



THE MIDDLE EAST & AFRICA REGIONAL AUDIT

Epidemiology, costs & burden of osteoporosis in 2011

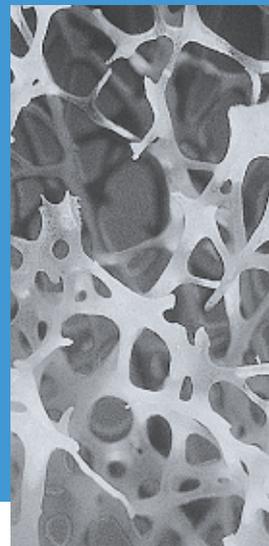


What is osteoporosis?

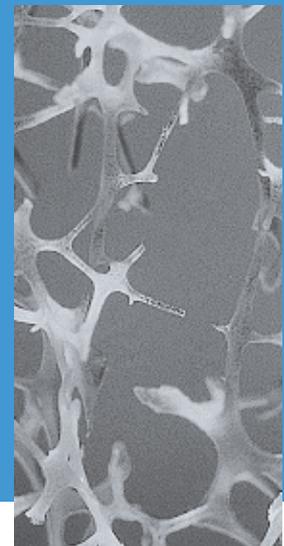
Osteoporosis is a disease in which the density and quality of bone are reduced, leading to weakness of the skeleton and increased risk of fracture, particularly of the spine, wrist, hip, pelvis and upper arm. Osteoporosis and associated fractures are an important cause of mortality and morbidity. In women over 45, osteoporosis accounts for more days spent in hospital than many other diseases, including diabetes, myocardial infarction and breast cancer¹. It may be asymptomatic until it presents with a fracture and even then it is estimated that only one out of three vertebral fractures come to clinical attention².

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Normal bone



Osteoporotic bone

International Osteoporosis Foundation IOF

IOF is an international non-governmental organization, which is a global alliance of patient, medical and research societies, scientists, healthcare professionals and the health industry. IOF works in partnership with its members and other organizations around the world to increase awareness, improve prevention, early diagnosis and appropriate care of osteoporosis. There are 200 member societies in 93 locations worldwide. IOF member societies represent approximately 5.33 billion people, which is equivalent to 82% of the world's population.

Lead author **Prof Ghada El-Hajj Fuleihan**

1st author **Dr Med Gemma Adib**

2nd author **Dr Laetitia Nauroy IOF**

Editors **Judy Stenmark BSc MPH IOF**
Laura Misteli IOF

Reviewers **Prof Cyrus Cooper • Dr Nicholas Harvey •**
Dr Chris Holroyd (Medical Research Council Lifecourse Epidemiology Unit, University of Southampton, UK)

Layout **Gilberto Domingues Lontro IOF**

Special Acknowledgements

Dr Najla Itani

Medical Resident, American University of Beirut (AUB) : for her immense contribution to the design and conduct of the literature review and search and synthesis of country templates.

Dr Asma Arabi

AProf Medicine, AUB: for her assistance with the review of papers and templates and validation of the information supplied from non-PAOS* countries.

Prof Rafic Baddoura

St. Joseph University: for sharing primary data from his review on osteoporosis in the Eastern Mediterranean Region.

Prof Ghassan Maalouf

St. Joseph University and Balamand University, Bellevue Orthopedic Center, President PAOS Scientific Committee, for his assistance with publications and collecting data from PAOS countries.

Dr Basel Masri

IOF Representative, Middle-East and Africa: for his assistance in gathering data from PAOS* countries.

*NOTE PAOS denotes Pan-Arab Osteoporosis Society

FOREWORD

In its 2010 Global Status Report on Non-Communicable Diseases (NCDs), the World Health Organization (WHO) identified NCDs as the leading cause of death, accounting for 2/3 of all causes of deaths worldwide. The impact of NCDs identified by WHO, namely cardiovascular illnesses, diabetes mellitus, obesity, cancer and chronic respiratory diseases, is projected to further increase due to global urbanization, sedentary lifestyle, obesity epidemic, and an increase in life expectancy in populations across the globe.

Osteoporosis is no exception in this rising tide of NCDs, not only sharing common risk factors, but also contributing substantially to a heavy social and economic burden on society. Worldwide, an osteoporotic fracture occurs every 3 seconds, a vertebral fracture every 22 seconds. In their remaining lifetimes, one in two women aged over 50 will experience a vertebral fracture and one in three women aged over 50 will experience a hip fracture – both result in substantial morbidity and mortality. Ten per cent of hip fracture patients ultimately sustain a hip fracture on the contra-lateral hip, twenty to forty percent die within the first year, and thirty to fifty per cent lose functional independence. Many people with osteoporosis in the region, and indeed worldwide, lack access to care, and for those who do receive treatment, it is often fragmented and sub-optimal.

The vision of the International Osteoporosis Foundation (IOF), ‘a world without osteoporotic fractures’, and its commitment to addressing the local needs of regions worldwide, is expressed in the IOF regionalization strategy. This includes the development of five IOF geographic regions as well as the publication of landmark regional epidemiological audits, and their launch at major regional scientific meetings.

The 2011 Audit on the Epidemiology, Costs and Burden of Osteoporosis in Middle East and Africa, is the third of its kind, following three successful regional audits, the 2008 European Audit, the 2009 Asian Audit, and the 2010 Eastern European and Central Asian Audit. These audits have been extremely useful tools for the societies and scientists in their respective countries, and have been



Ghada El-Hajj Fuleihan MD MPH

Lead Author

Professor of Medicine and Director

Calcium Metabolism and Osteoporosis Program, WHO Collaborating Center for Metabolic Bone Disorders, American University of Beirut Medical Center, Beirut, Lebanon • Founding President, Lebanese Society of Osteoporosis & Metabolic Bone Disorders • Member, Committee of Scientific Advisors, IOF



Gemma Adib MD

1st Author

Consultant Internist

Italian Hospital Osteoporosis Center, Damascus, Syria • UN & EU Medical Consultant • Founding President, Syrian National Osteoporosis Society (SYNOS) • General Secretary, Pan Arab Osteoporosis Society (PAOS)

far reaching and very effective in increasing awareness at the political and public level.

This audit assesses current and projected disease burden, and identifies gaps in knowledge and care, relevant to osteoporosis in the Middle East and Africa. It underscores the scarcity of data available, the lack of large population-based cohorts and of national databases and registries, to accurately assess major osteoporosis outcomes in most countries. Additional limitations in many instances include the absence of clear terms of reference, and the non-published nature of primary data presented here-in. However, it is the first report of its kind for this region, and presents a comprehensive assessment of the status of osteoporosis, a neglected but highly prevalent disease.

We would like to acknowledge the contribution of several public health officials throughout the region and in particular those Ministries of Health who shared primary national health care data and population-based registry information for the purposes of this audit (particularly at the Lebanese Ministry of Public Health). We trust this report will enable concerned stakeholders in the Middle East and Africa to establish a priority list of objectives and a timetable for a plan of action to develop appropriate programmes and advocate for policy change, to render the diagnosis and treatment of osteoporosis accessible to all at risk. The audit also provides the needed baseline evidence to monitor time trends in major outcomes, and assess progress achieved, in order to reduce the substantial gap in osteoporosis care in the region.

COUNTRY AUTHORS AND CONTRIBUTORS

Egypt	AUTHOR CONTRIBUTORS	Samir El Badawi Hazem A Azeem • Ahmad Rached • Ahmad Mortagi • Omar Hussin
Iran	AUTHOR CONTRIBUTORS	Bagher Larijani Eghbal Taheri • Abbasali Keshtkar • Hamidreza Aghaei Meybodi • Patricia Khashayar Zahra Jouyande • Mahdich Shojaa • Zahra Mohammadi
Iraq	AUTHOR CONTRIBUTORS	Ziad S. Al-Rawi Nizar A. Jassim • Dawood Al-Ubaidi • Daa' S. Saleh • Mohammad H. Munshid Ghazi T. Rudaini • Ala H. Badr • Mohammad A. Abbas • Ali H. Al-Kazzaz Faiq I. Gorial
Jordan	AUTHOR CONTRIBUTORS	Efteem Azar Basel Masri • Said Abdul Majeed • Mazen Kakish
Kenya	AUTHOR	Joseph Kabia
Lebanon	AUTHORS CONTRIBUTORS	Ghada El-Hajj Fuleihan • Rafic Baddoura • Najla Itani Asma Arabi • Ghassan Maalouf • Sani Hlais
Morocco	AUTHOR	Abdellah El Maghraoui
Palestine	AUTHOR	Elias Saba
South Africa	AUTHOR	Teréza Hough
Syria	AUTHORS CONTRIBUTORS	Gemma Adib • Hikmat Abou Samra Rami Eid • Bachar Mir Ali • Ousama Abou Samra
Tunisia	AUTHOR CONTRIBUTORS	Leith Zakraoui Sonia Kechaou • Bechir Zouari
Turkey*	AUTHOR CONTRIBUTOR	Sansin Tuzun Ulku Akarirmak
United Arab Emirates	AUTHOR CONTRIBUTORS	Mustafa Al Izzi Abdraheem Al Suhaili • Moh. Almahmoud • Humeira Badsha • Ahmed Al Sayaad

ADDITIONAL COUNTRIES INCLUDED IN THE REPORT

Bahrain, Qatar, Kuwait and Saudi Arabia

**Although Turkey is not officially included within the membership of the IOF Middle East and Africa region, it has been included here for the purposes of this report*

IOF MEMBER SOCIETIES IN THE MIDDLE EAST & AFRICA REGION

Kingdom of Bahrain	BAHRAIN OSTEOPOROSIS SOCIETY www.bos-bh.org
Congo	CONGOLESE OSTEOPOROSIS SOCIETY
Egypt	EGYPTIAN OSTEOPOROSIS PREVENTION SOCIETY www.egyptianops.org
Islamic Republic of Iran	ENDOCRINOLOGY & METABOLISM RESEARCH INSTITUTE (EMRI) http://emrc.tums.ac.ir
Iraq	IRAQ OSTEOPOROSIS PREVENTION SOCIETY (IOPS)
Jordan	JORDANIAN OSTEOPOROSIS PREVENTION SOCIETY (JOPS)
Jordan	JORDANIAN PHYSICIANS OSTEOPOROSIS SOCIETY (JPOS)
Kenya	OSTEOPOROSIS PREVENTION & AGE CONCERN http://osteolderly.tripod.com
Kuwait	KUWAIT OSTEOPOROSIS PREVENTION SOCIETY
Lebanon	LEBANESE OSTEOPOROSIS PREVENTION SOCIETY
Lebanon	LEBANESE SOCIETY OF OSTEOPOROSIS & METABOLIC BONE DISORDERS (OSTEOS) www.osteos.org.lb
Lebanon	LEBANESE SOCIETY OF RHEUMATOLOGY
Libya	LIBYAN OSTEOPOROSIS SOCIETY
Morocco	MOROCCAN SOCIETY FOR RHEUMATOLOGY www.smr.ma
Palestine	PALESTINIAN OSTEOPOROSIS PREVENTION SOCIETY (POPS)
Saudi Arabia	SAUDI OSTEOPOROSIS SOCIETY www.saudiosteo.org
South Africa	NATIONAL OSTEOPOROSIS FOUNDATION OF SOUTH AFRICA www.osteoporosis.org.za
Syrian Arab Republic	PAN ARAB OSTEOPOROSIS SOCIETY (PAOS)
Syrian Arab Republic	SYRIAN NATIONAL OSTEOPOROSIS SOCIETY (SYNOS) www.sy-nos.org
Tunisia	TUNISIAN OSTEOPOROSIS PREVENTION SOCIETY (TOPS)
United Arab Emirates	EMIRATES OSTEOPOROSIS SOCIETY (EOS) www.emiratesosteoporosisociety.com

Contact information is available on the IOF website at <http://www.iofbonehealth.org/about-iof/member-societies.html>

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EXECUTIVE SUMMARY

With ageing societies and changing disease patterns worldwide, the human, social, and economic costs of osteoporosis will continue to rise worldwide, and more so in the Middle East and Africa region. Indeed, whereas 8-20% of the population from this region is currently over 50 years, the proportion will reach up to 25% in 2020, and 40% in 2050, in several countries (World Bank online data <http://web.worldbank.org>). Thus, although hip fracture rates in this region currently fall in the lower third of the scale for rates worldwide, the above described demographic explosion and the secular trends anticipated with increased urbanization account for the projected highest proportional increase in hip fractures rates compared with many other regions worldwide. This audit captures the evidence, available statistics, and relevant country-specific facts needed to launch an effective strategy to address the growing threat herein.

A comprehensive online literature search was conducted by the group at the American University of Beirut for all 67 countries identified as part of Middle East and Africa by the World Bank. The search identified 3650 articles: 423 passed the initial title screen, 106 the

abstract screen, and 70 the full article screen (*see Appendix for full details*). Additional articles referred by authors and collaborators were also taken into consideration.

The audit focused on 17 countries in the region with IOF linked Committees of National Societies (CNS) and sufficient information was identified through the above literature search and/or as provided by key opinion leaders to enable conclusions to be drawn: Thus data were examined for Bahrain, Egypt, Iran, Iraq, Jordan, Kenya, Kuwait, Lebanon, Palestine, Morocco, Qatar, Saudi Arabia, South Africa, Syria, Tunisia, Turkey, and the United Arab Emirates (UAE).

Data on hip fracture incidence is scarce. There are very few population-based data, and evidence relating to vertebral fractures is almost non-existent throughout the region. Data on hip fracture incidence were provided in nine countries, but were not population-based in the majority, and in few cases incidence estimates were provided but no published data were available. Age-standardized rates if available, were reported to vary between 250 and

TABLE 1 Crude-Hip Fracture Incidence Rates/100 000 persons per year for Subjects >50 years in Middle East and Africa

COUNTRY	YEAR	MEN	WOMEN	TYPE OF STUDY	LEVEL OF EVIDENCE
Iran ¹	2000 - 2003	24-2287*	42-1958*	retrospective	fair
Iran ²	2003: 4 months	115.2	115.6	retrospective	fair
Iran ³	2010	472.1*		-	good
Kuwait ⁴	1992 - 1998	151.8	152.4	retrospective	fair
Lebanon ⁵	2006	88.1	187.5	Population based National Hip Fracture Registry	good
	2007	106.5	174.4		
	2008	105.3	163.9		
	2009	133.2	201.7		
Morocco ⁶	2002	43.7	52.1	retrospective	fair
Saudi Arabia ⁷	1990 - 1991	71	100	retrospective	fair
Turkey ⁸	2009	109	226	population based hospital registries	fair

* Average-Range for age group 55 to 85+ years (no average provided)

1 Soveid et al, Osteoporos Int 2005; **2** Moayyeri A et al, Osteoporos Int 2006; **3** Keshtkar et al, Osteoporos Int 2010; **4** Memon V et al, Int J Epidemiol 1998; **5** Sibai A et al, Osteoporos Int 2010; **6** Al Maghraoui et al, Osteoporos Int 2005; **7** Al Nuaim et al, Calcif Tiss Int 1995

8 Tuzun S et al, Osteoporos Int 2011 EPUB ahead of print

TABLE 2 Annual Hip Fracture Incidence Rates per 100 000 Women in Eastern Mediterranean Countries (in 5 year age increments)

COUNTRY	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	80+
Lebanon	24.2	30.6	43.1	80.7	198.2	429	1685.7
Kuwait	-	28.2	-	123.9	-	457.9	1188.7
Iran	34.9	26.3	69.7	84.1	204.1	259.2	572.4
Saudi Arabia	-	14.6	-	79	-	394	-
Morocco	7	12.6	74.6	22.6	85	215.4	-

REF Baddoura R, Hoteit M, El-Hajj Fuleihan G. J Clin Densitom. *In Press*

1 Lebanon: Sibai et al. Osteoporos Int 2011; 2 Kuwait: Memon et al. Int J Epidemiol 1998; 3 Iran: Moayyeri et al. Osteoporos Int 2006; 4 Saudi Arabia: Al Nuaim et al. Calcif Tiss Int 1995; 5 Morocco: El Maghraoui et al. Osteoporos Int 2002

350/100,000 persons per year for Lebanon, Kuwait and Iran, depending on gender and country. Rates were close to those reported in Southern Europe, with the exception of Turkey where the lowest rates were reported (*table 1*).

Only 4 of the 67 countries in region have an online FRAX[®] calculator: Jordan, Lebanon, Tunisia and Turkey; that in Lebanon was developed using data from a population based national hip fracture registry which was established by the Ministry of Health in 2006. Information on prevalent vertebral fractures was even scarcer. It was provided in three countries, ranging from 20-25% in women > 65 years, while the data on vertebral fracture incidence is practically non-existent.

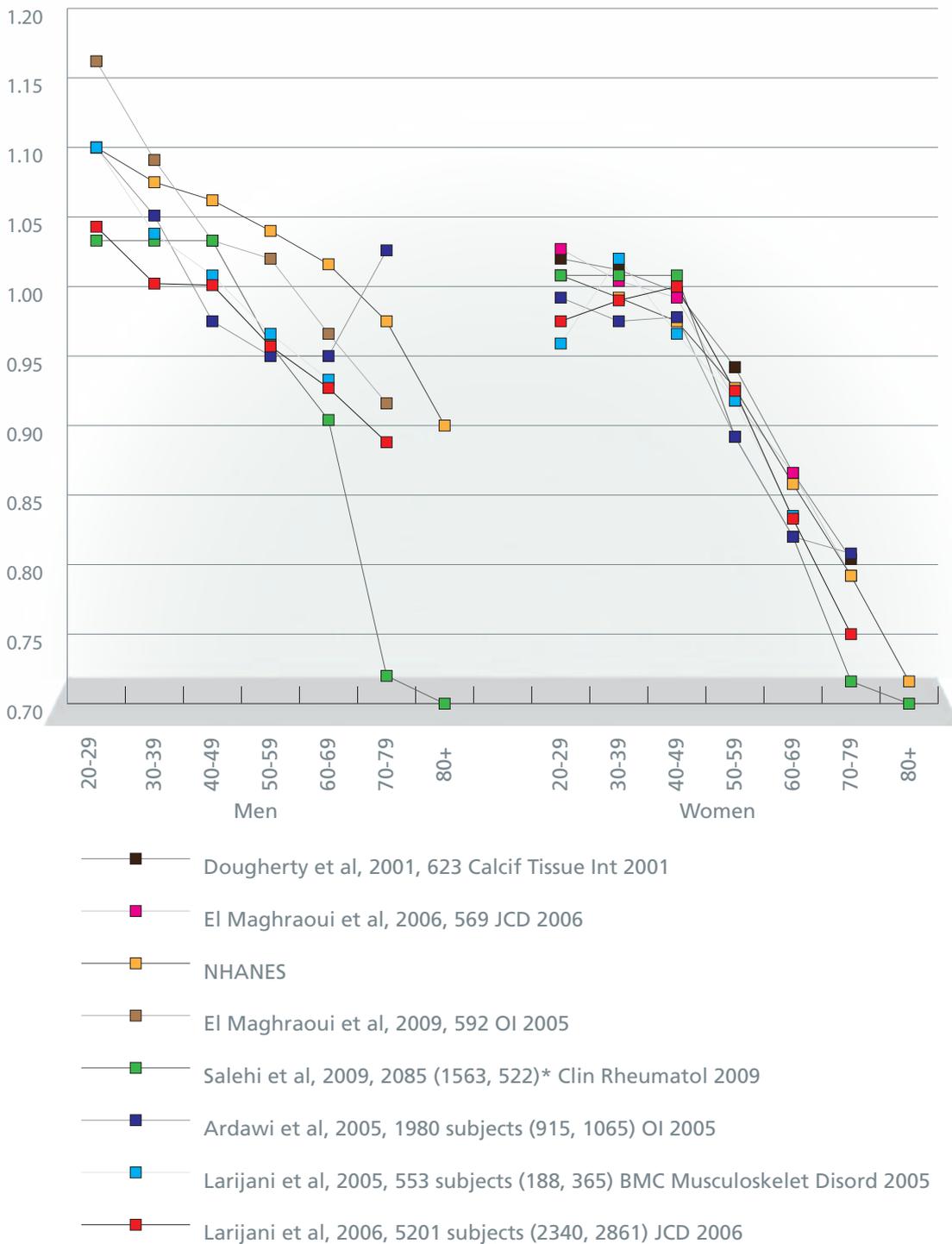
Osteoporosis was identified as a health priority in only three countries, national osteoporosis guidelines are available in five countries, and endorsed by government in only two. Access to DXA machines was extremely limited, with most countries estimating the availability to be less than 5 machines/million population, with the exception of Bahrain, Kuwait, Lebanon, Turkey and UAE. Most approved anti-resorptive drugs were available in the majority of countries, whereas PTH analogs were in only half. Reimbursement for diagnostics and therapeutics varied widely.

Despite favourable latitudes, hypovitaminosis D was prevalent (>50% of groups studied) throughout the region with consistent predictors including older age, female gender, multiparity, seasonality, conservative clothing style and low socio-economic status. This health problem is currently not addressed by international guidelines.

For the Middle East and African region it was clear that access to diagnostics is restricted, and access to care is

highly variable. This audit is therefore a call to action for collaborative efforts between academic institutions, national societies, and governmental entities to gather solid evidence on disease burden, improve awareness, institute affordable preventive strategies at the public health level, and make effective therapies readily available for people at high risk of osteoporosis and fractures. Such a concerted approach is the only means to effectively close the current (wide) care gap between this region and Western Europe and to achieve a significant impact on this silent, but highly costly disease.

FIGURE 1 Total Femur BMD (g/cm²) distribution by 10-years age groups in men (left panel) and women (right panel) across various countries in Eastern Mediterranean Region.



□ Value verified as reported in the original article.

* In the study of Salehi et al, the lowest density of total femur and the femoral neck region was reported as femur BMD.

Data from studies using DPX-Lunar densitometers. The NHANES database was derived from Lunar manufacturers. Using the same DXA technology and manufacturer the Figure shows BMD at the total femur (hip) in various populations from Middle East to be comparable or slightly lower than values reported for the universal standard NHANES database.

KEY FINDINGS IN MIDDLE EAST AND AFRICA IN 2011

HIGH FRACTURE RATES THROUGHOUT THE REGION AND MAJOR INCREASES PREDICTED BY 2050

- Predicted demographic explosion (subjects over age 50 will account for 25% of the population in 2020 and 40% in 2050) and the anticipated secular trends with increased urbanization throughout the region, account for the *highest projected proportional increase in hip fracture rates compared with many other regions worldwide*.
- Approximately 1.6 million hip fractures occur worldwide each year, by 2050 this number could triple or quadruple and reach between 4.5 and 6.3 million¹.
- Iran accounts for 0.85% of the global burden of hip fractures and 12.4% of the burden of hip fractures in the Middle East².
- National Hip Fracture Registry data, established by the Ministry of Health in Lebanon in 2006, show that the number of hip fractures in individuals over the age of 50 averages 1200-1400 per year. It is anticipated that these numbers may quadruple and that crude incidence rates/100,000 will almost double by 2050.
- Currently, it is estimated that there are 1008 hip fractures per year in Jordan, however based on the First Jordanian Hip Fracture Survey (2008), this number will quadruple by 2050.
- In Syria, there are approximately 4000 hip fractures per year with this number set to increase to 5500 by 2020 and as much as 15 000 to 20 000 cases by 2050.
- In Turkey more than 24 000 hip fractures occurred annually in men and women aged 50 years and over in 2010, and 36,000 are projected for 2020.
- In Saudi Arabia, it is estimated that the yearly number of hip fractures above age 50 years in 2010 was 9000³.
- In Iran, there were 50 000 hip fractures in 2010, and 62 000 are projected for 2020.

OSTEOPOROSIS - A NEGLECTED DISEASE

- Economic development has resulted in rapid socioeconomic changes in countries of the audit and non-communicable diseases have become the leading cause of mortality and morbidity.
- The 2010 WHO Global Status report underscored the importance of several non-communicable diseases, including cardiovascular diseases, diabetes mellitus, obesity, cancer and chronic obstructive pulmonary diseases, but osteoporosis was noticeably omitted. In Turkey, diabetes mellitus and chronic obstructive pulmonary diseases have higher importance than osteoporosis.
- The level of awareness among primary health care professionals is estimated as poor to medium in many countries.
- Allied Health Professionals are in general ill-equipped to take care of patients with osteoporosis in many countries.
- The level of awareness in certain specialties, most often endocrinology, rheumatology, and sometimes orthopaedics and obstetrics/gynecology, is estimated as medium to good in Jordan, Iran, Iraq, Lebanon, Morocco, Palestine, Syria, Turkey and United Arab Emirates.
- Osteoporosis is not integrated in the medical school curricula in most countries with the exception of Lebanon and Morocco.
- In Kenya, health care professional awareness about the disease is low. Most practitioners, except orthopaedists, who are well trained, are poorly equipped and trained to diagnose and treat osteoporosis.

COMPETITION WITH INFECTIOUS DISEASES

- Governments, donors and the WHO in the region have traditionally focused attention and allocated resources to fighting HIV and AIDS and other infectious diseases.

- Tuberculosis has plagued human kind for thousands of years, and although the first anti-tuberculosis drugs were discovered over 60 years ago, tuberculosis still kills 1.7 million persons per year⁴.
- Mortality incurred post-hip fracture is projected at 1.4 to 2 million deaths per year in 2050, yet this rising tide is still largely unrecognized.
- For instance, there is an urgent need in South Africa and many other countries in the region to establish accurate and specific prevalence and fracture statistics to enable societies to lobby successfully for policy change.
- In countries where diseases like HIV and AIDS, tuberculosis, and malnutrition are rife and currently responsible for the most deaths, osteoporosis still has a long way to go before being recognized as a serious disease.
- While the central operation for global tuberculosis control is led by the WHO, osteoporosis is not even mentioned in its 2010 Global Status report on-communicable diseases.

