OECD HEALTH DATA 2009, November 09

Figure shows that consumption of anti-inflammatory, antirheumatic non-steroidal drugs is highest in Finland and lowest in the Netherlands. There has, in most countries, been an increase in consumption over the period 1999-2007. In the Netherlands consumption declined significantly between 2004-2007.

Figure Pharmaceutical consumption, M01A-Antiinflammatory,antirheumatic products & non-steroids, Defined daily dosage per 1000 inhabitants per day

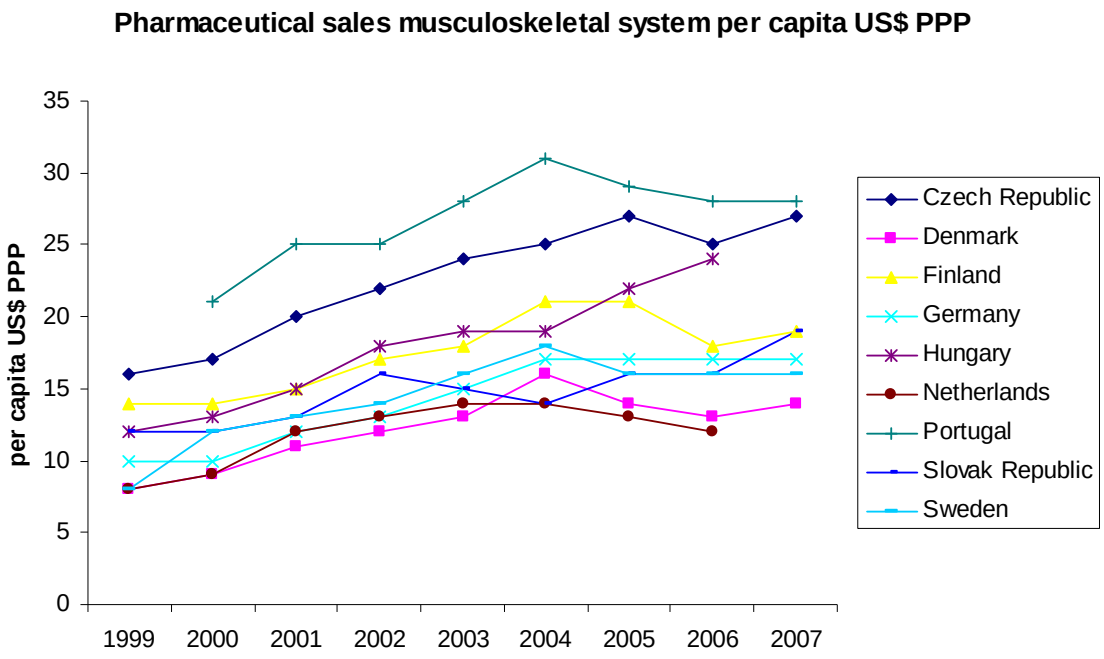


Source: OECD HEALTH DATA 2009, November 09

Pharmaceuticals sales for MSC

The same problems of underestimation mentioned above apply here. To compare pharmaceutical sales purchasing power parity (PPP) is used. PPP is an economic technique used when attempting to determine the relative values of two currencies. It is useful because often the amount of goods a currency can purchase within two nations varies greatly, based on availability of goods, demand for the goods, and other factors. PPP solves this problem by taking some international measure and determining the cost for that measure in each of the two currencies, then comparing that amount. In this case it enables the comparison of pharmaceutical sales across 9 different countries. Whilst pharmaceutical consumption for MSC was lowest in the Netherlands and Germany, Germany has higher sales than the Netherlands, Denmark and Sweden.

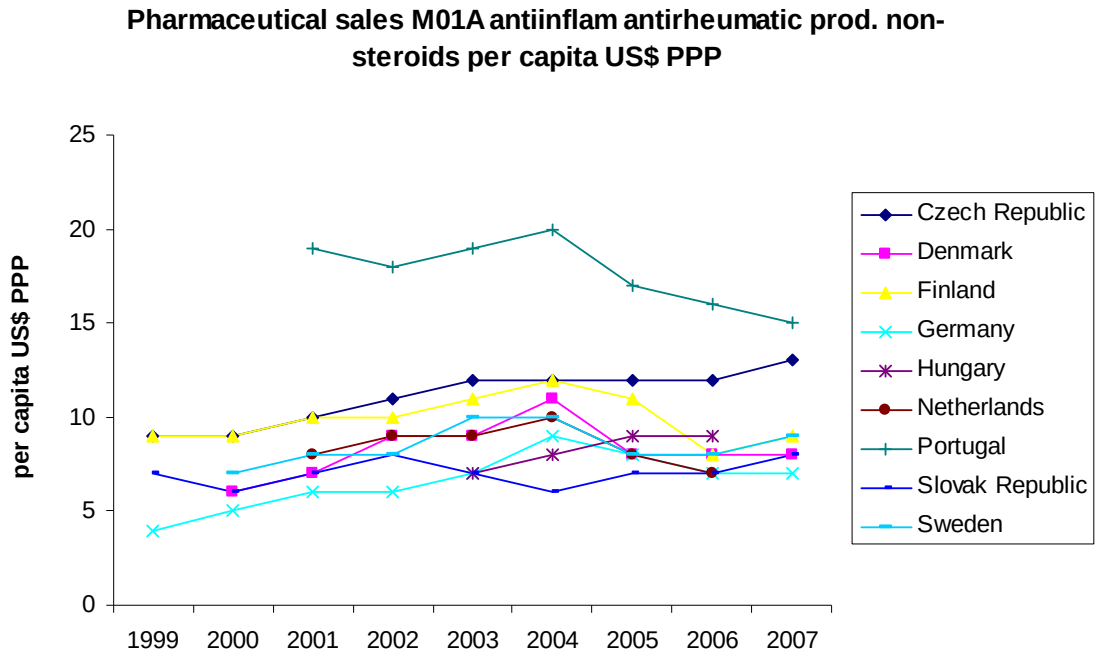
Figure Pharmaceutical sales, Musculoskeletal system per capita US$ PPP



Source: OECD HEALTH DATA 2009

Figure shows that sales of anti-inflammatory, antirheumatic non-steroidal drugs are highest in Portugal and Czech Republic and lowest in Sweden and Slovak Republic. Sales have fluctuated over the period, Czech Republic shows a steady rise in sales. This compares with a decline of sales in Portugal.

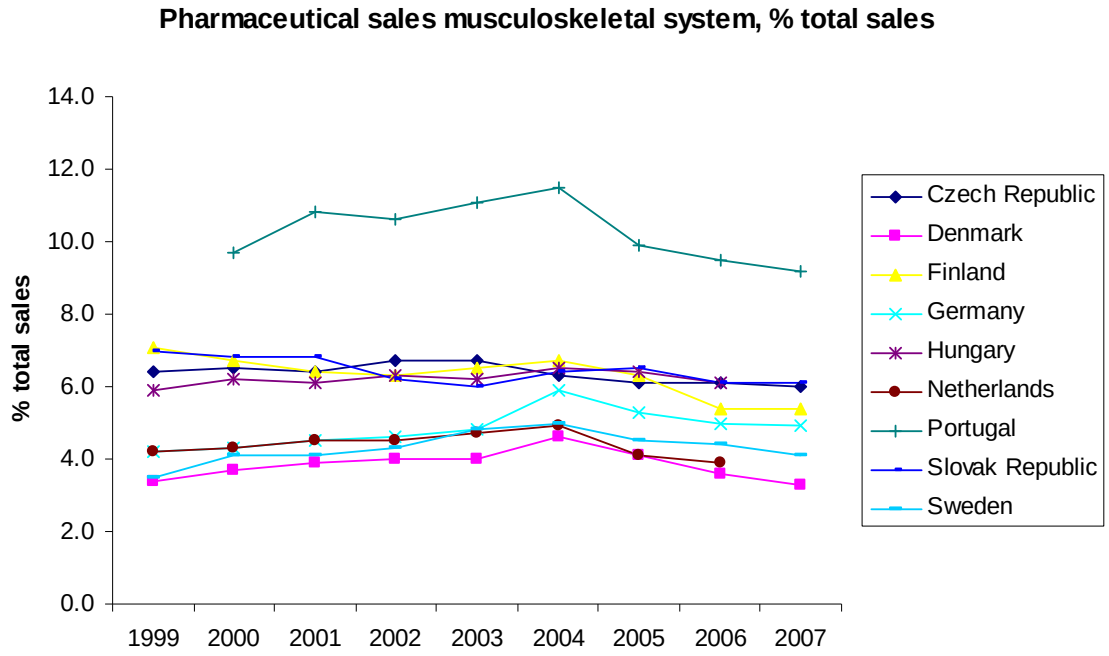
Figure Pharmaceutical sales, M01A Anti-inflammatory, antirheumatic products & non-steroids per capita US$ PPP



Source: OECD HEALTH DATA 2009

The sales of pharmaceuticals for the musculoskeletal system as a percentage of total pharmaceutical sales appear to have been relatively static between 1999 and 2007 with most countries showing a slight fall. Sales of pharmaceuticals for the musculoskeletal system as a percentage of total sales were lowest in Denmark, the Netherlands, and Sweden and highest in Portugal.

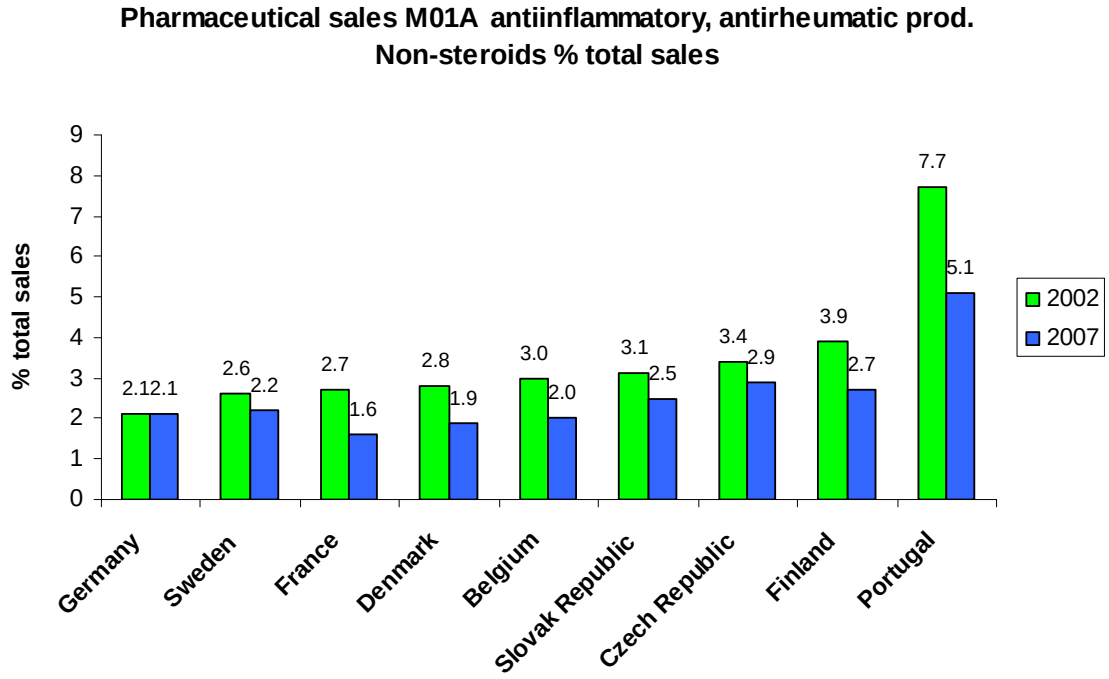
Figure Pharmaceutical sales musculoskeletal system, % total sales



Source: OECD HEALTH DATA 2009

The data in Figure suggests that with the exception of Germany the sales of anti inflammatory, antirheumatic products (M01A) as a percentage of total sales fell in the period 2002-2007.

Figure Pharmaceutical sales M01A Anti-inflammatory, antirheumatic products & non-steroids as % total of sales



Source: OECD HEALTH DATA 2009

International variation in use of TNF inhibitors & DMARD

Jonsson et al (2008) examined the international variation in the use of TNF inhibitors and of conventional DMARDS for the treatment of rheumatoid arthritis for the period 2000-2006. High uptake was observed for Sweden, the Netherlands and Finland; France Spain and the UK were around the EU 13 average. Germany Italy and countries of central and Eastern Europe were below this average. Possible reasons for differences proposed by the authors were:

- Differences in GDP (although there were large differences between countries with similar GDP)
- Differences in relative price levels
- Differences in national preferences and priorities
- Variations in access to rheumatologists

Variations in clinical guidelines have also been suggested as a reason for variation in usage of biological treatments (Kobelt & Kasteng 2009).

Impact on the individual

Musculoskeletal conditions can profoundly affect many aspects of the life of the individual, including physical and mental well-being, economic well-being and physical and emotional relationships. They impact on the life not only of the individual but also of carers, family and friends.

The impact of musculoskeletal conditions on the individual can be considered within the framework of the WHO International Classification of Functioning, Disability and Health (ICF). The ICF attempts to provide a coherent view of health from a biological, individual and social perspective. In this model a health condition represents anything that affects health and includes diseases, congenital disorders and acquired conditions such as injuries. A health condition can interact with all aspects of functioning. The term functioning encompasses the structures and functions of the body including any symptoms; activities that the person can do e.g. walking, lifting and what they participate in e.g. playing sports, visiting friends. Functioning describes the interaction between the individual with a health condition and the context is which they live. Contextual factors represent the complete background of the individual's life and their environment including the physical, social and attitudinal environment in which people live and personal factors such age and gender. Disability describes impairments to the body, limitations of activity and restrictions to participation. This model is useful when considering the effect of MSC on individuals and how it is influenced by the environment in which they live.

Measuring the impact of disease on quality of life

There are a large number of instruments (chiefly questionnaires) that are used to measure people's quality of life. Among the most widely used are the SF36, EuroQol 5D and HAQ.

The SF-36 Health Survey is a generic questionnaire consisting of 36 items clustered to measure eight health concepts

- General Health Perceptions
- Physical Functioning
- Role Limitations due to Physical Health (Role-Physical)
- Role Limitations due to Emotional Problems (Role-Emotional)
- Social Functioning
- Mental Health
- Vitality
- Bodily Pain

The SF-36 describes quality of life in 8 generic health concepts, considered to be universal and representing basic human functions and well-being. The score for each of the 8 scales ranges from 0-100. A higher score indicates better health in that aspect.

The EQ 5D measures:

- Mobility
- Self Care
- Usual Activities
- Pain/discomfort
- Anxiety/depression

The HAQ is an instrument for the self reporting of functional disability (Fries et al 1982). It was developed as a measure of outcome in patients with a wide variety of rheumatic diseases, including rheumatoid arthritis, osteoarthritis, juvenile rheumatoid arthritis, lupus, scleroderma, ankylosing spondylitis, fibromyalgia, and psoriatic arthritis. The questions included cover:

- Dressing & grooming
- Arising
- Eating
- Walking
- Hygiene
- Reach
- Grip
- Activities

- Pain VAS
- Patient global VAS

- Do you need help to do the task
- Do you use aids or appliances to do the task

Other instruments that have been developed for specific musculoskeletal conditions e.g. RA, OA, osteoporosis, back pain, hand problems and upper limb problems. The domains chosen are those considered appropriate to the condition and which meet validity criteria. Most of these instruments mix function, activities and participation. Examples include the Arthritis Impact Measurement Scales and the Aberdeen Back Pain Scale.

Chronic pain and physical disability impair social functioning and emotional well-being which seriously impacts on quality of life. Musculoskeletal conditions are often long term remitting and relapsing conditions meaning that patients and the doctors treating them need to be able to adapt to and manage the changing disease state. People with chronic musculoskeletal conditions experience pain, reduced mobility, physical disability, fatigue and depression (Simpson et al 2005). The psycho-social needs of people with long term physical conditions such as these are often overlooked (Lempp et al 2011).

In a recent UK survey of people with arthritis (Arthritis Care 2010) the majority of respondents experience severe levels of pain on a regular basis. The survey indicates that people have to endure significant limitations on everyday life due to unmanaged pain (Arthritis Care 2010). A study by Blake et al (1987) found that compared to those without arthritis those with arthritis had a greater loss of sexual satisfaction over time with fatigue and joint symptoms being major factors. In a more recent study 56% of patients with RA reported that fatigue and pain placed limitations on sexual intercourse (Hill et al 2002).

