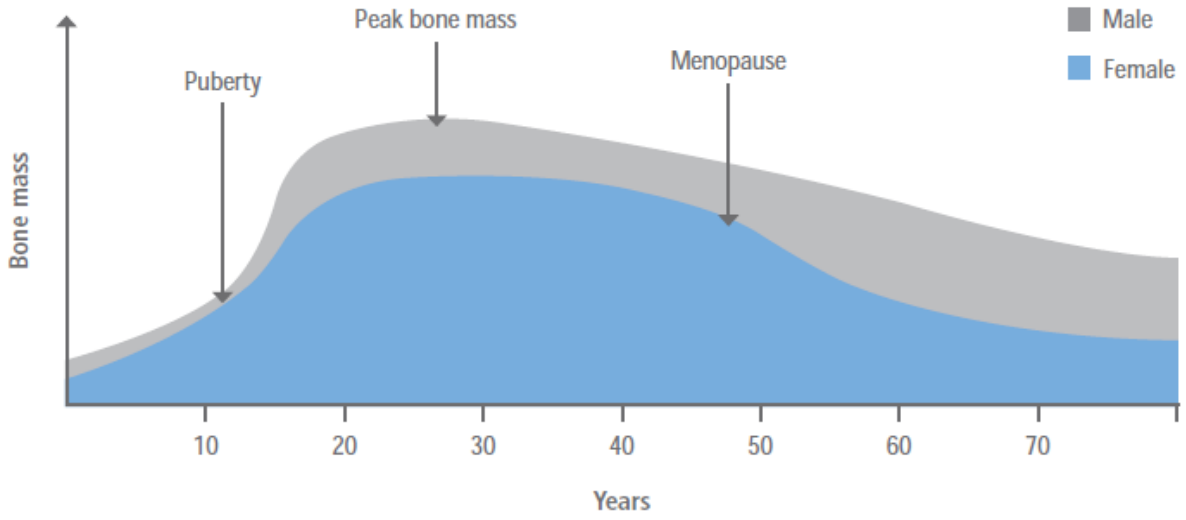
Epidemiology of Osteoporosis and Fragility Fracture

Dr. Afshin Ostovar, MD, MPH, PhD.

Professor of Epidemiology

Tehran University of Medical Sciences

WHAT IS OSTEOPOROSIS?



Osteoporosis is a disease which makes bones weak and fragile.

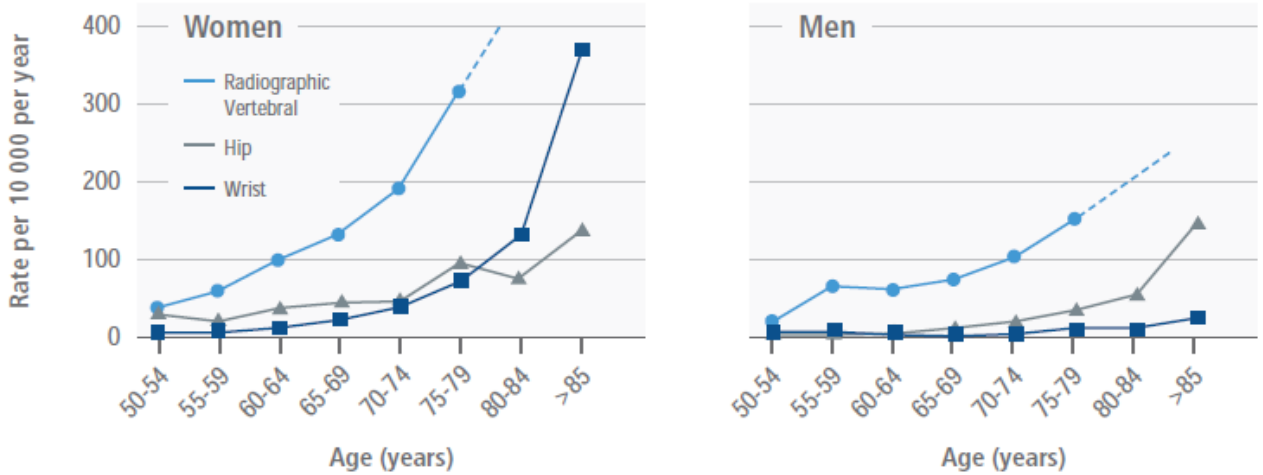
This greatly increases the risk of breaking a bone even after a minor fall or bump.

The disease has no obvious symptoms, so many people don't know they have osteoporosis until they suffer a fracture.

Fractures can be life-altering, causing pain, disability and loss of independence.

OSTEOPOROSIS AND FRACTURES

Age- and gender-specific incidence of hip, vertebral and distal forearm fractures



Worldwide, up to 37 million fragility fractures occur annually in individuals aged over 55, the equivalent of 70 fractures per minute.

Worldwide, 1 in 3 women over age 50 will experience osteoporosis fractures, as will 1 in 5 men aged over 50.

Using the WHO definition of osteoporosis, the disease affects approximately 6.3% of men over the age of 50 and 21.2% of women over the same age range globally.

Based on the world population of men and women, this suggests that approximately 500 million men and women worldwide may be affected.

HIP FRACTURES – BURDEN AND IMPACT

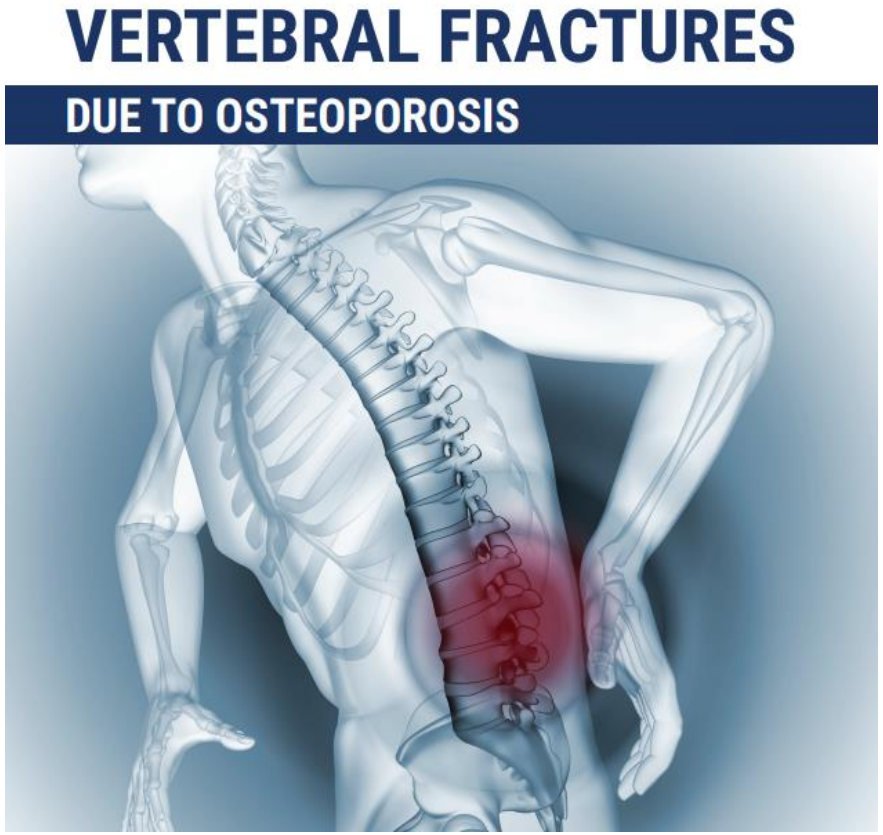
- More than 10 million hip fractures in people aged 55+ occur globally, based on 2019 data.
- With the ageing of the global population, the number of hip fractures is projected to nearly double from 2018 to 2050.
- By 2050, the worldwide incidence of hip fracture is projected to increase by 310% in men and 240% in women, compared to rates in 1990.
- Lifetime probability of hip fracture (%) at the age of 50 years:
  - 15.0% in women
  - 5.7% in men

HIP FRACTURES – BURDEN AND IMPACT

- A 10% loss of bone mass in the hip can result in a 2.5 times greater risk of hip fracture.
- Nearly 75% of all hip fractures occur in women.
- Hip fractures are invariably associated with chronic pain, reduced mobility, disability, and an increasing degree of dependence.
- In white women, the lifetime risk of hip fracture is 1 in 6, compared with a 1 in 9 risk of a breast cancer diagnosis.
- Up to 20% of patients die in the first year following hip fractures, mostly due to pre-existing medical conditions.

