

BROKEN BONES, BROKEN LIVES:

A roadmap to solve the fragility
fracture crisis in Italy



FOREWORD

With fragility fractures affecting one in three women and one in five men aged 50 or above, nearly everyone has a family member or friend who has been affected by a fragility fracture. Yet how many of us stop to question the true cause of fragility fractures and simply assume them to be a 'normal' sign of aging rather than the result of weakened bone? How many of us understand that an initial fracture may be a gateway to further fractures and should be treated as a warning sign and prompt us to seek out preventative treatment?

As Italy's population ages, the incidence and contribution of fragility fractures to the overall healthcare spend continue to increase. In 2017, 560,000 fractures occurred in Italy with an associated healthcare cost of €9.4 billion. This annual expenditure in Italy is predicted to increase by approximately 26% (to €11.9 billion) by 2030.

Beyond the immediate distress, healing time, and recovery associated with a fracture, an initial fracture significantly increases the risk of subsequent fractures and can trigger a negative spiral of healthcare dependence, escalating expense, and impaired quality of life, despite the existence of treatments and programs for secondary prevention of fragility fractures.

This report, **Broken bones, broken lives: A roadmap to solve the fragility fracture crisis in Italy**, explores the clinical, societal, and cost burdens associated with fragility fractures in Italy. The findings provide evidence that, despite the availability of effective preventative therapies and management approaches for fragility fractures, studies suggest that approximately 75% of elderly patients are discharged from Italian hospitals following a hip fracture without any pharmacological treatment for osteoporosis.

Secondary prevention of fragility fractures has been neglected for too long. There is an urgent need to recognize fragility fractures as a public health priority, and to establish secondary fracture prevention and management as an integral component of healthy aging.

In addition to providing the latest state of play of fragility fracture care, the report also serves as a roadmap, which includes policy recommendations that can assist policymakers in offering the best possible care for Italian citizens in order to reduce the number of fractures and their impact on patients and Italy's healthcare systems.



Cyrus Cooper, IOF President

The International Osteoporosis Foundation (IOF) is a registered not-for-profit, non-governmental foundation based in Switzerland that has been granted Roster Consultative Status with the Economic and Social Council of the United Nations. IOF functions as a global alliance of patient societies, research organizations, healthcare professionals, and international companies working to prevent osteoporosis and fragility fractures worldwide. Striving for a world without fragility fractures, in which healthy mobility is a reality for all, IOF is dedicated to advancing research and education, promoting policy change, increasing awareness of bone health, and improving patient care.



The Italian Foundation for Bone Disease Research (FIRMO) is a non-profit private body that has been active in the field of skeletal diseases since 2006. Since it was first established, the Foundation has set itself an ambitious objective: to bring together the best experts around skeletal diseases with the mission of eradicating bone diseases. FIRMO is active on every path that is strategic to its mission, covering information dissemination, training, and research. FIRMO has gained a prominent position in the care and prevention of skeletal diseases, becoming a reference point for patients, medical and scientific organizations, public health agencies, universities, researchers, and industry.

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The Italian Society of Osteoporosis, Mineral Metabolism and Skeletal Diseases (SIOMMMS) is a leading scientific society in Italy dealing with osteoporosis, metabolic diseases of the skeleton, and disorders of mineral exchange. SIOMMMS was originally part of the Society of Mineral Metabolism, founded in Verona in 1979, which then merged with the Italian Society for Osteoporosis in 2000. In its current form, SIOMMMS offers specialist training to its ≥750-strong membership, and organizes annual congresses to stimulate the progress of experimental and clinical studies, the development and standardization of research methodologies and assessment criteria, and clinical applications for the management of metabolic bone diseases. SIOMMMS is a point of reference for information on skeletal diseases, and works closely with the Italian Ministry of Health, Regions, Healthcare Companies, Universities, and other public health institutions.



The Italian Society for Orthopaedics and Traumatology (SIOT) was founded in Rome in 1892. SIOT's mission is to promote the continuous education of its 4,700 members through the sponsorship of congresses and the organization of Master's degrees and seminars. The society has strong links to associations in related disciplines ranging from diagnostics to surgery. It publishes two scientific journals (*Giornale Italiano di Ortopedia e Traumatologia* and *Journal of Orthopaedics and Traumatology*), and every year offers scholarships to encourage the professional growth of specialists under 35.

GLOSSARY

BMD	Bone Mineral Density
CI	Confidence interval
COPD	Chronic obstructive pulmonary disease
CTF®	Capture The Fracture®
DALY	Disability-adjusted life year
EU6	France, Germany, Italy, Spain, Sweden, and the UK
FIRMO	Italian Foundation for Bone Disease Research
FLS	Fracture Liaison Service
GDP	Gross domestic product
ICER	Incremental cost-effectiveness ratio
ICUROS	International Costs and Utilities Related to Osteoporotic Fractures Study
IOF	International Osteoporosis Foundation
LEA	Livelli Essenziali di Assistenza
LTC	Long-term care
MOF	Major osteoporotic fracture (hip, spine, humerus, or forearm fractures)
PDTA	Percorsi diagnostico-terapeutici assistenziali
PNP	National Prevention Plan
QALY	Quality-adjusted life year
SIOMMMS	Italian Society of Osteoporosis, Mineral Metabolism and Skeletal Diseases
SIOT	Italian Society for Orthopaedics and Traumatology



EXECUTIVE SUMMARY

This report provides an overview of the burden and management of fragility fractures in Italy and compares the national reality to that of the EU6 nations (France, Germany, Italy, Spain, Sweden, and the UK). The report not only aims to highlight the burden and challenges posed by fragility fractures, but also to signpost opportunities for increased efficiencies in fragility fracture management and to realize improvements in patient care.

As Italy's population ages, the challenge of preserving the independence and active lifestyles of the aging population has become a multifaceted challenge that technology, social initiatives, and healthcare policy can help tackle.

With approximately **560,000 new broken** bones occurring in Italy in 2017, fragility fractures are a major obstacle to healthy aging, impacting the independence and quality of life of **4 million men and women** living with osteoporosis in Italy.

Fragility fractures can be prevented, but their prevention and management have long been neglected despite the massive associated costs for the Italian healthcare system (**€9.4 billion in 2017**) and these are set to increase to €11.9 billion by 2030.

The burden of fragility fractures in Italy exceeds that for chronic obstructive pulmonary disease (COPD) and ischemic stroke.

After a fragility fracture, individuals are **five times** more likely to experience a second fracture within the next 2 years. Despite this, studies suggest that 75% of elderly patients do not receive pharmacological treatment for osteoporosis after a hip fracture. Not unique to Italy, this massive treatment gap is observed consistently across Europe, reflecting the low importance that has been given to fragility fractures to date and the current urgency to prioritize post-fracture care in our aging societies before costs get out of control.

With fragility fracture incidence in Italy predicted to increase by 22.4% by 2030, **now** is time to **break** the cost spiral, and take action to put an end to the dire consequences of fractures on patients.

Policies have a significant role to play in promoting, funding, and implementing care solutions, such as coordinated care models for patients following a fracture. The most common coordinated care model for post-fracture patients is a 'Fracture Liaison Service', or FLS. The FLS model has been proven to be both clinically effective and cost-effective: reducing further fractures, and lessening the burden on both healthcare and individuals at a reasonable level of investment.

While coordinated care models appear as a universal solution to improve patients' diagnosis, treatment, and follow-up, local policy solutions adapted to the specificities of healthcare systems and policies – within and across countries – should also be considered.

In recognition of the growing fragility fracture burden, the national roadmap for Italy calls for policy care efforts to be focused on:

- Prioritization of available resources for sub-populations at risk of subsequent fracture
- Establishment of clear pathways for the management of patients following an initial fragility fracture
- Greater use of available data to quantify and reduce fracture-related hospitalization costs
- Campaigns to raise awareness among patients and encourage proactive engagement with healthcare

DID YOU KNOW THAT...

- Osteoporosis (which means 'porous bone') is a disease that weakens the density and quality of the bone, thus increasing the risk of fracture. The loss of bone is symptomatically silent and progressive, until the first fragility fracture occurs due to a low-trauma event, such as a fall from standing height or even a minor bump¹
- One in five men and one in three women aged ≥50 years will experience a fragility fracture in their remaining lifetime²
- A fragility fracture is a warning sign that has to be taken seriously: a fracture increases the risk of a subsequent fracture, which can occur at a different site³
- It is not only important to treat the existing fragility fracture but also to prevent subsequent breaks, i.e. secondary fracture prevention⁴
- "By missing the opportunity to respond to the first fracture, healthcare systems around the world are failing to prevent the second and subsequent fractures" (Professor Kristina Åkesson)⁵

“Because I travel frequently, I'm a little fearful when public transportation is crowded. I break easily and worry that someone will bump into me or step on my foot. I can break a rib after a minor bump, and I've broken my ribs several times.”



Maria Grazia, Italy

THE SILENT BURDEN OF FRAGILITY FRACTURES FOR INDIVIDUALS AND HEALTHCARE SYSTEMS



Something else that affects my everyday life is fatigue. Pain results in incredible fatigue, which I think is difficult for others to be able to understand.



Anita, Sweden



Fragility fractures affect men and women across Italy

Prevalence of osteoporosis across Italy

Approximately...

