



Osteoporosis in Europe: a compendium of country-specific reports

Carl Willers^{1,2} · Nicholas Norton¹ · Nicholas C Harvey^{3,4} · Trolle Jacobson¹ · Helena Johansson^{5,6} · Mattias Lorentzon^{5,7} · Eugene V McCloskey^{6,9} · Fredrik Borgström^{1,8} · John A Kanis^{5,6} · the SCOPE review panel of the IOF

Received: 1 June 2021 / Accepted: 2 June 2021
© The Author(s) 2021

Abstract

Summary This report describes epidemiology, burden, and treatment of osteoporosis in each of the 27 countries of the European Union plus Switzerland and the UK (EU 27+2).

Introduction The aim of this report was to characterize the burden of osteoporosis in each of the countries of the European Union plus Switzerland and the UK in 2019 and beyond.

Methods The data on fracture incidence and costs of fractures in the EU27+2 was taken from a concurrent publication in this journal (SCOPE 2021: a new scorecard for osteoporosis in Europe) and country-specific information extracted. The information extracted covered four domains: burden of osteoporosis and fractures; policy framework; service provision; and service uptake.

Results The clinical and economic burden of osteoporotic fractures in 2019 is given for each of the 27 countries of the EU plus Switzerland and the UK. Each domain was ranked and the country performance set against the scorecard for all nations studied. Data were also compared with the first SCOPE undertaken in 2010. Fifteen of the 16 score card metrics on healthcare provision were used in the two surveys. Scores had improved or markedly improved in 15 countries, remained constant in 8 countries and worsened in 3 countries. The average treatment gap increased from 55% in 2010 to 71% in 2019. Overall, 10.6 million women who were eligible for treatment were untreated in 2010. In 2019, this number had risen to 14.0 million.

Conclusions In spite of the high cost of osteoporosis, a substantial treatment gap and projected increase of the economic burden driven by aging populations, the use of pharmacological prevention of osteoporosis has decreased in recent years, suggesting that a change in healthcare policy concerning the disease is warranted.

Keywords Epidemiology · Fracture · Economic burden · European Union · Treatment · Health technology assessment

✉ John A Kanis
w.j.Pontefract@sheffield.ac.uk

Carl Willers
carl.willers@ki.se

Nicholas Norton
nicholas.norton@quantifyresearch.com

Nicholas C Harvey
nch@mrc.soton.ac.uk

Trolle Jacobson
trolle.jacobson@quantifyresearch.com

Helena Johansson
helena@statiq.se

Mattias Lorentzon
mattias.lorentzon@medic.gu.se

Eugene V McCloskey
e.v.mccloskey@sheffield.ac.uk

Fredrik Borgström
fredrik.borgstrom@quantifyresearch.com

¹ Quantify Research, Stockholm, Sweden

² Department of Neurobiology, Care Sciences and Society, Karolinska Institutet, Stockholm, Sweden

³ MRC Lifecourse Epidemiology Unit, University of Southampton, Southampton, UK

⁴ NIHR Southampton Biomedical Research Centre, University of Southampton and University Hospital Southampton NHS Foundation Trust, Southampton, UK

⁵ Mary McKillop Institute for Health Research, Australian Catholic University, Melbourne, Australia

⁶ Centre for Metabolic Bone Diseases, University of Sheffield Medical School, Beech Hill Road, Sheffield S10 2RX, UK

⁷ Geriatric Medicine, Institute of Medicine, Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden

⁸ Department of Learning, Informatics, Management and Ethics (LIME), Karolinska Institutet, Stockholm, Sweden

⁹ MRC Versus Arthritis Centre for Integrated Research in Musculoskeletal Ageing, Mellanby Centre for Bone Research, University of Sheffield, Sheffield, UK

