



THE LATIN AMERICA REGIONAL AUDIT

Epidemiology, costs & burden of osteoporosis in 2012

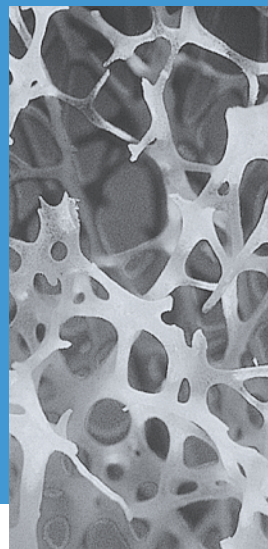


What is osteoporosis?

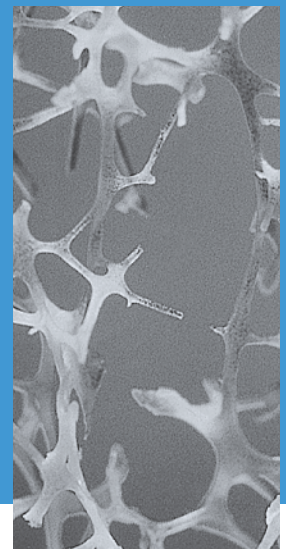
Osteoporosis is a disease in which the density and quality of bone are reduced, leading to weakness of the skeleton and increased risk of fracture, particularly of the spine, wrist, hip, pelvis and upper arm. Osteoporosis and associated fractures are an important cause of mortality and morbidity. In women over 45, osteoporosis accounts for more days spent in hospital than many other diseases, including diabetes, myocardial infarction and breast cancer¹. Osteoporosis may be asymptomatic until the patient 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

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FOREWORD

From data published worldwide we know that osteoporosis and fragility fractures are a major public health problem. Worldwide an osteoporotic fracture occurs every 3 seconds and a vertebral fracture every 22 seconds. In their remaining lifetimes, up to one in two women aged over 50 will experience an osteoporotic fracture; over a full lifetime a woman's chance of sustaining a fracture of the hip or spine is approximately 14% and 28% respectively – fractures at both sites result in substantial morbidity and mortality.

This report comprises the first attempt to gather information and assess the burden of osteoporosis in the Latin American region. Similar to many other geographical regions in the world there is a dearth of solid epidemiological data which makes it difficult to ascertain the true burden of osteoporotic fractures.

A notable key finding from this Audit is the expected explosion in the ageing population in almost every country in the Audit, leading to a predicted surge in the number of osteoporotic fractures. This will result in increased disability and premature death throughout the region. Additionally, many people in the region with osteoporosis lack access to appropriate diagnosis and care. In many cases people are not diagnosed with osteoporosis, even after coming to medical attention for fracture treatment. Thus osteoporosis remains low on the radar of many healthcare professionals involved in the care of fragility fractures.

The regionalisation strategy of the International Osteoporosis Foundation (IOF) includes the development of education, training, and awareness programmes for the five geographic regions of the world. A flagship of this process has been the production and dissemination of epidemiological audits. This 2012 Audit on the Epidemiology, Costs and Burden of Osteoporosis in Latin America is the fifth of its kind, following four successful regional audits; the 2008 European Audit, the 2009 Asia Audit, the 2010 Eastern European and Central Asia Audit and the Middle-East and Africa Audit in 2011. These Audits have been extremely useful policy tools which have enabled national societies,



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clinicians and key opinion leaders to assist in moving osteoporosis up the ladder in terms of importance. Such reports have far reaching effects in terms of increasing awareness at a public, healthcare professional and political level.

This Audit assesses current and projected disease burden in the region and identifies gaps in data, knowledge and care relevant to osteoporosis in Latin America. In almost all of the 14 countries included in this Audit, the scarcity of solid data and the lack of national databases and fracture registries is a common scenario. Even with the lack of robust epidemiological information for many countries, this report represents the first comprehensive assessment of osteoporosis in the region and denotes a landmark undertaking by the many expert clinicians and national osteoporosis societies involved in the compilation.

We hope that, having compiled these data, the Audit will help consolidate the efforts of all stakeholders in the region to establish a plan of action that will make fracture prevention a reality. We urge policy makers and healthcare professionals to join forces to formulate and implement effective strategies that will promote bone and muscle health for the community at large, and that will help to prevent fractures - and particularly secondary fractures - in those at high risk.

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Colombia	ASOCIACION COLOMBIANA DE OSTEOLOGIA Y METABOLISMO MINERAL (ACOMM) www.acomm.com.co
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Dominican Republic	DOMINICAN OSTEOPOROSIS, MENOPAUSE AND METABOLIC DISEASE FOUNDATION (FUNDEMOS) DOMINICAN MENOPAUSE AND OSTEOPOROSIS SOCIETY (SODOMOS) DOMINICAN SOCIETY FOR CLIMACTERIC AND MENOPAUSE STUDY
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Mexico	MEXICAN ASSOCIATION OF BONE AND MINERAL METABOLISM (AMMOM) www.ammom.com.mx MEXICAN COMMITTEE FOR THE PREVENTION OF OSTEOPOROSIS (COMOP)
Panamá	OSTEOPOROSIS AND BONE METABOLIC DISEASE FOUNDATION (FOSEMO) www.fundafosemo.org
Perú	SOCIEDAD PERUANA DE REUMATOLOGIA www.socreuma.org.pe PERUVIAN SOCIETY OF OSTEOPOROSIS AND BONE DISEASES (SPOEO)
Uruguay	URUGUAYAN SOCIETY OF OSTEOPOROSIS AND MINERAL METABOLISM (SUOMM) URUGUAYAN SOCIETY OF RHEUMATOLOGY (SUR) www.reumauruguay.org
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EXECUTIVE SUMMARY

Current predictions reveal a steady increase in the world's population, which is expected to reach upwards of 7.5 to 10.5 billion by the year 2050. Latin America and the Caribbean region account for 9% of the world's total population, with Brazil, as the fifth most populous country in the world, accounting for 32% of individuals in this region.

More importantly, with the exception of a few countries, the population in every region of the world is becoming more elderly. The world has never before faced an aged population of this magnitude. This shifting demographic is predicted to continue well into the 21st century, with implications that will be far-reaching for society and healthcare systems globally.

The Audit focussed on 14 countries in the Latin American region with an IOF National Society and/or sufficient information identified through the literature search and/or provided by key opinion leaders to enable sufficient conclusions to be drawn. Data were thus included for Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Guatemala, Mexico, Nicaragua, Panama, Peru, Uruguay, and Venezuela.

Statistics from the countries represented in this Latin America Audit reflect this shifting demography. Of the 14 countries examined the current percentage of the population 50 years of age and older lies between 13 and 29 per cent (U.S. census bureau). By 2050, these figures are estimated to increase 28 to 49 per cent. More significantly, the percentage increase in the 70 and over population between 2011 and 2050 averages 280%. Owing to continued advances in healthcare, the developing nations highlighted in this Audit are expected to have, on average, life expectancy increases of six years by the year 2050. This factor is likely to ensure a steady growth of the aged population in the coming decades.

The impact of these ageing populations will undoubtedly include an increase in the percentage of the population diagnosed with osteoporosis and an increase in the number of people with related fragility fractures. Other age-related chronic diseases of the

musculoskeletal system, such as osteoarthritis, will also be on the rise.

Currently, prevalence data for osteopenia and osteoporosis in Latin America are scarce. Research conducted in Argentina has revealed that one out of four women aged above 50 years has normal bone mineral density, two have osteopenia, and one has osteoporosis. Other countries participating in this audit revealed similar rates of osteopenia and osteoporosis using smaller non-population based studies.

The Latin American Vertebral Osteoporosis Study (LAVOS) included five countries in the region: Argentina, Brazil, Colombia, Mexico and Puerto Rico. An overall vertebral fracture prevalence rate of 14% was found for all ages and countries combined. Of note, the vertebral fracture prevalence rate reached as high as 38% in women 80 years and over. Work in this region pertaining to hip and vertebral fracture incidence rates is also limited. Data from Argentina revealed an annual rate for hip fractures as high as 488 per 100 000 for the population over 50 years old.

Osteoporosis is considered a health priority in only three of the 14 countries; Brazil, Cuba and Mexico. Osteoporosis guidelines are available in nine of the 14 countries, but none, with the exception of Bolivia and Cuba, are government approved. Access to dual-energy X-ray absorptiometry (DXA) machines is limited to urban areas and private clinics in the majority of the region and machine availability estimates range from one to ten per one million inhabitants.

Currently, only 4 of the countries in the region (Argentina, Colombia, Ecuador and Mexico) have an online FRAX calculator.

Bisphosphonates are available in every audited country with reimbursement policy differing in each country. Access to other osteoporosis medications such as selective estrogen receptor modulators (SERMs), strontium ranelate, hormone replacement therapy (HRT), parathyroid hormone (PTH) and denosumab is variable among the Audit countries.

Vitamin D studies are also limited in this region, but the available evidence reveals an abundance of hypovitaminosis D throughout Latin America.

For the Latin American region it is clear that access to diagnostics is restricted and access to care is highly variable particularly in regard to urban versus rural settings. The extreme lack of solid epidemiological fracture data is a major obstacle in assessing the size of the problem and therefore severely limits the ability of national experts to lobby for policy change that would lead to improved services for diagnosis and care of the osteoporotic patient.

This Audit should be used as a *call to action* for collaborative efforts to be sustained between national osteoporosis societies, key opinion leaders, academic institutions, policy makers and government bodies throughout the region; to gather solid epidemiological data on the disease burden, improve awareness and education, put in place effective preventative strategies and improve availability of diagnostic tests and affordable medication to stop the fragility fracture cascade.

Only with collaborative and focused strategies can the care gap be closed.

ATTENTION TO BONE HEALTH IS ESSENTIAL AT ALL STAGES OF LIFE.



KEY FINDINGS IN LATIN AMERICA IN 2012

SIGNIFICANTLY INCREASED FRACTURE RATES PREDICTED AS AGEING POPULATION SET TO EXPLODE IN COMING DECADES

- According to the World Health Organization, the population aged 65 years and over will increase significantly in the next 50 years in Latin America and the number of hip fractures will become similar to the numbers in the US and Europe today¹.
- It has been calculated that in 2050 there will be 6.3 million fractures per year worldwide, with more than half of these occurring in Latin America and Asia².
- It is estimated that there were 5236 and 2104 hip fractures respectively in Chilean women and men (both age 45 years and older) in the year 2008³. Estimated projections for 2050 show an increase in these numbers to 9988 and 4007 for women and men respectively⁴.
- In the year 2006, 9295 hip fractures were recorded in Cuba. This number has increased steadily over the years; 16 878 cases were reported in 2010 (Ministry of Public Health (MINSAP)).
- In Mexico, the annual number of hip fractures will rise from 29 732 in 2005 to 155 874 expected in 2050. If the age-specific incidence of hip fracture continues to rise, the number of hip fractures would increase by a further 46%⁵.
- In Argentina, over 34 000 hip fractures occur every year among the population 50 years of age and older, with an average 90 such fractures per day. Predictions show the numbers of hip fractures per year in this population will almost triple by the year 2050.
- Projections estimate that the number of hip fractures per year in Brazil, (currently at about 121 700) is expected to reach 160 000 by the year 2050^{6,7}.
- It is estimated that 8000 to 10 000 hip fractures per year occur in Colombia. Projections suggest that the number of hip fractures in women will increase to 11 500 annually by 2020.

HIGH INCIDENCE AND PREVALENCE RATES FOR OSTEOPOROSIS AND FRACTURES THROUGHOUT THE REGION

- In Colombia, it is estimated that currently 2 609 858 and 1 423 559 women are living with osteopenia and osteoporosis respectively. For the year 2050, these numbers could increase to 3 852 200 and 2 101 000 respectively.
- A community based hospital study, conducted in Colombia in 1999, showed a hip fracture incidence rate of 234.9:100 000 and 116.5:100 000 women and men per year respectively (50 years of age and over)^{8,9}.
- Based on data from Quiñonez¹⁰, the Asociación Guatemalteca de Climaterio y Menopausia estimates that, in the year 2020, 512 024 hip fractures will occur in Guatemala.
- A study in Costa Rica found that of 5580 DXA scans completed, 63% of the scans were abnormal. Of these, 64.5 % were osteopenic and the remaining 35.5% were osteoporotic¹¹.
- In 2005, the ACCMYO conducted a survey evaluating 108 hospitalized patients 60 years of age and older in Costa Rica. In those patients, the prevalence rate of vertebral fracture was 33.3%.
- The prevalence of clinically apparent vertebral fractures in Argentinean women aged 50 years and older is 16.2%⁶.
- Bone mineral density studies reveal that in Argentina, two out of four women 50 years of age and older have osteopenia, one has osteoporosis, and one has normal bone density¹².
- One of every 12 Mexican women and one in 20 Mexican men over 50 years of age will sustain a hip fracture¹³.
- According to the WHO's operational definition of osteoporosis, 17% of Mexican women and 9%

of Mexican men 50 years and over present with osteoporosis of the lumbar spine, and 16% of Mexican women and 6% of Mexican men have osteoporosis in the proximal femur¹.

LIMITED ACCESS TO DIAGNOSTIC TOOLS AND THERAPY

- Access to DXA testing is limited to urban areas throughout the region with availability estimates ranging from one to ten per one million inhabitants.
- In Mexico, there is a lack of national programmes oriented towards the detection and treatment of osteoporosis in high risk groups. Nor are there widely available programmes to assist primary care physicians to detect or prevent osteoporosis and secondary fractures, or to improve public awareness of the disease.
- In Costa Rica, the length of wait for a DXA scan is six months for patients within the social security system but no wait for those with private insurance.
- Brazil and Chile have the most DXA machines (10 per million inhabitants) of all the countries represented in the Audit.
- There is approximately one DXA machine for every one million inhabitants in Bolivia, Guatemala and Nicaragua.
- Vertebral fractures are largely underestimated in Mexico. Statistics show this fracture to be the least frequently clinically diagnosed¹³.
- Diagnostic tools (central densitometry) are not widely available in Mexico, neither in private or governmental health institutions. Only 25% of the available equipment is found in the government health institutions that cover the vast majority of Mexicans¹³.
- Bisphosphonate therapies are widely available throughout the region with considerable variability in reimbursement policy.
- Other osteoporosis therapies such as SERMs, PTH, hormone replacement therapy (HRT), and strontium ranelate, are also available but access is often restricted.
- Effective treatments have been approved by the Mexican Ministry of Health and are available,

however not all of them are provided by the government health care system¹³.

- In Chile, the public health system does not cover the costs of diagnostic testing or medication for osteoporosis.

GUIDELINES, GOVERNMENT ENDORSEMENT AND GOVERNMENT POLICY

- Osteoporosis is a national health priority in only three of the 14 countries in the Audit – Brazil, Cuba and Mexico.
- Although osteoporosis guidelines are available in nine of the 14 countries, they are only government endorsed in Bolivia and Cuba.
- In Argentina, Bolivia, Chile, Colombia, Costa Rica, Guatemala, Nicaragua, Panama, Venezuela, and Uruguay osteoporosis is not recognized as a major health problem and there are currently no governmental public awareness programmes covering prevention, diagnosis or management of osteoporosis.
- A group of experts has been appointed to the National Commission of the Institutes of Health and high-level specialty hospitals in Mexico to set up a specific plan for the next decade to include timely diagnosis and treatment of osteoporosis, wide-scale prevention programmes, and programmes oriented to increase awareness of osteoporosis in patients and health care professionals¹³.
- In many countries in the Audit region, osteoporosis still remains an undetected and untreated disease because of lack of awareness at all levels.

FRACTURES REPRESENT A HUGE PERSONAL, SOCIAL AND ECONOMIC BURDEN

- Approximate direct costs for an individual hip fracture are generally estimated by experts or national societies. For example;
 - Uruguay 3100 USD
 - Chile 2000-7000 USD
 - Argentina 3100 USD
 - Guatemala 4000 USD
 - Costa Rica 8000 USD
 - Colombia 6500 USD
 - Brazil 12 000 USD



FRAGILITY FRACTURES POSE A BURDEN ON HEALTHCARE SYSTEMS AND OFTEN HAVE LONG-TERM CONSEQUENCES FOR SUFFERERS AND THEIR FAMILIES.

- In Mexico, more than 97 million USD were reported in 2006 as the direct cost for acute medical care of hip fractures; the costs could range from 213 to over 466 million USD for 2025 and from 555 to 4.1 million USD for 2050 according to different projections¹³.
- In many Latin American countries, there is a marked difference in the availability of medical coverage for osteoporosis between the public and private health systems.
- In Argentina, one study revealed in-hospital mortality was 10%, while 33% of fracture patients died during the year following the event¹⁴.
- In Uruguay, 60% of hip fracture patients go to rehabilitation centres, and it is estimated that for each hip fracture, three months of productivity are lost in the workplace. The average hospital bed stay for a hip fracture patient is 10-12 days. According to SUOMM, this length of stay is significantly longer than for other major diseases including breast cancer, ovarian cancer, prostate cancer, heart disease and pulmonary disease.

VITAMIN D DEFICIENCY AND LOW CALCIUM INTAKE

- In Chile, vitamin D deficiency is a problem among the paediatric and adult populations. One study found that 47.5% of subjects (aged 55-84 years) had hypovitaminosis D using a cutoff level of 17 ng/mL¹⁵.
- Several recent studies on vitamin D in Mexico suggest that there are significant rates of insufficiency and deficiency in both paediatric and adult population samples. No official recommendations are given for supplementation at any age¹³.
- In 2009, a study conducted in Brazil revealed that 60% of the healthy adolescents studied had vitamin D insufficiency as defined by serum 25(OH)D concentrations >25 but <75 nmol/L¹⁶.
- Several surveys have detected insufficient calcium intake (averaging 500 mg daily) in the adult population of Argentina¹⁷. Despite ample sunshine in most areas of the country, prevalence of insufficient levels of

25(OH)D (<20 ng/mL) in the elderly population is relatively high, not only in the south (87% of the population), but also in the mid (64%) and northern (52%) regions¹⁸.

- In 2001, a study looking at Costa Rican teenagers between the ages of 13-18 years showed that 80% reported a dietary calcium intake of less than 1000 mg/d. At the time of the study, the recommended calcium intake for this age group was 1300 mg/d^{19,20}.

DEARTH OF DATA

- There are virtually no data available on the status of vertebral fractures in eight of the 14 audited countries.
- There is an extreme lack of reliable epidemiological data throughout the region. Where available, the studies are small and often not population based. Bolivia as an example has virtually no epidemiological or fracture data.
- The FRAX[®] calculator (WHO Fracture Risk Assessment Tool) is only available in Argentina, Colombia, Ecuador and Mexico.
- Only eight of the 14 countries in the audit have published hip fracture incidence data, and of those countries, many of the studies are out-dated and non-population based.

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THE AUDIT REGION



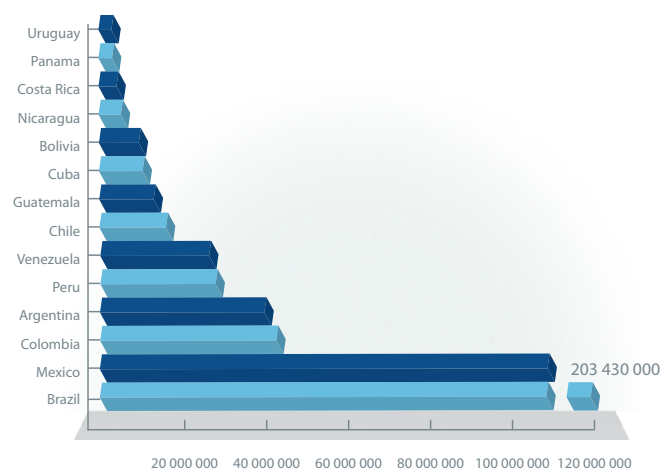
KEY COMPARISONS

DEMOGRAPHIC DATA

The countries represented in this audit region have a total population of 529 million people with an expected increase to 580 million and 684 million in the years 2020 and 2050 respectively. The most populous country, Brazil, currently has 203 million inhabitants with 20% of its population 50 years of age or older (fig 1). By the year 2050, Brazil's 50 and over population is expected to comprise 37% of the total population, with roughly 96 million people in this age range.

Cuba and Uruguay will see the large increases in their 50 and over populations. In comparison to Brazil, these countries populations are relatively small, but have proportionally larger over 50 populations of 28 (Cuba) and 29 (Uruguay) per cent with expected increases to 49 and 41 per cent respectively in 2050 (table 1).

FIGURE 1 Total Population by Country in 2011



SOURCE US Census Bureau, International Data Base 2011

TABLE 1 Percentage of population 50 years of age and over by country

COUNTRY	% OF POPULATION ≥ 50 YEARS	
	2011	2050
Argentina	25.0	36.6
Bolivia	13.8	29.0
Brazil	20.0	37.0
Chile	25.3	42.8
Colombia	19.0	39.0
Costa Rica	19.3	40.7
Cuba	28.0	49.0
Guatemala	12.9	27.8
Mexico	17.8	37.0
Nicaragua	13.0	38.0
Panama	19.0	36.0
Peru	17.7	36.3
Uruguay	29.2	41.7
Venezuela	17.2	33.0

SOURCE US Census Bureau, International Data Base 2011

TABLE 2 Population increase 70 years of age and over by country

COUNTRY	POPULATION ≥ 70 YEARS		
	2011	2050	% INCREASE
Argentina	3 203 061	7 354 684	129.6%
Bolivia	291 891	1 268 897	334.7%
Brazil	8 671 721	36 044 915	315.7%
Chile	1 037 461	3 234 614	211.8%
Colombia	1 736 444	7 781 619	348.1%
Costa Rica	183 697	898 883	389.3%
Cuba	842 286	2 067 798	145.5%
Guatemala	318 746	1 524 274	378.2%
Mexico	4 888 090	20 599 601	321.4%
Nicaragua	165 435	805 561	386.9%
Panama	160 427	651 086	305.8%
Peru	1 176 358	4 500 758	282.6%
Uruguay	324 754	567 325	74.7%
Venezuela	961 254	4 307 733	348.1%

SOURCE US Census Bureau, International Data Base 2011



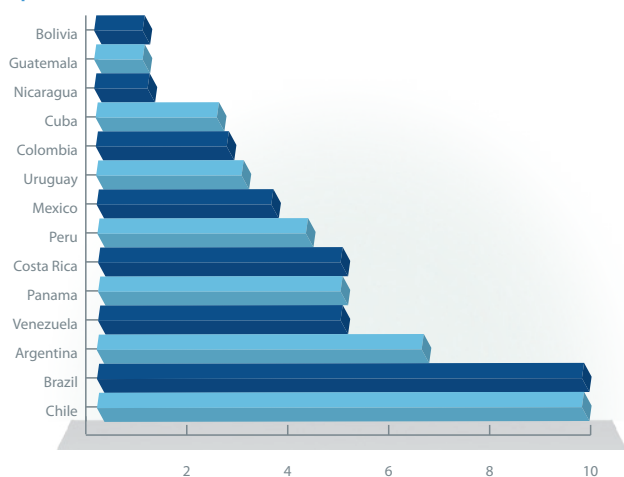
ACCESS TO BMD TESTING WITH DXA IS OFTEN RESTRICTED TO URBAN AREAS AND PRIVATE HEALTHCARE CENTRES.