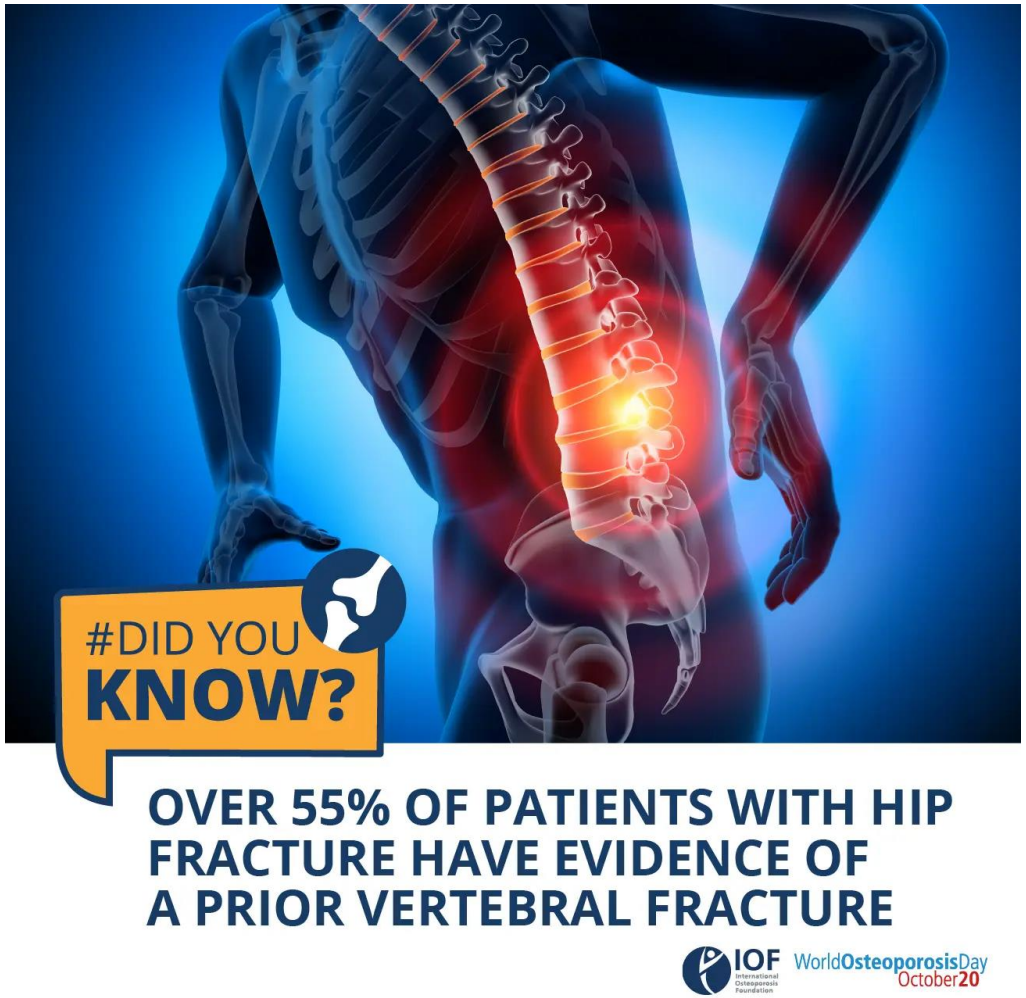
VERTEBRAL FRACTURES

- Vertebral fractures are the most common osteoporotic fractures.
- Vertebral fractures are associated with an 8-fold increase in age-adjusted mortality.
- A 50-year-old white woman in the US has a 16% lifetime risk of experiencing a vertebral fracture whereas a 50-year-old white man's lifetime risk is 5%.
- Vertebral fractures can lead to back pain, loss of height, deformity, immobility, increased number of bed days, and even reduced pulmonary function. Their impact on quality of life can be profound as a result of loss of self-esteem, distorted body image and depression. Vertebral fractures also significantly impact on activities of daily living.



VERTEBRAL FRACTURES

- It is estimated that only one-third of vertebral fractures come to clinical attention and under-diagnosis of vertebral fracture is a worldwide problem.
- The prevalence of vertebral fracture in men is similar to, or even greater than, that seen in women to age 50 or 60 years.
- Over 55% of patients with hip fracture have evidence of a prior vertebral fracture.
- A 10% loss of bone mass in the vertebrae can double the risk of vertebral fractures.

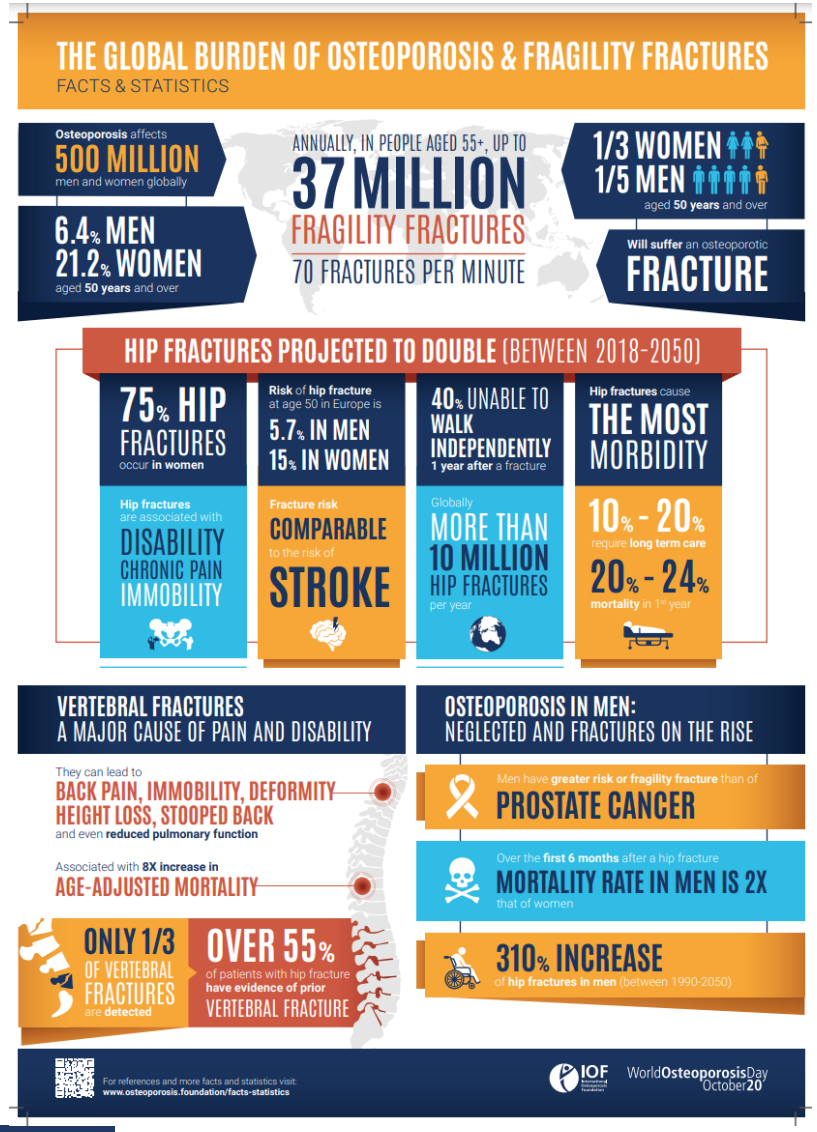


OSTEOPOROSIS COMPARED TO OTHER DISEASES

- When comparing fragility fracture-related DALYs to 16 other common NCDs in six EU countries, fragility fractures are placed as the fourth most burdensome, outranked only by ischemic heart disease, dementia and lung cancer.

- Fragility fractures are the fourth leading cause of chronic disease morbidity in Europe, after ischemic heart disease, dementia and lung cancer, however before chronic obstructive pulmonary disease and ischemic stroke.

- A 50-year-old woman from the US has a 2.8% risk of death related to hip fracture during her remaining lifetime, equivalent to her risk of death from breast cancer and 4 times higher than that from endometrial cancer.



Osteoporosis Prevalence in Iran

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ORIGINAL ARTICLE

Prevalence of osteoporosis among the elderly population of Iran

Noushin Fahimfar[1] · Sima Noorali[1] · Shakiba Yousefi[1] · Safoora Gharibzadeh[2] · Gita Shafiee[3] · Nekoo Panahi[1] · Mahnaz Sanjari[1] · Ramin Heshmat[3] · Farshad Sharifi[4] · Neda Mehrdad[4] · Alireza Raeisi[5] · Iraj Nabipour[6] · Bagher Larijani[7] · Afshin Ostovar[1]

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Abstract

Summary In a large population-based study of Iran, the age-standardized prevalence of osteoporosis was 24.6% in men and 62.7% in women aged ≥ 60 years. Osteoporosis was negatively associated with body mass index in both sexes, and with diabetes in men and hypertriglyceridemia in women.

Purpose Population aging has made osteoporosis and osteoporotic fractures an important health problem, especially in developing countries. This study aimed to explore the prevalence of osteoporosis and associated factors among the elderly population of the south-west of Iran.

Methods Baseline data of the second stage of the Bushehr Elderly Health program was used. Spinal, total hip, or femoral neck osteoporosis was described as a BMD that lies 2.5 standard deviations or more, below the average values of a young healthy adult in the lumbar spine, total hip, or femoral neck, respectively. Osteoporosis at either site was defined as total osteoporosis. Age-standardized prevalence of osteoporosis was estimated. We used the modified Poisson regression with a robust variance estimator to identify the factors related to osteoporosis, adjusting for potential confounders.

Results Overall, 2425 individuals (1166 men) aged over 60 years were included. In all, total osteoporosis was detected in 1006 (41.5%) of the participants. Using the reference value derived from Caucasian women aged 20–29 years, the age-standardized prevalence of total osteoporosis was 24.6 (95% CI: 21.9–27.3) in men, and 62.7 (95% CI: 60.0–65.4) in women. In men, osteoporosis was positively associated with age, smoking, history of fracture, and history of renal/liver diseases and negatively associated with body mass index (BMI) and diabetes. BMI, hypertriglyceridemia, and education were negatively correlated with osteoporosis in women, while years after menopause and history of fracture increased the likelihood of osteoporosis, significantly.

Conclusion Results support the high prevalence of osteoporosis and osteopenia in the elderly population. Considering the importance of severe complications, especially fractures, comprehensive interventions should be expanded.