***SCOPE review panel of the IOF**

Country	Name	Affiliation	Contact
Austria	Hans Peter Dimai	Division of Endocrinology and Diabetology, Department of Medicine, Medical University of Graz, Graz, Austria	hans.dimai@medunigraz.at
Belgium	Christian Muschitz	Medical Department II, St. Vincent Hospital, Vienna, Austria	christian.muschitz@meduniwien.ac.at
	Jean-Francois Kaux	Department of Physical and Rehabilitation Medicine, University Hospital and University of Liège, Belgium	jfkaux@chuliege.be
	Jean-Yves Reginster	Division of Public Health, Epidemiology and Health Economics, University of Liège, World Health Organization Collaborating Centre for Public Health aspects of musculo-skeletal health and ageing, Liège, Belgium	jyr.ch@bluewin.ch
	Olivier Bruyère	Biochemistry Department, College of Science, King Saud University, Riyadh, Saudi Arabia.	olivier.bruyere@uliege.be
	Etienne Cavalier	Division of Public Health, Epidemiology and Health Economics, University of Liège, World Health Organization Collaborating Centre for Public Health aspects of musculo-skeletal health and ageing, Liège, Belgium	Etienne.Cavalier@uliege.be
	Marie-Paule Lecart	Department of Clinical Chemistry, CHU de Liege, University of Liege, Liège, Belgium.	mplecart@chuliege.be
Bulgaria	Anna-Maria Borissova	University of Liège, Bone and Cartilage Metabolism Research Unit, Department of Physical and Rehabilitation Medicine, Department of Geriatrics, CHU Centre Ville, Liège, Belgium	anmarbor@abv.bg
	Mihail Boyanov	University Hospital Sofamed, Faculty of Medicine, Sofia University "Saint Kliment Ohridski", Sofia-, Bulgaria; Bulgarian League for the Prevention of Osteoporosis	mihailboyanov@yahoo.com
	Zlatimir Kolarov	University Hospital Alexandrovska, Sofia, Bulgaria; Bulgarian Society for Clinical Densitometry	zkolarov@abv.bg
Croatia	Simeon Grazio	University Hospital Sv. Ivan Rilski, Department of Rheumatology, Faculty of Medicine, Medical University Sofia, Sofia, Bulgaria; Bulgarian Association for Osteoporosis and Osteoarthritis	simeon.grazio@zg.t-com.hr
	Velimir Altabas	Department of Rheumatology, Physical and Rehabilitation Medicine, University Clinical Centre Sisters of Mercy, Zagreb, Croatia	velimir.altabas@gmail.com
	Zlatko Giljević	Department of Endocrinology, Diabetes and Metabolic Diseases, University Clinical Centre Sisters of Mercy, Zagreb, Croatia	zlatko.giljevic@kbc-zagreb.hr
Cyprus	George L Georgiades	Department of Endocrinology, University Clinical Centre Zagreb, Zagreb, Croatia	geoendo@cytanet.com.cy
Czechia	Vladimir Palicka	Deputy President of the Cyprus Association against Osteoporosis Osteology Centre, University Hospital and School of Medicine, Charles University, Hradec Kralove, Czech Republic	Palicka@lfhk.cuni.cz
	Richard Pikner	Department of Clinical Biochemistry and Bone Metabolism, Klatovy Hospital, Klatovy, Czech Republic	richard.pikner@klatovy.nemocnicepk.cz
	Jan Rosa	Department of Clinical Biochemistry and Haematology, Faculty of Medicine Pilsen, Charles University Prague, Pilsen, Czech Republic	
Denmark	Petr Kasalický	Faculty of Health Care Studies, University of West Bohemia, Pilsen, Czech Republic	rosaj@affidea-praha.cz
	Pernille Hermann	Osteology Centre, Affidea Praha, Prague, Czech Republic	kasalicky@affidea-praha.cz
	Bo Abrahamsen	Department of Endocrinology, Odense University Hospital, Denmark	Pernille.Hermann@rsyd.dk
Estonia	Katre Maasalu	Department of Clinical Research, University of Southern Denmark, Odense, Denmark	b.abrahamsen@physician.dk
	Eiki Strauss	Department of Medicine, Holbæk Hospital, DK-4300, Holbæk, Denmark.	katre.maasalu@kliinikum.ee
Finland	Ansa Holm	Tartu University Hospital, Clinic of Traumatology and Orthopaedics, Estonia	eiki.strauss@kliinikum.ee
	Thierry Thomas	University of Tartu, Department of Traumatology and Orthopaedics, Estonia	
France	Bernard Cortet	Tartu University Hospital, Clinic of Traumatology and Orthopaedics, Estonia	ansa.holm@luustoliitto.fi
	Thierry Thomas	Suomen Luustoliitto ry, Köydenpunojankatu 8 G, 00180 Helsinki, Finland	Bernard.CORTET@CHRU-LILLE.FR
		Department of Rheumatology and EA 4490, University-Hospital of Lille, Lille, France	thierry.thomas@chuse.fr
		Department of Rheumatology, Hôpital Nord, CHU Saint-Etienne, and INSERM U1059, Lyon University, Saint-Etienne, France	

(continued)