Of note, the majority of the countries represented in the Audit can expect at least a doubling if not a tripling of their 70 and over populations by the year 2050 (table 2). Although Cuba's population is expected to decrease 17% by the year 2050, it will have the greatest proportion of the 70 and over population by far. This segment of the population will approach one quarter of the entire population, reaching 2 million people (22%).

Guatemala, Nicaragua, and Bolivia are expected to see the greatest increase in the proportion of the population 50 and over with all three more than doubling their current levels by 2050 (table 1).

Costa Rica is projected to have the greatest increase in its population aged 70 and over, with a percentage increase of 389% by 2050. Nicaragua and Guatemala will follow closely with increases of 386% and 378% respectively

FIGURE 2 Number of DXA machines per million population in Latin America



SOURCE Kanis JA 2011, data on file

(table 2). Of note, Guatemala is likely to see the most overall growth of any of the countries represented with an expected 66% increase in population by 2050, followed closely by Bolivia at 58%.

DIAGNOSTIC TOOLS AND COSTS

Bone mineral density testing (BMD) is available in every country represented in the audit. Dual-energy X-ray absorptiometry (DXA) and ultrasound are used throughout the region. Despite some countries having adequate numbers of DXA machines for their population, in many cases, access is restricted to urban areas and private healthcare centers. The number of DXA machines per million inhabitants and DXA costs are illustrated in figure 2 and table 3.

TABLE 3 Cost of DXA in the audited countries

COUNTRY	COST
Argentina	22 USD per region
Bolivia	50 USD
Brazil	48 USD
Chile	40-100 USD
Colombia	30 USD
Costa Rica	55 USD
Cuba	no cost to patient
Guatemala	75 USD
Mexico	18-131 USD
Nicaragua	120 USD
Panama	50-125 USD
Peru	35 USD
Uruguay	50 USD
Venezuela	40 USD (in 2000)

SOURCE data provided by IOF CNS member societies

TREATMENTS

TABLE 4 Osteoporosis medications available in audited countries

COUNTRY	BISPHOSPHONATES	HORMONE REPLACEMENT THERAPY	SERMs*	STRONTIUM RANELATE	CALCITONIN	PTH ANALOG	DENOSUMAB
Argentina	✓	✓	✓	✓	✓	✓	✓
Bolivia	✓	✓	✓	n/a	✓	n/a	n/a
Brazil	✓	n/a	✓	✓	✓	✓	✓
Chile	✓	✓	✓	✓	✓	✓	✓
Colombia	✓	✓	✓	✓	✓	✓	✓
Costa Rica	✓	✓	✓	✓	✓	✓	n/a
Cuba	✓	✓	n/a	n/a	✓	✓	n/a
Guatemala	✓	✓	✓	✓	✓	n/a	n/a
Mexico	✓	✓	✓	✓	✓	✓	✓
Nicaragua	✓	✓	n/a	✓	n/a	n/a	n/a
Panama	✓	✓	✓	✓	✓	✓	approved but n/a
Peru	✓	✓	✓	✓	✓	✓	✓
Uruguay	✓	✓	✓	✓	✓	n/a	approved but n/a
Venezuela	✓	✓	✓	✓	n/a	✓	n/a

n/a not available

*SERM Selective Estrogen Receptor Modulator

GOVERNMENT POLICY, GUIDELINES AND NATIONAL HEALTH PRIORITY

TABLE 5 Summary of where osteoporosis is designated a health priority and where guidelines have been developed and endorsed by government

COUNTRY	OSTEOPOROSIS IS A HEALTH PRIORITY	OSTEOPOROSIS GUIDELINES	GUIDELINES GOVERNMENT ENDORSED
Argentina		✓	
Bolivia		✓	✓
Brazil	✓	✓	
Chile		✓	
Colombia			
Costa Rica		✓	
Cuba	✓	✓	✓
Guatemala			
Mexico	✓	in process	
Nicaragua		✓	
Panama			
Peru			
Uruguay			
Venezuela		✓	

VITAMIN D STATUS IN LATIN AMERICA

In the year 2010, the population of Latin America and Caribbean region was 583 million, from diverse ethnic origins. Mean life expectancy is currently 74 years and a significant growth of elderly population is anticipated throughout the region. Geographic latitudes across this continent vary enormously, ranging from 33° North to 55° South. Dietary habits show ample variations between regions and an inadequate nutritional status is common in the poorer regions¹. Hip fracture incidence (an average of published data) is 178/100 000 persons aged 50 years and older². Studies from a few countries have addressed the status of vitamin D among small samples of diverse populations. Table 1 shows some of the findings in comparable studies. The Table also includes the percentage of persons with inadequate levels (<30 ng/mL) of 25-OH-Vitamin D (from now on referred to as “Vitamin D”) in the mentioned countries.

A study in healthy elderly men and women from different regions of Argentina showed significant differences in mean values of vitamin D between inhabitants of northern (20.7 ng/mL) and southern (14.2 ng/mL) provinces. This study showed a cutoff level

of vitamin D of 27 ng/mL at which serum PTH begun to increase³. In Buenos Aires, a study found that 55.8% of ambulatory women seen at an Internal Medicine Unit had inadequate levels of vitamin D. A summary from seven studies from ambulatory persons from Buenos Aires, showed differences in Vitamin D levels in summer (19 ng/mL) and winter (29 ng/mL)⁵. Also, another study from ambulatory patients seen at an endocrinology clinic at Belo Horizonte in Brazil, found that 42% of them had low vitamin D⁶.

An international study (*findings summarized in Table 1*), which included women from Brazil (n=151), Chile (n=115) and Mexico* (n=149), show low values of vitamin D and a high prevalence of inadequate levels in all three countries (lower in Mexico than in Chile and Brazil)⁷. Discrete studies have shown a high prevalence of inadequate levels of serum vitamin D in postmenopausal women from Recife (44%)⁸; in women with low bone mineral density from Rio de Janeiro (68.3%)⁹; and elderly persons from both sexes seen hospitalized (71.2%) and as ambulatory patients (55.8%) in a Clinic at Sao Paulo¹⁰.

The study also found that half of Chilean postmenopausal women had inadequate levels of vitamin D⁷.

Another study, which included postmenopausal women (mean age of 67.5 years) who attended a public invitation to attend a diagnostic clinic for osteoporosis, found that 47.5% had low vitamin D¹¹. In this study, the authors also addressed the prevalence of vertebral fractures finding them in 30% of the 55 women with a mean age of 67.5 years included in the series.

A further study found that elderly Mayans from Guatemala had very low levels of vitamin D and 96% of them had some degree of deficiency¹².

Vitamin D status in postmenopausal women from Mexico has been studied in different settings. Some were included in the international study by Paul Lips et al⁷. Another study included women being screened for an osteoporosis clinical trial, who were not taking

TABLE 1 Studies on vitamin D status in adults in Latin America

COUNTRY	MEAN AGE	MEAN VIT D NG/ML	% < 30 NG/ML	REF
Argentina	71.3	17.6	87	3
Argentina	58	28.76	55.8	4
Brazil	58.8	38.2	40.2	6
Brazil	67.6	32.6	42.4	7
Brazil	65.6	28.8	44	8
Brazil*	79.1	14.2	71.2	10
Brazil	76.9	19.8	55.8	10
Chile	62.6	30.2	50.4	7
Chile	67.5	16.78	47.5	11
Guatemala	69	21.32	96.3	12
Mexico	65.6	26.2	67.1	7
Mexico	63.6	18.9	96.8	13
Mexico	65.8	31.2	50.6	14

*Hospitalized and institutionalized patients



THE POPULATIONS OF MANY COUNTRIES IN LATIN AMERICAN HAVE BEEN SHOWN TO HAVE INADEQUATE LEVELS OF VITAMIN D – DESPITE AN ABUNDANCE OF SUNSHINE.

any supplements¹³ and one more study included women with osteoporosis seen in daily practice (many of whom were on vitamin D supplements)¹⁴. The frequency of vitamin D inadequacy was 67.1%, 96.8% and 50.6%, respectively. In this last report, osteoporotic women from Mexico City taking calcium and vitamin D supplements had higher mean values (33.6) of 25-OH-vitamin D than those not taking any (25.7)¹⁴.

A number of studies in Latin America have assessed vitamin D status in children and young adults. A study of neonates and mothers from the southernmost province of Ushuaia in Argentina showed they had lower 25-OH-vitamin D than those from Buenos Aires¹⁵. Other studies in children and young adults showed an association between vitamin D deficiency and earlier menarche in girls from Colombia¹⁶; or found that 60% of adolescent students from São Paulo had inadequate levels of vitamin D¹⁷. This was also found in 57% of medical residents in training at a hospital in Porto Alegre, both in Brazil¹⁸. Two separate studies of children from Colombia¹⁹ and Mexico²⁰ found a negative

correlation between vitamin D levels and obesity, raising interesting questions about the association between the two, and corresponding public health concerns.

Differences found in results from discrete studies should lead us to consider methodological differences in patient selection, including the use or not of supplements, the type of assay used in each study, seasonal variations and sun exposure habits. Practical aspects of vitamin D in both public health and daily clinical practice should consider the need to increase awareness about several aspects of the promotion of bone health among health authorities, health professionals and public in general²¹. Attitudes to and knowledge of vitamin D may be less than ideal among practicing physicians²². Most existing guidelines for the management of osteoporosis include vitamin D supplementation as an integral component of both prevention and treatment, but there are not many countries in Latin America where national health policies specifically address the approach to managing vitamin D deficiency. Although there is a list of

existing preparations which includes different forms of vitamin D (Cholecalciferol and Ergocalciferol, as well as analogs like alfalcidol and calcitriol, and probably other forms) in different countries of Latin America, actual availability of vitamin D2 and D3 preparations may be limited in several countries (including Mexico), probably because of a low demand for such preparations. A recent comprehensive report from Argentina reviews the different approaches to supplement Vitamin D. It includes some preparations not available in many countries²³.

Finally, there is controversy regarding the safety of sun exposure. It is the main source of vitamin D for humans (via stimulation of cutaneous synthesis of vitamin D) and it may be associated with an increase in the frequency of some cutaneous problems, including some forms of skin cancer. Some evidence suggests that the health burden of avoiding sun exposure may be more dangerous than the risks of limited safe exposure to the sun²⁴, clearly with avoidance of burning. Health professionals should consider endorsing this concept if it could lead to a widespread acceptance of a life-style factor that could modify the overwhelming evidence of an abundance of hypovitaminosis D in Latin America.

Authored by Jorge Morales-Torres, MD, Hospital Aranda de la Parra, Hidalgo, Mexico.

** Several recent studies on vitamin D in Mexico suggest that there are significant rates of insufficiency and deficiency in both paediatric and adult population samples - see page 47.*

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ARGENTINA

OVERVIEW

Argentina is a large country with many different climate regions ranging from a considerably cold climate in the south to a subtropical climate in the north. This geography may be a factor in the varying prevalence rates of osteoporosis among different regions. Therefore, it is important to perform epidemiological studies throughout the country to determine each region's individual status.

In 2011, the total population of Argentina was estimated at close to 42 million, with 10 million inhabitants aged ≥ 50 years. The population is expected to increase 28% by 2050 and will reach 53 million, with the over 50's population reaching 19.5 million¹.

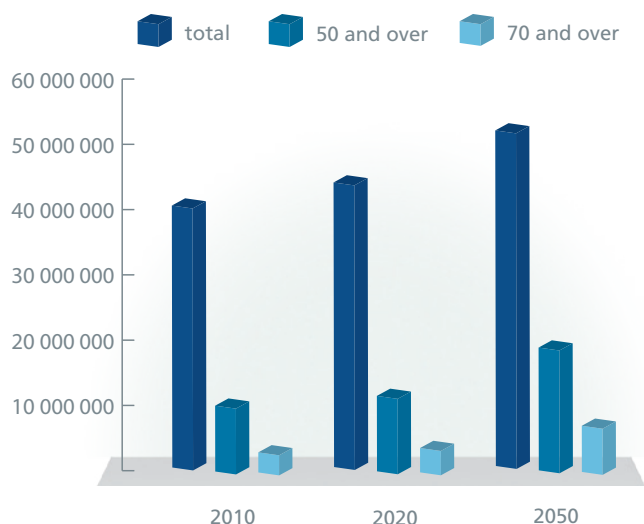
Local bone mineral density (BMD) studies reveal that two out of four postmenopausal women have osteopenia, one has osteoporosis, and one has a normal bone mineral density². By 2025 over three million women are expected to have osteopenia, rising to over five million in 2050. Although the rate of fragility fractures is higher in patients with osteoporosis, the absolute number of

fractures is higher in osteopenic patients. In Argentina, the mean annual rate of hip fractures is 298 per 100 000 women >50 years, and 118 per 100 000 men, with a 2.5:1 F/M ratio³⁻⁷. Thus, over 34 000 hip fractures occur every year among the aged population with an average 90 such fractures per day.

The Latin American Vertebral Osteoporosis Study (LAVOS) found an overall 16.2% prevalence of vertebral fractures in Argentinean women aged 50 years or over⁸. Hospitalization costs of hip and vertebral fractures in Argentina exceed 190 million USD per year. Consequently, the costs of osteoporosis for the public health system are staggering; however, the federal or the provincial governments of Argentina do not give the disease a high priority.

Efforts for the prevention of osteoporosis and fractures are urgently needed and include improved access to diagnostic tools. There is a particular need for improved education and awareness among individuals, health-care providers, policy makers and governments around prevention prior to the first fracture, timely diagnosis and improved management.

FIGURE 1 Population projection for Argentina until 2050



SOURCE US Census Bureau

KEY FINDINGS

Population growth statistics

The present population in Argentina is estimated to be 42 million. Of this, 25% (10 million) is 50 years of age and over and 7.6% (3 million) is 70 years and over. By 2050, it is estimated that 37% (19.5 million) of the population will be over 50 years, and 14% (7.4 million) will be 70 years and over while the total population will increase to 53 million¹ (fig 1).

The Argentinean population is expected to grow 28% by 2050, but the population aged 50 years and older, that is, the susceptible population, will grow by 86%¹. Furthermore, fertility rates are falling. The present average number of children per woman is 2.3, and is likely to fall to 2.0 within 20 years and to 1.8 within 50 years (source: *La Nación*. Buenos Aires, April 6th, 2008). This decline means that by 2050 the number of economically

active persons will not be enough to subsidize the health and retirement systems. Consequently it is reasonable to assume that osteoporosis will pose a significant burden in Argentina in the coming years.

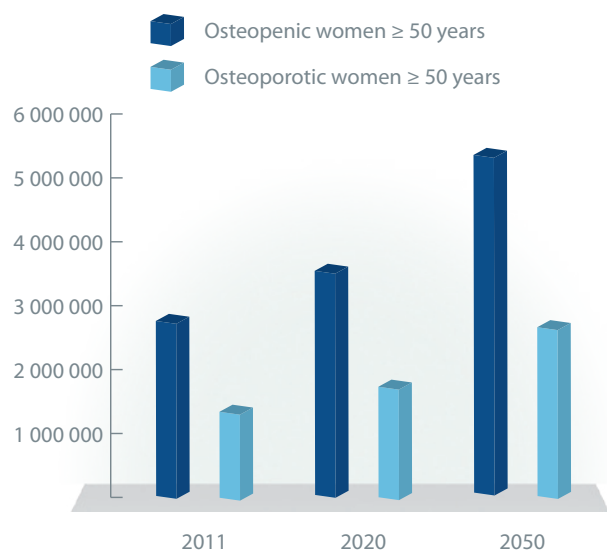
Epidemiology

Although neighbouring countries in Latin America have a diverse ethnic composition, composed of a variable mixture of Native American, white Caucasian and black African descents, Argentina is an exception with a predominantly white Caucasian population⁹. Of the 10.5 million people 50 years and over, the male/female ratio is 1:1.2 with 4.8 million men and 5.7 million women.

Age is an important risk factor for fragility fractures. The peak number of all fragility fractures occurs between 50 and 54 years of age and the peak number of hip fractures between the ages of 75 and 79¹⁰. Today, life expectancy at birth in Argentina is 77 years and is expected to be 82 years in 2050¹.

Population-based studies of osteoporosis prevalence in Argentina, analyzing BMD at two axial sites (lumbar spine and femoral neck) with DXA reveal that one out of four women aged above 50 years has normal BMD, two have osteopenia, and one has osteoporosis². As the estimated population of women aged 50 years or more will be 7.3 million in 2025 and 11 million in 2050¹¹, it can be projected more than three million women

FIGURE 2 Projected increase in number of Argentinean women ≥ 50 with osteopenia and osteoporosis



will suffer from osteopenia in 2025 and more than five million in 2050 (fig 2); the number of women with osteoporosis can be estimated as 1.82 and 2.75 million, respectively. Although the rate of fragility fractures is higher in people with osteoporosis, the absolute number of fractures is higher in osteopenic patients¹²⁻¹⁴.

Hip fracture

In Argentina, the mean annual rate of hip fractures, according to five published studies, is 488/100 000 inhabitants (SD=86/100 000) aged above 50 years, with a 2.6:1 female to male ratio³⁻⁷. Thus, over 34 000 hip fractures occur every year among the aged population, with an average 90 such fractures per day¹⁵. Estimates indicate that during the year 2050 there will be more than 63 000 hip fractures in women, and more than 13 000 in men¹⁵.

One prospective study compared the fracture incidence rates in distinct geographical regions within Argentina¹⁶. The study found that hip fracture incidence rates varied among some regions (table 1).

TABLE 1 Hip fracture incidence standardized by age and sex in women in four Argentine cities (100 000 inhabitants per year), adapted with permission¹⁶

AGE	LA PLATA	ROSARIO	MAR DEL PLATA	TUCUMAN
50 - 59	11.3	15.1	18.5	24.5
60 - 69	102.6	97.0	94.0	176.5
70 - 79	621.1	527.0	946.2	554.3
≥ 80	2807.3	2954.0		1598.8
≥ 50	379.4	405.0	259.6	334.9

In the largest published Argentinean study, the mean age of patients presenting with hip fracture was 82 years for women, and 79 years for men. Local experts estimate that 98% of hip fractures are surgically treated. Most fractures happened during the daytime and at home. More than 40% of patients had suffered previous fractures⁵. In a nationwide survey of 5500 patients discharged from public hospitals during the year 2000, 1.1% had a diagnosis of hip fracture and patients who had surgery for this type of fracture had an in-hospital mortality rate of 5%¹⁷. In another study, in-hospital mortality was 10%, while 33% of fracture patients died during the year following the event⁶.

In yet another study reporting data gathered from a managed care system, the mortality rate in the first year post-fracture was a low 9.1%⁷.

Direct costs of treating an acute episode of hip fracture (hospital admission, surgical intervention, price of an artificial prosthesis, and rehabilitation) were estimated at 5500 USD in 2004¹⁸. Table 2 shows the cost of hip fractures considering all cases registered in one year¹⁵.

TABLE 2 Hospitalization cost of hip and vertebral fractures in Argentina (in USD per year)¹⁵

	EXPECTED COST PER CASE	NUMBER OF CASES	TOTAL COST
Hip	3800	34 000	129 200 000
Vertebral	163	382 100	62 282 300

Mean duration of hospital stay for a non-complicated hip fracture case is four to five days in the private sector, and six to seven days in public hospitals. The average number of hospital bed days for hip fractures is estimated at 240 000 annually. It has been established that the number of hospital days due to osteoporotic fractures is higher compared to many other diseases¹⁹.

Vertebral fracture, other fragility fractures

It is estimated that approximately 382 100 vertebral fractures occur each year in Argentina. The number of vertebral fractures is an estimate based on the prevalence of such fractures among women aged 60 years or more⁸.

TABLE 3 Prevalence of vertebral fractures in 420 Argentinean women, adapted with permission¹⁸

AGE	PREVALENCE % (95% CI*)
50 - 59	10.4 (4.5-16.4)
60 - 69	13.7 (6.9-20.5)
70 - 79	16.8 (9.9-23.6)
≥ 80	24.4 (15.6-33.3)
Overall ≤ 79	13.8 (10.03-17.56)
Overall ages	16.19 (12.65-19.72)

* CI: confidence interval

The presence of vertebral fractures indicates an important risk factor for future osteoporotic fractures at the vertebral level as well as other anatomical sites. The LAVOS Study, a radiological survey among Latin American women aged 50 years or older, found an overall 16.2% prevalence of vertebral fractures in Argentina⁸. Vertebral fractures increased with old age and in the population aged above 80 years, as many as one in four women had a prevalent vertebral fracture (table 3).

The study highlighted two significant risk factors for vertebral fractures: history of fracture and height loss. Hormone replacement therapy was associated with 35% lower risk of having a vertebral fracture, and physical activity with 27% lower risk of having a vertebral fracture.

Diagnosis

In Argentina, there are 268 DXA machines²⁰ allowing for approximately 1 DXA machine per 150 000 inhabitants. There are many CT scanners in all large cities, but only 20 are used to perform central measurements of bone mineral density (QCT). This figure is an estimate based on information provided by commercial dealers of densitometers most frequently sold in Argentina. There are an undetermined number of quantitative ultrasound (QUS) devices in the country. There are four pQCT scanners and one high-resolution pQCT scanner, all of which are only used in research. The average length of wait for a DXA scan is 1 week.

Reimbursement policy

In Argentina, DXA machines are concentrated in large urban centers. DXA examinations are now accepted by most health insurance companies, including many public social security institutions. Most public health facilities lack densitometry equipment and the national welfare system for retired citizens and pensioners (PAMI) does not routinely cover bone densitometry. Requests made by primary care physicians must be audited and approved on a case-by-case basis.

The practice of bone densitometry is covered by third-party payers and the social security system (usually, one anatomical region per year). The average cost of a bone densitometry (with DXA or QCT) is 22 USD per anatomical region. Quantitative Ultrasound (QUS) is not recognized as a reimbursable practice.