VITAMIN D DEFICIENCY

- Despite ample sunshine, the Middle East (15°-36°N) and Africa (35°S-37°N), register the highest rates of rickets worldwide.
- The prevalence of hypovitaminosis D has been estimated to range between 50-90% in most countries and across age groups, depending on the threshold chosen.
- Consistent predictors of low levels of 25(OH)-vitamin D are older age, female gender, multi-parity, the season, conservative clothing style, low socioeconomic status and urban living.
- Vitamin D levels are lowest in the summer in some gulf countries due to the scorching heat during that season which keeps people indoors.
- International recommendations and guidelines regarding desirable doses and levels may not readily apply to populations from the region.

FRACTURES REPRESENT A HUGE PERSONAL, SOCIAL AND ECONOMIC BURDEN IN ALL COUNTRIES

- Mortality rates post-hip fracture may be higher in this region than those reported from western populations. While such rates vary between 25-35 % in western populations, they are 2-3 fold higher in populations from this region, as discussed in a recent review⁵.
- Indeed, in a retrospective chart review of 274 patients admitted with an osteoporotic hip fracture to a tertiary referral centre, between 1992 and 2002, in Beirut, Lebanon, the mortality rate in a subset of the original cohort was 47% overall, 73% in males and 28% in females ($p < 0.0001$); 70% of those who died did so within the first year⁶.
- Mortality was documented in two other case-series. One from Turkey included 92 hip fracture patients (56 females, 36 males) who were operated on with a 36 month follow-up, and reported a 3-year mortality rate of 61% in females and 50% in males⁷. Another retrospective study from Saudi Arabia reported an average 2-year mortality rate of 27%⁸.
- Several countries reported loss of productivity post-hip fractures ranging from 3-6 months. One study from Lebanon reported that 80% of patients with a hip fracture will ultimately regain normal walking.
- Information on social costs and quality of life was practically non-existent.

DEARTH OF DATA

- There is an extreme lack of solid epidemiological data throughout the region. If available it is often non-population based, and the grade of the evidence would, at best, be fair for most. Examples are Egypt, Bahrain and UAE.
- Published data on incidence rates for hip fractures are only available for six countries: Iran, Kuwait, Saudi Arabia, Lebanon, Morocco, and Turkey. Additional non-published data on hip fractures were provided for Jordan and Syria. Prevalence rates for morphometric vertebral fractures are only available in three countries, Lebanon, Morocco and Egypt, and information on morphometric vertebral fracture incidence from only one study from Lebanon.

- The FRAX® calculator (WHO Fracture Risk Assessment Tool) is only available for Jordan, Lebanon, Tunisia and Turkey.

LIMITED ACCESS TO DIAGNOSTIC TOOLS

- Most countries in the audit have limited numbers of DXA machines.
- For example in Iraq the distribution of DXA machines is 0.5 per million and in Morocco it is 0.6 per million.
- In contrast, Turkey and the United Arab Emirates have > 10 DXA machines per million, and in Lebanon the number almost reaches 20 per million population, if only FDA approved DXAs are taken into consideration.
- For comparison, in Europe approximately 60% of member states have at least 10.6 DXA machines per million population (the recommended number for Europe) according to a 2008 report. In China there are only 0.3 per million.
- In many countries DXAs are generally only available in urban areas. For example in Morocco, Syria, Egypt and Bahrain, DXA machines are available mainly in the big cities and private clinics, thereby placing DXA beyond the reach of a large proportion of the population.

EDUCATION AND LIFE STYLE - PREVENTION PROGRAMMES

- Of the three regional audits recently conducted by IOF (Asia; Eastern Europe & Central Asia; Middle East & Africa) the Middle East and African region has by far the youngest population. The challenge is to stimulate such a young audience and to conduct effective education programmes to increase general public awareness of the problem.
- In many countries in the audit no general education or lifestyle programmes are carried out, such as in Egypt, Morocco and Jordan.
- In Kenya and Iran, there are however government public awareness programmes regarding prevention, diagnosis and management of osteoporosis and fragility fractures.

- There is generally a low level of osteoporosis awareness in the countries included in this audit. For example awareness is especially low among the Moroccan population and in postmenopausal Palestinian women. The low awareness level among the latter group is linked to a low level of education, infrequent contact with health services, large family size and poor economic conditions.

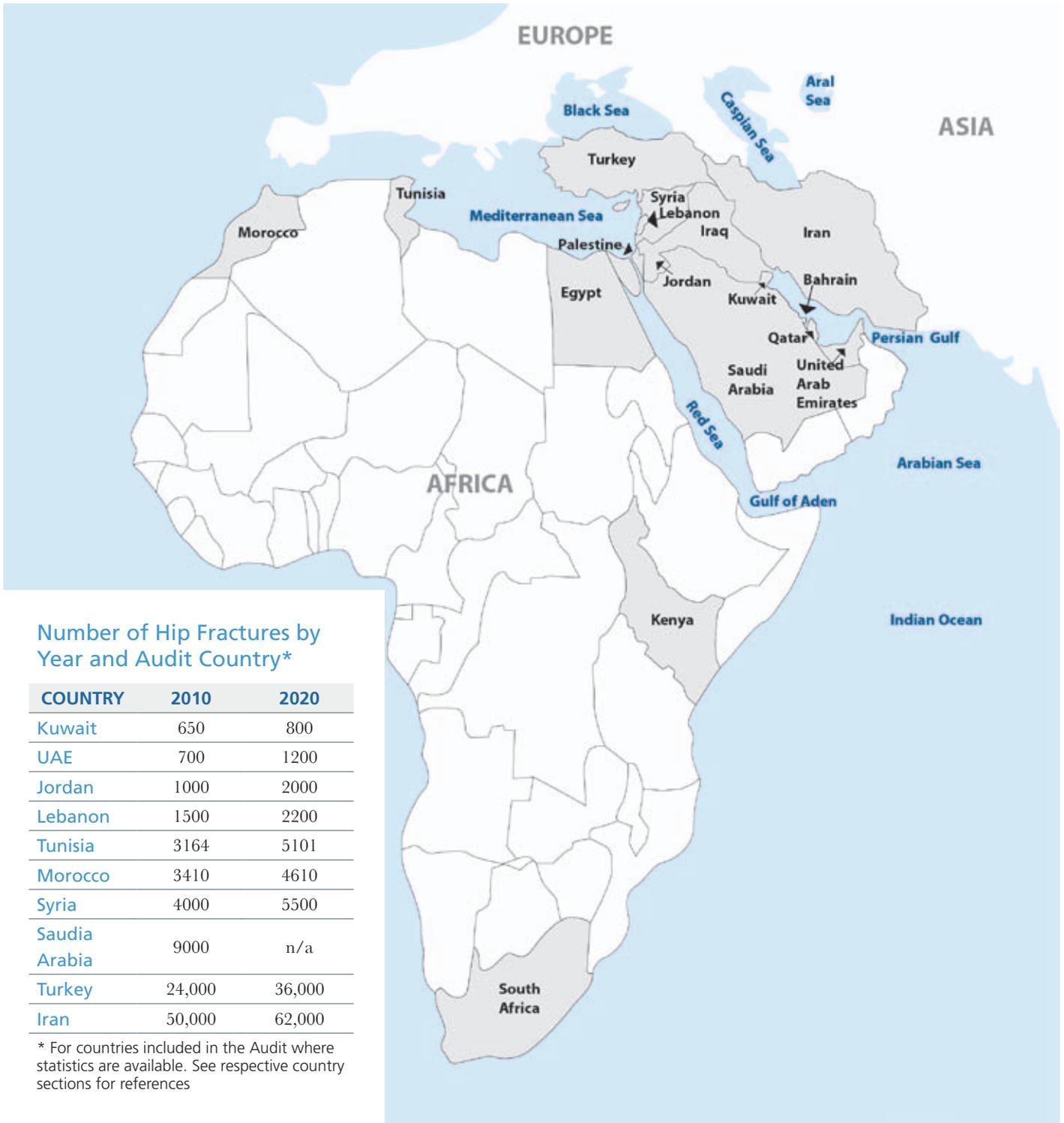
GUIDELINES, GOVERNMENT ENDORSEMENT AND GOVERNMENT POLICY

- Osteoporosis is considered a health priority in only 3 out of the 17 countries included in this audit (Iran, Iraq and Jordan).
- National Osteoporosis guidelines are reported to be available in five countries: Egypt, Iran, Iraq, Lebanon and South Africa. Such guidelines are officially endorsed by the Ministry of Health, pending endorsement in Iran, and to be endorsed by the government in Iraq.

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THE AUDIT REGION



Number of Hip Fractures by Year and Audit Country*

COUNTRY	2010	2020
Kuwait	650	800
UAE	700	1200
Jordan	1000	2000
Lebanon	1500	2200
Tunisia	3164	5101
Morocco	3410	4610
Syria	4000	5500
Saudia Arabia	9000	n/a
Turkey	24,000	36,000
Iran	50,000	62,000

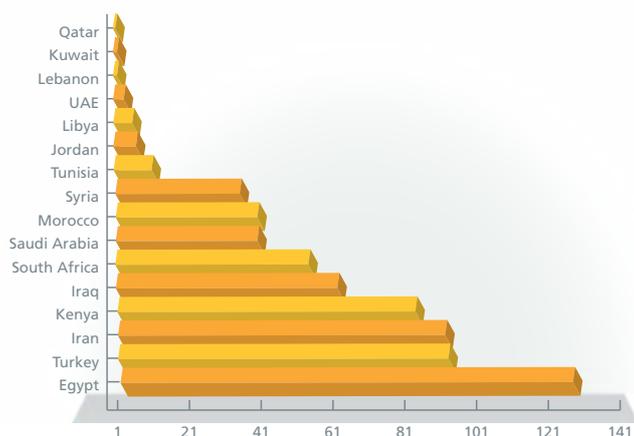
* For countries included in the Audit where statistics are available. See respective country sections for references

KEY COMPARISONS

DEMOGRAPHIC DATA

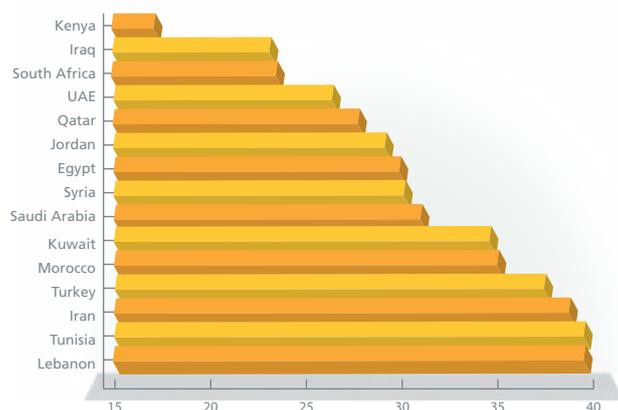
It is projected that by 2050, Egypt will have the largest population in the region with close to 130 million inhabitants, which represents a 50% increase compared to its current population and more than 30% of its population will be aged 50 years and over (fig. 1). In Lebanon, Iran and Tunisia, nearly 40% of the population will be 50 years old and over, compared to 20% today in Tunisia and Lebanon and 15% in Iran.

FIGURE 1 Total Population by Country in 2050



REF World Bank Projections

FIGURE 2 Percent Population over 50 years by Country in 2050



REF World Bank Projections

TABLE 1A Population Projections: Middle East in 2010, 2020 and 2050

COUNTRY	PERCENTAGE OF POPULATION > 50 YEARS		
	2010	2020	2050
Bahrain	10.3%	17.4%	32.9%
Iran	14.9%	19.3%	39.8%
Iraq	10.2%	12.2%	23.8%
Jordan	10.7%	13.9%	29.8%
KSA	10.6%	16.3%	31.5%
Kuwait	11.3%	18.6%	35.4%
Lebanon	19.8%	24.3%	40.0%
Qatar	8.5%	10.0%	28.7%
Syria	10.4%	13.6%	30.5%
Turkey	17.8%	22.4%	37.5%
UAE	8.4%	13.0%	27.3%
RANGE	8.4 - 19.8%	10.0 - 24.3%	23.8 - 40.0%

REF <http://www.worldbank.org> 3-2011

TABLE 1B Population Projections: Africa in 2010, 2020 and 2050

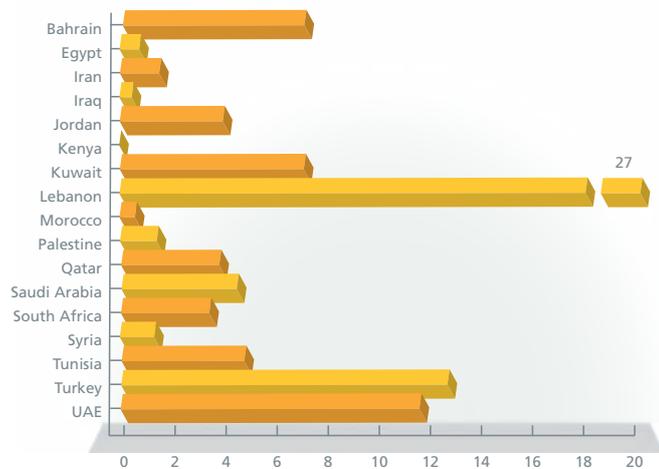
COUNTRY	PERCENTAGE OF POPULATION > 50 YEARS		
	2010	2020	2050
Algeria	14.3%	19.0%	36.3%
Egypt	14.9%	17.4%	30.3%
Kenya	8.8%	9.5%	17.3%
Libya	13.7%	17.7%	32.0%
Morocco	16.9%	20.6%	35.8%
South Africa	15.3%	17.3%	24.1%
Tunisia	19.3%	23.5%	40.0%
RANGE	8.8 - 19.3%	9.5 - 23.5%	17.3 - 40.0%

REF <http://www.worldbank.org> 3-2011

DIAGNOSTIC TOOLS AND COSTS

Bone mineral density (BMD) measured by dual-energy X-ray absorptiometry (DXA) is the standard diagnostic technique for diagnosing osteoporosis. DXA technology is relatively expensive and it is not widely available in most of the Middle East and African countries listed

FIGURE 3 Number of DXA Machines per Million Population in the Middle East and Africa



SOURCE Kanis JA, data on file, 2010 and data supplied by IOF societies
NOTE The DXA instrument count may include Hologic, Norland, and Lunar DXA machines in addition to other non-FDA approved densitometers.

TABLE 2 Cost of DXA in the Observed Countries

COUNTRY	GROSS NATIONAL INCOME PER CAPITA (USD) 2010 UN Data	MONTHLY INCOME (USD)	COST OF DXA (USD)*
Bahrain	26,663.90	2221.99	n/a
Egypt	5889.20	490.77	50
Iran	11,764.20	980.35	48.5
Iraq	n/a	n/a	60
Jordan	5956.00	496.33	70
Kuwait	55,718.60	4643.22	50
Lebanon	13,474.60	1122.88	20-170**
Morocco	4627.60	385.63	100
Palestine	n/a	n/a	25
Qatar	79,426.60	6618.88	n/a
Saudi Arabia	24,726.30	2060.53	n/a
South Africa	9812.10	817.68	130
Syria	4759.90	396.66	50
Tunisia	7979.30	664.94	40
Turkey	13,359.20	1113.27	50
UAE	58,005.80	4833.82	100-200

* Cost is per test that usually covers more than one site (for eg. spine and hip)

**Median cost for a 3 site scan 52 USD based on information provided by 70 centres that operate FDA approved densitometers (Lunar, Hologic and Norland).

in this audit. In Europe¹, the generally recommended number of DXA scanners per million population is 11.

COST OF DXA SCANNING IN THE OBSERVED COUNTRIES

Cost of DXA (table 2) varies widely from place to place and must be compared with the average income in each country. For example, in South Africa, the average monthly income per person is approximately USD 450 (2008). Thus USD 130 for a DXA scan represents almost 1/3 of the monthly income with most having to bear the cost themselves.

DENSITOMETRY TRAINING COURSES

Both IOF and the International Society for Clinical Densitometry (ISCD) have conducted several certified densitometry training courses in the region, since 2000. Cumulatively, IOF has certified over 230 individuals in the region and the ISCD, over 100. It should be noted that all IOF training courses have been organized by PAOS CNS societies. Going forward, IOF and ISCD have joined forces in an official global collaboration to develop a new international training course which will set new standards in education in the diagnosis and management of osteoporosis.

TREATMENTS

TABLE 3 Treatments available for osteoporosis per country

COUNTRY	BISPHOSPHONATES	HORMONE REPLACEMENT THERAPY	SERMs*	STRONTIUM RANELATE	CALCITONIN	PTH ANALOG
Bahrain	n/a	n/a	n/a	✓	n/a	n/a
Egypt	✓	✓	✓	✓	✓	✓
Iran	✓	✓	✓	no	✓	✓
Iraq	✓	✓	✓	no	✓	no
Jordan	✓	✓	✓	✓	✓	no
Kenya	✓	✓	✓	✓	✓	n/a
Kuwait	✓	✓	✓	✓	✓	✓
Lebanon	✓	✓	✓	✓	✓	✓
Morocco	✓	✓	no	✓	✓	✓
Palestine	✓	✓	✓	no	✓	✓
Qatar	n/a	n/a	n/a	✓	n/a	n/a
Saudi Arabia	✓	✓	✓	✓	✓	n/a
South Africa	✓	✓	✓	✓	✓	✓
Syria	✓	✓	✓	✓	✓	no
Tunisia	✓	✓	✓	✓	no	no
Turkey	✓	✓	✓	✓	✓	✓
UAE	✓	✓	✓	✓	✓	✓

n/a Information not available

*SERM Selective Estrogen Receptor Modulator



GOVERNMENT POLICY, GUIDELINES AND NATIONAL HEALTH PRIORITY

The table below summarizes where osteoporosis is a designated national health priority and where osteoporosis guidelines have been developed and/or endorsed by government.

TABLE 4

COUNTRY	OSTEOPOROSIS IS A HEALTH PRIORITY	OSTEOPOROSIS GUIDELINES	GUIDELINES GOVERNMENT ENDORSED
*Bahrain			
*Egypt		✓	
*Iran	✓	✓	in process
*Iraq	✓	✓	✓
*Jordan	✓		
Kenya			
*Kuwait			
*Lebanon		✓	✓
Morocco			
*Palestine			
Qatar			
*Saudi Arabia			
South Africa		✓	in process
*Syria			
*Tunisia			
Turkey	in process		
UAE			

*Representatives from osteoporosis societies and experts from these countries published a review and recommendations on osteoporosis: Maalouf G, Gannagé-Yared MH, Ezzedine J, Larijani B, Badawi S, Rached A, Zakraoui L, Masri B, Azar E, Saba E, Nammari R, Adib G, Abou Samra H, Alrawi Z, Salman S, El Muntasser K, TarseenR, El Kharousi W, Al-Lamki M, Alothman AN, Almarzook N, El Dessouki M, Sulaimani R, Saleh J, Suhaili AR, Khan A, Delmas P, Seeman E (2007) *The Middle-East and North Africa Consensus on Osteoporosis*. J Musculoskelet Neuronal Interact 7(2): 131-143

NOTE The criteria to identify osteoporosis as a health priority in the countries involved in this audit were not established a priori, thus the affirmative statements are, for the most part, based on expert opinion.

REIMBURSEMENT POLICY

Some countries have a very good reimbursement policy for diagnostic tools and therapies while in other countries there is absolutely no reimbursement available and patients have to pay for all diagnostic tests and treatment.

TABLE 5 Reimbursement Policy by Country

COUNTRY	PUBLIC	PRIVATE
Bahrain	n/a	n/a
Egypt	n/a	n/a
Iran	For DXA 70 % of the money is reimbursed by governmental insurances, some companies reimburse only if the prescription is written by an endocrinologist, rheumatologist or nephrologist. For treatment the government covers the price of all Iranian made drugs for osteoporosis with the exception of PTH analogues.	For DXA 100% is reimbursed. Private insurances pay for all Iranian-made medications.
Iraq	Exams and treatments are reimbursed.	
Jordan	Exams and treatments are reimbursed.	Most exams and treatments are reimbursed.
Kenya	No reimbursement.	yes
Kuwait	Exams & treatment are reimbursed for nationals.	With minimum charge for expatriates.
Lebanon	Exams and treatments are reimbursed 80-100%, if justification is provided.	Exams and treatments are reimbursed depending on specific insurance plan provisions, usually with additional premium coverage for medications.
Morocco	Diagnostics are reimbursed for patients with health coverage and without restrictions. The available drugs are reimbursed for patients with health coverage without any restriction.	Rates and reimbursement restrictions differ by type of private insurance. The available drugs are reimbursed by private insurances, but with different rates of reimbursement (70-98%) and after the first fracture for some.
Palestine	n/a	n/a
Qatar	n/a	n/a
Saudi Arabia	n/a	n/a
South Africa	No reimbursement.	Reimbursement in case of severe osteopenia, osteoporosis, fragility fractures, presence of risk factors and patients on higher-end plans.
Syria	Partially for State employees.	Recently exams and locally produced drugs are reimbursed.
Tunisia	Osteoporosis treatments reimbursed. Diagnosis exams are not reimbursed.	Exams and treatments are reimbursed.
Turkey	There is no restriction for annual DXA reimbursement, whereas treatment is covered according to reimbursement rules.	Rules for DXA and treatment are same as those followed by government.
UAE	Reimbursement for UAE nationals/no restriction.	Usually reimbursement for most expatriates/no restriction.

REF Kanis JA, Johnell O (2005) Requirements for DXA for the management of osteoporosis in Europe. Osteoporos Int 16: 229-238

VITAMIN D STATUS IN MIDDLE EAST AND AFRICA

Despite ample sunshine, the Middle East (15°-36°N) and Africa (35°S-37°N) register the highest rates of rickets worldwide. This is in large part explained by limited sun exposure due to cultural practices, multiparity and prolonged breastfeeding without vitamin D supplementation in the Middle East¹, and by dark skin colour and calcium deficiency, rather than vitamin D deficiency, in several countries in Africa². However, both regions also have a high prevalence for hypovitaminosis D. Hypovitaminosis D is very common in this region and does not spare the paediatric age^{3,4}. A large proportion of adolescent girls, up to 70% in Iran⁵ and 80% in Saudi Arabia⁶, had 25(OH)-vitamin D [25(OH)D] levels below 25 nmol/L. The reported proportions were 32% in Lebanese girls and between 9% and 12% in Lebanese adolescent boys^{7,8}. Diarrhoea and maternal vitamin D status in infants^{9,10} and gender, clothing style, season, and socioeconomic status in older children were independent risk factors for 25(OH)D levels^{5-7,11}. Several were also predictors for calcium and vitamin D intake¹².

The FiJoNOR survey in Jordan (2004-2005), from a national sample of 821 females age 20-89, showed that 50.3% were insufficient in vitamin D (25-OHD level < 50nmol/L) and 33.3% were deficient (25-OHD level < 25 nmol/L)¹³.

The first study in adults from the region was conducted in university students and elderly from Saudi Arabia and revealed a mean 25(OH)D level ranging between 10 and 30 nmol/L¹⁴. The mean 25(OH)D level was near 25 nmol/L in Lebanese, Saudi, Emirati, and Iranian women¹⁵⁻¹⁸. A similar mean was recorded in elderly Lebanese¹⁹. The proportion of subjects with vitamin D levels below specific cut-offs varied. It was between 60% and 65% in Lebanon, Jordan, and Iran^{15, 20, 21}; and was 48% for a cut-off less than 37.5 nmol/L in subjects from Tunisia²². In the elderly Lebanese, 37% of men and 56% of women had vitamin D levels below 25 nmol/L. In a similar international study conducted in women with osteoporosis, the highest proportion of hypovitaminosis D was noted in the Middle East. Inadequate vitamin D intake, urban dwelling, female gender, wearing the veil, winter season, age, and high parity were independent predictors of low vitamin D levels^{16, 20-22}. Neonates

born to mothers with low vitamin D levels have lower cord vitamin D levels and may be at risk for rickets and other complications^{3, 25}. Studies from Saudi Arabia, Kuwait, United Arab Emirates, and Iran reveal that 10–60% of mothers and 40–80% of their neonates had undetectable low vitamin D levels (0–25 nmol/L) at delivery²⁶⁻²⁹. Neonatal outcomes were not detailed in most studies. Higher socioeconomic status, antenatal care, and vitamin D intake were associated with higher vitamin D levels²⁹.

The negative impact of low vitamin D on mineral metabolism is illustrated in the inverse relationship between vitamin D and PTH levels noted in Lebanese of all age groups and in Emirati and Iranian women ($R = -0.2-0.25$)^{18, 30, 31}. A positive correlation between 25(OH)D and spine, but not hip BMD (Z-score) was noted in postmenopausal Iranian women³². Similar correlations were noted in elderly Lebanese with spine, hip, and forearm BMD ($R = 0.13-0.3$) but were not present after adjustment for age, height, lean mass, and PTH levels [102], consistent with findings in Iranian women³⁰.

Neonatal size or bone mass may be affected by maternal vitamin D status³. No effect of maternal vitamin D levels on neonatal birth weight was detected in a sample of 50 mothers- neonates from Iran after adjusting for maternal height, age, and parity²⁶. Conversely, in a larger sample of 449 women and their newborns from Tehran, neonates of mothers with adequate calcium and vitamin D intake were 0.9 cm taller and had a better Apgar at birth³³. Vitamin D supplementation for 1 year increased lean mass, bone area, and bone mass in a randomised controlled trial in Lebanese adolescent girls⁸.

In summary, vitamin D levels were quite low across all age groups in this region. Consistent predictors of low levels were;

- Older age
- Female gender
- Multi-parity
- The winter season, except in countries in the Gulf of Arabia, where an inverse pattern was reported and was explained by reduced outdoor activity as a result of the scorching heat in summer months.

