

Muath Almeaiki, BPharm, MS Candidate¹; Patrick W. Sullivan, PhD¹

¹Barry and Judy Silverman College of Pharmacy, Nova Southeastern University, Fort Lauderdale, FL.

Background

- Asthma affects ~25 million individuals in the U.S., with severe uncontrolled eosinophilic disease imposing a high clinical and economic burden.¹
- Despite available treatments, a substantial burden persists, reflected in ~3,700 deaths annually.¹
- The overall economic burden (~\$80+ billion annually) highlights the need for robust cost-effectiveness evaluation of biologic therapies.²

Objective

- To evaluate the cost-effectiveness of dupilumab and tezepelumab plus standard of care vs standard of care alone in adults with severe uncontrolled eosinophilic asthma (≥ 150 cells/ μ L) from a U.S. payer perspective.

Methods

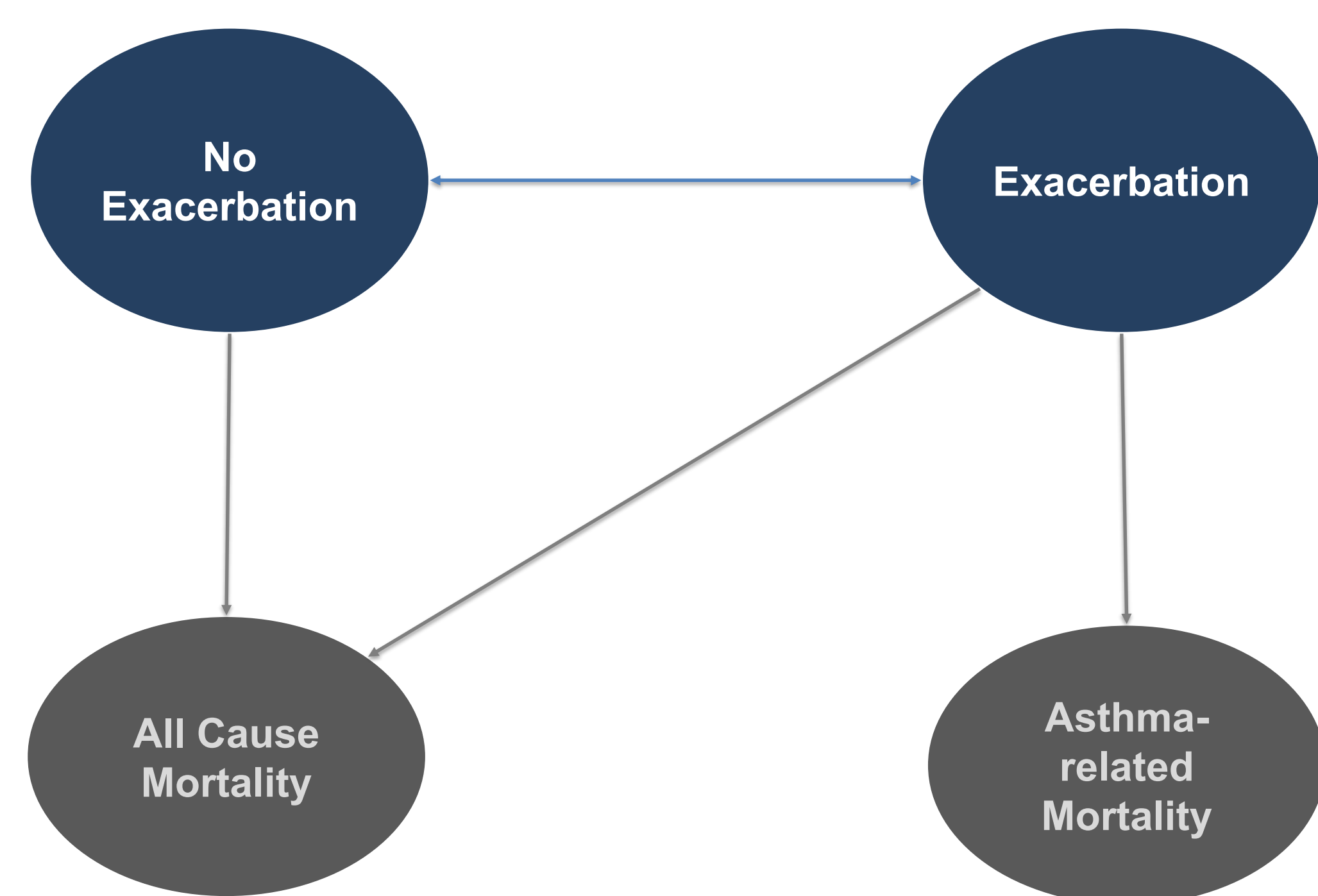


Figure 1. Markov Model Structure

Table 1. Model Overview

Model Overview	
Population	Adults with severe uncontrolled eosinophilic asthma
Perspective	U.S. payer perspective
Time horizon	1 year
Cycle length	2 weeks
Exacerbation subtypes	OCS burst, ED visit, hospitalization
Asthma-related mortality	Assumed to occur only following hospitalization