The price of radiological vertebral fracture assessment (lateral radiographs of the dorsal and lumbar spine) is 66 USD. A laboratory work-up to evaluate calcium/phosphate metabolism and bone turnover costs 60-70 USD. The cost of a medical office visit ranges from 7-15 USD and 30-50 USD, the former figures representing the medical fee within the managed care system, and the latter the fee in the private sector¹⁸.

Medical prescriptions for osteoporosis represent only 1% of the Argentinean pharmaceutical market, which totals 37 million USD per year. Of all osteoporosis prescriptions, 41.6% correspond to calcium salts, and 55.8% to bisphosphonates. In recent years, the prescription of calcitonin, oestrogens, and other hormonal preparations has dropped 30%, while that of bisphosphonates has increased¹⁸.

The average annual cost for the most frequently prescribed non-generic osteoporotic medications in Argentina (oral alendronate, risedronate, ibandronate, raloxifene and intravenous pamidronate and ibandronate) is 367 USD (range 289-1047 USD), including adequate calcium and vitamin D supplements. If generics are considered, the average annual cost decreases to 240 USD (range 190-945 USD). Finally, the most recent treatments (teriparatide, strontium ranelate, zoledronic acid), of which there are no generics in the market at this time, cost 10 300 USD, 961 USD and 722 USD respectively. Costs can be 40% lower for patients with medical coverage. Medications are provided free of charge within the public health system, and with sizable discounts (70%) or free for retired citizens and pensioners covered by PAMI. The eight most frequently prescribed anti-

IDENTIFYING AND TREATING THOSE INDIVIDUALS WHO ARE AT HIGHEST RISK OF FRACTURE IS ESSENTIAL IN ORDER TO REDUCE THE FUTURE BURDEN OF OSTEOPOROSIS.



osteoporotic drugs are generics, representing 62% of the total monetary value, and 68% of total units sold annually (source: Intercontinental Marketing and Statistics; Pharmaceutical Market)¹⁸.

Calcium and vitamin D

Several surveys have detected insufficient calcium intake (averaging 500 mg daily) in the adult population²¹. Despite ample sunshine in most areas of the country, prevalence of deficient/insufficient levels of 25(OH)-Vitamin D (<20 ng/ml) in the elderly population is relatively high, not only in the south (87% of the population), but also in the mid (64%) and northern (52%) regions²². The population living in Patagonia, the southernmost area of the country, is particularly at risk for hypovitaminosis D²³.

The Argentinean Guidelines for the Prevention and Treatment of Osteoporosis recommend a daily calcium intake of 1.5 g, and a daily vitamin D intake of 800 IU². Thus, to help prevent osteoporosis through nutrition, calcium- and/or vitamin D- fortified milk, yoghurts and juices are available. Calcium-enriched milks contain 40% more calcium than standard milk. The addition of vitamin D is low in fortified milk or juices, containing only 40 IU/liter²⁴. Calcium and vitamin D supplements are also available in Argentina.

PREVENTION, EDUCATION, LEVEL OF AWARENESS

Argentinean physicians are aware of osteoporosis as a disease and the importance of both preventing and treating it. Consensus reveals that although gynecologists, rheumatologists and endocrinologists are well trained in osteoporosis treatment guidelines, general practitioners, geriatricians, and orthopaedists are not. The perception is that Argentineans in general are aware of osteoporosis as a health problem and that pharmaceutical companies actively participate in promoting patient awareness.

There are no government-sponsored programmes for prevention and/or treatment of osteoporosis. Scientific and patient societies are active in improving public awareness about the disease through regularly organized conferences, symposia and courses on osteoporosis.

Every year, coinciding with scientific meetings and on World Osteoporosis Day, articles are published in newspapers, and often bone specialists appear on

radio and TV programmes to explain the problem and recommend preventive measures. Free peripheral densitometry tests are made available among men and women in order to identify people at high risk of osteoporotic fractures. The Argentine Society for Osteoporosis has helped organize an Association for Patients with Osteoporosis (SAPCO), which has become increasingly involved in spreading news about advances in prevention and treatment. Both the Argentine Association of Osteology and Mineral Metabolism (AAOMM) and the Argentine Society for Osteoporosis (SAO) organize annual training courses in densitometry for technicians and young physicians. Both associations jointly sponsored and published Guidelines for the Diagnosis, Prevention, and Treatment of Osteoporosis²⁵, which were updated in 2007².

RECOMMENDATIONS

It is apparent that in Argentina, the burden and costs of osteoporosis for the individual and for the public health system are staggering. However, the disease is not recognized as a major health problem by the federal or the provincial governments. Efforts towards the prevention of osteoporosis are urgently needed and should include the following¹⁸:

- Education starting in primary school, and sustained in high school and the tertiary level around lifestyle factors for building strong bones.
- Improved nutrition for children, adolescents, pregnant women and the elderly including fortification of food with calcium and vitamin D. Priority should be given to these measures in geographic areas at high risk of hypovitaminosis D²⁴.
- Media campaigns to increase the awareness of prevention and treatment of osteoporosis.
- Encouragement of targeted exercise programmes for adults and the elderly.
- Physicians should be urged to identify patients at high risk for fragility fractures, confirm the diagnosis of osteoporosis, and promptly begin treatment as indicated.
- Doctors and medical institutions should establish programmes to ensure that patients adhere to indicated treatment plans.

- Better practices should be implemented to produce practical, cost-effective strategies with measurable targets for reducing osteoporotic fractures.
- DXA reimbursement for people at high risk of fragility fractures, especially before the fracture event.

Enhancing accessibility to diagnosis and proven therapies alone is not enough. Improved education of policy makers, healthcare professionals, and the general public is necessary to reduce the incidence and burden of osteoporotic fractures in Argentina.

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BOLIVIA

OVERVIEW

Bolivia, located centrally within the South American continent, shares borders with Brazil, Paraguay, Argentina, Chile and Peru. It has a land area of 1 098 581 km², of which 65% is plains where 26% of the country's population is concentrated. 62.4% of Bolivia's population lives in urban areas and 47.3% in rural areas. Fifty point sixteen per cent (50.16%) of the country's population is female.

Bolivia's geography is varied, ranging from the peaks of the Andes in the West, to the Eastern Lowlands, situated within the Amazon Basin. It is a developing country, with a Medium Human Development Index score, and a poverty level of 53%. Its main economic activities include agriculture, forestry, fishing, mining, and manufacturing goods such as textiles, clothing, refined metals, and refined petroleum. Bolivia is very wealthy in minerals, especially tin.

The Bolivian population, estimated at 10 million, is multiethnic, including Amerindians, Mestizos, Europeans, and Africans. In the last 50 years, Bolivia's total population has tripled in size. This increase has been accompanied by an intense urbanization process. Between 1950 and 2000, the rural population decreased from 65% to 35% of the national population. In 2007, the urban population increased to 47.3 %. In 2000, 15% of the population was under 5 years of age, 40% under 15 years, and 59% less than 25 years. The total fertility rate remains high: between 1995 and 2000, women had 4.4 children on average.

The indigenous population is marginalized and lacks access to health care and basic services. In a study of 50 municipalities (of the country's 327) with high levels of extreme poverty, where the monolingual native population lives, infant mortality is twice as high as in the 138 municipalities where poverty is the lowest.

According to the information reported, the current distribution of mortality, within the population as a whole, reveals a predominance of cardiovascular causes

(40%), followed by communicable diseases (13%) and external causes (12%). Mortality is higher in men than in women (1102 versus 897 per 100 000).

In 2003, 27% of children suffered from chronic malnutrition and of these, 8% from severe malnutrition. Only 26% of the population is covered by the health insurance system, and over half the population practices traditional medicine. The private sector meets only 5 to 10% of the demand for services, which means that the remaining 70% of the population must be covered by the public sector. Limitations on access to the system leads to the conclusion that only half the population that should be served by the public sector actually has access to it; leaving the remaining 35 to 40% of the country's population without coverage.

Despite the fact that non-communicable chronic diseases (NCD's) have a great impact on the quality of life of the ageing population, today NCDs also affect younger populations, poor and low-income countries in Latin America and the Caribbean. The lower income countries, such as Bolivia and the Andean region, face the dual challenge of their limited resources to best accommodate both the control of communicable and non-communicable diseases and to reduce infant and maternal mortality.

NCDs are already recognized as a growing public health problem, but its contribution to social inequities as a determinant of premature mortality is not yet well recognized.

In order to capture the attention of the public and governments, Pan American Health Organization offices have a publication that includes an exploratory ecological analysis of the relationship only between premature mortality due to cerebrovascular disease and potential determinants of socio-economic inequality, in the countries of the Andean region: Bolivia, Colombia, Ecuador, Peru, and Venezuela.

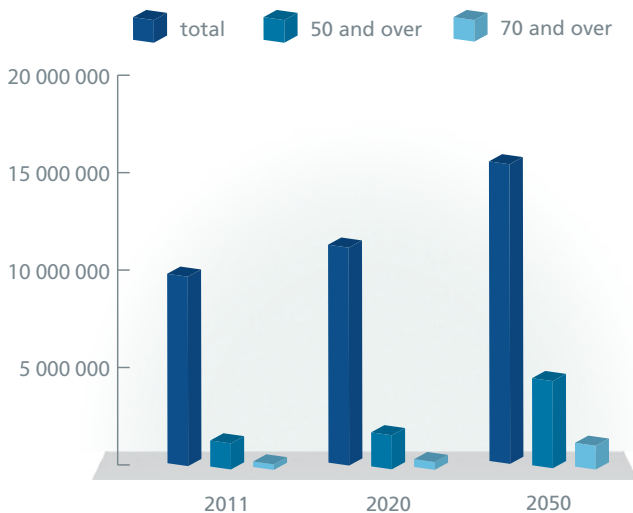
Furthermore, there are still no studies on osteoporosis or other musculoskeletal diseases.

KEY FINDINGS

Population growth statistics

The present population of Bolivia is estimated to be 10 million, of which 14% (1.4 million) is 50 years of age and older and 2.9% (292 000) is 70 years and over. By 2050, it is estimated that the total population will rise to 16 million, of which 29% (4.6 million) will be 50 years and older and 8% (1.3 million) will be 70 years and older¹ (fig 1).

FIGURE 1 Population projection for Bolivia until 2050



SOURCE US Census Bureau

Epidemiology

No available information.

Hip fracture

No available information.

Vertebral fracture, other fragility fractures

No available information.

Diagnosis

According to the Asociación Boliviana de Osteología y Metabolismo Mineral (ABOMM) there are nine DXA machines in Bolivia². This allows for approximately one DXA machine for every 1.1 million inhabitants. It

is estimated that the length of wait for a DXA scan is two to three weeks and one day for an ultrasound scan. Equipment is not widely available.

Reimbursement policy

The cost of a DXA scan is 50 USD. The cost of this test is not reimbursed by the government's universal health insurance for the elderly (Seguro Para el Adulto Mayor, SPAM). Only a few private health care insurance providers reimburse the cost of a DXA scan. The cost of an ultrasound scan is 10-20 USD and is not covered by SPAM or any other type of insurance. Treatment and follow-up is paid for individuals over the age of 60. Osteoporosis medications are reimbursed by SPAM and some private health care plans only if DXA is performed, and only in urban areas.

Calcium and vitamin D

Calcium and vitamin D supplements are available in Bolivia, but laboratory tests to evaluate vitamin D levels are not. These supplements and fortified foods are available only in urban areas.

PREVENTION, EDUCATION, LEVEL OF AWARENESS

Osteoporosis is not recognized as a major health problem in Bolivia and there are currently no official government public awareness programmes covering prevention, diagnosis or management of osteoporosis. There are no governmental health professional training programmes for osteoporosis, but there are approved basic governmental guidelines for prevention, diagnosis and treatment of osteoporosis prepared by the Bolivian Prevention Ministry of Health.

Some private health centers offer programmes in lifestyle prevention of osteoporosis. ABOMM actively provides osteoporosis awareness, prevention and education to physician and patient support groups. Public health awareness programmes are supported via advertisements, public lectures and other public awareness activities organized by associations across the country. Members of the ABOMM, the Rheumatology Society, and the National Chronic Diseases Committee cooperate with physicians and surgeon colleagues in cities throughout Bolivia to provide osteoporosis educational services to aid in diagnosis and treatment.

The level of osteoporosis awareness among the public has not yet been evaluated. There is some corporate involvement in osteoporosis awareness and education via pharmaceutical companies.

Osteoporosis awareness among physicians is increasing due to the efforts of ABOMM but in general, all medical practitioners are not well trained in diagnosis and treatment osteoporosis. Currently, osteoporosis training is not integrated into the medical school curriculum and there are no other accredited training programmes in Bolivia. In general, allied health professionals are poorly trained in this area. Few laboratories can perform bio-marker testing and it is unclear how many physicians actually use this testing method.

The ABOMM and the Bolivian Patient Society of Osteoporosis, in cooperation with the Department of Health Services, Universities, OPS (Panamerican Health Organization) and the WHO, provide educational programmes for prevention and management of osteoporosis. These organizations are working hard to bring the issue of osteoporosis to the top of the health care agenda.

During World Osteoporosis Day 2011, ABOMM and its branches conducted various education activities for physicians, patients and the public with the support of local hospitals, universities and health centres. They conducted exhibitions in public schools, seven educational workshops for children, “how to” prepare foods rich in nutrients like calcium, and a “race for nutrition” at the University where two hospitals were involved in teaching physiotherapy exercises.

RECOMMENDATIONS

- Greater involvement and awareness of national and international authorities such as the ministries of health, government, OPS, and other organizations are needed. Recognition of osteoporosis as a major national health burden will be important in bringing the problem before major organizations that can provide guidance and assistance in order to effectively educate health professionals and the public alike.
- Decision makers need to be motivated to recognize osteoporosis as a major health issue.
- Health professionals need training in the field of osteoporosis prevention, diagnosis and management

with more emphasis on training primary physicians to identify patient risk factors.

- Easier accessibility to DXA is required, with more machines distributed throughout the country.
- More funding for research and training is needed to address the dearth of epidemiological information on the status of osteoporosis in Bolivia.
- Finally, it is important to find cooperation and partnership with medical professionals and international organizations that are willing to facilitate global initiatives to create a world free of fracture and osteoporosis for men, women and children.

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BRAZIL

OVERVIEW

Although Brazil is considered a developing country, it has made outstanding progress in many aspects of its economy, education, politics and health in the last two decades. During this time, inflation has limited investments and the health system has felt the impact. From the 1990's onward, growing economic stability has led the people and government to think and act upon problems that have been neglected for many years, particularly in the health sector.

At present, a multicentre prospective study is collecting data representative of the population, reflecting clinical fracture risk and densitometry, from six research centres located across the country.

Estimated projections over the next 10 years reveal that the number of osteoporotic hip fractures per year (currently 121 700 fractures annually) is expected to reach 140 000 hip fractures annually by the year 2020^{1,2}. Trends in population ageing and life span are positive.

The official osteoporosis guidelines currently available were developed in 2002³. Life expectancy in Brazil is increasing and the government is becoming progressively more involved in osteoporosis diagnosis and treatment.

An important merger has recently taken place. Three Brazilian societies (SOBEMOM, SOBRAO and SBDens), those most active in the bone field, have now come together under one single name, scientific programme, board of directors and sponsorship. The society has assumed the name ABrASSO (Brazilian Society for Bone Health Assessment and Bone Metabolism). The name is meaningful because in Portuguese it means “embrace” and, from now on “unbreakable”, under this new found partnership. With some 1500 associate members, ABrASSO encompasses the medical community that focuses on bone metabolism and osteoporosis. ABrASSO has three seats at a permanent assessment committee to the Brazilian Ministry of Health advisory group. This is a great achievement because, even if politicians change places (and they often do), the Committee will remain active.

The societies that formed this merger are responsible for BRADOO - the largest event on bone densitometry, osteoporosis and bone metabolism in Brazil. The next BRADOO event will be held in Recife in 2013.

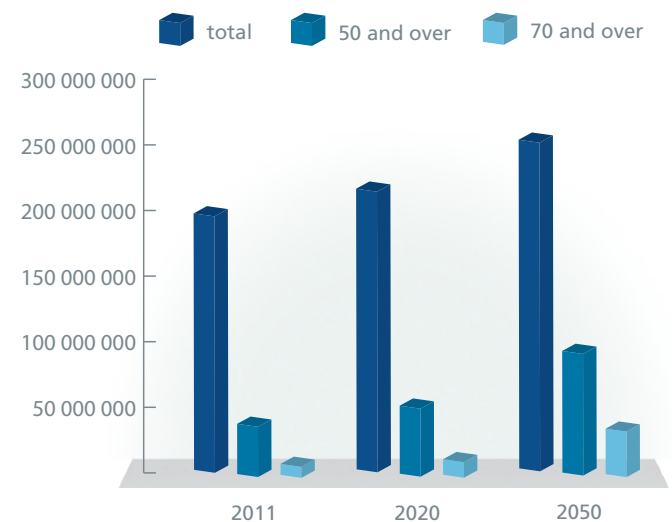
The greatest recent endeavour is the BRAVOS study (Brazilian Vertebral Osteoporosis Study). This multicentre prospective study will analyse the FRAX algorithm tool risk factors. This initiative is well designed to generate epidemiological data.

KEY FINDINGS

Population growth statistics

The present population in Brazil is estimated to be 203 million. Of this, 20% (40 million) is 50 years of age and over and 4.3% (8.6 million) is 70 years and over. According to 2010 Census data, the population over 60 years accounted for 20 million people (three times more than 30 years ago). Life expectancy rose from 52 years in 1952 to 71 years in 2010 and is projected to increase to 80 years in 2050. In 1950 the proportion was five seniors (> 65 years of age) per 100 young people (≥ 14 years of age). In 2010, the Census

FIGURE 1 Population projection for Brazil until 2050



SOURCE US Census Bureau

found that there were 30 seniors to 100 young people, i.e. six times more seniors within sixty years⁴. By 2050, it is estimated that 37% (96 million) of the population will be over 50 years, and 14% (36 million) will be 70 years and over while the total population will increase to 260 million⁵ (fig 1).

Epidemiology

The prevalence of osteopenia and osteoporosis in Brazil has been measured in many different ways, thus giving rise to a varying array of statistics. A recent São Paulo study, using the WHO diagnostic criteria, revealed that 33% of postmenopausal women had osteoporosis in the lumbar spine or femur⁶. Table 1 summarizes findings from other Brazilian studies.

A comparison of Brazilian men to men from the US and Europe showed no significant differences in BMD except for the lumbar spine in the seventh decade¹². See table 2 for results.

Hip fracture

It is estimated that there are currently 121 000 hip fractures per year in Brazil, with projections of that number increasing to 140 000 and 160 000 respectively in the years 2020 and 2050^{1,2}. Two studies completed in 1999 and 2004 showed overall incidence rates for hip fracture between 153-343 per 100 000 people aged 50 and over^{2,13}. It is estimated that 97% of hip fractures are treated surgically. Costs of treating a hip fracture patient in Brazil are estimated at 3987 USD per patient (Direct costs 12 000 USD in private hospitals¹⁰). The average hospital bed stay for a hip fracture patient is 11 days. Average waiting time for hip surgery of 6-7 days was reported by Satomi E. in 2009¹⁴. In this same study, Satomi reported that of 123 patients admitted to a hospital in Brazil for hip fracture, only 43% of the patients who were previously diagnosed with osteoporosis before the fracture were actually on treatment. None of the patients left the hospital with any referrals for bone density tests, or referrals for osteoporosis treatment.

TABLE 1 Low bone density prevalence according to Brazilian studies, adapted with permission¹¹

POPULATION		OSTEOPENIA	OSTEOPOROSIS	AUTHOR
Premenopausal		22%	6%	Martini et al. ⁷
Postmenopausal		38% - 56.6%	14.7% - 43.4%	Lanzillotti et al. ⁸
		30%	33%	Martini et al. ⁷
		33.6%	33.8%	Clark et al. ¹
Men (femoral neck only)		44.6%	15.4%	Tanaka et al. ⁹
Elderly	Men	33.3% - 57.4%	6.4% - 16.1%	Rodrigues Camargo et al. ¹⁰
	Women	36.6% - 56.6%	22.2% - 33.2%	

TABLE 2 Comparison of Brazilian and US/European male populations for lumbar spine and femoral neck bone mineral densities (g/cm²) stratified by decade, adapted with permission¹²

SITE	COUNTRY	50 - 59 YEARS	60 - 69 YEARS	70 - 79 YEARS
Spine	Brazil	1.157 ± 0.20 (n=122)	1.187 ± 0.17 (n=106)	1.171 ± 0.20 (n=54)
	US / Europe	1.145 ± 0.240 (n=250)	1.157 ± 0.24 (n=400)	1.173 ± 0.24 (n=330)
Neck	Brazil	0.939 ± 0.16 (n=122)	0.922 ± 0.13 (n=113)	0.862 ± 0.12 (n=54)
	US / Europe	0.956 ± 0.26 (n=319)	0.909 ± 0.26 (n=428)	0.876 ± 0.26 (n=344)

Of the 246 patients over the age of 60 admitted to various hospitals in Rio de Janeiro, 35% died either in the hospital or after discharge¹⁵. Another study showed an overall mortality rate of 21.5% during the first year following hip fracture¹⁵. The authors of this study attributed this high rate of mortality to inconsistent availability and use of antibiotics pre and post operatively as well as the limited amount of physical therapy patients received post operatively. The researchers then conducted a prospective study using 160 patients remaining from the previous study. The study examined the impact of hip fracture on functional status and revealed that 46% of the patients' functional status continued to decline during the 1-year follow-up. Another study demonstrated the negative impact of hip fracture on activities of daily living (ADLs) as shown in table 3¹⁷.

Vertebral fracture, other fragility fractures

The LAVOS study demonstrated an overall prevalence rate for vertebral fractures in women ≥ 50 years of 14.2%¹. The study examined a set of 415 subjects selected from the population in Espiritu Brazil. A prevalence rate of 25% was seen in the 80 years and over population (LAVOS). Extrapolating from the LAVOS study data, and considering the population of women 50 years and over in Brazil is currently estimated at 21 million, 2.9 million of these women could be living with vertebral fractures.

Another recent study looked at women over the age of 60 living in San Catarina State, Brazil. Forty-eight point nine per cent of the 186 white women participating had asymptomatic vertebral fractures. The fracture prevalence was 1.44 times higher in sedentary women¹⁷.

Lopes et al. studied community-dwelling elderly (65 years of age and older) to determine the prevalence of vertebral fractures in this group. Overall the prevalence rate was 27.5% in women and 31.8% in men¹⁸.