✉ Afshin Ostovar
aostovar@tums.ac.ir; afshin.ostovar@gmail.com

Noushin Fahimfar
nfahimfar@gmail.com

Sima Noorali
simanoorali@yahoo.com

Shakiba Yousefi
yousefish73@gmail.com

Safoora Gharibzadeh
safoora.gharibzadeh@gmail.com

Gita Shafiee
gshafiee.endocrine@gmail.com

Nekoo Panahi
nekoo.panahi@gmail.com

Mahnaz Sanjari
Mahnaz.sanjari@gmail.com

Ramin Heshmat
rheshmat@tums.ac.ir

Farshad Sharifi
farshad.sharifi@gmail.com

Neda Mehrdad
nmehrdad@tums.ac.ir

Alireza Raeisi
dr.alirezaraeisi@gmail.com

Iraj Nabipour
inabipour@gmail.com

Bagher Larijani
larijanib@tums.ac.ir

Extended author information available on the last page of the article

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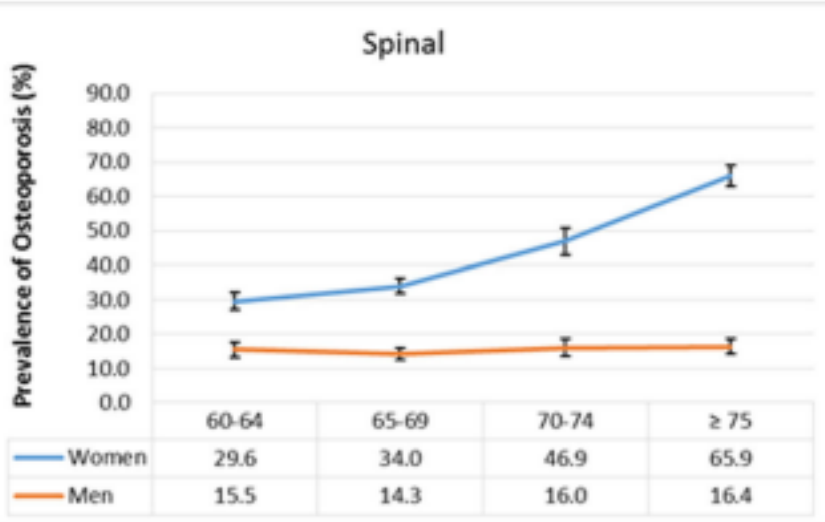
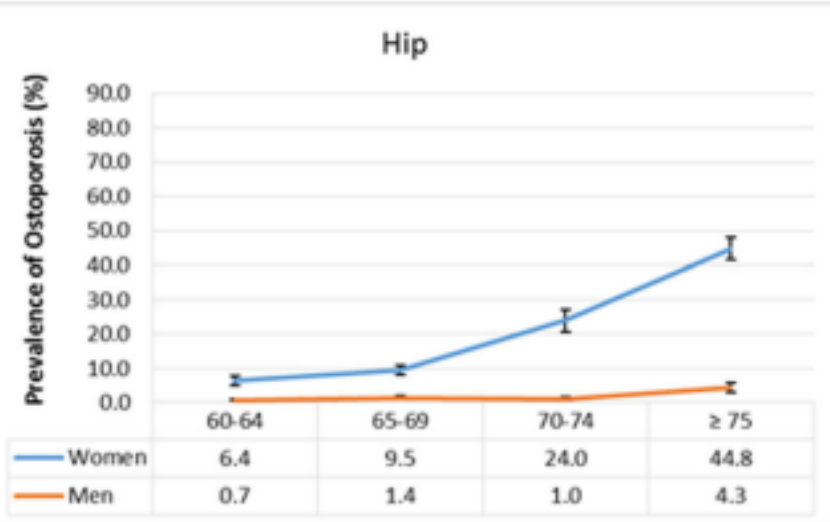
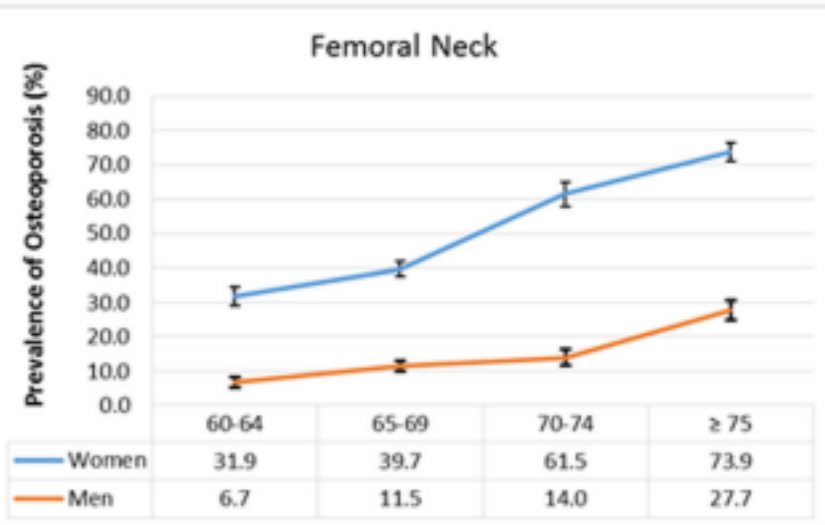
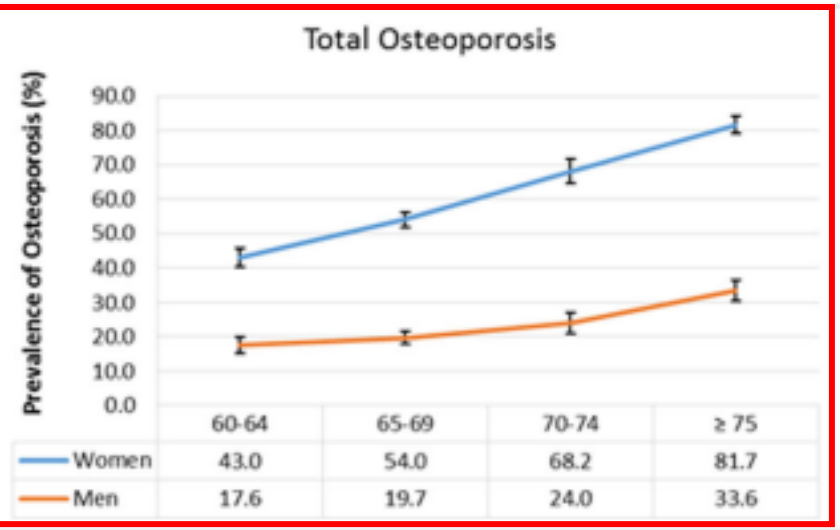
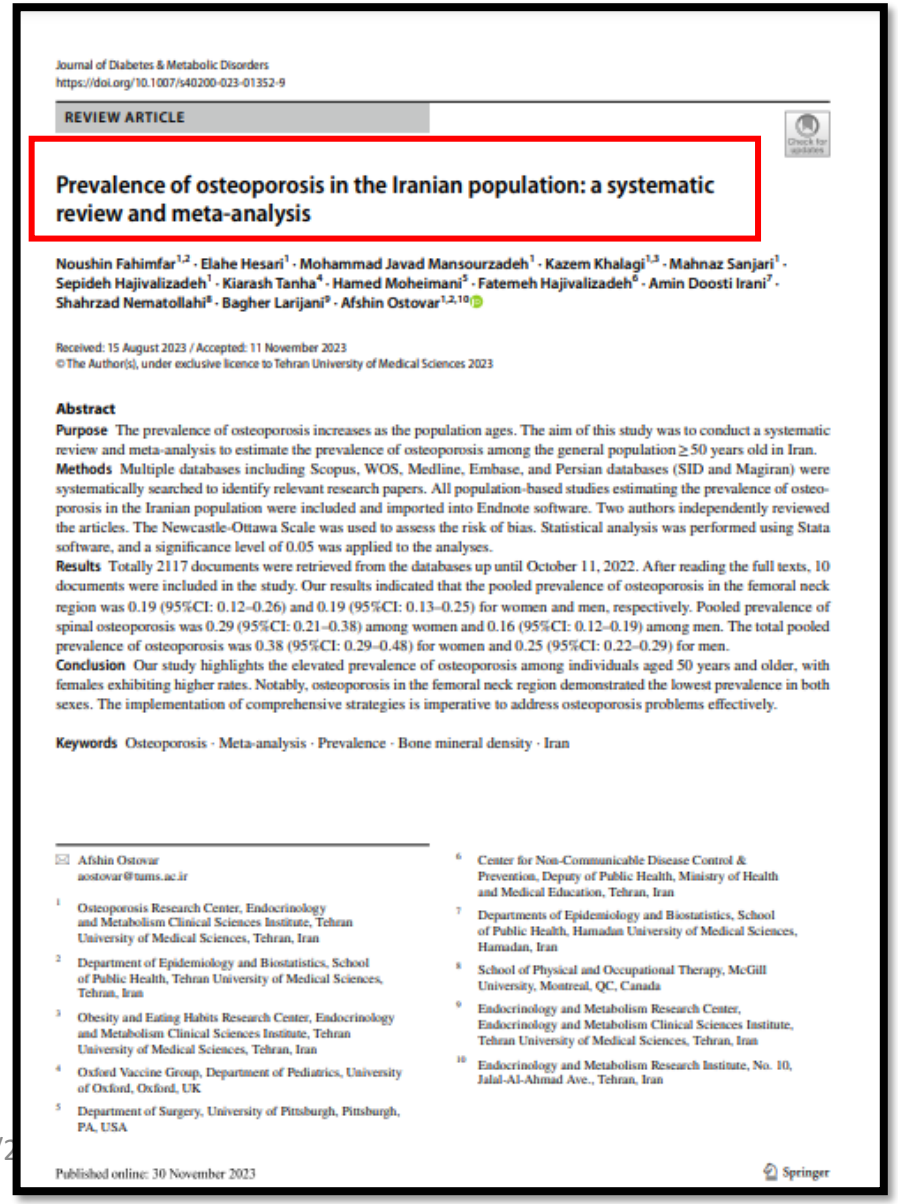








prevalence of Osteoporosis among Iranians: A Comprehensive Systematic Review and Meta-analysis