3.2 million

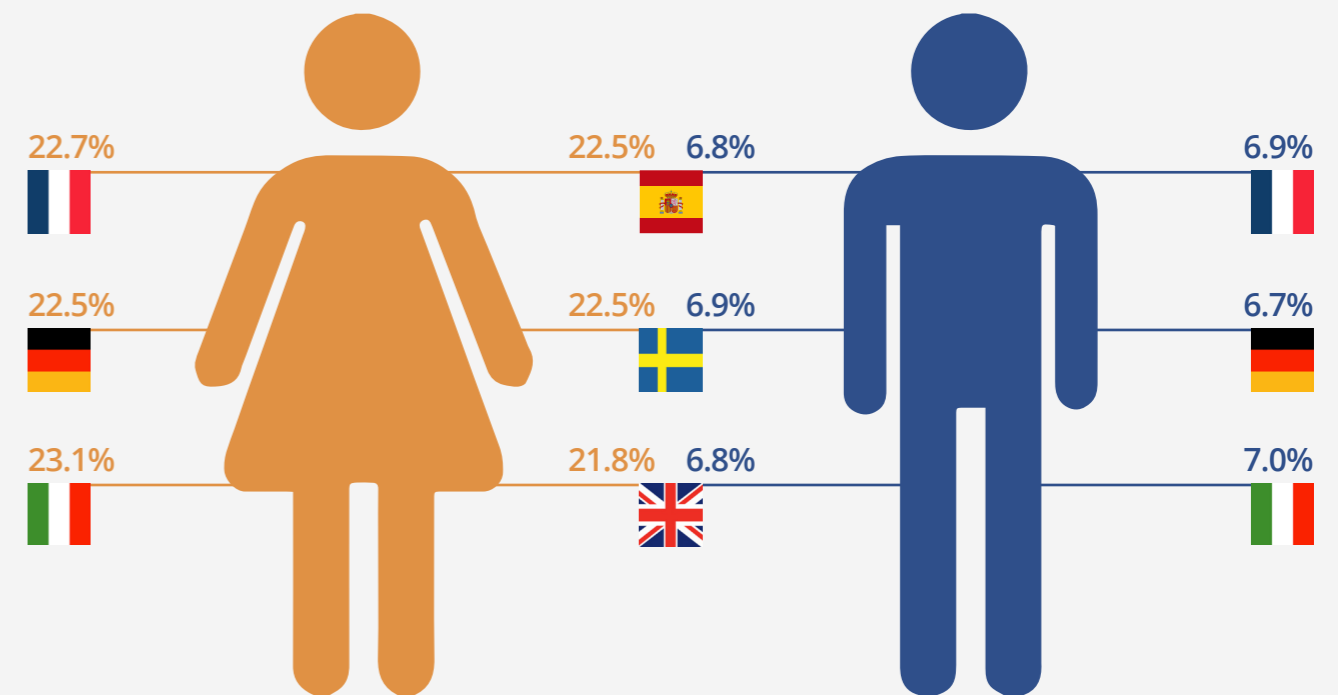


0.8 million



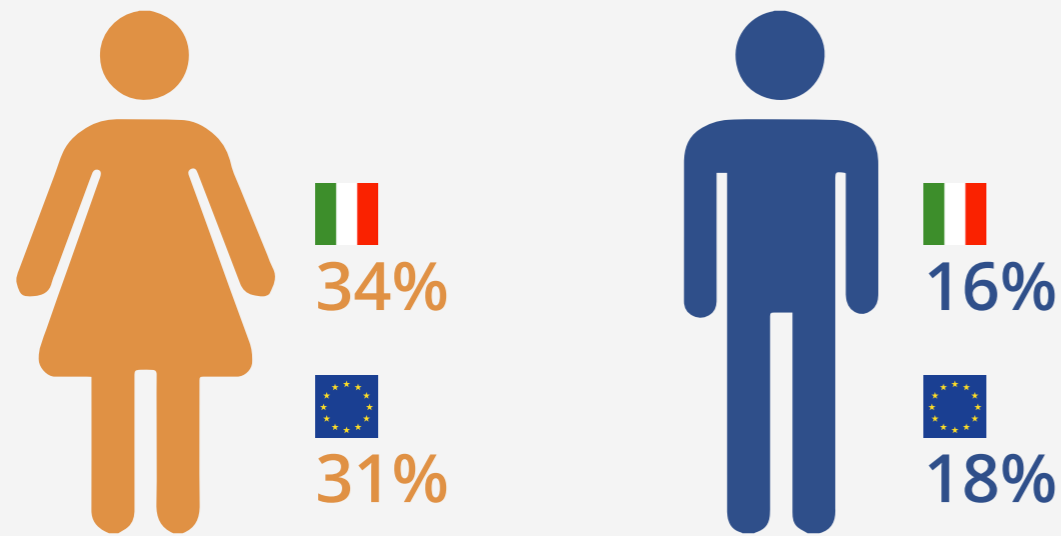
...4 million people in Italy have osteoporosis (assessed 2015).⁶

Prevalence of osteoporosis in Italy (23.1% for women; 7.0% for men) over the age of 50 years is comparable to that of France, Germany, Spain, Sweden, and the UK, which together with Italy are hereafter referred to as the EU6 nations:⁷⁻¹¹



Lifetime risk of fragility fractures

At the age of 50 years, the remaining lifetime risk for a major osteoporotic fracture (MOF) is higher for women in Italy than on average for women across the EU6, but slightly lower for men in Italy than for men across the EU6 nations.⁷



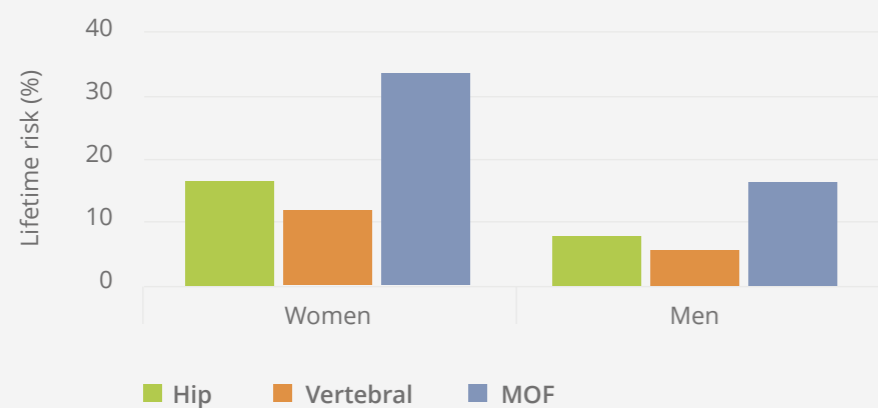
The lifetime risk of sustaining a fragility fracture varies for women and men, and by fracture site.

There is a marked difference in the risk of fracture between the EU6 countries, with Northern European countries having the highest fracture rates observed worldwide.

The reasons for the difference in fracture risk between countries are unknown and cannot be explained by differences in bone density. However, plausible factors include differences in body mass index, low calcium intake, reduced sunlight exposure and, perhaps the most crucial factor, socio-economic prosperity, which in turn may be related to low levels of physical activity.^{12,13}

Regardless of differences in fracture risk, the number of fractures in all countries is expected to increase due to an increasingly elderly population.

Lifetime risk of fragility fracture from the age of 50 years in Italy^{2,7,12,14-20}

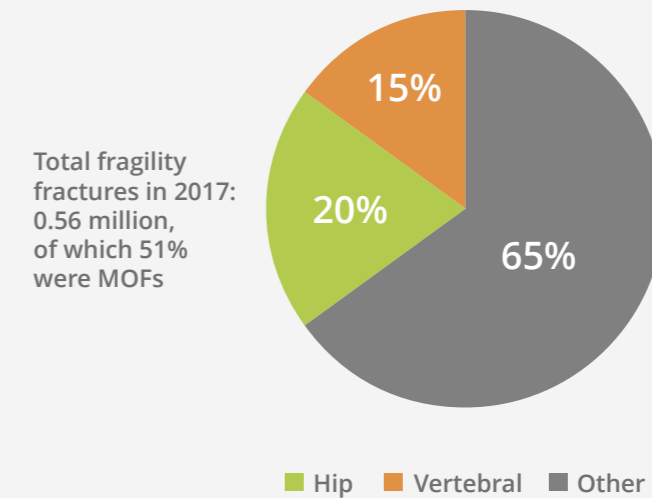


Fragility fracture incidence

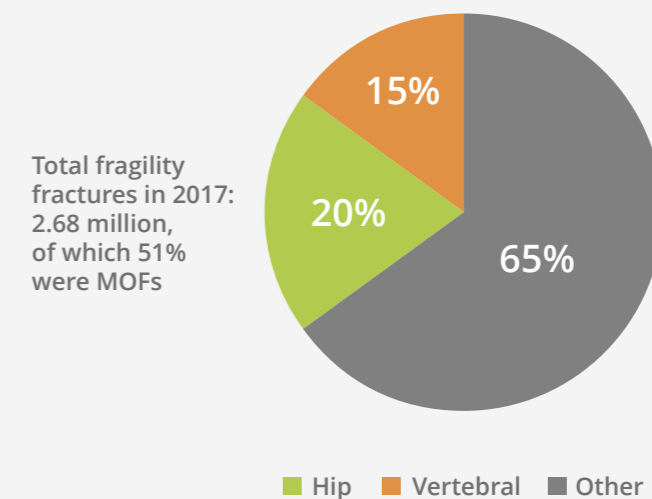
An estimated 0.56 million fragility fractures occurred in Italy in 2017.⁶

Estimated number of fragility fractures in Italy and the EU6 in 2017, by fracture category