Country	Name	Affiliation	Contact
	Laurent Grange	Department of Rheumatology, AFLAR, Grenoble Alpes University Hospital, Grenoble, France	LGrange@chu-grenoble.fr
	Francoise Alliot Launois	AFLAR - Association Française de Lutte Anti-Rhumatisme, Paris, France.	francoisealliotlaunois@gmail.com
Germany	Gisela Klatt	Bundesselbsthilfverband für Osteoporose e.V. (BfO) Federal Self-Help Association for Osteoporosis, Düsseldorf, Germany	gisela-klatt@t-online.de
	Stephan Scharla	Salinenstr. 8, 83435 Bad Reichenhall, Germany.	sscharla@gmx.de
	Andreas Kurth	Department of Orthopaedic and Trauma Surgery, Campus Kemperhof, Community Clinics Middle Rhine, Koblenz - Germany	kurth@dv-osteologie.de
Greece	Polyzois Makras	Department of Endocrinology and Diabetes, 251 Hellenic Air Force General Hospital, Athens, Greece,	pmakras@gmail.com
	Tatiana Drakopoulou	Butterfly Bone Health Society, Athens, Greece	tatiana@osteocare.gr
	George Trovas	Laboratory of musculoskeletal diseases, University of Athens, Athens, Greece	trovas1@otenet.gr
	George P Lyritis,	Hellenic Osteoporosis Foundation, Athens, Greece	glyritis@heliost.gr
	Stavroula Rizou	Hellenic Osteoporosis Foundation, Athens, Greece	st.rizou@heliost.gr
Hungary	Istvan Takacs	Semmelweis University, Department of Internal Medicine and Oncology	takacs.istvan@med.semmelweis-univ.hu
	Judit Donáth	National Institute of Rheumatology and Physiotherapy, Budapest, Hungary	donjudit@gmail.com
	László Szekeres	National Institute of Rheumatology and Physiotherapy, Budapest, Hungary	szekeres.laszlo@mail.orfi.hu
Ireland	Moira O'Brien	Irish Osteoporosis Society, Clonskeagh, Dublin, Ireland	info@irishosteoporosis.ie
	Michelle O'Brien	Irish Osteoporosis Society, Clonskeagh, Dublin, Ireland	info@irishosteoporosis.ie
Italy	Ferdinando Silveri	Department of Rheumatology, Università Politecnica delle Marche, Ancona, Italy	ferdinando.silveri@sanita.marche.it
	Maurizio Rossini	Italian Federation of Osteoporosis and Diseases of the Skeleton (FEDIOS), Falconara Marittima, Italy	maurizio.rossini@univr.it
	Maria Luisa Brandi	Rheumatology Unit, University of Verona, Policlinico Borgo Roma, Verona, Italy	maurizio.rossini@univr.it
	Maria Luisa Brandi	Italian Society for Osteoporosis, Mineral Metabolism and Bone Diseases (SIOMMMS), Verona, Italy	maurizio.rossini@univr.it
	Maria Luisa Brandi	Fondazione Italiana sulla Ricerca per le Malattie dell'Osso (F.I.R.M.O.), Florence, Italy	info@fondazionefirmo.com
Latvia	Ingvars Rasa	Latvian Osteoporosis and Bone Metabolic Diseases Association (LOKMSA), Riga East Clinical University Hospital Riga Stradiņš University; Riga, Latvia	dr.irasa@inbox.lv
Lithuania	Alekna Vidmantas	Faculty of Medicine, Vilnius University, Vilnius, Lithuania	vidmantas.alekna@osteo.lt
	Marija Tamulaitiene	Faculty of Medicine, Vilnius University, Vilnius, Lithuania	marija.tamulaitiene@mf.vu.lt
Malta	Raymond Galea	Department of Obstetrics and Gynaecology, University of Malta, Mater Dei Hospital, Malta	raymond.galea@um.edu.mt
	Raymond Galea	Malta Osteoporosis Society, c/o Department of Obstetrics & Gynaecology, Sptar Mater Dei, Malta	raymond.galea@um.edu.mt
Netherlands	Neville Calleja	Health Information & Research, Ministry for Health, Malta	neville.calleja@gov.mt
	Hany van den Broek	Osteoporose Vereniging, PO Box 418,2000 AK Haarlem, Netherlands	hvdbroek@osteoporosevereniging.nl
	Geraldine EMP Willemsen-De Mey	National Association ReumaZorg Nederland, Nijmegen, Netherlands	voorzitter@reumazorgnederland.nl
	Hendrien Witte	Osteoporose Vereniging, PO Box 418,2000 AK Haarlem, Netherlands	hwitte@osteoporosevereniging.nl
Poland	Edward Czerwiński	Jagiellonian University, Faculty of Health Sciences, Institute of Physiotherapy, Rehabilitation Clinics, Krakow, Poland	czerwinski@kcm.pl
	Janusz E. Badurski	The Polish Foundation of Osteoporosis Research Team, Białystok, Poland.	badurski@pfo.com.pl
Portugal	José António P. Da Silva	Faculty of Medicine, University of Coimbra, Portugal	jdasilva@ci.uc.pt
	António Tirado	Portuguese Society of Osteoporosis and Metabolic Bone Diseases (SPODOM), Lisbon, Portugal.	tirado.antonio2@icloud.com
	Ana Paula Barbosa	Portuguese Society of Osteoporosis and Metabolic Bone Diseases (SPODOM), Lisbon, Portugal.	apgsb1@gmail.com
	Ana Rodrigues	Portuguese Society of Osteoporosis and Metabolic Bone Diseases (SPODOM), Lisbon, Portugal.	anamfrodrigues@gmail.com
	Ana Pires Gonçalves	Portuguese Society of Osteoporosis and Metabolic Bone Diseases (SPODOM), Lisbon, Portugal.	aa.pgoncalves@gmail.com