Comparators	SoC; SoC + dupilumab; SoC + Tezepelumab
Standard of Care	ICS, LABA, rescue therapy

Table 2. Key model inputs

Clinical Inputs	
Baseline Annualized Asthma Exacerbation Rate. ⁶	1.91 events/year
Relative risk (Dupilumab). ⁶	0.34
Relative risk (Tezepelumab). ⁶	0.38
Costs	
SoC. ^{8†}	\$2,575/year
Dupilumab 300mg Q2W. ^{3,7*}	\$42,475/year
Tezepelumab 210mg Q4W. ^{4,7*}	\$40,883/year
OCS Burst. ⁵	\$236 per event
ED Visit. ⁵	\$826 per event
Hospitalization. ⁵	\$14,000 per event
Utilities	
No Exacerbation (SoC). ⁶	0.75
No Exacerbation (Dupilumab). ⁶	0.79
No Exacerbation (Tezepelumab). ⁶	0.80
OCS Burst. ⁶	-0.10
ED Visit. ⁶	-0.15
Hospitalization. ⁶	-0.20

- PSA (n=1,000) used beta distributions for utilities, gamma for costs, log-normal for relative risks, and Dirichlet for exacerbation subtype proportions.

* Net price estimated after applying a 25% rebate to WAC (biologic therapies)
† SoC costs were based on NADAC and assumed to reflect net prices.

Results

Table 3. Base-Case Results

Strategy	Total Costs	Total QALYs	Incremental Cost	Incremental QALYs	ICER (\$/QALY)
SoC	\$2,739	0.71			
Tezepelumab + SoC	\$41,848	0.77	\$39,109	0.052	\$745,377/QALY
Dupilumab + SoC	\$43,367	0.76	\$40,628	0.043	\$941,128/QALY