- Conservative clothing style
- Low socioeconomic status and urban living

The negative impact of low vitamin D levels on indices of mineral bone metabolism and the clear improvement in musculoskeletal parameters with vitamin D replacement in the study of Lebanese adolescents are consistent with observations worldwide, albeit usually made in adults, and support recommendations to optimize vitamin D status in populations from the region. These findings are

also consistent with recent recommendations from IOF and the Institute of Medicine (US). However, it is unlikely that recommendations tailored to western populations necessarily apply unchanged to populations from this region.

Adapted from Mithal A., Wahl D.A., Bonjour J-P et al. on behalf of the IOF Committee of Scientific Advisors (CSA). Nutrition Working Group. (2009) Global vitamin D status and determinants of hypovitaminosis D. Osteoporos Int 20:1807-1820.

TABLE 1 Prevalence of hypovitaminosis D by country in children in the Middle East and North Africa

AUTHOR	YEAR	COUNTRY - CITY	LATITUDE	N	GENDER	AGE (YRS) MEAN±SD RANGE	25-OHD (ng/ml)			PREDICTORS	COMMENTS
							MEAN± SD	% < 10-12	% BETWEEN 10-20		
El-Hajj Fuleihan	2001	Lebanon- Beirut	33°N	346	81 boys	13.3 ± 1.6	Boys: 19±7	Boys: 9%	Boys: 46%	Gender Season SES	Children selected 3 schools of different SES
					88 girls		Girls: 15±8	Girls: 32%	Girls: 42%		
					83 boys 94 girls	13.3 ± 1.7	Boys: 24±6 Girls: 19±7 All: 22±7	Boys: 0% Girls: 8% All: 4%	Boys: 25% Girls: 46% All: 36%	Clothing	
Bahijri	2001	Saudi Arabia- Jeddah	21 °N	935	-	4-72 months	• 4-6mon: 26.2±14.1 • 6-12mon: 24.9±14.1 • 12-24mon: 24.6±14 • 24-36mon: 6.7±11.3 • 36-72mon: 4.2±11.5	Between 5-10 ng/ml • 4-6mon: 14% • 6-12mon: 13% • 12-24mon: 14% • 24-36mon: 4% • 36-72mon: 8%		Episodes of diarrhea Dietary intake of vitamin D Sun exposure	Random selection covering all districts and all SES
Moussavi	2005	Iran- Isfahan	32° N	318	153 boys 165 girls	14-18	Boys: 37.3±18.8 Girls: 16.8±8.4	< 20 ng/ml Boys: 18% Girls: 72%		Gender Sun exposure	Cross-sectional, multistage random selection from schools
Dahifar	2006	Iran- Tehran	35° N	414	Girls	11-15	All: 30	All: 3.6%	-	Ca intake Sun exposure	Cross-sectional, random selection from schools
El-Hajj Fuleihan	2006	Lebanon- Beirut	33° N	363	184 boys 179 girls	10-17	All: 16±9	Boys: 12% Girls: 33%	Boys: 66% Girls: 51%	Gender Winter	Convenience sample, from 4 schools, balanced geographical and socioeconomic presentation
Siddiqui	2007	Saudi Arabia- Jeddah	21° N	433	Girls	12-15	-	All: 81%	-	Family income Sun exposure Intake of dairy products	Randomly selected from different schools

*25-OHD IS EXPRESSED IN NMOL/L UNLESS MENTIONED OTHERWISE. THE CONVERSION FROM NMOL/L TO NG/ML IS TO DIVIDE BY 2.496.

REF El-Hajj Fuleihan G. (2009) Vitamin D Deficiency in the Middle East and its Health Consequences. Clinical Reviews in Bone and Mineral Metabolism 7:77-93

TABLE 2 Prevalence of hypovitaminosis D by country in adults in the Middle East and North Africa

AUTHOR	YEAR	COUNTRY - CITY	LATITUDE	N	GENDER	AGE (YRS) MEAN±SD RANGE	25-OHD (ng/ml)			PREDICTORS	COMMENTS
							MEAN± SD	% < 10-12	% BETWEEN 10-20		
El-Sonbaty	1996	Kuwait-Kuwait city	29° N	72	Women: 50 veiled 22 unveiled	14-45	Veiled: 5.8±2 Unveiled: 12±3.3	<8 ng/ml Veiled: 86%	Veiling	Case-control study, convenience sampling	
El-Hajj Fuleihan	1999	Lebanon-Beirut	33° N	465	Women	15-60	All: 11±14	All: 60% All: 35%	Veiling	Random sample from a village in central Lebanon	
Ghannam	1999	Saudi Arabia-Riyadh	24° N	321	Women	10 ->50	All: 10 ±8	All: 52% -	Lactation Parity	Cohort, convenience sampling through advertisements	
Gannage	2000	Lebanon-Beirut	33° N	310	99 men 217 women	30-50	Men: 14.3±7.5 Women: 7.6±5.8 All: 9.7±7.1	<12 ng/ml Men: 48% Women: 84% <5 ng/ml Men: 41% Veiled: 62%	Vitamin D intake Urban dwelling Veiling High parity	Convenience sampling, from different rural and urban centers	
Mishal	2001	Jordan-Amman	31° N	146	22 men 124 women	18-45	Summer Men: 43.8±5.2 Women by dress style: • Western: 36.7±6.1 • Hijab: 28.3±4.5 • Niqab: 24.3±5.8 Winter Men: 34.7±4.2 Women by dress style: • Western: 30.9±4.6 • Hijab: 24.4±3.9 • Niqab: 22.7±3.0	5- 12 ng/ml Summer Men: 18% Women by dress style: • Western: 31% • Hijab: 55% • Niqab: 75% Winter Men: 46% Women by dress style: • Western: 75% • Hijab: 71% • Niqab: 82%	Dress style Winter	Convenience sampling	
Mirsacid	2004	Iran-Tehran	35° N	1172	682 men 490 women	3-69	Men: 35±26 Women: 21±22	< 20 ng/ml Men: 35% Women: 69%	Season	Cluster random sample. More variation than the women	
Meddeb	2005	Tunisia-Tunis	36° N	389	128 men 261 women	20-60	Veiled: 14 Non-veiled: 17	< 15 ng/ml All: 47% Veiled: 70% Non-veiled: 50%	Age Veiling Parity Menopause Winter	Transverse descriptive inquiry	
Hashemipour	2006	Iran - Tehran	35° N	1210	495 men 715 women	20-69	All: 13±16.5	< 5ng/ml All: 9% 5-10 ng/ml All: 56%	Gender Season	Randomized clustered sampling from the Tehran population	
Saadi	2006	UAE- Al Ain	24° N	259	Women	20-85	All: 10.1±4.3	<8ng/ml Premenopausal: 39%	Season (low in summer due to avoidance of heat)	Subjects recruited through advertisements. All had low vitamin D levels	
Arabi	2006	Lebanon-Beirut	33° N	443	157 men 286 women	65-85	Median Men: 11.3 Women: 9.6	Men: 37% Women: 56% Men: 57% Women: 39%	Gender	Randomly recruited based on geographical maps	
Hosseinpanah	2008	Iran-Tehran	35° N	245	PM women	40-80	All: 29.2±24.9	All: 5% All: 38%	Menopause	Cross-sectional, random sampling	

*25-OHD IS EXPRESSED IN NMOL/L UNLESS MENTIONED OTHERWISE. THE CONVERSION FROM NMOL/L TO NG/ML IS TO DIVIDE BY 2.496.

REF El-Hajj Fuleihan G. (2009) Vitamin D Deficiency in the Middle East and its Health Consequences. Clinical Reviews in Bone and Mineral Metabolism 7:77-93.

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BAHRAIN

OVERVIEW

Economic development in Bahrain has resulted in rapid socioeconomic changes in the Bahraini population and non-communicable diseases have become the leading cause of mortality and morbidity. Furthermore, the number of people over 60 years of age is increasing rapidly with osteoporosis and subsequent fragility fractures becoming a serious problem in the population.

The Bahrain Osteoporosis Society (BOS) has been active since 2000. BOS strives to provide information and support for people with osteoporosis, promote education for the public and health professionals, lobby Government and Health Authorities for policy change and encourage funding for research into osteoporosis prevention and treatment.

BOS is dedicated to reducing the incidence of osteoporosis and promoting bone health. BOS provides information to the public and health professionals on all aspects of the disease and offers support to people with osteoporosis and those at risk of fracture.

FIGURE 1 Population projection for Bahrain until 2050



REF US Census Bureau

BOS has held several successful awareness campaigns for the general public over the past decade as well as providing ultrasound testing, medical counseling and advice. An Osteoporosis Diagnostic Course was organized in Bahrain in February 2010, which was a phenomenal success, drawing 220 participants from across the region.

KEY FINDINGS

The present population in Bahrain is estimated to be 1.2 million. Of this, 12% is 50 years of age or over and 1.5% is 70 or over. By 2050, it is estimated that 27% of the population will be 50 or over and 8% will be 70 or over while the total population will increase to 1.8 million (fig 1).

By 2025, it is projected that the demand for treatment regarding musculoskeletal diseases will increase by 162% in Bahrain¹.

EPIDEMIOLOGY

A study was conducted in 2007 in five randomly selected primary health care centres in Bahrain, to test the association between edentulism (tooth loss) and osteoporosis. A sample of 170 postmenopausal Bahraini women was recruited and bone density measured using ultrasound. It was observed that only 21.7% of the women who participated in the study had normal bone density: 51.2% had osteopenia and 27.1% had osteoporosis².

Hip fracture

No available information.

Vertebral fracture, other fragility fractures

No available information.

DIAGNOSIS

No available information.

REIMBURSEMENT POLICY

Like all other health services, Bahrainis are in principle covered for all prescription drugs dispensed or administered in public facilities, provided they are included in the Drug Formulary 33 and are prescribed by an authorized prescriber. Within the public sector, patients may choose to use branded drugs or products not listed in the public sector formulary. Consequently, patients will pay the full price of these products. Another occasion that would require patient's payment for pharmaceutical product is out of stock items. Occasionally the public hospitals run out of certain drugs. Accordingly the patient is given the choice of waiting for official supply procedures or purchasing and personally supplying the drug(s). Unless covered by a voluntary health insurance plan that pays for drugs, patients bear the full cost of pharmaceuticals purchased from retail pharmacies and non-retail providers. Voluntary private health insurance plans tend to act as a 'passive bill payer', typically reimbursing plan members (who normally must pay out of their own pocket first and then seek reimbursement) for the cost of prescribed medicine. However, certain plans require the beneficiary cost sharing in pharmaceutical cost.

CALCIUM AND VITAMIN D

In 2002, around 80% of males and 70% of females achieved the UK Reference Nutrient Intakes for calcium intake³. Current WHO recommendations are 1000 mg per day for men aged between 19 to 65, and 1300 mg aged over 65. In women, recommendations are 1000mg per day if aged between 19 and the menopause and 1300 mg for postmenopausal women.

TABLE 1 Calcium intake in the adult Bahrainis population in 2002

	MALE		FEMALE	
	19-50 YEARS	OVER 50 YEARS	19-50 YEARS	OVER 50 YEARS
Calcium (mg)	588	589	498	488

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EGYPT

OVERVIEW

The Egyptian Osteoporosis Prevention Society (EOPS) was founded in 1999. The main objective of the society is to deliver awareness and prevention programmes for public and patients, by arranging sessions, educational support, and public events. As well physician education is carried out through annual meetings and workshops providing up-dates of diagnosis and treatment of osteoporosis and osteoarthritis.

In 2010 EOPS provided education programmes to junior physicians, including information on the latest and most useful facts on osteoporosis. The second course also covered:

- Osteoporosis In Children and Adolescents
- Bone Markers
- Bone Densitometry: The ideal detector for osteoporosis
- Glucocorticoid-Induced Osteoporosis

EOPS is currently involved in a large project – Prevalence of Osteoporosis Among the Egyptian Population - targeting a specific age group. As well, two other studies are in progress - Osteoporotic Hip Fractures, and Prevalence of Osteoarthritis and Osteoporosis in Rheumatoid Patients.

FIGURE 1 Population projection for Egypt until 2050



REF US Census Bureau

Furthermore, EOPS provides targeted suburban awareness programmes with recent sessions at Menia, and Luxor. As part of a three-year activity plan, these events will continue throughout Egypt's five main government areas. The EOPS website, www.egyptianops.org, was re-launched two years ago, with regular updates planned.

KEY FINDINGS

The present population in Egypt is estimated to be 80 million, of this 15% (12 million) is 50 years of age or over and 2.5% (2 million) is 70 or over. By 2050, it is estimated that 29% (40 million) of the population will be 50 or over and 8.4% (11 million) will be 70 or over while the total population will increase to 138 million (fig 1).

EPIDEMIOLOGY

Osteoporosis is a very old disease, as it was already present in ancient Egyptians (2687-2191 BC)! Zaki et al examined 74 skeletons and performed a DXA scan on these ancient Egyptians.

TABLE 1 Osteoporosis and osteopenia prevalence in ancient Egyptians¹

	OSTEOPENIA (%)	OSTEOPOROSIS (%)
Males (n=43)	18.6	9.3
Females (n=31)	22.5	16.1

In modern Egypt, based on different studies, it has been calculated that 53.9% of postmenopausal women have osteopenia and 28.4% have osteoporosis²; in men, 26% have osteopenia and 21.9% have osteoporosis.

TABLE 2 Osteoporosis and osteopenia prevalence in modern Egypt

	OSTEOPENIA (%)	OSTEOPOROSIS (%)
Males aged 20-89	26	21.9
Postmenopausal women	53.9	28.4

Hip fracture

No available information.

Vertebral fracture

Rashed et al. conducted a study in 2010 among 18 000 postmenopausal Egyptian women, measuring BMD using DXA and assessing vertebral fracture prevalence in normal, osteopenic and osteoporotic women (table 3).

DIAGNOSIS

No available information.

REIMBURSEMENT POLICY

No available information.

TABLE 3 Prevalence of vertebral fracture in normal, osteopenic and osteoporotic postmenopausal Egyptian women

	NORMAL		OSTEOPENIC		OSTEOPOROTIC		ALL	
	NO	%	NO	%	NO	%	NO	%
1-3 fractures	90	8.3%	630	5.6%	1134	19.8%	1854	10.3%
>3 fractures	9	0.8%	45	0.4%	252	4.4%	206	1.7%
all fractures	99	9.09%	675	6.03%	1386	24.2%	2160	12%
total	1089		11,187		2772		15,048	



CALCIUM AND VITAMIN D

A 2009 study by El Badawy et al from the Faculty of Medicine at Zagazig University and the Department of Rheumatology, Cairo University, assessed vitamin D levels in 432 females of childbearing age (mean age 37.3 ± 13.9) in two villages in Sharkia Governorate³. The study identified the role of different risk factors associated with vitamin D such as exposure to sun light, various lifestyle habits such as style of clothes, socio-biological factors and dietary intake of vitamin D. In addition, the study estimated the association between vitamin D levels and certain minerals and hormones such as Ca, Ph, bone specific alkaline phosphatase and parathyroid hormone. The cut-off point for 25OHVit D insufficiency was to be less than 40nmol/L. The results showed that 80.6% of the women were vitamin D insufficient. This could be attributed to insufficient sunlight exposure and low dietary vitamin D intake.

PREVENTION, EDUCATION, LEVEL OF AWARENESS

Low levels of awareness about osteoporosis were confirmed by a 2008 study which interviewed 462 women aged 40 and over and 262 physicians, excluding orthopedists and radiologists⁴. The results showed that among women, the awareness about risk factors and preventative measures was very low, with about one-third having unsatisfactory levels of awareness. A significant association was found between levels of awareness and socio-demographic factors such as income, place of residence and type of occupation. About 47% of the healthcare providers were found to have unsatisfactory levels of awareness, mostly related to their knowledge about the types of the disease (primary or secondary), risk factors and diagnostic methods. None of the socio-demographic factors were found to be associated with their level of awareness.

Egyptian Guidelines for the Diagnosis and Management of Osteoporosis have been developed to optimize the use of the existing tools available for the early diagnosis of osteoporosis and to help general practitioners as well as specialists in screening persons with or without risk factors in order to avoid the occurrence of fractures, especially the first fracture. The Guidelines have not yet been approved by the Ministry of Health.

RECOMMENDATIONS

There is a need to implement public health measures to improve vitamin D status through wide spread vitamin D supplementation, modest skin sunshine exposure, and increase of vitamin D fortified foods. In addition, given the low levels of osteoporosis awareness among the public and health professionals, efforts must be made to improve recognition and knowledge of osteoporosis and its repercussions - fragility fractures.

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IRAN

OVERVIEW

Osteoporosis, also known as the silent disease, is considered a health priority in Iran. The disease is believed to be responsible for a large number of fractures, which impose a heavy burden on society^{1,2,3}. Previous studies conducted in this field have revealed that the prevalence of osteoporosis and osteopenia in at least one measured site in the Iranians aged 50 years or older is 22.2% and 59.9% in women and 11.0% and 50.1% in men, respectively. Among subjects younger than 50 years, about 33.0% of women and 31.6% of men have reduced bone mass^{4,5}.

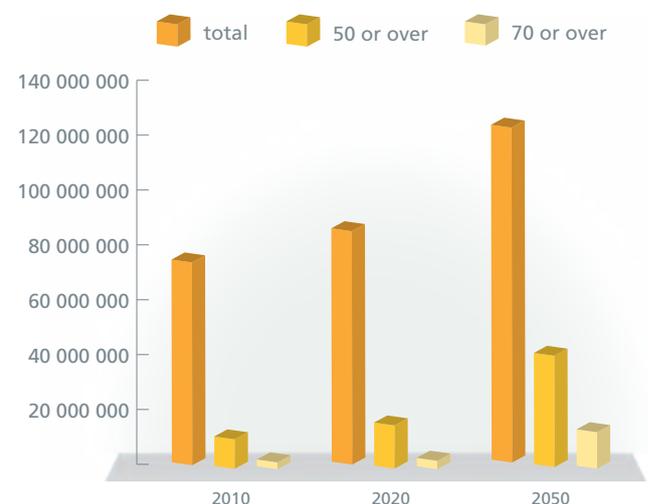
Despite the high prevalence of osteoporosis and osteopenia in Iran, there is not enough information regarding the prevalence of osteoporosis-related fractures and the burden of the disease. In view of the lack of data in this field, the Osteoporosis Research Center - Endocrinology and Metabolism Research Institute affiliated with the Tehran University of Medical Sciences (a collaborative member of WHO and IOF) is conducting numerous national projects. These include: Developing Osteoporotic Hip Fracture Registry, The Burden of Osteoporosis in Iran, Developing an Iranian version of FRAX[®], Assessment of Geometry in Iranian Population and expanding the Iranian Multi-Center Osteoporosis Study⁷ (IMOS), previously performed in five main cities in the country, to two other provinces. Fortifying Milk with Vitamin D Supplements is another main project conducted by the center with the aim of tackling vitamin D deficiency, a major risk factor contributing to osteoporosis in Iran. The Osteoporosis Research Center has also initiated a programme to develop an electronic medical recording and registry system for osteoporotic patients. In the next phases of the programme, the software would be distributed throughout the whole country in order to develop a national registry system.

In the modern world, websites play an important role in educating not only the general public but also healthcare providers. The Osteoporosis Research Center has launched both a Persian (<http://emir.tums.ac.ir/osteo>) and an English website (<http://emir.tums.ac.ir/osteo-en>), aiming

to provide everyone with their required information in the field of osteoporosis. Among other activities, the Osteoporosis Research Center publishes a set of educational brochures and booklets and holds various national and international congresses and workshops, both for the general public and healthcare providers, with the aim of informing the general population about different aspects of osteoporosis. These brochures are commonly distributed among patients referring to osteoporosis clinics. It should be added that the Iranian Ministry of Health and Medical Education is aiming to approve the modified version of the 'National Osteoporosis Guideline', developed in our centre, to be used for family physicians working in this field.

The National Osteoporosis Research Network was established in the first days of the year 2011. The network, which has members of research centres from different medical universities, aims to provide a basis for carrying out various multi-centre studies in the field of osteoporosis in order to pave the way for tackling the silent disease. The network also aims to improve the monitoring, treatment and prevention of the disease in different parts of the country.

FIGURE 1 Population projection for Iran until 2050



KEY FINDINGS

The present population in Iran is estimated to be 76 million, of this 14% (11 million) is 50 years of age or over and 3% (2.6 million) is 70 or over. By 2050, it is estimated that 34% (42 million) of the population will be 50 or over and 11% (14 million) will be 70 or over while the total population will increase to 127 million (fig 1).

EPIDEMIOLOGY

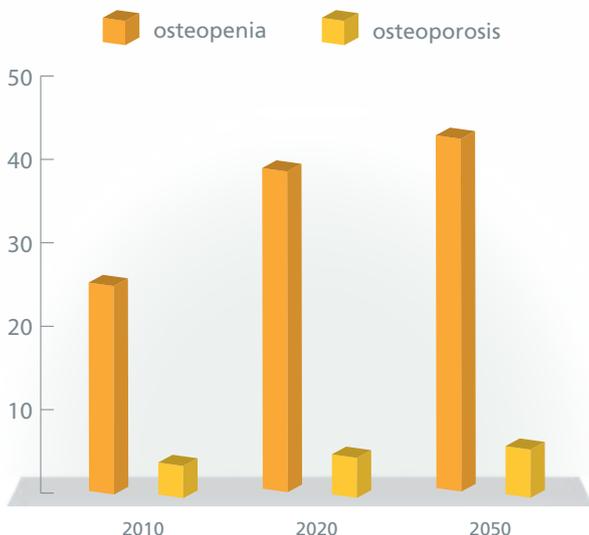
In Iran, it is estimated that currently around 34% of the total population has osteopenia, and according to the Endocrinology and Metabolism Research Center (EMRC), two million people are at risk of fracture, establishing osteoporosis as one of the chief health problems in the country^{6,7}.

In a 2008 study by Hosseinapanah et al., 11% of 245 randomly selected postmenopausal women with a mean age of 57.7 ± 7 years were found to be osteoporotic in the femoral neck and 25.3% were osteoporotic in the

TABLE 1 Osteoporosis and osteopenia in 2010 and projection

YEAR	OSTEOPENIA	OSTEOPOROSIS
2010	25 969 046	3 024 798
2020	40 303 730	3 592 708
2050	44 276 071	5 548 203

FIGURE 2 Number of people (in millions) with osteopenia and osteoporosis in 2010, 2020 and 2050⁶



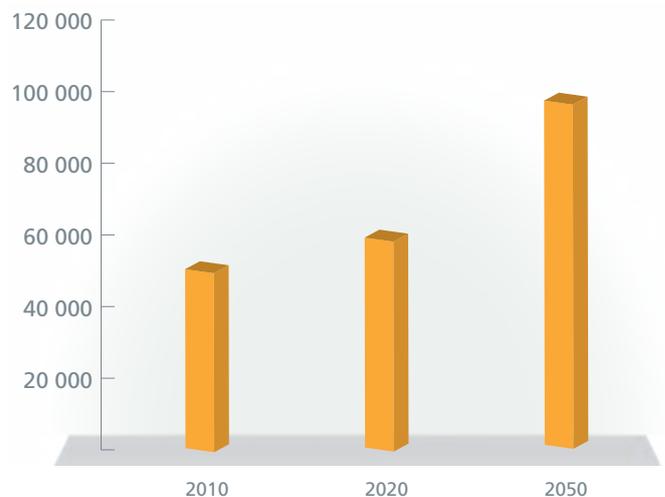
lumbar spine⁸. In a cross-sectional investigation assessing risk factors for osteoporosis, ninety women aged 48.5 ± 8.3 years, 27.8% were found to be osteopenic at the lumbar spine and 35.6% at the femoral neck. The prevalence of osteoporosis was 13.3%⁶ (table 1 and fig 2).

Hip fracture

In a nationwide prospective study assessing the burden of hip fracture in Iran, Iran accounted for 0.85% of the global burden of hip fracture and 12.4% of the burden of hip fracture in the Middle East⁹.

In 2010, the number of hip fractures in people aged over 50 years is estimated to be 472.1 cases per 100 000 population (fig 3).

FIGURE 3 Number of hip fractures in 2010 and projections for 2020 and 2050 in people aged over 50 years⁷



A 2005 cohort study in Shiraz, Iran, included 1,833 hip fracture patients with a mean age of 74.3 years in women and 74.2 years in men. The age-adjusted incidence rates of hip fracture standardized to the 1985 US white population were 325.7/100 000 for men and 519.1/100 000 for women. The age-adjusted incidence rates of hip fracture standardized to the 1989 US white population were 384.6/100 000 for men and 548.2/100 000 for women¹⁰. In a prospective survey by Moayeri et al. conducted in 9 provinces across the country, the age-standardized annual incidence rates of hip fracture were estimated at 127.3/100 000 and 164.6/100 000 for males and females respectively¹¹.

In an Iranian study assessing falls leading to hip fracture, Abolhassani et al found that the crude annual incidence of fall events and related hip fractures for those over the age of 50 years were 237.1 and 93.6 per 100 000 person-years, respectively¹².

In Iran, 84.3 % of cervical and trochanteric femoral fractures are surgically treated. The average number of hospital bed days for all hip fractures is 8.3 days.

TABLE 2 Direct costs of hip fractures (USD)¹³

YEAR	TOTAL DIRECT COST (IN MILLION USD)
2010	28
2020	51
2050	250

TABLE 3 Comparative tables of hospital bed days and costs

PATHOLOGY	HOSPITAL BED, DAYS PER YEAR	DIRECT COSTS (IN MILLION USD)	TOTAL COSTS (IN MILLION USD)
Hip fractures (surgical treatment)	300 000	28	n/a
Heart disease ^{15,16}	328 904	74	n/a
Other ¹⁷	2429	590	743

Ahmadi-Abhari et al. conducted a study in which the Global Burden of Disease method created by the WHO was applied. It was found that hip fractures yielded an overall 1.9 DALY (disability-adjusted life years) per 1000 of the population above 50 years of age¹⁴. The DALY per 1000 for both Iranian men and Iranian women was lower than that of their counterparts worldwide⁹.

