GLP-1 Financial Model Methods Online Appendix

March 9, 2026

To understand the financial implications of SB455, we created a New Hampshire population-level GLP-1 financial model based on the Institute for Clinical and Economic Review's (ICER) evidence report "Semaglutide and Tirzepatide for Obesity: Effectiveness and Value" and our analysis of New Hampshire data from the 2023 Behavioral Risk Factor Surveillance System (BRFSS). Our financial model maps ICER's clinical and economic information to the entire New Hampshire adult population creating a long-term cost-benefit analysis of SB455 at the state-level.

We exclude consideration of liraglutides as ICER excludes it, and we focus on injectable semaglutides and tirzepatides, excluding oral semaglutides since they were very recently approved and the data on its usage is limited and subject to change.

Clinical and Economic Inputs from ICER

The ICER model creates projections of a GLP-1's cost-effectiveness for a 46 year old patient, the mean age from clinical trials.

We use the following results from ICER's long-term cost-effectiveness model:[1]

- Intervention Acquisition Costs (the cost of purchasing the GLP-1 Drug)
- Total Lifetime Medical Costs (the cost of all medical expenses incurred by a patient for the remainder of their life over the next 25 years)
- Total Lifetime Medical Costs with Productivity Costs included
- Quality-adjusted Life Years (QALYs) gained

This allows us to calculate the productivity cost and other medical costs unrelated to the GLP-1 intervention cost.

Totals	Base Lifestyle Modification	Lifestyle + Injectable Semaglutide	Lifestyle + Oral Semaglutide	Lifestyle + Tirzepatide
Intervention Acquisition Costs	$9,036	$132,229	$132,475	$158,493
Total Lifetime Medical Costs	$370,644	$447,925	$449,980	$459,490
Total Lifetime Medical Costs + Productivity Costs	$417,517	$480,212	$483,224	$487,310
QALYs Gained	15.63	16.79	16.68	17.16
Calculated Vars				
Productivity Costs	$46,873	$32,287	$33,244	$27,820
Other Medical Costs (Non-intervention Acquisition)	$361,608	$315,696	$317,505	$300,997

The relevant clinical trials of GLP-1s are conducted typically contrasting the drug with a baseline of intensive lifestyle modification. As such, we use the incremental (or marginal) costs of GLP-1s compared to only having a lifestyle modification treatment. Parentheses show negative costs, meaning they are benefits.

Incremental (marginal cost (benefit) of GLP-1s)	Injectable Semaglutide	Oral Semaglutide	Tirzepatide
Intervention Acquisition Costs	$123,193	$123,439	$149,457
Total Lifetime Medical Costs	$77,281	$79,336	$88,846
Total Lifetime Medical Costs + Productivity Costs	$62,695	$65,707	$69,793
QALYs Gained	1.16	1.05	1.53
Calculated Vars			
Productivity Costs	($14,586)	($13,629)	($19,053)
Other Medical Costs (Non-intervention Acquisition)	($45,912)	($44,103)	($60,611)

Finally, ICER also created a scenario where the GLP-1s were priced at $245 a month following the Trump Administration's new Most Favored Nation pricing model.[2] We also use these estimates and compute a separate scenario for NH Medicaid with access to these discounts.

Incremental with Most Favored Nation Pricing	Injectable Semaglutide	Oral Semaglutide	Tirzepatide
Intervention Acquisition Costs	$54,910.00	$55,002.00	$56,968.00
Total Lifetime Medical Costs	$8,998.00	$10,899.00	($3,643.00)
Total Lifetime Medical Costs + Productivity Costs	($5,588.00)	($2,730.00)	($22,696.00)

The ICER report includes a comprehensive list of assumptions made by the model, shown by Table 4.1 of the report.[3] As this model uses ICER's model for clinical and economic information, the same assumptions would apply.