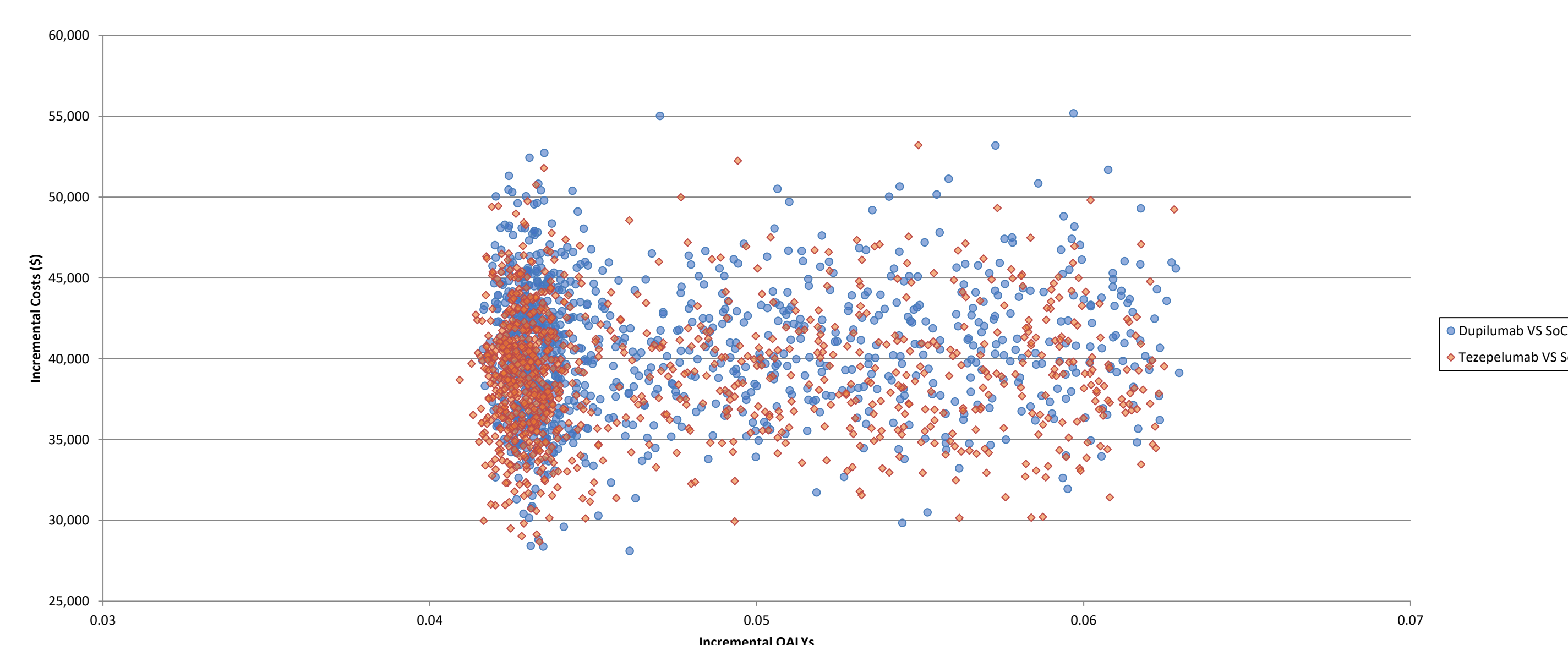


Figure 2. Incremental Cost-Effectiveness Plane Scatterplot

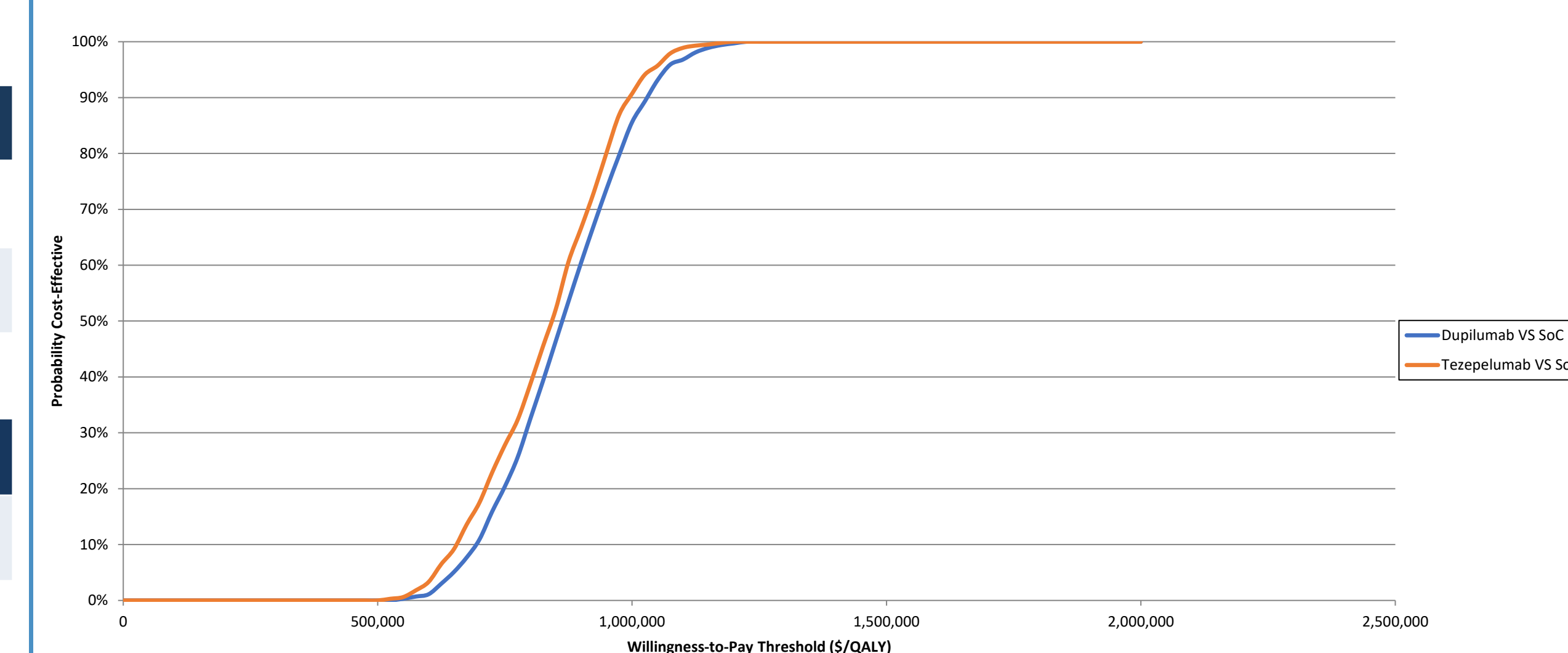