Italy: distribution of fracture type



EU6: distribution of fracture type

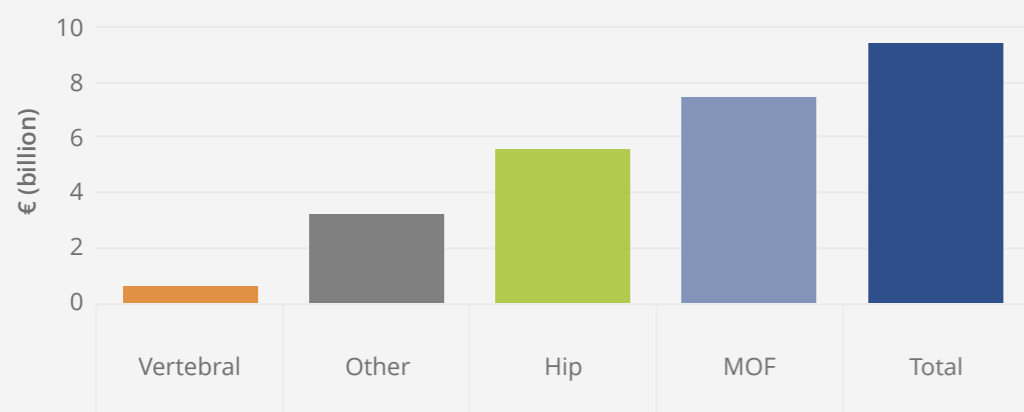


Fragility fractures incur substantial healthcare costs

Fragility fractures are associated with significant healthcare costs

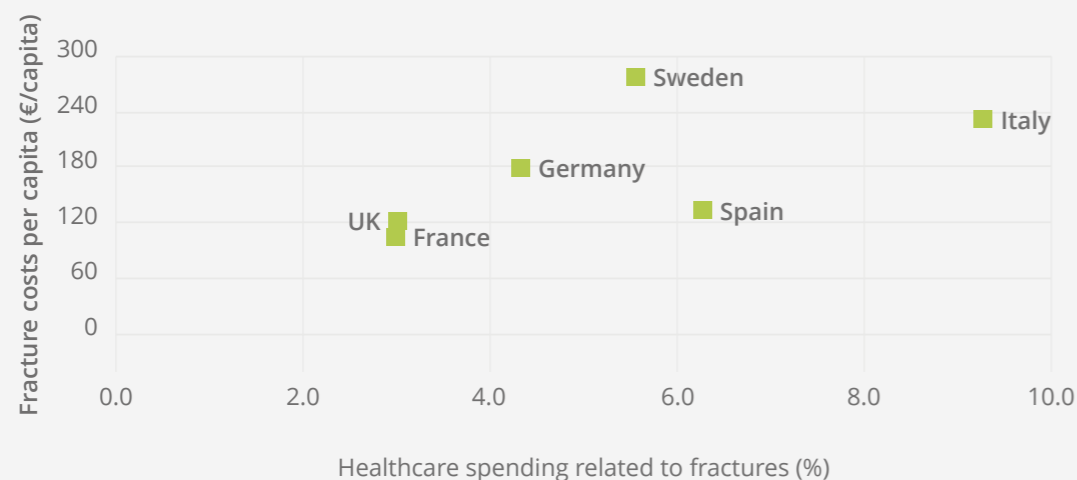
In 2017, fracture-related costs totaled approximately **€9.4 billion** in Italy.

Estimated annual fracture-related costs in Italy in 2017



When fracture costs are compared to healthcare spend, Italy appears to have the highest portion of healthcare spend devoted to fragility fractures of any of the EU6 countries.⁶

Comparison of per capita fracture cost as a proportion (%) of overall healthcare spend for the EU6 countries



Fracture-related costs:^{21,22}



mostly occur in the first year following a fracture



differ between fracture sites, and to some extent, reflect the severity of fracture



tend to be highest with hip fractures, as this is the most severe fracture site

Fragility fractures place a high burden on patients and healthcare systems

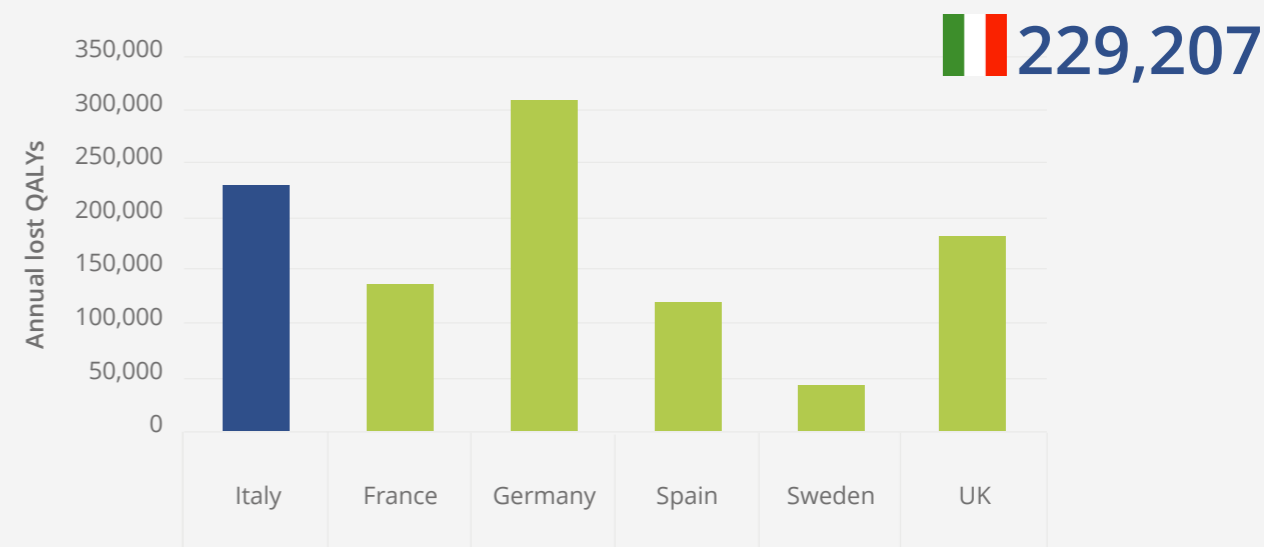
The burden of fragility fractures on individuals is demonstrated here with the annual loss of quality-adjusted life years (QALYs).

QALYs are a measure of the state of health of a person or group in which the benefits, in terms of length of life, are adjusted to reflect the quality of life. One QALY is equal to 1 year of life in perfect health. QALYs are calculated by estimating the years of life remaining for a patient following a particular treatment or intervention and weighting each year with a quality-of-life score (on a 0 to 1 scale). It is often measured in terms of the patient's ability to carry out the activities of daily life, and freedom from pain and mental disturbance.²³

The loss of QALYs as a result of fragility fractures varies across the EU6 countries. These differences are largely driven by variations in the risk of fractures and age distribution between countries.⁶

The total health burden in 2017 due to fragility fractures in Italy is estimated at 229,207 QALYs, 69% of which is attributable to fractures occurring among women.

Total annual loss of QALYs across the EU6 nations in 2017



Fragility fractures have a multifaceted impact on the individual and society

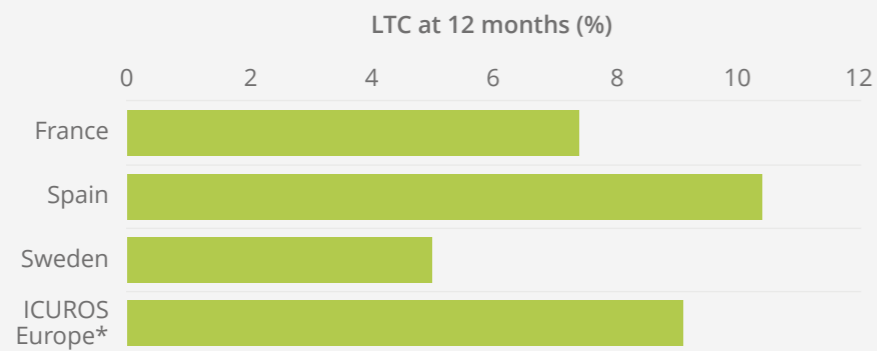
Reduced independence and lifestyle impairment

Reduced independence can be one of the most distressing outcomes for fracture patients. The disability associated with hip fractures can be severe. One year after hip fracture, 40% of patients are still unable to walk independently, and 80% are restricted in other activities, such as driving and grocery shopping.²⁴

A fracture not only affects people physically, but also emotionally. Knowledge of their increased fracture risk can negatively affect patients' outlook, causing them to change their levels of social interaction and to avoid certain activities, impairing their overall quality of life.²⁵

The long-term loss of independence and mobility can put physical, emotional, and financial strain on patients, as well as their relatives and friends, potentially leading to the need for institutional care, particularly in older age groups.²⁶

Proportion of patients (%) in long-term care (LTC) at 12 months after a hip fracture, by country⁶



*International Costs and Utilities Related to Osteoporotic Fractures Study (ICUROS) Europe: Austria, Estonia, Spain, France, Italy, and Sweden

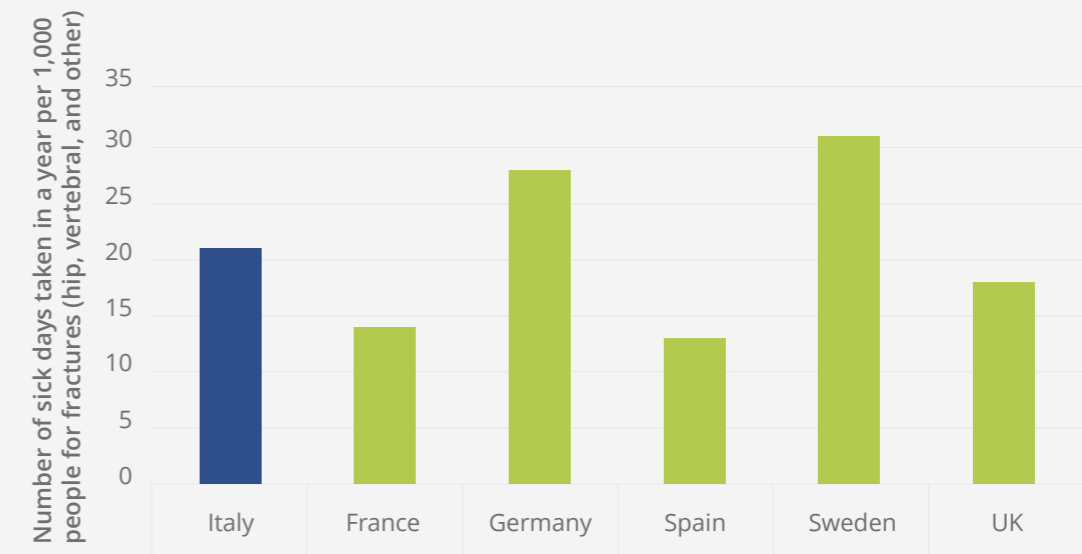
Across Europe, the proportion (%) of patients that move into LTC within a year of sustaining a hip fracture increases with age, from 2.1% at age 50–60 years to **35.3%** above 90 years.⁶