Impact of Rheumatoid arthritis on Quality of Life

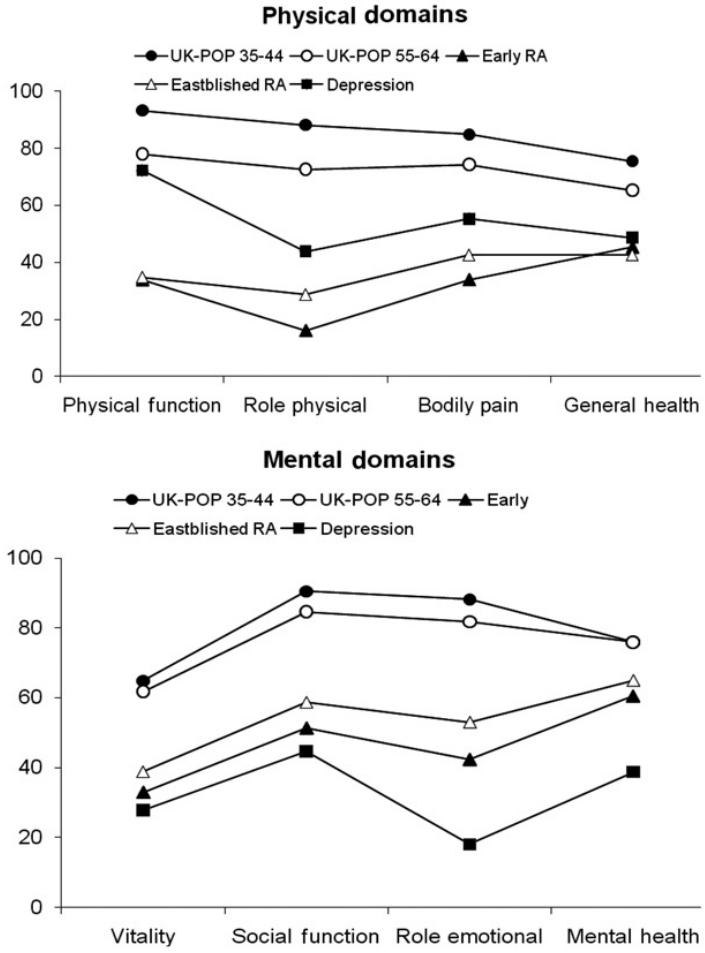
Assessment of QoL is recognised as an important primary outcome for RA (NICE 2009). A study carried out in Norway shows that RA affects all aspects of health as measured by the SF-36 in both sexes and across all age groups. The effect of RA on physical functioning was shown to be high with the loss of function increasing with age. The effect of RA on mental health was shown to be low to moderate. With increasing age the loss in mental function remained stable or declined.

Coping on a daily basis with RA can have a negative impact on mental health. Depression has been found to be more common in people with RA than in controls (Dickens et al 2003). In RA an important aspect is the unpredictability with patients experiencing acute "flare-ups" and changes in their reactions to treatment. Pain during flare-ups and fatigue can lead to low mood, depression and anxiety (Gettings 2010). Depression can also rise because of reduced ability to carry out "normal" household tasks, social interaction and recreational activities (Katz & Yelin 2001). The psychological effects of RA can extend to patient's partners, families and carers. There is some evidence that cognitive behavioural therapy, meditation and exercise can enable patients with RA to better manage the psychological burden associated with their condition. (Gettings 2010)

A study published in 2011 (Lempp et al 2011) compared the quality of life in patients with depression and those with early or established rheumatoid arthritis and the general population. For each of the domains the means of SF-36 scores were significantly lower in patients with early and established RA and depression compared to the UK population ages 35-44 and 55-64. RA shows greater reductions in mean scores for physical function, role physical and bodily pain compared to depression. Those with early RA had lower mean scores for role physical and bodily pain compared to patients with established RA. In RA there were strong correlations between pain, vitality, social function and mental health. Mental health problems appear in the earliest stages of RA. The author concludes that "mental health problems in RA are more likely to reflect changes in vitality, social function and pain rather than synovial inflammation itself" (Lempp et al 2011: 122) and that in the

management of RA physical, mental and social problems should be assessed and treated.

Figure Comparison of SF-36 scores in patients with early RA, established RA, depression and the general UK population



Source: Lempp et al 2011.

(Comparison of three study groups and general reference population for SF-36 physical and mental domain scores. Mean values are shown for each domain)

Impact of Osteoarthritis and Osteoporosis on Quality of Life

A prospective study of City Council workers in Belgium showed that subjects with OA and both OA and OP had significantly lower scores on all SF-36 dimensions

compared with subjects without these conditions. The OP group had significantly lower mean scores for physical functioning and pain compared with controls. Subjects with both OA and OP had significantly lower values for physical functioning, physical role and pain when compared with the OA and OP groups. Both diseases have a major impact on health-related quality of life compared with that of people without self-reported musculoskeletal diseases (Rebenda et al 2007).

Impact of hip fracture on Quality of Life

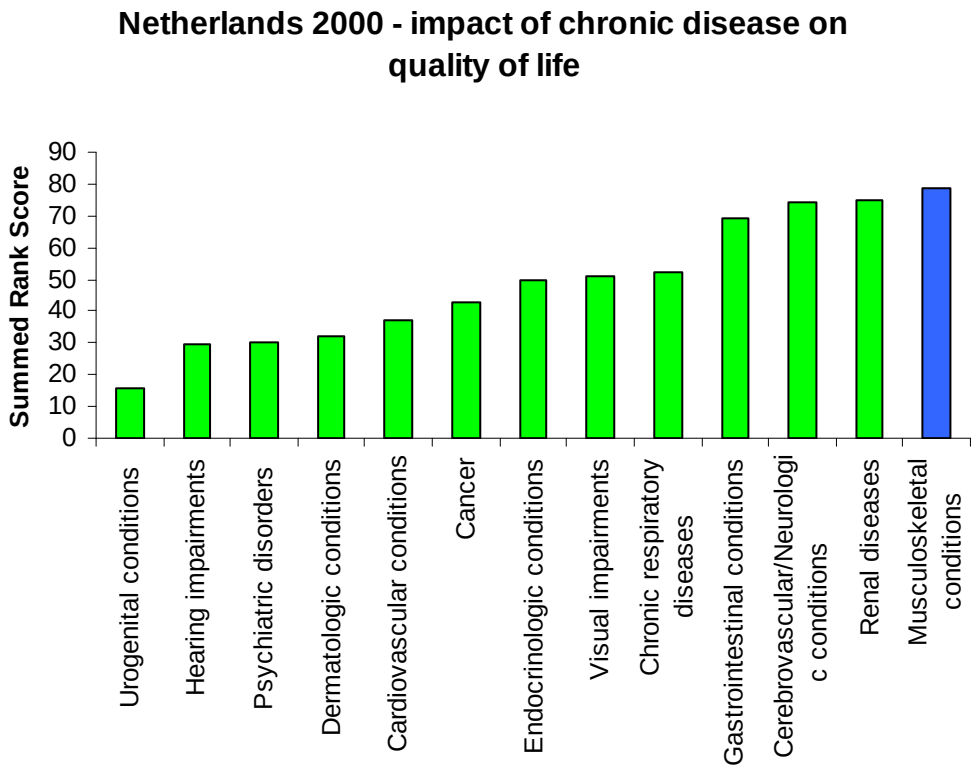
In one UK study after hip fracture up to 30% of patients had to give up independent living and enter institutional care (Keene 1993). In the same study only 40% of patients who walked unaided before the hip fracture could walk unaided one year after hip fracture.

QoL in patients with MSC compared to other conditions

The International Quality of Life Assessment project examined the impact of multiple chronic conditions on populations in Denmark, France, Germany, Italy, Japan, the Netherlands, Norway and the US using the SF-36. This showed that arthritis, chronic lung disease and congestive heart failure were the conditions with the highest impact on SF-36 physical summary score. RA had a significant negative effect on the SF36 mental summary score. Arthritis had the highest impact on health related quality of life in the general population (Alonso et al 2004).

A large survey study in the Netherlands (Sprangers et al 2000) which compared health related quality of life (using SF-36 or SF-24) across a wide range of long term conditions found that people with musculoskeletal conditions (included are back impairments, RA, osteoarthritis/other joint complaints) reported the lowest levels of physical functioning, role functioning and pain.

Figure Netherlands – impact on quality of life of chronic disease



Source: Adapted from Sprangers et al.2000.

A Spanish study (Loza et al 2008) used data from the 1999-2000 national health survey to assess health related quality of life (HRQOL) and functional ability across groups of chronic diseases in Spain using the Health Assessment Questionnaire (HAQ) and the SF-12. Looking at the effects of individual diseases on functional disability (measured by the HAQ) weighted by disease prevalence, neurological diseases caused the greatest impairment in the HAQ, followed by congenital malformations, pulmonary diseases, and rheumatic diseases. For physical functioning weighted by disease prevalence the adjusted SF-12 physical component scores were worst in congenital malformations, followed by rheumatic diseases. The adjusted SF-12 mental component scores were worst in psychiatric disorders, with rheumatic diseases in fourth place.

This study took into account not only the level of impairment but also the prevalence of the disease. It found that Rheumatic diseases are among the diseases that produce the largest impairment in Health Related Quality of Life (HRQoL) and daily functioning. When the definition of the burden of disease includes a measure of function and of HRQoL that is weighted by the prevalence of disease, rheumatic diseases, as a group, may be considered on a par with major diseases such as neurological, cardiac, or pulmonary diseases.

Comparing Quality of Life between musculoskeletal conditions

A Dutch study compared the quality of life and work in patients of working age with rheumatoid arthritis and those with ankylosing spondylitis (AS) (Chorus et al 2003). Physical health related QOL was reported to be worse in patients with RA than in patients with AS but physical role functioning was similar for both diseases. Mental health related QOL was more favourable in RA than in AS but social role functioning was similar. A positive association was found between work and physical health related QOL for those with RA and for those with AS.

Differences between countries in MSC related quality of life

There is a very little comparative data between countries on quality of life relating to musculoskeletal conditions. One study compared Lithuania and Norway (Dadoniene et al 2003). The study shows differences in employment, disease activity, physical function, and self reported health status in patients with RA in the two countries. Disease activity (DAS28) as well as functional impact (employment and HAQ) and perceived general health (SF-36) were worse in patients from Lithuania. Likely explanations presented were socioeconomic inequalities, differences in disease management and access to specialised health care. Methodological issues regarding instruments and data collection may also have contributed to some extent.

Improvements in Quality of Life

In recent years new treatment options for Rheumatoid Arthritis have emerged including the biological drugs. Access to therapies has also increased. This has led to improvements in the quality of life of those with this condition including a reduction in the effect on work and functional ability (Scott et al 2005).

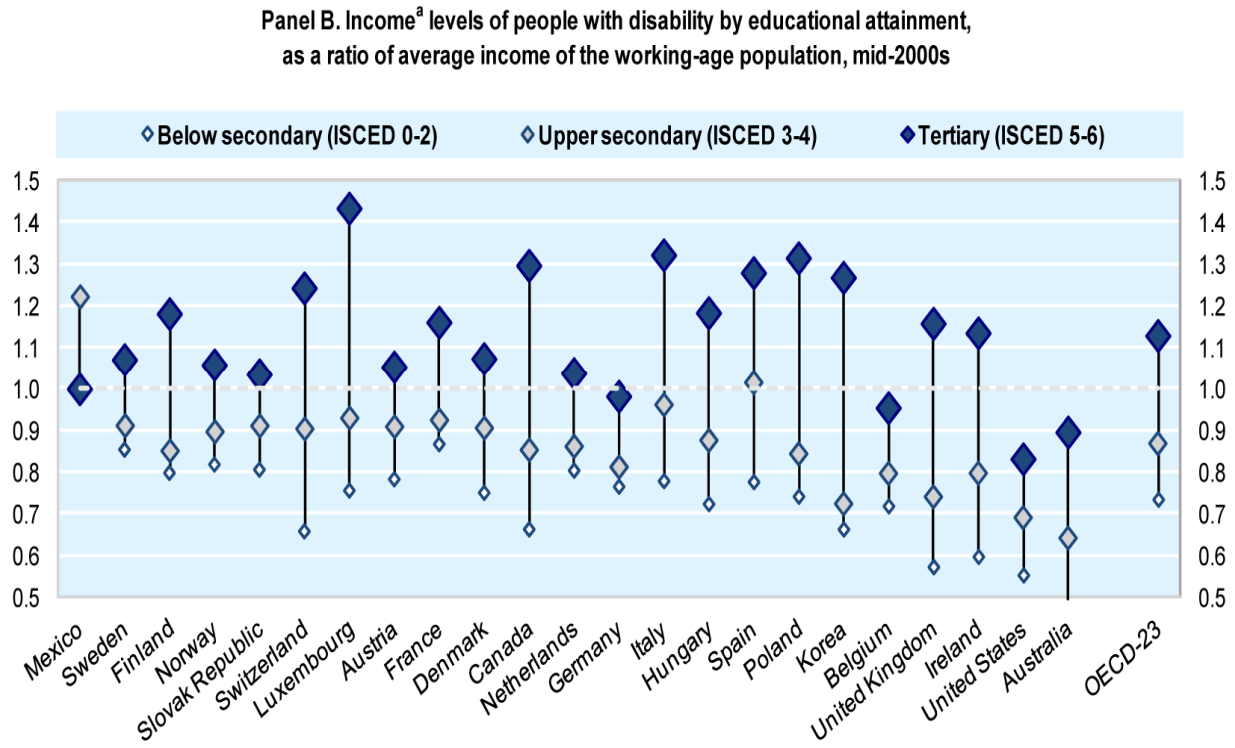
A study conducted in Norway using the Oslo Rheumatoid Arthritis Register indicated that the health status in RA improved across all dimensions of health in the period 1994-2004. The most pronounced improvement was in physical and global health measures. Patients with more recent disease onset had better physical function, less pain and higher utility than those with earlier onset (Uhlig et al 2008).

Musculoskeletal conditions and work disability

Work disability is a common consequence of rheumatoid arthritis (RA) with the rates of work disability higher than in the general population (adjusting for age and gender). Disease related factors, demographic characteristics and level of education all influence the work status of people with RA (Uhlig 2010).

A report produced by the OECD in 2009 (OECD 2009 i) examined sickness, disability and work. It found that across the countries of the OECD people with disabilities are far less likely to be employed than those without disabilities. People with disability are twice as likely to be unemployed, even when there is no recession and almost never leave longer-term disability benefit for employment. On average across the OECD, the income of people with disability is 12% lower than the national average. The exception is those people with disability that are highly educated who tend to receive higher incomes.

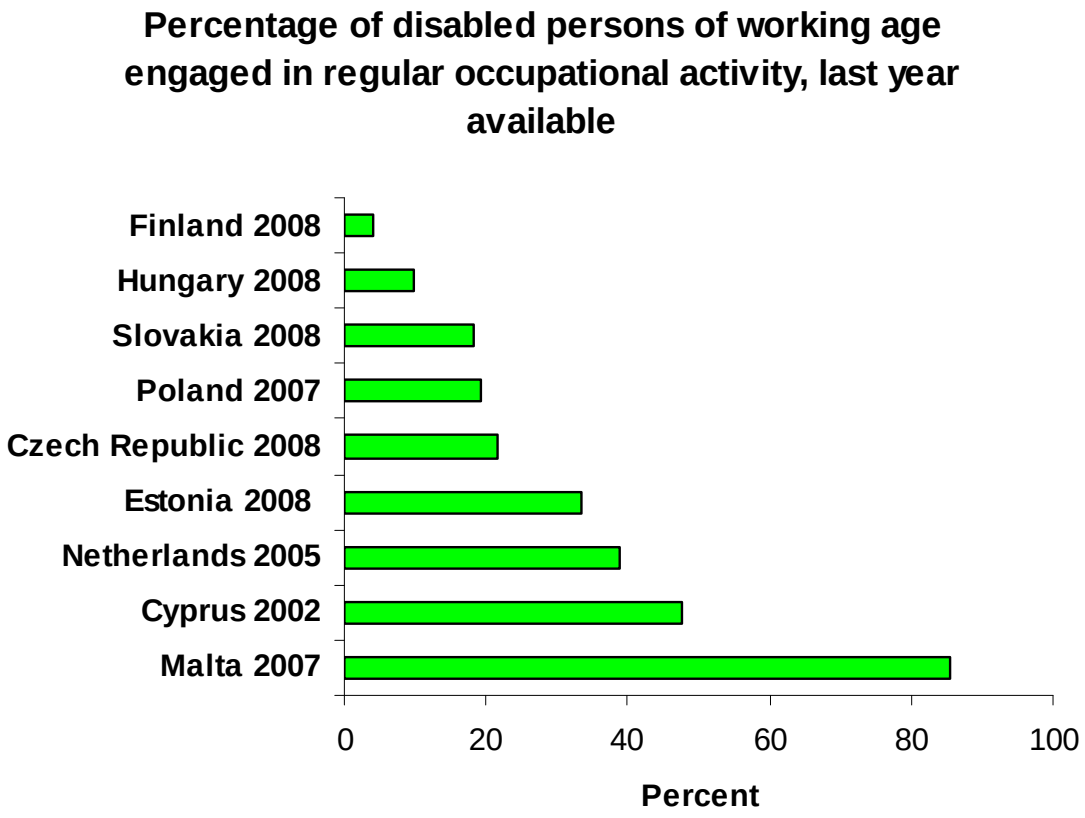
Figure Disability and level of income – differences by education



Source: OECD Sickness, disability and work: keeping on track in the economic downturn. Background paper, High-Level Forum, Stockholm, 14-15 May, 2009

The percentage of disabled persons of working age who have a regular occupational activity differs significantly between countries in Europe. However this may in part be a result of differences in classification of "regular occupational activity" and how such activity is recorded.