The BRAZOS study, completed in 2009, showed that the prevalence rate of low-impact fractures ranged from 10.6% - 21.8% in men and 10.5% - 17% in women²⁰. Significant findings were a higher fracture incidence for women living in urban areas versus rural, a high incidence rate for men living in the northeastern part of the country. Table 4 illustrates these findings.

A 2010 analysis of 4332 women demonstrated a prevalence rate of 11.5% for all types of reported osteoporotic fractures in women 50 years and older. Thirty-three per cent of the women in this age group were found to be osteoporotic⁶.

Diagnosis/training course

There are approximately 1850 DXA machines in Brazil²¹. This allows for one DXA machine per 100 000 inhabitants. There is no statistical information available on the availability of ultrasound devices. With private

TABLE 3 Activities of daily living in patients before and after hip fracture, adapted with permission¹⁷

ACTIVITIES OF DAILY LIVING (ADL)		YES	%	NO	%	P
Bathing	before	23	70%	10	30%	0.004
	after	14	45%	17	55%	
Dressing	before	27	82%	6	18%	0.01
	after	16	52%	15	48%	
Toilet	before	27	82%	6	18%	0.001
	after	16	52%	15	48%	
Physical ambulation	before	29	88%	4	12%	0.001
	after	17	55%	14	45%	
Urinary/faecal continence	before	21	64%	12	36%	0.001
	after	10	32%	21	68%	
Feeding	before	30	91%	3	9%	0.016
	after	23	74%	8	26%	

TABLE 4 Prevalence of low-impact fractures in men and women in different Brazilian regions, adapted with permission²⁰

	MEN (%)	WOMEN (%)
North	13.1	12.2
Northeast	21.8*	15.3
Midwest	13.8	10.5
Southeast	13.9	16.2
South	10.6	13.8
Metropolitan	13.9	17.0**
Rural (country side)	11.6	12.8

*P = 0.06 compared to other regions

**P < 0.05 compared to rural regions

health care insurance, the length of wait for a DXA is 1 day whereas the length of wait within the public system is up to 6 months. Public access is extremely limited in large cities as virtually all DXA equipment is located within private clinics.

ABrASSO holds three different kinds of DXA and Osteoporosis Training Courses designed for the general practitioner, specialists and also for allied health professionals (e.g. physiotherapists, nutritionists and others). For more details, visit www.abrasso.org.br.

Reimbursement policy

The cost of a DXA scan in Brazil is approximately 48 USD. The tests are reimbursed by private and public health care plans but there is limited access to these tests through the public system. Private health plans do not reimburse for osteoporosis medications and government health systems dispense certain types of osteoporosis medications.

Calcium and vitamin D

As of 2011, calcium and vitamin D supplements are available to the public. Fortified foods are not readily available in Brazil.

A study completed in 2009 revealed that 60% of the healthy adolescents studied had vitamin D insufficiency, or serum 25(OH)D concentrations >25 but <75nmol/L. The researchers found that, in Brazil, few foods are fortified with vitamin D²¹. Another study found that of the 151 Brazilian postmenopausal women with

osteoporosis examined, 42% had vitamin D levels of less than 75nmol/L²³.

In 2006, Bandeira F. et al. demonstrated that the prevalence of vitamin D deficiency in Brazil was similar to that of the USA but actually greater than the prevalence seen in Canada and the Scandinavian countries. This study reinforced the notion that abundance of sunlight does not necessarily prevent vitamin D deficiency in postmenopausal women²⁴.

PREVENTION, EDUCATION, LEVEL OF AWARENESS

In Brazil, osteoporosis is recognized as a major health problem and there is currently a government public awareness programme focusing on prevention. In 2011, a campaign was launched to raise the population's awareness of the risks of osteoporosis – “*Osteoporosis Prevention Campaign: from the Child to the Senior*”, launched by the Ministry of Health – *Technical Health Sector for Seniors*. However, the therapeutic guidelines and clinical protocols are from 2002 – currently, they are being reformulated by a group of representatives of the Ministry of Health and partner institutions.

The Ministry of Health is starting a programme dedicated to ageing, frailty and falls. Through the *Technical Health Sector for Seniors*, the Ministry of Health is developing a plan geared towards capacity development of the public health system (SUS) highlighting osteoporosis prevention, diagnosis and treatment and fall prevention workshops, both nationally and locally. The objective is to provide healthcare professionals with tools with which they can identify seniors at risk of falling and fracturing; working towards a two per cent annual reduction in hospitalization due to femur fractures in seniors (60 years and over). A committee has been formed by medical societies related to this theme coordinated by the *Technical Health Sector for Seniors / Ministry of Health*.

There is an ongoing study to validate the use of FRAX[®] in Brazil. Physician guidelines, published in 2002³, are being revised and other guidelines can be referenced under the 2008 Official positions of the Brazilian Society for Clinical Densitometry. There is no governmental health professional training and there are currently no approved governmental guidelines for osteoporosis treatment or prevention.

There are no formal patient support groups in Brazil, however, FENAPCO (National Federation of Osteoporosis Patients Associations) supports patient care in the Rio de Janeiro region of Brazil. ABrASSO turned its public campaign into a permanent initiative. Named *Seja Firme e Forte Contra a Osteoporose* (meaning: Stand Still Against Osteoporosis), different actions will take place throughout the period of one year long on streets, fitness centers, beauty parlors, websites and blogspots. For more details, visit www.sejafirmeeforte.com.br.

Level of awareness among health professionals has not been measured to date. ABrASSO is currently conducting two studies which will address public and physician awareness of osteoporosis. In general, health professionals are not well able to diagnose and treat osteoporosis as medical schools do not currently offer this teaching with their curriculum. Allied health care professionals are also poorly equipped to participate in the care of patients with osteoporosis.

RECOMMENDATIONS

- Initiation of public awareness campaigns for osteoporosis prevention and screening.
- Development of osteoporosis training programmes for all healthcare professionals.
- More active involvement of the Brazilian government in initiating public awareness programmes and making DXA testing and osteoporosis medications available to the public at low cost.
- Public health policy makers need to consider the results of national studies when establishing prevention programmes and disease management strategies in order to allocate financial resources most effectively.

THERE IS A NEED FOR PREVENTION PROGRAMMES THAT PROMOTE HEALTHY LIFESTYLE CHOICES AT ALL AGES, ESPECIALLY AMONG THE YOUNG.



- Additional prospective epidemiological data will be required to assess the impact of each risk factor for osteoporosis in order to determine the most cost effect approaches to treatment.

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CHILE

OVERVIEW

Like the populations of many other countries, the Chilean population is getting older due to the decrease in birth rate and the increase in life expectancy. The problem of diagnosing and treating osteoporosis will become a health and economic issue for public and private health insurers alike. At the present time, the public system does not cover costs for diagnostic testing or medication for osteoporosis, as osteoporosis is not a priority for the government health system. Private systems have a partial coverage of those costs related to diagnosis and treatment.

There is a marked difference in the availability of medical coverage for osteoporosis for people using public versus private medical systems, and also between people from larger versus smaller urban centers.

The public awareness about bone health is increasing but there are still not enough educational campaigns or programmes. In addition, Chileans have a low calcium intake in the adolescent and adult population.

A major problem in Chile is vitamin D deficiency among the paediatric and adult populations. There are no public policies to fortify food or increase vitamin D recommendations. There is insufficient awareness among physicians and allied health professionals about this topic.¹⁻²

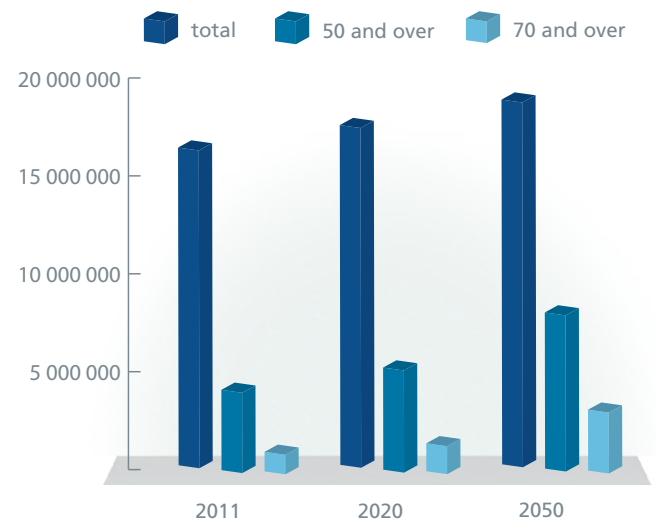
The Chilean Society of Osteoporosis (SCHOMM) is working towards validation of the FRAX model for prediction of fracture risk. They hope to have it available in the first semester of 2012.

KEY FINDINGS

Population growth statistics

The present population of Chile is estimated to be 17 million, of which 25% (4.3 million) is 50 years and older and 6% (1 million) is 70 years and over. By 2050, it is estimated that the total population will rise to 19 million, of which 43% (8.3 million) will be 50 years and older and 17% (3.2 million) will be 70 years and older³ (fig 1).

FIGURE 1 Population projection for Chile until 2050



SOURCE US Census Bureau

Epidemiology

There is a dearth of recent epidemiological data demonstrating the prevalence of osteoporosis and osteopenia in Chile. In 1987, a community based study, looking at women aged 50 years and over, showed a prevalence rate at the proximal femur of 46% and 22% respectively for osteopenia and osteoporosis⁴.

In 1994, Arteaga et al. found that, in a group of 171 women over 40 years, 29.2% were osteopenic at the spine as defined by a bone mineral density (BMD) less than 0.92 g/cm²⁵. A 2002 study, examining postmenopausal Mapuche women, showed that, of the 95 women studied, 17.9% had osteopenia and 56.8% had osteoporosis at the spine. In the same study, the femoral neck bone mineral density revealed 57.9% with osteopenia and 7.4% with osteoporosis⁶. Overall, this revealed that 83.2% of the study participants had either osteopenia or osteoporosis at the hip or spine leaving only 16.8% with normal bone density. Interestingly, a 2003 study revealed that Mapuche ethnicity is a protective factor for hip fracture⁷.

In 2007, Rodriguez, et al. recruited 555 women between the ages of 55 and 84 to participate in a study looking at frequency of vertebral fractures. This study revealed

that 14% of the women had a T-score of -2.5 or less at the hip, while 32% had a T-score of -2.5 at the spine. For those participants between the ages of 80-85, osteoporosis at the femoral neck reached a rate of 53.3%⁸.

Unpublished data from FUNDOP (Chilean Osteoporosis Foundation) revealed that, in 2009, a sample of 40 000 women over the age of 50 years had a rate of osteopenia of 52% by calcaneus ultrasound. Eight per cent of these women showed osteoporosis using the same method.

Hip fracture

It is estimated that there were 5236 and 2104 hip fractures respectively in Chilean women (age 45 and older) and men (age 45 and older) in the year 2008⁹. Estimated projections for 2050 show an increase in these numbers to 9988 and 4007 for women and men respectively¹⁰. Local Chilean experts estimate that, currently, 90% of hip fractures are treated surgically.

In 1991, rates of hip fracture were analyzed using hospital records. An overall incidence of 23.5 fractures for every 100 000 inhabitants was reported. In women aged 50 years and over, the incidence rate was 192.5 per 100 000. More importantly, the incidence rate increased

after the age of 75 to 617 per 100 000 women, double the rate found in men¹¹.

Another study showed an increase in hip fracture rates from 1982 to 1993. The study demonstrated that the increase was not entirely due to an increasing proportion of older women but rather more likely related to lifestyle changes¹².

In 2003, a retrospective study showed that, of 203 patients admitted for hip fracture surgery, 90% were never diagnosed or treated for osteoporosis¹³.

According to SCHOMM, the direct hospital cost for treating a hip fracture is estimated between 2000 and 7000 USD depending on whether the fracture is treated in a public or private healthcare setting. The average hospital bed stay for a hip fracture patient is five to seven days and it is estimated that for each hip fracture, 45 days of productivity are lost in the workplace.

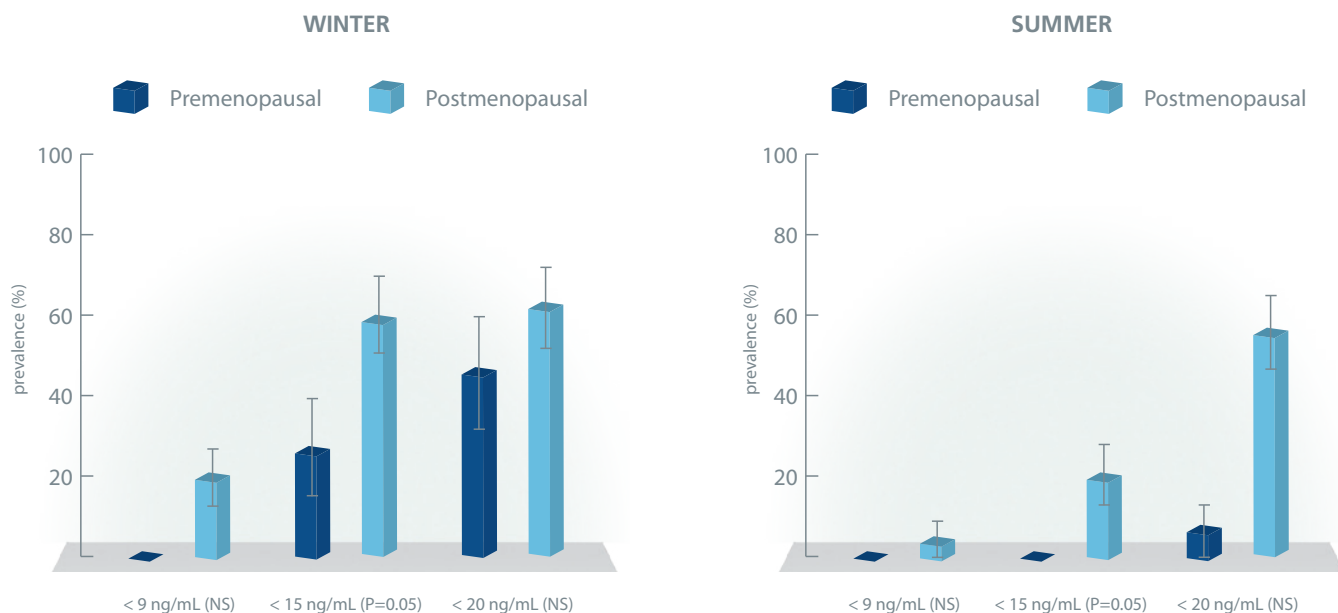
Vertebral fracture, other fragility fractures

There are minimal data available showing the incidence of vertebral fracture in Chile. A 2007 study revealed that 29.7% of the 55-84 year old women assessed had at least

BEGINNING IN CHILDHOOD, THE THREE KEY INGREDIENTS FOR STRONG BONES ARE A CALCIUM AND PROTEIN-RICH DIET, ADEQUATE VITAMIN D, REGULAR EXERCISE.



FIGURE 2 Prevalence of vitamin D deficiency in pre- and postmenopausal women in winter versus summer, adapted with permission¹⁵



one vertebral fracture. Fifty-six per cent of the patients with vertebral fractures did not have osteoporosis by densitometry at any anatomical site⁸.

Diagnosis

In Chile there are 161 DXA machines¹⁴ allowing for approximately one DXA per 100 000 inhabitants. The average length of wait for a DXA scan is five days. There is one pQCT machine designated for research and no information is available on the number of ultrasound machines in the country. DXA machines are mainly available in urban centers and private health clinics.

Reimbursement policy

The cost of a DXA scan is 40 - 100 USD. DXA is not reimbursed by the government health plan, but is reimbursed by private health care insurance. There is partial reimbursement for FONASA beneficiaries. Osteoporosis medications are not reimbursed by public health care plans but are sometimes reimbursed by private health care plans, and only for patients with osteoporosis.

Calcium and vitamin D

Calcium, vitamin D supplements, and calcium fortified foods (milk and some cereals) are available in Chile.

A study conducted in 1997 demonstrated that healthy postmenopausal women living in Santiago, Chile, with no vitamin D fortification in their diets, are vitamin D deficient despite normal sun exposure¹⁵. Figure 2 above illustrates the levels of the vitamin D deficiency for the women included in the study.

Another study showed that 47.5% of the patients (aged 55-84 years) had hypovitaminosis D using a cutoff level of 17 ng/mL⁸.

Few studies have investigated typical calcium intake in Chile. One study demonstrated that of the 80 women (age 42 years and over) studied, the average intake was 745 mg/day¹⁶.

PREVENTION, EDUCATION, LEVEL OF AWARENESS

Osteoporosis is not recognized as a major health problem and there are currently no government public awareness programmes covering prevention, diagnosis or management of osteoporosis.

Physician guidelines for Chile can be found at:

<http://www.asocimed.cl/Guias%20Clinicas/endocrinologia/osteoporosis.html>

<http://www.iofbonehealth.org/latin-america-guidelines>

There is no governmental health professional training and there are currently no approved governmental guidelines for osteoporosis treatment or prevention.

There are no known osteoporosis patient support groups in Chile. Public health awareness programmes are supported via websites and advertisements. The milk industry actively supports patient awareness through advertising campaigns targeted at increasing milk consumption among adults.

Awareness of osteoporosis among the public is considered to be average to high, whereas the level of awareness among health professionals is rated as low to medium. There is a consensus among experts in Chile that Primary care physicians are not educating their patients about osteoporosis.

According to local Chilean experts, in general, medical health professionals are poorly equipped and trained to care for patients with osteoporosis. Gynaecologists, geriatricians, rheumatologists and endocrinologists are considered to be the most well equipped. In the allied health profession, nutritionists and nurses are better equipped than physiotherapists.

RECOMMENDATIONS

- Considering that projected population increases for Chile will see the population 50 years and older increase from 25% today to 43% in the near future, the hospital infrastructure will have to expand to account for the subsequent increase in the number of hospital beds needed, particularly in relation to the number of hip fracture patients.
- An increase in dietary calcium and vitamin D, along with an increase in the amount of fortified foods available to the public, will be important in helping future generations reach their peak bone mass.
- Better access to diagnostic machines and better coverage of these tests by both private and public health insurers will allow more people to be diagnosed and subsequently treated.
- Increased reimbursement of medications for the treatment and prevention of osteoporosis for citizens with both private and public health plans is needed.

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COLOMBIA

OVERVIEW

Osteoporosis has been a topic of medical interest for nearly 20 years in Colombia. The national association, Asociacion de Osteologia y Metabolismo Mineral (ACOMM), was founded in 1994 by rheumatologists and endocrinologists interested in learning about and understanding this new field of medicine that was booming worldwide.

At present, ACOMM has continued to be very important in the field of continuing medical education both at basic and advanced levels. Nevertheless osteoporosis is not a public health priority in Colombia, where basic health problems such as maternal morbidity and mortality, infant mortality, malnutrition, vaccination and other health issues consume most of the nation's health budget. Other chronic and high cost entities such as cancer, HIV, diabetes mellitus and cardiovascular disease, also take a high percentage of the health budget.

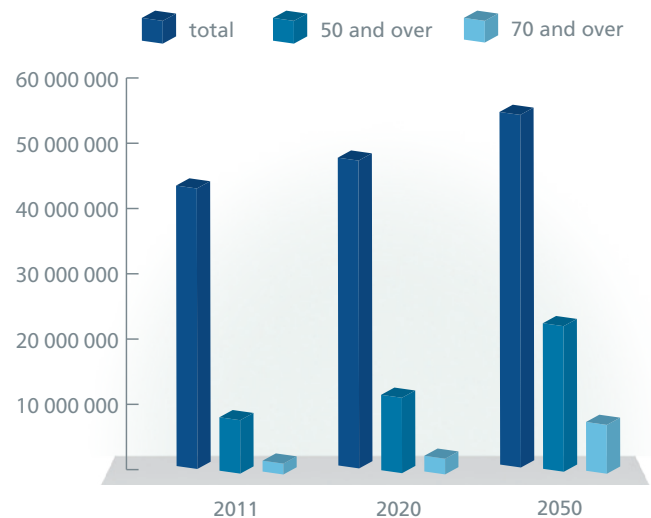
The lack of unified central healthcare statistics is undoubtedly another barrier to quantifying the real impact osteoporosis has on health status and quality of life, not to mention the economic burden its presence places on the nation.

The estimated fracture data presented were derived from the rough data obtained through health insurance companies, both private and official. These data were then projected to the general population statistics.

A clear lack of direct and good quality statistics on osteoporosis and osteoporosis associated fractures is evident in Colombia.

Two population based studies are worth mentioning, as they have helped in understanding certain osteoporotic fracture prevalence in Colombia. Firstly, the LAVOS (Latin American Vertebral Osteoporosis Study) study revealed similar prevalence rates for morphometrically defined vertebral fractures in Colombia to those found in other countries of the region.

FIGURE 1 Population projection for Colombia until 2050



SOURCE US Census Bureau

Secondly, the work done by ACOMM's ex-president, Dr J.J. Jaller, was a prospective follow up of hip fractures done in the city of Barranquilla. These data were extrapolated to the country's population by the WHO-FRAX working group to make it possible to incorporate Colombia's data into the FRAX tool.

The update of the local consensus on osteoporosis is one of the priorities of the present Board of Directors at the ACOMM. The development of the ICUROS study will greatly enhance the body of knowledge surrounding the effect of osteoporotic fractures on quality of life in Colombia, as well helping to understand the economic consequences of these fractures for the country as a whole.

KEY FINDINGS

Population growth statistics

The present population of Colombia is estimated to be 45 million, of which 19% (8.5 million) is 50 years of age and older and 3.9% (1.7 million) is 70 years and older. By 2050, it is estimated that the total population will rise to 56 million, of which 39% (22 million) will be 50 years of age and older and 14% (7.8 million) will be 70 years and older¹ (fig 1).

Epidemiology

In Colombia, it is estimated that currently 2 609 858 and 1 423 559 women 50 years and over are living with osteopenia and osteoporosis respectively. It is projected that these numbers will grow to 2 884 150 for osteopenia and 1 573 173 for osteoporosis by the year 2020. By the year 2050, these numbers could increase to 3 852 200 and 2 101 000 Colombian women with osteopenia and osteoporosis respectively.

A study conducted by Colombia's National Institute of Health demonstrated a dramatic increase in osteoporosis in Colombian women in their fifth and sixth decades of life coupled with a higher prevalence when compared to other international statistics using the same age group².

In 1999, researchers found a prevalence rate of 49.7% and 47.5% for osteopenia at the spine and proximal femur respectively in women 50 years and older in Bogotá, Colombia. This same group of women showed a prevalence rate of osteoporosis of 15.7% at the spine and 11.4% at the site of the proximal femur^{3,4}.

