A quantitative assessment of the economic decision drivers outlined in HTA outcomes through stratification and sentiment analysis: Evidence from Canada, England, Scotland, and Sweden.

HTA201

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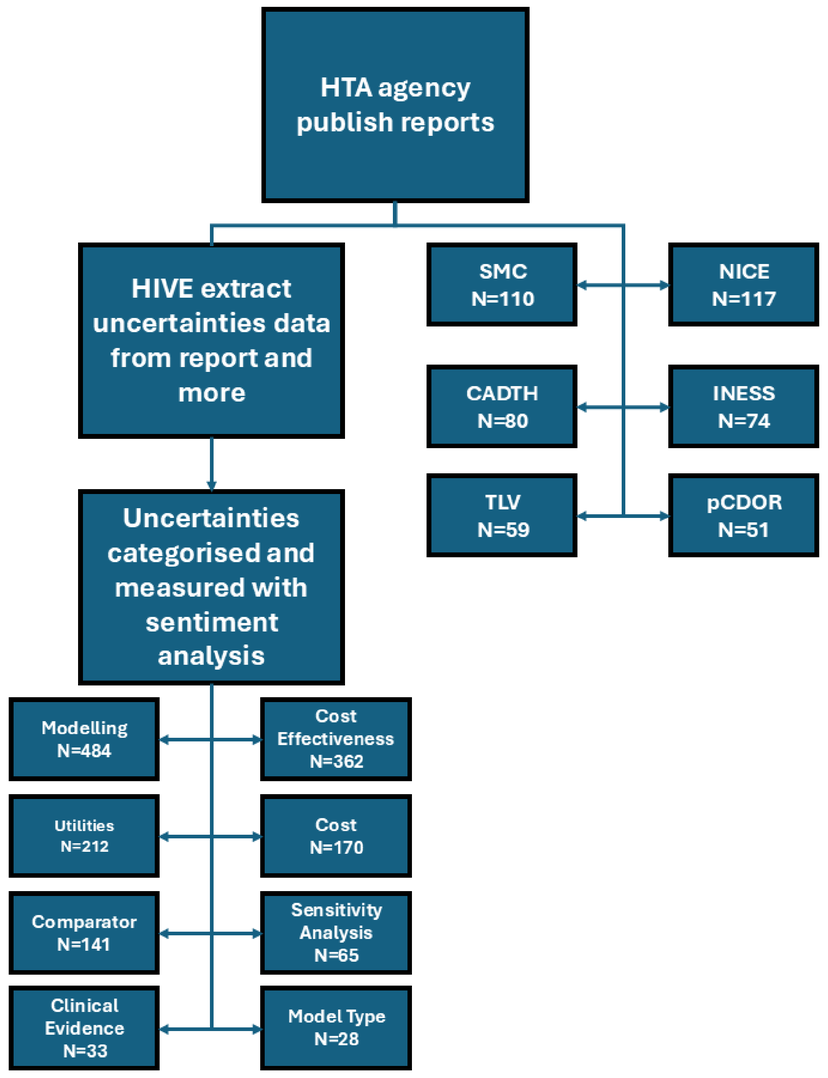
Introduction

- Approaches to the economic evaluation of innovative medicines can vary significantly across HTA agencies.
- This research aims employs natural language processing techniques to contextualise the degree of severity of issues raised related to the economic evaluations in HTA.
- Here we propose a novel approach towards characterizing and comparing economic issues raised by HTA agencies, using numerical methods to assess the severity of comments and allow for large scale analysis of extremely detailed reports