Figure Disabled persons in regular occupational activity



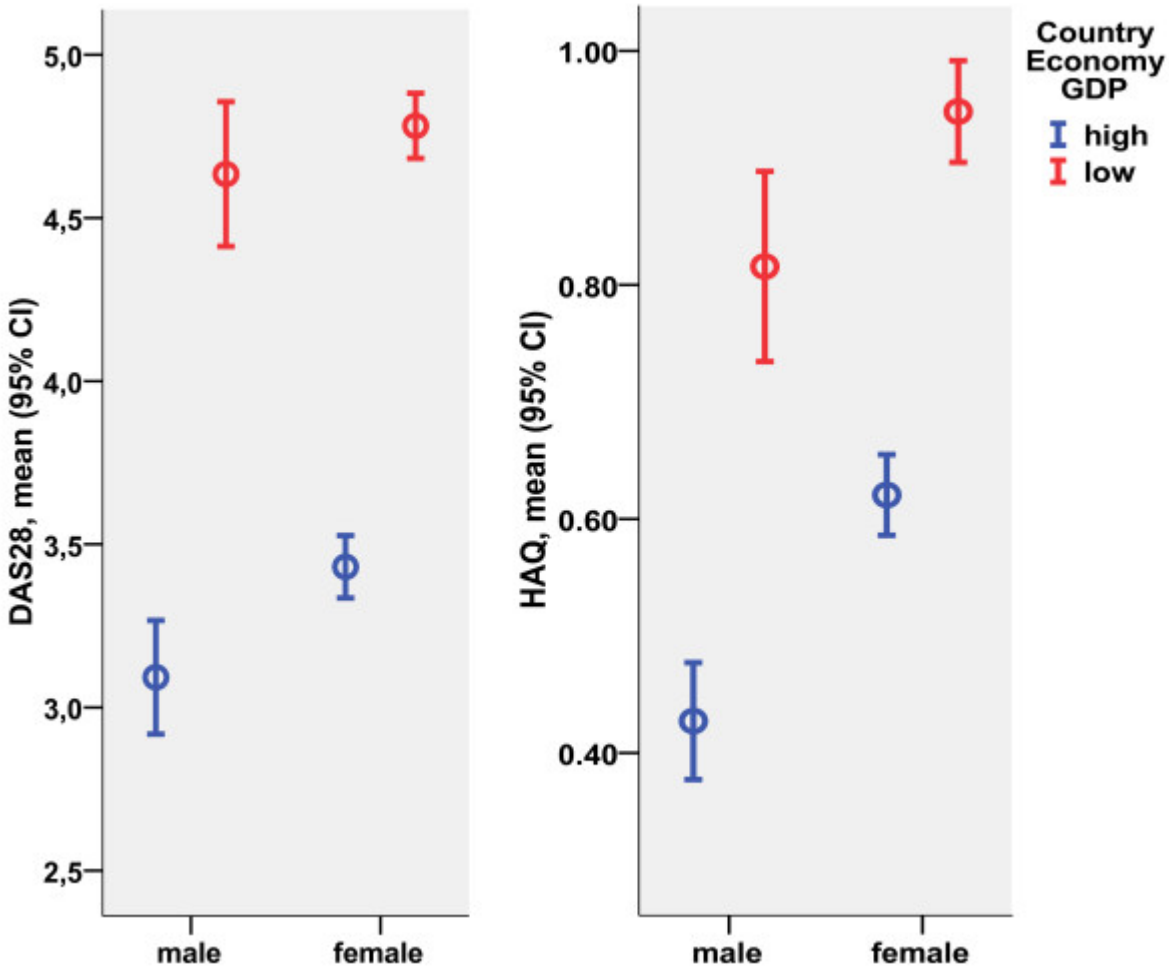
Source: WHO Health For All Database 2010.

QUEST-RA study

The QUEST-RA study examined work disability in 8,039 patients with RA across 32 countries including 16 EU Member States (Sokka et al 2010). At the time of first symptoms 86% of men and 64% of women under 65 were working. 37% of these patients reported subsequent work disability due to RA. For those patients that had their first symptoms in the 2000s the probability of continuing work at 5 years was 68%; this was similar between those from high GDP and low GDP countries. An important finding was that patients who stopped working in high GDP countries had better clinical status than patients who continued working in low GDP countries – this

highlights the importance of cultural and economic factors in influencing levels of work disability.

Figure Disease activity (DAS28) and physical function (HAQ) in men and women who were younger than 65 years old and continued working in high-GDP and low-GDP countries. CI, confidence interval; DAS28, disease activity score using 28 joint counts; GDP, gross domestic product; HAQ, Health Assessment Questionnaire.

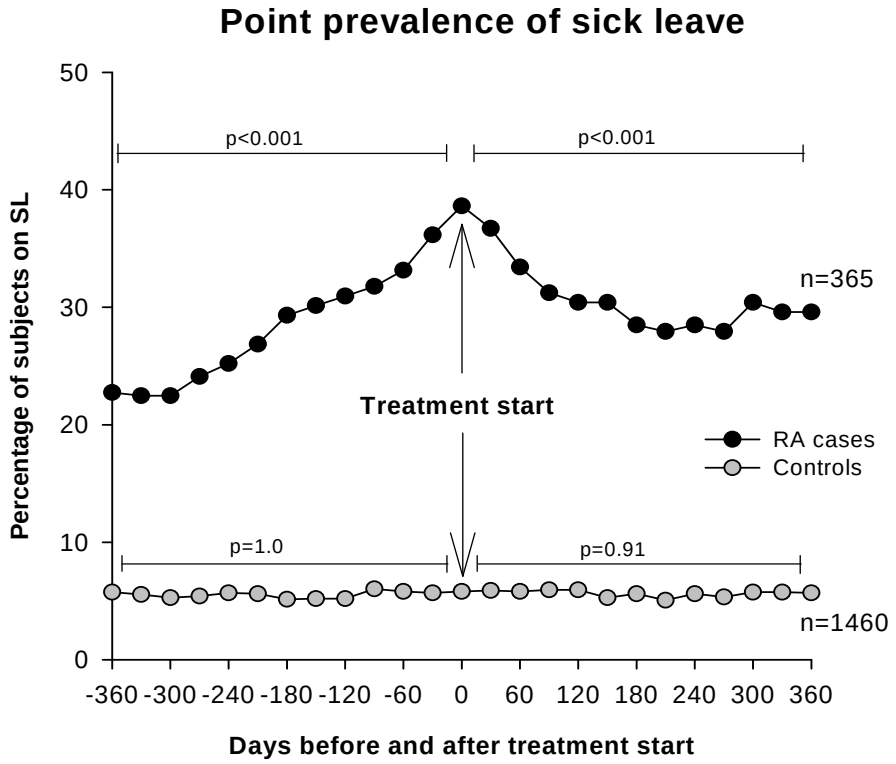


Source: Sokka et al 2010

TNF treatment of RA - sick leave & disability

A Swedish study investigated the effect of TNF antagonist treatment of patients with RA on sick leave and disability pension as compared to a matched reference group from the general population (Olofsson et al. 2010). The main finding in this study was a continuous increase in sick leave point prevalence among patients with RA the year before initiation of TNF antagonists, followed by a rapid decrease during the first 6 months of therapy. The level of sick leave point prevalence was then maintained throughout the first treatment year. The point prevalence of sick leave for the reference group was almost unchanged during the same period. There was a steady increase in the point prevalence of disability pensions for patients with RA during the whole study period which seemed unaffected by the initiation of TNF inhibitors. This may be because disability pension often reflects irreversible work incapacity. The study showed a substantial and sustained decrease in sick leave among RA-patients in the first 12 months after start of treatment with TNF-antagonists.

Figure Decrease in sick leave among patients with rheumatoid arthritis in the first 12 months after start of treatment



Source: Olofsson et al. 2010

Disability and poverty

A recent OECD study (2009i) shows higher poverty rates among working age people with disabilities than among working age people without disabilities in all but 3 (Norway, Slovakia and Sweden) of the 21 countries included. Of those EU Member States included in the study the relative poverty risk (poverty rate of working-age people with a disability relative to that of working-age people without disabilities) was highest in Ireland and lowest in the Netherlands.

People with disabilities and their family incur additional costs in order to achieve a standard of living equivalent to that of non-disabled persons. For example they may

incur extra costs for transport, personal care and assistive devices (WHO 2011). A study from Ireland (Cullinan et al 2010) estimated that these costs varied from 20-30% of average weekly income (depending on the duration and severity of the disability).

Impact on carers

Many patients with RA live at home and spouses, family and friends often play a significant role as providers of informal care (Jacobi et al 2001). Families and partners of patients with RA can be affected psychologically by the disease (Matheson et al 2009). There is also some evidence that it can in addition affect other aspects of their health related quality of life (Werner et al 2004). The burden of care may be substantial in terms of time especially when caring for those with advanced disease (Werner et al 2004).

A study by Brouwer et al (2004) examined the nature and burden of care for informal carers of patients with RA in The Netherlands. The study found that caregivers had been caring for the RA patients for, on average, more than 11 years. They provided a substantial amount of care (over 27 hours per week) and this was chiefly made up of household activities and assistance with activities of daily living. 43.5% said they had incurred additional costs related to informal care and 18.9% said they had reduced leisure time due to informal care.

Impact on Society

As a major cause of sick leave and work disability musculoskeletal conditions have a significant impact on society. MSCs are the largest single cause of work loss in Europe and their effect on worker participation gives rise to substantial work productivity costs. Musculoskeletal conditions also give rise to significant health resource utilisation with associated health and non-healthcare costs for society. Musculoskeletal conditions are in the top 5 diagnostic groups in Europe in terms of health care costs.

Health care costs

The table below sets out the health care costs which are associated with MSC. Whilst not fully comprehensive it gives an indication of the range of costs incurred. Research indicates that direct costs increase as functional capacity decreases (Schoels et al 2010).

Table.. Examples of health care costs arising from MSC

Health care costs	
Outpatient costs	▪ Visits to physicians (primary care and specialist) ▪ Outpatient surgery ▪ Emergency room ▪ Rehabilitation service utilisation ▪ Medication (prescription and non-prescr ption) ▪ Diagnostic / therapeutic procedures and tests ▪ Devices and aids
Inpatient costs	▪ Acute hospital facil ties (without surgery) ▪ Acute hospital facil ties (with surgery) ▪ Non acute hospital facilities
Personal costs	▪ Transportation ▪ Patient time ▪ Carer time
Other disease related costs	▪ Home health care services ▪ Environmental adaptations ▪ Medical equipment (non-prescript on) ▪ Non-medical practitioner, alternative therapy
Change of living status	▪ Nursing home or residential home ▪ Home care services
Out of pocket	▪ Out of pocket expenses

Source: Adapted from European Action Towards Better Musculoskeletal Health BJD 2005.

Comparing health care costs across the EU is usually done at the aggregate level and variations are examined in terms of, for example, purchasing power parities (PPPs) per capita and percentage of GDP (Busse et al 2008). Comparison across countries of the costs of individual services such as hip replacement is problematic because of limitations in the comparability of data. Variations may be due to differences in:

- the definition of the start and end of a service (e.g. whether rehabilitation following a hip replacement is part of the hospital treatment or seen as a separate service)
- the type of service delivered, e.g. technologies used or the human resources employed;
- treatment time and length of stay;
- input costs (e.g. costs of implant and hourly costs of personnel).
- How associated services (e.g. anaesthesia) are counted and charged

The following section presents some examples of health costs relating to MSCs however the data does not allow for direct comparisons.

Cost of illness studies use the system of health accounts (SHA) to measure health care cost by disease, health provider, age and gender of health care users. They are "detailed descriptions of the monetary burden of disease on the basis of characteristics of supply and demand" (Heijink et al 2008. p.50). The validity of comparing cost of illness studies across countries has been debated (Polder et al 2005). It is clear however that across the EU musculoskeletal conditions are amongst the largest diagnostic groups in terms of health care expenditure.

Figure Cost of illness in millions Euro Germany 2008

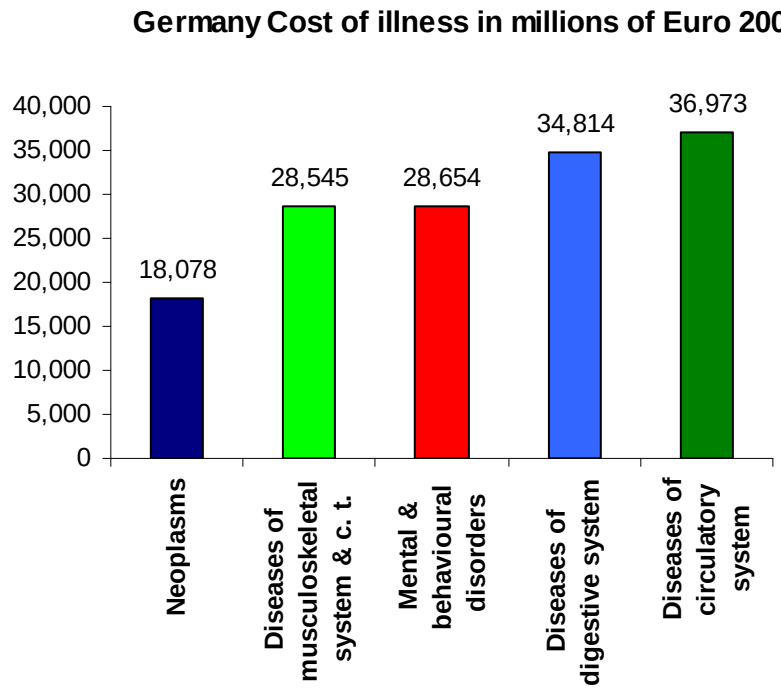
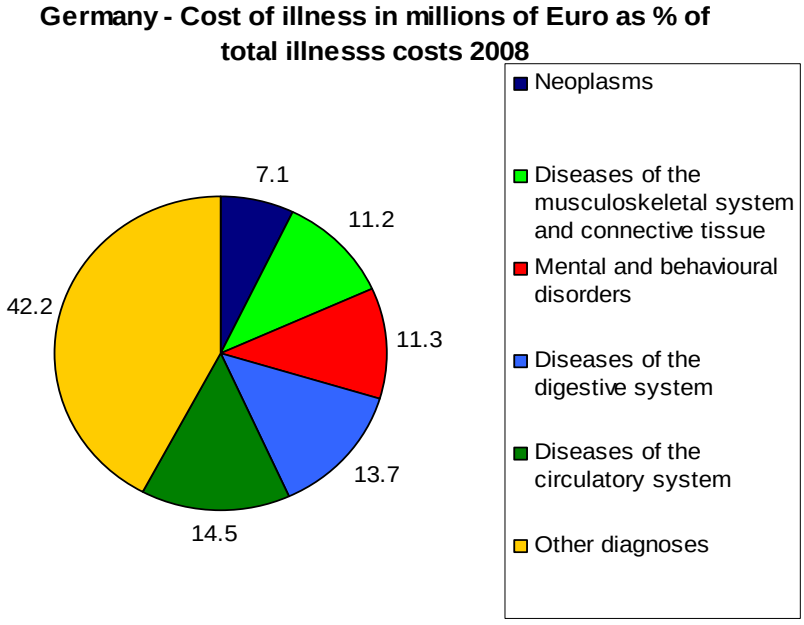


Figure Cost of illness in millions Euro as percentage of total illness costs, Germany 2008



Source: Cost of illness accounts, Federal Statistical Office 2011

The following are examples of direct health costs from musculoskeletal conditions:

- In Ireland in 2008 General Medical Services Scheme expenditure on drugs, medicines and appliances for conditions relating to the musculoskeletal system was 67.14 million euros (5.86 % of total expenditure). Expenditure on drugs for musculoskeletal conditions was 3048 million euros (6.01% of total drug expenditure).