Hip fracture

It is estimated that in Colombia, 8000 to 10 000 hip fractures occur in women annually, and that approximately 90% of these hip fractures are treated surgically. Projections foresee the number of hip fractures in women increasing to 11 500 annually by 2020.

A community based hospital study, conducted in 1999, showed a hip fracture incidence rate of 234.9:100 000 and 116.5:100 000 women and men respectively. The study participants were aged 50 years and older^{3,4}.

The direct hospital cost for treating a hip fracture is estimated at 6457 USD. The average hospital bed stay for a hip fracture patient is 10 days. There are no data available which might help demonstrate loss of productivity in the workplace and effects on quality of life post hip fracture.

Vertebral fracture, other fragility fractures

Data provided by the ACOMM estimates the number of annual vertebral fractures in women in Colombia at 284 711. Approximately one per cent of these fractures are treated surgically. In 2009, The LAVOS study revealed an overall prevalence of vertebral fractures

in women aged 50 - 79 years of 10.7%. Note that, compared to the other Latin American countries studied, Colombia had the highest prevalence rate for its 70 - 79 year olds. Results here indicated that 22% of the study participants in this age range showed radiological evidence of vertebral fracture⁵.

It is estimated that 854 135 osteoporotic fractures at other sites occur each year in Colombia, in women 50 years and over.

Diagnosis

There are 122 DXA machines in Colombia⁶ allowing for one DXA machine per 370 000 inhabitants. The average length of wait for a DXA scan is two to ten days, and DXA machines are only available in urban centers. There are currently no data available for ultrasound devices.

Reimbursement policy

The cost of a DXA scan is 30 USD. DXA tests are reimbursed by the government health plan only if ordered by a specialist rather than a general practitioner. DXAs are generally approved by private health plans if ordered by a specialist and the patient is older than 50 years of age. Some exceptions are made if well justified. Follow up DXAs are generally approved after one to three years, varying among different health insurance plans. Certain bisphosphonates are covered by the government health plan, but alternative osteoporosis medication use must be justified by the treating physician before an approval by a scientific committee will allow for reimbursement.

Calcium and vitamin D

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

PREVENTION, EDUCATION, LEVEL OF AWARENESS

Osteoporosis is not recognized as a major health problem and there are currently no governmental public awareness programmes covering prevention, diagnosis or management of osteoporosis. Physician guidelines do not exist. There is no governmental health professional training and there are currently no approved governmental guidelines for osteoporosis treatment or prevention.

Patient support groups do exist in Colombia. ACOMM supports public health awareness programmes via their website as well as hosting lectures and workshops for patients mainly surrounding the events of World Osteoporosis Day.

Lifestyle prevention programmes for osteoporosis are currently in development. Level of awareness among citizens of Colombia is considered to be average. ACOMM works with various corporate partners within the pharmaceutical industry. The level of awareness among healthcare professionals varies with specialty and geographic location. With the exception of rheumatologists, endocrinologists, and an increasing number of gynecologists dedicated to the care of postmenopausal women, as well as a minority group within the orthopaedic field, physicians are poorly equipped to diagnose and treat patients presenting with osteoporosis. Allied health professionals also lack training in care of osteoporotic patients.

RECOMMENDATIONS

- Continued development of both basic and advanced medical education programmes for health professionals.
- Public education and awareness campaigns about osteoporosis and fracture prevention are needed. ACOMM has developed a public campaign based on “Ask your doctor: do I have osteoporosis?”.
- Publication and implementation of government approved guidelines.
- Encourage research and epidemiological studies to provide reliable statistics on fracture prevalence.
- Improve accessibility to diagnosis and treatment, especially for the rural population.
- Developing sustained awareness actions within the medical and general communities.
- Working progressively to acquire better statistics on the frequency and costs (economic and quality of life), as planned through the ICUROS Study, will in the future help in lobbying actions to give priority to this silent disease in Colombia.

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COSTA RICA

OVERVIEW

With a population of 4.6 million people, Costa Rica occupies, according to the 17th State of the Nation 2010 report, one of the best positions in the area of health in Latin America. Thanks to Social Security, a statewide system of health care covering 92% of the population, Costa Rica recently achieved the highest life expectancy rate in Latin America. However, though there are many positive indicators, this system has a number of severe problems that negatively impact service provision. One is financial and the other, a more complex issue, is the progressive ageing of the population. There is a need for global restructuring to address these changes in the country's epidemiological profile. There is also a need for advances in medical care to take advantage of new diagnostic and therapeutic alternatives. These circumstances affect the efforts being made in the field of prevention, early diagnosis and effective treatment of osteoporosis.

Despite not having specific statistics in this field, there is data to support a prevalence rate of 40% osteopenia and 22% osteoporosis in postmenopausal women in Costa Rica¹. In 2004 there were 2015 hip fractures reported in Costa Rica. Of these fractures, 1492 were reported in the population over 60 years².

The Asociación Costarricense de Climaterio Menopausia y Osteoporosis (ACCMYO) was founded in 1999. Each year, ACCMYO organizes a national congress for health care professionals. There are guidelines for the management of osteoporosis driven by ACCMYO, however, there is no national health plan with clear policies that addresses this issue comprehensively. The Society also actively participates in lobbying for new medication approval at the government level.

In the diagnostics field, densitometry equipment is concentrated in metropolitan areas for the private practice of medicine; with availability limited in rural areas and within the Social Security System.

Therapeutically, only generic alendronate is available in the state system but multiple alternatives are available in

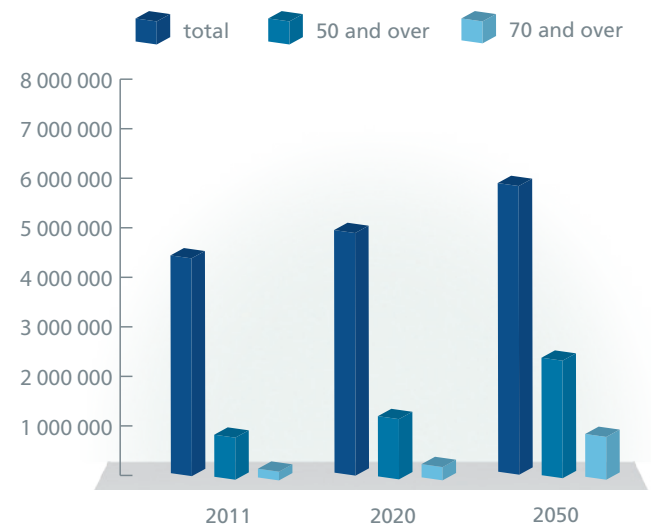
the private sector. Unfortunately only a small segment of the population has the financial resources to access the private sector.

KEY FINDINGS

Population growth statistics

The present population of Costa Rica is estimated to be 4.6 million, of which 19% (884 000) is 50 years of age and older and 4% (184 000) is 70 years and over. By 2050, it is estimated that the total population will rise to 6.1 million, of which 41% (2.5 million) will be 50 years and older and 15% (900 000) will be 70 years and older³ (fig 1).

FIGURE 1 Population projection for Costa Rica until 2050



SOURCE US Census Bureau

Epidemiology

In 2010, ACCMYO evaluated data from four principal diagnostic osteoporosis centers within major metropolitan areas of Costa Rica. Of the 5580 DXA scans analyzed (97% women, 3% men), the researchers found abnormal DXA results in 3528 (63%) patients. 64.5% were osteopenic and 35.5% were osteoporotic¹.

Hip fracture

Sancho Rojas CA et al. examined hip fracture incidence in Costa Rica between 1994 and 1998. On average, the number of hip fractures per year in people aged 50 and over was 1205⁴. López G et al. reviewed hip fractures reported by the Statistics Department of the Costa Rican Social Security Fund during the years 2000-2004. In the 61-80 year olds, 2991 cases of hip fracture were reported during that time frame². There was a steady increase in the number of fractures each year with an overall annual incidence of 458:100 000 in the population 60 years and over in 2004. Assuming a constant age adjusted incidence rate, we can expect the annual number of hip fractures in the population 60 years and over to reach 7618 in Costa Rica by the year 2050³.

ACCMYO estimates that approximately 75% of these hip fractures are treated surgically and the associated costs are covered by social security or private insurers. The direct hospital cost for treating a hip fracture is estimated at 8000 USD, with an average hospital bed stay of 12 days. There is no data on social costs of hip fracture in Costa Rica.

Vertebral fracture, other fragility fractures

According to ACCMYO, the number of vertebral fractures is underestimated and many go undiagnosed. In 2005, ACCMYO conducted a survey evaluating 108 hospitalized patients 60 years and over. In those patients, the prevalence of vertebral fractures was 33.3%.

Diagnosis

In Costa Rica there are 24 DXA machines⁵ allowing for approximately one DXA for every 200 000 people. The average length of wait for a DXA scan is six months for those within the Social Security System and no wait for those with private health insurance. DXA machines are only available in urban centers. There are no data available regarding ultrasound machines.

Reimbursement policy

The cost of a DXA scan is 55 USD. The Social Security System covers more than 90% of the population, offering DXA diagnosis for the population with high osteoporotic fracture risk. Only three DXA machines are available for this purpose and the waiting list is very long. The other 18 DXA machines are allocated to private medical practice. The National Private Insurance doesn't cover the exam for primary diagnosis, and is reimbursed only for follow up after a fracture.

When medically indicated, bisphosphonates and hormone replacement therapy are covered by the Social Security System. Most osteoporosis medications are reimbursed by private health care insurance on a case by case basis before a diagnosed fracture. After fracture, all patients can receive reimbursement for osteoporosis medications.

Calcium and vitamin D

Calcium, vitamin D supplements, and fortified foods are available in Costa Rica. In 2001, a study looking at

TABLE 1 Reported mean daily calcium intake of Costa Rican teenagers, adapted with permission⁷

VARIABLE	URBAN			RURAL			TOTAL		
	BOYS (n=68)	GIRLS (n=62)	P VALUE	BOYS (n=68)	GIRLS (n=62)	P VALUE	BOYS (n=136)	GIRLS (n=124)	P VALUE
Weight (kg)	58.1 ± 12	53.5 ± 7	0.001	55.6 ± 11	53.4 ± 8	0.197	57.2 ± 11	53.2 ± 8	0.001
Height (cm)	165.4 ± 9	157.7 ± 6	0.000	163.6 ± 8.9	156.5 ± 5	0.000	164.9 ± 9	157 ± 6	0.000
Energy intake (kcal)	2439 ± 227	2078 ± 216	0.002	2318 ± 278	1939 ± 248	0.002	2378 ± 203	2008 ± 287	0.000
Protein intake (g)	78 ± 15	63 ± 12	0.000	66 ± 11	53 ± 13	0.009	72 ± 14	59 ± 13	0.000
Calcium intake (mg)	723 ± 336	578 ± 302	0.011	516 ± 347	467 ± 361	0.285	619 ± 312	523 ± 287	0.000
Calcium intake /1000 kcal	303 ± 131	274 ± 109	0.180	222 ± 84	242 ± 106	0.256	263 ± 117	258 ± 109	0.010
Calcium intake /kg	13 ± 8	11 ± 6	0.093	9.4 ± 5	8.7 ± 5	0.449	11 ± 7	10 ± 5	0.081
Ratio calcium/protein	9.3 ± 3.5	9.3 ± 3.7	0.955	7.9 ± 3	8.5 ± 3.2	0.280	8.6 ± 3	8.9 ± 3	0.510

Costa Rican teenagers between the ages of 13-18 years showed that 80% reported a dietary calcium intake of less than 1000 mg/d. At the time of the study, the recommended calcium intake for this age group was 1300 mg/d⁶. The study revealed that the lowest levels of calcium intake were in females and those living in rural areas⁷. Table 1 illustrates the findings for calcium intake for the adolescents participating in the study.

PREVENTION, EDUCATION, LEVEL OF AWARENESS

Osteoporosis is not recognized as a major health problem and there are currently no government public awareness programmes covering prevention, diagnosis or management of osteoporosis. However, the Social Security System has an education programme targeting prevention and treatment of chronic diseases such as osteoporosis. Physician guidelines are available (Guía para la Prevención, Diagnóstico y Tratamiento de la Osteoporosis, año 2000; Guía para el Aborde Integral del Climaterio, Menopausia y Osteoporosis año 2010). There is no governmental health professional training and there are currently no approved governmental guidelines for osteoporosis treatment or prevention.

Patient support groups do exist in Costa Rica. Public health awareness programmes are supported via websites, advertisements, and public lectures. The ACCMYO actively organizes public lectures and participates in radio and televised educational programmes for osteoporosis. Each year, during World Osteoporosis Day, many activities are organized for the public. In 2011, over 800 participants attended this international event. Educational programmes are also organized during Menopause Day. The Costarican Osteoporosis Foundation also organizes activities to educate the general public. Pharmaceutical companies also promote awareness of osteoporosis through their support of the ACCMYO at congresses and assistance with distribution of the osteoporosis guidelines and educational materials.

Data on public awareness around osteoporosis in Costa Rica are not available. Health professionals in the public sector are poorly equipped to diagnose and treat osteoporosis whereas those in the private sector are well-equipped. Osteoporosis training is integrated into educational programmes, but only into medical school training for endocrinologists and rheumatologists. Allied health professionals are, in general, poorly trained in caring for patients with osteoporosis.

RECOMMENDATIONS

- Actions are needed to include osteoporosis training in nursing and medical school programmes.
- A call to conscience to government leaders about the economic importance of preventing fractures and about the population's right to receive adequate care.
- More epidemiological studies are needed to be able to better understand the scope of the problem.
- Involve our political leaders in establishing national strategies for prevention, diagnosis and treatment of this disease.

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CUBA

OVERVIEW

Cuba, despite its status as a developing country, has a large and powerful health system based on the national primary care system. This system covers all provinces linked to secondary and tertiary care as well as research centres.

Healthcare is free by law, and private practice is not allowed. This state support has proven to be invaluable. There are structured health programmes including those for maternal and child health, comprehensive women's healthcare, elderly care, comprehensive rehabilitation, care for the disabled, as well as those for chronic non-communicable diseases which include osteoporosis and related fractures.

Having several ultrasound scanners (and 25 DXA machines), distributed throughout the country, facilitates the diagnosis of low bone mass and fracture risk among the Cuban population.

Studies performed in Cuba have provided insights into the peak bone mass of its population compared with other countries' populations. Data, from the Statistical Office of Cuba's Ministry of Public Health (MINSAP), indicated a progressive increase in osteoporotic hip fractures between 2006 (9295) and 2010 (16 878). A study has suggested that osteoporotic hip fracture rate is likely to be similar to that in other Latin American countries. In a community-based sample of 3155 adults aged 15 to over 80 years, 36 participants had experienced a low trauma fracture (equivalent to 1140 per 100 000) and of these, 11 had experienced a hip fracture (equivalent to 340 per 100 000). However, the study design does not allow accurate estimates of future incidence rate or total number osteoporotic fractures as the population grows¹.

In the fields of rheumatology, endocrinology, gynaecology, nutrition, geriatrics and orthopaedics, care of postmenopausal women and hip fracture care are well integrated. Despite this, increased prevention measures are still essential.

Osteoporotic fracture incidence and mortality rates are increasing, creating a socioeconomic burden and

damaging the quality of life for Cuban residents. Annual deaths due to hip fractures increased from 1877 deaths in the year 2006 to 2553 deaths during the year 2010. There were more deaths in women than in men.

There are some data available from various small epidemiological studies, but there is still a dearth of large-scale epidemiological studies aimed at determining the national prevalence and incidence of osteoporosis and its associated fractures. Studies are also needed to establish major osteoporotic risk factors, and the extent of the socioeconomic impact osteoporosis will have on the nation. Strategies and programmes must be established based on these studies in order to minimize the impact of this disease.

These carefully designed population surveys should be implemented by health authorities and scientific associations to deepen the understanding of the magnitude of the problem. Prevention, improvements in lifestyles, and health promotion should continue to be priorities. More diagnostic studies should be done among the population determined to be at risk in order to reduce the morbidity and mortality due to osteoporosis related complications.

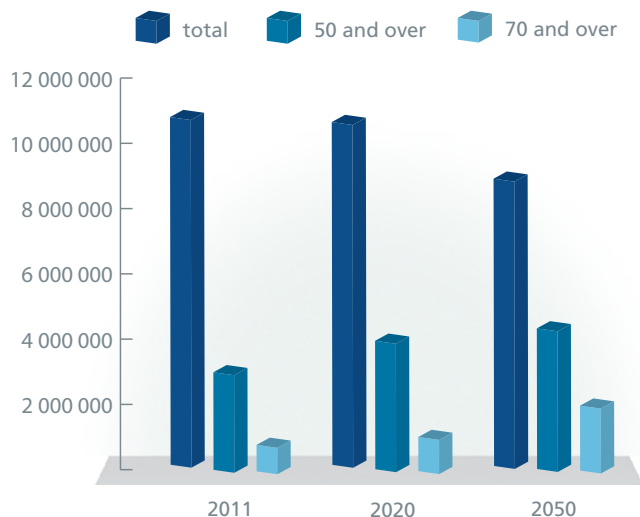
Scientific conferences such as the congresses of rheumatology, endocrinology, nutrition, menopause and climacteric gynaecology are forums for discussion and analysis of the problem of osteoporosis in Cuba, and in the world.

KEY FINDINGS

Population growth statistics

The present population of Cuba is estimated to be 11.1 million, of which 28% (3.1 million) is 50 years of age and older and 7.6% (842 000) is 70 years and older. By 2050, it is estimated that the total population will fall to 9.2 million. Despite the decline in total population the number of older people will continue to rise and 49% (4.5 million) will be 50 years of age and older and 23% (2.1 million) will be 70 and older² (*fig 1*).

FIGURE 1 Population projection for Cuba until 2050



SOURCE US Census Bureau

Epidemiology

There is a dearth of epidemiological data for osteoporosis in Cuba. A 2009 community survey of 3155 men and women (mean age 47.9 years) revealed 36 with previous low trauma fractures. This is equivalent to 1140 previous fractures per 100 000 people, but it is not possible to accurately estimate the true prevalence of past fracture in the whole population, due to differences in age distribution and other factors between the studied cohort and the country as a whole¹.

Hip fracture

In the year 2006, 9295 hip fractures were recorded in Cuba. This number has increased steadily over the years as evidenced by the 16 878 cases reported in 2010 (Ministry of Public Health (MINSAP)). Local Cuban medical societies report that 100% of hip fractures with surgical indications are treated surgically as access to the healthcare system is free for all. The hospital costs for treating a hip fracture are assumed by the Cuban government by constitutional law. Although treatment of the fracture is provided at no cost to the citizens of Cuba, the estimated cost to the government is between 8600 to 12 000 USD, which includes the prosthesis. There are variable periods of rehabilitation and social reintegration after hip fracture. The state ensures patients are cared for at every stage of recovery. The average hospital bed stay for a hip fracture patient is seven to ten days.

Vertebral fracture, other fragility fractures

There are minimal data regarding the number of vertebral fractures occurring in Cuba. A 2009 community survey revealed four vertebral fractures in a set of 3155 men and women ranging in age from 15 to 80¹. According to the national society, 100% of spine fractures patients that enter a health center are treated, but, as in the rest of the world, it is likely that a substantial proportion do not reach medical attention.

Diagnosis

In Cuba there are 25 DXA machines allowing for approximately one DXA machine per 400 000 inhabitants. The machines are widely distributed with 10 machines located in the area of the capital. The average length of wait for a DXA scan is three to seven days. There are no data on the availability and use of ultrasound machines.

Reimbursement policy

There is no cost for a DXA scan in Cuba. The state assumes all healthcare costs of its citizens. Private health care insurance is not allowed.

Calcium and vitamin D

Calcium and vitamin D supplements are available in Cuba, however, there is little availability of foods fortified with calcium and vitamin D.

PREVENTION, EDUCATION, LEVEL OF AWARENESS

Osteoporosis, and its associated fractures, is recognized as a major health problem in Cuba. The government has a wide variety of public awareness programmes covering prevention, diagnosis and management of osteoporosis. Programmes also exist for the elderly, disabled and those affected by chronic illness. National osteoporosis health practice guidelines, developed by a group of nutrition experts, are available and can be referenced at the National Ministry of Public Health Nutrition. The Cuban Societies of Rheumatology, Gynecology & Obstetrics, and Endocrinology along with other experts developed a national guide finished in 2010, pending publication. There are governmental health professional training and development programmes sponsored by both the Ministry of Public Health and national scientific societies.

There are no patient support groups in Cuba. Public health awareness programmes are supported through written media as well as via radio and television programmes. These programmes focus on promotion of healthy lifestyles that will in turn improve the quality of life for Cuban residents. The Cuban government funds all public awareness and education campaigns carried out by scientific institutions, medical societies and committee of advisors to the Ministry of Health.

Training related to osteoporosis is not integrated into the medical school curriculum in Cuba, but local experts state that all physicians are informed and well equipped to treat patients with osteoporosis. There has been a joint effort among all osteoporosis specialists and a National Osteoporosis Consensus was published in 2010. This consensus was a joint effort among the Cuban Society of Endocrinology, the Cuban Society of Rheumatology, and the Consensus Group of Gynecology and Menopause.

DANCING IS AN EXCELLENT FORM OF WEIGHT-BEARING AND MUSCLE-STRENGTHENING EXERCISE FOR PEOPLE OF ALL AGES.



RECOMMENDATIONS

- Joint actions are needed between the Ministry of Public Health, the advisory groups to the Minister of Health (MINSAP), and the scientific societies to minimize the health impact of osteoporosis in Cuba.
- Mass distribution of prevention information such as the importance of breastfeeding, smoking cessation, limiting alcohol intake and leading an active lifestyle is necessary.
- World Osteoporosis Day should be used as a focus around which to develop more activities promoting osteoporosis awareness.
- There is a need to complete large-scale epidemiological studies aimed to determine the national prevalence of osteoporosis and the incidence of associated fractures. Studies are also needed to establish major osteoporotic risk factors, and the extent of the socioeconomic impact osteoporosis will have on the nation. Strategies and programmes must be established based on these studies in order to minimize the impact of this disease.
- Prevention, improvements in lifestyles, and health promotion should continue to be priorities. More diagnostic studies should be performed among the population determined to be at risk in order to reduce the morbidity and mortality due to osteoporosis related complications.