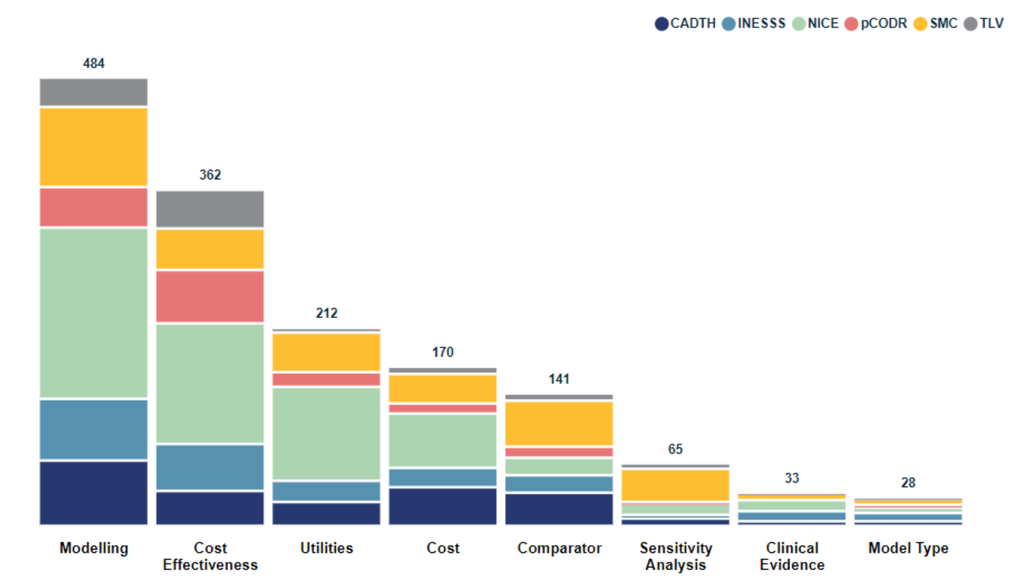
Methods

- HTA data from Canada, England, Scotland, and Sweden were extracted from an internal HTA database (HTA-Hive), constructed using a validated and published framework for the assessment of HTA outcomes.
- Preliminary was analysis conducted on a sample of 497 spanning 2009-2024. Prioritizing drug indication pairs available in 4 or more of the countries and with full economic assessments .
- A sentiment analysis model VADER using the nltk package in Python was applied to the uncertainties to assess sentiment severity across agencies.
- A manual inspection was carried out on lemmatization results, found that negative uncertainties were being given a compound score of 0. Some manipulation was needed to allow more context for each uncertainty by removing fewer stop words, allowing inclusion of “no” and “won’t” for example
- Uncertainty severity was assessed across multiple factors, including agencies, orphan drug status, oncology drug status, type of uncertainty, and size of the pharmaceutical company organized by market cap.
- Economic issues were categorised into: utilities, costs, modelling assumptions, the type of model selected, and sensitivity analyses conducted by the payer or the agency.