- In 2006, the Belgian Federal Knowledge Centre in Healthcare (KCE) estimated the direct cost of back pain in Belgium to be 272 million euros (Manzina et al 2006).

- In the UK, 2003, the estimated cost of GP consultations for diseases of the musculoskeletal system was £1,340 million; only costs of diseases of the respiratory system (£1,790 mill.) and diseases of the circulatory system (£1,350 mill.) were higher.

The International Osteoporosis Foundation produced a report on health services utilisation and costs relating to osteoporosis and associated fractures and presented the following table adapted from work by Kanis. Although given the differences in the measurement of hospital costs between countries the results much be interpreted with caution they do suggest that there is a wide variety in cost associated with vertebral fracture.

Table Hospital costs per vertebral fracture in the EU 2006

Hospital costs per vertebral fracture in the European Union

Country	Cost per vertebral fracture (thousand euros)	Length of stay (days)
Austria	2.7	8
Belgium	4.3	16
Denmark	3.0	14
Finland	2.8	13
France	6.1	20
Germany	4.4	17
Greece	0.4	5
Ireland	3.6	8
Italy	2.1	7
Luxembourg	3.0	12
Netherlands	3.9	14
Portugal	1.4	12
Spain	2.6	10
Sweden	4.0	9
UK	3.5	15
European Union	3.9	13

Adapted from Kanis JA on behalf of the World Health Organization Scientific Group (2007) Assessment of osteoporosis at the primary healthcare level. Technical Report. WHO Centre for Metabolic Bone Diseases, University of Sheffield, UK 2007, page 43.

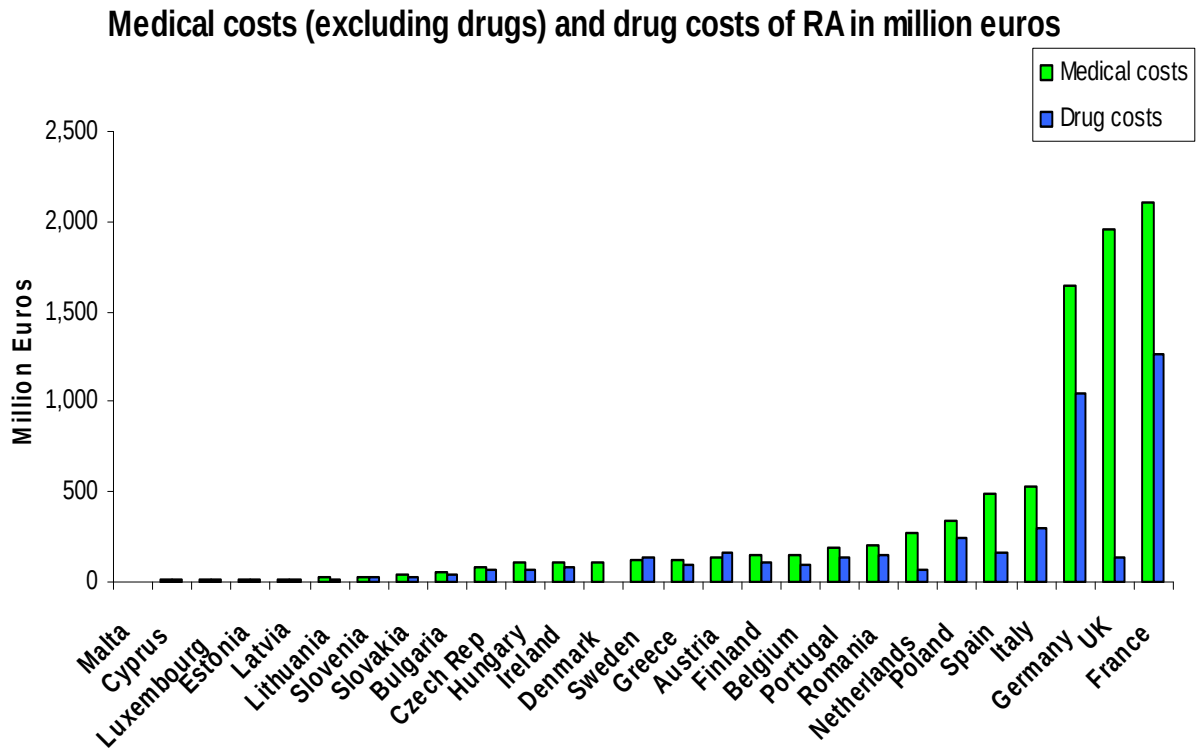
Source: Osteoporosis in the European Union 2008. International Osteoporosis Foundation.

Obtaining comparable data on the direct and indirect costs of RA across Europe is problematic. A study by Lundkvist et al (2008) produced estimates for the cost of RA in Europe in 2006 based on the available prevalence and economic literature. These estimates, derived using modelling, give some sense of the economic burden of RA:

- The estimated total cost of RA was 45 million euros.
- The estimated average annual cost per patient in was approximately 13,000 euros.
- The medical cost excluding drugs was nearly 9.5 million euros.
- The indirect cost totalled 16,584 euros.

There is a wide variation between the annual national medical and drug costs for Rheumatoid Arthritis. The data presented in Figure are estimates and it should be noted that the studies on which the estimates are based were conducted at different points in time. This is significant as drugs costs have tended to increase over time, in particular after the introduction of the new biological agents. However it would appear that medical costs are substantially higher in France, UK and Germany compared to the rest of Europe. It is interesting to note that whilst drug costs are also high in France and Germany this is not true of the UK which has relatively low drug costs. Malta and Cyprus and countries in Central and Eastern Europe have much lower medical and drug costs.

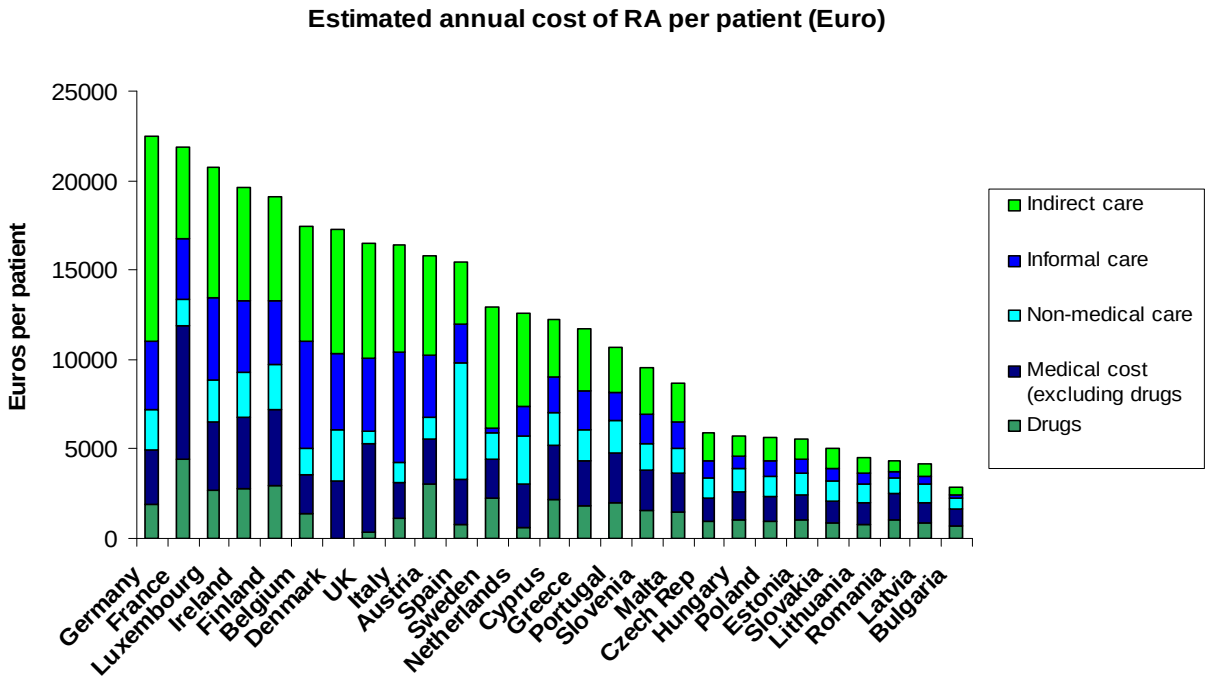
Figure.. Medical costs and drug costs of RA in million Euros 2006



Source: Lundvist, J, Kastang F, Kobelt G. 2008. The burden of RA and access to treatment: health burden and costs. *Eur J Health Econ* 8(suppl 2): S49-S60.

The figure below shows the estimated annual cost of RA by the type of care. The highest total costs are in Germany, France and Luxembourg. The lowest costs are in the Central and Eastern European member states.

Figure Estimated annual cost of RA per patient by type of care



Source: Lundvist, J, Kastang F, Kobelt G. 2008. The burden of RA and access to treatment: health burden and costs. 2008. *Eur J Health Econ* 8(suppl 2): S49-S60. Adapted from Table 5.

A study carried out in Austria in 2010 calculated the direct costs of illness in patients with advanced osteoarthritis of the hip and knee. The costs were reported retrospectively by a self-administered questionnaire, covering the period of 12 months prior to joint replacement. It was estimated that the total direct costs were 2747 Euro. Medical costs amounted to 1148 Euro and non-medical costs 1599 Euro. The high cost of late-stage osteoarthritis was due to the costs associated with the personal care and household assistance caused by severe loss of function.

Work loss and productivity

Musculoskeletal conditions are a major cause of productivity loss. This loss can be categorised as (Burton et al 2005):

- Work limitation (presenteeism): lost productivity because of diminished capacity while at work.
- Work loss (absenteeism): time off work for those in paid work
- Work disability: permanent partial or complete disablement for work purposes

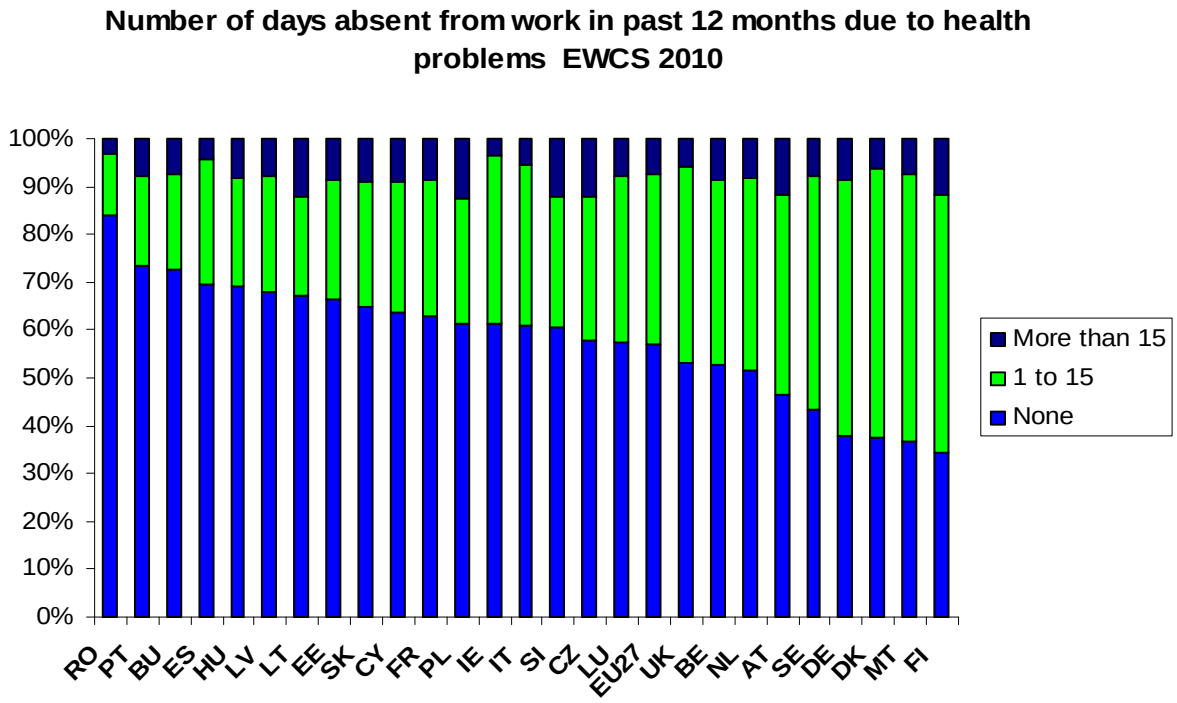
Productivity loss can be valued using several approaches. The most widely used are the human capital approach and the friction costs method. The human capital approach assumes that the productivity losses associated with a worker who stops work due to illness or dies, are the average annual wage for their age and gender from the time that they stop work until the age of 65. The Friction Cost approach assumes that workers can be replaced and new workers trained to perform at the same level as the injured or deceased worker within a period of time (usually 3-12 months). The Friction cost approach assumes that workers will return to work after a health intervention.

Stewart et al 2003 examined the lost productive time due to common pain conditions (arthritis, back, headache, and other musculoskeletal pain) in the US. 13% of the total workforce experienced a loss in productive time during a 2-week period due to a common pain condition. Headache (5.4%), back pain (3.2%), arthritis pain (2.0%), and other musculoskeletal pain (2.0%) were the most common pain conditions resulting in lost productive time. The majority (76.6%) of lost productive time was explained by reduced performance while at work and not work absence.
Workers who reported arthritis or back pain had mean lost productive times of 5.2 hours per week. In a study in the Netherlands individuals with neck or shoulder pain, arm pain or both report productivity losses while at work of up to 36% (van den Heuvel et al. 2007). Similar to the U.S example the majority of productivity losses resulted from reduced performance at work and reduced working hours rather than sickness absence.

Comparing sickness absence across countries is problematic because of differences in regulations governing sickness benefits and differences in social insurance schemes. For example those who may be on sickness benefits in one country may in another country be receiving unemployment or permanent disability benefits. There are very few comparative studies of sickness absence in Europe. Higher levels of sickness absence have been reported in public sector employees compared with those in the private sector (Lund et al 2007). Sickness absence has also been shown to vary by occupational group. A study comparing differences in sickness absence between Sweden and Denmark showed an increased retention of employees with health problems in the Swedish labour market compared to Denmark. The authors argued that this could be due to differences in the sickness insurance legislation (Lund et al 2008). Indicators are needed for use across the EU27 which capture the occurrence, duration and cause of sickness absence.

Temporary work loss according to diagnostic code is a core eumusc indicator however obtaining this data from the EU27 has proved problematic. In the absence of this data the subsequent figures show other alternative data to illustrate the impact of MSCs on work loss. Figure shows data relating to work absence from the European Working Conditions Survey which was conducted in 2010. The highest percentage of respondents who had no days of absence from work for health problems in the past 12 months was in Romania (84.2%) the lowest was in Finland (34.5%). Poland had the highest percentage of respondents who had been absent from work for more than 15 days in the past 12 months at 12.6%.