Journal of Diabetes & Metabolic Disorders
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REVIEW ARTICLE

Prevalence of osteoporosis in the Iranian population: a systematic review and meta-analysis

Noushin Fahimfar[1,2] · Elahe Hesari[1] · Mohammad Javad Mansourzadeh[1] · Kazem Khalagi[1,3] · Mahnaz Sanjari[1] · Sepideh Hajivalizadeh[1] · Kiarash Tanha[4] · Hamed Moheimani[5] · Fatemeh Hajivalizadeh[6] · Amin Doosti Irani[7] · Shahrzad Nematollahi[8] · Bagher Larijani[9] · Afshin Ostovar[1,2,10]

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Abstract

Purpose The prevalence of osteoporosis increases as the population ages. The aim of this study was to conduct a systematic review and meta-analysis to estimate the prevalence of osteoporosis among the general population ≥ 50 years old in Iran.

Methods Multiple databases including Scopus, WOS, Medline, Embase, and Persian databases (SID and Magiran) were systematically searched to identify relevant research papers. All population-based studies estimating the prevalence of osteoporosis in the Iranian population were included and imported into Endnote software. Two authors independently reviewed the articles. The Newcastle-Ottawa Scale was used to assess the risk of bias. Statistical analysis was performed using Stata software, and a significance level of 0.05 was applied to the analyses.

Results Totally 2117 documents were retrieved from the databases up until October 11, 2022. After reading the full texts, 10 documents were included in the study. Our results indicated that the pooled prevalence of osteoporosis in the femoral neck region was 0.19 (95%CI: 0.12–0.26) and 0.19 (95%CI: 0.13–0.25) for women and men, respectively. Pooled prevalence of spinal osteoporosis was 0.29 (95%CI: 0.21–0.38) among women and 0.16 (95%CI: 0.12–0.19) among men. The total pooled prevalence of osteoporosis was 0.38 (95%CI: 0.29–0.48) for women and 0.25 (95%CI: 0.22–0.29) for men.

Conclusion Our study highlights the elevated prevalence of osteoporosis among individuals aged 50 years and older, with females exhibiting higher rates. Notably, osteoporosis in the femoral neck region demonstrated the lowest prevalence in both sexes. The implementation of comprehensive strategies is imperative to address osteoporosis problems effectively.

Keywords Osteoporosis · Meta-analysis · Prevalence · Bone mineral density · Iran

✉ Afshin Ostovar
aostovar@tums.ac.ir

[1] Osteoporosis Research Center, Endocrinology and Metabolism Clinical Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran
[2] Department of Epidemiology and Biostatistics, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran
[3] Obesity and Eating Habits Research Center, Endocrinology and Metabolism Clinical Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran
[4] Oxford Vaccine Group, Department of Pediatrics, University of Oxford, Oxford, UK
[5] Department of Surgery, University of Pittsburgh, Pittsburgh, PA, USA
[6] Center for Non-Communicable Disease Control & Prevention, Deputy of Public Health, Ministry of Health and Medical Education, Tehran, Iran
[7] Departments of Epidemiology and Biostatistics, School of Public Health, Hamadan University of Medical Sciences, Hamadan, Iran
[8] School of Physical and Occupational Therapy, McGill University, Montreal, QC, Canada
[9] Endocrinology and Metabolism Research Center, Endocrinology and Metabolism Clinical Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran
[10] Endocrinology and Metabolism Research Institute, No. 10, Jalal-Al-Ahmad Ave., Tehran, Iran

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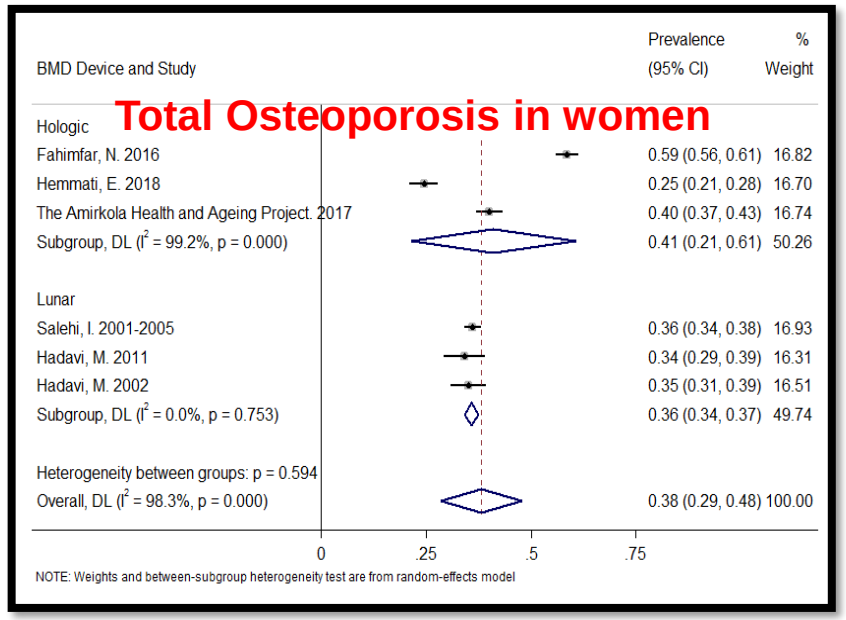
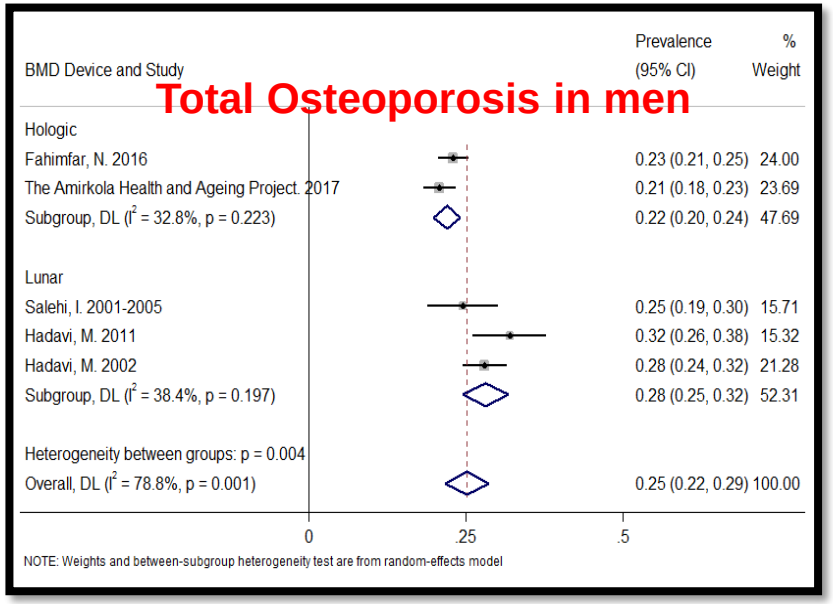
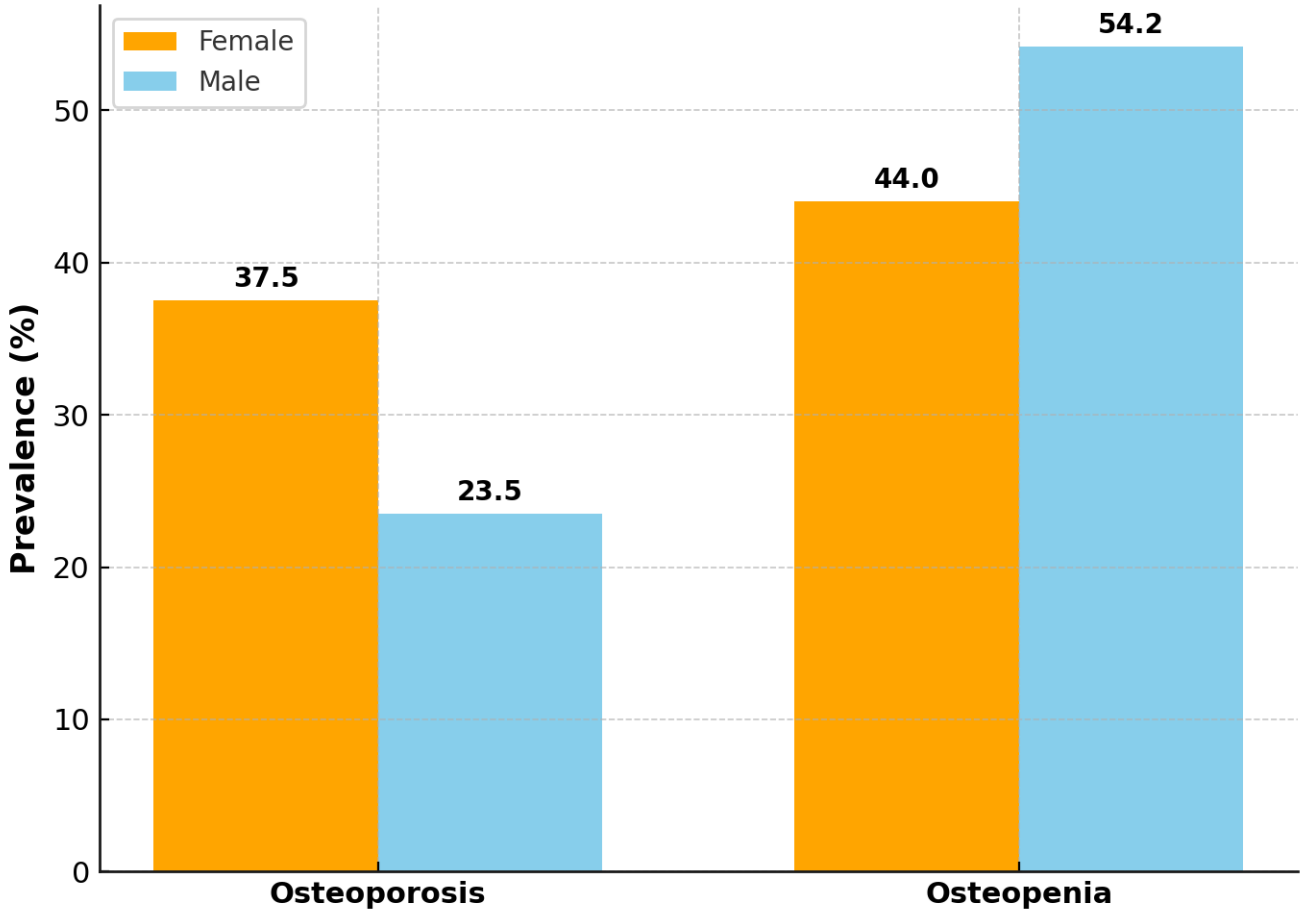


