Exploring the Integration of Artificial Intelligence in Health Economic, Systematic Review, and Evidence Synthesis Methods: A Scoping Review of NICE Technology Appraisal and Assessment Reports

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Introduction

Artificial Intelligence (AI) is increasingly influencing methodological approaches used in health economic evaluations, systematic reviews, and evidence synthesis. Health technology assessment (HTA) agencies such as the National Institute for Health and Care Excellence (NICE) and Canada's Drug Agency (CDA-AMC) have released position statements outlining how AI could be responsibly incorporated into these processes.[1,2] However, the extent to which AI is currently being applied or reported in HTA submissions remains unclear. Our research question was as follows, how is AI being utilized in health economic, systematic review, and evidence synthesis methods within technology appraisal and assessment reports?

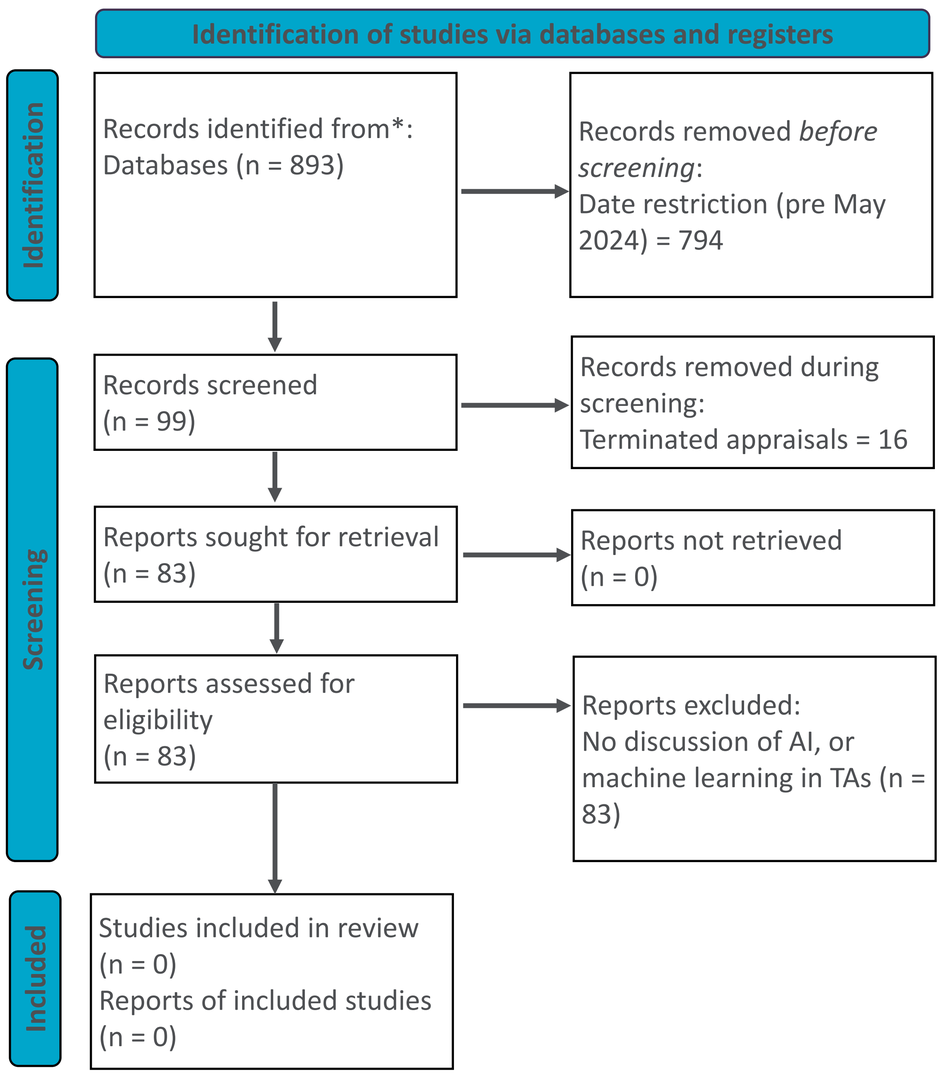
Methods

To answer our research question, a scoping review was undertaken in accordance with JBI guidance[3] and is reported here following the PRISMA extension for scoping reviews.[4] The review included all completed technology appraisals (TAs) and highly specialized TAs published on the NICE website between May 28, 2024, and June 6, 2025. Terminated TAs were excluded. A single reviewer completed this screening with a second reviewer checking the decisions made in full. Publication characteristics and any documentation of AI use within different components of the methods being reported was charted by a single reviewer with a second reviewer checking each extraction. We planned to tabulate data and describe AI methods use within a narrative synthesis.