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GUATEMALA

OVERVIEW

Osteoporosis is currently defined as the silent epidemic disease of the new century, affecting the entire world population. In Guatemala it has not been given the importance it truly deserves. There is a belief that the population has no increased risk for developing osteoporosis because of race, tropical sun exposure during agricultural activity, the climate, and dietary practices which include daily frequent consumption of tortillas. However, there are some studies and publications of fracture risk, using FRAX[®], in which it is clear that there is a significant osteoporotic fracture risk in women over 50 years in Guatemala¹. Application of FRAX demonstrates a statistically normal distribution of fracture risk among the studied population, similar to that found in other Hispanic populations.

The Guatemalan medical community recognizes that BMD (Bone Mineral Density) measurements are an important population screening tool. However, in Guatemala, it is not possible to have a DXA scanner in each clinic or in each health center. Maintenance and training of personnel to operate the machine and to interpret the results costs 2.5 times more than simply treating patients with high fracture risk identified using a simple screening survey. As long as there are no nationwide studies, the BMD values of the Guatemalans will remain unknown.

Due to its lower cost, the peripheral DXA technique is the most common and standardized test used in private practice in Guatemala. However, peripheral studies are best used as screening tests for patients at risk, not for diagnosis.

Given the socio-economic conditions of Guatemala, the use of index FRAQO (GT) provides a practical and effective tool that allows screening of the population at risk at a very low cost. It is unfortunate that the Guatemalan health authorities do not yet recognize this tool as a valid predictor of fracture risk. A significant increase in fractures is predicted over the next 10 years, reaching an alarming increase of 36%.

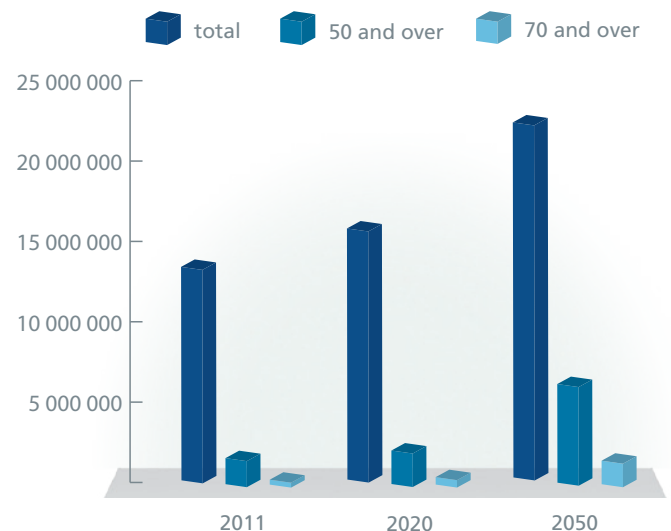
In Guatemala, there are no statistical records indicating the prevalence of diseases that affect the majority of the population. The INE (National Statistics Institute) and MSPAS (Ministry of Public Health and Social Support) report on limited pathologies. In the case of osteoporosis, it represents a major public health problem due to the incapacitating nature of resulting fragility fractures. There is no central database that can be used to identify those menopausal and post-menopausal women who are at risk and are prone to suffering from osteoporosis. Therefore, prevention of fractures and education of the public at risk is challenging.

KEY FINDINGS

Population growth statistics

The present population of Guatemala is estimated to be 13.8 million, of which 12% (1.7 million) is 50 years of age and older and 2.3% (319 000) is 70 years and over. By 2050, it is estimated that the total population will rise to 23 million, of which 28% (6.4 million) will be 50 years of age and older and 6.6% (1.5 million) will be 70 years and older² (fig 1).

FIGURE 1 Population projection for Guatemala until 2050



SOURCE US Census Bureau

Epidemiology

Based on data collected at various institutions on pre and post menopausal women, the AGCYM (Asociación Guatemalteca de Climaterio y Menopausia) estimates that 36.6% of this population group has osteopenia and 20% have osteoporosis.

Hip fracture

With the use of data from Quiñonez¹, the AGCYM estimates that 512 024 hip fractures will occur in Guatemala in the year 2020. Recent data shows that post-menopausal urban woman over 50 years have a 27.94% probability of hip fracture and 23.3% probability of any osteoporotic fracture at 10 years determined by FRAX using the Hispanic population database¹.

According to the AGCYM, approximately 70% of hip fractures are treated surgically. The direct hospital cost for treating a hip fracture ranges from 3750 - 4000 USD. Indirect hospital costs are estimated at 3000 USD. It is estimated that for each hip fracture, four to six months of productivity are lost in the workplace. The average hospital bed stay for a hip fracture patient is 4 - 14 days.

Vertebral fracture, other fragility fractures

No available information.

Diagnosis/training course

Guatemala has an estimated 13 DXA machines³ allowing for one DXA machine per one million inhabitants. There is one ultrasound scanner per 200 000 inhabitants. There is no available information regarding length of wait for these diagnostic tests.

Reimbursement policy

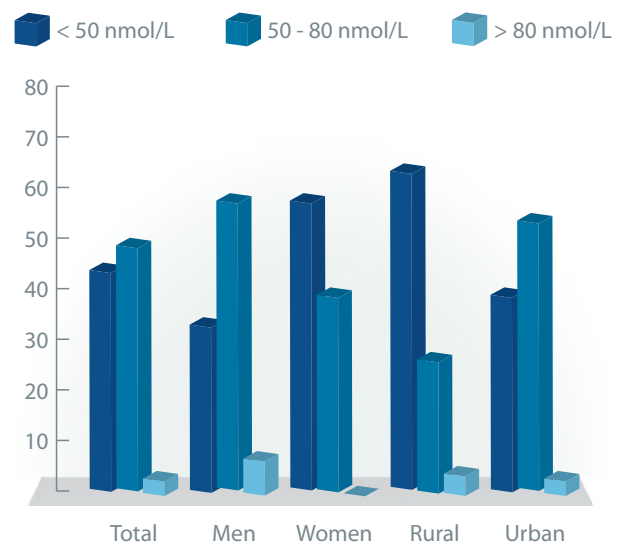
The cost of a DXA scan is 75 USD. The cost of an ultrasound scan is 20 USD. No information is available regarding reimbursement of these services.

Calcium and vitamin D

Calcium, vitamin D supplements, and fortified foods are available in Guatemala. One study, in older Mayan residents of the western highlands of Guatemala, showed that despite ample sunlight, vitamin D levels

were low⁴. Figure 2 illustrates the variability in the subjects vitamin D levels based on gender and whether or not they were urban versus rural dwellers.

FIGURE 2 Distribution of study participants with varying Vitamin D (25 (OH)D) levels according to gender and area, adapted with permission⁴



PREVENTION, EDUCATION, LEVEL OF AWARENESS

Osteoporosis is not recognized as a major health problem and there are currently no government public awareness programmes covering prevention, diagnosis or management of osteoporosis. Governmental physician guidelines do not exist. There is no governmental health professional training on osteoporosis and there are currently no approved governmental guidelines for osteoporosis treatment or prevention.

There is no information on the existence of patient support groups or public health awareness programmes in Guatemala.

At the private level, health care professionals are better equipped to care for patients with osteoporosis as diagnostic machines, and ancillary support via nutritionists, physiotherapists and counselors are available.

RECOMMENDATIONS

- Raise awareness among the Guatemalan health authorities about osteoporosis and its economic impact in the future.



A REDUCTION IN THE NUMBER OF FRAGILITY FRACTURES WILL ENABLE MILLIONS OF LATIN AMERICAN SENIORS TO LEAD INDEPENDENT AND PRODUCTIVE LIVES WELL INTO OLD AGE.

- More DXA machines are needed to adequately screen the country's population. Machines need to be more widely distributed and available in rural areas and public institutions.
- Development of a central osteoporosis database to assist researchers in conducting epidemiological studies to provide better information on the state of osteoporosis in Guatemala.

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MEXICO

OVERVIEW

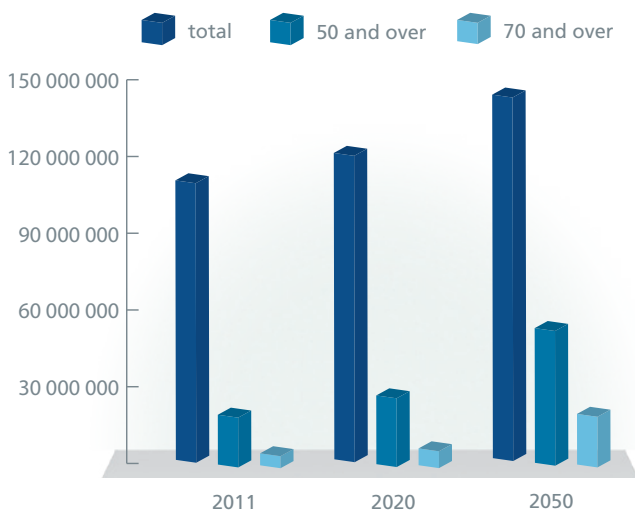
Consistent with trends in other regions of the world, demographic dynamics have changed in Mexico, and its population is ageing. Although this ageing process occurred over two centuries in industrialized and developed countries, it is occurring very rapidly in Mexico. Life expectancy at birth has increased almost 39 years on average over the last seven decades (from 36.2 to 75 years old). The population of those aged 60 years and over, which is currently 10.7 million, will increase to 36.4 million by 2050. By then, the average life expectancy in Mexico will be 82 years of age¹. Because osteoporosis and fragility fractures are diseases associated with ageing, their incidence is expected to increase accordingly.

KEY FINDINGS

Population growth statistics

The present population in Mexico is estimated to be 113 million. Of this, 18% (20 million) is 50 years of age and over and 4.3% (5 million) is 70 years and over. By 2050, it is estimated that 37% (55 million) of the population will

FIGURE 1 Population projection for Mexico until 2050



SOURCE US Census Bureau

be over 50, and 14% (20 million) will be 70 years and over while the total population will increase to 148 million¹ (fig 1).

Epidemiology

In Mexico, a polarized model of epidemiological transition — in which diseases with infectious etiology coexist with chronic degenerative illness — has been forming over the last 25 years. Middle and upper income individuals have been experiencing the benefits of this transition whereas lower income individuals have been left behind. The main factors contributing to this transition are increases in life expectancy, decreases in mortality, increases in the ageing population (65 years and over), and the economic impact of these differences².

Some recent figures have been reported in the literature regarding the number of individuals with osteoporosis and osteopenia diagnosed by central DXA in accordance with the WHO classification criteria.

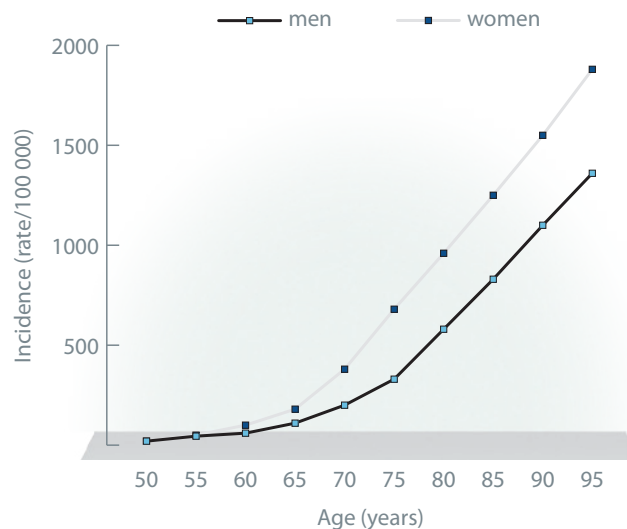
The first study was done in three different geographic areas in Mexico. Delezé et al reported on a comparison of lumbar spine and femoral BMD of 4,460 urban dwelling women, aged 20 to 69 years³. The authors found significant variation in BMD across different regions of Mexico. Women in the north had higher BMD at the lumbar spine than women in the centre or the south, but were significantly larger and taller than women in the centre or in the south. The authors concluded that regional differences in BMD were significantly different according to the region where the population was counted.

The second study was based on a random sample used for the LAVOS study⁴ in Mexican women and the vertebral fracture prevalence study in men. This random sample of 807 men and women were invited to have a central DXA of the spine and femur. Results at the lumbar spine showed osteoporosis in 9% and 17% of the men and women respectively and osteopenia in 30% and 43% of the men and women respectively. Total femur results revealed osteoporosis in 6% of men and 16% of women and osteopenia in 56% of men and 41% of women⁵.

Hip fracture

The incidence rates and lifetime risk probability in Mexican men and women at the age of 50 years were reported in 2005⁶. The hip fracture cases registered in 2000 were collected at all main tertiary-care hospitals in the two major health systems in Mexico City: IMSS and SS. The diagnoses were validated by chart review in all cases. Annually, 169 women and 98 men per 100 000 had hip fractures, and the numbers increase exponentially with age in both sexes. The lifetime risk of having a hip fracture at 50 years of age was 8.5% in Mexican women and 3.8% in Mexican men. In other words, one in 12 women and one in 20 men over the age of 50 years will sustain a hip fracture later in life. According to the classification done by Maggi et al. Mexico has an intermediate rate of hip fractures compared with other countries, with the highest rates occurring in Sweden or in Whites in Olmsted, USA, and the lowest rates occurring in continental China and Turkey⁷. The mean incidence of hip fracture for the years 2000 to 2006 by age and sex is shown in figure 2. A recent published paper shows that age and sex-specific rates of hip fractures increased between 2000 and 2006 both for men and women by 1% per year; the same paper report the projections to the year 2050 where demographic changes estimated for Mexico indicate that the annual number of hip fractures will

FIGURE 2 Mean incidence of hip fracture in Mexican women and men (2000 – 2006)

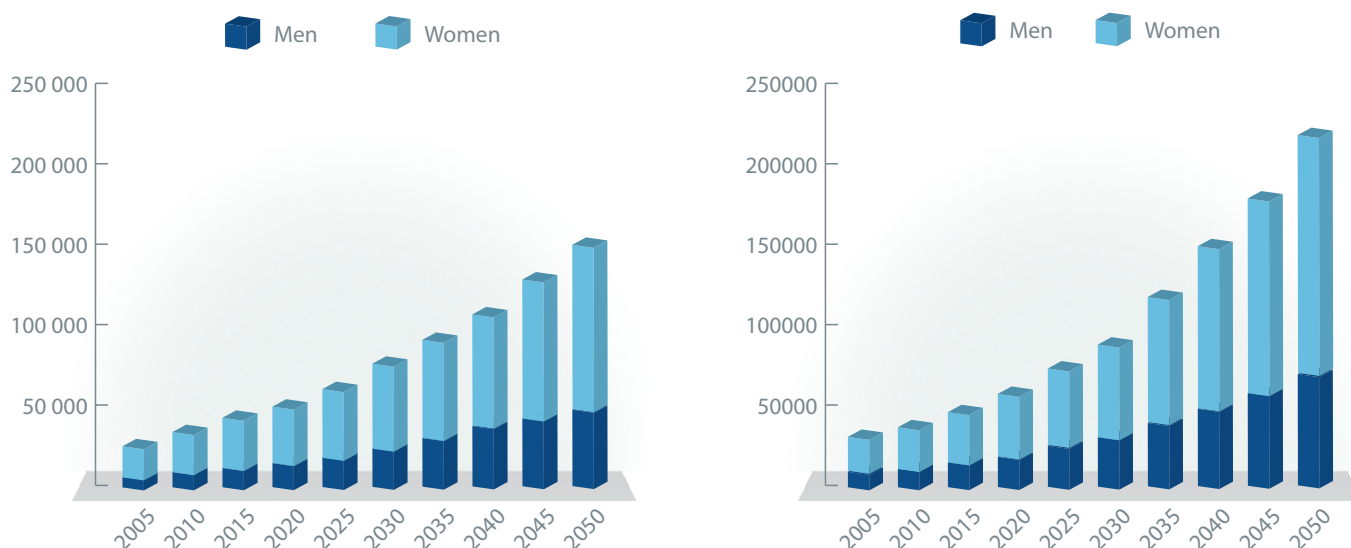


SOURCE adapted from⁸.

rise from 29 732 in 2005 to 155 874 expected in 2050. If the age-specific incidence of hip fracture continues to rise, the number of hip fractures would increase by a further 46% (fig 3)⁸.

The direct costs related to acute medical treatment of hip fractures paid for by governmental institutions and by patients at private settings in the Mexican health system and estimates of the impact of these entities have been

FIGURE 3 Number of hip fractures estimated for men and women in Mexico from 2005 to 2050 (left figure assumes no change in age- and sex-specific incidence from 2005 and right figure assumes the secular trend observed between 2000 and 2006 continues), adapted with permission⁸.



published. The information was gathered through direct questionnaires given to 218 patients with hip fractures.

Additionally, a chart review was conducted and information using expert panels was obtained to get accurate protocol scenarios and microcosting; activity-based techniques were used to yield unit costs. The total direct cost for hip fractures estimated for 2006 based on the projected annual incidence of hip fractures in Mexico was a little more than 97 million USD. This estimate was based on the occurrence of about 22 000 hip fracture cases, with an individual cost per event of 4365.50 USD⁹.

The average hospital stay for hip fractures is different for each institution. The IMSS has the highest average, 10.7 days per event; the SS had an average of 9.3; and private institutions had an average of 5.2 days².

In a previous study, the IMSS analyzed the frequency and costs of hospital care due to fractures in a two-year period (2000 - 2001) using hospital discharges and the data of Related Diagnostic Groups (RDG) to estimate the costs of hip, distal forearm, and vertebral fractures. The average cost for each case of the above-mentioned fractures was 5101.63 USD. The same study reported the cost of hospital care of hip fracture in postmenopausal women to be 36 593 271 USD for a two-year period¹⁰⁻¹¹.

In a review of the literature of the Latin American region, figures similar to the one published by Clark et al.⁹ for hip fractures in the region ranged from 4500 to 7550 USD.

These two studies mentioned above used different methodology, therefore comparison is not possible. However, they both showed that the costs for fragility fractures are high in Mexico and prevention efforts have to be implemented as soon as possible to avoid future epidemics of fragility fractures and their economic impact.

There are no studies analysing indirect costs of hip or other fragility fractures in Mexico, but recently a protocol on costs and quality of life has been approved and funded. This study is part of an international study (ICUROS) and results are expected by 2012².

Table 1 (*below*) shows cost variance in the different institutions as well as the reasons for these differences.

Table 2 (*next page*) illustrates the costs of other chronic illnesses. The methodology in every case is different and the degree of accuracy is unknown as most of the data were gathered from databases in different institutions. In the hip fracture cases, the methodology included direct

TABLE 1 Total cost per patient with hip fracture, adapted with permission²

RESOURCE UTILIZATION	IMSS	SS	MEDIUM- TO LOW-INCOME PRIVATE	HIGH-INCOME PRIVATE
Surgery	\$1110.60	\$439.20	\$3374.80	\$5191.90
Medical staff*			\$2006.90	\$6689.50
Prosthesis or fixation**	\$660.50	\$362.80		
Hospital stay***	\$1893.30	\$610.50	\$361.20	\$1190.90
Lab and image test	\$226.80	\$178.20	\$415.50	\$609.40
Direct medical costs	\$3891.20	\$1590.70	\$6158.40	\$13 681.80
Transportation	\$14.60	\$3.90	\$21.80	\$43.60
Meals	\$15.30	\$18.10	\$25.10	\$52.20
Non-medical costs	\$29.90	\$22.00	\$47.90	\$95.80
TOTAL COSTS[†] (USD, 2006)	\$3921.10	\$1612.70	\$6206.30	\$13 777.70

*In the private sector, this represents the honoraria of a surgeon, two assistants, an anesthesiologist, and an internist. These costs are included in the surgery item for IMSS and SS.

** In private patients, these costs are included in a surgery pack.

*** General ward and Intensive Care Unit. **For private patients only in excess of 4 days in a general ward is taken into consideration**

[†] Adjusted by the Purchasing Power Parity (PPP) Index

TABLE 2 Average cost per year in selected chronic conditions in Mexico*, adapted with permission²

DISEASES	AVERAGE COST/YEAR (2009, USD)
Breast cancer	\$10 050.35
Localized cervical cancer treatment*	\$6991.63
Heart Disease	
Myocardial infarction	\$16 856.25
Stroke	\$15 371.24
Pulmonary Disease	
COPD	\$9424.37
Lung cancer	\$14 073.54
Inflammatory Diseases	
Rheumatoid arthritis	\$2251.35

* Cumulative cost of diagnosis and treatment

interviews, chart review, and micro-costing, so there is uncertainty about the comparability of costs².

Because there is little information on costs of musculoskeletal diseases (and there is only a little information about rheumatoid arthritis), it is difficult to prove their burden and impact on the health system. There is a need for these studies to be done so that they can be compared with other groups of diseases and prioritized in the context of the health system.

Vertebral fracture, other fragility fractures

The LAVOS study⁴ reported the radiographic prevalence of vertebral fractures in women 50 years and older from five Latin American countries using the standard methodology previously reported at SOF in the United States and the EPOS study in Europe (see table 3). The overall prevalence in Mexican women was 19.2%, the highest among the five countries included

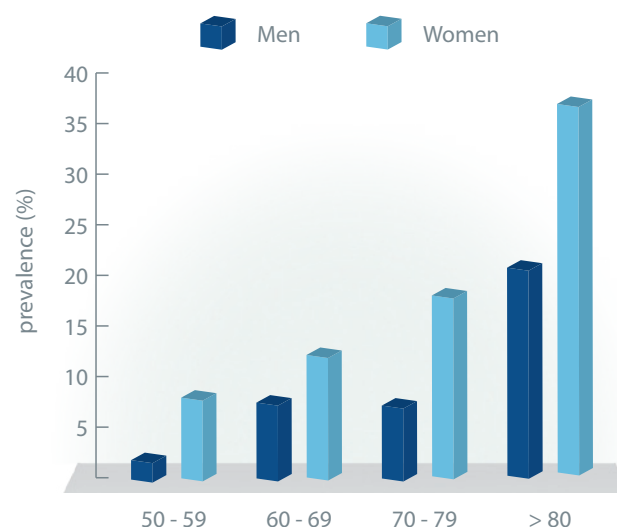
TABLE 3 Age-specific prevalence (%) of vertebral fracture in Mexican women aged 50 and older, adapted with permission²

AGE (YEARS)	PREVALENCE % (CI 95%)
50 - 59	8.3 (2.7 - 13.8)
60 - 69	12.6 (6.1 - 19.1)
70 - 79	18.6 (10.7 - 26.4)
> 80	37.9 (28.3 - 47.4)

in the study (Argentina, Brazil, Colombia, Mexico, and Puerto Rico).

Another study revealed the prevalence of vertebral radiographic fractures by digital morphometry in a random sample of Mexican men 50 years and over¹². Results showed the prevalence in men is half the prevalence of women (9.8%). In both sexes, the fractures increased with age, as shown in figure 4.