Fragility fractures can significantly impact the working population

Although fragility fractures mostly affect people in later life, an estimated 20% of fractures occur at pre-retirement age.² In 2017, a total of 717,316 sick days were taken in Italy among individuals of pre-retirement age affected by fragility fractures.²⁷

An average number of 21 sick days are taken per 1,000 people following a fragility fracture in Italy, which is close to the average for the EU6 countries:⁶

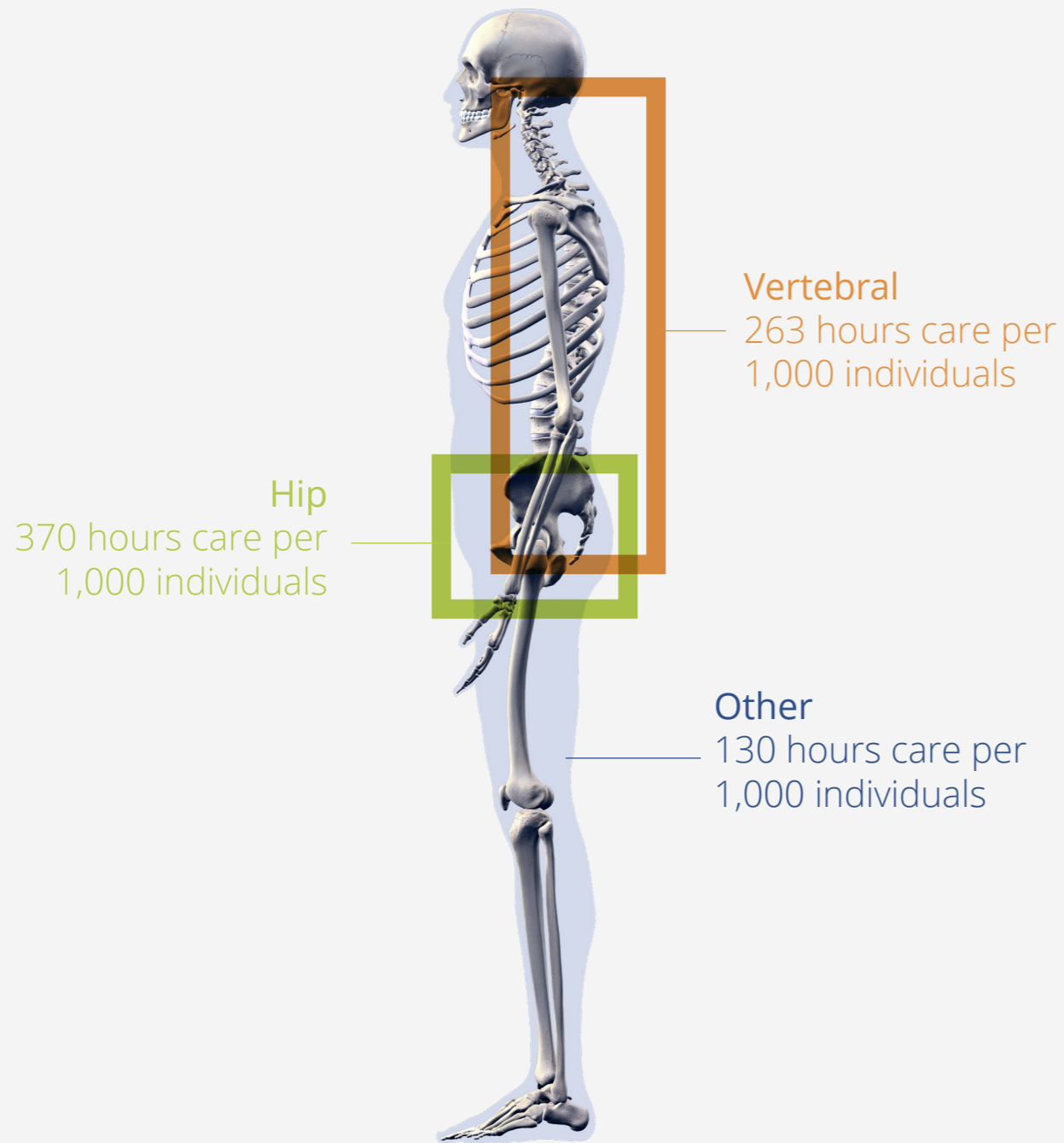
Average sick days taken after fragility fracture per 1,000 people, by EU6 country



Patients suffering fragility fractures depend on care from family and friends

As a result of reduced mobility and ability to complete activities of daily living, individuals who have suffered a fragility fracture may rely on informal caregivers, such as family members or friends.

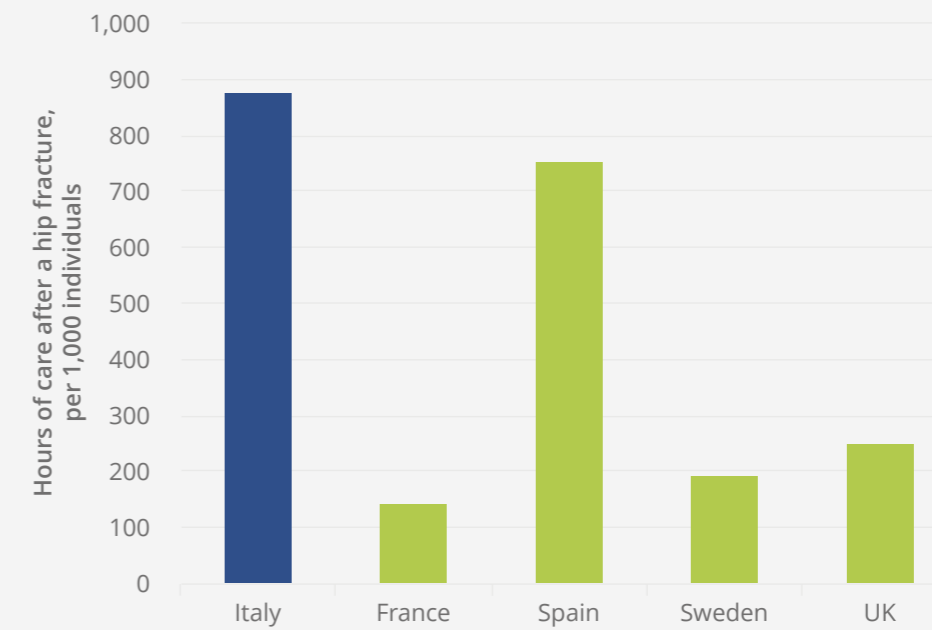
During the first year after a fracture, the hours of care provided by relatives vary greatly by fracture type and country.*⁶ **The more serious the fracture, the more support is needed.**



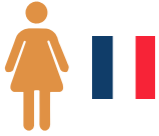
*To measure the average burden placed on informal caregivers per year, survey responses from ICUROS²⁸⁻³⁰ were also used to determine the caregiver burden due to osteoporotic fracture. It was measured in terms of hours of care per year provided by relatives in ICUROS Europe (a substitute measure for the EU6), as well as selected countries.

In countries where cross-generational support is more established, the impact of fragility fractures on caregivers is generally higher.³¹ Italy has the highest caregiver burden of all the EU6 nations, with an average of 882 hours a year per 1,000 individuals spent caring for patients with hip fractures, almost twice the EU6 average (443 hours/year/1,000 individuals).