Figure Work absence due to health problems 2011

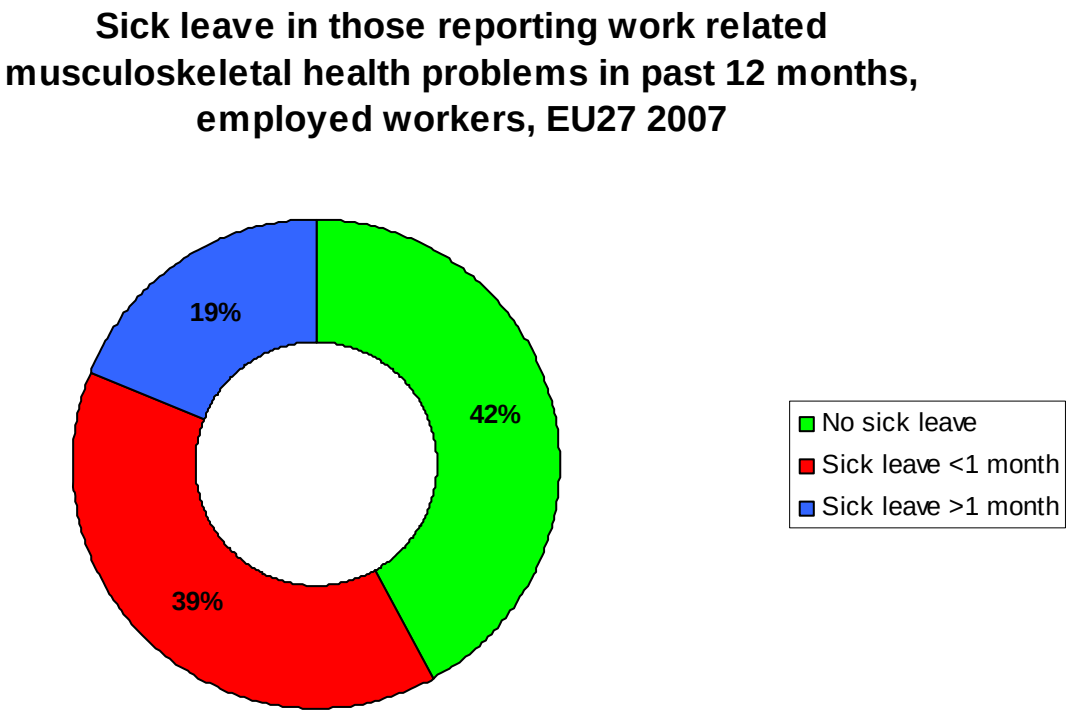


Source: European Working Conditions Survey 2010

The Labour Force Survey ad hoc module 2007 examined sick leave in employed people for different types of work related health problems (EUROSTAT 2009). Sick leave of one day or more but less than one month was more likely among those with breathing or lung problems (51%) and bone, joint or muscle problems which mainly affects back (42%). Prolonged sickness absence, i.e. sick leave for one month or more, was most likely among employed persons with a heart disease or attack, or other problems in the circulatory system (29%), stress, depression or anxiety (25%) and bone, joint or muscle problems of the hips, legs or feet (25%).

Again using data from the Labour Force Survey 2007 Figure shows sick leave in those who reported musculoskeletal problems as their most serious health related work problem in past 12 months. Of those with musculoskeletal problems nearly one fifth took sick leave of one month or more.

Figure Sick leave in those reporting work related musculoskeletal health problems in the past 12 months, employed workers, EU27 2007.



Source:
http://epp.eurostat.ec.europa.eu/portal/page/portal/health/health_safety_work/data/database

The following tables show some examples of lost work days due to MSDs using data from national statistical offices.

Table Percentage of sick leave days attributed to MSDsMSDs

Country	Year	Percentage sick days
Austria	2007	24
Belgium	2008	40
Finland	2007	33
Romania	2007	22
Slovenia	2006	19
UK	2009	33

Sources:

Austria: Federal Bureau of statistics 2010.

Belgium: Securex 2008 cited in Musculoskeletal Disorders and Belgian Labour Market. 2009. http://www.fitforworkeurope.eu/Downloads/Website-Documents/ffw_Belgium311009.pdf

Finland: Bureau of Statistics 2010.

Romania: Todea, A. & Ferencz, A. (2007). Occupational musculoskeletal disorders in Romania (statistics, legislation). Presentation. Retrieved 28 July 2009 from ams.protectiamuncii.ro/conferinta/materiale/0111_todea_en.ppt cited in Musculoskeletal Disorders and Romanian Labour Market. 2011. http://www.fitforworkeurope.eu/Website-Documents/ffw_Romania_english.pdf

Slovenia: Eurofound www.eurofound.europa.eu/ewco/studies/tn0611018s/at0511019q.htm.

UK: http://www.hse.gov.uk/statistics/overall/hssh0910.pdf

Table Number of work days lost per annum due to MSDs (in millions)

Country	Year	No work days lost
Austria	2004	7.7
France	2006	7.0
Slovenia	2006	2.47
UK	2009	9.3

Sources work days lost:

Austria, France, Slovenia: European Agency for Safety and Health at Work. 2010. OSH in figures: Work-related musculoskeletal disorders in the EU – Facts and figures. Luxembourg 2010.

UK: Health & Safety executive
http://www.hse.gov.uk/statistics/causdis/musculoskeletal/days-lost.htm

Table shows the average length of work absence due to MSDs. Sources of variation in average length of absence may include demographic factors (MSDs occur more in older age groups), the occupational mix (the occurrence of MSDs is higher in certain industries) and health services (waiting time for health care may vary). Caution is advised in interpreting this data as there are national variations in definitions used when calculating work absence. In all countries listed the length of the average absence due to MSD was 10 days or longer.

Table Average duration of work absence due to MSD (days)

Country	Year	Total average days	Male average days	Female average days
Austria	2007	10		
Bulgaria	2004	13.2	13.0	13.5
Czech Republic	2004	53	49.6	57.1
Denmark	1999	88	81.0	100.5
UK	2009/10	16.3		

Source: European Agency for Health and Safety at Work. OSH in figures: Work related musculoskeletal disorders in the EU – Facts and figures. Luxembourg 2010.

Statistics from the German Federal Bureau rank diseases according to which cause the longest periods of inability to work. Back pain (Dorsalgia) ranks first before acute respiratory infections and depression.

Table The diseases with the longest periods of inability to work Germany 2008

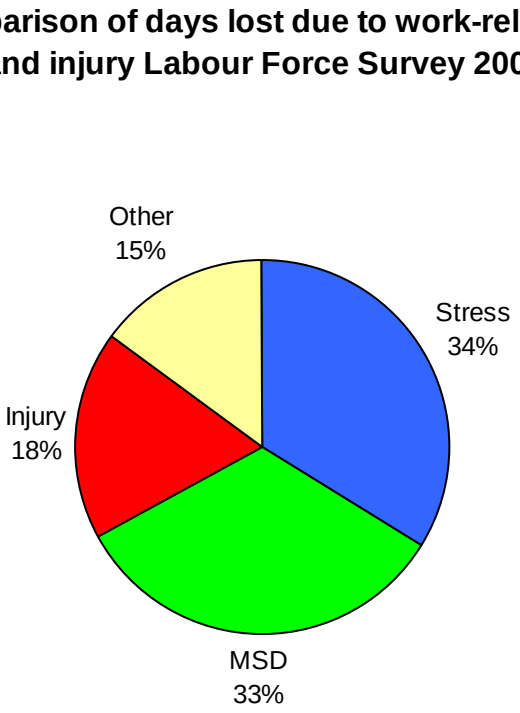
Disease	Rank	Days of inability to work
Dorsalgia	**1**	14,261,158
Acute respiratory infection	**2**	6,108,783
Depressive episode	**3**	3,711,674

Source: German Federal Bureau of Statistics 2011

Refers to Compulsory members of the Local Statutory Health Insurance (AOK) without pensioners.

In the UK in 2009/10, an estimated 9.25 million working days were lost through work-related musculoskeletal disorders.

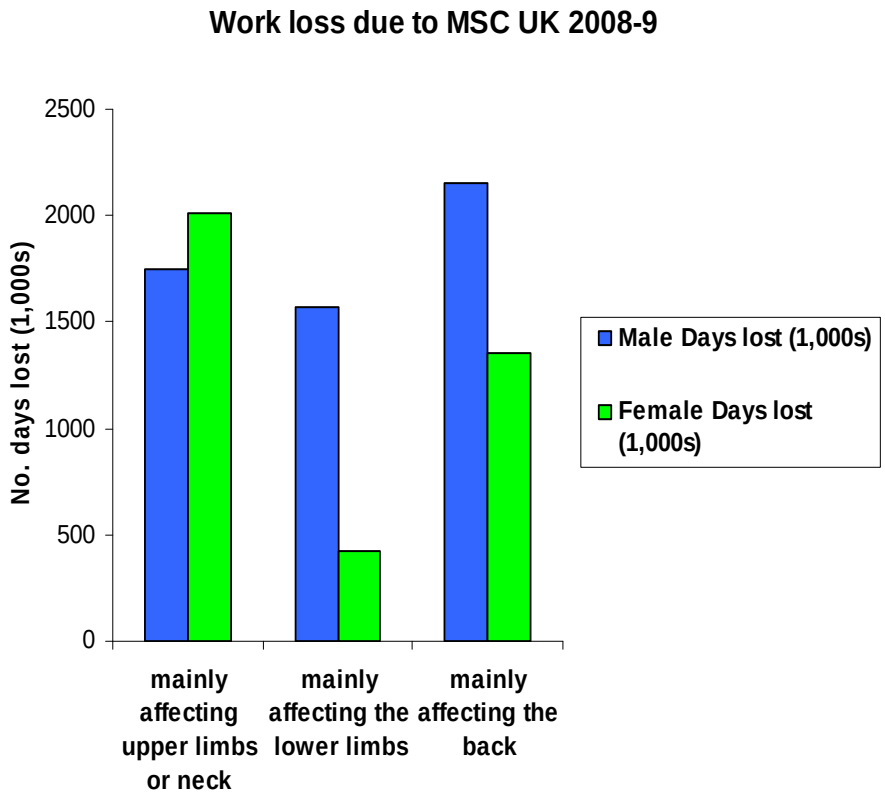
Figure Comparison of days lost due to work-related ill health and injury – UK 2009/10



Source: http://www.hse.gov.uk/statistics/injuryhealth.htm

Around three-quarters of days lost due to MSD were accounted for by conditions mainly affecting the back and upper limbs or neck, with 3.5 million days and 3.7 million days respectively. The remaining 2.0 million days was attributed to disorders of the lower limbs. The largest gender differential in the average days lost per case was for disorders affecting the lower limbs; the average days lost in men for this condition was 25.3 compared to 12.5 days for women. Women lost more days than men due to MSC affecting upper limbs and neck.

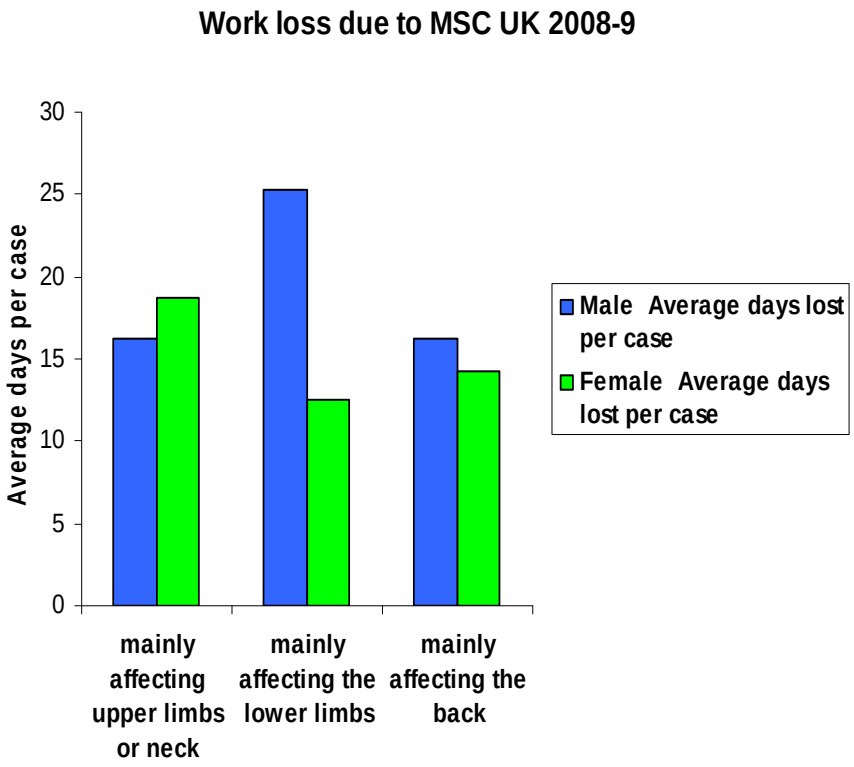
Figure Work loss due to MSC UK 2009-10 – number of days lost (1,000s) by region and gender



Source: http://www.hse.gov.uk/statistics/causdis/musculoskeletal/scale.htm

Looking at the average number of work days lost per case due to MSC in the UK the gender differential was smaller than that when comparing number of lost days. This was particularly true for MSC affecting the lower limbs.

Figure Average work days lost per case due to MSC UK 2009-10 by region and gender



Source: http://www.hse.gov.uk/statistics/causdis/musculoskeletal/scale.htm

Costs arising from productivity loss are the most important contributors to the total costs of illness of MSC, (using the human capital approach which includes the cost of work disability). Comparison of the cost of work related musculoskeletal conditions is difficult because of the difference in organisation of insurance systems, the lack of standardised assessment criteria and differences in how costs are measured. In Germany the estimated productivity loss due to musculoskeletal conditions in 2006 was 95 million days lost (23.7% of total days lost) at a cost of 23.9 billion euros or 1.1% of the GNP (SUGA 2006). In Finland for 2004 it was estimated that the direct costs of work-related MSDs (for absences from work lasting more than nine days) were in excess of 222m euros (SSI, 2004). In France figures from 2007 show that nearly 7.5 million working days were lost due to temporary incapacity caused by

work-related MSDs causing a cost to society of more than 736 million euros (CNMATS 2008).

Musculoskeletal conditions and disability costs

Musculoskeletal conditions are a major cause of disability and as such they lead to significant costs in terms of disability pensions and benefits.

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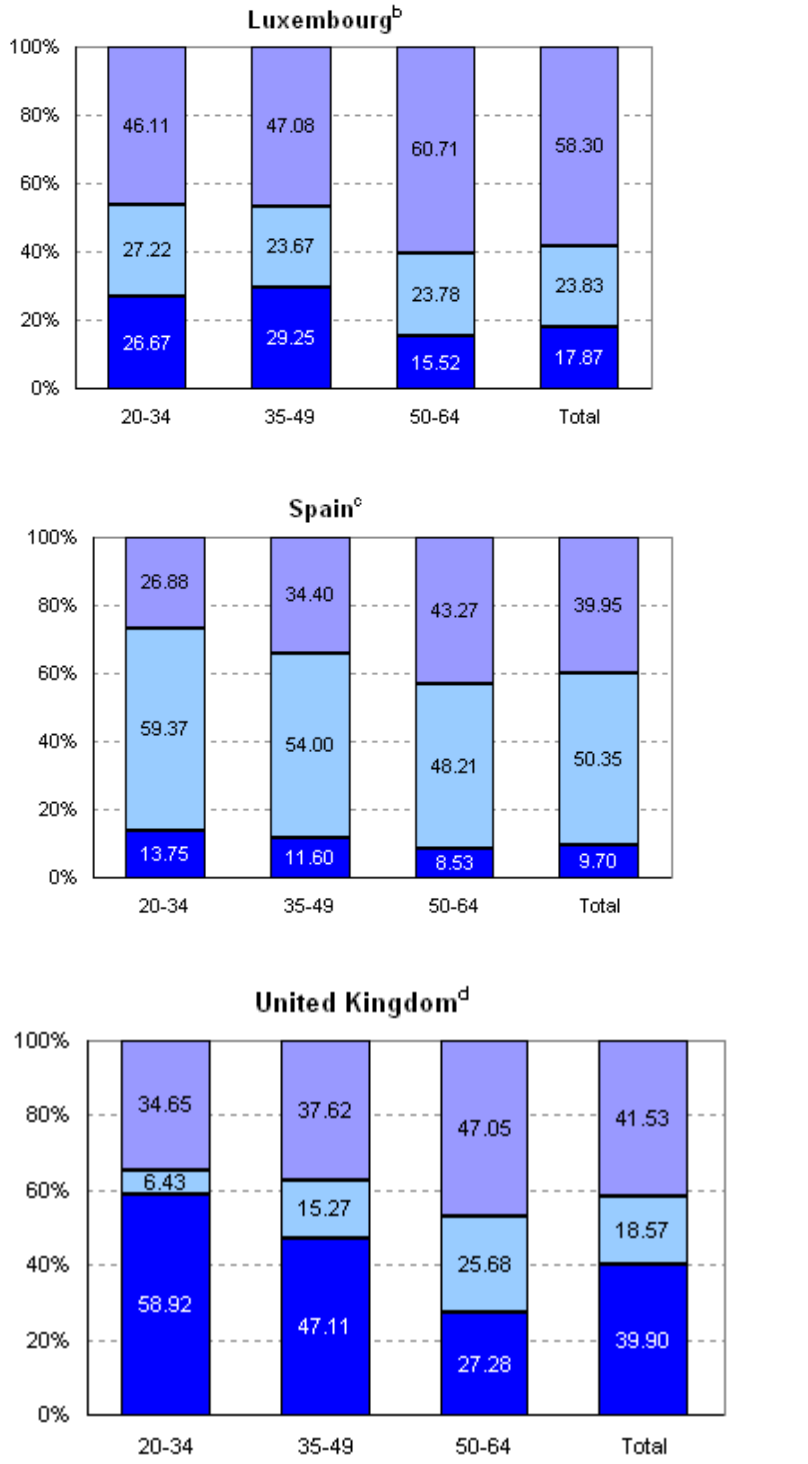
- **Austria 2001 -** 35% of all new disability pensions in 2001 were due to MSCs (Lang et al 2003)
- **Spain -** 18% of persons receiving disability pension in 2007 received pension due to musculoskeletal conditions (Spain national statistics bureau 2011).
- **Netherlands -** 30% of all new allowances for work disability in 2010 were granted for musculoskeletal diseases (including trauma). This is similar to new allowances for mental health (Netherlands Statistical Bureau 2011)..
- **Belgium** -diseases of the 'locomotor' system were the primary cause of invalidity among male workers (28 per cent); second most important, after mental disorders, in female workers (27 per cent) in 2009 (Belgian National Institute for Sickness and Invalidity Insurance).
- **UK** - Disability Living Allowance (DLA) is a benefit for people who are so disabled as to have personal care needs and/or mobility needs and who claim before their 65th birthday. In 2010 38% of those claiming DLA were doing so because of musculoskeletal conditions (Department of Work & Pensions).