Productivity Costs

ICER calculates productivity costs primarily focusing on chronic conditions that affect an individual's health and capability to accomplish day to day tasks. For example, they estimate that a heart attack reduces an individual's annual productivity by $10,287, using data sourced from the American Heart Association. It is possible that this methodology slightly underestimates productivity gains as it does not consider the effect of obesity directly on productivity at work. Studies have shown that individuals with moderate or extreme obesity experienced health-related decreases in productivity.[4]

Population Health Inputs from BRFSS

We used the CDC's BRFSS, an annual nationwide survey on health risks and events, to construct a health profile for New Hampshire. We selected New Hampshire data from the 2023 BRFSS wave because it is the most recent wave with data on comorbid conditions such as hypertension and high cholesterol. This sample contains 6,960 unweighted respondents, and we use the BRFSS weights to scale up these respondents to a weighted sample of 1,157,746, approximately equivalent to the size of the New Hampshire adult population. We use variables from BRFSS data, such as Body Mass Index (BMI) and hypertension, to determine the newly eligible population under SB455. Since Medicaid already covers GLP-1s for obesity-associated comorbidities, such as hypertension, the population with a comorbidity is excluded. After applying the eligibility criteria, our unweighted sample of individuals who would be eligible for coverage through SB455 contains 341 out of 6,960 respondents, translating to 118,737 of 1,157,746 weighted individuals.

Our key variables from the BRFSS for identifying the eligible population are:

- Age
- BMI
- Diabetes
- Prediabetes
- Hypertension
- Coronary heart disease
- High cholesterol

Sleep apnea

The BRFSS includes data on obesity-associated comorbidities which would already be covered by Medicaid and many private plans. Of the comorbidities, we capture all of them except for sleep apnea for which there is no data.

Insurance Coverage Imputation

Due to an increased number of Medicaid enrollees in 2023 from Covid-19-related stimulus funding, we determined that using the question asked in the BRFSS survey about the respondent's health insurance provider would introduce bias to the model's results. As such, we decided to use income, demographic, and general coverage information to impute whether a respondent would have private or public insurance in 2026.

First, we exclude respondents who do not have health insurance. Then, we use household size and income to determine whether households are eligible for Medicaid coverage. We match these income categories by the midpoint of each group to a cutoff formula of 133% of the federal poverty line by household size, below which households are eligible for Medicaid coverage under standard Medicaid or Granite Advantage.[5]

There were a few respondents who refused to answer about their income. To maintain the larger sample size and accuracy of the model's results, we utilized probit imputation with other demographic categories to estimate Medicaid eligibility, as it was determined to introduce less bias than other methods. We tested a few options to handle the missing data and decrease the effect it would have on the results.

1. Complete case analysis (delete respondents who refused income question)
2. Sample mean (all respondents assigned private insurance)
3. Probit imputation (using demographic categories to estimate Medicaid eligibility)

Complete case analysis would bias overall results of the projection downwards for both groups leading to severe underestimates. Assigning all missing individuals the sample mean of income would place all missing individuals in the commercial insurance group, since the average income is far above federal poverty line thresholds, leading to a possible large overestimate of the impact to private payers. Overall, probit imputation was concluded to be the strongest option.

A probit regression of the following form is used for this imputation:

$$Pr(Y = 1|X) = \Phi\big(\beta_0 + \beta_1 a + \beta_2 f + \beta_3 emp + \beta_4 edu + \beta_5 hh + \beta_6 (f \times hh) + \beta_7 (emp \times hh)\big)$$

where:

- Y is whether an individual is covered by Medicaid
- a is the respondent's age
- f is an indicator variable for sex reported female
- emp is the respondent's employment status
- edu is the respondent's educational attainment
- hh is the household size

We used interaction terms between certain demographic variables (female and employment) and household size to allow for household size to account for possible non-linear effects. For example, in the case of employment, a large household with an unemployed adult may be more likely to be below the threshold since the threshold is higher. After testing multiple imputation methods, we find no significant changes in insurance coverage results based on the specification.