Relative care hours related to hip fractures per 1,000 people, by country



FRAGILITY FRACTURES IN THE CONTEXT OF PUBLIC HEALTH PRIORITIES

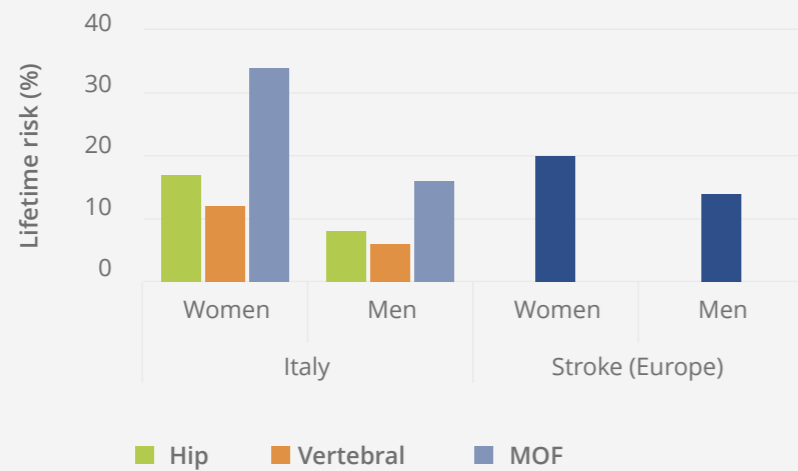


I can no longer run to catch a bus. I no longer feel young.
Maryvonne, France



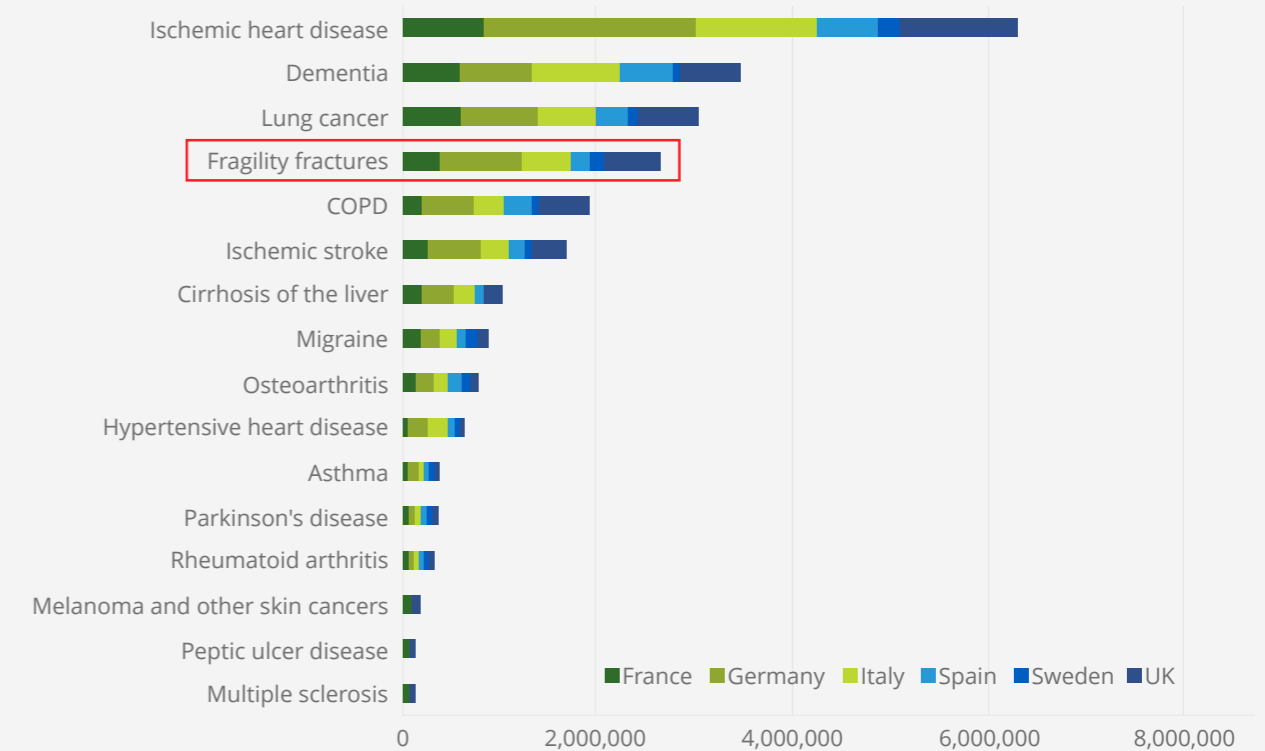
Fragility fractures represent a health risk for individuals aged 50 or above. In Italy, the **lifetime risk of MOF fracture at age 50 is higher than the lifetime risk of stroke** in Europe for both women (20%) and men (14%).^{32,33}

Lifetime risk of fragility fracture from the age of 50 years in Italy and the equivalent risk of stroke in Europe^{2,7,12,14-20}



The fragility fracture burden in the EU6 is greater than that of many other chronic diseases (including COPD). It is surpassed only by ischemic heart disease, dementia, and lung cancer.³⁴

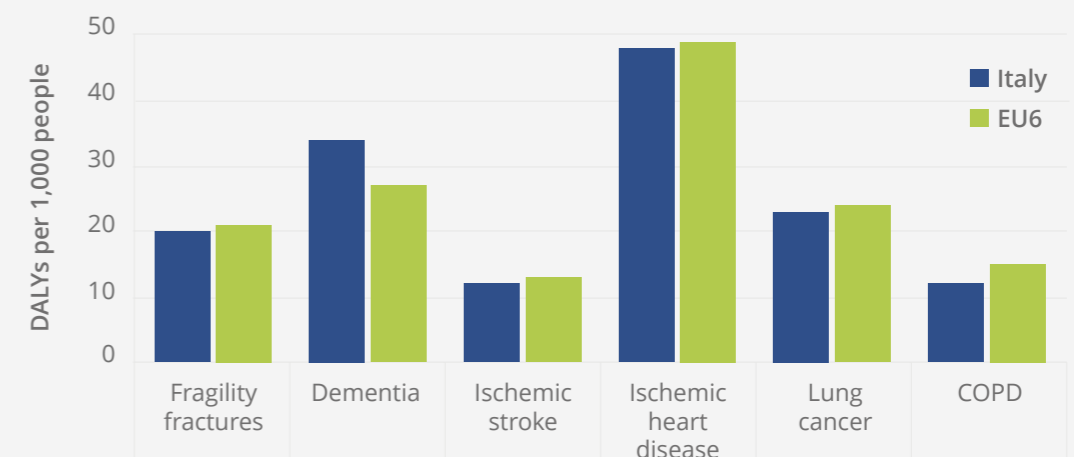
Country contribution to total disability-adjusted life years (DALYs) by disease in the EU6 in 17 selected diseases



Fragility fractures are the fourth leading cause of chronic disease morbidity, rising from a ranking of sixth in 2009. Across the EU6, fragility fractures now account for more than 2.6 million DALYs (a measure of the impact of a disease or injury in terms of healthy years lost²³) annually, more than for hypertensive heart disease or rheumatoid arthritis.⁷

The DALYs lost per 1,000 individuals due to fragility fractures in Italy were estimated at 20 years, which is higher than the national burden associated with other chronic diseases, such as stroke (12 years) and COPD (12 years).³⁴

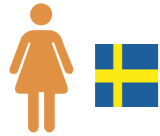
DALYs per 1,000 people (aged over 50 years) by disease in Italy and the EU6³⁴



FRAGILITY FRACTURES ARE A GROWING CHALLENGE IN THE PUBLIC HEALTH LANDSCAPE



My daily life has changed completely. I now walk with two canes. I can't bend down and I'm constantly in pain. I cannot carry things and, therefore, cannot go shopping. I miss my active life, very, very much.

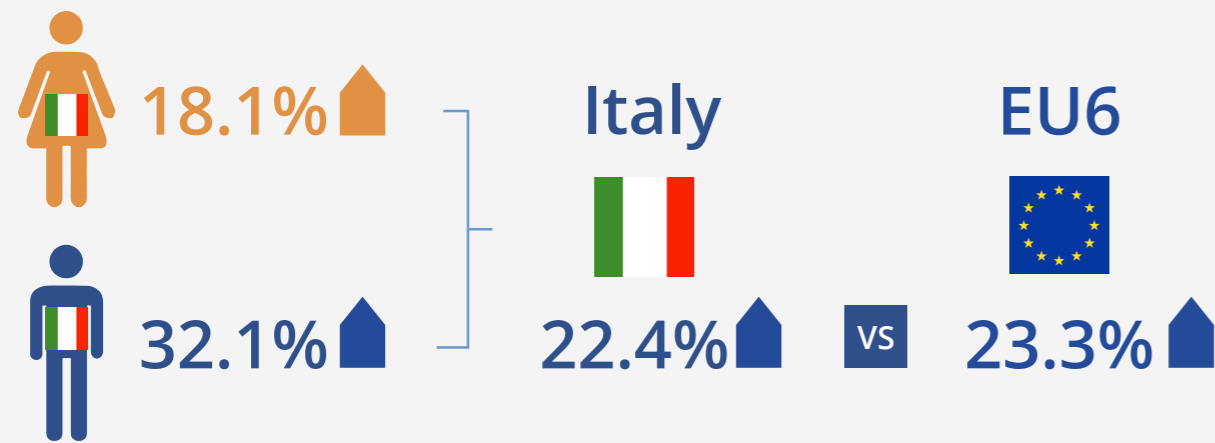


Inger, Sweden

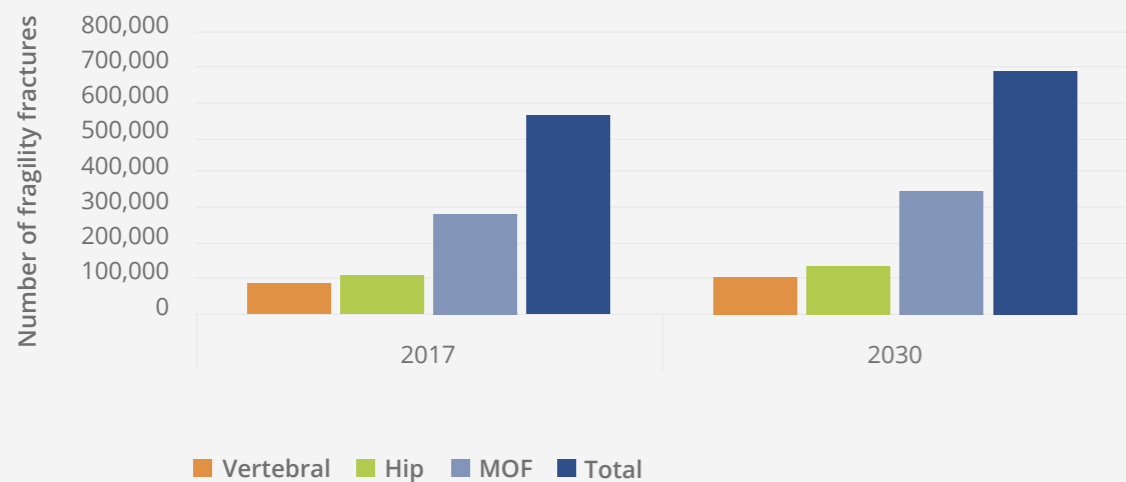


An ever-growing public health challenge is emerging: more than half a million (0.56 million) fragility fractures occurred in Italy in 2017, and the annual incidence is estimated to increase to 0.69 million by 2030.⁶

This projected increase in fracture incidence in Italy (22.4%) is in line with the projected increase across the EU6 over the same period (23.3%):⁶

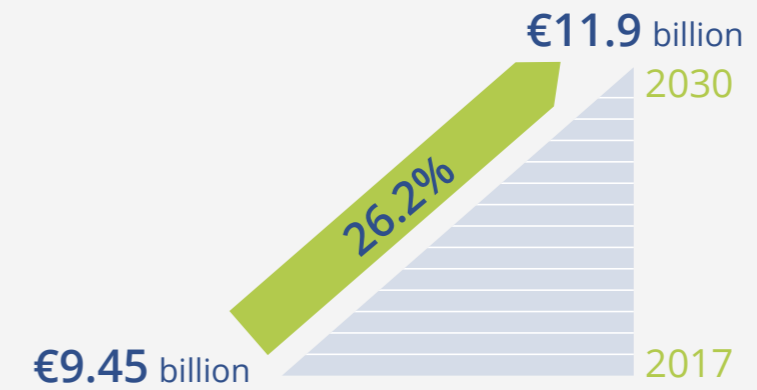


Estimated number of fragility fractures by fracture category for Italy in 2017 and 2030