38% (95% confidence interval: 29-48; p<0.001, I² = 98.3%)



25% (95% confidence interval: 22-29; p=0.001, I² = 78.8%)

Prevalence of Osteoporosis and Osteopenia by Sex in Iranians aged ≥50, IMOS 2022



- A total of 1450 participants were included in the study.
- The participants' ages ranged from 50 to 94 years, with mean and SD of 60.7 and 8 years, respectively.
- 46 % of the participants were male and 54% of them were female.
- 75 % of the participants lived in the urban and 25 % in the rural areas.

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BMC Geriatrics

RESEARCH Open Access

Annual incidence of osteoporotic hip fractures in Iran: a systematic review and meta-analysis

Kiarash Tanha[1,2], Noushin Fahimfar[2*], Shahrzad Nematollahi[3], Sayed Mahmoud Sajjadi-Jazi[4,5], Safoora Gharibzadeh[6], Mahnaz Sanjari[2], Kazem Khalagi[2], Fatemeh Hajivalizedeh[7], Alireza Raeisi[8], Bagher Larijani[5] and Afshin Ostovar[2]

Abstract

Background: Osteoporosis (OP) is progressively becoming a global concern with the aging of the world's populations. Osteoporotic fractures are associated with significantly increased mortality rates and a financial burden to health systems. This Meta-analysis aims to estimate the annual incidence of osteoporotic fractures in Iran.

Methods: A comprehensive systematic literature search was performed through Medline (PubMed), Embase, Scopus, Web of Science, and Google Scholar to identify studies which contain an investigation of the incidence of osteoporotic fractures in Iran up to December 3rd 2020, with no time and language restriction. For the risk of bias assessments of studies, the Joanna Briggs Institute (JBI) critical appraisal checklist for studies reporting prevalence data was used. The pooled estimation of the incidence of osteoporotic fractures in population aged≥50 years was calculated using random-effects meta-analysis, and the heterogeneity of included studies was quantified with the I^2 statistic.

Results: In all, 6708 papers were initially retrieved from the electronic databases, among which seven studies were included in the meta-analysis. The pooled standardized annual cumulative incidence of hip fractures was estimated as 138.26 (95% CI: 98.71–193.65) per 100,000 population and 157.52 (95% CI: 124.29–199.64) per 100,000 population in men and women, respectively.

Conclusion: This study showed a high incidence rate of osteoporotic hip fractures in Iran. Early detection and treatment of individuals with higher risks of primary fragility fractures at primary health care as well as implementing fracture liaison services to prevent secondary fractures are highly recommended. The results suffer from the following limitations: first, a low number of studies that were eligible for inclusion; second, the lack of population-based studies; and presence of highly heterogeneous studies despite the use of a random effect model.

Keywords: Osteoporosis, Osteoporotic fractures, Incidence, Iran, Meta-analysis

*Correspondence: nfahimfar@sina.tums.ac.ir; nfahimfar@gmail.com
[2] Osteoporosis Research Center, Endocrinology and Metabolism Clinical Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran
Full list of author information is available at the end of the article

Background

Osteoporosis (OP), defined by low bone mass and microarchitectural deterioration of bone tissue, is a common issue for global health [1–3] and is gradually becoming a global concern with the aging of the world's populations. It was reported that 200 million women are affected by osteoporosis worldwide [4]. The health burden of osteoporosis has been authenticated by health authorities

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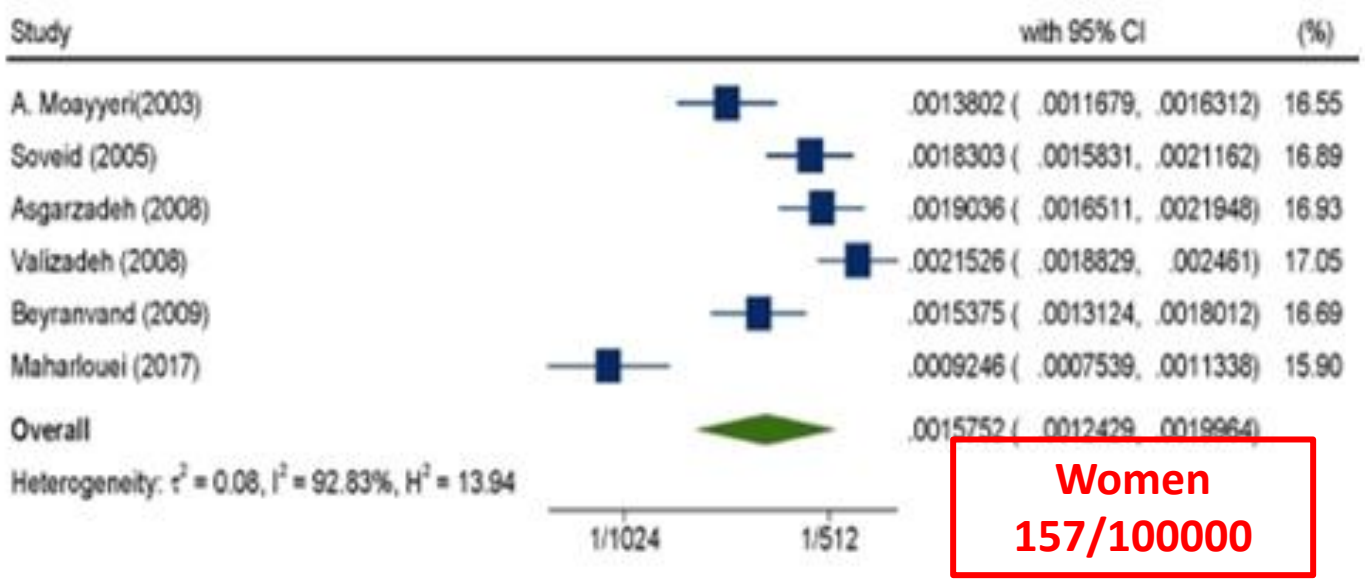
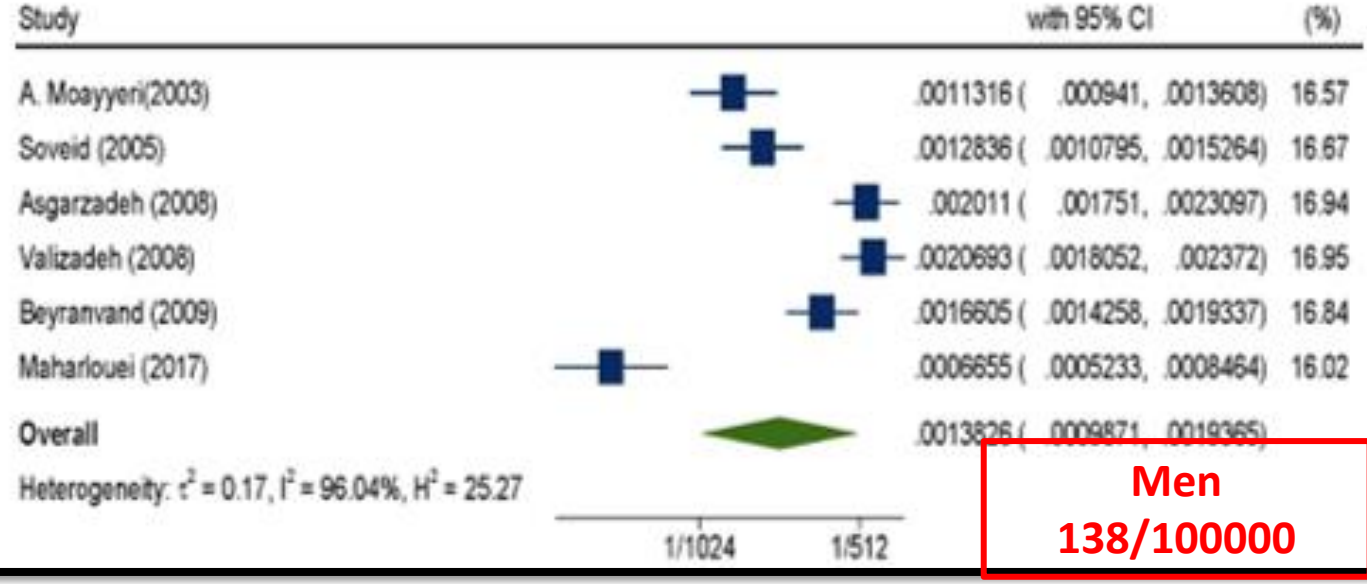


