HPR58

Distributional Cost-effectiveness Analysis: A Case Study of Obesity

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INTRODUCTION

Obesity is a chronic disease associated with numerous comorbidities, including a heightened risk of developing type 2 diabetes, cancer, and cardiovascular disease [1]. Furthermore, socioeconomic deprivation is associated with increased obesity risk [2].

Diet and exercise (D&E) are modifiable factors at the person's disposal to manage obesity and when adhered to, are an effective intervention for weight loss. However, obesity rates worldwide continue to rise. Weight-gain relapse after diet and exercise programmes is a common outcome attributable to psychosocial and environmental factors.

Obesity medications, in conjunction with D&E, offer novel solutions to the growing obesity epidemic. Semaglutide (2.4mg) has a positive recommendation from the National Institute for Health and Care Excellence (NICE) for managing obesity, and is available through the National Health Service (NHS) [3]. However, the potential impact on health inequalities has not been explored.

Aggregate distributional cost-effectiveness analysis (DCEA) builds upon traditional cost-effectiveness analysis to provide information about the societal distribution of costs and health effects. The objective of this study was to:

- Conduct an aggregate DCEA of semaglutide (2.4mg) compared with D&E.
- Estimate the impact of semaglutide (2.4mg) on health inequalities and health-related social welfare in England.

METHODS

An aggregate DCEA was conducted to estimate the impact of semaglutide (2.4mg) compared with D&E on health inequalities in England, using Index of Multiple Deprivation (IMD) quintiles as the stratifying socioeconomic variable. The DCEA was developed in R [4] following the methods laid out in Asaria et al. 2016 [5]. The cost of semaglutide (2.4mg) includes a commercial discount previously arranged with NHS England.

The base population was people with obesity (defined as having body mass index (BMI) >30kg/m2) in England. A subgroup analysis was conducted on the population with BMI >40kg/m2.

Uncertainty was incorporated through probabilistic sensitivity analysis (PSA). Additionally, extensive sensitivity and scenario analysis was undertaken to explore how the health equity impact differed under alternative assumptions, including alternative uptakes, health opportunity costs and prevalence. Key inputs for the DCEA are presented in Table 1.

Table 1: DCEA inputs

Input	Source
Discounted incremental costs and quality-adjusted life years	IQVIA Core Obesity Model [6]
Population of England by IMD quintile	Office for National Statistics [7]
Prevalence of obesity in England by IMD quintile	Health Survey for England [8]. Scenario analysis used data from Clinical Practice Research Datalink (CPRD).
Baseline quality adjusted life expectancy (QALE)	Love-Koh et al. 2023 [9]
Predicted uptake of semaglutide by IMD quintile	NICE TA875 [10]. Assumed flat gradient in base case. Scenario analysis considered higher uptake in the least deprived.
Health opportunity cost (HOC) by IMD quintile	Assumed flat following Anaya-Montes et al. 2025 [11]. Scenario analyses considered alternative gradients weighted towards the most and least deprived, as well as estimates from Love-Koh et al. 2020 [12].
HOC threshold	£20,000/quality-adjusted life year (QALY) - NICE's base case threshold. Scenario analysis used thresholds of £15,000/QALY and £30,000/QALY.
Atkinson inequality aversion parameter (IAP)	Assumed 1 in base case. Sensitivity analysis used values from 0 to 20.

RESULTS

Figure 1 shows the health benefit, health opportunity cost, and net benefit by IMD quintile for semaglutide (2.4mg) compared with D&E. The results of the PSA iterations are plotted on the equity-efficiency impact plane in Figure 2.

Under base case assumptions, semaglutide (2.4mg) has a positive net health benefit, and a positive equity impact compared with D&E. The total net health benefit was 1,889 QALYs. The distribution of the net health benefit followed the distribution of obesity. The net health benefit was highest for IMD1 at 1,296 QALYs and lowest for IMD5 at -751 QALYs. The reasons for differing impacts across IMD quintles were driven by uptake and prevalence of obesity by IMD, and the health opportunity cost of NHS spending.

When the analysis was conducted in the subpopulation with BMI >40kg/m2, the positive impact on health inequalities increased due to the steeper gradient in IMD quintile for this population, and due to Semaglutide (2.4mg) being more cost effective in this subpopulation.