(continued)

Country	Name	Affiliation	Contact
Romania	Andrea Ildiko Gasparik	Department of Public Health and Health Management, University of Medicine and Pharmacy of Tirgu Mures, Tirgu Mures, Romania.	ildikogasparik@gmail.com
	Ionela Pascanu	Department of Endocrinology, University of Medicine and Pharmacy, Science and Technology (UMFST) G.E. Palade of Tg. Mures, Romania	iopascanu@gmail.com
	Daniel Grigorie	National Institute of Endocrinology, Carol Davila University of Medicine, Bucharest, Romania.	grigorie_d@yahoo.com
Slovakia	Juraj Payer	Comenius University Faculty of Medicine in Bratislava, 5. Department of Internal Medicine, University Hospital Bratislava, Bratislava, Slovakia	payer@ruzinov.fnspsba.sk
	Pavol Masaryk	National Institute of Rheumatology, Piešťany, Slovakia	pavol.masaryk@nurch.sk
	Peter Jackuliak	Comenius University Faculty of Medicine in Bratislava, 5. Department of Internal Medicine, University Hospital Bratislava, Bratislava, Slovakia	peter.jackuliak@fmed.uniba.sk
Slovenia	Tomaz Kocjan	Department of Endocrinology, Diabetes, and Metabolic Diseases, University Medical Centre Ljubljana, Ljubljana, Slovenia	tomaz.kocjan@kclj.si
Spain	Santiago Palacios	Faculty of Medicine, University of Ljubljana, Ljubljana, Slovenia	spalacios@institutopalacios.com
	Manuel Navas-Diaz	Palacios Institute of Women's Health, Madrid, Spain.	mnaves.huca@gmail.com
	Adolfo Diez-Perez	Bone and Mineral Research Unit, Hospital Universitario Central de Asturias, Instituto de Investigación Sanitaria del Principado de Asturias (ISPA), Retic REDinREN-ISCIII, Oviedo, Spain.	ADiez@parcdesalutmar.cat.
Sweden	Kristina E Åkesson	Department of Internal Medicine, Hospital del Mar/IMIM and CIBERFES, Autonomous University of Barcelona, Barcelona, Spain.	kristina.akesson@med.lu.se
		Department of Clinical Sciences, Clinical and Molecular Osteoporosis Research Unit Malmö, Lund University, Lund, Sweden.	
Switzerland		Department of Orthopaedics, Skåne University Hospital, Malmö, Sweden.	
	Bo Freyschuss	Department of Medicine, Karolinska Institutet, Stockholm, Sweden	bo.freyschuss@ki.se
	Serge Ferrari	Service and Laboratory of Bone Diseases, Geneva University Hospital and Faculty of Medicine, Geneva, Switzerland.	Serge.Ferrari@unige.ch
	Rene Rizzoli	University Hospitals and Faculty of Medicine of Geneva, Geneva, Switzerland	Rene.Rizzoli@unige.ch
United Kingdom	M Kassim Javaid	Nuffield Department of Orthopaedics, Rheumatology and Musculoskeletal Sciences, University of Oxford, Oxford, UK.	kassim.javaid@ndorms.ox.ac.uk
	Craig Jones	Royal Osteoporosis Society, Bath, UK	Craig.Jones@theros.org.uk
	Cyrus Cooper	MRC Lifecourse Epidemiology Unit, Southampton General Hospital, University of Southampton, Southampton, UK.	cc@mrc.soton.ac.uk
IOF	Philippe Halbout	International Osteoporosis Foundation, Nyon, Switzerland	phalbout@iofbonehealth.org

Abbreviations

BMD	Bone mineral density
DXA	Dual-energy X-ray absorptiometry
EU27+2	Refers to the 27 countries of the European Union plus Switzerland and the UK
FLS	Fracture liaison service
FRAX	Fracture risk assessment tool
HRQoL	Health-related quality of life
IOF	International Osteoporosis Foundation
OP	Osteoporosis
QALY	Quality-adjusted life year
SCOPE	Scorecard for osteoporosis in Europe
TBS	Trabecular bone score

Table of Contents

	Page
Introduction	5
Epidemiology and economic burden of osteoporosis in	
1. Austria	6
2. Belgium	11
3. Bulgaria	15
4. Croatia	19
5. Cyprus	23
6. Czech Republic	27
7. Denmark	32
8. Estonia	37
9. Finland	42
10. France	46
11. Germany	50
12. Greece	54
13. Hungary	58
14. Ireland	62
15. Italy	66
16. Latvia	71
17. Lithuania	75
18. Luxembourg	79
19. Malta	83
20. Netherlands	87
21. Poland	91
22. Portugal	95
23. Romania	99
24. Slovakia	104
25. Slovenia	108
26. Spain	112
27. Sweden	116
28. Switzerland	120
29. United Kingdom	125

Introduction

Osteoporosis, literally “porous bone,” is a disease characterized by weak bone. It is a major public health problem, affecting hundreds of millions of people worldwide, predominantly postmenopausal women. The main clinical consequence of the disease is bone fractures. It is estimated that one in three women and one in five men over the age of fifty worldwide will sustain an osteoporotic fracture. Hip and spine fractures are the two most serious fracture types, associated with substantial pain and suffering, disability, and even death. As a result, osteoporosis imposes a significant burden on both the

individual and society. Over the past three decades, a range of medications has become available for the treatment and prevention of osteoporosis. The primary aim of pharmacological therapy is to reduce the risk of osteoporotic fractures.