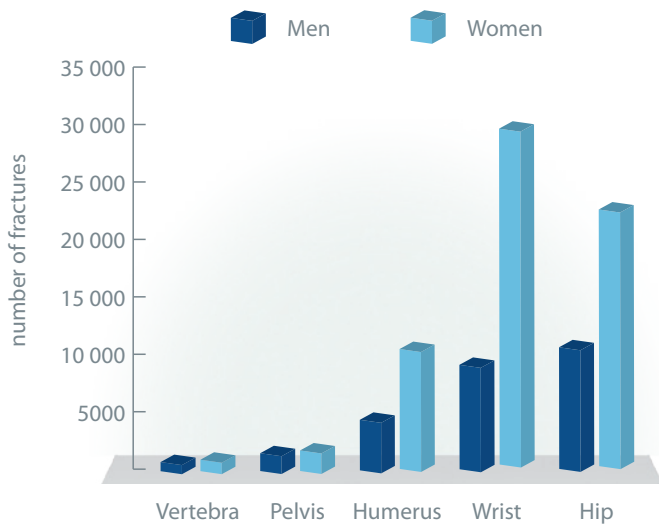
FIGURE 4 Vertebral fractures in Mexicans 50 years and over²



A major concern is that vertebral fractures are greatly underestimated. The databases consulted included emergency rooms and specialty consultations in all care facilities in the country at IMSS. There were no reliable reports of vertebral fractures in any of these facilities. A possible explanation for this bias is that vertebral fractures are not diagnosed at any level of medical attention and will probably be reported as osteoarthritis of the spine or lumbago. Special attention should be given to this matter. Timely diagnoses of vertebral fractures allows for diagnosis and treatment of underlying disease and subsequent prevention of future fractures.

Databases at the Division of Informatics at IMSS were accessed to analyze the frequency of other major osteoporotic fractures in men and women over 50 years². Illustrated in Figure 5 (next page), and in agreement with the literature, wrist fractures are by far the most frequent fractures reported followed by hip, humerus and pelvis.

FIGURE 5 Other fractures in Mexico (2005)²



SOURCE Division of Information in Health (IMSS)

Diagnosis/training course

There are 409 reported DXA scanners in Mexico¹³. Eighty-five per cent of the machines can be found in the private sector. The Mexican Society of Bone and Mineral Metabolism (AMMOM), which offers the certification course on bone densitometry yearly, reports that not more than 300 BMD machines are in use in DXA centres, and only some technicians had attained certification by the International Society of Clinical Densitometry or other exams².

The cost of a DXA scan in Mexico ranges from 18 to 131 USD depending on the service (private vs. government).

The quantity of DXA machines in Mexico is clearly insufficient. If there were 16 724 525 people older than 50 years of age in Mexico in 2008, then only about 1.8 to 2.3 pieces of equipment were available per million people. The imbalance in this resource is noteworthy because the majority of the Mexican population use the governmental facilities where only a minority (15%) of the DXA machines in the country can be found².

Reimbursement policy

The Mexican health care system is a mixture of governmental and private institutions, with varying quality of services offered at different costs. The costs and impact of osteoporosis and fragility fractures differ in these systems.

The government maintains multiple parallel health systems for different populations groups. There are two main governmental systems. One is the Mexican Institute of Social Security (IMSS), which provides several benefits besides health care (pensions, life insurance, disability, etc.) and covers almost 50 million beneficiaries (employees and their families). It is financed by employees' payroll taxes plus legally mandated government contributions. The second-largest governmental health care system is offered through the Ministry of Health (SS) and covers the health needs of around 48% of indigenous people who have no access to other health care facilities¹⁴. During the last decade, the Ministry of Health began a health reform project that was expanded to offer health insurance for this population; it covers basic health needs and is called Seguro Popular¹⁵. Finally, a heterogeneous, private system covers about 2 million people. It is noteworthy that 54% of the total health care expenditures in Mexico are out-of-pocket payments. These figures were published in 2002¹⁴.

Calcium and vitamin D

In Mexico the status of vitamin D and calcium is only partially known and no official recommendations are given for supplementation at any age. Few studies have reported on calcium ingested by Mexicans over 50 years through questionnaires in epidemiologic studies^{4,16}. Mexicans on average ingest far less calcium than the international recommendations for this nutrient.

Regarding vitamin D, there are two recent studies in the paediatric population in Mexico and several studies in adults: Elizondo et al. reported in 2010 that 62% of a paediatric sample had deficiency and 20.2% insufficiency using radioimmunoassay¹⁷. The second study measured vitamin D concentrations using ELISA in 1025 children from two to 12 years old from the 2006 ENSANUT Survey. The authors found insufficient levels in 23% of the sample and deficiency in 16%¹⁸. A third study of 585 adults 14 years and older using tandem mass spectrophotometry found that 46.8% of the sample was deficient and 43.6% was insufficient¹⁹. All three studies use the cut-off points published by Hollick et al.

Lips et al. examined vitamin D levels in osteoporotic women in Mexico, Chile and Brazil. In the Mexican population studied, 67% had vitamin D level of < 30 ng/mL²⁰. Two other studies in Mexican postmenopausal women also demonstrated low levels

of vitamin D. One study revealed that 96.8% had levels below 30 ng/ml while the other study (which included women on vitamin D supplements) reported that 50.6% of the women studied had levels below 30 ng/mL²¹⁻²².

There are many calcium supplements that can be easily acquired over the counter in any pharmacy, supermarket, or health and nutrition store. Several doses and types can be found. Some of them have vitamin D together with calcium.

Milk and dietary products are fortified with vitamin D. Recently new types of calcium enriched milk have been specially marketed for men and women over 40 years. Juices and cereals of different brand names are also fortified with calcium and vitamin D.

PREVENTION, EDUCATION, LEVEL OF AWARENESS

There are no official programmes for prevention of osteoporosis or fragility fractures in Mexico at this time. The dairy industry now has a marketing programme to increase the consumption of milk and dairy products. In Mexico, the ingestion of milk has been displaced by ingestion of carbonated soft drinks, making it the second-highest country in consumption per capita of soft drinks (160 litres per person) and the highest in consumption of cola soft drinks².

In 2008, the Ministry of Health through the National Commission of the Institutes of Health and high-level specialty hospitals in Mexico convened a group of experts to study osteoporosis. The group was

STUDIES ACROSS LATIN AMERICA HAVE SHOWN THAT CALCIUM CONSUMPTION IS GENERALLY FAR BELOW INTERNATIONALLY RECOMMENDED LEVELS.



composed of clinical researchers, epidemiologists, health economists, social scientists, and policymakers from different institutions in Mexico. The objective of the team was to develop a national programme for prevention, treatment, and education to bring awareness to health professionals and the general public regarding osteoporosis and fragility fractures.

The group now meets on a regular basis and is currently gathering national and international data to develop national guidelines and protocols of treatment for osteoporosis. The agenda also includes setting priorities for research that will eventually evolve into nationwide prevention programmes at the population level. Education programmes for laypeople and physicians will be part of these programmes. This governmental initiative is a positive step as osteoporosis and bone health are on the government's agenda for the first time².

Part of the group was involved with the WHO Collaborative group in modelling the FRAX[®] Mexican version that was added to the site in 2011.

Many structured activities are organized through AMMOM, the Mexican Committee for study of Osteoporosis Prevention (COMMOP), and local societies or groups within different provinces of Mexico for the World Osteoporosis Day in October; however, little occurs outside of these efforts. There have been three initiatives to form patient societies; unfortunately, none of them have been successful.

Several courses are offered for continuing education for different health care professionals, mostly clinicians. The courses are fully sponsored by the pharmaceutical industry; nevertheless, they are taught by leading specialists and the programmes are comprehensive and of high quality.

The Seguro Popular offers courses to qualified general physicians in several areas, and osteoporosis and fragility fractures are included in this programme.

AMMOM holds a yearly meeting in the first semester of the year, and attendees are mostly physicians with varying specialties. Posters and oral presentations are included in the programme every year. A prize is awarded for the best poster or oral work presented at the meeting.

A group of academics in the field of nutrition from the Department of Health at the Universidad IBERO works actively with COMMOP as well as with the Department of Sports Medicine at the National University (UNAM) and at the Autonomous University in the State of Mexico.

AMMOM published a Consensus Conference on Diagnoses and Treatment of Osteoporosis in 2003²³.

RECOMMENDATIONS

- Improved epidemiological data collection is required for: the number of fractures, common sites, direct and indirect costs related to fragility fractures, quality of life, disability and death rates in affected individuals.
- Estimate disability adjusted life years (DALY) lost due to osteoporosis and its fractures, and develop sound economic modelling studies to estimate the burden of this disease in Mexicans in order to help the government to prioritize this health condition and be able to allocate the resources needed to treat and prevent osteoporosis.
- Develop absolute risk of fractures in Mexicans, using the Mexican version of the WHO FRAX, and conduct a cost effectiveness analysis study and a case finding strategy to help the Mexican authorities set up reasonable treatment thresholds for the Mexican population.
- Implement special programmes to assist clinicians in detection of vertebral fractures, because timely diagnosis and treatment will prevent other fragility fractures in the elderly.
- Study individuals who present with wrist fracture at the age of 50 years and over and follow them as high-risk group.
- Increase the number of DXA machines in order to meet the needs of the elderly and distribute them wisely within the governmental institutions.
- Facilitate better diagnosis, treatment opportunities, and education programmes for primary physicians.
- Encourage research on vitamin D and calcium status in Mexicans. Determine to what extent

these nutritional supplements are needed in older Mexicans and develop national recommendations for supplementation accordingly.

- Increase awareness and education programmes for consumers and health professionals using as many avenues as possible and to as many people of influence as possible (medical centers, periodical journals, newspapers, government departments, business community groups, and media campaigns).
- Make resources available to fund large-scale research projects that are evidence based and provide tools for early identification, recognition, post-fracture treatment and management of osteoporosis both by the health care profession and in the community.

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NICARAGUA

OVERVIEW

Due to the absence of statistical data, it is difficult to summarize the situation of osteoporosis in Nicaragua. Osteoporosis is not considered an important problem for the Nicaraguan government. The Nicaraguan Association of Menopause (ANCYM) was founded 11 years ago, and its six board members have developed projects related to prevention, detection and management of osteoporosis. Through lectures, symposia, television, radio and newspapers, ANCYM strives to provide the public with information about the diagnosis, prevention and treatment of osteoporosis.

Through the years, ANCYM has been successful in educating the public, and can see how patients now know that there is a silent disease that affects mostly women and their quality of life. Many patients, during consultation, request DXA examinations and want more information about preventing osteoporosis.

In summary, osteoporosis is not a priority for the national health system in Nicaragua. There is no central database to compile information collected from clinical tests. ANCYM has been working only a short time, but has been able to

educate the public about osteoporosis. There is considerable interest in the disease amongst the Nicaraguan public, both in terms of personal diagnosis and desire for increased understanding. Osteoporosis must become a priority for the Ministry of Health of Nicaragua.

KEY FINDINGS

Population growth statistics

The present population of Nicaragua is estimated to be 5.7 million, of which 13% (733,000) is 50 years of age and older and 2.9% (165,000) is 70 years and over. By 2050, it is estimated that the total population will rise to 7.2 million, of which 38% (2.8 million) will be 50 years and older and 11% (806,000) will be 70 years and older¹ (fig 1).

Epidemiology

There is a dearth of epidemiological data for osteoporosis in Nicaragua. ANCYM reports that the Nicaraguan female population aged 40 years or older, has prevalence rates of 45% osteopenia, 15% osteoporosis, and 40% with normal bone density.

Hip fracture

No available information.

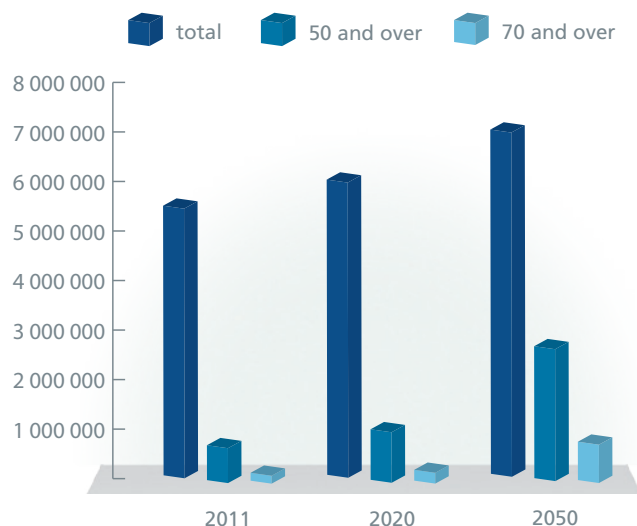
Vertebral fracture, other fragility fractures

No available information.

Diagnosis

In Nicaragua, there are five DXA machines² allowing for one DXA per 1.1 million inhabitants, and there are 30 ultrasound scanners allowing for one ultrasound per 200 000 inhabitants. All DXA equipment is located in the main city (Managua), and no machines are available in public hospitals. Of the exams performed, 90% are performed in the Hospital Metropolitano Vivan Pellas, and the other 10% are performed in other private institutions. Information regarding the average length of wait for a DXA scan is not available.

FIGURE 1 Population projection for Nicaragua until 2050



SOURCE US Census Bureau

Reimbursement policy

The cost of a DXA scan is 120 USD, and the cost of an ultrasound scan is 40 USD. DXA exams are not reimbursed within the public health system. Sixty-five per cent of the total population is covered by the public health system, 25% by social security and 10% are privately insured.

Calcium and vitamin D

Calcium and vitamin D supplements are available in Nicaragua, but fortified foods are not.

PREVENTION, EDUCATION, LEVEL OF AWARENESS

In Nicaragua, osteoporosis is not recognized as a major health problem and there are currently no government public awareness programmes covering prevention, diagnosis or management of osteoporosis. There is no governmental health professional training and there are currently no approved governmental guidelines for osteoporosis treatment or prevention. ANCYM organizes one annual congress and two patient awareness conferences every year. Physicians provide information about osteoporosis and patient education information.

Patient support groups do exist in Nicaragua. Public health awareness programmes are supported via helplines, public lectures and other various public awareness activities through the local society, ANCYM.

RECOMMENDATIONS

- DXA machines should be accessible to the entire population rather than just to those within the private health industry.
- Create a central statistical database to provide a robust and objective analysis about osteoporosis throughout the region.
- Every osteoporosis related association must continue to improve dissemination of information to the public and physicians of varying specialties.
- Invite a wide range of specialists to be incorporated into the various national societies.

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PANAMA

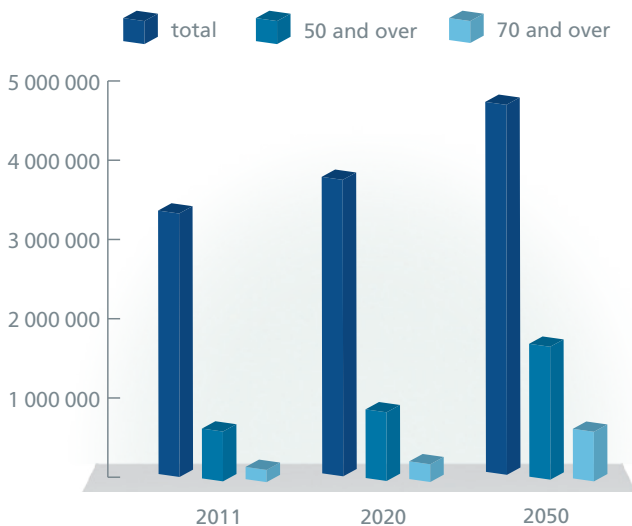
OVERVIEW

In Panama, the fracture predictions over the next 10 years are unknown. Researchers have attempted to determine the percentage of annual fractures due to osteoporosis, but have not been able to complete their studies for a variety of reasons, including economic constraint. Osteoporosis is not a health priority in Panama. The authorities are aware of the problem of osteoporosis, as they attend events hosted by national osteoporosis societies in Panama. However, public hospitals currently have no densitometers or medical treatment other than calcium and vitamin D.

Osteoporosis treatment guidelines do not exist, and there is serious lack of epidemiological data and resources needed to support them. There is a great need for sponsorship of epidemiological studies. COPOS (Panama Council of Osteoporosis) has been educating the public for over 17 years. There is good collaboration among heterogeneous and multidisciplinary groups of specialists within the society.

In 2011, COPOS organized its sixth national congress on osteoporosis, where 325 physicians from varying

FIGURE 1 Population projection for Panama until 2050



SOURCE US Census Bureau

specialties attended the meeting. The council also held six lectures throughout the year. During World Osteoporosis Day, COPOS organized several activities including press conferences, lectures in public and private hospitals, and a keynote lecture entitled “New techniques to evaluate bone quality”. The council members also participated in a television programme and conferences at four civil organizations.

KEY FINDINGS

Population growth statistics

The present population of Panama is estimated to be 3.5 million, of which 19% (654 000) is 50 years of age and older and 4.6% (160 000) is 70 years and over. By 2050, it is estimated that the total population will rise to 4.8 million, of which 36% (1.7 million) will be 50 years and older and 13% (651 000) will be 70 years and older¹ (fig 1).

Epidemiology

There is a dearth of epidemiological data for osteoporosis in Panama. In one small study, published in 2000, bone density studies were performed on 1031 women in Panama. Of these women, 821 (79.6%) were found to be osteopenic or osteoporotic².

Hip fracture

One small study completed in 1994 found that 318 women had a hip fracture that year. The majority of the fractures occurred in postmenopausal women. Therefore a hip fracture rate of 191 for every 100 000 women 50 years of age and older was derived from this study³.

Data from one study completed in 2004 listed the direct cost of hip fracture in Panama at 6000 USD⁴.

Vertebral fracture, other fragility fractures

No available information.

Diagnosis

There are 17 DXA machines in Panama⁵. This would allow for approximately one DXA machine for every 200 000 inhabitants. Public hospitals do not have DXA machines. The cost of bone densitometry testing ranges from 50 to 125 USD depending on whether or not the machine used is capable of performing a vertebral fracture assessment (VFA).

Reimbursement policy

No available Information.

Calcium and vitamin D

Calcium, vitamin D supplements, and fortified foods are available in Panama. A study, completed in 2008, showed that adolescents in Panama are not consuming adequate amounts of calcium. The average calcium consumption was found to be 377 mg/d which is less than 50% of the recommended calcium intake determined by the American Academy of Paediatrics. They were also found to have a high intake of carbonated beverages which may also negatively affect their future bone health⁶.

PREVENTION, EDUCATION, LEVEL OF AWARENESS

Osteoporosis is not recognized as a major health problem and there are currently no government public awareness programmes covering prevention, diagnosis or management of osteoporosis. Physician guidelines do not exist. There is no governmental health professional training and currently there are no approved governmental guidelines for osteoporosis treatment or prevention.

Patient support groups do exist in Panama. Public health awareness programmes are supported via public lectures. Programmes in lifestyle prevention for osteoporosis are organized by the Panama Osteoporosis Council.

In general, level of awareness about osteoporosis is low in Panama. Physicians and allied health professionals are poorly equipped to care for patients with osteoporosis.

RECOMMENDATIONS

- Epidemiological studies need to be funded and completed to evaluate the state of osteoporosis in Panama.
- More DXA machines are needed, especially within public institutions.
- Training programmes, specializing in the detection (especially VFA), prevention and treatment of osteoporosis for physicians and allied health professionals, need to be developed.

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PERU

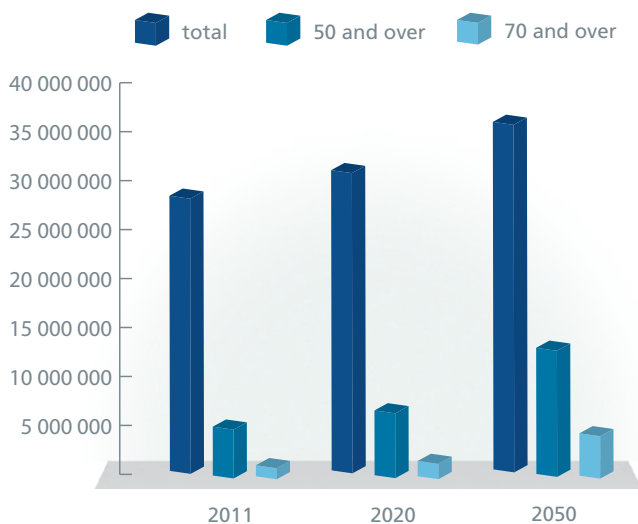
OVERVIEW

Peru is the fourth most populous country in South America. Osteoporosis is a problem that mainly affects the elderly population and postmenopausal women in Peru, involving more than 7% of women between the ages of 40 and 60 years, and close to 30% of women older than 60 years. Focus should be on prevention. If women can reach adequate peak bone mass, ingest an adequate amount of calcium, maintain a regular regimen of physical exercise, and reduce modifiable risk factors, the general prevalence of osteoporosis will decrease.

Currently there are three societies that participate in the field of osteoporosis. The Peruvian Society of Osteoporosis and Bone Diseases (SPOEO), the Peruvian Society of Rheumatology (Sociedad Peruana de Reumatología (SPR)), and the Peruvian Menopause Society (Sociedad Peruana del Climaterio (SPC)). Osteoporosis is not the main field of study and activities for SPR and SPC.

Eighty per cent of SPOEO scientific activities are dedicated to osteoporosis and 20% to other bone related disease. During 2012, the calendar of educational

FIGURE 1 Population projection for Peru until 2050



SOURCE US Census Bureau

activities includes three workshops that will be located outside Lima and one densitometry course in Lima. This is a significant change from previous years where SPOE activities were centralized in Lima, Peru.

A coordinated action among health professionals, governmental institutions, public media and the Peruvian people is needed to change the prognosis of osteoporosis. Early diagnosis of osteoporosis should be a priority, especially in rural areas of Peru. Finally, governmental reimbursement of osteoporosis treatments, including anti-resorptive therapy, will be crucial for the future of treatment in Peru.

KEY FINDINGS

Population growth statistics

The present population of Peru is estimated to be 29 million, of which 18% (5.2 million) is 50 years of age and older and 4% (1.2 million) is 70 years and over. By 2050, it is estimated that the total population will rise to 37 million, of which 36% (13 million) will be 50 years and older and 12% (4.5 million) will be 70 years and older¹ (fig 1).

Epidemiology

Data from EsSalud² indicates a rate of osteoporosis of 7% for women between the ages of 40 and 60 years and a rate of 30% for women older than 60 years of age.