Results

We screened 99 records, out of which 16 were terminated appraisals. This resulted in 83 TA reports being assessed for eligibility. Upon further assessment of these reports none explicitly described the use of AI or machine learning tools or methods for health economic, systematic review, or evidence synthesis methods.

Figure 1. PRISMA flowchart



No references were made to machine learning applications in screening, natural language processing for data extraction, or adaptive simulation approaches for economic modelling.

Discussion

NICE released a position statement in August 2024 outlining expectations for how AI could be integrated into evidence generation and reporting for HTA, signalling growing interest and acceptability of use. This reflected an acknowledgment of AI's potential to enhance the efficiency, reproducibility, and transparency of health economic evaluation and evidence synthesis. However, despite this strategic positioning, our review of 90 NICE TA reports published between May 2024 and June 2025 found no explicit mention of AI applications in any element of systematic review, evidence synthesis or economic modelling.

Our findings mirror the broader evidence landscape. In their recent systematic literature review NICE identified 25 published studies describing exploratory applications of AI in health economic evaluation—most at the conceptual or prototype stage. Reported applications focused on accelerating model replication, conceptualization, and reporting tasks, with promising results regarding efficiency and usability. However, the review highlighted a notable absence of formal implementation in regulatory HTA submissions. Our findings are broader than this and flag a lack of formal implementation of AI not only in health economic evaluation but also in systematic review and evidence synthesis in regulatory HTA submissions.

The NICE systematic review flagged the following, common shortcomings of reports on AI use in health economic evaluation including limited methodological transparency, lack of peer-review, inadequate explainability of AI algorithms, and inconsistent reporting of methods and results. These issues reduce confidence in outputs of economic evaluations using AI and may limit their suitability for formal HTA processes.[7]

The findings stand in contrast to NICE's activity appraising AI in diagnostic and clinical decision-support contexts (e.g., DG57, HTE11)[5,6] indicating a gap between clinical applications of AI and HTA methodological adoption. This could be reflective of the clearer frameworks and standards (e.g., evidence requirements for medical devices, regulatory guidance on software as a medical device) that exist for diagnostics and clinical decision making compared to those still emerging for AI use in systematic review, evidence synthesis or HTA modelling.

The NICE position statement aims to guide and clarify how AI methods can be appropriately and responsibly used to generate evidence for NICE evaluations and provides practical principles for responsible GenAI use in HTA submissions (**Table 1**):[8]

Table 1. NICE's GenAI best practice principles

1.	GenAI methods should be used only when there is clear, demonstrable value.
2.	Submitting organisations remain accountable for all content.
3.	Compliance with data protection, copyright, and licensing obligations must be ensured.
4.	Tools supporting explainability and transparency should be used wherever possible.
5.	AI methods must augment—not replace—human judgment.

These principles are also echoed by Canada's CDA-AMC in its statement that AI methods can play a supportive role across the evidence lifecycle in HTA, including systematic reviews, clinical evidence, real-world data analysis, and health economic modelling, but must be applied responsibly, transparently, and under deliberate human oversight. The Cochrane collaboration is also actively engaging in shaping how AI is responsibly used in evidence synthesis and has issued a three-paper collection of recommendations and guidance.[9]

Embedding these principles will be crucial for enabling credible use of AI in HTA.

Conclusion

Although NICE and other HTA agencies have shown strategic interest in AI and are actively evaluating AI technologies in clinical contexts, formal integration of AI into the methodological aspects of HTA (particularly in systematic reviews, health economic modelling and evidence synthesis) has yet to occur. Bridging this gap will require clear methodological guidance and transparent reporting standards promoting legal and ethical clarity.

References

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