Women 157/100000



Men 138/100000

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BMC Geriatrics

RESEARCH Open Access

Mortality and re-fracture rates in low trauma hip fracture

Vahideh Mohseni[1,2], Noushin Fahimfar[2,3], Akram Ansarifar[1], Safdar Masoumi[4], Mahnaz Sanjari[2], Kazem Khalagi[2,5], Abolfazl Bagherifard[6], Bagher Larijani[7], Leila Janani[8], Mohammad Javad Mansourzadeh[2], Afshin Ostovar[2,3*] and Masoud Solaymani-Dodaran[1,9*]

Abstract

Objectives This study aimed to estimate the incidence rate of re-fracture and all-cause mortality rate in patients with hip fractures caused by minor trauma in the first year following the event.

Materials and methods This is a retrospective cohort study of patients over 50 years of age conducted in a referral hospital located in Tehran (Shafa-Yahyaian). Using the hospital information system (HIS), all patients hospitalized due to hip fractures caused by minor trauma during 2013–2019 were included in the study. We investigated the occurrence of death and re-fracture in all patients one year after the primary hip fracture.

Results A total of 945 patients with hip fractures during a 307,595 person-days of follow-up, were included. The mean age of the participants was 71 years (SD = 11.19), and 533 (59%) of them were women. One hundred forty-nine deaths were identified during the first year after hip fracture, resulting in a one-year mortality rate of 17.69% (95% CI: 15.06–20.77). The one-year mortality rate was 20.06% in men and 15.88% in women. Out of all the participants, 667 answered the phone call, of which 29 cases had experienced a re-fracture in the first year (incidence rate = 5.03%, 95% CI: 3.50–7.24). The incidence rates in women and men were 6.07% and 3.65%, respectively.

Conclusion Patients with low-trauma hip fractures have shown a high rate of mortality in the first year. Considering the increase in the incidence of hip fractures with age, comprehensive strategies are needed to prevent fractures caused by minor trauma in the elderly population.

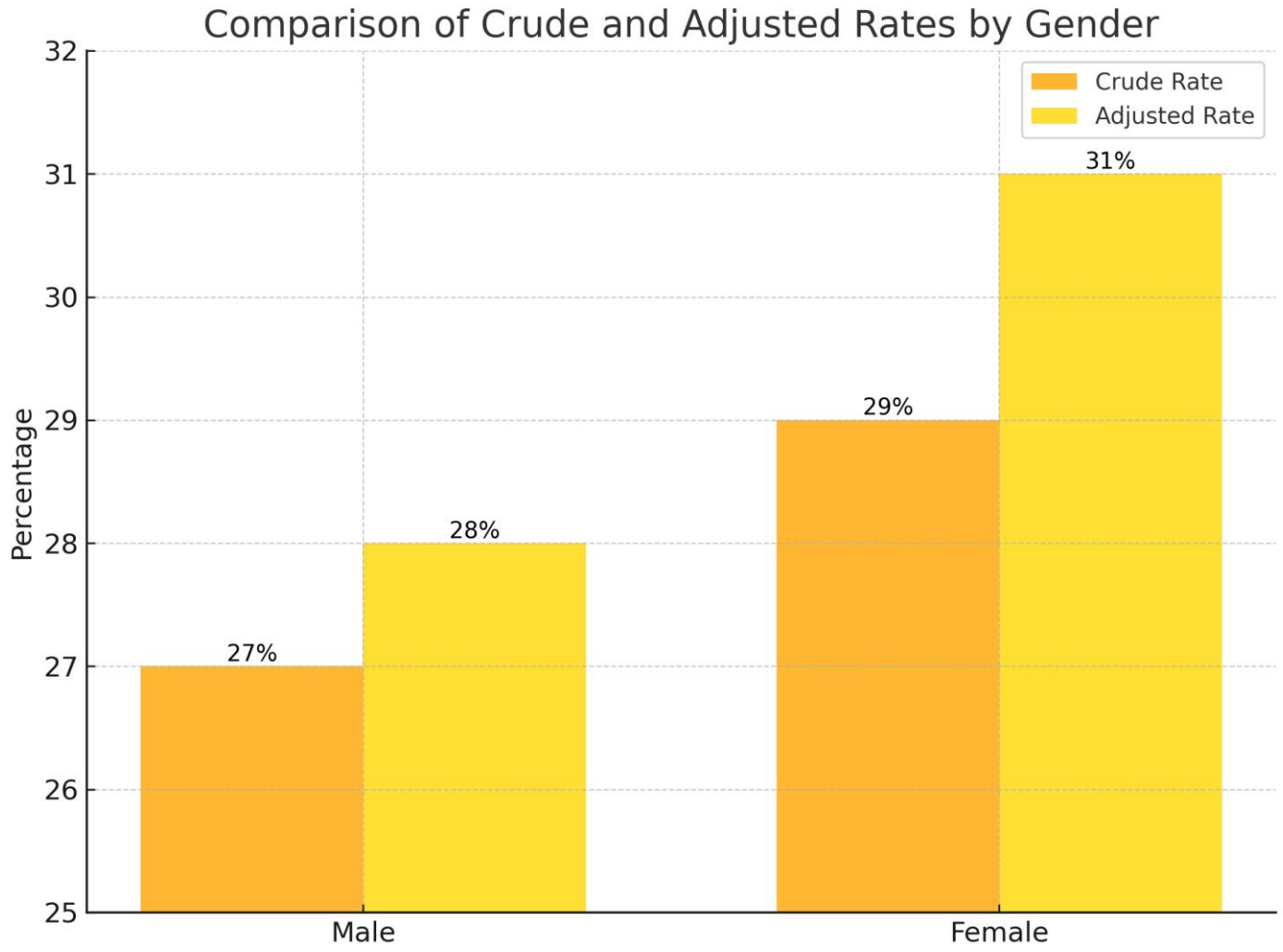
Keywords Osteoporosis, Hip fracture, One-year survival, Incidence, Death, Re-fracture

*Correspondence:
Afshin Ostovar
aostovar@sina.tums.ac.ir
Masoud Solaymani-Dodaran
msdodran@gmail.com
[1]Department of Epidemiology, School of Public Health, Iran University of Medical Sciences, Tehran, Iran
[2]Osteoporosis Research Center, Endocrinology and Metabolism Clinical Sciences Research Institute, Tehran University of Medical Sciences, Tehran, Iran
[3]Department of Epidemiology and Biostatistics, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran
[4]Department of Biostatistics, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran
[5]Obesity and Eating Habits Research Center, Endocrinology and Metabolism Clinical Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran
[6]Bone and Joint Reconstruction Research Center, Shafa Orthopedic Hospital, Iran University of Medical Sciences, Tehran, Iran
[7]Endocrinology and Metabolism Research Center, Endocrinology and Metabolism Clinical Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran
[8]Department of Biostatistics, School of Public Health, Iran University of Medical Sciences, Tehran, Iran
[9]Minimally Invasive Surgery Research Center, Hazrat-e-Rasool Hospital, Iran University of Medical Science, Tehran, Iran