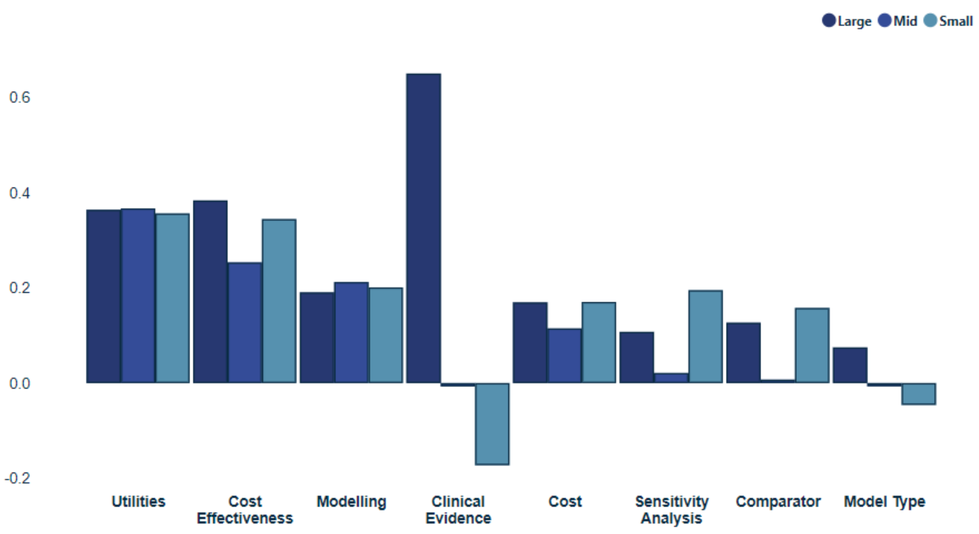


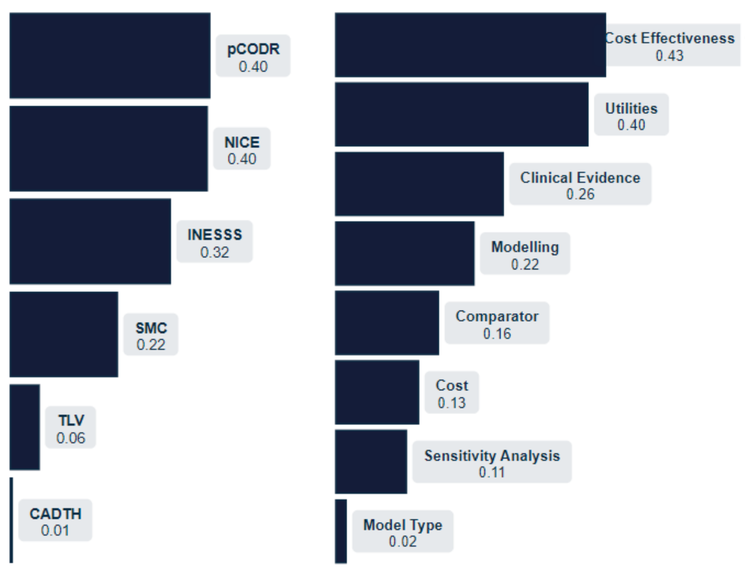
Results

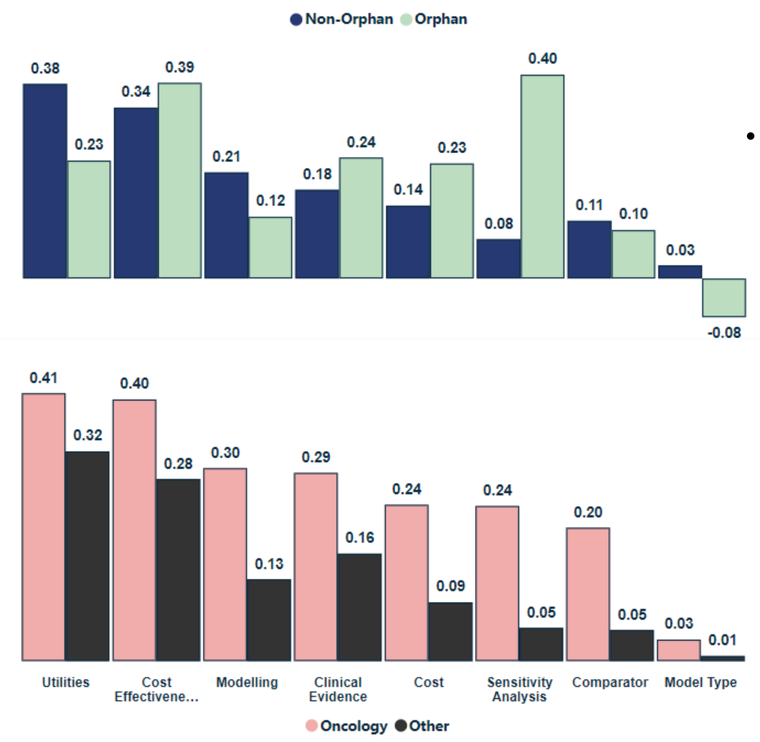
- Out of a total of 1,550 economic uncertainties, the most frequent related to modelling assumptions (32.3%), and the least frequent was model selection (1.9%).



- Sentiment scores were highly variable across manufacturer size with more than 10 reports (0.068 – 0.512).







- TLV had the worst average sentiment (0.06), significantly worse than NICE, INESSS ($p<0.001$). NICE was the most positive (0.40), significantly better than CADTH, SMC, and TLV ($p<0.001$). The average compound sentiment across all clinical uncertainties was 0.27. The category with the lowest average sentiment was model selection (0.19), highest was modelling assumptions (0.32).
- Average sentiment was similar across orphan and non-orphan medicines (0.293 vs 0.269) and oncology drugs have a significantly higher average score than other drugs (0.371 vs 0.190).

Conclusion

- More positive sentiment analysis for oncology drugs suggests that disease severity and unmet may positively influence the consideration of economic issues in HTA.
- There is a large scope for future work to understand the positive economic trends in oncology. Potentially indicative of the shorter life expectancy in this area.
- Natural language processing techniques can help to contextualise the issues raised by agencies in their evaluation of economic evidence.