Figure 3. Cost-Effectiveness Acceptability Curve

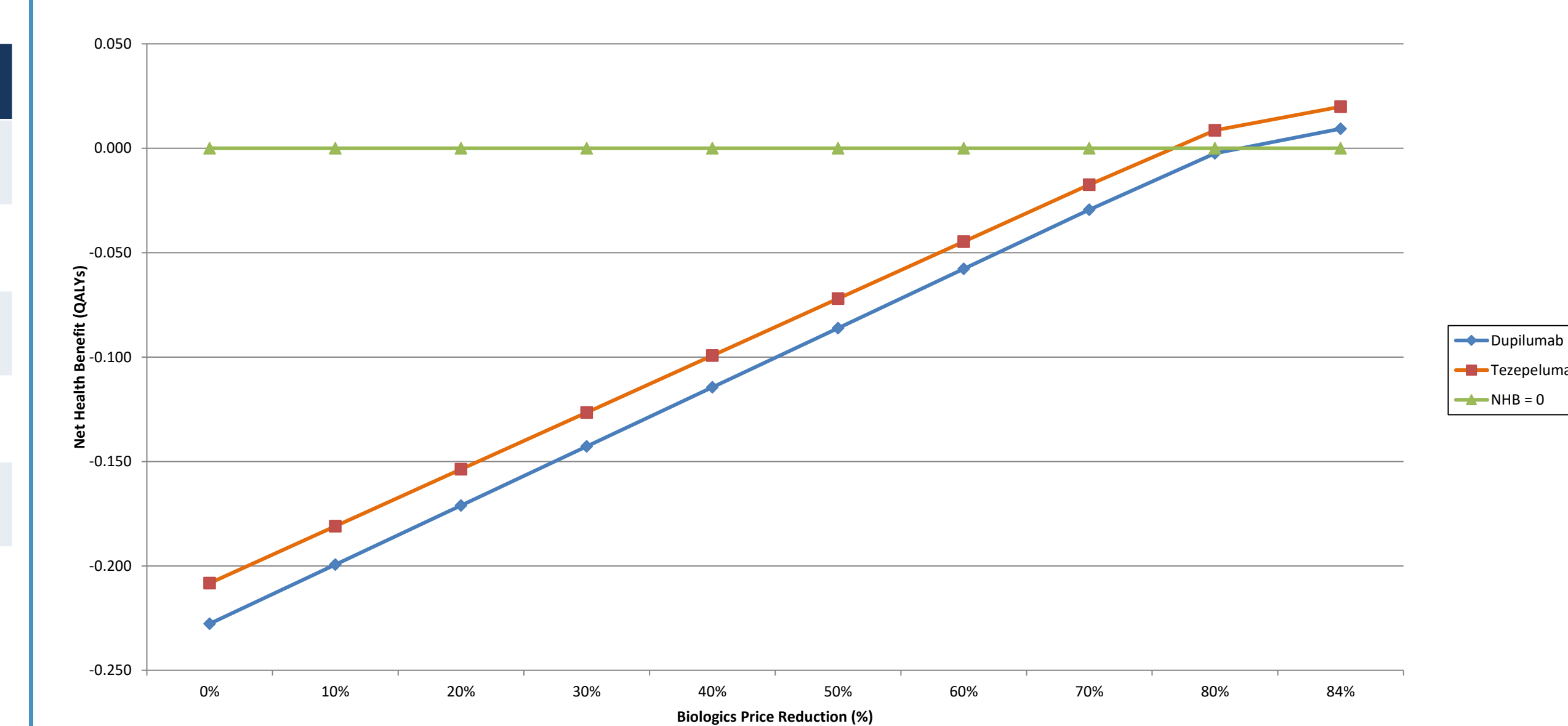


Figure 4. Price Threshold Analysis: Net Health Benefit