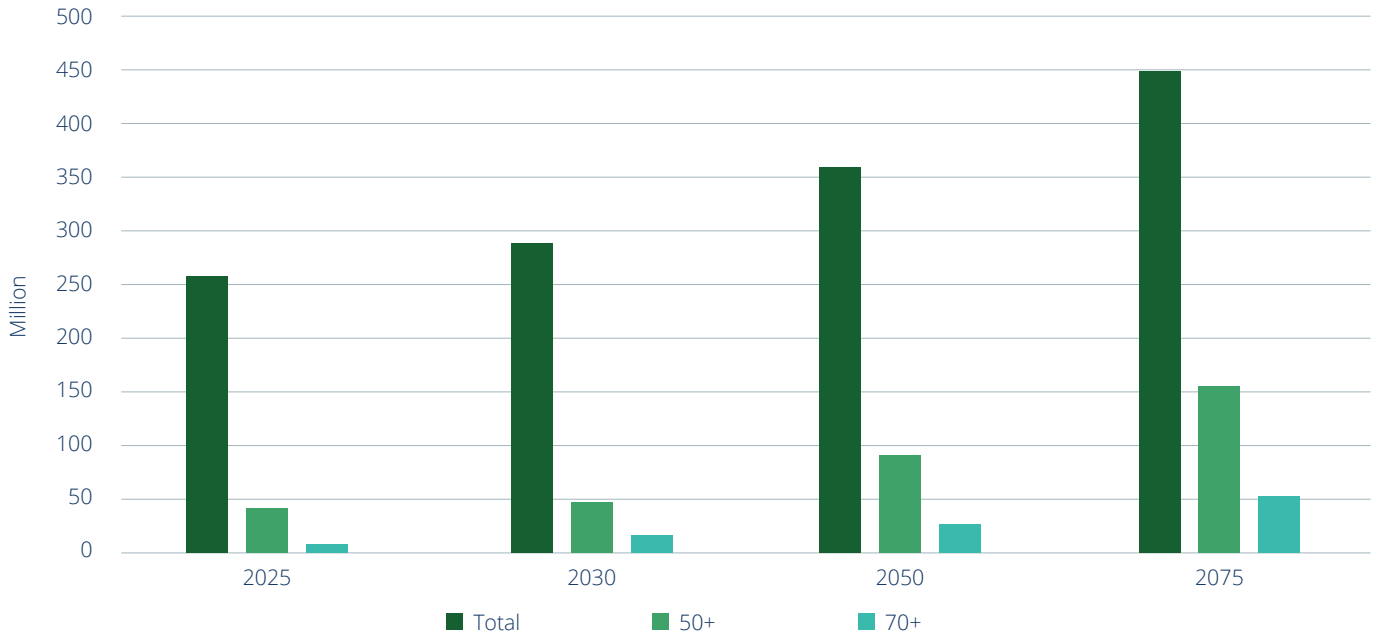
DEMOGRAPHIC TRENDS

Pakistan's population is projected to grow considerably over the coming decades, increasing by 43% from 257.0 million in 2025 to more than 366.5 million by 2050, and by a further 22% to reach 447.0 million by 2075 *(Figure 1)*. Pakistanis currently have an average life expectancy of 70.5 years, which is expected to rise to 82.5 years by 2075, an increase of 17%.

The proportion of Pakistanis aged 50 years or older is set to rise significantly. In 2025, this group of almost 38.3 million people represents 15% of the total population. By 2075, this will increase to 35%, with numbers quadrupling to 155.6 million *(Figure 1)*.

The most dramatic demographic shift in Pakistan will be among those aged 70 years or older, whose numbers are projected to surge from 7.6 million in 2025 to 53.9 million in 2075, a 608% increase in absolute terms. Equally striking is their growing share of the total population. In 2025, those aged 70+ accounted for just 3% of Pakistan's 257.0 million people. By 2075, they will make up 12% of a larger 447.0 million population, reflecting a 307% relative increase in their proportion of the total population.

