Background

Two million Americans suffer an osteoporotic fracture every year, often causing significant morbidity, reductions in quality of life, loss of independence, and mortality.1

- Such fractures contribute to high costs to payers ($22 billion) and result in substantial indirect costs (e.g., informal caregiving).2

This economic and clinical burden is driven by inadequate diagnosis and treatment of high-risk individuals.

Given an aging population and recent decrease in utilization of preventive measures, this burden is expected to rise.2

- Policy-driven expansion of case-finding (e.g., dual-energy X-ray absorptiometry (DXA) and treatment (e.g., pharmacologic therapies) of high-risk women could lower this burden.

While previous analyses have projected the future economic and clinical burden of osteoporotic fractures, they have not considered how interventions may impact projections.3,4

Objective

- We aimed to project the fracture burden in US women 65+ years old given policy changes and various interventions.

Methods

- A microsimulation forecasting model was developed to project the burden of osteoporosis from 2018 to 2040 (Figure 1).

We assessed hypothetical cohorts of 10 million US women ages 65 years and older annually, and estimated total fractures and direct and indirect costs with or without potential hypothetical policy changes.

![TABLE 1: POPULATION CHARACTERISTICS FROM NHANES](https://example.com/table1)

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>Mean Female/Female Trend</th>
<th>Precalculated Fracture</th>
<th>Fracture Rate (Rate of Event)</th>
<th>Residual Vitality (Provision)</th>
<th>Residual Risk (Chance of Use)</th>
<th>Excessive Risk (Calculated Risk)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>20,403,148</td>
<td>15,785,017</td>
<td>X</td>
<td>Medicare</td>
<td>14</td>
<td>9%</td>
<td>68</td>
</tr>
</tbody>
</table>

![FIGURE 1: PATIENT FLOW THROUGH THE MODEL](https://example.com/figure1)

Results

- Risk factor prevalence was estimated from analyzing NHANES,3 a nationally representative population-based survey conducted every 2 years (Table 1).

- Given anticipated population aging and growth, annual osteoporotic fractures were projected to increase from just under 2 million over 3.2 million from 2018 to 2040, an increase of 68%.

- Such incident costs related to fracture prevention and treatment are expected to rise from $52 billion in 2018 to over $87 billion in 2040, however, none of these are preventable.

- If interventions that increase case finding were implemented, the economic and clinical burden could be reduced.

- Policy-driven increases in case finding of high-risk women could substantially decrease the clinical burden, preventing up to 4.2 million fractures over the next 22 years compared to status quo (Table 2).

- With increases in costs associated with additional case finding and treatment, preventive services would represent less than 6% of total costs of osteoporosis (Table 3).

![TABLE 2: COST INPUTS](https://example.com/table2)

<table>
<thead>
<tr>
<th>Model Input</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>$53.9 billion</td>
</tr>
<tr>
<td>Medicare</td>
<td>$20,403,148</td>
</tr>
<tr>
<td>Fracture Rate</td>
<td>14</td>
</tr>
<tr>
<td>Residual Risk</td>
<td>68</td>
</tr>
</tbody>
</table>

- In case finding and treatment could reduce payer costs by $21 billion and total societal costs by $44 billion over the next 22 years through the prevention of 6.1 million fractures (Table 3, Figure 2).

Conclusions

- Given a growing population of postmenopausal women in the US and increasing longevity, there is an expected rise in the economic and clinical burden of osteoporotic fractures.

- To prevent this rapid growth in fractures, emphasis must be placed on identifying and treating high-risk individuals.

- Our analysis found that such measures would simultaneously reduce the clinical burden while reducing costs, unlike many other disease areas where improving outcomes requires higher spending.

![FIGURE 3: COMPARISON OF DIRECT AND INDIRECT COSTS FROM 2018 TO 2040 WITH INCREASED CASE FINDING AND TREATMENT](https://example.com/figure3)

- DXA, dual-energy X-ray absorptiometry; Fracture Risk Assessment Tool (FRAX); Population attributable fraction; RRs, risk ratios.