Under 65 Years Old Savings Share

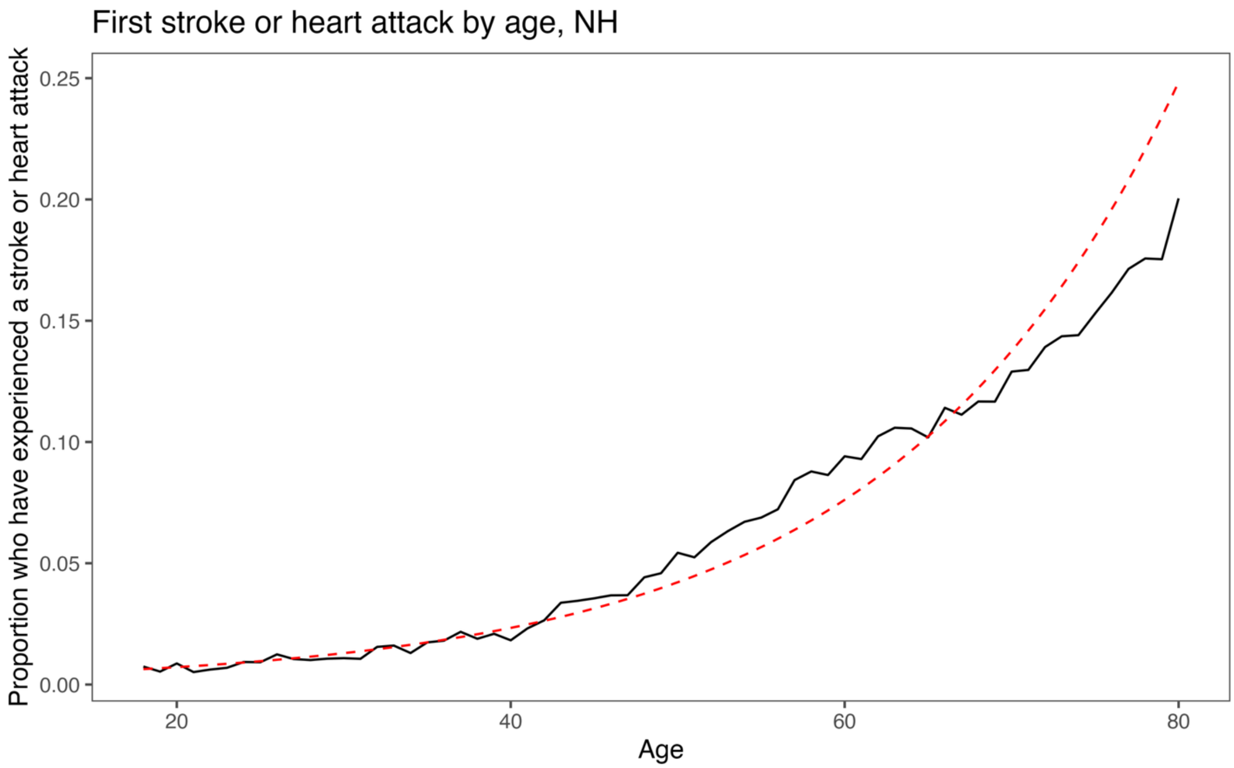
According to ICER's report, injectable semaglutides and tirzepatides reduce the number of stroke and myocardial infarction events by 22 and 24 per 100 people, respectively. Reductions in these severe diseases, among others, drives the medical cost savings of GLP-1s, as treating these severe diseases comes at a high cost. To determine the share of savings received by the state and private payers vs. the federal government, we calculated for each patient in the model a share of savings that would be realized before they are 65 years old.

At 65, individuals are eligible for Medicare and so any cost savings from then on are wholly received by the federal government. This is an especially prominent issue as the risk of severe health events, such as strokes or heart attacks, increases exponentially with age, potentially indicating that a large portion of savings would go to Medicare and not Medicaid or commercial insurance.

First, we use the BRFSS data of all individuals in NH to fit an exponential curve to the first occurrence of a stroke or heart attack. This exponential curve is fit with the specification:

$$\ln(firstStrokeHeartAttack_i) = \beta_0 + \beta_1 t_i + \epsilon$$

where: t_i is the age of the respondent



The resulting curve, as shown by the red dashed line in the figure above, is the cumulative distribution function of having one's first stroke or heart attack and is given by the equation:

$$F(t) = e^{0.059111*t-6.121808}$$

And the probability density function is the derivative:

$$f(t) = 0.059111e^{0.059111*t-6.121808}$$

To remain consistent with our other results, we also create a discount function to discount the risk in future years by 3% per year:

$$d(t,a) = \frac{1}{1.03^{t-a}}$$

where:

- a is the current age of a patient

- $t - a$ becomes the number of years to discount as it is the difference between a respondent's current age and the future age at which we are assessing their risk of stroke/heart attack

Our under 65 share of savings for patient at current age a is defined as follows:

$$under65share(a) = \frac{\int_a^{65} f\,(t) \cdot d(t,a)dt}{\int_a^{70} f\,(t) \cdot d(t,a)dt}$$

where:

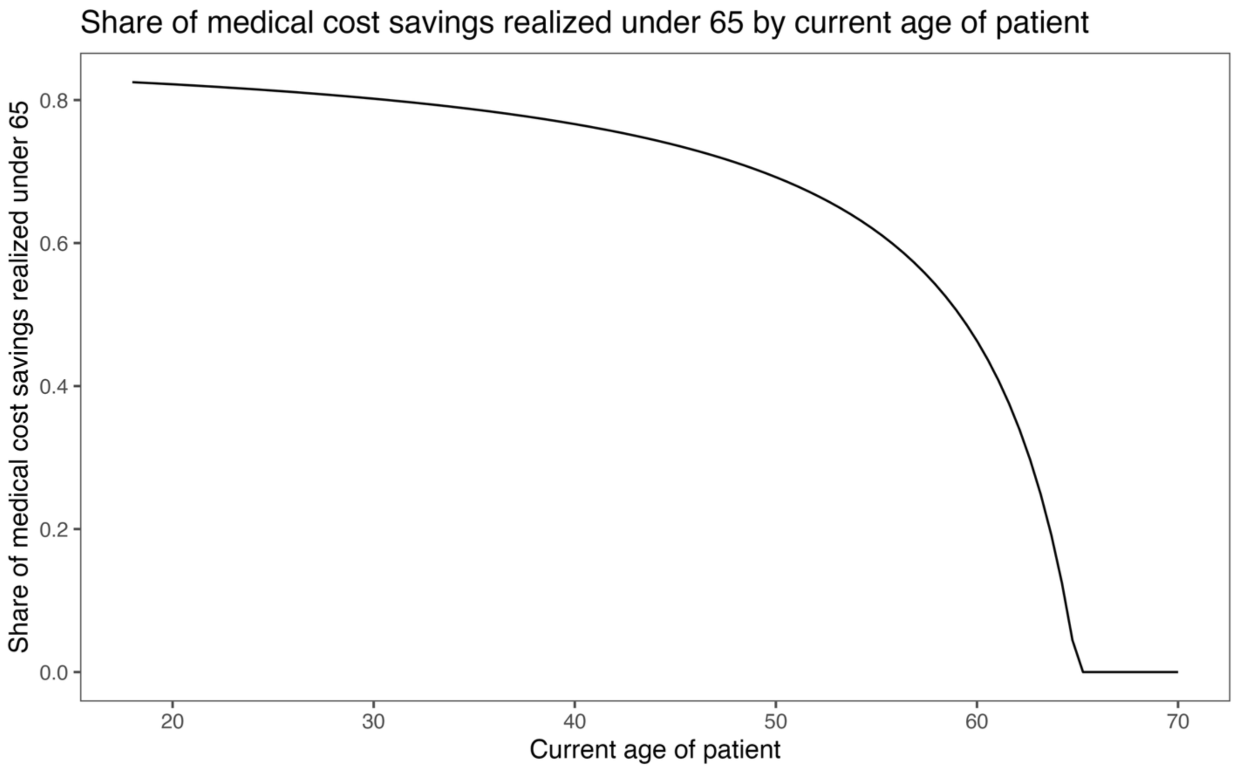
- inside each integral is our probability density function (risk of experiencing first stroke/heart attack each year over an individual's life) multiplied by the discount function of 3% per year
- the numerator is the amount of savings realized from the respondent's current age a to the threshold age of 65
- the denominator is the total amount of savings realized from the respondent's current age to their life expectancy of 70 derived from ICER's model

Under 65 Share Savings Discrete Example
Assume a patient is currently 63 years old, and their $a = 63$.

1. The numerator integral evaluates their risk of stroke/heart attack at 63 with no discount.
2. The numerator integral evaluates their risk of stroke/heart attack at 64 discounting by 3% for one year in the future.
3. The numerator integral evaluates their risk of stroke/heart attack at 65 discounting by 5.74% for two years in the future.
4. The numerator integral stops and adds each of these together.
5. The denominator integral repeats the same steps for age 63 to 70 and adds them together.

1. 6. The division then yields the share of savings under 65.

The final chart for the savings realized under 65 is shown here:



- The share of savings realized is high at first around 80% at age 18
- The share then declines at an increasing rate until 65 where it drops to zero

This function reflects both the increasing risk of stroke/heart attack and increased discounting in further years. The function declines at an increasing rate as the risk of stroke/heart attack increases quickly and there is less discounting of high-risk older years as the current age increases.

A weighted average of each person in the sample is used to determine the final share of savings realized at the state level to Medicaid or commercial payers vs. at the federal level to Medicare. This produces our estimates of Medicaid share of savings vs. Medicare share of savings in the benefits column of our financial model result figures.

Other input assumptions

A final set of assumptions are needed to complete the model.

QALY value

The value of a QALY was set to $100,000. It is challenging to place a dollar value to human life and health. The decision to use the $100,000 aligns with the medical community's common practice.[6] US-based authors reference the $100,000 threshold 47% of the time and a $150,000 threshold 24% of the time.