A study by the OECD looked at the distribution of total benefit receipts by condition and age for Luxembourg, Spain, and UK. It showed that in all three countries musculoskeletal conditions contributed significantly, particularly in the 50-64 year age group.

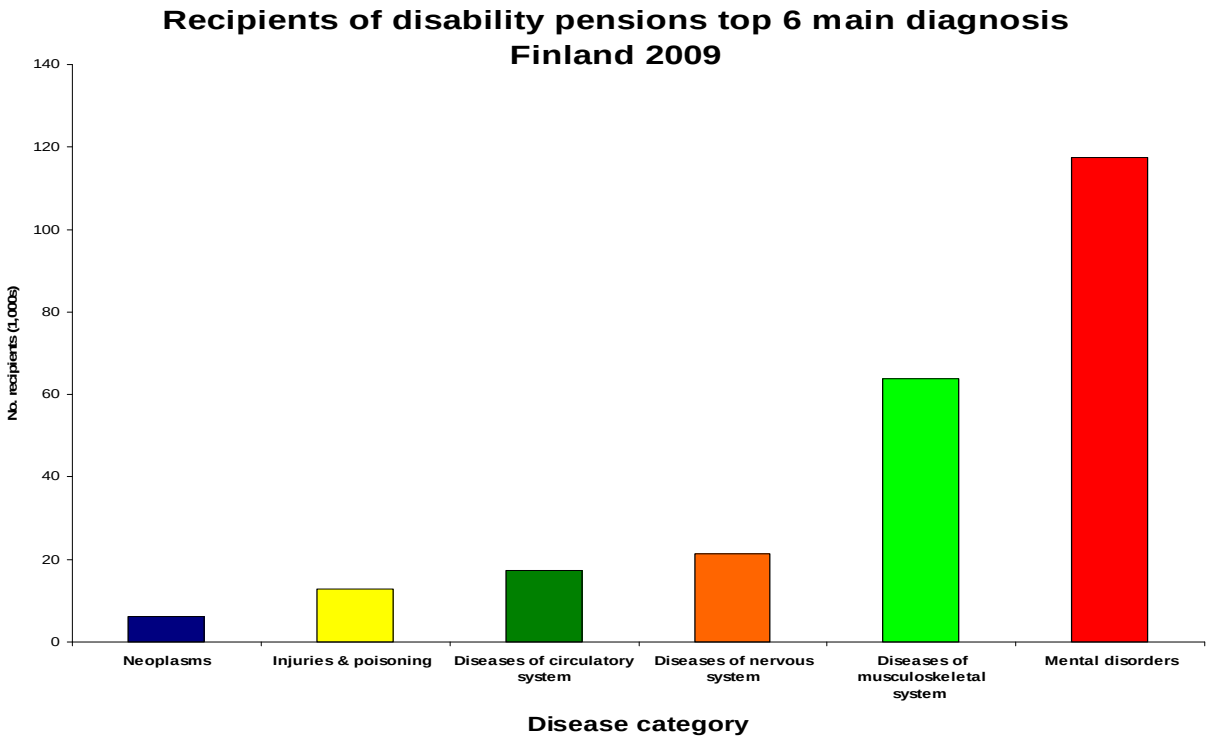
Figure Percentage distribution of total benefit recipients, by age group, most recent available year: 2004 for Luxembourg and Spain, 2006 for the United Kingdom.



Source: OECD. 2007. Sickness, Disability and Work: Breaking the Barriers Vol. 2: Australia, Luxembourg, Spain and the United Kingdom 2007.

In Finland in 2009 diseases of the musculoskeletal system was second only to mental disorders as the principal diagnostic reason for receipt of a disability pension.

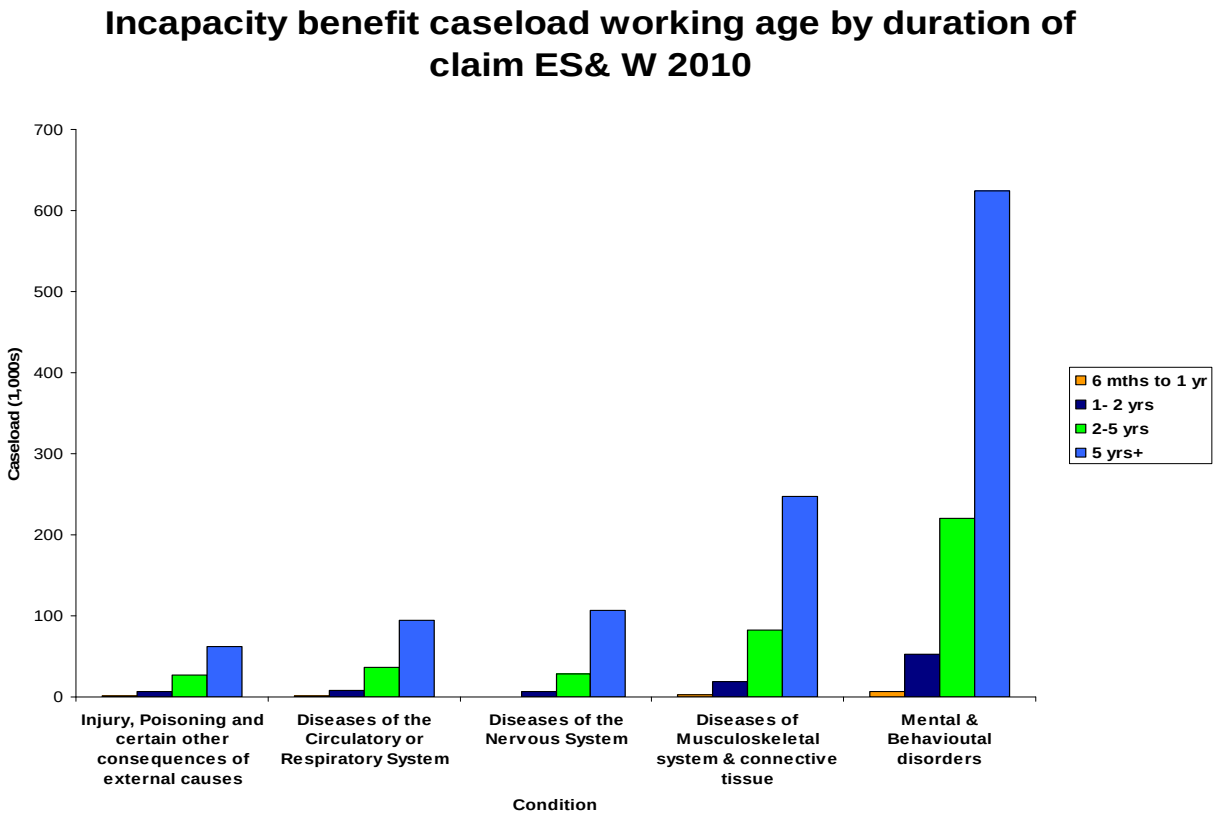
Figure Disability pensions by main diagnosis Finalnd 2009



Source: Finnish Centre for Pensions and The Social Insurance Institution of Finland. Statistical Yearbook of Pensioners in Finland 2010. Statutory earning-related and/or national pensions.

Data from England, Scotland and Wales on the duration of incapacity benefit claims by condition shows that MSC are second only to mental health conditions in terms of caseload and duration of claim.

Figure Duration of incapacity benefit claim by condition England, Scotland & Wales 2010



Source: Department of Work & Pensions. 2011. Analysis of Incapacity Benefits: detailed medical conditions and duration. http://research.dwp.gov.uk/asd/asd1/adhoc_analysis/2011/ib_sda_esa_medical_duration_aug_2010.pdf

In a study by Hallert et al (2006) the direct and indirect costs of early rheumatoid arthritis in Sweden was calculated. Costs were calculated for subjects of working age (18–65 years), using the human capital approach, estimating the value of lost production during the entire period of work absenteeism, assuming full productivity. Indirect costs exceeded direct costs in all 3 years of the study period. The average direct costs were 3704 Euro in year 1 and 2652 Euro in year 3. All costs decreased, except those for medication and surgery. The indirect costs were 8871 Euro in year one and remained largely unchanged. Almost 50% of study participants were on sick

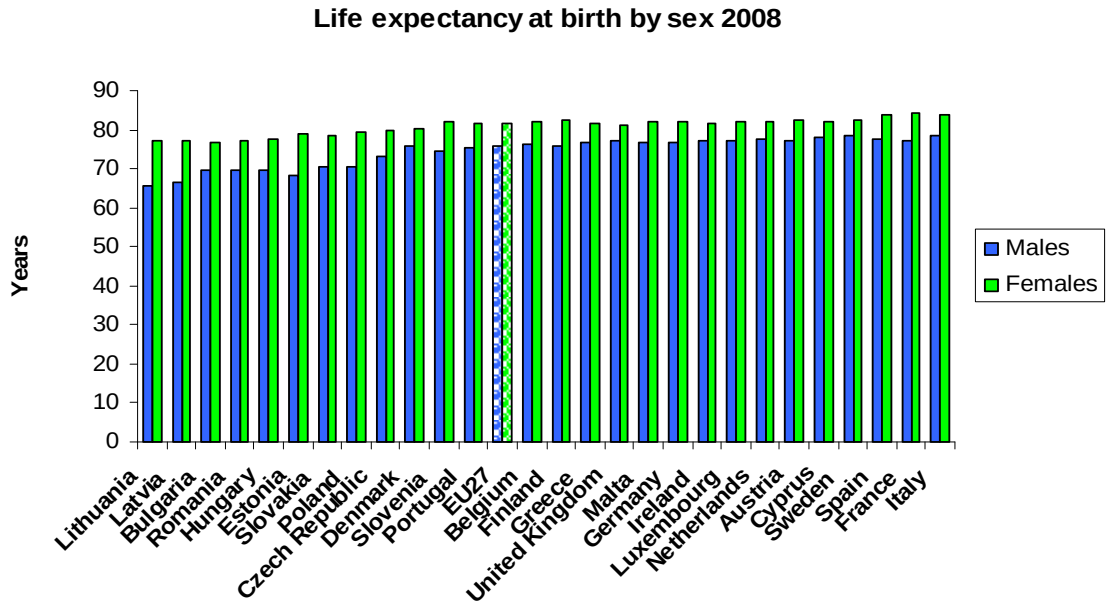
leave or early retirement at inclusion. Sick leave decreased but was offset by an increase in early retirement.

Health inequalities and musculoskeletal conditions

The Commission on Social Determinants of Health (CSDH 2008) defined health equity as: "the absence of unfair and avoidable or remediable differences in health among population groups defined socially, economically, demographically or geographically"

It is important to look at health inequities in the wider context of socioeconomic differentials. There are significant socio-economic differentials between and within EU countries. Life expectancy is an important measure of inequity. There is a 12 year difference between the highest and the lowest life expectancy at birth for males in the EU27. Lowest life expectancy for males is 66 years in Lithuania and the highest is 78 years in Italy, Spain, Sweden, Cyprus and The Netherlands. For women the lowest life expectancy at birth is 77 years in Lithuania, Latvia, Bulgaria and Romania. The highest is 84 years in Spain, France and Italy. The EU27 average is 76 years for males and 82 years for females.

Figure Life expectancy at birth by sex 2008

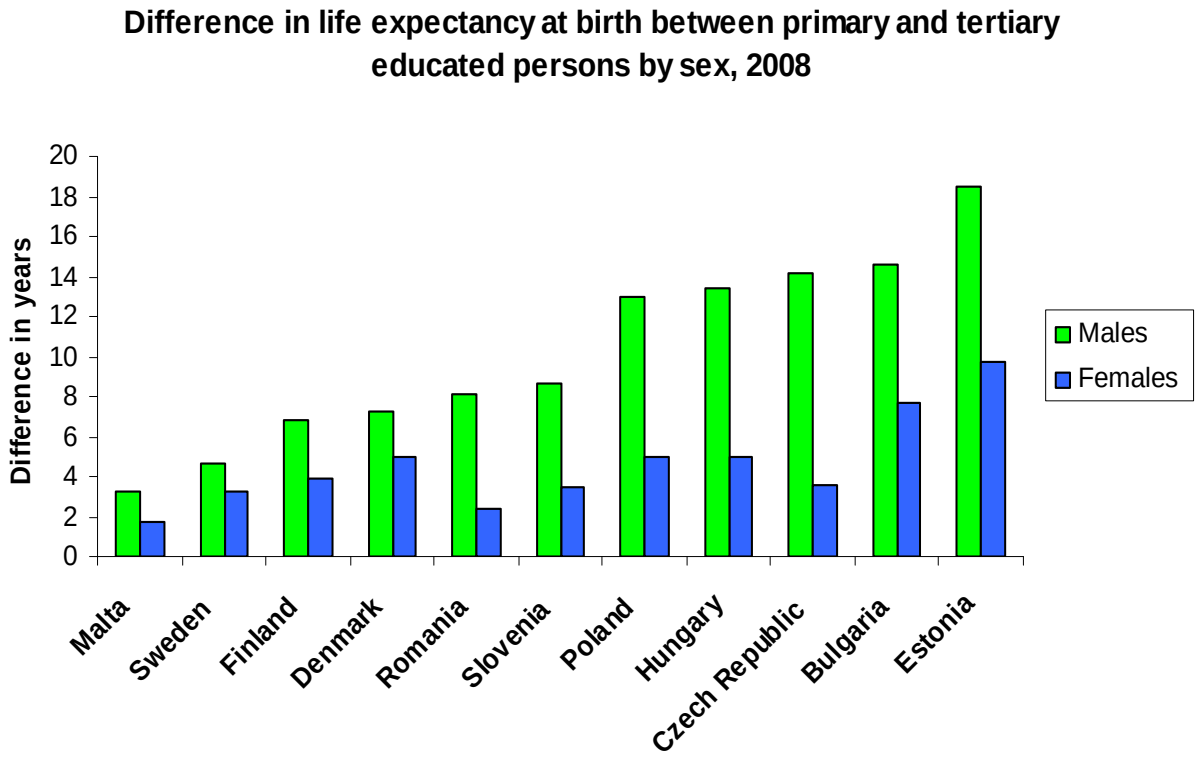


Source: Eurostat 2011.

http://epp.eurostat.ec.europa.eu/portal/page/portal/population/data/database

The within-country differences in life expectancy can be substantial. Examining life expectancy by education, men in Estonia with tertiary education have a life expectancy 18.5 years longer than those with primary education. Primary educated males in Estonia have a life expectancy of 57.5 years. For women the differential is 9.5 years with the life expectancy for primary educated women being 76.8 years. The lowest educational differential in the 11 countries presented here is in Malta where males with tertiary education live 3.2 years longer than males with primary education; for women the differential between education groups is 1.7 years.