A recent report “SCOPE 2021: a new scorecard for osteoporosis in Europe” describes the current burden of osteoporosis in the EU in 2019 [1]. In 2019, 25.5 million women and 6.5 million men were estimated to have osteoporosis in the European Union plus Switzerland and the United Kingdom; and 4.3 million new fragility fractures were sustained, comprising 827,000 hip fractures, 663,000 vertebral fractures, 637,000 forearm fractures and 2,150,000 other fractures (i.e., fractures of the pelvis, rib, humerus, tibia, fibula, clavicle, scapula, sternum, and other femoral fractures). The economic burden of incident and prior fragility fractures in 2019 was estimated at € 57 billion. In the EU27+2, there were estimated to be 248,487 causally related deaths in 2019. The number of fracture-related deaths are comparable to or exceed some of the most common causes of death such as lung cancer, diabetes, chronic lower respiratory diseases. The population age 50 years or more is projected to increase by 11.4% in men and women between 2019 and 2034 and the annual number of osteoporotic fractures in the EU27+2 will increase by 25%. The majority of individuals who have sustained an osteoporosis-related fracture or who are at high risk of fracture are untreated and the proportion of high risk patients on treatment is declining.

The objective of this report is to review and describe the current burden of osteoporosis in each of the EU member states plus Switzerland and the UK. Epidemiological and health economic aspects of osteoporosis and osteoporotic fractures are summarised for 2019 with projections of the future prevalence of osteoporosis, the number of incident fractures, the direct and total cost of the disease including the value of QALYs lost. The report also provides information on the policy framework together with service provision and service uptake within each country. The report may serve as a basis for the formulation of healthcare policy concerning osteoporosis in general and the treatment and prevention of osteoporosis in particular. It may also provide guidance regarding the overall healthcare priority of the disease in each member state.

References

1. Kanis JA, Norton N, Harvey NC, Jacobson T, Johansson H, Lorentzon M, McCloskey EV, Willers C, Borgström F (2021) SCOPE 2021: a new scorecard for osteoporosis in Europe. Arch Osteoporos 16: 82. doi.org/10.1007/s11657-020-00871-9

Epidemiology and economic burden of osteoporosis in Greece

P Makras · GP Lyritis · S Rizou · T Drakopoulou · G Trovas · C Willers · N Norton · NC Harvey · T Jacobson · H Johansson · M Lorentzon · EV McCloskey · F Borgström · JA Kanis

Introduction

The scorecard summarises key indicators of the burden of osteoporosis and its management in the 27 member states of the European Union, as well as the UK and Switzerland (termed EU27+2) [1]. This country-specific report summarises the principal results for Greece.

Methods

The information obtained covers four domains: burden of osteoporosis and fractures; policy framework; service provision; and service uptake. Data were collected from numerous sources including previous research and IOF reports, and available registers which were used for additional analysis of resource utilization, costing and HRQoL data. Furthermore, country-specific information on osteoporosis management was obtained from each IOF member state via a questionnaire.

Burden of disease

The direct cost of incident fractures in Greece in 2019 was €694.7 million. Added to this was the ongoing cost in 2019 from fractures that occurred before 2019, which amounted to €203.5 million (long-term disability). The cost of pharmacological intervention (assessment and treatment) was €80.5 million. Thus, the total direct cost (excluding the value of QALYs lost) amounted to €0.98 billion in 2019. Key metrics are presented in Table 1.

In 2019, the average direct cost of osteoporotic fractures in Greece was €91.2 per individual in the population, while in 2010 the average was €66.2 (after adjusting for inflation), representing an increase of 38% (€91.2 versus €66.2) and put Greece in 13th place in terms of highest cost of osteoporotic fractures per capita in the EU27+2.

The cost of osteoporotic fractures in Greece accounted for approximately 6.2% of healthcare spending (i.e. €0.98 billion out of €14.60 billion in 2019), which was significantly higher than the EU27+2 average of 3.5%. Indeed, Greece was ranked first across the EU27+2 countries. These numbers indicate a substantial impact of fragility fractures on the healthcare budget.

Using World Health Organization diagnostic criteria for osteoporosis based on the measurement of bone mineral density (BMD) [2], there were approximately 684,000 individuals with osteoporosis in Greece in 2019, of whom almost 80% were women. The prevalence of osteoporosis in the total Greek population amounted to 5.5%, on par with the EU27+2 average (5.6%).