Vertebral fracture

No available information.

DIAGNOSIS

In total, there are 126 DXA machines in Iran (0.017 per 10 000 population). Considering the available data there

are about 52 DXA in Tehran, the capital of Iran, and about 74 other devices in the other 30 provinces in the country (the number of devices in these provinces range from 1 to 8). DXA is available in nearly all big cities all across the country. It should be noted that DXA is not available in five provinces. There is no waiting time for a DXA scan as it is performed at the same time the patient is referred to the imaging centre.

The cost of a DXA assessment is USD 48.50 and ultra sound costs the same.

REIMBURSEMENT POLICY

The governmental insurances reimburse 70% of the cost of a DXA assessment. It should be noted that Khadamat Darmani, one of the main governmental insurances, only reimburses the cost if the prescription is written by an endocrinologist, rheumatologist or nephrologist. The governmental insurances pay the price of all Iranian-made osteoporotic medications, except for PTH analogues.

Private health care insurance reimburse 100% of the DXA exam and all Iranian made osteoporotic medications.

CALCIUM AND VITAMIN D

Calcium, vitamin D supplements and fortified foods are available in Iran. However, only milk and some fruit juices are products fortified with calcium and vitamin D in Iran. These products are not available everywhere and few individuals use them. In collaboration with the Iranian Ministry of Health and Medical Education, EMRI is conducting a project aiming to point out the benefits of using fortified milk in different groups. Apart from this project, the country holds several seminars and congresses to increase public awareness regarding osteoporosis and the importance of taking supplements and fortified milk to strengthen bones. Many programmes on related issues are also broadcast in the national mass media (television, radio and newspapers).

PREVENTION, EDUCATION, LEVEL OF AWARENESS

As a health priority in Iran osteoporosis related fractures form part of the country's surveillance programme, undertaken by various governmental and non-governmental agencies:

- The country has managed to develop an Iranian osteoporosis network which aims to increase public awareness in different parts of the country and improve patient care, and to conduct multi-centre research in this field. In a study applying the Health Belief Model for Osteoporosis Prevention among middle school girl students, 76% of students admitted to ingestion of less than 670 mg of calcium daily before the study intervention. After the intervention, 74% of the students increased their intake to between 650 and 1300 mg of calcium. Furthermore, 50% of the girls in the intervention arm had less than 20-30 minutes of physical activity three times a week before, and this increased to 89%¹⁸.
- Holding various public education seminars, particularly in October concurrent with World Osteoporosis Day.
- Several pamphlets, booklets and posters on various osteoporosis-related topics are developed and sent to different parts of the country.
- A national osteoporosis guideline has been developed.
- A multicenter study on the prevalence of osteoporosis and vitamin D deficiency is being conducted in several major Iranian cities.
- Several workshops and seminars are being held to keep health professionals working in the related fields updated.

A National Guideline for Osteoporosis Prevention, Diagnosis and Management has already been developed and is to be revised and translated in English for regional use. Guidelines have been issued for nurses, physiotherapists and nutritionists working in this field.

The Iranian Osteoporosis Society (IOS) is actively collaborating to increase public awareness in the field of osteoporosis. In this regard, it provides both general public and healthcare providers with related information through its site (emir.tums.ac.ir/ios). It also helps in the development of material on various osteoporosis-related topics and sends it to different parts of the country. While multi-centric projects are being carried out, a recent study has shown that Iranians have a low knowledge regarding the importance of calcium and vitamin D consumption in improving bone health. Their knowledge regarding sources of foods rich in calcium, on the other hand, was relatively higher¹⁹.

RECOMMENDATIONS

Considering the lack of information regarding the accurate burden of osteoporosis in Iran and the lack of any fracture registries in the countries, the majority of the reports and studies conducted in this field seem to be incomplete. However, certain national projects will be implemented, which will give us more accurate data on the mentioned fields in the coming years.

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IRAQ

OVERVIEW

The Iraqi Osteoporosis Society (IOS) was established in 2001 by a number of Iraqi doctors interested in the field of osteoporosis. The Society has several main aims:

- Upgrading the scientific level of its members by finding suitable opportunities for holding scientific and clinical meetings and encouragement of scientific research in the field of osteoporosis.
- Improving the level of training of medical and allied health professionals in the diagnosis, prevention and treatment of osteoporosis by holding training courses and workshops inside Iraq, and through participation in meetings and courses outside Iraq.
- Publishing of scientific bulletins and establishing a web site.
- Cooperating with other Iraqi societies in different medical specializations and with Arabic, regional and international osteoporosis associations.
- Working together with health and teaching institutions in different fields; giving opinions and consultations about the resolution of health problems that are related to osteoporosis.
- Holding public lectures to increase awareness about prevention of osteoporosis and its complications among individuals.

IOS has been a member of PAOS since its establishment and has participated in all its activities. IOS has also held many scientific and clinical symposia and continued its activities in spite of the difficult situation in the country over that period. The last activity held by the society was a symposium on updates in the field of osteoporosis, held in Sulaimany in Sept 2010 with the participation of distinguished speakers and the attendance of more than 150 doctors interested in bone health.

In cooperation with the Ministry of Health (MOH), IOS established Guidelines for the Diagnosis and Treatment of Osteoporosis in Iraq, and guidelines for the prevention of osteoporosis at the level of primary prevention health care centres in Iraq. IOS works in cooperation with MOH to offer tools for the screening and diagnosis of osteoporosis (DXA & QUS) in wide areas of the country.

IOS is arranging a study to estimate the prevalence of osteoporosis in different diseases and its prevalence in the Iraqi population.

KEY FINDINGS

The present population in Iraq is estimated to be 29.6 million, of this 9.5% (2.8 million) is aged 50 or over and 1.9% (570 000) is 70 or over. By 2050, it is estimated that 26 % (15 million) of the population will be 50 or over and 7.2 % (4 million) will be 70 or over, while the total population will increase to around 56 million (fig 1).

FIGURE 1 Population projection for Iraq until 2050



REF US Census Bureau

EPIDEMIOLOGY

No available information.

Hip fracture

In Iraq, 75-80% of hip fractures are surgically treated. The average number of hospital bed days is 5-10 days and the loss of productivity to the workplace is 90 days.

Direct hospital costs are estimated to be USD 1000-3000 per hip fracture.

Indirect hospital costs are around USD 500-1500.

Vertebral fracture, other fragility fractures

There are no data on the number of fragility fractures or vertebral fractures in Iraq but it is estimated that only 20% of vertebral fractures and 40% of other fragility fractures are treated by a doctor.

DIAGNOSIS

There are 15 DXA machines, 3 ultrasound and 1 Quantitative CT in Iraq. All these machines are only available in urban centres. A DXA exam costs USD 60 and a US scan costs USD 25.

REIMBURSEMENT POLICY

Both exams and osteoporosis treatments are reimbursed by government health plan. Drugs are only available with physician prescription.

CALCIUM AND VITAMIN D

Calcium supplements, Vitamin D supplements and fortified foods are available.

Programmes in lifestyle prevention of osteoporosis do exist.

PREVENTION, EDUCATION, LEVEL OF AWARENESS

Osteoporosis is recognized as a major health problem in Iraq and the government has approved guidelines and developed health professional training. The level of awareness among health care professionals is good, however it is low among allied health professionals. The national osteoporosis society holds scientific symposiums about the diagnosis, prevention and treatment of osteoporosis and contributes to activities held by PAOS and IOF.

Recent major achievements have been:

1. The availability of DXA scanners in a good number of governmental hospitals.
2. The establishment of guidelines for prevention of osteoporosis at the level of primary prevention centres.

3. The establishment of Iraqi guidelines for the prevention and treatment of osteoporosis by the Ministry of Health.
4. The improvement in educational programmes for prevention and treatment of osteoporosis.

RECOMMENDATIONS

The main recommendations are to increase the number of DXA machines and to establish more training courses in the field of osteoporosis.

JORDAN

OVERVIEW

The Jordanian Osteoporosis Prevention Society (JOPS) is a nonprofit organization founded in February, 1998 under the umbrella of the Ministry of Social Development and the honorary presidency of HRH Princess Sarvath El-Hassan.

JOPS is a founding member of the Pan Arab Osteoporosis Society (PAOS) which was created in 1998, encompassing osteoporosis societies from several Arab countries. It is also an active member of the International Osteoporosis Foundation (IOF) whose patron is Her Majesty Queen Rania Al-Abdullah.

The society's goals are:

- Spreading awareness among the population as well as among physicians as to the nature of osteoporosis and its effects on the affected individual and on society.
- Working towards preventing this silent disease before fractures occur.
- Facilitating the execution of scientific research related to osteoporosis to best serve the local and international community.
- Helping osteoporosis patients via special programmes sponsored by the society.

JOPS main activities

Osteoporosis awareness campaigns: Lectures about bone health, osteoporosis diagnosis, prevention and treatment are a core activity and are delivered as power-point presentations in Arabic at various venues such as schools, clubs, meeting halls, etc. The material is varied according to the expected audience. On the average 15-20 such lectures are given annually, usually at the request of schools or different societies.

Educational activities to implement the awareness of osteoporosis, all over the country: JOPS has organized several seminars and conferences aimed at doctors in Jordan and the Arab world, often with the participation of international experts on osteoporosis.

National studies about Osteoporosis: Two major studies have been undertaken by JOPS. In 2004-2005, the First Jordanian National Osteoporosis Record (FiJoNOR) defined the peak bone mass of Jordanian females and the prevalence of osteoporosis in Jordanian post-menopausal women. Several spin-offs were obtained from that study such as the determination of vitamin D levels in Jordanian women. The FiJoNOR survey, from a national sample of 821 females aged 20-89, showed that 50.3% were insufficient in vitamin D (25-OHD level < 50nmol/L) and 33.3% were deficient (25-OHD level < 25 nmol/L) (*unpublished data*).

The second major study was designed to determine the incidence of fragility (osteoporotic) hip fractures in Jordan (FiJoHip). This was carried out in 2008-2009 and involved obtaining data about every single patient with a hip fracture admitted to any hospital in Jordan over a period of one year.

The data from both these studies has been used to include Jordan in the 10-year fracture risk assessment (FRAX[®]) model.

JOPS has been given the task of translating all the FRAX[®] material into Arabic. This can now be viewed on <http://www.shef.ac.uk/FRAX/>

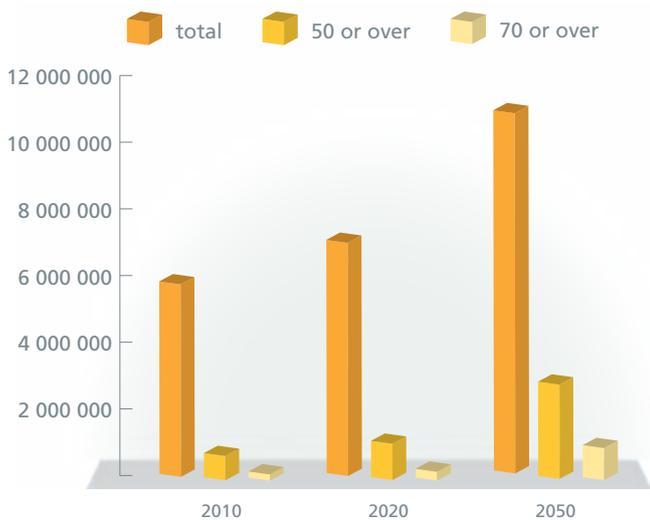
The Jordanian Ministry of Health and the Department of Statistics have had a central role in coordinating both these surveys. World Osteoporosis Day is celebrated around October 20 annually by holding public sessions that attract hundreds of people to watch presentations about osteoporosis, discuss their bone-health problems with volunteer doctors, and watch a skit about osteoporosis in an informal, friendly atmosphere. Various drug companies involved with osteoporosis treatment have also been key sponsors of our various activities and studies.

KEY FINDINGS

The present population in Jordan is estimated to be 6 million; of this 12% (750 000) is aged 50 or over and 3% (194 000) is 70 or over. By 2050, it is estimated that 26%

(3 million) of the population will be 50 or over and 9% (1 million) will be 70 or over, while the total population will increase to around 11 million (fig 1).

FIGURE 1 Population projection for Jordan until 2050



REF US Census Bureau

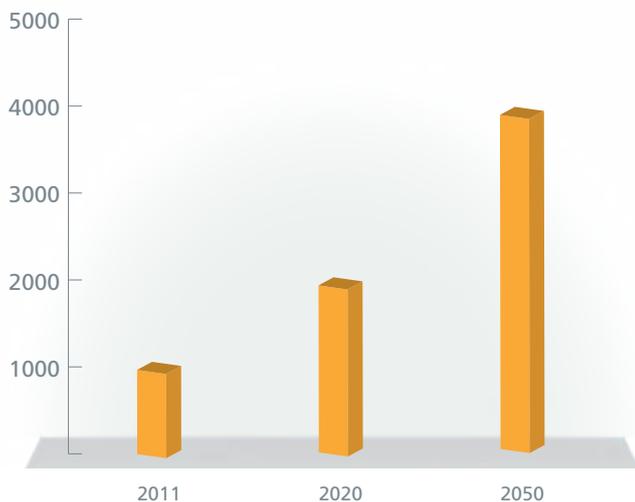
EPIDEMIOLOGY

No available information.

Hip fracture

Currently, it is estimated that there are 1008 hip fractures per year in Jordan, however based on the First Jordanian Hip Fracture Survey (2008), it is predicted that this number will quadruple by 2050.

FIGURE 2 Number of hip fractures projection



In Jordan, 80% of all hip fractures are surgically treated.

Direct hospital costs are estimated to be USD 7000.

The average hospital bed days for all hip fractures is 7 days (median figure obtained from Jordanian Hip Fracture survey in 2008).

Vertebral fracture, other fragility fractures

No available information.

DIAGNOSIS

There are 25 DXA machines in Jordan and 4 ultrasound machines located in urban centres. A DXA exam costs USD 70 and an ultrasound scan costs USD 40. The waiting time for a DXA scan is 0-1 day and there is no wait for ultrasound.

REIMBURSEMENT POLICY

DXA exams and QUS scans are reimbursed by the Jordanian government health plan and by most private health care insurances.

CALCIUM AND VITAMIN D

Calcium and vitamin D supplements are available, as well as fortified foods.

PREVENTION, EDUCATION, LEVEL OF AWARENESS

Osteoporosis is now recognized as a major health problem in Jordan.

There is no programme in lifestyle prevention of osteoporosis nor government public awareness programmes. However, the Middle East and North Africa Consensus On Osteoporosis (2007) has been approved by the government.

The level of awareness among individuals is considered as moderate and the level of awareness among health care professional is low, except among orthopedists, rheumatologists, endocrinologists and some gynecologists. In general, allied health professionals are poorly equipped and trained to participate in the care of patients with osteoporosis.

The Jordanian Osteoporosis Prevention Society has been very active in promoting bone health awareness at the national level via lectures, medical conferences, brochures, handouts, media involvement (TV appearances, radio interviews, newspaper and magazine articles). This has led to a vastly increased awareness about osteoporosis by the medical establishment and general public. Several private insurances now cover DXA testing and medical treatments of osteoporosis as a result of JOPS efforts. Government guidelines now exist.

RECOMMENDATIONS

The costs of treatment should be reviewed when insurance is not available and measures need to be put in place to improve patient compliance with appropriate therapy. Strategies and programmes should be undertaken to improve awareness of the burden of osteoporosis and treatment guidelines among physicians. For example there is often confusion between osteoporosis and other musculoskeletal diseases, such as osteoarthritis.



KENYA

OVERVIEW

Osteoporosis is not a health priority in Kenya, and clinical guidelines regarding osteoporosis prevention and treatment do not exist. This is against a background of rising alarm from some medical practitioners in the country. Lifestyle/non communicable diseases are on the increase and government should now embark on targeting non-communicable diseases that are prevalent, rather than solely focusing on HIV and AIDS, which has declined tremendously in recent years.

The lack of osteoporosis data in Kenya calls for an urgent initiative both in the government and the private sector for a full scale clinical research on the epidemiology of fractures in the East Africa region.

One of the major initiatives undertaken by the Kenya Osteoporosis Prevention and Age Concern (OPAC) is a national media osteoporosis awareness campaign from the year 2000 to date. The campaign has been instrumental in raising awareness of osteoporosis in Kenya and the East Africa region, where until recently it was completely unknown. Another of our major organization initiatives is the 2008 launch of the first World Osteoporosis Day (WOD), in Kenya. The organization marked a great milestone in celebrating the first World Osteoporosis Day in East and Central Africa region. The third major initiative is the efforts to bring the government on board in the fight against osteoporosis in Kenya. Today, the director of non-communicable diseases in the Ministry of Health is a member of the organization's scientific board of advisors in Kenya.

OPAC has undertaken other initiatives such as striking a collaboration with the African Medical and Research Foundation (AMREF) International in the provision of virtual courses on osteoporosis, to be incorporated with the AMREF Virtual Nursing Studies (AVNS). This is an initiative hampered by lack of donors or financing, with an aim of providing bone health literacy to about 40,000 nurses currently undertaking nursing update courses from certificate to Diploma via special internet oriented structures. The students are spread throughout the East and Central Africa region.

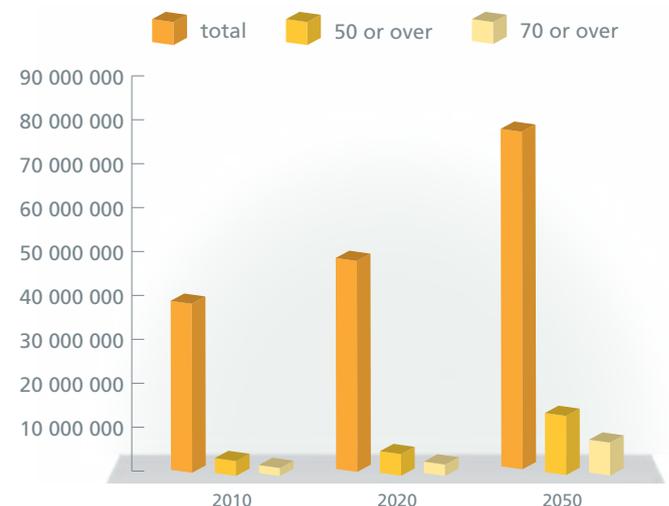
An immediate priority in Kenya involves undertaking comprehensive clinical research involving East Africa regional countries. This will form a strong baseline dataset which will be critical to elucidating the epidemiology of osteoporosis in Kenya and the East Africa region.

With assistance from the IOF Middle East and Africa office, another priority is to partner and lobby top government officials and corporate entities to support programmes on bone health research and education. This includes, in partnership with the IOF office, lobbying the government to train local physicians on the diagnosis and treatment of osteoporosis. This should move in conjunction with acquisition of DXA machines for all public hospitals in the East Africa region.

KEY FINDINGS

The present population in Kenya is estimated to be 40 million: of this 9% (3.5 million) is aged 50 or over and 5% (1.9 million) is 70 or over. By 2050, it is estimated that 17% (14 million) of the population will be 50 or over and 10% (7.8 million) will be 70 or over, while the total population will increase to 80 million (fig 1).

FIGURE 1 Population projection for Kenya until 2050



REF US Census Bureau

Older adults are increasingly playing the principal role in caring for younger adults sick with HIV and AIDS and for orphaned grandchildren. Recent research conducted in Thailand, Zimbabwe, and Uganda found that over two-thirds of elderly respondents were the main caregivers of ill adults or orphans whose parents had died of AIDS (Knodel et al.2001; WHO 2001; Ntozi and Nakayiwa, 1999). Often older people have no alternative but to provide nursing care to their ailing adult children and to become active parents again, in addition to providing for themselves.

EPIDEMIOLOGY

In Kenya, a hospital based osteoporosis study by F.O. Odawa, revealed that osteoporosis prevalence in the black female population (over 50 years) currently stands at 24.5%.

Hip fracture

No available information.

Vertebral fracture, other fragility fractures

No available information.

DIAGNOSIS

It is estimated that there is 1 ultrasound (US) machine per 60,000 people, and these are only available in urban centers. The cost of an exam is approximately USD 70. None of these exams are reimbursed by a government health plan as osteoporosis is not recognized as a high priority sector but private health care insurance does provide reimbursement.

REIMBURSEMENT POLICY

No available information.

CALCIUM AND VITAMIN D

Calcium and vitamin D supplements are available as well as fortified foods.

PREVENTION, EDUCATION, LEVEL OF AWARENESS

Osteoporosis is not recognized as a health priority in Kenya and there are no official guidelines or government

public awareness programmes regarding prevention, diagnosis and management of osteoporosis and fragility fractures. Amongst health care professionals awareness about the disease is low; it is not part of the medical school curriculum, and most practitioners, except orthopedists who are well trained, are poorly equipped and trained to diagnose and treat osteoporosis in Kenya.

Apart from organizing World Osteoporosis Day events in Kenya, the Kenyan based Osteoporosis Prevention and Age Concern (OPAC), is currently organizing and mobilizing the elderly population and voicing their concerns about their health.

Programmes in lifestyle prevention of osteoporosis are organized by the OPAC, Kenya.

RECOMMENDATIONS

Funding

The major setback in any osteoporosis initiative in Kenya is the lack of finance to support various activities. As osteoporosis is a completely new concept in Kenya and the East Africa region, it is not a traditional area of funding and therefore it is difficult to attract donors.

Government support

The government priorities concerning public health and research is another great problem. For many years now regional governments have directed large sums of public funds into HIV prevention programmes. It is now time for government to focus as well on non communicable disease prevention, in particular prevention of fractures.

Infrastructure

There is inadequate equipment to measure bone density in Kenya and even in the EA countries. This lack of facilities has greatly hampered bone health literacy in Kenya and EA region.

Information, Kenyan culture

The African perception of osteoporosis is entirely different from the scientific definition. The traditional societies understanding in witchcraft and other traditional beliefs still hamper a clear understanding of osteoporosis in Africa and especially in Kenya. For example, some people may feel that the bending spine in the elderly is associated with a bad omen or a curse in old age.

KUWAIT

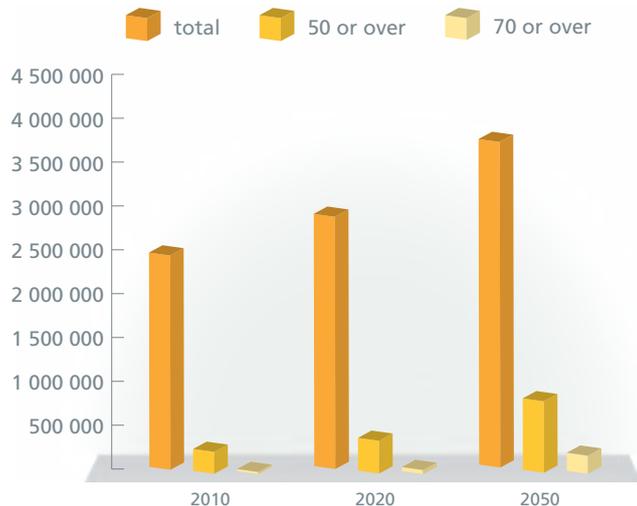
OVERVIEW

The Kuwaiti Osteoporosis Prevention Society was founded in 1996. It is a longstanding member of IOF and Pan Arab Osteoporosis Society (PAOS). The society carries out educational work with practitioners, hospital doctors and nurses, and holds regular meetings and conferences.

KEY FINDINGS

The present population in Kuwait is estimated to be 2.5 million, of this 10% (260 000) is aged 50 or over and 1% (26 000) is 70 or over. By 2050, it is estimated that 22% (850 000) of the population will be 50 or over and 5.6% (215 000) will be 70 or over, while the total population will increase to around 4 million (fig 1).

FIGURE 1 Population projection for Kuwait until 2050



REF US Census Bureau

EPIDEMIOLOGY

No available information.

Hip fracture

The incidence of hip fracture in the Kuwaiti population is higher than that reported from other countries in Asia

and is comparable to the incidence in some Western European and North American populations.

TABLE 1 Age standardized rates (per 100 000 persons per year) of hip fracture in females and males aged ≥ 50 years in Kuwait (1992-1995)¹

	FEMALE	MALE
non-Kuwaitis	374	215
Kuwaitis	295	200

Rates of hip fracture in Kuwaiti females (295 per 100 000 persons per year; 95% CI: 238.8-350.8) were similar to those observed in some of the European countries (Italy, UK, France) and in Asian females in the US. When compared with the rates from other Asian countries, Kuwaiti females had one of the highest rates of hip fracture. Rates of hip fracture among females in China, Singapore, and Korea were about one-third of the rates in Kuwaiti females or lower.

Rates of hip fracture in Kuwaiti males (200 per 100,000 persons per year; 95% CI: 163.3-236.5) were almost equal to those reported for white males in the US. Kuwaiti males had higher rates of hip fracture compared with the rates reported for males in some of the European countries (Italy, UK, France, Netherlands) and for Asian males in the US. Compared with the rates reported for males in other Asian countries, Kuwaiti males had the highest incidence rate of hip fracture. Rates of hip fracture among males in Korea, Singapore, China, Malaysia, and Japan were about half the rates in Kuwaiti males or lower.

Vertebral fracture, other fragility fractures

No available information.

DIAGNOSIS

No available information.

REIMBURSEMENT POLICY

No available information.

CALCIUM AND VITAMIN D

Milk consumption per capita (1998): 177 kg/year (source: FAO) (For comparison: Finland 370 kg/year, Dem. Rep. Congo 0.6 kg/year).