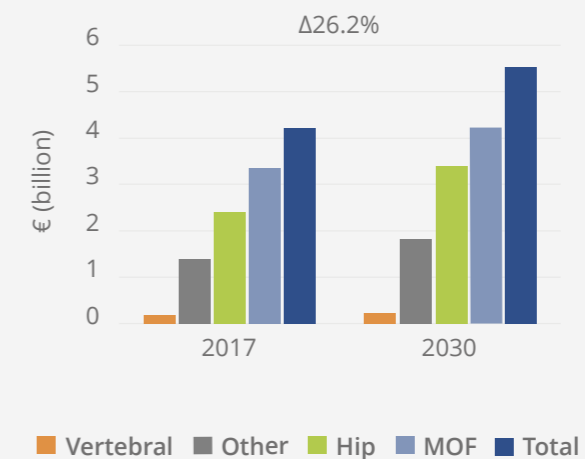


Fracture-related costs are set to rise

Fracture-related costs in Italy are projected to increase by 26% between 2017 and 2030.⁶



Estimated annual fracture-related costs in 2017 and 2030, and percentage change for Italy



Δ percentage change for all fragility fractures

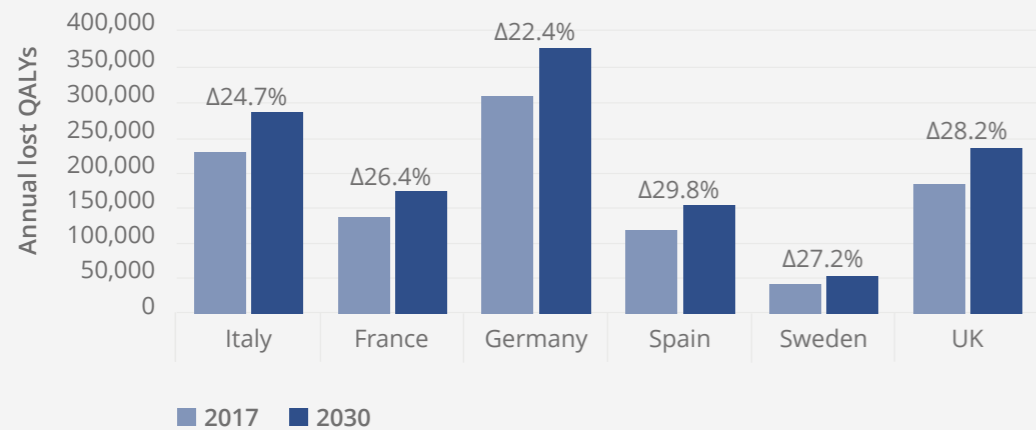


Although hip fractures make up **1/5** of total fractures, they are estimated to incur an estimated **59%** of total fracture-related costs

Fracture-related patient burden is set to increase

Based on population projections, the QALY losses associated with fragility fractures will increase between 2017 and 2030, with Italy facing an increase of 24.7% over the period.⁶

Total annual loss of QALYs by country in 2017 and 2030, and percentage change



Δ percentage change for all fragility fractures



EFFECTIVE MANAGEMENT CAN IMPROVE OUTCOMES AND REDUCE COSTS

“



If the fracture I suffered in my spine had been spotted earlier than it was, I would have been spared a great deal of pain and suffering.

Christine, UK

”

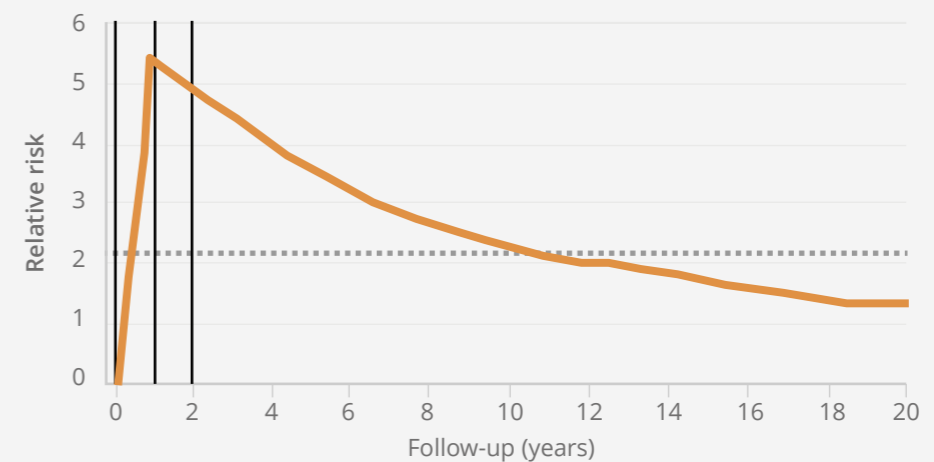
One fragility fracture leads to another

For women aged 50–80, after their first fragility fracture, their risk of a subsequent fracture within the first year after a fracture is **five times greater** than women who have not had a prior fracture.³⁵

Subsequent fracture risk is highest in the first 2 years following an initial fracture, when there is an **imminent risk** of another fracture at the same, or other, sites.³⁶ This is why it is critically important to identify patients as soon as possible after fracture to optimize fracture prevention treatments and keep the patient from having another fracture.

Similar patterns of imminent fracture risk have been observed in most countries evaluated,^{21,22} but between-country comparisons are limited by data availability.

Relative risk of all subsequent fractures calculated as a mean from the first fracture (gray line) and per separate year of follow-up (orange line)



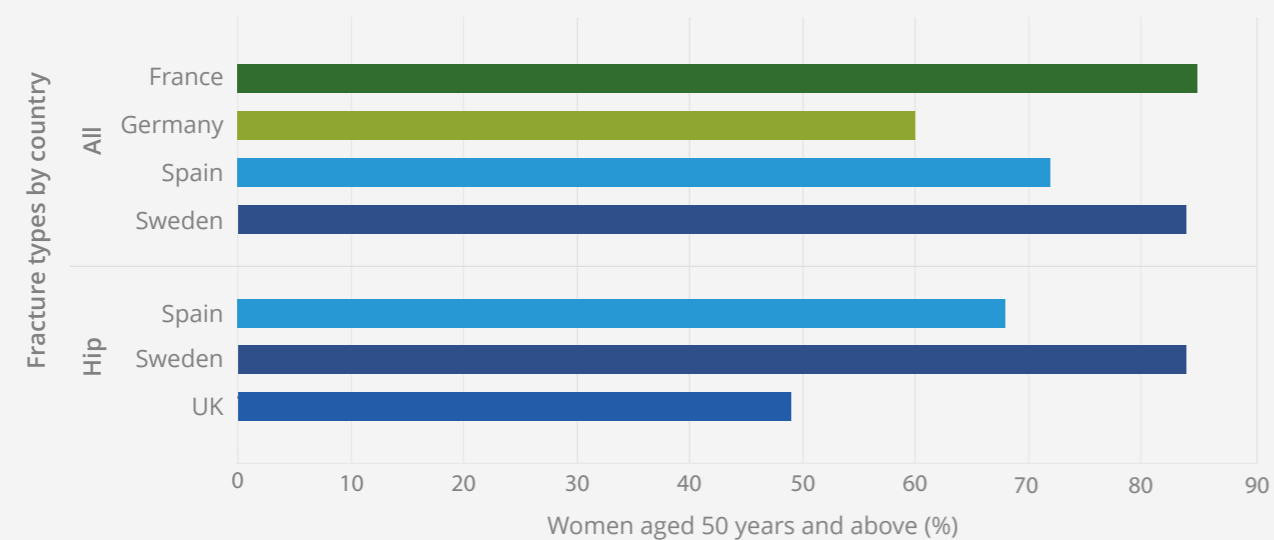
Adapted from van Geel et al. 2009³⁵

Most eligible patients do not receive treatment to prevent fragility fractures following their first fracture

With appropriate medical treatment, many fragility fractures can be avoided.

The guidelines recommend that all patients should receive treatment after suffering a fragility fracture – unfortunately this is not always the case, with **60–85% of women not receiving treatment following a fracture**.³⁷

Proportion (%) of female patients (50 years and above) untreated within a year of osteoporotic fracture^{6,37-39}



The proportion of women aged 50 years or more that are not treated within a year of an osteoporotic fracture varies by country. A recent retrospective study involving four Italian hospitals found that even after a hip fracture only 23.2% of elderly patients were discharged with a prescription for any pharmacological treatment for osteoporosis (10.5% of men and 27.2% of women).⁴⁰

Multidisciplinary models for secondary fracture prevention can contribute to closing the treatment gap

Post-fracture coordinated care models, such as a Fracture Liaison Service (FLS), are multidisciplinary healthcare delivery models for secondary fracture prevention. Systematically, they aim to identify, diagnose, and treat (by referral) all eligible patients within a local population who have suffered a fragility fracture, with the aim of reducing risk of subsequent fractures. In the FLS model, care is usually coordinated by a dedicated, specialist nurse who helps patients navigate the way through the various departments of relevance (e.g. orthopedic surgery, radiology, and primary care).