Table 1 Key measures of burden of disease for Greece

Category	Measure	Estimate	Rank
Burden of disease	Direct cost of incident fracture (€m)	694.70	
	Long-term disability cost (€m)	203.51	
	Intervention cost (€m)	80.46	
	Total cost (€m)	978.68	
	QALYs lost (€m)	1 518	
	Cost per capita (€)	91.23	13
	Proportion of healthcare spending	6.2%	1
	Prevalence of osteoporosis	5.7%	7

There were estimated to be 99,000 new fragility fractures in Greece in 2019, equivalent to 272 fractures/day (or 11 per hour). This was a slight increase compared to 2010, equivalent to an increment of 1.8 fractures/1000 individuals, totalling 22.0 fractures/ 1000 individuals in 2019.

Some osteoporotic fractures are associated with premature mortality [3]. In Greece, the annual number of deaths associated with a fracture event was estimated to be 130 per 100,000 individuals of the population aged 50 years or more, compared to the EU27+2 average of 116/100,000. The number of fracture-related deaths is comparable to or exceeds that for some of the most common causes of death such as lung cancer, diabetes, chronic lower respiratory diseases.

The remaining lifetime probability of hip fracture (%) at the ages of 50 years in men and women was 8.0% and 15.8%, respectively, placing Greece in the upper tertile of risk for men and the mid tertile for women.

The population in men and women age 50 years or more is projected to increase by 11.9% between 2019 and 2034, close to the EU27+2 average of 11.4%. The increases in men and women aged 75 years or more are even more marked and amount to 23.7% and 21.0%, respectively. The annual number of osteoporotic fractures in Greece is expected to increase by 22,000 to 121,000 in 2034.

Policy framework (Table 2)

Documentation of the burden of disease is an essential prerequisite to determine the resources that should be allocated to the diagnosis and treatment of the disorder. High quality national data on hip fracture rates have been

identified in 18 of 29 countries, of which Greece was not deemed as one. No data are collected on a national basis and the latest report dates from 2007 [4].

Given that osteoporosis and fragility fractures are common and that effective treatments are widely available, the vast majority of patients with osteoporosis are preferably managed at the primary health care level by general practitioners (GPs), with specialist referral reserved for difficult complex cases. Primary care was the principal provider of the medical care for osteoporosis in 13 of the 28 countries where data were available.

Osteoporosis and metabolic bone disease is not a recognised specialty in most countries including Greece. For Greece, orthopaedics was the lead specialty for osteoporosis management. Specialty care of osteoporosis in Greece is also managed via other specialties including endocrinology, and rheumatology. Osteoporosis is also recognized as a component of specialty training. Although it is possible that these specialties educate their trainees adequately, the wide variation may reflect inconsistencies in patient care, training of primary care physicians and a suboptimal voice to “defend” the interests of those who work within the field of osteoporosis.

Table 2 Policy framework for osteoporosis in Greece

Category	Measure	Estimate
Policy framework	National fracture data availability	No
	OP recognized as a specialty	No
	OP primarily managed in primary care	No
	Other specialties involved	Orthopaedics, Endocrinology, Rheumatology
	Advocacy areas covered by patient organisation	Policy, capacity, research and development

The role of national patient organisations is to improve the care of patients and increase awareness and prevention of osteoporosis and related fractures among the general public. Advocacy by patient organisations can fall into four categories: policy, capacity building and education, peer support, research and development. For Greece, three of these advocacy areas were covered by a patient organisation. All four advocacy areas were covered for only 10 out of the 26 countries with at least one patient organisation.

Service provision (Table 3)

A wide variety of approved drug treatments is available for the management of osteoporosis [5]. Potential

limitations of their use in member states relate to reimbursement policies which may impair the delivery of health care. 12 out of 27 countries offered full reimbursement, of which Greece was not one.

The assessment of bone mineral density forms a key component for the general management of osteoporosis, being used for diagnosis, risk prediction, selection of patients for treatment and monitoring of patients on treatment. In Greece, the number of DXA units expressed per million of the general population amounted to 51.4 which puts the country in 1st place among the EU27+2.

The average waiting time for DXA ranged from 0 to 180 days across countries, and there was no clear relation between waiting times and the availability of DXA. In Greece, the estimated average waiting time for DXA amounted to five days. Only two countries reported shorter average waiting times.

Table 3 Service provision for osteoporosis in Greece

Category	Measure	Estimate	Rank
Service provision	Reimbursement of OP medications	75%	
	DXA units/million inhabitants	51.4	1
	DXA cost (€)	55	11
	FRAX risk assessment model available	Yes	
	Fracture liaison service density	1-10%	

Reimbursement for DXA scans varied between member states both in terms of the criteria required and level of reimbursement awarded. In Greece, the reimbursement was conditional and varied depending on the patient’s condition.