Results of a study conducted in 2005 among 214 full-term pregnant Kuwaiti mothers and their neonates demonstrates that 40% of the mothers and 60% of the neonates are vitamin D deficient on the day of delivery. The vitamin D of the mothers and neonates are highly correlated ($r = 0.790$, $P < 0.001$)².

PREVENTION, EDUCATION, LEVEL OF AWARENESS

Attention needs be directed to increase awareness of osteoporosis in Kuwait, especially regarding warning signs, preventive measures, and screening tests.

Women should be aware that osteoporosis is definitely preventable, and if diagnosed early, could be treated to decrease bone loss³.

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LEBANON

OVERVIEW

Osteoporosis is prevalent in Lebanon as indicated by the population-based study of Lebanese elderly individuals from the greater Beirut area¹. Indeed, in that cohort, the prevalence of morphometric vertebral fractures, taking into account fractures classified as grade 2 and above, was 12% in men and 19% in women. Similarly the prevalence of osteoporosis, using the WHO DXA-based operational definition, was 33.0% [27.5-38.8] at the total hip in women and 22.7% [16.2-30.2] in men^{1,2}.

Annual hip fracture crude incidence rates for those over fifty years of age have been reported between 164 and 188/100 000 persons per year for females and between 88 and 107/100 000 persons per year for males, rates comparable to those from Southern Europe³. The annual age-standardized rates per 100 000 persons per year in the Lebanese are between 329 and 370 in females and 110 and 134 in males³.

Assuming current estimates of hip fractures prevail for the coming decades, the demographic transition alone will drive the overall crude rates among women to 179/100 000 persons per year in 2030 and 193/100 000 persons per year in 2050, and the overall crude rates among men to 124/100 000 persons per year in 2030 and 143/100 000 persons per year in 2050³.

Osteoporosis is not considered a national health priority in Lebanon yet, but ongoing efforts are being made to change this. The Ministry of Health (MOH) established a hip fracture registry in 2006 and has worked with lead investigators from academic centers on endorsing osteoporosis national guidelines^{4,5} (initially in 2002 and 1st Update in 2007) as well as fragility fracture guidelines⁶. In addition, national data on hip fracture incidence was made available for the development of FRAX[®] Lebanon in 2008 which was subsequently launched in September 2009.

The MOH also established a National Task Force for Osteoporosis and Metabolic Bone Disorders in 2010, and strongly supported the designation of a WHO

Collaborating Center of Metabolic Bone Disorders at American University Beirut.

The Lebanese Osteoporosis Prevention Society (LOPS), the first osteoporosis patient society in the Middle East and Africa, is a non-governmental multidisciplinary organization, registered with the Ministry of Social Affairs. It was inaugurated in 1995 and has since made significant efforts to raise awareness of osteoporosis in the general community. It helped create the '206 Bone Fund' and the Pan Arab Osteoporosis Society. It opened a dispensary to offer bone density assessment at greatly reduced prices while providing patients with educational pamphlets; it organized a national symposium on osteoporosis as well as a *Fun Run* that was attended by 17 000 individuals to raise awareness. Regarding education, LOPS was given approval in 1998 to integrate osteoporosis into curricula in schools, targeting children aged between 8 and 16 years. They also launched the first Middle East Training Course on Osteoporosis in 2005 and have been publishing a quarterly magazine, *Osteonews*, to promote awareness. As of May 2011, a 6-month media campaign is planned to highlight awareness of musculoskeletal diseases.

The Lebanese Society for Osteoporosis and Metabolic Bone Disorders (OSTEOS), a scientific multidisciplinary society affiliated with the Lebanese Order of Physicians, was founded in 2006. It has tackled osteoporosis at three important levels: the patient, the health care professional, and the government. With regard to patients, the society has been involved in producing guides for fall prevention, clinical education pamphlets (endorsed by the MOH), Ministry of Social Affairs (MOSA), and the Lebanese Order of Physicians, and it has been active on World Osteoporosis Day, producing bone oriented educational place mats at the hospital cafeteria and offering free DXA scans for needy patients. In collaboration with the MOSA and OSTEOS representatives, a series of educational sessions were held in MOSA social and healthcare centres throughout the country. With respect to healthcare professionals, OSTEOS has been involved in producing a newsletter for physicians and handy office materials with the Lebanese guidelines and FRAX[®], as well as sponsoring a BMD workshop and ISCD

courses. The government's involvement via the Ministry of Public Health is apparent through its endorsement of yearly OSTEOS meetings (also supported by the Lebanese Order of Physicians and the WHO) and its endorsement of the aforementioned guidelines.

Priorities for the coming years have been set by the Osteoporosis National Task Force and OSTEOS which will work closely with the MOH and the WHO Lebanon office. These include: revision and dissemination of the current Lebanese Osteoporosis Guidelines, development of national quality assurance measures for densitometry testing⁷ and guidelines for the use of FRAX[®] Lebanon, vitamin D assays, collection of national data on non-hip fractures, and assessment of the social (morbidity and mortality) as well as economic burden of osteoporosis in Lebanon. Finally, collection of information on quality of life studies is also essential.

KEY FINDINGS

The present population in Lebanon is estimated to be 4.3 million, of this 20% (850 000) is 50 years of age or over⁸. By 2050, it is estimated that 40% (2 million) of the population will be 50 or over while the total population will increase to 5 million (fig 1).

FIGURE 1 Population projection for Lebanon until 2050



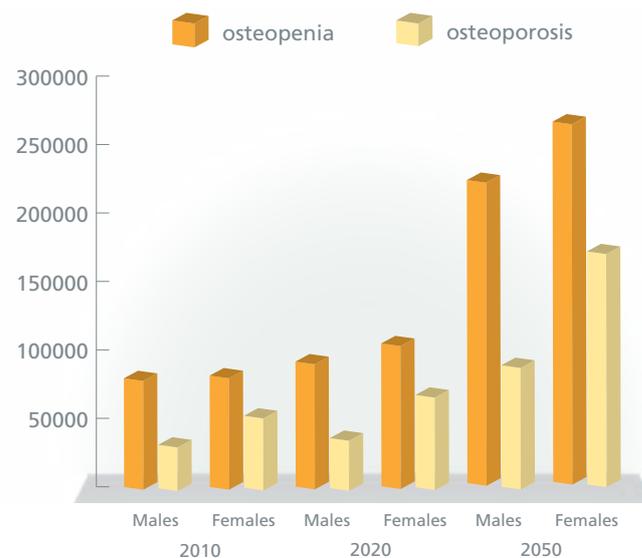
REF US Census Bureau

EPIDEMIOLOGY

In a population-based study in which a random sample of 432 elderly subjects from the greater Beirut area aged 65-84 years was studied, osteopenia prevalence using

DXA at total hip was found to be 51% in women and 56.6% in men¹ (*unpublished data*). This would yield a total of 84 660 women and 82 636 men aged 65 and above with osteopenia, using the World Bank population data for 2010. In the same study of elderly subjects aged 65-84 years, osteoporosis prevalence using DXA at total hip was found to be 33.0% [27.5-38.8] in women and 22.7% [16.2-30.2] in men^{1,2} (*published data*). This would yield a total of 54,780 women and 33 142 men aged 65 or above with osteoporosis, using the World Bank population data for 2010. Hip fractures occur at a younger age in Lebanon compared to Western populations, and 60% of patients with hip fractures have osteopenia rather than osteoporosis⁹.

FIGURE 2 Number of osteopenic/osteoporotic individuals ≥ 65 years and projections



Hip fracture

In a study using national registry data provided by the Ministry of Health³, crude incidence rates for those over the age of fifty varied across the years (2006-2008) between 164 and 188/100 000 per year for females and between 88 and 107/100 000 per year for male subjects. The calculated age standardized rates per 100 000 in the Lebanese ranged across the years between 329 and 370 per year in females and 110 and 134 per year in males. The study population was restricted to those individuals covered by the MOH, which represents around 50% of the Lebanese population³.

NOTE The corresponding age standardized rates (ASR's) for neighboring countries in the region and adjusted for the U.S. population were 330

and 224 for Kuwaiti women and men, respectively, and varied between 171 and 251 for women from Iran, and between 131 and 191 for Iranian men, depending on study site and year.

In a prospective study conducted in 1996, in which orthopedic surgeons completed a structured questionnaire, the estimated annual incidence rate of hip fracture in Lebanese subjects aged 30 or above was 129/100 000 person-years (women:153/100 000 person-years and men 100/100 000 person-years)¹⁰.

Projections to 2020 and projections to 2050: Assuming that current age-specific estimates of hip fractures prevail for the coming decades, the demographic transition, alone, will drive the overall crude rates among women to 179/100 000 persons per year in 2030 and 193/100 000 persons per year in 2050, and the overall crude rates among men to 124/100,000 persons per year in 2030 and 143/100 000 persons per year in 2050³.

In Lebanon, it is estimated that 98% of hip fractures are surgically treated.

Hip fracture costs

In order to derive projected costs incurred from health care it is important to consider the sources of health care coverage of Lebanese citizens: 50% obtain their medical care through the Ministry of Health (MOH), 25% through the National Social Security Fund (NSSF), 12.5% through private insurance companies, and 12.5% through Co-ops, Army, Internal Security Forces. Some of this last group may be also covered by private insurers.

Direct (hospital) costs: In a 1999 Bulletin Report from the WHO, it was estimated that the cost per person varies, for example from USD 12 000 in Australia to USD 8700 in Lebanon¹¹. It should also be kept in mind that these figures only represent the direct hospital costs; primary, outpatient and institutional care may multiply the real cost of hip fractures by 2.5. Therefore, the estimated total cost for Lebanon, direct and indirect, could be as high as USD 21 750 per person.

Using class II as a reference, the mean cost of surgical repair per hip fracture at AUB-Medical Center (a tertiary and academic care centre) is USD 12 126 (weighted average). The cost estimate provided by LOPS for average direct hospital cost for treating a hip fracture is USD 10 000. Using the Ministry of Health data,

the average cost for treating hip fracture is USD 2069 (weighted average).

Based on the above detailed breakdown for providers of health care in Lebanon, MOH, NSSF, and private insurers, the total cost for hip fractures per year is estimated to be USD 7 716 775. Projection to 2020: USD 10 186 143 total cost per year for all hip fractures; Projection to 2050: USD 17 902 918 total cost per year for all hip fractures.

The average hospital bed days for all hip fractures is 7-10 days.

According to a retrospective study, hip fracture patients admitted to the AUB-Medical Center from 1992-2002 with an age of >50 years had an average length of stay in hospital equal to 9.2 ± 7 days post hip fracture surgery¹².

Using data from May 2010-2011 at AUB-Medical Center, average hospital bed days ranged between 2-10 days; averaging 6.5 days for femoral neck fractures, and 6.8 days for intertrochanteric or sub- trochanteric fractures.

TABLE 1 Hospital bed days per year

MEDICAL PROBLEM	BED DAYS PER YEAR
Hip fracture	7700 to 12 000
Breast cancer	8755
Ovarian cancer	855
Prostate cancer	3805

REF Lebanon Ministry of Health and National Cancer Registry of Lebanon 2003-4

Loss of productivity in the workplace is estimated to be around 6 months. In terms of social costs, according to a retrospective study of 100 cases from 1990-1994, 79% of hip fracture patients will regain the ability to walk normally while 18% will walk with help¹³.

Vertebral fracture, other fragility fractures

In the same population-based sample, of subjects aged 65-84 years, the prevalence of vertebral fractures was estimated at 19.9% in women and 12.0% in men¹. Furthermore, using the elderly population in a study assessing the effect of PTH and vitamin D on bone loss in addition to population growth data, the annual incidence of vertebral fractures in women was estimated at 1.5% [0.6-3.0]¹⁴. (manuscript is in preparation). This

would in turn translate to 2,490 [996-4980] women aged 65 and above sustaining a vertebral fracture per year.

DIAGNOSIS

There are a total of 130 DXA machines in Lebanon, 8 of which are currently not in use, but only 82 machines are FDA approved (that is 0.19/10 000, or 19/million population). Distributors of the two major DXA companies in Lebanon estimate an increase of 4-5 machines per year from each company (i.e. around 10 total). Most equipment is located in urban centers.

The range of prices per DXA scan varies between LBP 30 000-255 000 / USD 20-170 depending on where in Lebanon the scan is done and how many sites it includes: 2, 3, or full body (Seventy densitometry centers provided updated information for the purposes of the audit). Many centers are no longer performing 2 site DXA scans and opt to do the 3 sites instead. Therefore, the mean cost for a DXA scan based on the 3 site DXA scan price is LBP 93 000 /USD 62 and the median cost is LBP 78 000 LBP/USD 52. The waiting time for a scan is usually less than 1 day but in some academic institutions the length of wait can be up to 1 week depending on the workload as well as availability of technicians.

REIMBURSEMENT POLICY

Reimbursement for outpatient tests and care also depends on type/source of health coverage as detailed above. In terms of DXA, there are several government health plans that reimburse patients with anywhere between 80-100% of the price of the DXA scan. In terms of medication coverage, the MOH (government insurance) covers bisphosphonates, calcitonin and parathyroid hormone but not strontium ranelate or raloxifene. Preference of coverage will be given to the generic drug if one exists.

There are no conditions that must be met for an individual to be reimbursed by the NSSF. It covers all approved medications and reimburses the patient with 80% of the price of the medication as long as the patient has a BMD T-score < -2.5 or a report from their physician.

Most of the diagnostic tests are reimbursed by private health care insurance. Treatments can be reimbursed by private health care insurance plans but this is not the

general rule for outpatient insurance coverage, unless the patient has purchased specific premiums to do so.

CALCIUM AND VITAMIN D

Calcium, Vitamin D supplements and fortified foods are available.

In a study addressing the risk factors for vitamin D deficiency, 251 postmenopausal women were asked about the consumption of calcium and vitamin D-rich foods and a mean milk intake of only half a cup daily was reported. This was attributed to the high prevalence of lactose intolerance in the Lebanese population¹⁵. Various studies conducted on Lebanese adults report a noteworthy prevalence of hypovitaminosis D¹⁶ and have subsequently verified that this problem can be a significant contributor to bone loss^{14,17}.

Lifestyle prevention programmes do not exist but several societies are working to promote awareness and therefore prevention of osteoporosis.

PREVENTION, EDUCATION, LEVEL OF AWARENESS

Osteoporosis is not yet recognized as a major health problem in Lebanon but active efforts to raise its profile are underway: the National Task Force for Osteoporosis was appointed by the MOH in March 2010 and includes members from all relevant disciplines (endocrinology, rheumatology, orthopedics, radiology, and obstetrics and gynecology). The mission of such a task force is to establish a national programme for osteoporosis, generate protocols for the treatment of osteoporosis, and create a national registry to determine the prevalence of hip fracture and its causes. Other priorities include assessment of disease burden using measures of morbidity and mortality.

There is no adequate evidence assessing public awareness of osteoporosis in Lebanon. However, in a 1999 Bulletin Report of the WHO, awareness polls showed that around 75% of the Lebanese adult population had heard of osteoporosis¹⁰. This is most likely attributed to the efforts of LOPS, which specifically includes public information in its programme. However, few data exist from recent population based samples, and little is known about healthy behaviours regarding osteoporosis prevention.

LEVEL OF AWARENESS AMONG HEALTH CARE PROFESSIONALS

Proportion of patients with osteoporosis that are treated with supplementation: In 1995, bone densitometry became available in Lebanon and awareness of osteoporosis increased. This is reflected in a retrospective study conducted by Hreybe et al. in which hip fracture patients admitted to AUB-MC between 1992 and 2002 were studied¹¹. There was an increase in the proportion of hip fracture patients receiving calcium supplementation on admission between the period before 1995 and the period after 1995 increasing from 2.1% to 8.7%, $p=0.013$. Similarly, there was an increase in the proportion of hip fracture patients receiving calcium supplementation on discharge between the period before 1995 and the period after 1995, increasing from 3.4% to 11.4% ($p=0.07$). This can be considered a reflection of the greater HCP awareness of osteoporosis due to increased diagnosis by densitometry.

Educational Materials for Health Care Professionals: OSTEOS has been involved in producing a newsletter four times a year to update Lebanese physicians on the most recent developments in osteoporosis research, diagnostic care, practice guidelines and upcoming bone programmes. Physician oriented osteoporosis office materials specific to the Lebanese osteoporosis guidelines and FRAX Lebanon have also been produced and distributed at major local and regional bone meetings. Moreover, a BMD workshop that was organized by the founders of OSTEOS was held in 2002, prior to the society foundation. Two densitometry courses have been held by OSTEOS in collaboration with the ISCD, were attended by over 200 registrants, and resulted in ISCD certification of around 95 individuals. As of 2009, yearly scientific meetings have been organized by OSTEOS and co-sponsored by the Ministry of Public Health, the Lebanese Order of Physicians, and the WHO. As of 2011, additional collaborative interdisciplinary symposia have been organized between OSTEOS and several other key scientific societies concerned with osteoporosis namely: the Lebanese Society of Radiology, the Lebanese Oncology Society, the Lebanese Society of Obstetrics and Gynecology and the Lebanese Society of Rheumatology. These have been a useful means by which updates on bone disease, diagnosis, and management were relayed to a large base of internists and specialists concerned with osteoporosis.

LOPS has also been involved in health care professional awareness through its national symposia, the launching of a Middle East Training Course on Osteoporosis in 2005, and most recently by producing guidelines for fragility fractures. Furthermore, their active collaboration with the Pan-Arab Osteoporosis Society has increased health care professional awareness in the Middle East.

Guidelines

Lebanese guidelines for osteoporosis assessment and treatment were published in 2002 and have been most recently updated in 2007. The guidelines were reviewed and endorsed by the Lebanese scientific societies of endocrinology, orthopedics, obstetrics and gynecology, radiology, rheumatology, and subsequently by the Eastern Mediterranean Region Organization of the WHO. Currently, the updated guidelines have been endorsed by the 5 Lebanese scientific societies, the Lebanese Society for Osteoporosis and Metabolic Bone Disorders (OSTEOS), the WHO-Lebanon, and the MOH. The guidelines cover several important issues including whom to test, what measures to use, and when to treat^{4,5}. In addition, the Lebanese Osteoporosis Prevention Society (LOPS) has most recently produced guidelines for fragility fractures that were approved by the Ministry of Public Health in addition to the Lebanese Orthopedics Association, the Lebanese Society of Physiotherapy and Rehabilitation, and the Faculty of Medicine at Saint Joseph University⁶. Furthermore, regional guidelines on osteoporosis for the Middle East and North Africa were also developed and endorsed by societies throughout the region including the LOPS¹⁹.

There are several important issues that need to be considered:

- Lack of national data on non-hip fractures (hip fracture data currently available are from the MOH)
- Lack of investigations about the social and economic impact of hip fractures and osteoporosis (i.e. morbidity, QALYs)
- All necessary medical specialties and allied health professionals need to be well equipped and well trained in the management of osteoporotic patients. This entails proper distribution of the Lebanese guidelines not only to health care professionals but to the allied professionals as well
- Lack of national quality assurance measures for densitometry testing to allow for better detection
- Lack of data on risk factors such as diet, physical activity, and other lifestyle patterns
- Gaps in fracture management

RECOMMENDATIONS

At an individual level, programmes in lifestyle prevention that target both men and women at younger ages should be instituted. For example, just as the young are encouraged to engage in the necessary steps to prevent obesity, similar actions need to be taken for osteoporosis. Furthermore, awareness campaigns covering both urban and rural areas in Lebanon would not only prompt lifestyle changes among those previously ignorant of osteoporosis risk but would also encourage those that are at greatest risk of osteoporosis and hip fracture to make active decisions regarding their health. Furthermore, it is necessary to properly assess healthy behaviour with regards to osteoporosis and identify the barriers preventing individuals from engaging in appropriate lifestyles.

At a national level, the National Task Force for Osteoporosis and relevant societies must work together to revise and disseminate the current Lebanese Osteoporosis guidelines, develop national quality assurance measures for densitometry testing⁷ and guidelines for the use of FRAX[®] Lebanon, perform vitamin D assays, collect national data on hip and non-hip fractures through creation of national registries, while promoting data collection through healthcare facilities, and assess the social (morbidity and mortality) as well as economic burden of osteoporosis in Lebanon. It is only through this joint effort that all relevant health providers can be reached and subsequently reinforce prevention and detection of osteoporotic fractures.

Health care professionals (HCPs) will continue to be involved in two significant stages. The first stage entails the endorsement of the national guidelines and of all recommendations issued by the National Task Force through their respective scientific societies. The second stage necessitates their participation in educational sessions to disseminate the guidelines and enhance osteoporosis and hip fracture care in the country.

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MOROCCO

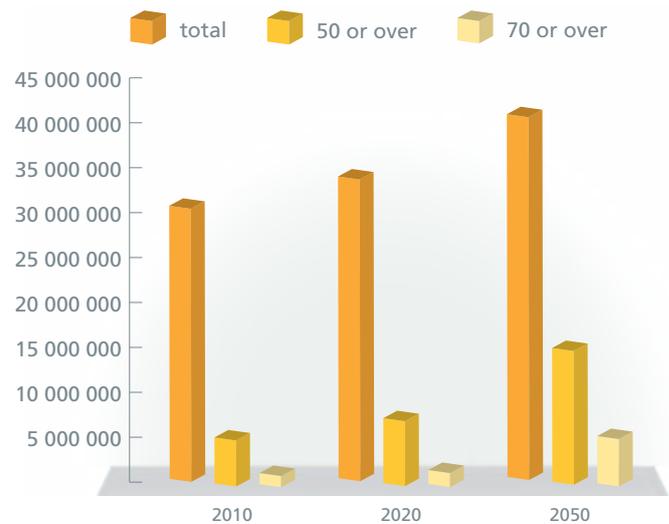
OVERVIEW

Morocco's population is approximately 32 million in 2010. It is a young population with only 5 637 000 people aged over 50 years. However, the age group >60 years which represents 8% of the population in 2010 will double in 2030 (15.4%). Moreover, the average life expectancy which was 59 years of age in 1981, has increased to 72 years of age in 2010 and continues to increase. There are many recent studies on osteoporosis epidemiology in Morocco: incidence of hip fractures, prevalence of vertebral fractures in men and women, distribution of BMD, prevalence of hypovitaminosis D, and quality of life of women with osteoporosis have all been studied. Clinicians follow international recommendations for the diagnosis and treatment of osteoporosis. The current gold standard for osteoporosis diagnosis is bone mineral density (BMD) determination by DXA assessment, but in Morocco, DXA machines are available mainly in the big cities and private clinics, thereby placing it beyond the reach of most people. It has been estimated that 13.4% of men aged over 50 and 44.6% of postmenopausal women have osteoporosis¹⁻³. About 13% of men and 26% of women over 50 years have asymptomatic vertebral fractures⁴⁻⁵. The annual incidence of hip fractures per 100 000 inhabitants is estimated at 52.1 among women and 43.7 among men. Hypovitaminosis D prevalence has been estimated to affect 91% of the female population⁶. Thus, despite being a common metabolic bone disease, osteoporosis is still under-diagnosed and undertreated. It attracts little attention and even less action in our country. It is not yet considered a public health priority in Morocco. The Moroccan Society of Rheumatology recently used wide media coverage to increase awareness of osteoporosis. A large multicentric cohort study on osteoporosis and incident fractures is currently being prepared.

KEY FINDINGS

The present population in Morocco is estimated to be 32 million, of this 17% (5.3 million) is 50 years of age or over and 4% (1.3 million) is 70 or over. By 2050, it is estimated that 37% (15.5 million) of the population will be 50 or over and 13% (5.5 million) will be 70 or over while the total population will increase to 42 million (fig 1).

FIGURE 1 Population projection for Morocco until 2050



REF US Census Bureau

EPIDEMIOLOGY

Normal values of BMD were determined in general population-based large samples of healthy Moroccan women² and men³ and the proportion of osteopenia and osteoporosis were evaluated. Based on extrapolations from these studies, DXA estimation and WHO classification, 2 137 410 people have osteopenia (about 39% of the population over 50) and 984 730 have osteoporosis in Morocco in 2010 (fig 2).

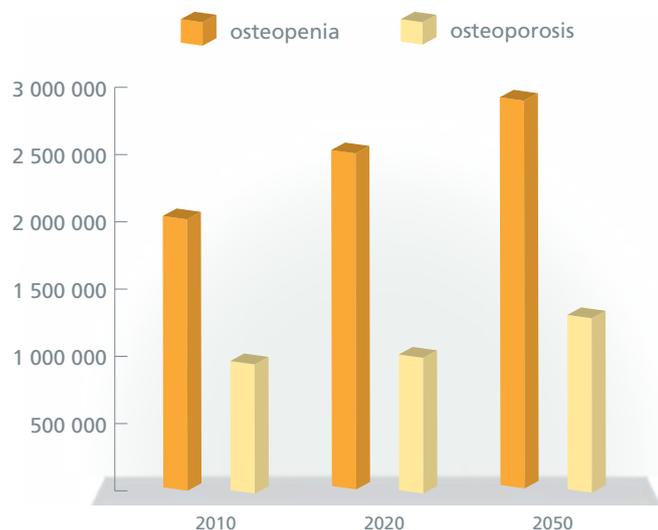
In a 2009 study assessing the relationship between historical height loss and vertebral fractures, in which 288 postmenopausal Moroccan women were recruited, 31% of the patients were found to be osteoporotic⁸. In another study of 357 postmenopausal women living in urban areas with a mean age of 58.7 ± 7.8 years, 42.1% had osteopenia and 30.1% had osteoporosis.

Hip fracture

In 2011, it is estimated that there will be 2,707 hip fractures in Morocco.