Figure 1: Health benefit, health opportunity cost and net health benefit

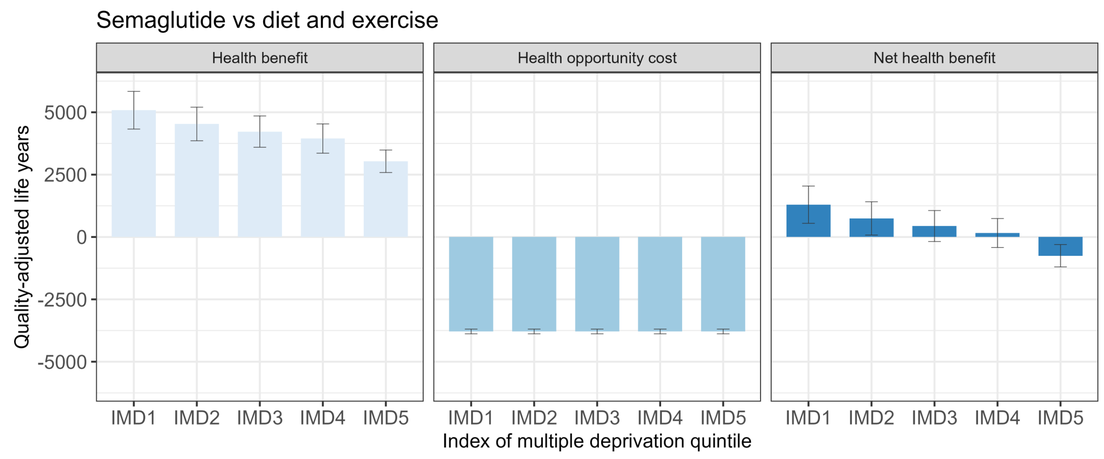
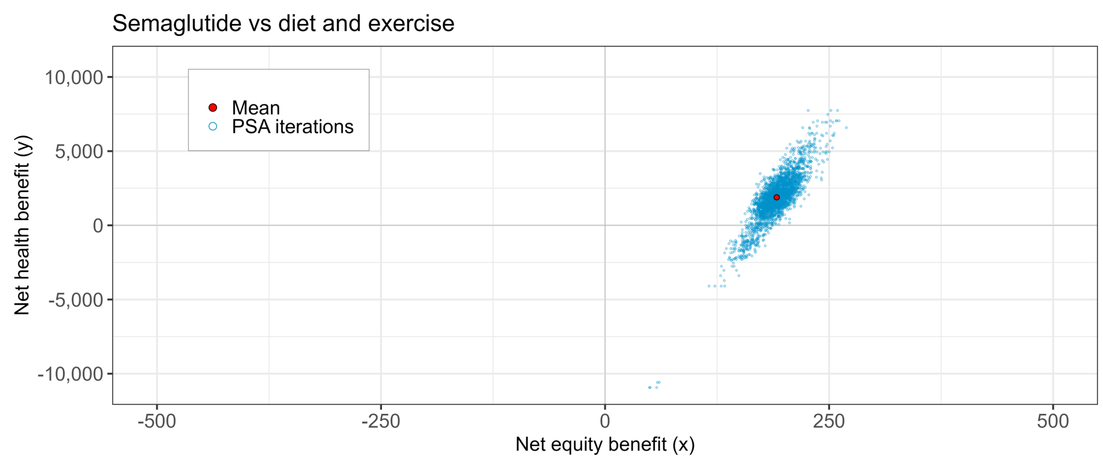


Figure 2: Equity-impact plane



SCENARIO ANALYSIS

Semaglutide (2.4mg) remained cost effective and health equity improving in the following scenario analyses: CPRD prevalence data, a cost-effectiveness threshold of £30,000 per QALY, and all HOC gradients from Anaya-Montes et al.

Threshold analysis suggested that uptake would have to increase by 15-20% in the least deprived quintiles or decrease by 15-20% in the most deprived quintiles compared to the base case for semaglutide (2.4mg) to have a neutral equity impact. However, a pro-affluent uptake gradient may be less likely if affluent populations continue to access obesity medications on the private market at higher rates instead. Nonetheless, predicting market behaviour prior to public reimbursement is highly uncertain. The scenario analysis demonstrates the importance of targeted implementation to improve health inequalities.

CONCLUSIONS

Semaglutide 2.4mg is cost effective, improves total population health and reduces health inequalities.

Equity impacts were driven by obesity prevalence and medication uptake rates.

Targeted implementation plans will play an important role in maximising total health benefit and reducing health inequalities.

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