Ovarian Aging Economic Analysis Report

Analysis Date: October 20, 2025 **Discount Rate:** 3% **Time Horizon:** 6 years of benefit

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Executive Summary

This report presents a comprehensive economic analysis of delaying menopause by 5 years. The analysis evaluates both health outcomes and associated economic impacts across multiple disease categories.

Key Finding: Delaying menopause by 5 years would generate a net economic benefit of **$60.9 million per 100,000 women** (equivalent to **$609.2 million per million women**) through reduced disease incidence and associated treatment costs.

Methodology

Data Sources

1. **Combined Menopause Data** - Risk ratios for early menopause across health outcomes
2. **Baseline Incidence Rates** - Disease incidence per 100,000 women in general population
3. **Disease Treatment Costs** - Annual treatment costs per disease (USD)

Calculation Approach

1. **Baseline Rate**: Disease incidence in normal menopause population
2. **Risk Ratio**: Relative risk for early menopause vs. normal timing
3. **Early Menopause Rate**: Baseline rate × Risk ratio
4. **Cases Prevented**: Early rate - Baseline rate (cases avoided by delaying menopause)
5. **Present Value Factor**: PV = [1 - (1+r)^(-years)] / r
6. **Economic Value**: Cases prevented × Annual cost × PV factor

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Results: Positive Effects (Benefits)

1. Coronary Heart Disease (CHD)

- **Baseline Incidence:** 350 per 100,000 women
- **Risk Ratio:** 1.45
- **Cases Prevented:** 158 per 100,000 women

- **Annual Treatment Cost:** $18,953
- **Economic Value:** $16,170,845
- **Impact:** Largest contributor in terms of cases prevented

2. **Stroke**

- **Baseline Incidence:** 150 per 100,000 women
- **Risk Ratio:** 1.58 (highest risk ratio)
- **Cases Prevented:** 87 per 100,000 women
- **Annual Treatment Cost:** $30,000
- **Economic Value:** $14,138,870
- **Impact:** Second-highest economic benefit

3. **Osteoporotic Fracture**

- **Baseline Incidence:** 400 per 100,000 women (most common condition)
- **Risk Ratio:** 1.23
- **Cases Prevented:** 92 per 100,000 women
- **Annual Treatment Cost:** $37,544 (highest treatment cost)
- **Economic Value:** $18,711,239
- **Impact:** Highest economic benefit due to high prevalence and treatment costs

4. **Dementia (any type)**

- **Baseline Incidence:** 40 per 100,000 women
- **Risk Ratio:** 1.37
- **Cases Prevented:** 15 per 100,000 women
- **Annual Treatment Cost:** $64,745 (most expensive per case)
- **Economic Value:** $5,190,894
- **Impact:** Lower impact due to relatively low incidence rate

5. **Type 2 Diabetes Mellitus (T2DM)**

- **Baseline Incidence:** 550 per 100,000 women (most prevalent)
- **Risk Ratio:** 1.15 (lowest risk ratio)
- **Cases Prevented:** 82 per 100,000 women
- **Annual Treatment Cost:** $15,000
- **Economic Value:** $6,703,774
- **Impact:** Moderate benefit despite high prevalence

Results: Negative Effects (Risks)

Note: Currently no risk factors are included in this analysis. Future iterations should include: - Breast Cancer risk - Endometrial Cancer risk - Other hormone-related conditions

Financial Summary

Category	Value (per 100K women)
Total Benefits	$60,915,622
Total Costs	$0
Net Benefit	$60,915,622

Scaled Projections

Population Size	Net Economic Benefit
100,000 women	$60.9 million
500,000 women	$304.6 million
1,000,000 women	$609.2 million
10,000,000 women	$6.09 billion

Benefit Distribution Analysis

Economic Value by Disease Category

Disease	Economic Value	% of Total Benefits
Osteoporotic Fracture	$18,711,239	30.7%
CHD	$16,170,845	26.5%
Stroke	$14,138,870	23.2%
Type 2 Diabetes	$6,703,774	11.0%
Dementia	$5,190,894	8.5%

Key Insight: The top 3 conditions (Osteoporotic Fracture, CHD, and Stroke) account for 80.4% of total economic benefits.