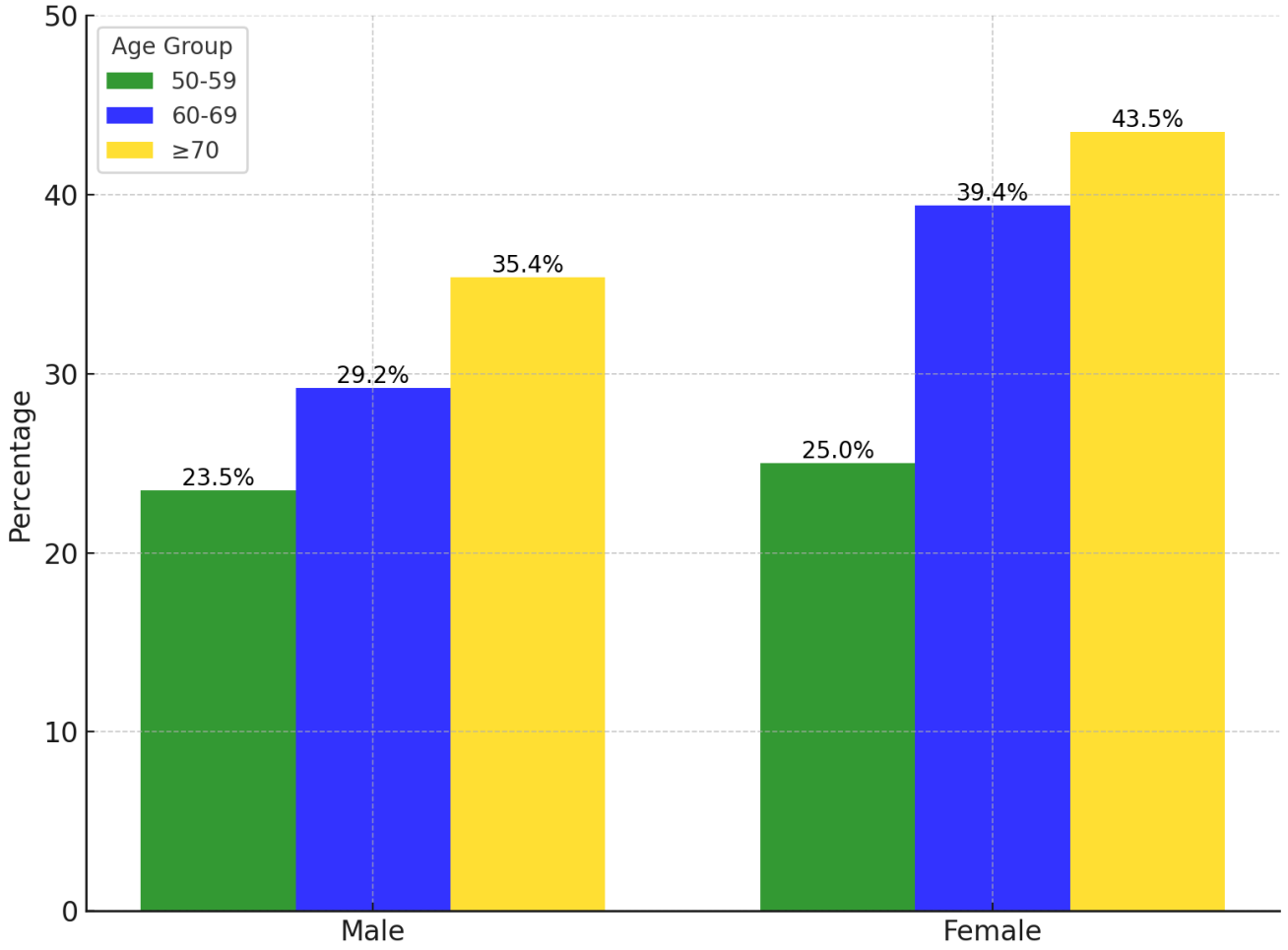
Table 2 Mortality and re-fracture rates (percent) in the first year in the cohort of study participants by gender

		Person-day of follow up	Event	Rate per 100 per year	95% Confidence Interval
Death at the first year					
	Female	174,724	76	15.88	12.68–19.89
	Male	132,870	73	20.06	15.95–25.24
	Total	307,595	149	17.69	15.06–20.77
Re-fracture at the first year					
	Female	120,151	20	6.07	3.91–9.41
	Male	89,947	9	3.65	1.90–7.01
	Total	210,098	29	5.03	3.50–7.24

Prevalence of Vertebral Fracture in individuals >=60 years old in Iran Bushehr Elderly Health Program



Prevalence of Vertebral Fracture in individuals >=60 years old by age group in Iran Bushehr Elderly Health Program

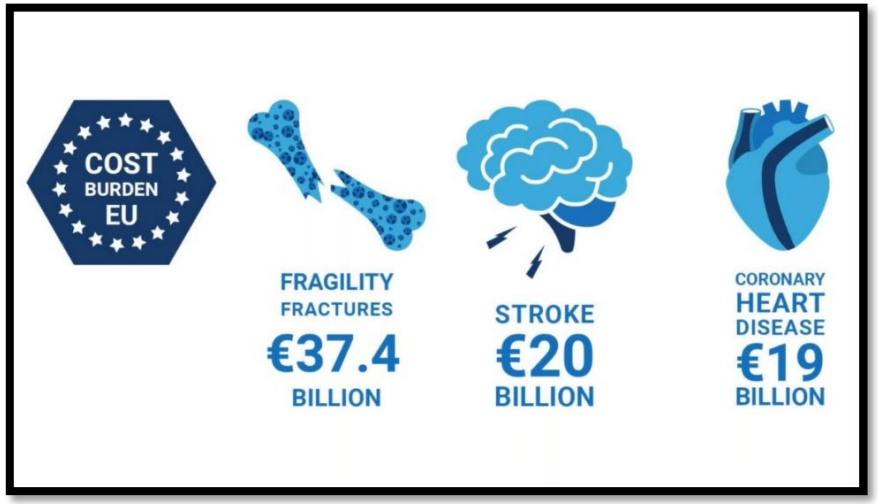


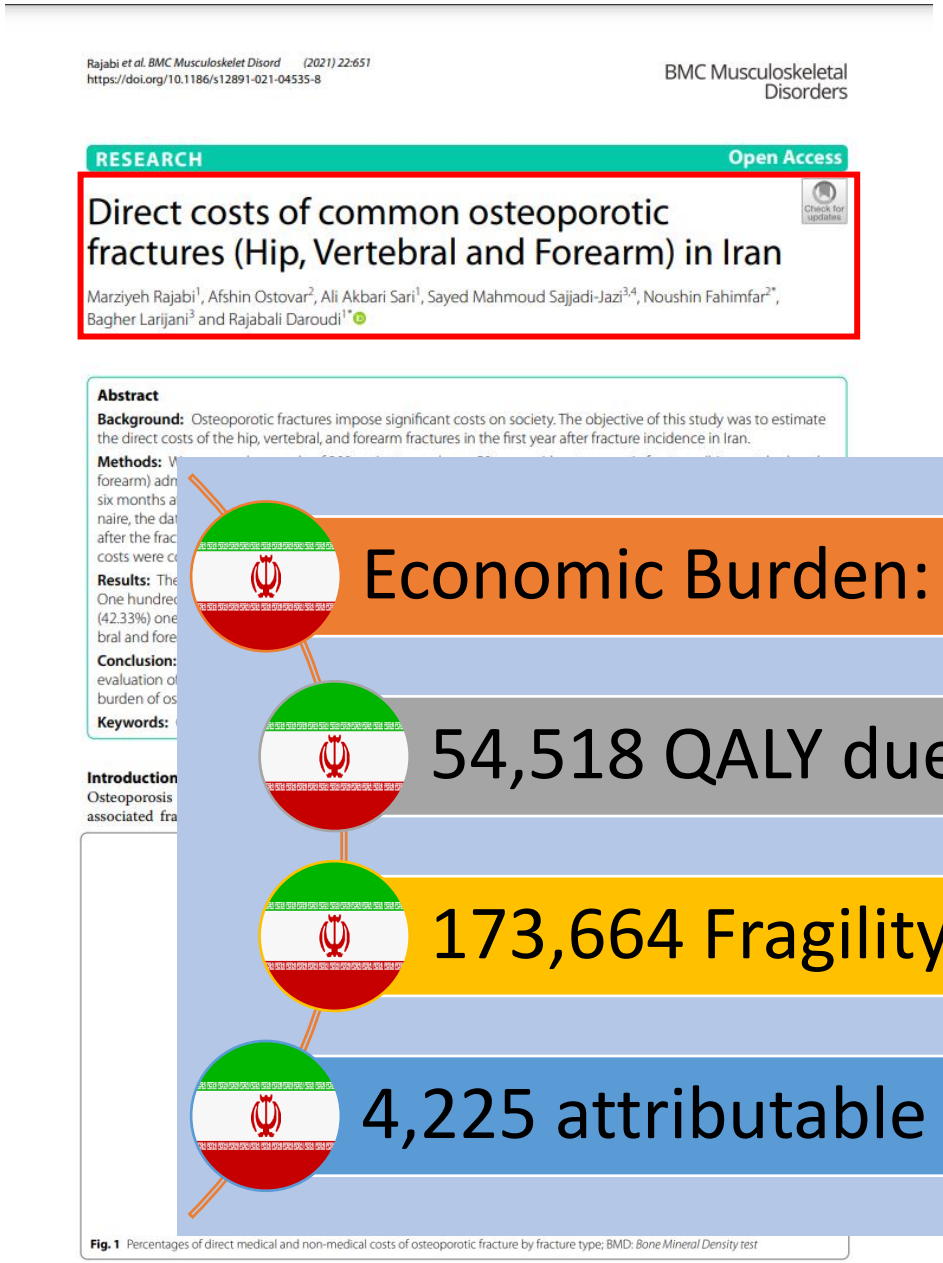
Economic Burden of poor bone health: world

- In 2018 osteoporotic fracture costs the United States **$52 billion** which is expected to climb 83% to **$95 billion** by 2040

- In 2017, more than **7.6 million sick days** were taken due to osteoporotic fractures in France, Germany, Italy, Spain Sweden and the United Kingdom

- Up to **56%** of individuals with a hip fractures become **dependent** on an informal care giver causing a significant financial burden for both families and employers





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Direct costs of common osteoporotic fractures (Hip, Vertebral and Forearm) in Iran

Marziyeh Rajabi[1], Afshin Ostovar[2], Ali Akbari Sari[1], Sayed Mahmoud Sajjadi-Jazi[3,4], Noushin Fahimfar[2*], Bagher Larijani[3] and Rajabali Daroudi[1*]

Abstract

Background: Osteoporotic fractures impose significant costs on society. The objective of this study was to estimate the direct costs of the hip, vertebral, and forearm fractures in the first year after fracture incidence in Iran.

Methods: W... forearm) adm... six months a... naire, the dat... after the frac... costs were c...

Results: The... One hundred... (42.33%) one... bral and fore...