The effective targeting of treatment to those at highest risk of fracture requires an assessment of fracture risk. Risk assessment models for fractures, most usually based on FRAX, were available in 24 out of 29 countries, of which Greece was one. For Greece, guidance on the use of risk assessment within national guidelines was available, as in only 14 of the other countries.

Guidelines for the management of osteoporosis were available in Greece (as in 27 out of 29 countries). The guidelines in Greece included postmenopausal women specifically, as well as osteoporosis in men.

Fracture liaison services (FLS), also known as osteoporosis coordinator programmes and care manager programmes, provide a system for the routine assessment and management of postmenopausal women and older men who have sustained a low trauma fracture. Fracture

liaison services were reported for 1–10% of hospitals in Greece.

The use of indicators to systematically measure the quality of care provided to people with osteoporosis or associated fractures has expanded as a discipline within the past decade [6]. No use of national quality indicators was reported for Greece.

Service uptake (Table 4)

The web-based usage of FRAX showed considerable heterogeneity in uptake between the countries. The average uptake for the EU27+2 was 1,555 sessions/million/year of the general population with an enormous range of 49 to 41,874 sessions/million. The usage for Greece amounted to 4,566 sessions/million in 2019, with an eight-fold increase since 2011.

Many studies have demonstrated that a significant proportion of men and women at high fracture risk do not receive therapy for osteoporosis (the treatment gap) [7]. In the EU27+2 the average treatment gap was 71% but ranged from 32% to 87%. For Greece, the treatment gap amongst women amounted to 43% or 211,000 out of 485,000 characterised at risk and had increased compared to 2010. The average treatment gap among EU27+2 increased from 55% in 2010 to 71% in 2019.

Table 4 Service uptake for osteoporosis in Greece

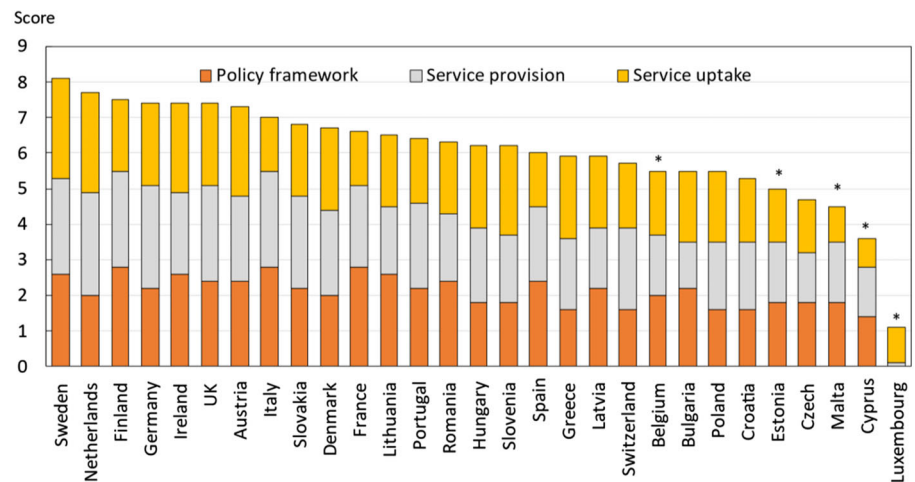
Category	Measure	Estimate	Rank
Service uptake	Number of FRAX sessions/million people/year	4566	4
	Treatment gap for women eligible for treatment (%)	43	3
	Proportion surgically managed hip fractures	>90%	

About 5% of people with a hip fracture die within 1 month of their fracture [8]. A determinant of peri-operative morbidity and mortality is the time a patient takes to get to surgery [9]. For Greece, the average waiting time for hip fracture surgery after hospital admission was reported to be 2–3 days. The proportion of surgically managed hip fractures was reported to be over 90%.

Scores and scorecard

Scores were developed for Burden of disease and the healthcare provision (Policy framework, Service provision and Service uptake) in the EU27+2 countries. Greece scores resulted in a 9th place regarding Burden of disease. The combined healthcare provision scorecard resulted in a 18th place for Greece. Thus, Greece presents as one of the eight high-burden low-provision countries among the EU27+2.