at Varying Biologic Prices (WTP = \$150,000/QALY)

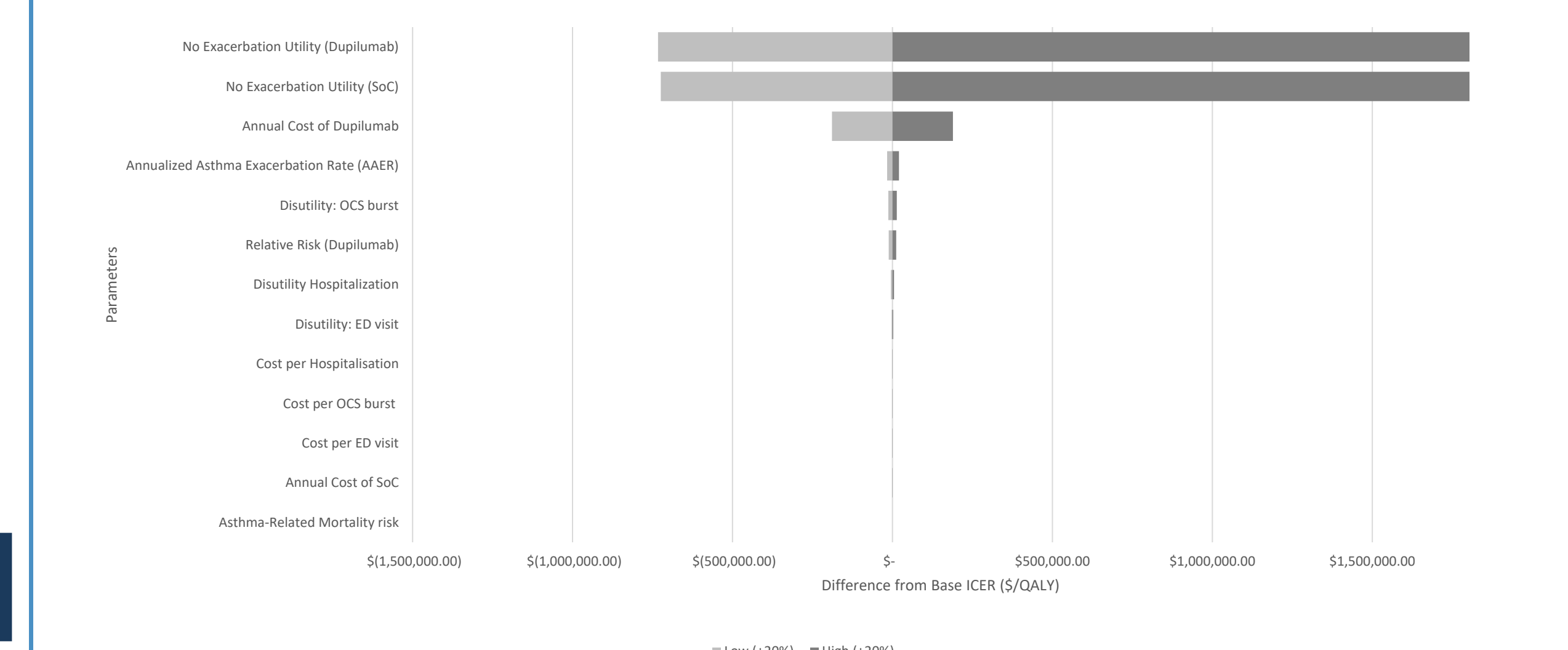


Figure 5. Tornado Diagram for Dupilumab vs SoC.