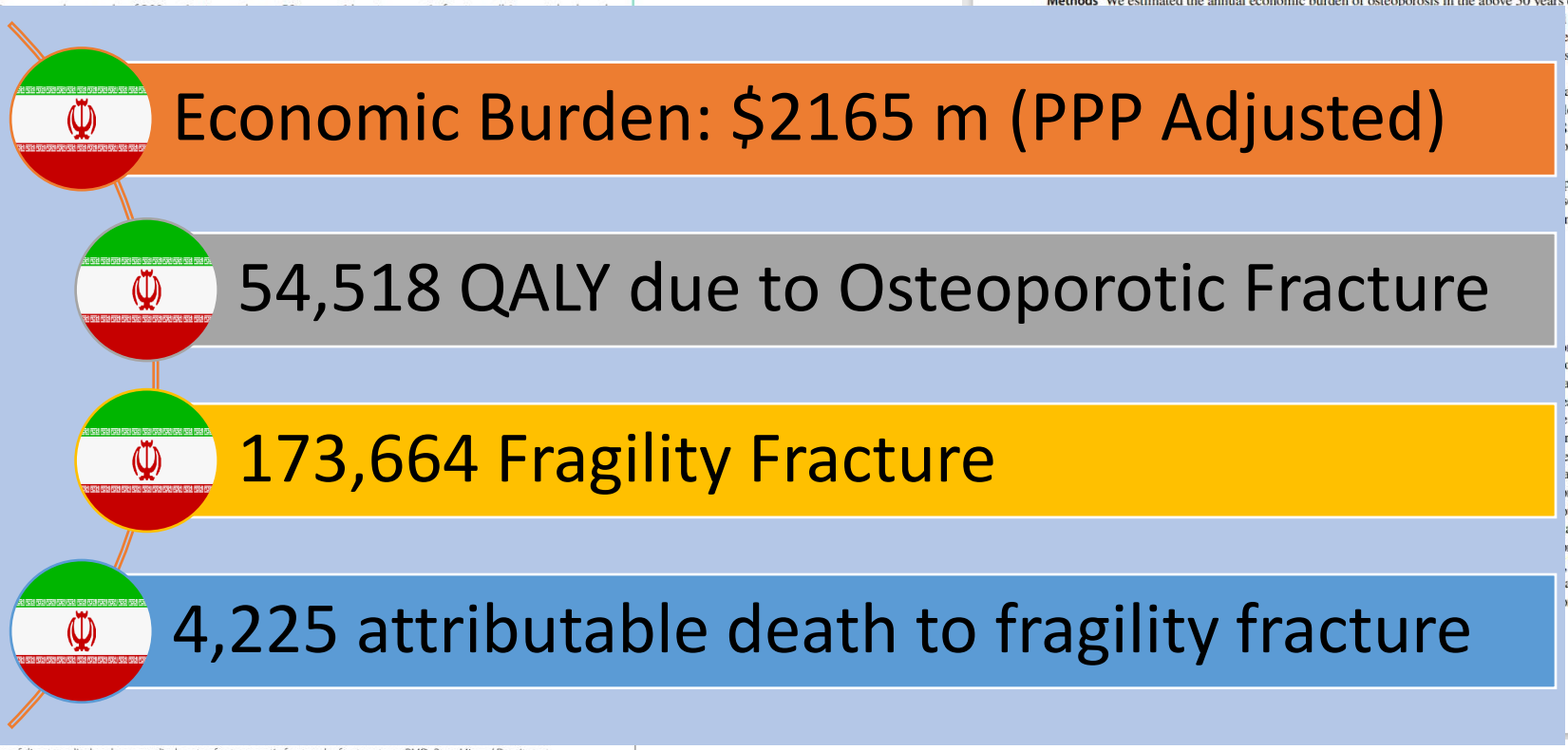
Conclusion: ... evaluation o... burden of os...

Keywords:

Introduction

Osteoporosis ... associated fra...

Fig. 1 Percentages of direct medical and non-medical costs of osteoporotic fracture by fracture type; BMD: *Bone Mineral Density test*

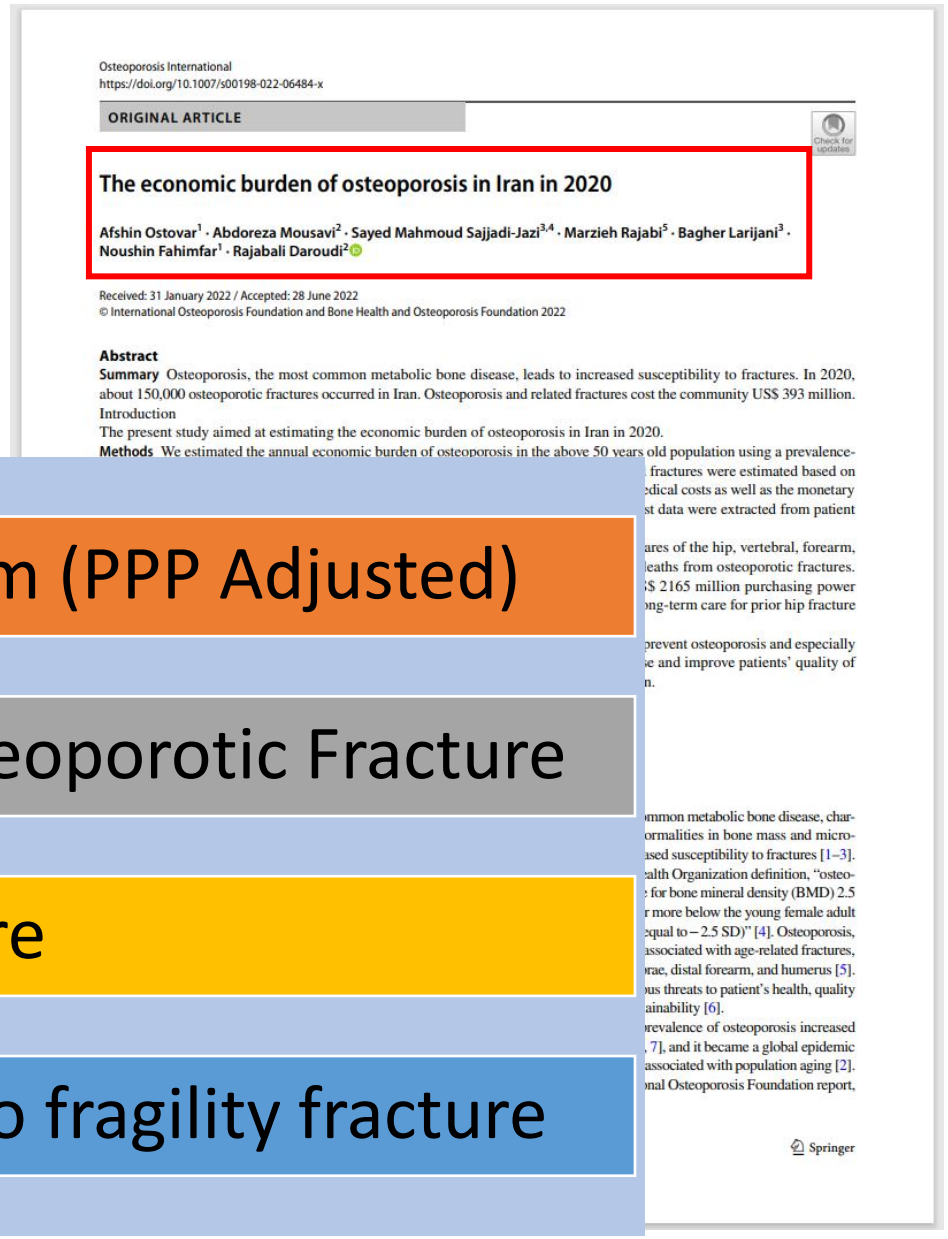


Economic Burden: $2165 m (PPP Adjusted)

54,518 QALY due to Osteoporotic Fracture

173,664 Fragility Fracture

4,225 attributable death to fragility fracture



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ORIGINAL ARTICLE

The economic burden of osteoporosis in Iran in 2020

Afshin Ostovar[1] · Abdoreza Mousavi[2] · Sayed Mahmoud Sajjadi-Jazi[3,4] · Marzieh Rajabi[5] · Bagher Larijani[3] · Noushin Fahimfar[1] · Rajabali Daroudi[2]

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Abstract

Summary Osteoporosis, the most common metabolic bone disease, leads to increased susceptibility to fractures. In 2020, about 150,000 osteoporotic fractures occurred in Iran. Osteoporosis and related fractures cost the community US$ 393 million.

Introduction

The present study aimed at estimating the economic burden of osteoporosis in Iran in 2020.

Methods We estimated the annual economic burden of osteoporosis in the above 50 years old population using a prevalence-... fractures were estimated based on ...edical costs as well as the monetary ...st data were extracted from patient ...

...ares of the hip, vertebral, forearm, ...leaths from osteoporotic fractures. ...S$ 2165 million purchasing power ...ong-term care for prior hip fracture ...

...prevent osteoporosis and especially ...e and improve patients' quality of ...n.

...mmon metabolic bone disease, char-...ormalities in bone mass and micro-...ased susceptibility to fractures [1–3]. ...alth Organization definition, "osteo-... for bone mineral density (BMD) 2.5 ...r more below the young female adult ...equal to − 2.5 SD)" [4]. Osteoporosis, ...associated with age-related fractures, ...rae, distal forearm, and humerus [5]. ...us threats to patient's health, quality ...ainability [6]. ...revalence of osteoporosis increased ..., 7], and it became a global epidemic ...associated with population aging [2]. ...nal Osteoporosis Foundation report,

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