Fully-insured vs. self-insured plans and Medicaid fee-for-service

The majority of commercial insurance in NH is provided by self-insured plans, which do not fall under the regulation of NH. We exclude self-insured plans by multiplying the eligible population by the MCO private share of 0.446 based on the 2024 Final Report of Health Care Premium and Claim Cost Drivers.[7]

This is also the case for Medicaid which has a small portion of individuals on fee-for-service, although the adjustment is far smaller. We exclude NH Medicaid fee-for-service by multiplying the eligible population by the MCO public share of 0.925 based on the percent of NH patients enrolled in Medicaid comprehensive managed care.[8]

Tirzepatide and semaglutide share

We assume 64% of patients opt to use tirzepatides and the remaining 36% opt to use semaglutides. This reflects the state of the US national market among the two most popular GLP-1s for weight loss—Eli Lilly's Zepbound and Novo Nordisk's Wegovy.[9] State-level data was not available.

Average Federal Medical Assistance Percentage (FMAP)

Since NH receives a 90% FMAP for Granite Advantage enrollees and a 50% FMAP for standard Medicaid, we calculated the average amount of FMAP using the share of enrollees on Granite Advantage vs. standard Medicaid.[10] This figure was used to calculate the split between state and federal drug costs under Medicaid and benefits from medical cost savings.

No Medicaid-commercial insurance mobility

We assume that the population health profile of New Hampshire and proportion of individuals covered by Medicaid versus private insurance in the state stay the same throughout the projection. Due to the random and anonymous nature of the BRFSS, the data constraints prevent analysis of dynamics of individuals switching between insurance plans. The economic and clinical inputs from the ICER report also fit a static analysis better than an analysis with a dynamic population. Making this assumption is an abstraction that reduces the complexity of the model without compromising our key cost-benefit ratios.

Endnotes

[1] Grace A. Lin et al., *Semaglutide and Tirzepatide for Obesity: Effectiveness and Value* (Institute for Clinical and Economic Review, 2025), https://icer.org/wp-content/uploads/2025/09/ICER_Obesity_Draft-Report_For-Publication_090925.pdf.
[2] Sarah K. Emond et al., "Semaglutide and Tirzepatide for Obesity: Effectiveness and Value," November 13, 2025, https://icer.org/wp-content/uploads/2025/12/ICER_Obesity_Evidence-Presentation_For-Publication_111325.pdf.
[3] Lin et al., *Semaglutide and Tirzepatide for Obesity: Effectiveness and Value*.
[4] Donna M. Gates et al., "Obesity and Presenteeism: The Impact of Body Mass Index on Workplace Productivity," *Journal of Occupational and Environmental Medicine* 50, no. 1 (2008): 39–45, https://doi.org/10.1097/JOM.0b013e31815d8db2.
[5] "Federal Poverty Guidelines / Levels for 2026 & Their Relevance to Medicaid Eligibility," *American Council on Aging*, January 15, 2026, https://www.medicaidplanningassistance.org/federal-poverty-guidelines/.
[6] Peter J. Neumann and David D. Kim, "Cost-Effectiveness Thresholds Used by Study Authors, 1990-2021," *JAMA* 329, no. 15 (2023): 1312, https://doi.org/10.1001/jama.2023.1792.
[7] Jenn Smagula et al., "2024 Final Report of Health Care Premium and Claim Cost Drivers," New Hampshire Insurance Department, November 15, 2024.
[8] MACStats, *EXHIBIT 29. Percentage of Medicaid Enrollees in Managed Care by State, July 1, 2022* (MACStats, 2022), https://www.macpac.gov/wp-content/uploads/2024/12/EXHIBIT-29.-Percentage-of-Medicaid-Enrollees-in-Managed-Care-by-State-July-1-2022.pdf.
[9] Maggie Fick et al., "Novo Nordisk's Weight-Loss Challenge in Five Charts," Healthcare & Pharmaceuticals, *Reuters*, December 23, 2025, https://www.reuters.com/business/healthcare-pharmaceuticals/novo-nordisks-weight-loss-challenge-five-charts-2025-08-06/.
[10] New Hampshire Department of Health and Human Services, *New Hampshire Medicaid Enrollment Demographic Trends and Geography* (2026), https://www.dhhs.nh.gov/sites/g/files/ehbemt476/files/documents2/bpq-da-medicaid-enrollment.pdf.