In a 2002 retrospective study, there were a total of 150 hip fractures in those over the age of 50 between January

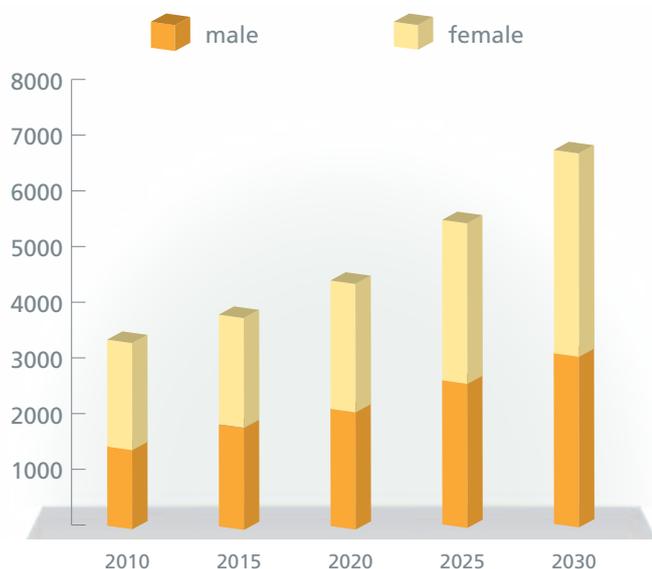
FIGURE 2 Incidence of osteopenia and osteoporosis in 2010 and projection for 2020 and 2030



1 to December 31 in Rabat, a province in Morocco⁷. The age-adjusted one-year cumulative incidence of hip fracture was 52.1/100 000 in women and 43.7/100 000 in men.

Another retrospective study evaluating the hip fracture incidence between 2006 and 2009 using the same design collected 1004 hip fractures and found an age-adjusted incidence of 61.8/100 000 in women and 58.0/100 000 in men (recent unpublished data). The estimation of the number of hip fractures is derived from this study (fig 3).

FIGURE 3 Estimation of the number of hip fractures for 2010, 2020, 2030



The direct (i.e. hospital) costs of hip fractures is around 1500-3000 euros. Free health care is provided for all people in public hospitals¹.

Vertebral fracture, other fragility fractures

The number of vertebral fractures is estimated to be 1 553 565 million. In a study cohort of 328 women with a mean age of 65 ± 6.5 years, vertebral fractures were detected in 25.6% using vertebral fracture assessment (VFA) with at least 60% of those women having 2 fractures³. In the aforementioned study of 357 postmenopausal living in urban areas, with a mean age of 58.7 ± 7.8 years, 46.7% were diagnosed with vertebral fractures⁴. Vertebral fracture prevalence has been estimated to be 13% in asymptomatic men⁵.

DIAGNOSIS

In total, there are 20 DXA machines in Morocco and 4 ultrasound machines. This equipment is available only in some urban centers. A DXA assessment costs USD 100 and an ultrasound USD 18. The waiting time is between 0 to 2 days for a DXA assessment and there is no waiting time for an ultrasound.

REIMBURSEMENT POLICY

These exams are reimbursed without restrictions for patients with health coverage but the rates and reimbursement restrictions differ between private health care insurances. Only 17% of patients in Morocco have health insurance, and a large number of patients have to pay for their densitometry⁵.

Regarding treatment, the available drugs are reimbursed for patients with health coverage without any restriction; private insurances apply different rates of reimbursement (70-98%) and some reimburse only after the first fracture. Osteoporotic treatments are available under prescription.

CALCIUM AND VITAMIN D

Calcium and vitamin D supplements are available as well as fortified foods. There are no programmes on lifestyle prevention.

PREVENTION, EDUCATION, LEVEL OF AWARENESS

In Morocco, osteoporosis is not yet recognized as a major health problem. There are no government approved guidelines but physicians follow international guidelines.

In general the level of osteoporosis awareness among the population is low. In a study of 356 healthy Moroccan women with a mean age of 58.9 ± 7.7 , the prevalence of osteoporosis showed an inverse relationship with education level, ranging from 19.7% for the most educated to 50% for the non-educated women ($p < 0.05$)¹⁰.

Physicians in medical specialties (rheumatologists, orthopedists, gynecologists and endocrinologists) treating a population susceptible to osteoporosis are well trained to diagnose and treat the disease and osteoporosis is integrated into the medical school curriculum. However, most general health professionals are generally very poorly equipped and trained to manage patients with osteoporosis except those working in specialized centers.

The Rheumatology Moroccan Society in Morocco is active and organizes regular meetings focusing on osteoporosis, communications in newspapers and different media, including radio, television, web etc.

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PALESTINE

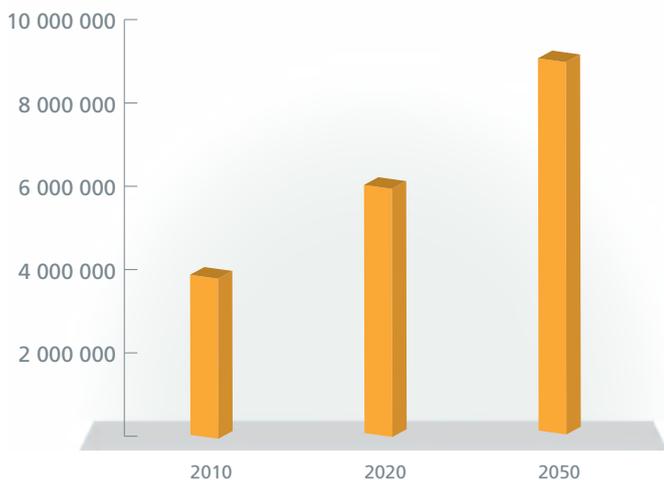
OVERVIEW

Osteoporosis is not yet a health priority in Palestine. Basic epidemiological studies are lacking; additionally there is an absence of any statistical evidence regarding incidence of major osteoporotic fractures and a lack of government involvement in the prevention of osteoporosis. The Palestinian Osteoporosis Prevention Society (POPS) conducted a study on the prevalence of osteoporosis among postmenopausal women published in May 2010 in *Archives of Osteoporosis* and it was found that around 40% of postmenopausal women were affected. The poor socioeconomic status of the Palestinian population and the abundance of other health priorities have meant that osteoporosis has not achieved a high priority within the Ministry of Health's public health strategy. Many of the population have limited access to medication through the health care system, even though these drugs are available on the open market.

KEY FINDINGS

Currently it is estimated that 4 million people live in Palestine: 9.2% are aged 50 or over (368 000) and 54% of this population are women (fig 1).

FIGURE 1 Population projection for Palestine until 2050



EPIDEMIOLOGY

More than 50% of the studied population were osteopenic at age 60-69 years (table 1 and 2).

TABLE 1 Prevalence of postmenopausal osteoporosis/osteopenia at the lumbar spine, femoral neck and total hip among Palestinian women living in the West Bank region of Palestine.

SITE	OSTEOPOROSIS	OSTEOPENIA	NORMAL
Spinal	29.7%	40.4%	29.9%
Femoral neck	24%	47.9%	28.1%
Total hip	14%	46%	40%
At any site	40.6%	74%	50%
At all sites	8%	5.5%	16%

Hip fracture

Direct hospital costs for hip fractures are USD 3500-4500.

Vertebral fracture, other fragility fractures

No information available.

DIAGNOSIS

In Palestine, there are 6 DXA machines and 2 quantitative ultrasound (QUS) machines. These diagnostic tools are available in urban centers only. The cost of a DXA exam is USD 25 and USD 7 for QUS assessment. The waiting time to access both exams is of a few days. These exams are not reimbursed by any government health plan and only some private insurance offer reimbursement.

REIMBURSEMENT POLICY

No information available.

CALCIUM AND VITAMIN D

Calcium and vitamin D supplement are available but not widely distributed. Foods fortified with calcium or vitamin D are available.

PREVENTION, EDUCATION, LEVEL OF AWARENESS

Among the postmenopausal Palestinian women in the West Bank, the level of awareness of osteoporosis is associated with age, educational level, residency and the use of dietary supplements (calcium, vitamin D, and multivitamin) and milk consumption. Oestrogen replacement therapy is not linked to awareness, due to the fact that hormonal treatment is instituted based on clinical examination and evaluation.

Only about 12% of the studied postmenopausal women answered correctly at least 70% of questions that were included in the calculation of the knowledge score on osteoporosis. This low score is mostly due to several factors including:

- lack of adequate health education
- poor contact between subjects and health centres for women of postreproductive age
- absence of regular programmes for periodic health and clinical evaluation due to cultural beliefs (milk only for children, and doctors only for sick people)
- fairly large family sizes
- poor economic conditions

These findings point to the urgent need to raise the level of awareness about osteoporosis in the society and to recognize osteoporosis as one of the major health complications that requires immediate attention at both the official level and the public level.

However, education and prevention programs have been implemented with the support of the Ministry of Education and the Ministry of Health and guidelines for the management of osteoporosis are being developed in collaboration with the Ministry of Health.

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TABLE 2 Osteoporosis/osteopenia at the lumbar spine, total hip and femoral neck in relation to age

	SITE	AGE (YEARS)				
		49	50-59	60-69	70-79	≥80
LUMBAR SPINE	OSTEOPOROSIS	-	19%	36%	45.2%	75%
	OSTEOPENIA	23.8%	41.7%	40.7%	41.9%	25%
	NORMAL	76.2%	39.3%	23.3%	12.9%	-
TOTAL HIP	OSTEOPOROSIS	-	4.3%	13.4%	33.3%	87.5%
	OSTEOPENIA	38%	36%	58.1%	51.6%	12.5%
	NORMAL	62%	59.7%	28.5%	15.1%	-
FEMORAL NECK	OSTEOPOROSIS	4.8%	11.4%	27.3%	47.3%	62.5%
	OSTEOPENIA	33.3%	44.5%	56.4%	44.1%	37.5%
	NORMAL	16.9%	44.1%	16.3%	8.6%	-

REF Abd-Alhameed I, Saba E, Darwish HM (2010) Prevalence and awareness of osteoporosis among postmenopausal Palestinian women. Arch Osteoporos 5: 111-118

QATAR

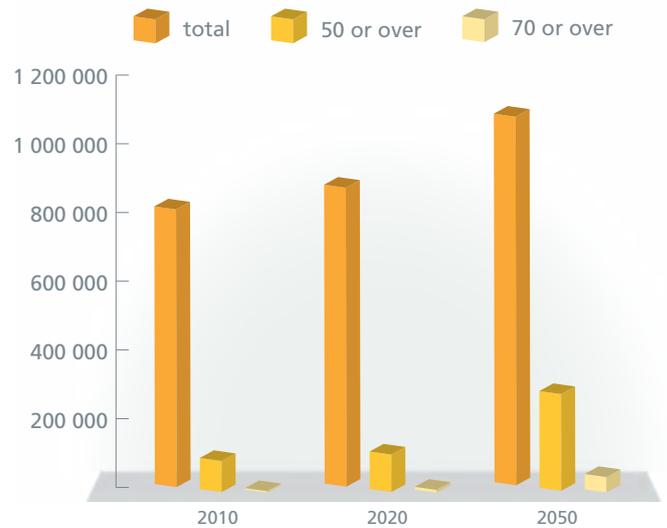
OVERVIEW

Little information is available about osteoporosis in Qatar and there is no IOF member osteoporosis society at present. Qatari society is similar to that of Saudi Arabia and based on Saudi studies and a Qatar study on vitamin D mentioned here below, it can be concluded that there is a high prevalence of vitamin D deficiency, particularly among the female population. As in many countries within the region, women are conservatively dressed with clothing that covers most of the body and there is low exposure to sunlight, despite sunshine all year. Furthermore, women lead a sedentary life and engage in very little outdoor activity. In addition to all this, there is low calcium intake, multiparity and prolonged periods of lactation.

KEY FINDINGS

The present population in Qatar is estimated to be 841 000, of this 11% (94,000) is 50 years of age or over and 0.6% (5000) is 70 or over. By 2050, it is estimated that 26% (293 000) of the population will be 50 or

FIGURE 1 Population projection for Qatar until 2050



REF US Census Bureau

over and 4% (46 000) will be 70 or over while the total population will increase to 1.1 million (fig 1).

TABLE 1 Comparison of the mean BMD measurements at spine (g/cm²) for Qatari females compared with Caucasian, Kuwaiti, Saudi and Lebanese females by decade of age

AGE GROUP	QATARIS	KUWAITIS	SAUDI ARABIA	LEBANESE	CAUCASIANS
20-29	1.159	1.210	1.131	1.100	1.196
30-39	1.164	1.238	1.155	1.113	1.210
40-49	1.149	1.200	1.109	1.103	1.180
50-59	1.065	1.098	1.038	1.017	1.102
60-69	0.918	1.008	0.993	0.953	1.015

TABLE 2 Comparison of the mean BMD measurements at femur (g/cm²) for Qatari females compared with Caucasian and Kuwaiti females by decade of age

AGE GROUP	QATARIS	KUWAITIS	CAUCASIANS
20-29	0.990	1.022	1.018
30-39	1.016	1.015	0.994
40-49	1.041	0.996	0.984
50-59	0.992	0.944	0.941
60-69	0.868	0.870	0.875

EPIDEMIOLOGY

In 2005 a cross-sectional study of 574 Qatari women aged between 20 and 69 years was carried out in Qatar using DXA scan to establish reference values of bone mineral density¹. Measurements were taken at the lumbar spine and proximal femur. The results showed that the Qatari subjects presented a decline in BMD at spinal sites with age after peaking at 30–39 years age group, and for femoral site at 40–49 years. The BMD values of the spine of Qatari women were lower than that of Caucasian and Kuwaiti women but higher than the Lebanese and similar to Saudi women. The BMD values of the total femur were higher in Qatari females than Caucasians, Kuwaitis, Lebanese and Saudis in the age group of 40–59, but lower in the age group 60–69 years (*table 1 and 2*).

The BMD data were examined in regard to the prevalence of osteoporosis and osteopenia. However, this study was conducted among ambulatory individuals with strict exclusion criteria and so does not represent the prevalence of osteopenia/osteoporosis in the country (*table 3*).

Hip fracture

No information available.

Vertebral fracture, other fragility fractures

No information available.

DIAGNOSIS

No information available.

REIMBURSEMENT POLICY

No information available.

CALCIUM AND VITAMIN D

In 2009, a study conducted among 458 Qatari children below 16 years of age demonstrated a prevalence of vitamin D deficiency among the studied population of 68.8%, mostly in the age group 11–16 years (61.6%)². There was a significant difference between vitamin D deficient and normal children as compared to their age ($P=0.013$). Vitamin D deficiency was more common among girls (51.4%) than boys (48.6%). The present study revealed that the prevalence of vitamin D deficiency is high in Qatari children and more common in Qatari girls. In the young population in Qatar, vitamin D deficiency appears to result from a combination of limitations in sunlight exposure and a low oral intake of vitamin D. Deficiency has also been observed in a cross-sectional study conducted among health care professionals working at Hamad Medical Corporation. It showed that the mean overall vitamin D level was 11.7 ng/ml. It was lower in females (10.3ng/ml) than males (13.7 ng/ml).

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TABLE 3 Prevalence of osteoporosis and osteopenia among the population studied following BMD measurement at spine and total femur according to age by decade¹

AGE GROUP	SPINE (L2-L4)		FEMUR	
	OSTEOPOROSIS (%)	OSTEOPENIA (%)	OSTEOPOROSIS (%)	OSTEOPENIA (%)
20-29	0.8	13.6	0.0	11.9
30-39	0.0	11.2	0.0	5.6
40-49	0.6	14.2	0.0	3.9
50-59	5.7	30.2	0.9	11.3
60-69	21.2	48.1	7.7	26.9

SAUDI ARABIA

OVERVIEW

The Saudi Osteoporosis Society is a scientific society concerned with osteoporosis and other metabolic bone diseases. Its mission is to improve patient care in the field of osteoporosis through evidence-based learning, expert analysis and case study-based management.

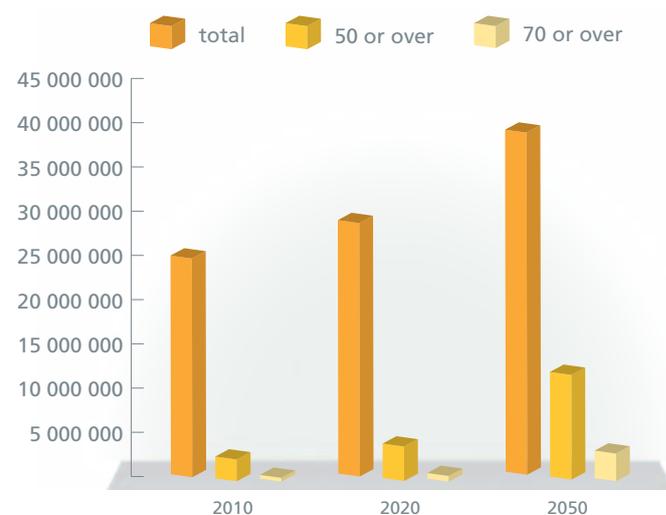
The Society aims to achieve the following objectives:

- The progression and development of the scientific thinking in the specialties of the Society (osteoporosis and related diseases).
- Giving the opportunity for the members in the Society to contribute to the scientific development of its fields.
- Enhancing exchange of scientific thinking in its field amongst different institutions and disciplines in the Kingdom and abroad.
- To help establish guidelines for the diagnosis and management of the common disorders related to the specialties of the society.
- Participation in Public Health Education in problems and diseases related to osteoporosis and related diseases.
- Issuing booklets, letters, etc. for public health education.
- Initiating, promoting and supporting programmes related to the specialties of the society; any of these programmes can be run as a separate unit, under the supervision of the Society.
- Cooperating with other societies and institutions in the Kingdom and abroad with similar activities.

KEY FINDINGS

The present population in Saudi Arabia is estimated to be 25.7 million, of this 10% (2.5 million) is 50 years of age or over and 2% (450 000) is 70 or over. By 2050, it is estimated that 31% (12.3 million) of the population will be 50 or over and 8% (3.2 million) will be 70 or over while the total population will increase to 40 million (fig 1).

FIGURE 1 Population projection for Saudi Arabia until 2050



REF US Census Bureau

TABLE 1 Prevalence of osteopenia and osteoporosis in Saudis (≥ 50 years), using US/European and Saudi reference data²

SITE		FEMALES		MALES	
		US/European reference	Saudi reference	US/European reference	Saudi reference
SPINE (L2-L4)	OSTEOPENIA	39.1%	42.2%	32.8%	19.1%
	OSTEOPOROSIS	47.7%	30.5%	38.3%	49.6%
FEMUR (TOTAL)	OSTEOPENIA	57.0%	58.6%	32.3%	56.7%
	OSTEOPOROSIS	7.8%	4.7%	6.3%	1.2%
EITHER (SPINE OR FEMUR)	OSTEOPENIA	41.4%	43.4%	46.5%	54.1%
	OSTEOPOROSIS	44.5%	28.2%	33.2%	37.8%

EPIDEMIOLOGY

In a study of 483 postmenopausal Saudi women aged 52 to 62 years, El-Desouki found the prevalence of osteopenia and osteoporosis to be 34% and 24%, respectively¹ (table 1).

Greer et al estimated the prevalence of osteoporosis for Saudi Arabian women aged 50-70 years to be approximately 23%³.

Hip fracture

The number of osteoporotic hip fractures was estimated to be 8768 cases in 2004⁴.

TABLE 2 Incidence of hip fractures per 100,000 population⁵

AGE (YEARS)	WOMEN	MEN
40-49	4.5	7
50-59	14.6	22
60-69	79	36
>70	394	251

The average number of days in hospital was 17.67 ± 13.63 (5-72 days).

Dalal Bubshait analyzed the economic implications of osteoporosis-related femoral fractures in Saudi Arabian society⁴. The annual cost of management of these fractures in the Eastern province of Saudi Arabia is USD 12.78 million (2004). By extrapolation to the whole Kingdom, the annual cost of managing femoral fractures would be USD 1.14 billion, a 27% increase in 5 years (1999, estimate was USD 0.47 billion).

TABLE 3 Vertebral fractures in 159 postmenopausal women according to age

AGE (YEARS)	TOTAL	WITH SINGLE FRACTURE	WITH MULTIPLE FRACTURES
< 51	2	2	0
51-60	24	22	2
61-70	70	70	0
71-80	49	20	29
> 80	14	4	10

Vertebral fracture, other fragility fractures

M Sadat-Ali et al. reviewed 785 chest radiographs from Saudi women over the age of 50 years at King Fahd Hospital of the University⁶. They observed that 20.3 % (159) of patients had at least 1 vertebral fracture and that only 13.2% of women with vertebral fractures were on antiresorptive therapy for osteoporosis.

DIAGNOSIS

No information available.

REIMBURSEMENT POLICY

No information available.

CALCIUM AND VITAMIN D

The problem of osteoporosis in Saudi Arabia has been overlooked until now. In 1990, Saleh Sedrani et al. observed that 22% of the studied Saudi children and 20% of Saudi adults had low concentrations of 25-OHD (5-10ng/ml), while the frequency of vitamin D deficiency (25-OHD level ≤ 5ng/ml) was 3.4% in total children and 5.5% in total adults⁷.

PREVENTION, EDUCATION, LEVEL OF AWARENESS

A large number of middle aged and elderly Saudi women are unaware of osteoporosis risk factors. Al-Shahrani et al. conducted a study among 368 Saudi women who attended the well-person clinic in a primary health care centre in Dirab area, Riyadh, Saudi Arabia between January and July 2006, using a validated questionnaire⁸. Seventy-six percent of women were postmenopausal and 62% had heard of osteoporosis. The identification of risk factors by participants ranged from poor to fair. Sixty percent of women identified low calcium intake, 39% lack of exercise and 22% a family history of osteoporosis as risk factors of osteoporosis. Only 48% of participants correctly identified calcium-rich foods.

Previous activities to raise prevention, education and level of awareness include:

- Recommendations and Guidelines on Diagnosis and Management of Osteoporosis (King Faisal Specialist Hospital and Research Center) were published 2004 and updated 2011.

- In April 2011 the Saudi Osteoporosis Society published its first bulletin on osteoporosis designed to provide education and updates to doctors and interested health care providers.
- An 'Osteo-Club' in the format of presentations and discussions was held in Riyadh every month in 2010.
- Workshops entitled 'Bone Builders' and 'Osteo-Strong' were designed to reach different parts of the Kingdom.

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SOUTH AFRICA

OVERVIEW

In South Africa the incidence of osteoporosis in the white, Asian (from the Indian sub-continent) and mixed-race populations appears to be similar to that of developed countries although no fracture data exist. Like in the USA, osteoporosis at the hip is less prevalent in the black populations, although vertebral bone mass, and possibly also vertebral fracture prevalence, in black and white South Africans appear to be similar. Further research on this important topic is clearly required. Until such data exist, we are using extrapolated data from the USA, UK, Canada and Australia. We acknowledge the likely inaccuracy of such extrapolated data as this does not take race, genetics and the uniqueness of the South African population into consideration.

Because of the paucity of local data it would be unwise to make a 10-year fracture prediction, although based on the current population where only 7.5 million people are over the age of 50, it can be assumed that the ageing population will exponentially increase in the next decade or two with a consequent increase in the incidence of osteoporosis and osteoporotic fractures. Anti-retroviral therapy use has increased dramatically and the negative influence of these medications on bone health is known and being studied.

Osteoporosis is still not a health priority in South Africa where HIV/AIDS, tuberculosis and malnutrition are rife. The National Osteoporosis Foundation of South Africa (NOFSA) has therefore published guidelines on treatment and prevention in 2000 and rewrote these guidelines in 2010. Prevention of osteoporotic fractures and reduction in morbidity and mortality were the major considerations in the development of these guidelines and although no formal economic analysis was undertaken, the cost-efficacy of diagnostic and therapeutic interventions was considered in all recommendations. All healthcare workers, general practitioners, specialist physicians and health authorities are targeted in the guidelines and ongoing discussion with the national Department of Health takes place regularly to ensure national distribution and use of these guidelines. We hope that

these discussions will lead to an assessment of local fracture data, following which a health economic strategy can be developed to treat osteoporosis in this country.

KEY FINDINGS

The present population in South Africa is estimated to be 50 million, of this 16% (8 million) is aged 50 or over and 3% (1.6 million) is 70 or over. By 2050, it is estimated that 28% (13.6 million) of the population will be 50 or over and 8% (4 million) will be 70 or over, while the total population will stay around 50 million (fig 1).

FIGURE 1 Population projection for South Africa until 2050



REF US Census Bureau

Projections are probably underestimated due to the fact that projections were done prior to instating anti-retroviral therapy to tackle the HIV pandemic.

EPIDEMIOLOGY

If extrapolating data from international statistics, it is estimated that around 1.4 million females aged over 50 and 0.6 million males aged over 50 are suffering from osteoporosis.

Hip fracture

If extrapolating US data, there would be approximately 54 890 hip fractures per year. This however may be inaccurate as other factors such as genetics and race for example, are not taken into consideration. We can state, with some degree of certainty based on data from local studies, that BMD values, as measured with DXA in our whites, mixed race and Indian populations are similar and not vastly different from the manufacturer's reference values. Hip fracture prevalence would therefore probably be similar in these population groups. However, no epidemiological data on hip fractures exist. Unlike the Afro-Americans who have a much higher BMD than their white counterparts, local studies have shown that vertebral BMD in South African blacks and whites are the same and that vertebral fracture rates appear to be similar in the black and white populations. Hip BMD values in blacks are however significantly higher.

Regarding hip fracture treatment, there are no accurate data available, but certainly the vast majority of fractures are surgically treated.

TABLE 1 Hip fracture costs and bed days

DIRECT HOSPITAL COSTS (PER PATIENT IN PRIVATE PRACTICE)	INDIRECT HOSPITAL COSTS (PER PATIENT)	AVERAGE HOSPITAL BED DAYS
R ±170,000 (USD 24,000)	R ±20,000 (USD 2,500)	7-9 days

By comparison, total cost/year for heart disease is estimated to be more than R 10 billion (USD 1,4 billion).