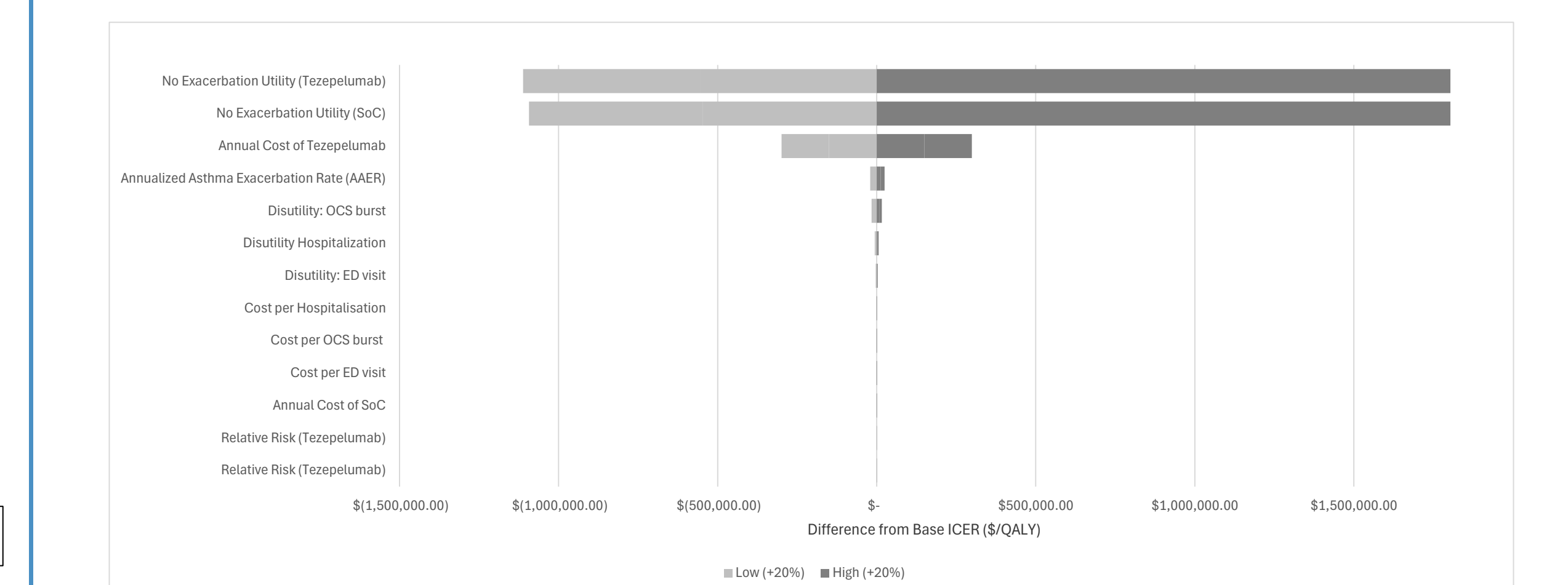


Figure 6. Tornado Diagram for Tezepelumab vs SoC.