Risk Factor Analysis

Highest Risk Ratios (Most Impacted by Early Menopause)

1. **Stroke** - 1.58x increased risk
2. **CHD** - 1.45x increased risk
3. **Dementia** - 1.37x increased risk

Highest Baseline Incidence

1. **Type 2 Diabetes** - 550 per 100K
2. **Osteoporotic Fracture** - 400 per 100K
3. **CHD** - 350 per 100K

Highest Treatment Costs

1. **Dementia** - $64,745/year
2. **Osteoporotic Fracture** - $37,544/year
3. **Stroke** - $30,000/year

Limitations and Considerations

1. **Incomplete Risk Profile**: Current analysis does not include breast cancer or other potential negative outcomes of delayed menopause
2. **Time Horizon**: 6-year benefit window may be conservative or optimistic depending on intervention type
3. **Discount Rate**: 3% discount rate reflects standard health economic evaluations but may vary by context
4. **Treatment Costs**: Based on current healthcare costs; may vary by country and healthcare system
5. **Lifetime Costs**: Analysis uses annualized costs; lifetime disease burden may differ
6. **Quality of Life**: Economic analysis does not capture QALYs (Quality-Adjusted Life Years) or patient well-being
7. **Prevention vs. Delay**: Analysis assumes disease prevention; actual benefit may be disease delay rather than prevention

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Recommendations

For Research

1. **Add Breast Cancer Data**: Critical to complete risk-benefit analysis
2. **Expand Time Horizons**: Evaluate 10, 15, and 20-year benefit periods
3. **Include QALY Analysis**: Incorporate quality of life metrics
4. **Sensitivity Analysis**: Test varying discount rates (0%, 5%, 7%)
5. **Stratify by Age Groups**: Different benefit profiles for various age cohorts

For Policy Makers

1. **Cost-Effectiveness Threshold**: Compare net benefit to intervention costs

2. **Population Targeting**: Identify high-risk groups for maximum impact
3. **Healthcare Planning**: Allocate resources based on benefit distribution
4. **Long-term Budgeting**: Plan for reduced disease burden over time

For Clinical Practice

1. **Risk Assessment**: Identify patients at highest risk from early menopause
2. **Treatment Selection**: Consider economic value alongside clinical outcomes
3. **Patient Education**: Communicate both benefits and risks of delaying menopause
4. **Monitoring Protocols**: Track long-term outcomes to validate projections

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Conclusions

Delaying menopause by 5 years shows substantial economic benefits, primarily through reduced cardiovascular disease and osteoporotic fractures. The analysis demonstrates potential savings of **$609 million per million women** over a 6-year period.

However, this analysis is **incomplete without breast cancer risk data**. The true net benefit could be significantly lower once all risk factors are included. Further research is needed to provide a complete risk-benefit profile before clinical or policy recommendations can be made.

The strongest benefits are observed for: - Conditions with high treatment costs (osteoporotic fracture, dementia) - Diseases with high early menopause risk ratios (stroke, CHD) - Prevalent conditions (diabetes, fractures)

Technical Notes

Present Value Calculation

The present value factor accounts for the time value of healthcare savings:

```
PV = [1 - (1 + discount_rate)^(-years)] / discount_rate
PV = [1 - (1.03)^(-6)] / 0.03
PV = 5.417
```

This factor converts future annual savings into present value terms, accounting for the fact that savings realized in future years are worth less in today's dollars.

Data Quality

- All source data verified from Excel datasets

- Disease name mappings implemented to handle nomenclature variations
- Calculations reviewed and validated against source methodology

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Report Generated by: Ovarian Aging Calculator v1.0 **Code Repository:** calculator.py **Contact:** For questions about methodology or data sources, please refer to the source datasets