Even higher rates were found in a 2001 study by the Peruvian Society of Rheumatology. In adults, osteoporosis prevalence rates of 20% and 14% for women and men respectively were reported, with the prevalence rate increasing to 41% in women over 50³.

Hip fracture

EsSalud (National Health Insurance provider for the working population) estimates that 12 - 16% of women older than 50 years will have a hip fracture annually in Peru². Based on the present population of 2.7 million women 50 years of age and over in Peru, this would produce between 324 000 to 432 000 fractures in this

population per year. Population projection statistics estimate the number of women 50 years of age and over will grow to 7.5 million in 2050. Therefore, we can extrapolate these data to estimate that between 900 000 and 1.2 million women 50 years of age and older could fracture in the year 2050.

A study conducted in Lima, Peru in 2000 showed a one-year mortality rate of 23.2% following hip fracture⁴. Mortality rates were higher among males than females⁵.

In 2002, a community based study revealed a hip fracture incidence rate of 444:100 000 and 264:100 000 women and men respectively. The participants in the study were aged 50 years and over^{5,6}.

The direct hospital cost for treating a hip fracture is estimated at 800 USD. The average hospital bed stay for a hip fracture patient is three weeks.

The social costs of hip fractures and effect on quality of life is more significant for informal workers than for the formally employed. The latter have insurance to cover their absence from work whereas informal workers do not.

Vertebral fracture, other fragility fractures

No available information.

Diagnosis

In Peru there are 125 DXA machines⁷ allowing for one DXA machine for every 232 000 inhabitants. There are 435 ultrasound scanners allowing for one machine per 67 000 inhabitants. There is no wait for a DXA or ultrasound scan. Diagnostic equipment is only available in urban centers.

Reimbursement policy

Peru has private and public health insurance systems and a free government health service for the poor. Within the public sector, there are two types of national insurance. The first, called Seguro Integral de Salud (SIS) is mandated by the Peruvian Ministry of Health (Ministerio de Salud, or MINSAL). This free insurance aims to protect the health of Peruvians who do not have health insurance, giving priority to those vulnerable populations who are living in poverty or extreme poverty. The second type, EsSalud, is a national insurance coverage that provides health services to the working population and their

families within national EsSalud facilities and hospitals. EsSalud covers approximately 20% of the population, which includes formal sector workers, retirees and their families. Twenty per cent of the population does not have access to any health care services or facilities, regardless of their insurance coverage⁸.

The cost of a DXA scan is 35 USD. Ultrasound scans are generally free of cost. These diagnostics tests are not reimbursed by the national health plan, but may be reimbursed by private health care insurance. Patients under the age of 50 years must demonstrate risk factors in order to be eligible for reimbursement.

Only private health insurance companies provide reimbursement for osteoporosis medications.

Calcium and vitamin D

Calcium, vitamin D supplements, and fortified foods are available in Peru.

PREVENTION, EDUCATION, LEVEL OF AWARENESS

Osteoporosis is recognized by the Ministry of Health as an issue amongst other non-communicable diseases and there are currently government public awareness programmes covering prevention, diagnosis and management of osteoporosis. Physician guidelines do not yet exist. There is no governmental health professional training and currently no approved governmental guidelines for osteoporosis treatment or prevention.

Programmes in lifestyle prevention of osteoporosis and patient support groups do not yet exist in Peru. Public health awareness programmes are supported via websites, radio advertisements and public lectures. The Peruvian Society of Rheumatology holds national and international courses, and scientific congresses. They also organize educational activities for hospital physicians via monthly meetings.

The Sociedad Peruana de Osteoporosis y Enfermedades Óseas (SPOEO), the Peruvian Society of Rheumatology (Sociedad Peruana de Reumatología), and the Peruvian Menopause Society (Sociedad Peruana del Climaterio) are active in Peru. Programmes for the public are available during World Osteoporosis Day and National Osteoporosis Day. According to SPOEO, the level

of osteoporosis awareness is high among individuals and the pharmaceutical industry is active in public awareness through educational talks and distribution of educational materials.

The level of awareness of osteoporosis is considered high among health care professionals as well. In general, gynaecologists, radiologists, geriatricians, orthopaedists, rheumatologists and endocrinologists are well equipped and trained in diagnosing and treating osteoporosis. General practitioners, emergency care physicians and paediatricians are less well-equipped and trained.

Nurses and physiotherapists are considered well-trained whereas other allied health professionals are not. Osteoporosis guidelines for medical and allied health professionals are available through the Peruvian Society of Osteoporosis and the Peruvian Society of Rheumatology.

RECOMMENDATIONS

- Development of patient support groups.
- Better training for general practitioners and allied health professionals.
- Government reimbursement of osteoporosis medications.
- Improved early detection of osteoporosis, especially in rural areas.
- Coordinated action among health professionals, governmental institutions, public media, and the Peruvian people to improve the prognosis of osteoporosis.

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URUGUAY

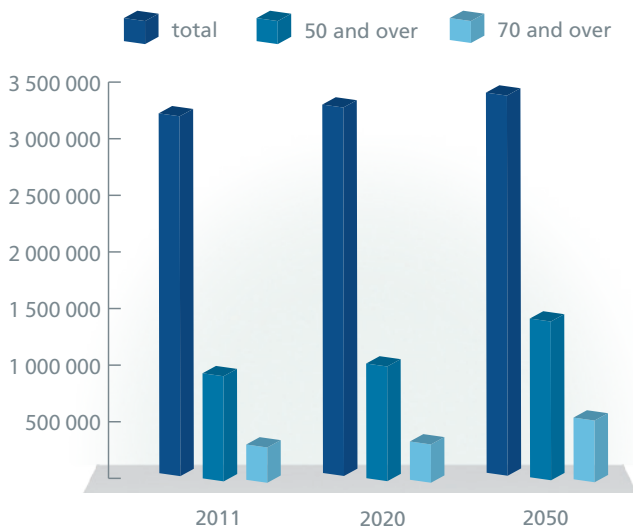
OVERVIEW

Uruguay has the largest proportion of seniors in Latin America. Osteoporosis is one of the more frequent chronic pathologies in adults; therefore the focus of government and policy makers should be to try and identify people at risk of fragility fractures after the age of 50 years.

The Uruguayan Society of Osteoporosis and Mineral Metabolism (SUOMM) utilizes guidelines according to the IOF and ISCD consensus in their work with the public and with physicians. The association is active in preparing conferences and special information material to facilitate understanding of this limiting, deforming and painful disease.

SUOMM holds preventative ultrasound campaigns, organizes activities each year for World Osteoporosis Day, participates in television programmes, lectures on the use of DXA in diagnosing osteoporosis, promotes weight-bearing exercise, and educates the public about the importance of sufficient vitamin D intake as well as a balanced diet rich in calcium and proteins.

FIGURE 1 Population projection for Uruguay until 2050



SOURCE US Census Bureau

Currently, there are no government guidelines or education materials for osteoporosis and no financial assistance. SUOMM's goals are to reduce the patient's fracture risk, ensure independence later in life, and to show support for people with osteoporosis.

KEY FINDINGS

Population growth statistics

The present population of Uruguay is estimated to be 3.3 million, of which 29% (960 000) is 50 years of age and older and 9.8% (325 000) is 70 years and over. By 2050, it is estimated that the total population will rise to 3.5 million, of which 41% (1 436 000) will be 50 years and older and 16% (567 000) will be 70 years and older¹ (fig 1).

Epidemiology

No available information.

Hip fracture

It is estimated, from public and private hospital data, that there were 994 hip fractures in 2009. The SUOMM predicts that these numbers will increase by 30% by the year 2020 and by up to 90% in the year 2050. Approximately 85 - 90% of hip fractures are treated surgically. The indirect hospital cost for treating a hip fracture is estimated at 5000 USD. Sixty per cent of hip fracture patients go to nursing homes, and it is estimated that for each hip fracture, three months of productivity are lost in the workplace. The average hospital bed stay for a hip fracture patient is 10 - 12 days. According to SUOMM, this length of stay is significantly longer than for other major diseases including breast cancer, ovarian cancer, prostate cancer, heart disease and pulmonary disease.

Vertebral fracture, other fragility fractures

No information is available regarding the prevalence of vertebral fractures in Uruguay. According to the national society, a review of patient histories revealed that 90% of reported spine fractures are treated by a physician.

Diagnosis

In Uruguay, there are an estimated 10 DXA machines², allowing for one DXA per 330 000 inhabitants. There is one ultrasound scanner per 400 000 inhabitants. The average length of wait for a DXA scan or ultrasound scan is one week.

Reimbursement policy

The cost of a DXA scan is 50 USD. The cost of an ultrasound scan is 5 USD. These diagnostics tests are not reimbursed by the government health plan, but are reimbursed by private health care insurance.

SUOMM indicates that some osteoporosis medications are covered by both public and private insurance companies. Reimbursement details are not available.

Calcium and vitamin D

Calcium, vitamin D supplements, and fortified foods are available in Uruguay.

PREVENTION, EDUCATION, LEVEL OF AWARENESS

In Uruguay, osteoporosis is not recognized as a major health problem and there are currently no government public awareness programmes covering prevention, diagnosis or management of osteoporosis. Physician guidelines do not exist. There are no governmental health professional training programmes and there are currently no approved governmental guidelines for osteoporosis treatment or prevention.

Patient support groups do exist in Uruguay. Public health awareness programmes are supported via websites, TV advertisements and televised health programmes.

The level of awareness among health professionals and the public has not been measured. The SUOMM reports that rheumatologists, endocrinologists, nutritionists and physiotherapists are the most well equipped and appropriately trained in caring for patients with osteoporosis.

RECOMMENDATIONS

- SUOMM recommends that a DXA scan be included with other investigations such as cervical

smear and mammography in the yearly exam for patients. Patients should be excused from work to have the exams and they should be free of cost.

- More population based epidemiological studies are needed to examine the osteoporosis and fracture incidence in Uruguay.
- Campaigns are needed to alert citizens to initiate prevention. Uruguayans need to determine their bone quality via a bone density scan.
- Osteoporosis treatment and prevention guidelines are needed in order to be able to better educate medical professionals.
- Osteoporosis should be recognized by the government as a major health problem.

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VENEZUELA

OVERVIEW

Currently, Venezuela does not have a system in place to track the incidence of osteoporosis using public hospital records. There is no active prevention programme for osteoporosis. The Venezuelan Society of Menopause and Osteoporosis (SOVEMO) is making efforts to raise awareness among the public in general via their chapter OSTEOAMIGO. SOVEMO is a non-profit scientific society established in 1989. Every two years, SOVEMO organizes a three-day national congress and in between carries out workshops, seminars and other educational programmes for clinicians all around the country. An Executive Committee runs the society and the members are renewed by election every three years. SOVEMO maintains a good relationship with other scientific societies with a focus on menopause and osteoporosis locally and around the world, and is a full IOF CNS Member.

OSTEOAMIGO is a patient oriented organization that is part of SOVEMO and relies on its scientific content and support. OSTEOAMIGO provides patient education and organizes activities to create awareness about osteoporosis, its risk factors and available treatments. Last year, in partnership with the IOF Latin America office, OSTEOAMIGO organized the Women Leaders Round Table in Venezuela, under the theme “Valuable Women. Valuable Bones. Love your bones” that had a great impact on public opinion about bone health in Venezuela. In 2012, OSTEOAMIGO will organize the Walk for Your Bones to celebrate World Osteoporosis Day on October 20th.

Published in 2009, *The Practical Guide of Osteoporosis* was intended to provide guidelines for diagnosis and treatment of metabolic disease. There is a clear lack of statistical records for this public health problem in Venezuela. The local society (SOVEMO) is struggling to tackle this problem. Despite the recent increase in numbers of DXA machines, there is a lack of trained personnel available to perform the actual tests. This lack of training significantly limits their ability to do research. SOVEMO is actively working to correct this problem. There are specific studies published about proximal femur fractures which report that it is possible that

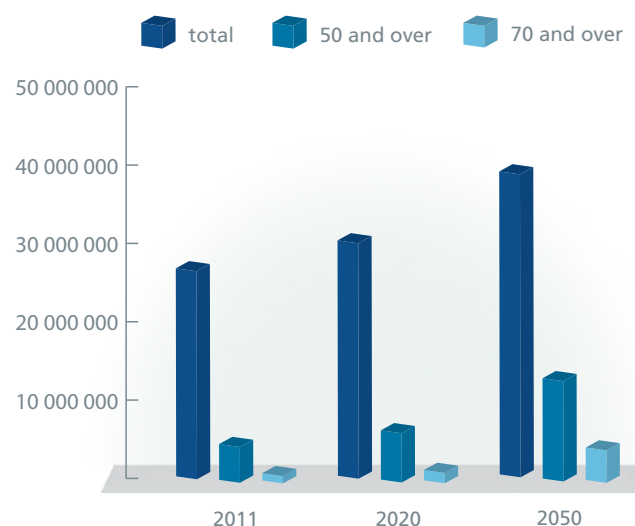
growth in the number of proximal femur fracture in the next decade will be 14%. It is important to note that in most of these studies, the average age of the patients is 50 years or postmenopausal. The average life expectancy in Venezuela is currently 74 years with an expected increase to 79 years by the year 2050.

KEY FINDINGS

Population growth statistics

The present population of Venezuela is estimated to be 28 million, of which 17% (4.8 million) is 50 years of age and older and 3.5% (961 000) is 70 years and over. By 2050, it is estimated that the total population will rise to 40 million, of which 33% (13 million) will be 50 years and older and 11% (4.3 million) will be 70 years and older¹ (fig 1).

FIGURE 1 Population projection for Venezuela until 2050



SOURCE US Census Bureau

Epidemiology

There is minimal epidemiological information on osteoporosis in Venezuela. One study, conducted in 2003, showed that only 10% of the population older than 70 years had a normal bone density².



THROUGHOUT LATIN AMERICA MORE RESEARCH STUDIES ARE NEEDED TO QUANTIFY THE PROBLEM OF FRAGILITY FRACTURES AND RELATED MUSCULOSKELETAL DISEASES.

Hip fracture

There is a dearth of data on hip fracture incidence in Venezuela. In 1995, it was reported that 9.6 hip fractures occurred each day in Venezuela. Based on population statistics, it is estimated that 67 hip fractures will occur daily in 2030³. The study also found that 17% of those who suffer a hip fracture died within four months of fracturing³.

A community based study examining the population 50 years and over in the late 1980's showed a hip fracture incidence rate of 94:100 000 per year and 44:100 000 per year in women and men respectively. The participants in the study were 50 years of age and older^{4,5}. Kanis et al. reported a hip fracture rate of 150:100 000 in women over 50 years in Venezuela⁶. In 2002, Kanis et al. predicted a hip fracture incidence rate of 193:100 000 per year and 381:100 000 per year for 80 year old men and women respectively in Venezuela⁷.

There is currently no information available demonstrating the direct cost of hip fracture today. However, a study conducted in 2000 showed the direct cost of hip fracture in Venezuela was 4500 USD⁴. This cost was significant as the national gross income per capita at that time was 3680 USD.

Vertebral fracture, other fragility fractures

No available information.

Diagnosis

In Venezuela there are 149 DXA machines⁸. This allows for approximately one machine per 200 000 inhabitants. No information is available for ultrasound machines or length of wait for a DXA scan.

Reimbursement policy

A study conducted in 2000 showed the cost of DXA testing at that time was 40 USD. Presently, experts estimate the cost of a DXA at 25 USD.

Bisphosphonates, including annual intravenous (IV) infusion, and PTH are reimbursed by both public and private health care insurance plans.

Calcium and vitamin D

Calcium, vitamin D supplements, and fortified foods are available in Venezuela.

PREVENTION, EDUCATION, LEVEL OF AWARENESS

Osteoporosis is not recognized as a major health problem and there are currently no government public awareness programmes covering prevention, diagnosis or management of osteoporosis. Physician guidelines prepared by the local society SOVEMO were published in 2009. There is no governmental health professional training and currently no approved governmental guidelines for osteoporosis treatment or prevention.

Public health awareness programmes are supported via websites, advertisements, public lectures as well as World Osteoporosis Day activities supported by local societies.

In general, physicians and allied health care professionals alike are poorly trained in the diagnosis and treatment of osteoporosis. Orthopaedists, rheumatologists, gynaecologists, endocrinologists, radiologists and physiotherapists are better equipped than other health professionals to provide care for patients with osteoporosis.

RECOMMENDATIONS

SOVEMO has several initiatives planned to facilitate understanding of the extent of osteoporosis in Venezuela. They also have plans to increase the amount of education available to the medical community and the public alike.

- Determine the peak bone mass by densitometry in the Venezuelan population and its loss rate taking account of the Hispanic/indigenous population structure.
- Determine the prevalence of osteoporosis in Venezuela.
- Study the incidence of fractures due to osteoporosis at individual sites including the distal radius, spine and proximal femur.
- Develop more educational courses for medical specialists on osteoporosis.
- Institute general information courses for the public.
- Attempt to create interest in the field among national and regional health authorities in Venezuela.

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CONCLUSIONS AND RECOMMENDATIONS

Osteoporosis and resulting fragility fractures represent a major human, social and economic burden throughout the region. This Audit, including data from 14 countries in Latin America, raises the alarm for immediate action to stop the growing burden of osteoporosis and related fractures.

It is apparent that this serious and costly age-related chronic disease already represents a significant health issue in Latin America and, given the projected increase in the ageing populations, the burden of the disease is expected to grow enormously in magnitude throughout the region. By 2050, the countries represented in this

Audit will have 251 million people 50 years of age and older. Thus, in the coming decades, the number of fragility fractures is anticipated to double if not triple in most countries.

As well as the expected increase in life expectancy, the Audit points to certain lifestyle factors which will continue to impact negatively on the high prevalence rates of osteoporosis and fractures in Latin America, as elsewhere around the world. Among these factors are widespread vitamin D deficiency and the growing urbanization which tends to lead to more sedentary lifestyles. These lifestyle factors also have a long-term

GIVEN THE PROJECTED INCREASE IN PEOPLE AGED 50 AND OVER, THE BURDEN OF OSTEOPOROSIS IS EXPECTED TO RISE DRAMATICALLY.



impact on bone health at those critical ages when children and adolescents are building towards their peak bone mass.

The burden of fragility fractures due to osteoporosis extends far beyond the direct medical costs of fracture treatment. Hip fractures in particular have enormous personal and socio-economic consequences for millions of people throughout Latin America. International studies have shown that loss of physical function and quality of life among survivors of hip fracture is profound. Forty percent are unable to walk independently and 60% still require assistance a year later. As a result, hip fractures are a major cause of loss of independence among seniors – at older ages 33% may be totally dependent on care in the year following the hip fracture. This represents a huge burden for families and communities throughout the region.

The low socioeconomic levels and urban/rural disparities in many countries covered in this Audit result in restricted access to diagnosis and treatment. In many rural areas there is no accessibility to DXA for early diagnosis of osteoporosis. Often, diagnosis and treatment are only offered in the urban areas and reimbursed within the private health insurance system for a minority of the population. As a result there are major restrictions in access to standard healthcare for the poor and the rural population.

Another glaring finding of this report is the general lack of solid epidemiological data on fractures in most of the countries included in the Audit. Research is scarce, and when present is often limited to small local studies, thus providing at the most only fair evidence. When available, studies reveal, often by extrapolation, that hip fracture rates are significant throughout the

EVERY INDIVIDUAL SHOULD TAKE STEPS TOWARDS A FUTURE OF ACTIVE AGEING WITHOUT FRAGILITY FRACTURES AND MUSCULOSKELETAL DISEASES.



countries studied, incurring substantial morbidity and mortality, and heavily impacting on limited national healthcare budgets.

In most countries in the region, health authorities do not yet consider osteoporosis a national health priority. Many of the countries covered in the Audit do not have government endorsed prevention and treatment guidelines, and there is often no formal training on osteoporosis within medical schools and physician education programmes. Much needed campaigns to raise public awareness about the importance of bone health and osteoporosis prevention are often carried out by local patient and medical societies, without support from government health care authorities.

In order to achieve a substantial impact on the disease burden incurred by this devastating and costly disease, the International Osteoporosis Foundation joins national societies in Latin America to urge action on the following key points.

SUPPORT RESEARCH TO GATHER REQUIRED EVIDENCE

- 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 major centres in the region to monitor hospitalization rates, and relevant indicators.
- Acquisition of the necessary data (such as that above) in order to develop a FRAX[®] algorithm for those countries without a current model.
- Evaluate the prevalence of vitamin D insufficiency; and its impact on musculoskeletal and other outcomes.
- Support research aimed at evaluating quality of life and economic impact of osteoporosis and fractures.

FORMULATE NATIONAL HEALTH POLICIES, DEVELOP AND DISSEMINATE GUIDELINES

- Stakeholders (local leaders, experts in the field, scientific, medical and patient societies) must lobby policy makers in Ministries of Health (MOH) and the WHO to upgrade the priority of osteoporosis and musculoskeletal diseases.
- Implementation of national and regional guidelines for prevention, diagnosis and treatment of osteoporosis.

- Development of vitamin D supplementation strategies for at risk groups.
- Implementation of affordable national strategies, including lifestyle and treatment strategies through government health care policies and community-based initiatives.
- 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

The involvement of medical and healthcare professionals, national osteoporosis societies and patients is critical. More must be done to:

- Disseminate and reinforce National Osteoporosis Guidelines for prevention and treatment of osteoporosis and fragility fractures.
- Engage health care providers and allied health care professionals through regular training and required certification, where applicable.
- 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, as appropriate, to widen access to effective care.
- Empower patients through public awareness campaigns, including those that identify risk factors to prevent the first fracture.



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 and related musculoskeletal diseases. With more than 200 member societies in 93 locations worldwide, IOF member societies represent millions of osteoporosis sufferers and others who are affected by this silent disease.



**International Osteoporosis
Foundation**

THE LATIN AMERICA REGIONAL AUDIT

Epidemiology, costs & burden of osteoporosis in 2012

Covering 14 countries in the Latin American region, the Audit report is the first to collect information on the epidemiology, burden and costs of osteoporosis in one document. The Audit assesses current and projected disease burden, and identifies gaps in knowledge and care that are predominant in the region.

Future projections for the majority of the countries indicate that there will be a dramatic increase in fragility fractures as the proportion of older people within the population grows. Gaps in health professional training and research, vitamin D insufficiency and low accessibility to diagnosis and treatment are also shown. Evidently, action must be taken by all stakeholders – medical professionals, government health authorities, health insurances and the public – to reduce the impact of osteoporosis and related fragility fractures. As the first compilation of its kind for the region, the Audit is a valuable tool that serves as a 'Call for action' by directing attention and instigating change at the national level on this important healthcare challenge.

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