Figure 1. Population projections for Pakistan from 2025 to 2075[1]



CENTRALISED DATABASES FOR FRACTURES AND EPIDEMIOLOGY

The Hip Fracture Registry for Pakistan was launched in January 2023 through a mobile application available on both Android and iOS platforms. Developed by a dedicated working group in collaboration with the Pakistan Orthopaedic Association and supported by the Asia Pacific Orthopaedic Association, the registry is overseen by the Health Advisory Board. Participating members and institutions represent all four provinces of Pakistan.

HEALTHCARE COSTS ASSOCIATED WITH FRAGILITY FRACTURES*

Average direct hospital costs for treating osteoporotic hip fractures (USD)	Average indirect hospital costs for treating osteoporotic hip fractures (USD)	Average bed days for hip fractures
1,070 – 3,560*	No data*	4 – 5*

**Best available estimates as reported by country experts in the absence of published data.*

CLINICAL SPECIALTY RESPONSIBLE FOR MANAGEMENT OF OSTEOPOROSIS

In Pakistan, there are no dedicated professionals exclusively assigned to the management of osteoporosis, as may be the case in some Western healthcare systems. Instead, healthcare providers across various specialties based on the patient's clinical presentation and healthcare setting contribute to the diagnosis, treatment, and ongoing management of the disease. Osteoporosis is not recognised as a standalone medical specialty. However, it is currently a formal component of specialty medical training, particularly for family physicians, internal medicine specialists, endocrinologists, gynaecologists, rheumatologists, orthopaedic surgeons, and chemical pathologists. Efforts are underway to formally recognise metabolic medicine, including metabolic bone diseases such as osteoporosis, as a subspecialty within Chemical Pathology. Additionally, a growing number of radiologists are developing a special interest in osteoporosis, reflecting a positive trend toward more specialised care. However, there are no dedicated osteoporosis clinics in most hospitals.

PATIENT SUPPORT ORGANISATIONS

There are no formal patient support organisations that focus on osteoporosis in Pakistan. However, the country does have a patchwork of efforts like patient awareness sessions, free medical camps for osteoporosis screening, social media campaigns and some laboratories in Pakistan have developed 'Osteoporosis Panels' to support patient education and facilitate easier diagnostic pathways.

OSTEOPOROSIS AS A DOCUMENTED NATIONAL HEALTH PRIORITY (NHP)

Osteoporosis is not documented as a National Health Priority (NHP) in Pakistan.

WAITING TIME FOR HIP SURGERY

Average waiting time for hip surgery after hip fracture	2 - 3 days
% of hip fractures surgically managed	51 - 75%

FRACTURE RISK ASSESSMENT TOOLS

In 2021 the surrogate model for Pakistan specific FRAX® for fracture risk assessment was introduced for clinical use but it is still not widely used within the country. Currently, the group at an Academic Medical Center is working to integrate the FRAX® tool in nursing assessment at the outpatient clinics.

AVAILABILITY AND REIMBURSEMENT OF MEDICATION

As shown in *Table 1*, a range of osteoporosis treatments are available in Pakistan. However, none are designated as first-line or reimbursed.

Table 1. Availability and reimbursement of osteoporosis treatments in Pakistan

Treatment	Available
Risedronate	X
Alendronate	X
Ibandronate	X
Zoledronic acid	X
Clodronate	X
Pamidronate	X
Raloxifene	X
Bazedoxifene	
Denosumab	X
Strontium Ranelate	X
Teriparatide	X
PTH (1-84)	
Abaloparatide	
Romosozumab	X
Vitamin D/Calcium supplements	X
Calcitonin	X
Hormone Replacement Therapy	X
Testosterone	X
Alfacalcidol	X
Calcidiol	X
Calcitriol	X
Tibolone	X

Pakistan does not have a comprehensive national health system like those in some other countries, such as the National Health Service in the United Kingdom. Healthcare in Pakistan is primarily provided through a combination of public and private sectors. In the public sector, healthcare services are typically provided through government hospitals and clinics. Treatment at these facilities may be subsidised or provided free of charge to certain segments of the population, particularly those who are unable to afford healthcare services. However, the quality and availability of healthcare in public facilities can vary significantly across different regions of Pakistan. In addition, non-governmental organisations play an important role in providing subsidised and free of charge services.