Vertebral fracture, other fragility fractures

In 2005 Delmas et al. suggested that approximately 12,281 vertebral fractures per year occur in South Africa when using automated extrapolation of US, European and Australian statistics.

DIAGNOSIS

It is estimated that there are 180 DXA machines in South Africa (0.036/10 000), mostly only available in urban areas; the exam costs about R 1000 (USD 130). Approximately

30 000 DXA scans are done annually in state hospitals, at no cost to patients. It takes 1-2 weeks to get the exam in state hospital and 1-2 days in private practice. Ultrasound machines are rarely used as a diagnostic tool for osteoporosis. The exam costs R 350 (USD 50).

REIMBURSEMENT POLICY

South Africa does not have a Government Health plan so far, although it is planning to implement one within the next few years. Private health care insurance reimburse these exams if BMD demonstrates severe osteopenia or osteoporosis, if fragility fractures or risk factors are present. Medical Aids pay for DXA and medication for patients on higher end plans.

CALCIUM AND VITAMIN D

Calcium and vitamin D supplements are available but very few products are fortified with calcium or vitamin D.

PREVENTION, EDUCATION, LEVEL OF AWARENESS

Although osteoporosis is not yet recognized as a major health problem in South Africa, the National Department of Health has guidelines (supplied by the National Osteoporosis Foundation of South Africa - NOFSA) for the prevention and treatment of osteoporosis. These are distributed at Primary care level, and NOFSA supply prevention and treatment guidelines to both physicians and the general public. Lobbying at the government level and with Medical Aids is an ongoing process and there have been many meetings with both parties to discuss the new guidelines that were published in 2010.

Medical students and most allied health care workers (dietitians, physiotherapists, nurses, and radiographers) receive training in the prevention, diagnosis and treatment of osteoporosis.

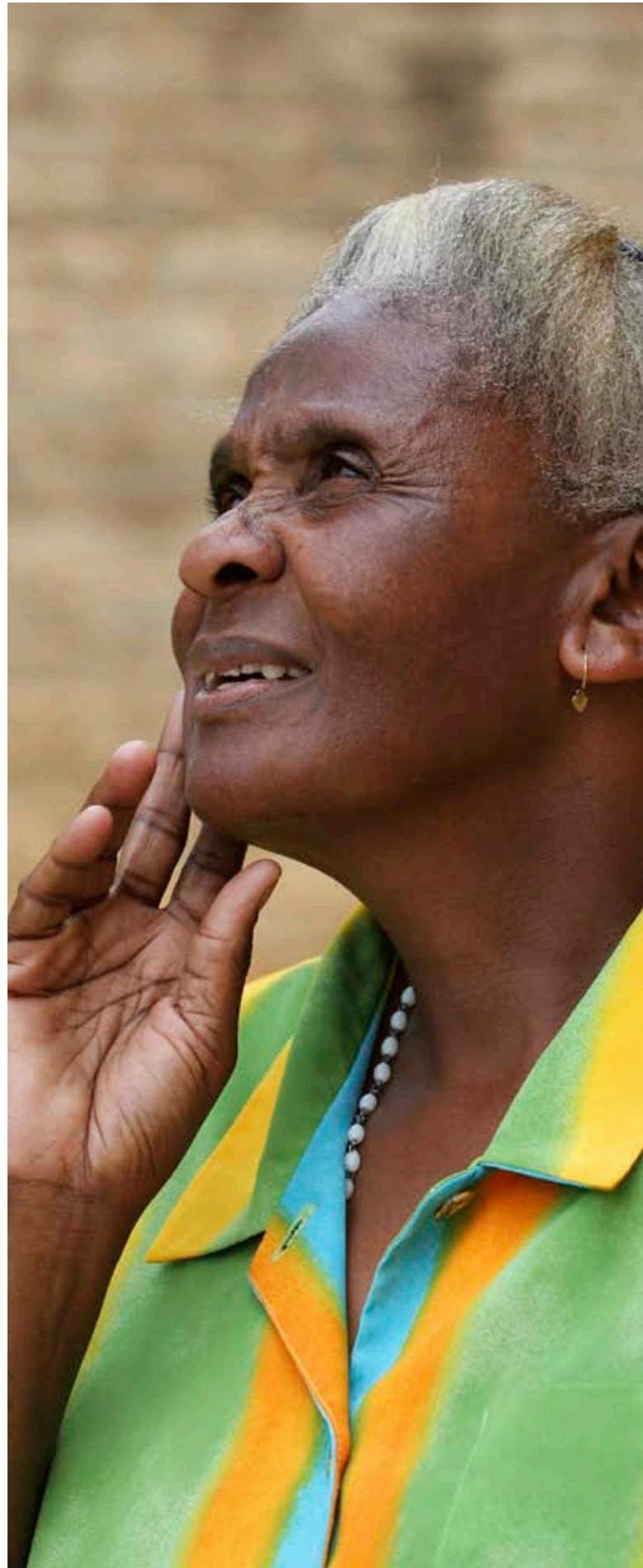
In general, the level of awareness about osteoporosis among individuals is good. NOFSA tries to spread awareness throughout the year by means of radio-talks and the printed media. They hold a specific bone awareness month in October/November where especially community radio and other media broadcast relevant interviews (from World Osteoporosis Day on October 20th to the end of November).

NOFSA is the only Foundation dealing with osteoporosis in this country and therefore the only reference centre. Articles (about 20 per year) which are written in the lay press are mostly run by NOFSA first for factual correctness. It also hosts a Healthy Bones web-forum nationally, does about 30 radio and TV talks per year, distributes an annual newsletter to patients and physicians, runs an annual Advanced Training Course (based on the IOF-model) for physicians, and has hosted three joint training courses for physicians as well as DXA operators with the ISCD. NOFSA also has an annual media-based bone awareness month in November which is driven by NOFSA's PR company which does this pro-bono and has also co-hosted a Skippathon for children with a local dairy company.

RECOMMENDATIONS

There is an urgent need for South African specific prevalence and fracture statistics to lobby successfully. In a country where diseases like HIV and Aids, tuberculosis, and malnutrition are rife and currently responsible for the most deaths, osteoporosis still has a long way to go before being recognized as a serious disease. The myth also still exists that this is a disease of old white women and a normal part of ageing, whereas we have found that black women have similar bone densities and in fact fracture their vertebrae at the same rate as white women.

Funding for epidemiologic prevalence studies are not that readily available, hence the paucity of reliable local fracture statistics.



SYRIA

OVERVIEW

Interest in osteoporosis in Syria started in 1994. It began with activities on a private basis by opening the first Osteoporosis Consulting Center at the Italian hospital. Later the Minister of Health encouraged this initiative and the Osteoporosis Medical Council was formed; it started promoting knowledge and awareness of osteoporosis among healthcare professionals and the general public. In 2005, The Syrian National Osteoporosis Society (SYNOS) was established as a nongovernmental and nonprofit organization. SYNOS' main objectives are to raise public awareness of osteoporosis and its prevention and treatment.

SYNOS is a founding member of the Pan Arab Osteoporosis society (PAOS) and active member of the International Osteoporosis Foundation (IOF).

SYNOS' activities are many and varied including:

- Frequent lectures to medical doctors of all concerned specialties.
- Frequent general public lectures and exhibitions.
- Schools orientation activities, with educational osteoporosis programme and workshops.
- Exercise awareness with frequent walks in which many of our members and members of the public participate.
- Occasional dinner-dances where osteoporosis is the key issue.
- Regular advertisements and media interviews, regular articles in local and Arab newspapers and magazines.
- Annual WOD activities, including conferences, sport competitions and Q&A for adults and children, expositions, bone-oriented restaurant mats, meet-the-expert sessions, disseminated posters and brochures, free DXA scans. These activities attract high media coverage.
- Regular Free US bone density examination in many public centres.
- Active SYNOS website with all necessary information about the disease and the society: www.sy-nos.org

SYNOS organized the 4th IOF Osteoporosis Diagnosis Course in Damascus (2009) and chaired the 5th Pan

Arab Osteoporosis Congress in collaboration with IOF, held in Damascus in April 2010.

SYNOS has produced several publications including a nutrition booklet, osteoporosis information magazine with prevention and treatment guidelines, a children's book and CD, a high calcium recipe book, and One-Minute Osteoporosis Risk Test leaflets.

The health authorities have shown some interest on the disease but it is still not recognized as a major healthcare problem. The main priorities are:

- Family planning and birth rate reduction
- National hip fracture registry
- National Syrian Guidelines for Osteoporosis
- Increasing the number of DXA machines
- Vitamin D measurement, and deficit prevention

KEY FINDINGS

The present population in Syria is estimated to be 22 million, of this 11% (2.3 million) is 50 years of age or over and 2% (0.5 million) is 70 or over. By 2050, it is estimated that 15% (4 million) of the population will be 50 or over and 3% (8 million) will be 70 or over while the total population will increase to 51 million (*fig 1*).

FIGURE 1 Population projection for Syria until 2050



REF US Census Bureau

EPIDEMIOLOGY

Unfortunately there is a lack of official statistics about the incidence of osteoporosis, and no special national fragility fracture registry currently in Syria. Records in hospitals are well documented but they are difficult to obtain for statistical purposes after the patient has been discharged. The figures stated in this audit were calculated by:

- considering the increase in population of 3.2% annually
- considering the population above 50 years of age at 10.4 % as in 2010
- the estimated number of hip fractures in 2010

Hip fracture

A hip fracture registry was set up in 2001 (running from January 1st to June 30th).

The aim was to collect 1000 case histories which were taken from the private clinic of a reputable orthopaedic surgeon and a middle-sized, 500-bed general hospital. Unfortunately it was not followed through due to lack of interest from official sources and the movement of interested resident doctors to other hospitals. The results are available.

Interest was again triggered in 2009 and new data were collected from the following sources:

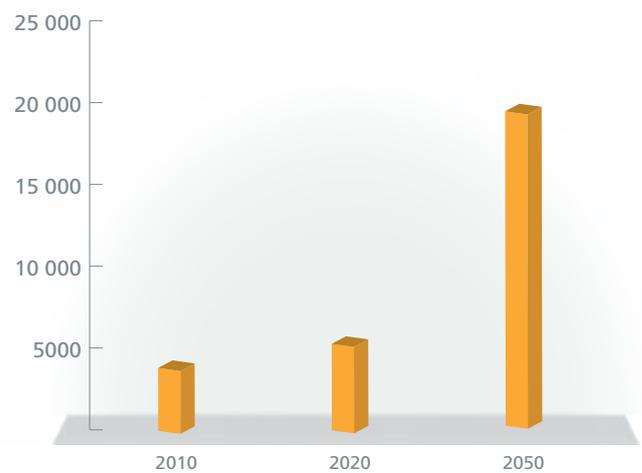
- Damascus Assembly Hospital, the largest health service hospital in Damascus (2500 beds) which provides the main accident and emergency department for the city.
- Mouasat Hospital, the main teaching hospital in Damascus with 2500 beds and the second largest accident and emergency department in the city.
- The orthopaedic medical supply companies which provide the materials used in treating fractures.
- The Osteoporosis Centre, Italian Hospital - information and records collected during DXA scans are used by SYNOS for statistical purposes (but as it only services the private sector it has its limitations).
- Private medical clinics.

TABLE 1 Costs of hip fractures (USD)

	DIRECT HOSPITAL COSTS PER CASE	INDIRECT HOSPITAL COSTS PER CASE	TOTAL COSTS FOR HIP FRACTURES/YEAR	BED DAYS (STATES HOSPITAL)
2011	2500	1000	22 000 000	12
Projections to 2020		5000	44 000 000	-
Projections to 2050		10 000	-	-

In Syria, it is estimated that there are around 4000 hip fractures per year and this number will increase to 5500 hip fractures to 2020 and could be between 15 000 to 20 000 cases in 2050 (fig 2).

FIGURE 2 Number of hip fractures per year and projections until 2050



In Syria, 70% of hip fractures are surgically treated.

After a hip fracture, the loss of productivity at the workplace is estimated to be 6 months and only 50% of patients regain their normal life style after a hip fracture (table 1 and 2).

Vertebral fracture, other fragility fractures

It is estimated that there are about 15 000 vertebral fractures per year of which only 20% are treated by a doctor. In addition, there are an estimated 40 000 other fractures associated with osteoporosis in Syria each year.

DIAGNOSIS

In Syria, there are 20 DXA machines and 6 QUS machines, and these are only available in urban centres. The cost of a DXA scan is 2500 SL /USD 50 and 500SL/

TABLE 2 Costs and bed days' comparison with other diseases

	TOTAL COSTS (USD)	BED DAYS
Breast cancer	200 000 000	3 days + 30 days as out patients
Ovarian cancer	11 000 000	5 days + 30 days
Prostate cancer	12 000 000	3 days + 30 days
Heart disease	55 000 (1 patient)	3-20 days
Pulmonary disease	55 000 (1 patient)	5-20 days

*Adapted from MOH and National Cancer Registry Society

USD 10 for a QUS. The length of waiting time for DXA scan is 1 day.

REIMBURSEMENT POLICY

DXA and QUS scans are reimbursed only for State employees. Recently, some private health insurances offer reimbursement, but with a lot of restrictions.

Locally produced medicines are reimbursed.

CALCIUM AND VITAMIN D

Vitamin D measurement is expensive in Syria and just available in a few laboratories.

A private clinic study was conducted to assess the prevalence of vitamin D deficiency among 120 women over the age of 40. It showed that 75% have 25(OH)-vitamin D level below 25nmol/L.

Calcium and vitamin D supplements are available as well as fortified milk and juice.

SYNOS is conducting a school project aiming to highlight the importance of vitamin D and calcium- rich nutrition to strengthen bones and prevent osteoporosis.

In addition, SYNOS organizes regular breakfast conferences where nutritionists assess the benefit of calcium and vitamin D fortified food.

PREVENTION, EDUCATION, LEVEL OF AWARENESS

Today osteoporosis is not yet recognized as a major health problem in Syria.

Programmes in lifestyle prevention and guidelines regarding osteoporosis exist through SYNOS awareness programmes and some general magazine publications.

The level of awareness among individuals is fair thanks to SYNOS regular activities such as lectures to health professionals and the public, exhibitions, publications, schools awareness programmes, media involvement, courses and congress, and the website.

RECOMMENDATIONS

- In general, allied health professionals are poorly equipped and trained to participate in the care of patients with osteoporosis. Training and continuous medical education should be improved so they could also elevate the level of knowledge and understanding of their patients.
- The Government should upgrade the priority of osteoporosis in future health plans and manage fracture registries.
- A National Osteoporosis Guideline is now under development and will be disseminated to health professionals.
- Training and continuous medical education for the health professionals and medical doctors should be improved to increase the level of knowledge and understanding of their patients.
- The Ministry of Health should upgrade the priority of osteoporosis in future health plans by: increasing the number of DXA machines in public hospitals, helping to conduct a large nationwide study that includes both sexes for the prevalence of osteoporosis and the status of vitamin D in Syria, and managing a fractures registry.
- Increasing media involvement is important to highlight the burden of the disease, and the possibility of prevention and treatment.

TUNISIA

OVERVIEW

The Tunisian Osteoporosis Prevention Society was founded in 2000. It provides support for patients and education materials for the public and physicians. As well as organizing meetings and conferences, the Society also develops education programmes for practitioners, hospital doctors and nurses. Tunisia is one of only four countries in the Middle East and North Africa region which has a FRAX® model, developed on the basis of recent research.

KEY FINDINGS

The present population in Tunisia is estimated to be 10.5 million, of this 20% (2.1 million) is 50 years of age or over and 5% (500 000) is 70 or over. By 2050, it is estimated that 40% (5.3 million) of the population will be 50 or over and 16% (2.1 million) will be 70 or over while the total population will increase to 13 million (fig 1).

FIGURE 1 Population projection for Tunisia until 2050



REF US Census Bureau

EPIDEMIOLOGY

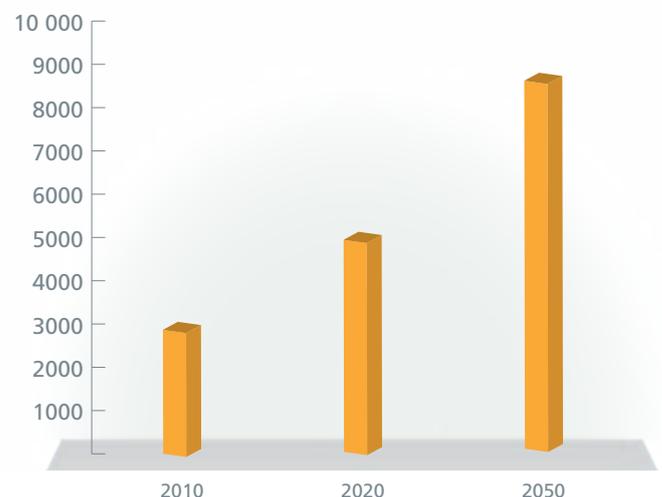
Osteopenia is estimated to affect 504 254 women aged over 40 years and 244 293 women in the same age category are thought to suffer from osteoporosis. In a 2006 study of the prevalence of osteoporosis, one out of four

postmenopausal Tunisian women studied had a T-score below 2.5 (the WHO threshold for osteoporosis)¹. In a further study, national references in Tunisian women were also calculated².

Hip fracture

The number of osteoporotic hip fractures in 2001 was 3,164 cases in individuals aged 50 years or over, and 2,979 in individuals over 60 years of age. This number is projected to reach 5101 by 2020 and 8850 by 2039 (fig.2). The data on the incidence of hip fracture was established in the national HIFIT study of 2002 (Hip Incidence Fracture in Tunisia) which estimated 213.5 fractures per 100 000 per year³.

FIGURE 2 Hip fracture projections by 2050



The average number of hospital bed days for hip fracture is nine.

The direct hospital costs for hip fractures are €4 million (data derived from public hospital stays only)⁴.

Vertebral fracture, other fragility fractures

Sellami et al studied osteoporosis fractures among 1,311 postmenopausal women; among these women, 16%

presented with a fracture at one of the sites studied for investigation⁵. Vertebral fractures accounted for 60% of all fractures and wrist fractures for 32% and proximal femoral fractures represented only 4.1% of all fractures.

DIAGNOSIS

In Tunisia, there are 50 DXA machines and 10 quantitative ultrasound instruments. This equipment is only available in urban centers. The cost of a DXA scan is USD 40 and USD 15 for an ultrasound scan. The length of waiting time for a DXA scan is less than 3 days and less than 1 day for an ultrasound scan.

REIMBURSEMENT POLICY

These diagnostics are not reimbursed by the government health plan but could be reimbursed by private health care insurance depending on the individual plan. Osteoporosis therapies are reimbursed by the government health plan and private health care insurance.

CALCIUM AND VITAMIN D

Calcium and vitamin D supplements are available and calcium intake was evaluated in the DOPIT study⁴.

In a Tunisian study conducted during wintertime among 269 women aged 20 to 60 years, vitamin D deficiency ($\leq 15\text{ng/ml}$) was observed in 55.2% of cases⁶.

In addition, research published in 2006 and 2007 by A. Laatar et al. studied the main risk factors for osteoporosis in Tunisian women^{7,8}.

There are no programmes addressing lifestyle prevention of osteoporosis.

PREVENTION, EDUCATION, LEVEL OF AWARENESS

Osteoporosis is not yet recognized as a major health problem in Tunisia and as of yet, there are no physician guidelines for osteoporosis or health professional training programmes. However, there is a government public awareness programme.

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TURKEY

OVERVIEW

Turkey has a unique age distribution which makes it an extremely young country; 65% of the population is under the age of 35 which means that a large proportion of the Turkish population is still achieving peak bone mass. Moreover, Turkey is an ageing and developing country and that is why osteoporosis presents a huge health care problem. This fact should be taken into consideration when determining health care policy. Although Turkey is still among the countries with a low hip fracture rate in Europe, the incidence of hip fractures according to the FRACTURK study seems to be much higher than the rates documented 20 years ago. On the other hand, osteoporosis and low bone density are considerably prevalent in Turkey. We should be aware of our epidemiological data with regard to osteoporosis and related fractures in order to make decisions for future healthcare interventions.

The crude incidence of hip fractures from the age of 50 years is 109/100 000 in men, and 226/100 000 in women in Turkey. Hip fracture rates were similar in men and women between the ages of 50 to 64 years, but after this age, incidence rates were markedly higher in women. Hip fracture rates in both sexes increased in an exponential manner with age. The life-time probability of sustaining a hip fracture at the age of 50 years was 15% in women and 3.5% in men. The average 10-year probability of sustaining a hip fracture at the age of 50 years was 0.2% in men and 0.3% in women. Ten-year probabilities increased progressively with age and at the age of 80 years were 3.6% and 7.3% in men and women, respectively.

When hip fracture rates were applied to the Turkish population, it is estimated that more than 24 000 hip fractures occurred annually in men and women aged 50 years or more in 2010. The majority of hip fractures (73%) in women occurred after the age of 75 years.

In the year 2010, the estimated total population of Turkey was 75.7 million. In 2035, the population is expected to increase by about 23% to 92.9 million. However the increase in the total population will not be

uniform. The greatest increase will be in the elderly. The number of men aged 50 years or more is expected to more than double from 6.4 million to 13.9 million with a rise in the female population from 7.0 to 15.4 million. The number of individuals aged 85 years or more will increase in men and women more than 9-fold. Since hip fracture risk increases exponentially with age, there will be a large increase in the number of hip fractures in men from 6554 in 2010 to 14 860 in 2035, and in women from 17,807 to 49 029 over the same interval. Based on these data, we estimate that more than 24 000 hip fractures occurred annually in men and women aged 50 years or more in 2010, and the numbers of hip fractures will more the double over the next 25 years to 64 000.

The prevalence of osteoporosis in populations below and above 65 years of age was assessed, as according to Turkish reimbursement rules, osteoporosis intervention is possible for people under 65 years of age if their T-Score is below -3.0. According to data of the Turkish Osteoporosis Society, the prevalence of osteoporosis in the 50-64 age group was 17.1 whereas it was 33.7% in the population over 65 years of age. In general, 49.6% of the survey population had osteopenia, while 24.8% of them categorized as osteoporosis in terms of lumbar and/or hip BMD results. Osteoporosis and osteopenia were found in 27.2 % and 49.1% of females and 22.2% and 50.2% in males in our study, respectively. In contrast to hip fractures, osteoporosis and low bone density are considerably prevalent in Turkey. In the case of Turkey, the BMD values and the age-specific prevalence of osteoporosis in the present study are comparable to those for Sweden.

Turkey urgently needs to obtain epidemiologic data in regard to major fractures other than hip. Clinical observations indicate that Turkish women are also at risk regarding vertebral fractures. Collecting current epidemiologic data will be helpful in raising the profile of osteoporosis in order to assist in making it a national health priority.

KEY FINDINGS

The present population in Turkey is estimated to be 78 million, of this 18% (14 million) is 50 years of age and

over and 4% (3 million) is 70 and over. By 2050, it is estimated that 38% (38 million) of the population will be 50 and over and 13% (13 million) will be 70 and over while the total population will increase to 100 million (fig 1).

FIGURE 1 Population projection for Turkey until 2050

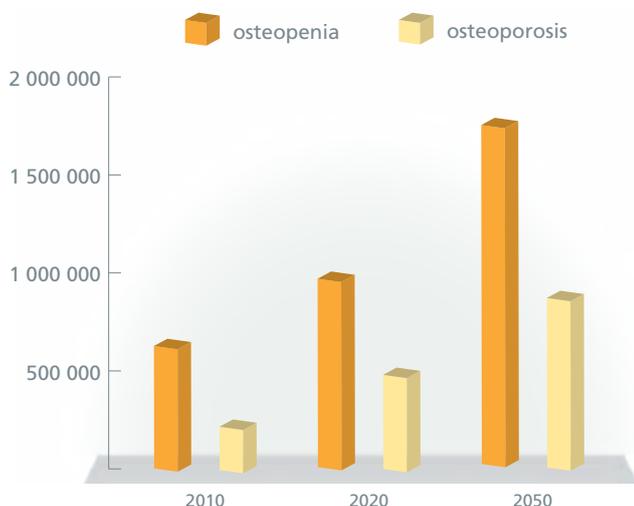


REF US Census Bureau

EPIDEMIOLOGY

It is estimated that about 1% of the total population is suffering from osteopenia.

FIGURE 2 Estimated number of people with osteopenia and osteoporosis in 2010 and projections until 2050



In a retrospective study conducted in 2005, that included both men and women aged 65 years and over, 63.5%

of women and 45.9% of men were shown to have osteoporosis at any site¹. However, lower values for women were reported in a 2008 multicentre study of 724 postmenopausal women residing in five major cities, with a mean age of 57.6 ± 9.6 years. In this study, 30% of the women were found to have osteoporosis and 27.2% had osteopenia².

The overall osteoporosis prevalence in men and women aged 50 years or over in terms of femoral neck BMD measurements were 7.5% and 12.9%, respectively³.

Hip fracture

Currently, it is estimated that there are around 24 000 hip fractures per year in Turkey (fig 3, table 1 and fig 4).

In comparison with the MEDOS and FRACTURK study, there has been a substantial increase in the age and sex specific risk of hip fracture over the past 20 years.

In Turkey, 77% of hip fractures are surgically treated.

The average hospital bed day per hip fractures is 11 days, which is around 270 000 bed days per year for hip fractures.