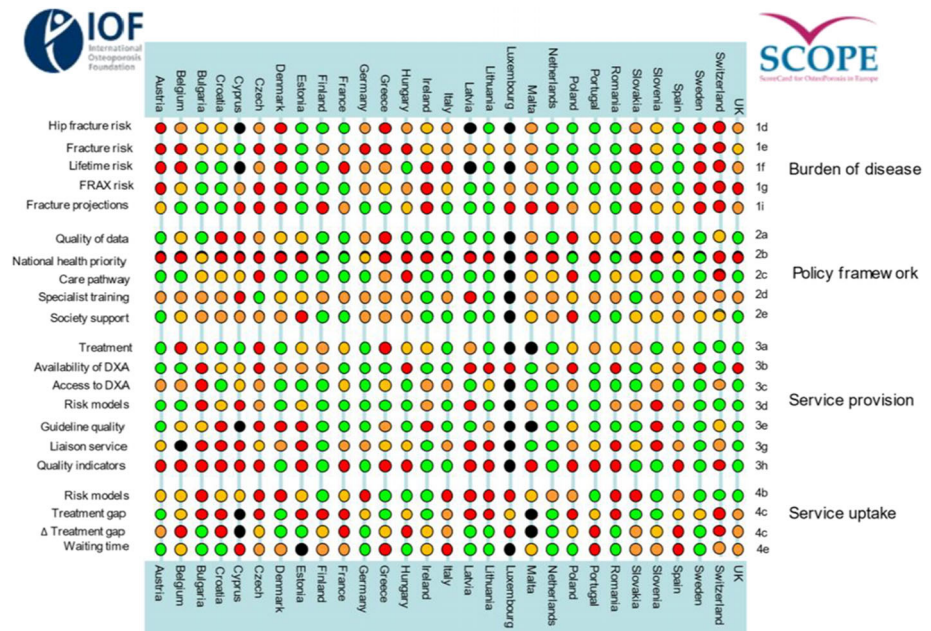
Fig. 1 Scores by country for metrics related to policy framework, service provision and service uptake. The mean score for each of the 3 domains is given. An asterisk denotes that there was one or more missing metric which decreases the overall score



The first SCOPE was undertaken in 2010, almost 10 years previously. Fifteen of the 16 score card metrics on healthcare provision were used in the two surveys. Scores had improved

or markedly improved in 15 countries, remained constant in 8 countries and worsened in 3 countries. For Greece the scores were unchanged.

Fig. 2 The scorecard for all the EU27+2 countries illustrating the scores across the four domains. The elements of each domain in each country were scored and coded using a traffic light system (red, orange, green). Black dots signify missing information



The second edition of the Scorecard for Osteoporosis in Europe (SCOPE 2021) allows health and policy professionals to assess key indicators on the healthcare provision for osteoporosis within countries and between countries within the EU 27+2. The scorecard is not intended as a prescriptive template. Thus, it does not set performance targets but may serve as a guide to the performance targets at which to aim in order to deliver the outcomes required.

Acknowledgements

SCOPE was supported by an unrestricted grant from Amgen to the International Osteoporosis Foundation (IOF). Amgen was neither involved in the design nor writing of the report. We are grateful to Anastasia Soulié Mlotek and Dominique Pierroz of the IOF for their help in the administration of SCOPE. We are grateful to the Butterfly Bone Health Society for their assistance. The report has been reviewed by the members of the SCOPE Consultation Panel and the relevant IOF National societies, and we are grateful for their local insights on the management of osteoporosis in each country. The source document has been reviewed and endorsed by the Committee of Scientific Advisors of the IOF and benefitted from their feedback.

References

1. Kanis JA, Norton N, Harvey NC, Jacobson T, Johansson H, Lorentzon M, McCloskey EV, Willers C, Borgström F (2021) SCOPE 2021: a new scorecard for osteoporosis in Europe. Arch Osteoporos 16:82. doi.org/10.1007/s11657-020-00871-9

2. World Health Organisation (1994) Assessment of fracture risk and its application to screening for postmenopausal osteoporosis. Report of a WHO Study Group. World Health Organ Tech Rep Ser, 1994/01/01 edn, pp 1-129
3. Johnell O, Kanis JA, Oden A, Sernbo I, Redlund-Johnell I, Pettersson C, De Laet C, Jonsson B (2004) Mortality after osteoporotic fractures. Osteoporos Int 15:38-42
4. Lyritis GP, Rizou S, Galanos A, Makras P (2013) Incidence of hip fractures in Greece during a 30-year period: 1977-2007. Osteoporos Int 24: 1579-85.
5. Hernlund E, Svedbom A, Ivergard M, Compston J, Cooper C, Stenmark J, McCloskey EV, Jonsson B, Kanis JA (2013) 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 8:136
6. Allen P, Pilar M, Walsh-Bailey C, Hooley C, Mazzucca S, Lewis CC, Mettert KD, Dorsey CN, Purtle J, Kepper MM, Baumann AA, Brownson RC (2020) Quantitative measures of health policy implementation determinants and outcomes: a systematic review. Implement Sci 15:47
7. Borgstrom F, Karlsson L, Orsater G, Norton N, Halbout P, Cooper C, Lorentzon M, McCloskey EV, Harvey NC, Javadi MK, Kanis JA (2020) Fragility fractures in Europe: burden, management and opportunities. Arch Osteoporos 15:59
8. Kanis JA, Oden A, Johnell O, De Laet C, Jonsson B, Oglesby AK (2003) The components of excess mortality after hip fracture. Bone 32:468-473
9. National Clinical Guideline Centre (2011) The Management of Hip Fracture in Adults. In Centre NCG (ed) London

Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by

statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

Publisher's note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.