Post-fracture coordinated care models, like FLSs, offer the potential for a **cost-effective care delivery model** that reduces the risk of re-fracture and mortality by increasing the number of patients being treated and improving adherence to treatment.^{5,41-46} Data published from the FLS in Glasgow, Scotland, showed that FLSs are cost-effective for the prevention of further fractures in fragility fracture patients, resulting in fewer fractures and cost savings for healthcare systems.^{5,43}

A recently published systematic literature review and meta-analysis based on 159 scientific publications highlighted the benefits of FLSs:⁴⁷

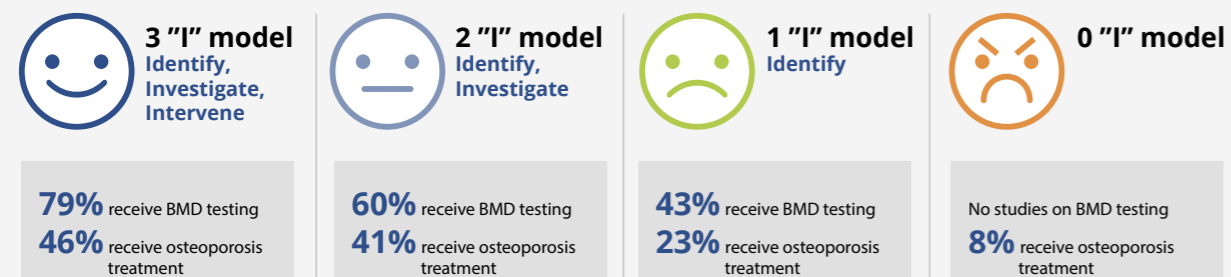
Outcome measure ⁴⁷	Effect of FLS (absolute change)	95% CI	Duration of follow-up (months)	Number of studies included
BMD testing	+24%	0.18 to 0.29	3–26	37
Treatment initiation	+20%	0.16 to 0.25	3–72	46
Treatment adherence	+22%	0.13 to 0.31	3–48	9
Re-fracture rate	-5%	-0.08 to -0.03	6–72	11
Mortality	-3%	-0.05 to -0.01	6–72	15

BMD, Bone Mineral Density

However, not all FLSs are the same between and within countries. FLSs vary in the services they offer, from identifying and informing patients without taking further action, to more comprehensive models that include investigating, treating, and monitoring patients. This variation in structure affects the level of impact on health outcomes.⁴⁶

The effect of different models of care on osteoporosis treatment and frequency of BMD testing were evaluated in a meta-analysis by Ganda et al.⁴⁸

A meta-analysis demonstrated that adoption of the 3 "I" model, with core priorities of Identify, Investigate and Intervene, offered greater effectiveness in patient assessment and treatment than 0-2 "I" models



Adapted from Ganda et al.⁴⁸

The analyses by both Ganda et al. and Wu et al. showed **dramatic increases in BMD testing and osteoporosis treatment initiation**, which further supports the value of post-fracture care coordination to prevent fragility fractures and reduce the overall cost of care for these patients.^{47,48}

Capture The Fracture® (CTF®): A global initiative of IOF

CTF® aims to 'facilitate the implementation of coordinated, multidisciplinary models of care for secondary fracture prevention'. CTF® has created a set of internationally endorsed standards and guides for best practice to bridge the gap between FLS providers, and to help in the development and implementation of new FLSs. CTF® includes the largest network of individual FLS providers in the world. Providers undergo a CTF® audit to determine service quality, with a gold, silver, or bronze star awarded.

There are huge variations between and within countries in terms of the availability of coordinated care models. A CTF® survey reported that such models only existed for 2.8% of responders in Italy and up to 37.5% of responders in Sweden for hospital referrals, reducing to 1-10% for general practitioner referrals. In contrast, in the UK, the National Osteoporosis Society estimated that 55% of the UK population has access to an FLS.

FLSs are a cost-effective option for patient management

Several studies have showed FLSs to be a cost-effective healthcare delivery form in European countries. Although not specifically evaluated for Italy, in Sweden and the UK the cost of improving patient outcomes through an FLS has been estimated to be:^{49,50}



ICER, incremental cost-effectiveness ratio (a statistic used to summarize the cost-effectiveness of a healthcare intervention)

Based on a survey sent to a number of FLSs across the EU6 enrolled in IOF's CTF network, it is estimated that only 2.8% of Italian hospitals and 0-10% of general practitioners have an established referral system for fracture patients. This is significantly less than seen in the UK, where the National Osteoporosis Society estimates that 55% of the UK population has access to an FLS.

A recent health economic analysis suggested that the introduction of an FLS for all individuals aged over 50 years could prevent an estimated 2,868 subsequent fragility fractures in Italy every year, and achieve savings of €55.7 million annually.⁶

Cost implications of extending an FLS to all individuals over 50 years in Italy



The World Health Organization (WHO)⁵¹ provides guidance on how an intervention with a benefit expressed in QALY value equivalent to 1 year's gross domestic product (GDP) per capita or less is considered to be reasonable expenditure, representing the likelihood of achieving at least 1 additional year of healthy life per capita.

With the GDP in Italy currently estimated at €35,910,⁵² FLSs not only offer **clear cost-effectiveness and cost savings for the healthcare system**, but also the possibility of improved care for the Italian population.

A ROADMAP TO SOLVE THE FRAGILITY FRACTURE CRISIS IN ITALY

“

Three more vertebral fractures occurred and this second incident was very severe.



I couldn't even get out of a chair.

Giovanni, Italy

”

Italy faces a paradoxical situation; on paper, there is a strong framework to encourage post-fracture care:

- Medical societies have adopted various guidance documents supporting appropriate patient care; national health authorities (Agenzia Italiana del Farmaco) have defined a clear treatment algorithm in the Nota 79⁵³
- The 2017 Livelli Essenziali di Assistenza (LEA),⁵⁴ which define a national statutory benefits package to be offered to all residents in every region,⁵⁵ highlighted the major risk factors that should prompt a bone health assessment
- A number of regions have adopted care pathways (Diagnostic-Therapeutic Care Pathways [PDTA]) focused on fragility fractures

However, many of these recommendations remain theoretical and are yet to be implemented in practice. As a consequence, Italian patients do not receive optimal care and the healthcare system does not benefit from the potential cost savings.

All stakeholders (including healthcare professionals, hospital managers, and regional and national authorities alike) have a responsibility to implement the following policy recommendations for the benefit of their patients.

1. Prioritize sub-populations at risk of subsequent fracture

The Italian authorities have recently acknowledged the need to tackle the health and socio-economic impact of fragility fractures in its osteoporosis strategy, which was adopted in May 2018.⁵⁴ Building on this major milestone, policymakers in Italy must further prioritize care for the sub-populations at risk of (re)fracture, which remains an area of unmet medical need.

2. Encourage the development of patient pathways after a fragility fracture

In line with the objective of the National Health Service to reduce fragmentation in the provision of healthcare services and to improve the quality and effectiveness of care, policymakers should encourage the development of integrated care pathways specifically designed for patients who have experienced a fragility fracture.

Most fragility fractures are not taken seriously, and patients and healthcare professionals alike wrongly attribute these fractures to clumsiness or age. It is of utmost importance that fragility fractures are recognized for what they are at the admission phase, and managed accordingly throughout a structured care pathway. This would ensure that the patient receives the right care for his/her fracture, including surgery and rehabilitative care, as well as a bone health assessment, a pharmacological or non-pharmacological treatment (if appropriate), and information about the disease and adjustments in lifestyle.

This requires a multidisciplinary approach involving all relevant specialties (e.g. orthopedic surgeons, radiologists, internists, geriatricians, endocrinologists, and rheumatologists).

Once established, these pathways could be captured in PDTAs.



3. Use quality metrics and a database to reduce costs associated with hospitalization

The National Prevention Plan (PNP), initially planned for 2014–2018 and now extended to 2019, identified hospitalization due to fragility fractures for patients over 75 years old as an indicator to measure an individual's physical activity, and set a 15% reduction target by the end of 2018.

Quality metrics can only be effective if they are complemented by a database that tracks the overall hospital performance against these key performance indicators.

As the 2018 deadline is approaching, it is important that:

- Regions establish a regional database supported by a robust IT system, which would allow appropriate tracking and comparison across hospitals and regions
- Regions continue to appropriately track relevant metrics and publicly report on the attainment of hospitalizations due to fragility fractures at the end of 2018
- The Ministry of Health and regions continue tracking post-fracture care metrics in the next PNP. Besides hospitalization rate, essential metrics reflecting the burden of fragility fractures should be captured, as well as the ability of the healthcare system to treat fragility fractures and prevent subsequent fractures:
 - Number of fractures (priority for hip, vertebral, humerus)
 - Rate of previous fractures
 - Follow-up – rate of diagnosis and treatment
 - 1-year follow-up: survival rate, re-fracture rate, adherence rate

4. Foster patient proactivity through awareness campaigns

Public awareness and understanding are key to ensuring individuals play an active role in post-fracture care management, either as patients or as carers. Through improved understanding of the reasons behind broken bone(s) and how future fractures can be prevented, patients can contribute to improving their own health outcomes. Large-scale awareness campaigns have the potential to reach large parts of the population, especially elderly people who are potentially at risk of fracture, and their relatives. This is an opportunity for the Italian Ministry of Health to raise awareness of fragility fractures as a growing public health burden that affects millions of Italians.