Figure Difference in life expectancy at birth between primary and tertiary educated persons by sex, 2008.

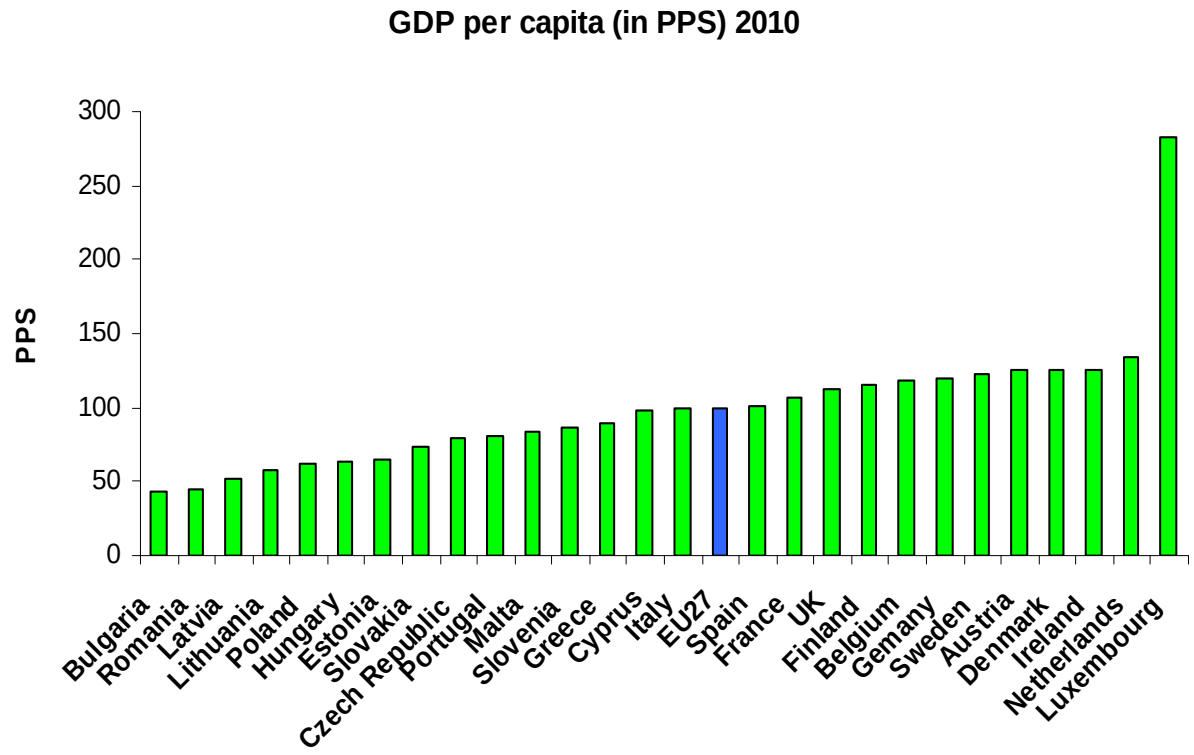


Source: EUROSTAT 2011.
http://epp.eurostat.ec.europa.eu/portal/page/portal/population/data/database

The Purchasing Power Standards (PPS) is an artificial currency unit that eliminates price level differences between countries allowing for direct comparison. Gross Domestic Product per capita in 2010 expressed in PPS varied from 43% to 283% of

the EU27 average across the Member States. The highest recorded level of GDP per capita was in Luxembourg (283). Romania (45) and Bulgaria (43) were approximately 55% below the EU27 average.

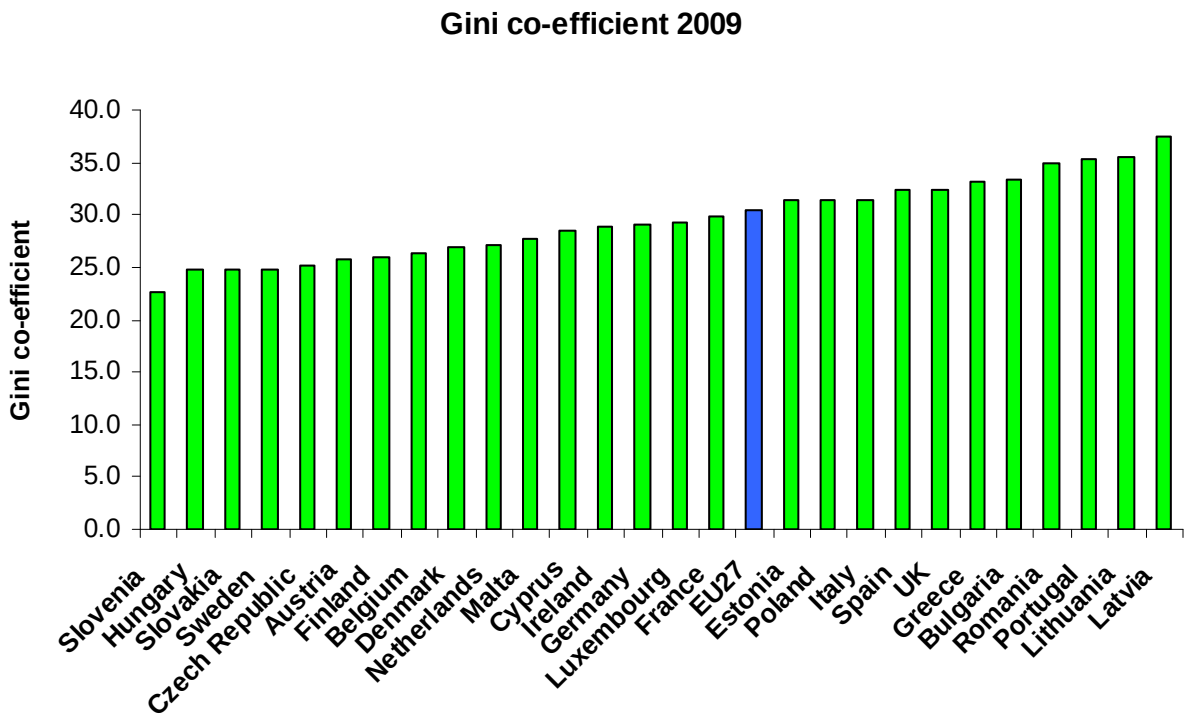
Figure GDP per capita in PPS 2010



Source: Eurostat news release 21 June 2011.
http://epp.eurostat.ec.europa.eu/cache/ITY_PUBLIC/2-21062011-AP/EN/2-21062011-AP-EN.PDF

The Gini Coefficient is the most commonly used measure of income inequality. The coefficient varies between 0, which reflects complete equality and 100, which indicates complete inequality (one person has all the income or consumption, all others have none). The 2009 average for the EU27 countries was 30.6. The data indicates that Slovenia, Hungary, Slovakia and Sweden have the most equal income distribution, the most unequal is found in Latvia, Lithuania, Portugal and Romania.

Figure Gini co-efficient EU27 2009



Source: EUROSTAT EU-SILC 2011: http://epp.eurostat.ec.europa.eu/portal/page/portal/income_social_inclusion_living_conditions/data/database

The Relative Index of Inequality (RII) is the ratio between the rate of self-assessed health in the lowest educational group and the rate of self-assessed health in the highest educational group. In the EU the RII is higher than 1 in all selected countries, for both men and women, indicating that self-assessed health is always worse in the lowest as compared to the highest educational group (Eurothine 2007).

Health care inequalities

Inequalities in health care can arise from a number of factors:

- Beliefs and health seeking behaviour

Health beliefs, perceptions of need and previous health care experiences affect health seeking behaviour and how people utilise health care services. For example people may consider that joint pain is a natural part of ageing and believe that it cannot be treated. In a UK survey of 1,400 people with a confirmed diagnosis of RA (National Audit Office 2009) one third of people who were finally diagnosed with RA delayed going to their GP for 6 months or more after their symptoms appeared. The attitudes and beliefs of healthcare providers can also act as a barrier to care (Van Ryn & Fu 2003).

- Financial barriers

The cost of health care itself (for example the need to make co-payments) or costs associated with accessing health care (for example transport costs or those associated with missed work or childcare) can act as a barrier to accessing health care.

- Organisational barriers

These include barriers such as referral patterns and waiting times. In the UK National Audit survey one third of respondents waited 6 months or more to obtain a referral to a specialist and nearly one quarter of respondents had to wait over a year for effective treatment and care. (National Audit Office 2009).

MSC and socioeconomic status

Individuals with lower socioeconomic status have:

- Higher prevalence of chronic musculoskeletal complaints (Hagen, 2005)
- Higher prevalence of osteoarthritis (Hannan 1992, Hawker 2002)
- More severe disease and worse disease progression in rheumatoid arthritis (ERAS Study Group 2000, Harrison 2005)
- Studies in the US, Canada and the UK have found relationships between total joint arthroplasty (TJA) and socioeconomic status. Patients with lower income

have TJA less frequently than those with higher socioeconomic status (Rahman et al 2011).

- A UK study showed that residents in the most deprived areas got less provision relative to need for total hip replacement and total knee replacement than those in the least deprived areas (Judge et al 2010).
- In England it was found that a socioeconomic gradient of 25.9% difference existed for in-hospital hip fracture mortality in 2008 (Wu et al 2011).

Education has an important influence on health. The mechanism is unknown but it is thought that education may influence health outcomes by providing the trigger for healthier lifestyles and behaviour and providing access to employment opportunities and other chances that can protect individuals from disadvantage later in life (Acheson 1998, HSE 2002). Studies show that there is an association between level of education and the likelihood of having a musculoskeletal condition.

A study by Dalstra et al (2005) examined the socioeconomic differences in the prevalence of common chronic disease in 8 European countries using data from health surveys. The study calculated the odds ratios for the prevalence of disease comparing lower education with higher education level. With the exception of back and spine disorder in England the prevalence of musculoskeletal conditions was higher in those with low education levels than those with high education levels. The table below show odds ratios for the prevalence of MSC in adults aged 25-79 by education.

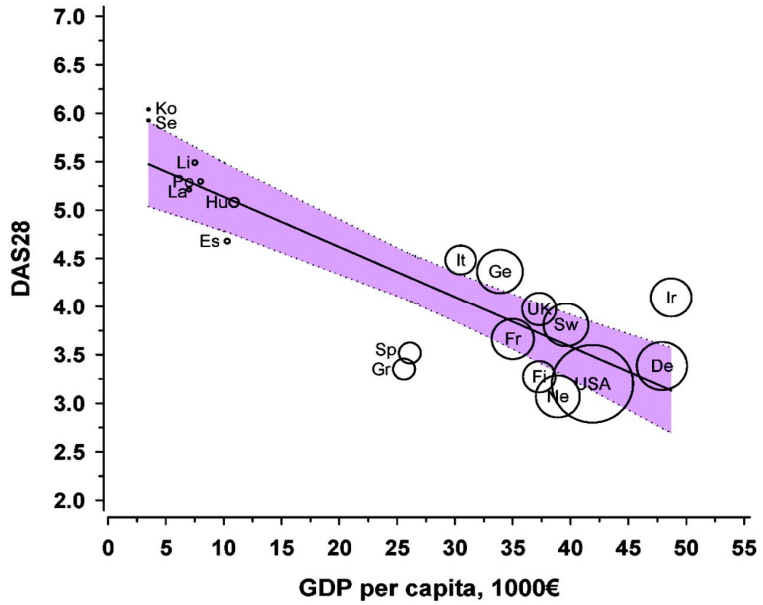
Table Odds ratios for prevalence of MSC by education differences (low vs. high education), adults aged 25-79

Condition	Denmark	England	Netherlands	Belgium	France
Arthritis		1.73	1.48	1.44	
Osteoporosis			1.61	1.54	1.43
Back & spine disorder	1.16	0.90	1.17	1.53	1.09

Source: Dalstra et al 2005.

The Quantitative Standard Monitoring of Patients with Rheumatoid Arthritis (QUEST–RA) study included clinical and questionnaire data from 6004 patients who were seen in usual care at 70 rheumatology clinics in 25 countries as of April 2008. These included 18 European countries. Demographic variables, clinical characteristics, RA disease activity measures, including the disease activity score in 28 joints (DAS28), and treatment-related variables were analysed according to GDP per capita. It included 14 "high GDP" countries with GDP per capita greater than US$24 000 and 11 "low GDP" countries with GDP per capita less than US$11 000. Disease activity DAS28 ranged between 3.1 and 6.0 among the 25 countries and was significantly associated with GDP. Patients who were taking or not taking biological agents in ''high GDP'' countries had similar disease activity levels of 3.7, whereas in ''low GDP'' countries those who were taking biological agents had a statistically significantly lower mean DAS28 of 4.4 compared with patients who were not taking biological agents. Disease activity levels differed substantially between "high GDP" and "low GDP" countries at much greater levels than according to whether patients were currently taking or not taking methotrexate, prednisone and/or biological agents. The study concluded that the burden of arthritis appears substantially greater in "low GDP" than in "high GDP" countries.

Figure The burden of rheumatoid arthritis (DAS28) by GDP



Source: Sokka T et al. 2009.

Age and gender

As we saw earlier age is a risk factor for musculoskeletal problems. A UK study of the provision of total hip replacement and total knee replacement showed that compared with people aged 50-59, those aged 60-84 got more provision relative to need, while those aged ≥85 received less total hip replacement and less total knee replacement (Judge 2010). In certain occupation groups young age is associated with increased risk of musculoskeletal conditions- this could be a result of young people being engaged in more physically demanding activities or due to older workers leaving these occupations due to the physical demands.

In relation to gender, studies have shown that women have a higher prevalence of OA, a lower rate of total joint arthroplasty and a greater unmet need for TJA than men (Borkhoff et al 2011). A US study indicated that women are operated on for TJA at a more advanced stage in the course of their disease than men (Katz 1994). A study from the UK also showed that men received more provision relative to need for total hip replacement and total knee replacement than women (Judge 2010). In a study by Hawker et al. (2000) women were more than 3 times less likely to undergo arthroplasty than men despite reporting equal willingness to have the procedure.

Ethnicity

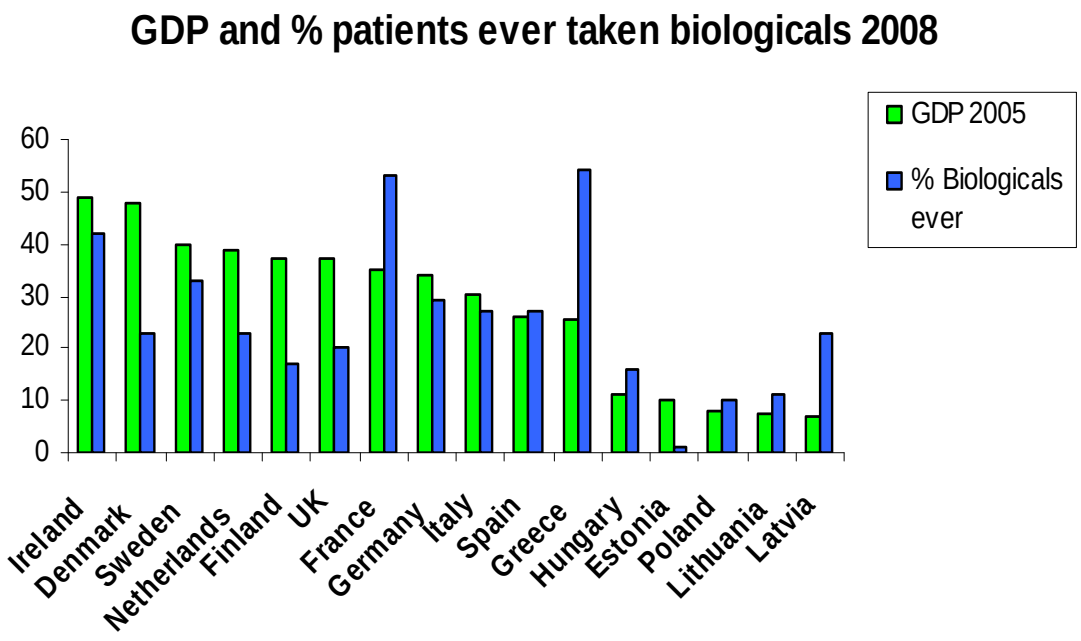
There is little data or literature available on ethnicity and MSC health inequalities in Europe. A UK study showed that for total knee replacement, patients living in non-white areas received more provision relative to need than those in predominantly white areas (Judge et al 2010). In a US study older American Hispanics were more likely to report having arthritis and reported having a higher prevalence of limitations in activities of daily living than non-Hispanic whites (Dunlop et al 2001).