In the private sector, healthcare services are provided by private hospitals, clinics, and healthcare professionals. Patients usually pay out-of-pocket for treatment received at private healthcare facilities. However, some individuals may have private health insurance coverage that helps offset the cost of medical expenses. Private health insurance coverage in Pakistan is not as widespread as in some other countries, but it is available for purchase from various insurance companies.

FRACTURE LIAISON SERVICES (FLS) REIMBURSEMENT AND AVAILABILITY

The FLS model of care is currently being implemented at three hospitals in Pakistan. As a relatively new concept in the country, these institutions have initiated pilot programmes that are still evolving. Additionally, one institute has conducted feasibility studies to assess the potential model for broader implementation.

% of hospitals with an FLS	Other fracture types identified by or referred to an FLS
1 - 9%	No data
Hip fractures identified by or referred to an FLS	**Reimbursement mechanism to support FLS activities**
In process at 3 hospitals. One institute is doing feasibility studies.	Private funding
Vertebral fractures identified by or referred to an FLS	**% of patients recommended for treatment who actually receive treatment**
No data	< 20%

QUALITY INDICATORS

There are no quality indicators for hip and other fractures in Pakistan. Pathfinder audits to assess the practices in management have been conducted in hip fracture patients [2] and gap analysis conducted against IOF best practice standards [3]. These findings together with the findings of a feasibility study will help in determining the key performance indicators for fragility fractures.

GUIDELINES FOR OSTEOPOROSIS MANAGEMENT

In 2023, the Bone and Mineral Disease Research Group and CITRIC Center at Aga Khan University developed a clinical practice guideline titled *GRADE-ADOLOPMENT of Clinical Practice Guideline for Postmenopausal Osteoporosis Management—a Pakistani Context* [4]. The guideline focuses specifically on the management of postmenopausal women with osteoporosis.

It provides comprehensive recommendations for use of surrogate fracture risk assessment tool for Pakistan. The guideline also outlines criteria for initiating treatment based on these risk factors. However, it does not address population-based screening strategies.

Despite its alignment with international standards in terms of clinical assessment and treatment thresholds, the guideline's implementation in Pakistan remains limited. There is currently no national reimbursement policy for osteoporosis care, leaving patients to cover the full costs of diagnosis and treatment out of pocket. This lack of financial support poses a significant barrier to the practical application of the guideline at a national level. The guidelines were developed without direct patient involvement. Additional details on the development of these guidelines are included in *Table 2*.

Table 2. Development of clinical guidelines for the management of osteoporosis in Pakistan

Systematic literature review undertaken	Yes
Recommendations	Yes
Stakeholder involvement	No
External review	Yes
Procedure for update defined	Plans are in place to tailor the guidelines according to APCO framework
Economic analysis	No
Editorial independence	Yes

ACCESS TO DXA AND/OR ULTRASOUND AND REIMBURSEMENT

DXA is available in Pakistan.

Waiting time (d)	1 - 3
Cost (USD)	25 - 30
Is it reimbursed?	Some private insurance provides coverage
Is reimbursement a barrier to accessing treatment?	Yes, as it is an expensive test available in the private sector mostly

Quantitative ultrasound is available in Pakistan.

Waiting time (d)	1 - 3
Cost (USD)	25 - 30
Is it reimbursed?	Some private insurance provides coverage, free at some NGO facilities
Is reimbursement a barrier to accessing treatment?	No

OVERVIEW OF OSTEOPOROSIS IN PAKISTAN

In Pakistan, osteoporosis lacks recognition as a National Health Priority, evidenced by the absence of an action plan and epidemiological data on the condition. The recent development of Clinical Practice Guidelines (CPGs) [4] on postmenopausal osteoporosis underscores the necessity for their dissemination and endorsement by national societies.

Currently, fracture rates specific to Pakistan are unavailable, prompting reliance on estimates derived from studies on Indians residing in Singapore, extrapolated to reflect the Pakistani population based on United Nations data from 2015, as reported by IOF[5]. Projections indicate a concerning trajectory, with the annual number of hip fractures in individuals aged 50+ anticipated to surge by 214% by the year 2050 [6], driven largely by an escalation in cases among women due to their extended life expectancy. However, this alarming trend highlights the urgent imperative for comprehensive epidemiological studies on fractures within Pakistan.