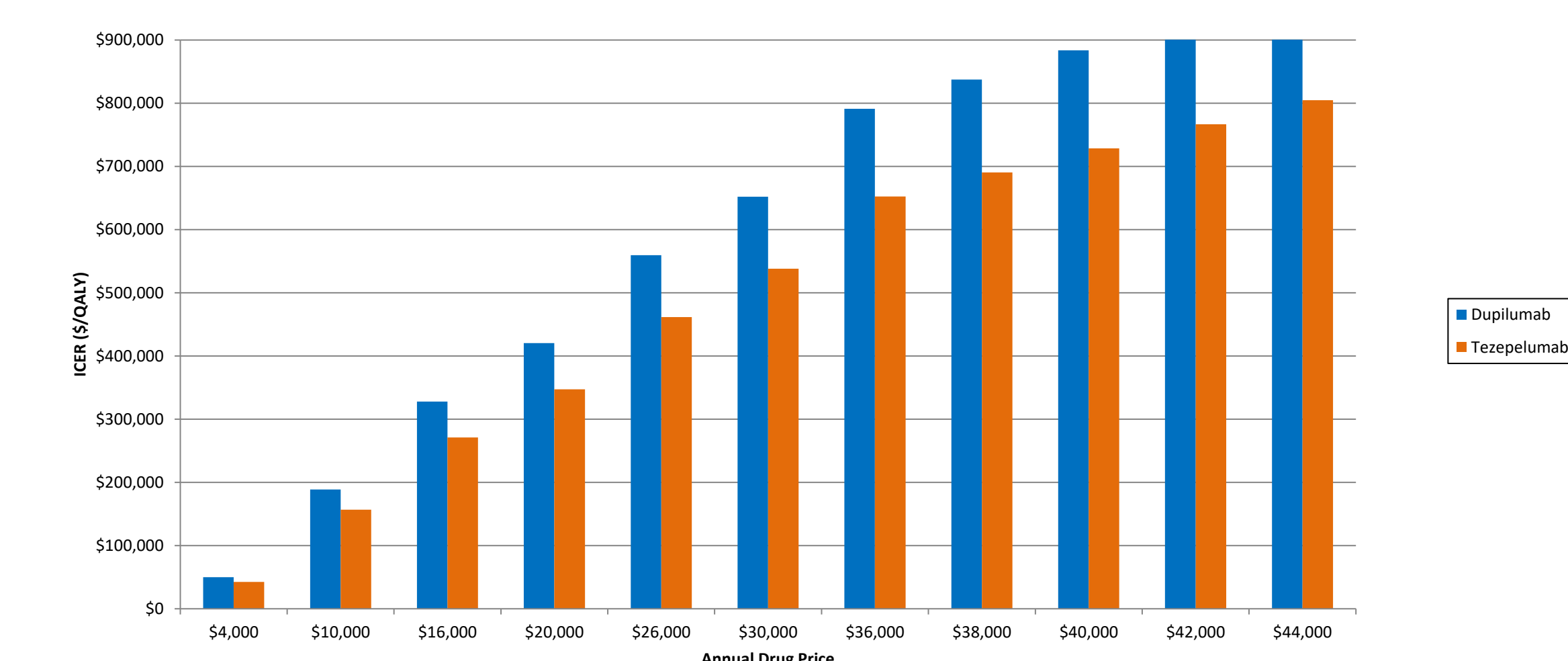


Figure 7. Price Sensitivity of ICER by Annual Drug Price

Limitations

- The one-year time horizon may underestimate long-term benefits and risks.
- The analysis was conducted from a payer perspective and did not capture broader societal costs and outcomes.
- Long-term consequences of oral corticosteroid exposure (e.g., cumulative toxicity) were not explicitly modeled.

Conclusion

- At conventional willingness-to-pay thresholds, biologic therapies were not cost-effective due to high acquisition costs and modest QALY gains; substantial price reductions are required to achieve cost-effectiveness.

References

- Centers for Disease Control and Prevention. Asthma mortality in the United States. 2024.
- Asthma and Allergy Foundation of America. Asthma economic burden in the United States. 2024.
- Numata T, Araya J, Miyagawa H, et al. Real-world effectiveness of dupilumab in severe asthma. *J Asthma Allergy*. 2022;15:395–405.
- Chiner E, Boira I, Antón M, et al. Real-world effectiveness of tezepelumab in severe asthma. *J Pers Med*. 2026;16:167.
- Pham T, Barker AR, Eisenstein SA, et al. Costs of single maintenance and reliever therapy vs traditional therapy for asthma. *JAMA Netw Open*. 2026;9(2):e2556757.
- Institute for Clinical and Economic Review; 2021. Updated June 14, 2023.
- IBM Micromedex. Red Book: drug pricing database. 2026. Accessed January 2026.
- Centers for Medicare & Medicaid Services. National Average Drug Acquisition Cost (NADAC) for Medicaid. Accessed August 2025.