Equity of access to MSC treatments across the EU

A report by Kobelt and Kasteng (2009) examined the uptake of biologic treatments across the EU. The study faced a number of methodological challenges including

those due to the absence of comparable data across the Member states and the lack of information on the proportion of drugs used for RA rather than other indications. Therefore the results must be interpreted with caution. The results suggest that there are large differences in the proportion of patients with RA who are treated with biologics across EU Member States. The wealthier countries in the EU tend to have a higher proportion of patients treated with biologics. The authors conclude that differences between countries with similar economic conditions are due to a number of factors including reimbursement schemes, treatment guidelines, access to specialists and relative costs (Kobelt 2009). The QUEST-RA study also showed a large variation in the percentage of patients who had ever taken biologicals form a high of 54% in Greece to a low of 1% in Estonia. This was not related to GDP.

Table GDP and % patients ever taken biologicals 2008

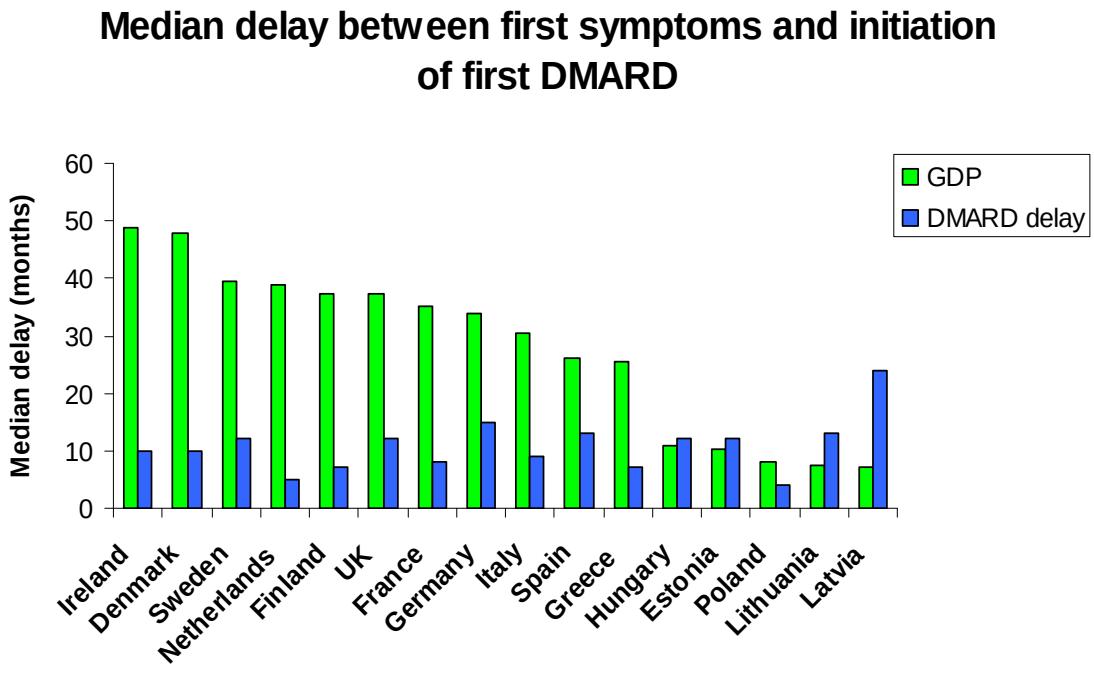


Source: Sokka et al 2009.

Disease modifying antirheumatic drugs (DMARD) were taken by 92–100% of all patients in the 16 EU countries included in the study, with no differences between

‘‘high GDP’’ and ‘‘low GDP’’ countries; the mean number of DMARD was 2.7. The median delay between first symptoms and initiation of the first DMARD ranged widely but with no statistically significant difference between “high GDP” and “low GDP” countries (Sokka 2009). DMARD were taken for less than 50% of disease duration in the UK, Ireland, Hungary, Latvia, Lithuania and for more than 100% in Finland and Greece (percentages greater than 100 indicate the simultaneous use of two or more DMARD).

Figure Delay between first symptoms and initiation of first DMARD by GDP



Source: Sokka et al 2009.

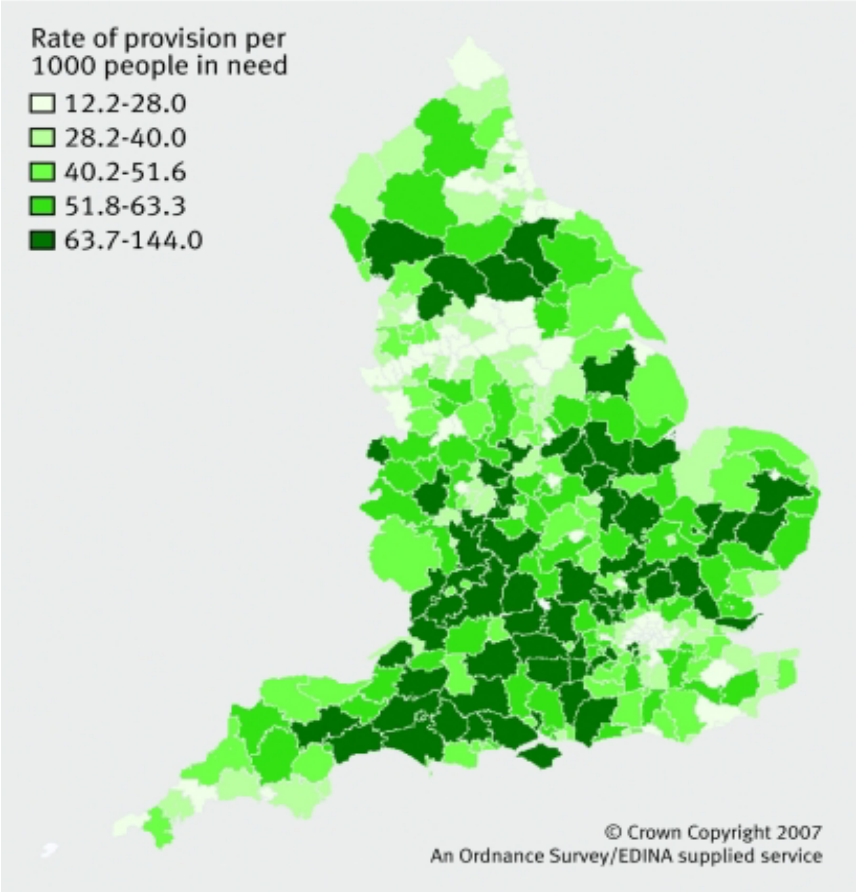
Regional inequalities in access to MSC health care

In many countries across Europe studies have identified significant regional differences in access to health care services and care (Lopez-Casanovas et al 2005, Salmela 1993). There are very few studies looking at these differences in relation to musculoskeletal conditions. The 2010 study by Judge et al showed that there were substantial regional differences in access to total hip replacement and total knee

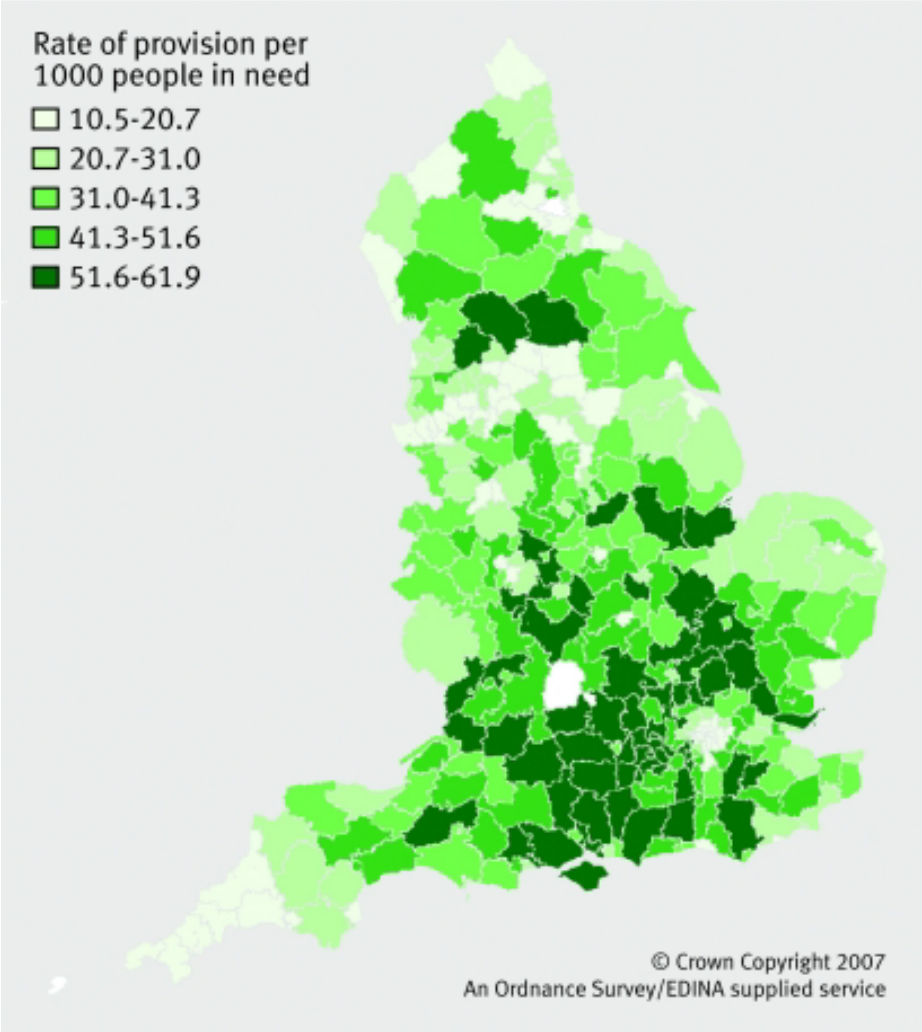
replacement in England. The maps show that a district with a high rate of equity (dark green) is providing more operations for people in need than a district with a low rate of equity (light green). On average, a district in the bottom fifth would have to perform an additional 24 hip replacement operations per 1000 people in need (13/1000 for knee replacement) to move from the bottom to middle fifth. For hip and knee replacement the level of equity is worse for people living in the north, the West Midlands, and London. Except for London, people in need of surgery living in the south of England were more likely to get an operation than in other areas of the country.

Figure Regional access to total hip & total knee replacement in England

Map of equity to access to THR across 354 districts in England



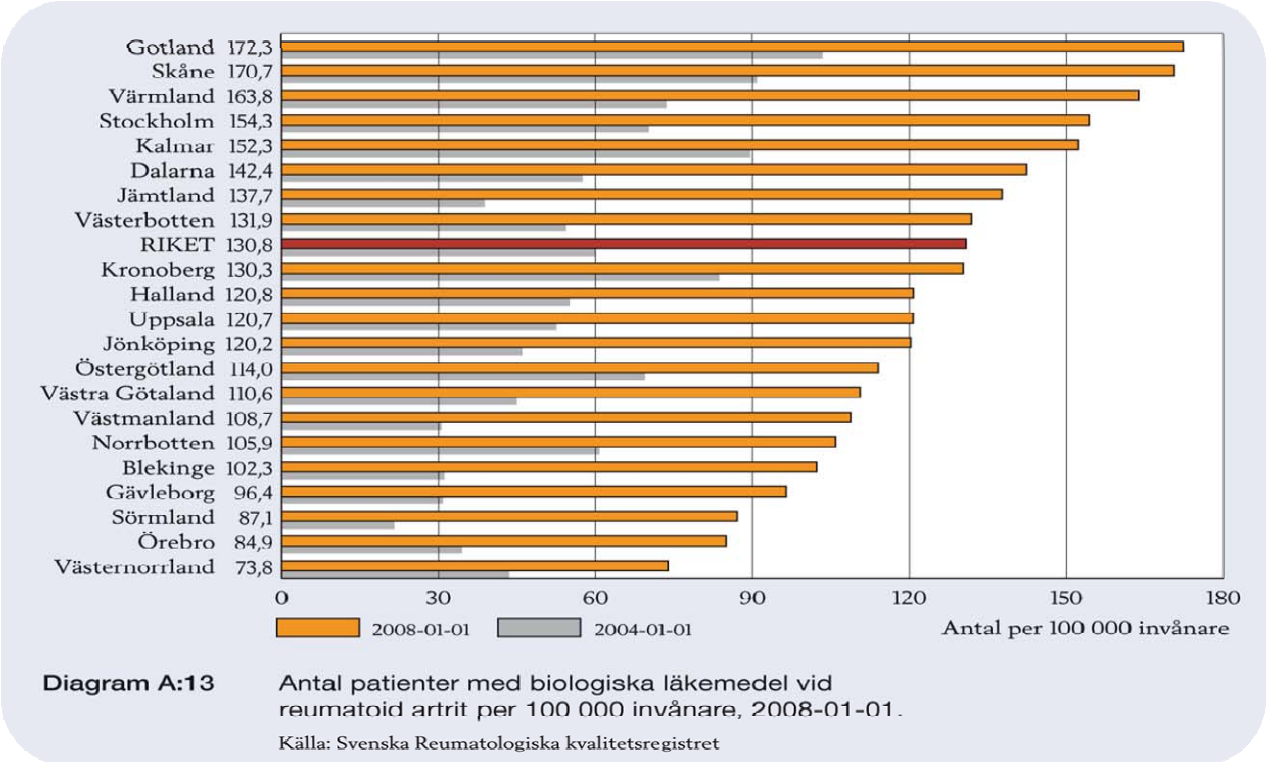
Map of equity to access to TKR across 354 districts in England



Source: Judge et al 2010.

Data from Sweden (http://english.skl.se/) shows that despite an even distribution of the occurrence of RA over the country before the launch of national guidelines in 2011 there were significant health inequalities between different regions in the access to biologic therapy for RA.

Figure Number of patients with biological medicines for rheumatoid arthritis per 100,000 people by region, Sweden 2008.



Source: Swedish Rheumatology Quality Register. Contributed by MORSE, Sweden

Conclusion

This report has sought to describe the health, social, employment and economic impacts of musculoskeletal conditions across EU Member States. In doing so it has drawn on information and data from a wide range of sources. In compiling this report the lack of up to date comprehensive data which is comparable across all Member States is apparent. This is particularly the case for incidence and prevalence data from Central, Eastern European and Mediterranean countries. This highlights the need for improved sources of routine data on these common but high impact conditions.

Changes in the lifestyles of Europeans including increasing obesity and inactivity are putting populations at high risk of developing musculoskeletal conditions. This together with Europe's ageing population suggests that without action the burden of these conditions will increase. At present musculoskeletal diseases are a leading cause of burden of disease in the EU as measured by Disability Adjusted Life Years (DALYS) and Years Lived with Disability (YLDs). Central and Eastern European countries show a relatively high burden of musculoskeletal disease including rheumatoid arthritis and osteoarthritis. These countries also have the lowest GDP per capita in the EU27. This is compatible with the evidence that there is a correlation between osteoarthritis, rheumatoid arthritis and socioeconomic conditions.

Musculoskeletal conditions are a major cause of productivity loss. There are very few comparative studies of sickness absence in Europe and there is an urgent need for indicators which can be used across the EU27 to capture the occurrence, duration and cause of sickness absence. MSC are a major cause of prolonged sickness absence and as a major cause of disability and as such they lead to significant costs in terms of disability pensions and benefits.

Musculoskeletal conditions can profoundly affect many aspects of the life of the individual, including physical and mental well-being, economic well being and physical and emotional relationships. They impact on the life not only of the individual but also of carers, family and friends. Taking in account not only the level of impairment but also the prevalence of disease Rheumatic diseases are among the

diseases that produce the largest impairment in Health Related Quality of Life (HRQoL) and daily functioning and, as a group, may be considered on a par with major diseases such as neurological, cardiac, or pulmonary diseases.

Across the EU there are significant differentials in the burden of disease by age, gender, education and occupation. National and regional inequalities in access to health care services and resources have also been identified. Of particular concern is the evidence which suggests that disease activity levels differ substantially according to whether countries are classified as having a high or low GDP.

Everyone is at risk of developing musculoskeletal conditions, but to reduce the enormous impact on the quality of life of individuals and socio-economic impact on society related to musculoskeletal conditions, people at all ages should be encouraged to follow a bone and joint healthy lifestyle and to avoid the specific risks related to musculoskeletal health.

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