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REFERENCE LIST

1. NOF. What is osteoporosis? Available at: <https://www.nof.org/patients/what-is-osteoporosis/osteopedia-2/>. Last accessed August 2018.
2. Kanis J, Johnell O, Oden A, *et al.* Long-term risk of osteoporotic fracture in Malmö. *Osteoporos Int* 2000;11:669–74.
3. IOF. Facts and statistics. Available at: <https://www.iofbonehealth.org/facts-statistics#category-14>. Last accessed August 2018.
4. Lems WF, Dreinhöfer KE, Bischoff-Ferrari H, *et al.* EULAR/EFORT recommendations for management of patients older than 50 years with a fragility fracture and prevention of subsequent fractures. *Ann Rheum Dis* 2017;76:802–10.
5. IOF. Capture the Fracture. Available at: <http://capturethefracture.org/post-fracture-care-gap>. Last accessed August 2018.
6. Data on file. 2018. Fragility Fractures in Italy. Burden, management and opportunities: EU6 Summary Final Report 2018-06-26.
7. Hernlund E, Svedbom A, Ivergård M, *et al.* Osteoporosis in the European Union: medical management, epidemiology and economic burden. A report prepared in collaboration with the International Osteoporosis Foundation (IOF) and the European Federation of Pharmaceutical Industry Associations (EFPIA). *Arch Osteoporos* 2013;8:136.
8. Kanis JA, Johnell O, Oden A, Jonsson B, De Laet C, Dawson A. Risk of hip fracture according to the World Health Organization criteria for osteopenia and osteoporosis. *Bone* 2000;27:585–90.
9. Looker AC, Wahner HW, Dunn WL, *et al.* Updated data on proximal femur bone mineral levels of US adults. *Osteoporos Int* 1998;8:468–89.
10. Strom O, Borgstrom F, Kanis JA, *et al.* Osteoporosis: burden, health care provision and opportunities in the EU: a report prepared in collaboration with the International Osteoporosis Foundation (IOF) and the European Federation of Pharmaceutical Industry Associations (EFPIA). *Arch Osteoporos* 2011;6:59–155.
11. United Nations DESA/Population Division. World Population Prospects. 2017. Available at: <https://esa.un.org/unpd/wpp/Download/Standard/Population/>. Last accessed August 2018.
12. Pisani P, Renna MD, Conversano F, *et al.* Major osteoporotic fragility fractures: Risk factor updates and societal impact. *World J Orthop* 2016;7:171.
13. Jakobsen A, Laurberg P, Vestergaard P, Andersen S. Clinical risk factors for osteoporosis are common among elderly people in Nuuk, Greenland. *Int J Circumpolar Health* 2013;72:19596.
14. Icks A, Haastert B, Wildner M, Becker C, Meyer G. Trend of hip fracture incidence in Germany 1995–2004: a population-based study. *Osteoporos Int* 2008;19:1139–45.
15. Diez A, Puig J, Martínez MT, Diez JL, Aubia J, Vivancos J. Epidemiology of fractures of the proximal femur associated with osteoporosis in Barcelona, Spain. *Calcif Tiss Int* 1989;44:382–6.
16. Elffors I, Allander E, Kanis J, *et al.* The variable incidence of hip fracture in southern Europe: the MEDOS Study. *Osteoporos Int* 1994;4:253–63.
17. Piscitelli P, Chitano G, Johannson H, Brandi ML, Kanis JA, Black D. Updated fracture incidence rates for the Italian version of FRAX®. *Osteoporos Int* 2013;24:859–66.
18. Izquierdo MS, Ochoa CS, Sánchez IB, Hidalgo MP, del Valle Lozano F, Martín TG. Epidemiology of osteoporotic hip fractures in the province of Zamora (1993). *Revista española de salud pública* 1997;71:357–67.
19. Sosa M, Segarra M, Hernández D, González A, Limiñana J, Betancor P. Epidemiology of proximal femoral fracture in Gran Canaria (Canary Islands). *Age Ageing* 1993;22:285–88.
20. Curtis EM, van der Velde R, Moon RJ, *et al.* Epidemiology of fractures in the United Kingdom 1988–2012: Variation with age, sex, geography, ethnicity and socioeconomic status. *Bone* 2016;87:19–26.
21. Roux C, Briot K. Imminent fracture risk. *Osteoporos Int* 2017;28:1765–9.

22. Bonafede M, Shi N, Barron R, Li X, Crittenden DB, Chandler D. Predicting imminent risk for fracture in patients aged 50 or older with osteoporosis using US claims data. *Arch Osteoporos* 2016;11:26.
23. National Institute for Health and Care Excellence. Glossary. Available at: <https://www.nice.org.uk/glossary>. Last accessed August 2018.
24. Cooper C. The crippling consequences of fractures and their impact on quality of life. *Am J Med* 1997;103:S12–S19.
25. National Osteoporosis Society. Living with Osteoporosis. Available at: <https://nos.org.uk/about-osteoporosis/living-with-osteoporosis/>. Last accessed August 2018.
26. McKercher HG, Crilly RG, Klosock M. Osteoporosis management in long-term care. Survey of Ontario physicians. *Canadian Family Physician Medecin de Famille Canadien* 2000;46:2228–35.
27. Data on file. 2018. Fragility Fractures in Europe. Burden, management and opportunities: EU6 Summary Final Report 2018-06-26.
28. Borgstrom F, Lekander I, Ivergard M, *et al.* The International Costs and Utilities Related to Osteoporotic Fractures Study (ICUROS) – quality of life during the first 4 months after fracture. *Osteoporos Int* 2013;24:811–23.
29. Svedbom A, Borgstrom F, Hernlund E, *et al.* Quality of life after hip, vertebral, and distal forearm fragility fractures measured using the EQ-5D-3L, EQVAS, and time-trade-off: results from the ICUROS. *Qual Life Res* 2017;27:707–16.
30. Svedbom A, Borgstrom F, Hernlund E, *et al.* Quality of life for up to 18 months after low-energy hip, vertebral, and distal forearm fractures—results from the ICUROS. *Osteoporos Int* 2018;29:557–66.
31. Eurocarers. The Situation of Carers in the EU. Available at: <http://www.eurocarers.org/userfiles/files/factsheets/Eurocarers%20Situation%20of%20carers%20in%20EU.pdf>. Last accessed August 2018.
32. World Health Organization. Priority diseases and reasons for inclusion: Acute stroke. 2013. Available at: http://www.who.int/medicines/areas/priority_medicines/Ch6_6Stroke.pdf Last accessed August 2018.
33. Hippisley-Cox J, Coupland C, Robson J, Brindle P. Derivation, validation, and evaluation of a new QRISK model to estimate lifetime risk of cardiovascular disease: cohort study using QResearch database. *BMJ* 2010;341:c6624.
34. Institute for Health Metrics and Evaluation (IHME) (2016) GBD Compare Data Visualization. <https://vizhub.healthdata.org/gbd-compare/>. Last accessed August 2018.
35. van Geel TA, van Helden S, Geusens PP, Winkens B, Dinant GJ. Clinical subsequent fractures cluster in time after first fractures. *Ann Rheum Dis* 2009;68:99–102.
36. Johansson H, Siggeirsdottir K, Harvey NC, *et al.* Imminent risk of fracture after fracture. *Osteoporos Int* 2017;28:775–80.
37. Data on file. 2018. Fragility Fractures in Germany. Burden, management and opportunities: EU6 Summary Final Report 2018-06-26.
38. *l'Assurance Maladie. Améliorer la qualité du système de santé et maîtriser les dépenses. Propositions de l'Assurance Maladie pour 2016, 2016 edn.*
39. Klop C, Gibson-Smith D, Elders PJ, *et al.* Anti-osteoporosis drug prescribing after hip fracture in the UK: 2000–2010. *Osteoporos Int* 2015;26:1919–28.
40. Gonnelli S, Caffarelli C, Iolascon G, *et al.* Prescription of anti-osteoporosis medications after hospitalization for hip fracture: a multicentre Italian survey. *Aging Clin Exp Res* 2017;29:1031–7.
41. Eekman DA, van Helden SH, Huisman AM, *et al.* Optimizing fracture prevention: the fracture liaison service, an observational study. *Osteoporos Int* 2004;25:701–9.
42. Huntjens KM, van Geel TA, van den Bergh JP, *et al.* Fracture liaison service: impact on subsequent nonvertebral fracture incidence and mortality. *J Bone Joint Surg Am* 2014;96:e29.
43. McLellan AR, Wolowacz SE, Zimovetz EA, *et al.* Fracture liaison services for the evaluation and management of patients with osteoporotic fracture: a cost-effectiveness evaluation based on data collected over 8 years of service provision. *Osteoporos Int* 2011;22:2083–98.
44. Nakayama A, Major G, Holliday E, *et al.* Evidence of effectiveness of a fracture liaison service to reduce the re-fracture rate. *Osteoporos Int* 2016;27:873–9.
45. Schray D, Neuerburg C, Stein J, *et al.* Value of a coordinated management of osteoporosis via Fracture Liaison Service for the treatment of orthogeriatric patients. *Eur J Trauma Emerg Surg* 2016;42:559–64.
46. Walters S, Khan T, Ong T, Sahota O. Fracture liaison services: improving outcomes for patients with osteoporosis. *Clin Interv Aging* 2017;12:117–27.
47. Wu CH, Tu ST, Chang YF, *et al.* Fracture liaison services improve outcomes of patients with osteoporosis-related fractures: A systematic literature review and meta-analysis. *Bone* 2018;111:92–100.
48. Ganda K, Puech M, Chen JS, *et al.* Models of care for the secondary prevention of osteoporotic fractures: a systematic review and meta-analysis. *Osteoporos Int* 2013;24:393–406.
49. Jonsson E, Borgström F, Ström O. PHS49 – Cost Effectiveness Evaluation of Fracture Liaison Services for the Management of Osteoporosis in Sweden. *Value Health* 2016;19:A612.
50. Leal J, Gray AM, Hawley S, *et al.* Cost-effectiveness of orthogeriatric and fracture liaison service models of care for hip fracture patients: a population-based study. *J Bone Miner Res* 2017;32:203–11.
51. Bertram MY, Lauer JA, Joncheere Kees De, *et al.* Cost-effectiveness thresholds: pros and cons. *Bull World Health Organ* 2016;94:925–30.
52. Trading Economics. GDP per capita | Europe. Available at: <https://tradingeconomics.com/country-list/gdp-per-capita?continent=europe>. Last accessed August 2018.
53. Agenzia Italiana del Farmaco (AIFA), 2017 Gazzetta Ufficiale della Repubblica Italiana, Aggiornamento della Nota 79 di cui alla determina 4 gennaio 2007 (Determina n. 446/2017). 2017. Available at: http://www.aifa.gov.it/sites/default/files/Determinazione_446-2017_agg_nota79.pdf. Last accessed August 2018.
54. Livelli Essenziali di Assistenza (LEA). La conferenza permanente per il rapporto tra lo stato, le regioni e le province autonome di Trento e Bolzano. Available at: <http://www.trovanorme.salute.gov.it/norme/renderNormsanPdf?anno=2018&codLeg=64280&parte=1%20&serie=null>. Last accessed August 2018.
55. International Commonwealth Fund. International healthcare system profiles: Italian Health Care System, 2018. Available at: <https://international.commonwealthfund.org/countries/italy/>. Last accessed August 2018.



Our vision is a world without fragility fractures,
in which healthy mobility is a reality for all

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