FIGURE 3 Projections of the number of hip fractures per year until 2050

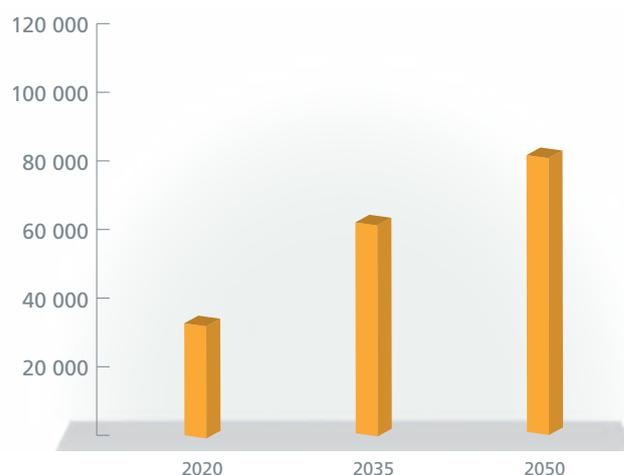


TABLE 2 Direct costs for hip fractures and projection

YEAR	TOTAL DIRECT COSTS (IN MILLION USD)
2010	72
2020	100
2050	205

The estimated direct hospital costs for hip fracture: USD 3000 per case.

By comparison, in a 2007 study, the cost of lung cancer was estimated to be USD 18 000 per year with a mean direct medical cost of USD 5480⁵.

Vertebral fracture, other fragility fractures

No information available.

DIAGNOSIS/TRAINING COURSES

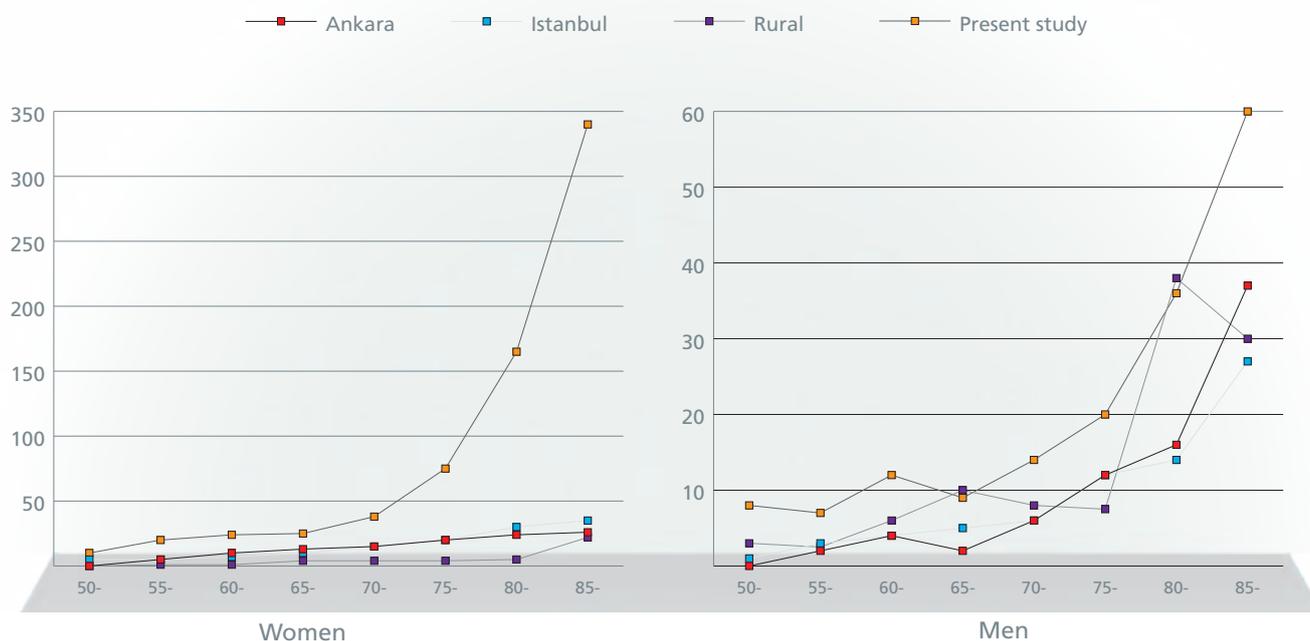
In total, there are 1000 DXA machines available all over Turkey and the exam costs USD 50. Annual DXA exams are reimbursed without restriction in all reimbursement plans (private and public). The waiting time for a DXA scan is 0-2 days.

The Turkish Osteoporosis Society organized two clinical densitometry training courses in collaboration with IOF.

TABLE 1 Number of hip fractures and incidence (rate/100 000)³

AGE (YEARS)	MEN			WOMEN		
	NUMBER OF FRACTURES	POPULATION	INCIDENCE	NUMBER OF FRACTURES	POPULATION	INCIDENCE
50-54	37	51 743	71.5	26	52 327	49.7
55-59	23	41 493	55.4	27	41 461	65.1
60-64	34	32 488	104.7	32	30 520	104.8
65-69	24	28 151	85.3	41	24 636	166.4
70-74	32	23 356	137.0	52	20 223	257.1
75-79	39	20 472	190.5	105	14 534	722.4
80-84	35	10 214	342.7	91	5637	1614.3
> 85	27	4575	590.2	71	2099	3382.6

FIGURE 4 Incidence of hip fracture (rate/10 000) in the FRACTURK study³ and the MEDOS Turkish Centres⁴



REIMBURSEMENT POLICY

Initial intervention with therapy in Turkey includes; bisphosphonates (alendronate, risedronate, ibandronate, and zoledronic acid). Patients ≥ 75 yrs or with hip fracture are covered regardless of DXA measurements, patients ≤ 65 years and T-score ≥ -3 are covered regardless of CRFs, patients ≥ 65 years, are covered regarding WHO definition in terms of DXA measurements, patients with a pathological fracture, or secondary osteoporosis are covered regardless of age (T-score should be ≥ -1). Other medications (strontium ranelate, raloxifene, calcitonin) are considered for patients who are unable to comply with administration of, or have a contraindication to or are intolerant of bisphosphonates. Teriparatide is reserved for women above 65 years, having T-score ≥ -4 (lumbar or hip total), and more than 2 fractures confirmed by X-Ray are necessary for it to be reimbursed (prescribed only by endocrinologists!).

CALCIUM AND VITAMIN D

Calcium and Vitamin D supplements are available; calcium enriched milk is available, whereas no vitamin D fortified products are available.

There is no official programme in lifestyle prevention of osteoporosis.

PREVENTION, EDUCATION, LEVEL OF AWARENESS

In Turkey, osteoporosis is not yet recognized as a major health problem. There is no specific government policy or guidelines regarding osteoporosis, on the other hand diabetes mellitus and chronic obstructive pulmonary diseases have additional importance in Turkey.

There is an average level of awareness among health care professionals, but both the Turkish Society of Osteoporosis and Osteoporosis Patient Society of Turkey are planning special training programmes for general practitioners, family physicians, and specialists in many locations around the country. Turkish physicians mostly use international guidelines, but the Turkish Osteoporosis Society agreed on developing a clinical guideline for physicians, which should be available in the fall of 2011.

A study conducted in 2008 demonstrated that the level of awareness about osteoporosis among rural Turkish women aged 40 years and older is low⁶. In another study,

it was reported that only 54% of osteoporotic patients were aware of osteoporosis which means that 46% were not⁷. In general, patients in rural areas have less access to health care centres and accordingly less opportunity to acquire knowledge about osteoporosis from physicians.

The Osteoporosis Patient Society of Turkey has developed a prevention programme collaborating with both governorships and The Ministry of Education to increase the awareness of children at primary schools, and elderly people living in Nursing Homes. The aim of the project is to build a bridge between primary and tertiary prevention.

RECOMMENDATIONS

Specific actions should be taken in order to reach patients at high risk for osteoporosis and related fractures and to organize educational programs for health care professionals on a regular basis to update the level of knowledge regarding osteoporosis.

At the government level, the collaboration with societies and academic staff is necessary to develop specific prevention strategies for osteoporosis and related fractures. The government should take action in order to build a bridge between primary and tertiary prevention in Turkey.

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UNITED ARAB EMIRATES

OVERVIEW

The prevalence of osteoporosis in the United Arab Emirates (UAE) is affected by the rather unique population structure. The total population is around 4.9 million. Of this, 20% are Emirati nationals with a female/male ratio of 1/1.1. The rest are expatriates with a female/male ratio of 1 to 4.

Moreover, the total population above 50 years of age is only around 7%. Thus the expected population with osteoporosis will be relatively small in number, however proper epidemiological prevalence figures for osteopenia and osteoporosis in UAE are not available. One screening study on 1825 healthy individuals, average age 42 years, using quantitative ultrasound, revealed that 24% had osteopenia and 2.5% had osteoporosis.

Although no national registry of hip fractures has been initiated in UAE, we estimated that there are 2.25 osteoporotic hip fractures per 1000 population. This data is from the records of one major hospital in Abu Dhabi.

With a DXA scanner distribution of 0.1 per 10 000 population in UAE there is an obvious need for increased resources. The issue of hypovitaminosis D also carries great relevance as a previous study here on the local population revealed that 78% had deficient levels.

So far osteoporosis is not regarded as a major health problem at governmental level and there are no national guidelines available in this context. The Emirates Osteoporosis Society (EOS) and a division of the Emirati Medical association (EMA) have recently been in contact with the governmental health bodies to raise awareness of current and future activities.

EOS successfully organized the 4th Pan Arab Osteoporosis Meeting in Dubai in March 2008 and a World Osteoporosis Day event in 2007. Now it is looking forward to the IOF Regionals – 1st Middle East and Africa Meeting in Dubai in October 2011. This event will serve to greatly increase awareness in regard to osteoporosis at the governmental level and among health professionals in UAE and throughout the entire region.

KEY FINDINGS

The present population in UAE is estimated to be 4.9 million, of this 7% (300 000) is 50 years of age or over and less than 25000 is 70 or over. By 2050, it is estimated that 12% (550 000) of the population will be 50 or over and 2% will be 70 or over while the total population will increase to 8 million (fig 1).

FIGURE 1 Population projection for UAE until 2050



REF US Census Bureau

EPIDEMIOLOGY

It is estimated that 24% of people have osteopenia (estimation based on a screening of 1825 healthy individuals) and 2.5% people have osteoporosis (average age 42, with QUS).

Hip fracture

Currently, there is no national hip fracture registry available but it is estimated that there are 2.25 osteoporotic hip fractures per 1000 population per year (data collected from a major hospital in Abu Dhabi).

In United Arab Emirates, 90% of the hip fractures are surgically treated. The average number of bed days is 14 days per fracture.

Direct hospital costs are estimated to be USD 12 000 per patient and loss of productivity to the workplace is estimated to be 90 days.

Vertebral fracture, other fragility fractures

No information available.

DIAGNOSIS

There are around 50-55 DXA machines all over UAE, mostly located in the main cities. The length of waiting time to access a DXA exam is 7-10 days in government hospitals and 1 day in private hospitals. The DXA exam costs USD 100-200 and an ultrasound USD 50-70.

REIMBURSEMENT POLICY

DXA exams and osteoporosis treatments are reimbursed for UAE nationals and private health insurance usually reimburses drugs and the exams for expatriates.

CALCIUM AND VITAMIN D

Calcium and vitamin D supplements are available.

PREVENTION, EDUCATION, LEVEL OF AWARENESS

Today, osteoporosis is not yet recognized as a major health problem in UAE and there are no government-approved guidelines.

Programmes on lifestyle prevention are limited to EOS awareness programmes.

The level of awareness among health care professionals and allied health professionals is estimated as medium to poor except in some specialties like rheumatology or endocrinology.

RECOMMENDATIONS

Osteoporosis should be recognized as a major health problem by the government – there is a need for government-approved guidelines and prevention programmes. Individuals should have greater access to DXA scans. The level of awareness among health care professionals must be increased to ensure improved diagnosis, prevention and treatment.



CONCLUSIONS AND RECOMMENDATIONS

Osteoporosis and fragility fractures represent a major public health burden throughout the region. This audit, that included seventeen countries from the Middle-East and Africa, indicates that it is a serious and costly disease, to be added to the growing list of NCDs. The disease burden can only rise with the projected increase in the aging populations, with over 35% exceeding the age of 50 years. Thus, in the coming decades, the number of fragility fractures is anticipated to double if not quadruple in most countries.

The expected increase in life expectancy, the high prevalence rates of vitamin D deficiency, heavy smoking, sedentary lifestyle, low socioeconomic levels, and significant restrictions in access to healthcare for elderly with limited pension and retirement plans, are major culprits compounding the social and economic burden of osteoporosis. Across the board there is a dearth of solid epidemiological data on fractures, research is scarce, and when present is usually limited by weak designs, thus providing at the most only fair evidence. When available, studies reveal hip fracture rates to be significant throughout the region, incurring substantial morbidity and mortality, and heavily taxing limited national healthcare budgets. There are often no formal standards of care and access to diagnostic facilities and reimbursement policies are generally limited. In most countries in the region, health authorities do not yet consider osteoporosis a national health priority.

Establishing a solid partnership between the main stakeholders, that is policy makers, researchers/centres of excellence, national/regional osteoporosis societies, patients and health care professionals is a priority. Only such partnerships can ensure optimal healthcare delivery, and achieve a substantial impact on the disease burden incurred by this silent, yet so devastating and costly, disease. This pressing call can no longer be ignored.

SUPPORT RESEARCH TO GATHER THE NEEDED EVIDENCE

Government support must be expanded in terms of logistics and financial assistance, to national osteoporosis task forces, academic centres and experts, to gather the

evidence needed to develop comprehensive policies at primary, secondary and tertiary healthcare levels.

- Support and promote large scale epidemiological studies on prevalence and incidence of osteoporosis and fractures, relevant risk factors, and outcomes.
- Establish hip fracture registries in several major centres in the region to monitor hospitalization rates, and relevant indicators.
- Support research aimed at evaluating quality of life and economic impact of osteoporosis and fractures.
- Evaluate the impact of hypovitaminosis D on musculoskeletal and other outcomes.

FORMULATE NATIONAL HEALTH POLICIES, DEVELOP AND DISSEMINATE GUIDELINES

Local leaders, experts in the field, investigators, scientific and IOF national societies must lobby policy makers in Ministries of Health (MOH) and the WHO to upgrade the priority of osteoporosis among NCD policies. Health authorities also need to establish and endorse national strategies to impact on the serious health burden imposed by osteoporosis, based on solid evidence.

- Implement national and regional guidelines for prevention, diagnosis and treatment of osteoporosis.
- Promote and instigate affordable lifestyle and treatment strategies (including falls prevention) through government health care policies and community-based initiatives.
- Develop vitamin D supplementation strategies based on local data for at risk groups.
- Develop cost-effective health policies to reduce the gap in fracture care management and thus reduce the burden of osteoporotic fractures.

CAPACITY BUILDING, EDUCATION/TRAINING AND QUALITY IMPROVEMENT PROTOCOLS IN THE FIELD

No impact is possible without the critical involvement of medical and healthcare professionals, national osteoporosis societies and patients.

- Engage health care providers and allied health care professionals through regular training and required certification, where applicable.

- Disseminate and reinforce National Osteoporosis Guidelines.
- Disseminate knowledge about fracture risk assessment, and about FRAX[®] as a cost-effective alternative for fracture risk assessment if BMD is not indicated or not available.
- Improve access to and availability of DXA and appropriate, reimbursed therapies.
- Institute and monitor quality assurance programmes for vitamin D assays and DXA measurements.
- Establish quality assurance protocols for evaluation and approval of generic anti-resorptive therapies to widen access to effective care.
- Empower patients through public awareness campaigns, including those that identify risk factors to prevent the first fracture.



APPENDIX

MIDDLE EAST AND AFRICA REGIONAL AUDIT MEDLINE SEARCH METHODOLOGY

The search methodology outlined in this Appendix was developed at the American University of Beirut Medical Center by the Medical Librarian at Saab Medical Library in collaboration with Dr Najla Itani. It was conducted and applied to all countries included in the Audit.

The search was comprehensive and ensured that all relevant references were included.

A total of 3650 titles were screened, 106 of abstracts of original papers reviewed and 70 full text papers ultimately retrieved and formally reviewed.

Stage 1: Defining sections of the template requiring literature review

The template that was provided by the International Osteoporosis Foundation (IOF) was assessed, and the sections that the team members believed could be completed using a pertinent literature review proceeded through the stages described below. There were, however, several sections that did not necessarily require a literature review, but rather expert opinion, key informants from the WHO or Ministries of Health, or relevant contact with distributors of medical equipment. The latter sections are listed below.

1. Diagnostics
2. Treatment
3. Recommendations

Stage 2: Defining relevant terms to be searched

All remaining subdivisions of the sections to be used in the literature review were used to identify the *main search terms* that would be necessary for the completion of the online search. Related terms were then generated from the main terms. For example, the main search term “cost” can also be designated as “economic burden” or “expenditure” (related terms). *The 25 main search terms were country X (Lebanon, KSA, etc.), fracture, incidence,*

osteoporosis, osteopenia, treatment, cost, hospital bed days, hip fracture (specifically), work productivity, quality of life, breast cancer, ovarian cancer, prostate cancer, heart disease, pulmonary disease, lifestyle prevention, government policy, awareness, patient awareness, health care professional, specialized fields, medical education, medical training, and guidelines.

Stage 3: Creating a search strategy for pertinent literature

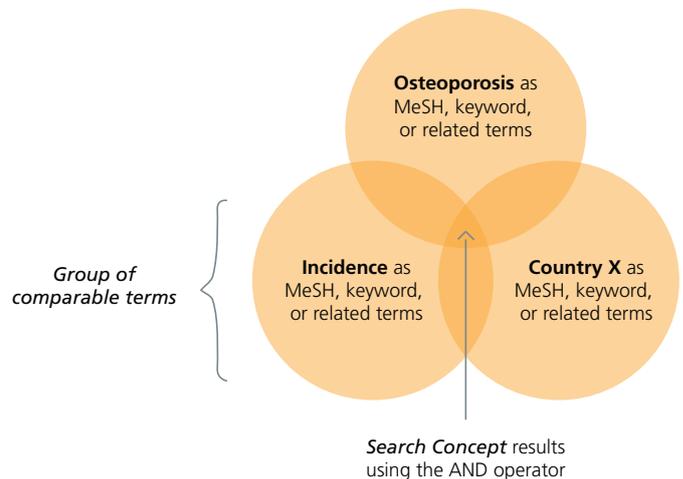
The online search utilized diverse search options/ techniques that the OVID interface allows such as MeSH¹ terms, explode functions, keyword searching in title, abstract, and subject headings, adjacency, and publication types, in addition to Boolean operators (and, or) and truncation. All of the latter were used to identify as many relevant articles as possible using the main terms and related terms that were previously agreed upon.

Please refer to the diagram on the subsequent page for a graphic representation of the following: For every subdivision in the template, all previously defined main terms were searched as a MeSH term (if applicable)

EXAMPLE

Search concept = Number of people with osteoporosis in Country X

Main Search terms = Osteoporosis, Incidence, and Country X



and as a keyword along with all its related terms. This would yield a group of comparable words merged using the OR operator. Then, one group of terms would be combined using the AND operator with other groups to yield the *search concept* for that subdivision (eg. Osteoporosis group of terms AND Incidence group AND Country X group to give search concept = Number of people with osteoporosis in Country X). This concept would be used as a final search to retrieve as many articles as possible for the topic of the subdivision. This was then replicated for all subdivisions to form a template of searches that could be applied repeatedly to each country of interest (see *Example on previous page*).

Stage 4: Applying the template of searches to all the countries of the audit- Final count for countries included in the Audit.

The template of searches was then performed on each of the relevant countries with adjustments only made to the country name search group. Template was applied to all 67 countries of the Middle East and Africa: 5 countries came back with no hits and 62 remaining countries proceeded to the next stage; 39 countries had 0 hits after last stage of screening (full-texts), 3 of the 39 countries with 0 hits were still left under consideration because of active CNS (UAE, Algeria, Kenya), the remaining 23 countries had at least one hit but 6 were excluded from the audit because of lacking CNS IOF status, so that a total of 20 countries were to be included in the Audit. However due to the inability to collect sufficient data and/or the absence of an IOF national society, Algeria, Libya, Oman and Yeman were ultimately not included.

Stage 5: Applying limits

Due to the well-established scarcity of literature in the region, the only limit that was applied to each search was a limit to articles about humans. Restriction by age may have excluded articles with prevention or awareness data and was therefore not set as a limit.

Stage 6: Screening

The final articles were then screened using a three-tier approach to reduce the number of irrelevant finds.

Step 1) Screening by titles of articles

Each of the searches was evaluated for relevance by

comparing the titles of the articles to the search concept or topic of the template subdivision. The titles of articles that were unrelated to the audit topics were excluded. Examples include titles with facial bone fractures or conditions not associated with osteoporosis, fracture, and relevant diseases such as breast cancer or heart disease. A Total of 3650 article titles were screened.

Step 2) Pull all relevant abstracts identified by title search.

A total of 106 abstracts were screened.

Step 3) Pull all relevant full text articles identified by abstract search.

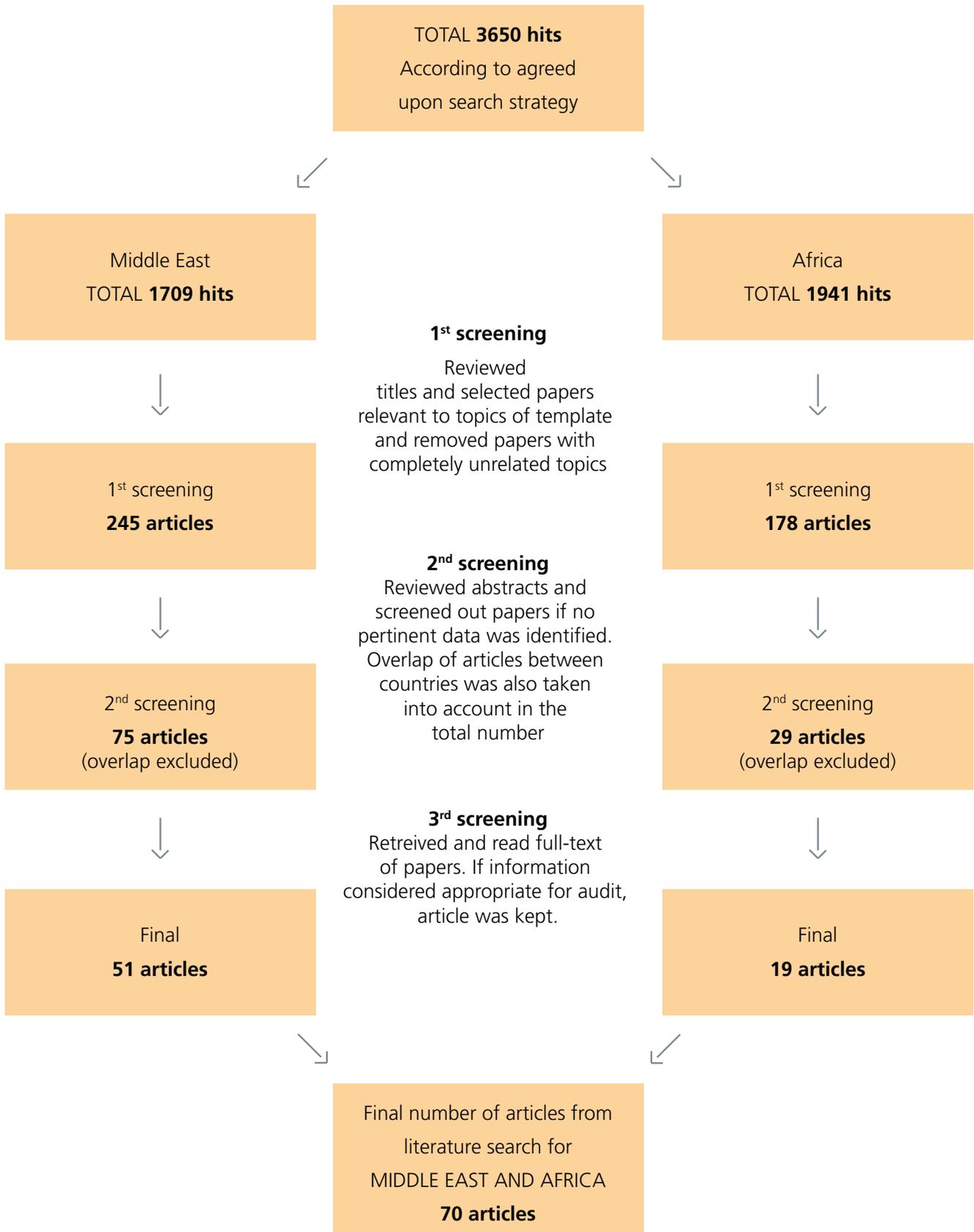
A total of 70 full text articles were reviewed (see Diagram below).

Additional papers provided by authors and collaborators were also used.

NOTE

MeSH is used by the indexers at National Library Medicine to describe the content of an article. These MeSH terms are also organized in a hierarchy or tree structure, and this would allow users to explode a MeSH to ensure that narrower MeSH terms are also included in the search results.

LITERATURE SEARCH Middle East and Africa



THE MIDDLE EAST & AFRICA REGIONAL AUDIT

Epidemiology, costs & burden of osteoporosis in 2011

This Audit report, covering 17 countries in the Middle-East and Africa region, is the first to collect information on the epidemiology, burden and costs of osteoporosis in one document. The report assesses current and projected disease burden, and identifies gaps in knowledge and care that are relevant to the region.

The gaps shown are considerable and the future projections for the majority of the countries indicate that there will be a drastic rise in fragility fractures as the proportion of older people in the population grows. Evidently, action must be taken by all stakeholders – government health policy officials, medical professionals, health insurances and the public – to reduce the impact of osteoporosis and related fractures. Being the first report of its kind for the region, we hope that this Audit will become a valuable tool that serves as a ‘Call for action’ to direct attention to this important healthcare challenge.

Professor Cyrus Cooper

Chair of the Committee of Scientific Advisors, IOF

International Osteoporosis Foundation

Rue Juste-Olivier 9
CH-1260 Nyon
Switzerland
T +41 22 994 01 00
F +41 22 994 01 01
info@iofbonehealth.org
www.iofbonehealth.org

The production of this report was supported by an unrestricted educational grant from:



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