Furthermore, Pakistan contends with one of the highest prevalences of vitamin D deficiency globally. The CPG for postmenopausal osteoporosis recommends elevated doses of vitamin D (2000–4000 IU) for patients with specific conditions such as obesity, malabsorption, and advanced age, while cautioning against excessive dosing. For those deficient in vitamin D, loading doses ranging from 5000 IU daily for eight weeks to larger doses administered weekly over the same period are advised, with consideration given to more aggressive regimens for patients with severe symptoms impacting their quality of life. Clinical trials, such as that conducted by Masood et al. [7] have shown promising results in correcting deficiency with single large doses given orally or intramuscularly. For asymptomatic individuals and those who have successfully completed loading doses, maintenance supplementation with at least 600 IU daily for adults and 700–800 IU daily for older adults is recommended. As outlined in the CPG [4], patients are counselled on the importance of achieving adequate calcium intake, aiming for a total daily intake of 1,200 mg from both dietary sources and supplements particularly for women aged 50 years and above.

Over the past decade, the *Bone and Mineral Disease Research Group* has made remarkable strides in advocating for bone health and addressing fragility fractures by embracing inclusivity and engaging diverse professional groups including nursing, orthopaedics, rheumatology, nutrition, endocrinology, and basic science. This collaborative effort culminated in the launch of FFN-Pakistan under the *Global Fragility Fracture Network*, establishment of special interest groups, and the successful organisation of the first international conference aimed at fostering synergies in bone health. A series of workshops were conducted, covering a range of topics including comprehensive geriatric assessment from a nursing perspective, falls prevention, recent advances in fragility fracture management, formulation of guidelines for vitamin D, and orthogeriatric nursing in emergency and perioperative settings. Moreover, the group introduced *Continuing Medical Education (CME)* seminars, case-based discussions, and invited lectures under the theme *'Bone and Mineral Matters.'* It also played a pivotal role in co-hosting Asia Pacific Pocket Meetings of the Global FFN to advance orthogeriatric care across the region.

An addition to the current scenario of osteoporosis care in Pakistan, where standardised training and coordinated management practices have been lacking is the *'Online Certificate Course on Osteoporosis'*, developed under the auspices of FFN-Pakistan and the *Bone and Mineral Disease Research Group*. It is an evidence-based educational programme aimed at improving clinical understanding and practice in osteoporosis prevention, diagnosis, and management. The course, accredited with continuing professional development credit hours, is live since 2024 for healthcare providers.

To further expand national networks on fragility fractures and education, a provincial Chapter for FFN-Pakistan was established during the Endobone colloquium in Lahore. Collaborative efforts with organisations such as the *Pakistan Orthopaedic Association* and the *Pakistan Arthroplasty Society* resulted in the organisation of the first ISCD Course on Osteoporosis and the development of a multidisciplinary online course for healthcare professionals involved in orthogeriatric care.

The research group's initiatives extended beyond educational efforts to include the development of clinical practice guidelines for post-menopausal osteoporosis [4], as well as the creation and validation of tools for nutrition assessment and sunlight exposure measurement, tailored to the Pakistani context. Mentoring support was provided to other research groups aiming to develop multidisciplinary projects in bone and mineral disorders, particularly focusing on high-risk groups such as patients with infertility, Polycystic Ovary Syndromes (PCOS), thalassemia, and recurrent stone formation.

Future priorities include developing consensus recommendations for implementing secondary fracture prevention (SFP) and disseminating guidelines endorsed by national societies, updating to in light of the APCO framework [8], and refining guidelines on vitamin D and thalassemia. Recognising the socio-economic determinants of bone health, efforts will also focus on addressing inequality and enhancing community support systems. Shifting perspectives towards better skeletal health will involve public health initiatives that improve access to education, healthcare, and economic opportunities, alongside promoting social policies that reduce disparities and foster collaboration among healthcare professionals, policymakers, and the community.

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