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# Environmental impact and health technology assessment: state of art and future perspectives.

*HTA179*

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## Background

Manufacture, distribution, use, excretion, and disposal of health technologies all have environmental impacts. In the new Health Technology assessment (HTA) definition, Environmental Impact (EI) is recognized as a domain that should be assessed. However, EI in HTA methods are lacking. Aim of this study was to identify current advances and limitations in incorporating EI in HTA evaluation.

## Material and Methods

We conducted an extensive literature review in Embase and MEDLINE, using the following keywords: HTA, environmental impact, and environmental sustainability. No filters by study design, language or type of evaluated technology were used. Articles published in the last 5 years were included.

## Results

- Eight Identified publications highlighted the lack of robust and clear methods of EI assessment and its inclusion in HTA process (Figure 1).
- Several authors have outlined the importance of assessing the EI (i.e. CO2 emissions and plastic waste) of health technology throughout its life cycle, including raw material, manufacturing, plastic and devices consumption, and disposal in both drugs and devices development and marketing. To assess the EI in HTA the perspective and to support the use of the EI data by decision-makers and HTA agencies, clear domains should be specified (i.e. time horizon, analysis perspective, source of data on pollutant emissions).
- EI evaluation should be prioritized as a HTA dimension in drug assessments and the HTA agencies should recognize the EI to assess the added value of the drugs, due to the impact on the entire society.
- In the literature different methods and approaches have been proposed to incorporate EI in HTA; some rely on already establish assessment methods ("enriched" cost-utility analysis, adjusted willingness-to-pay, and multicriteria decision analysis (MCDA)) and other proposed more specific approaches as "information conduit", "parallel evaluation", "integrated evaluation", and "environment-focused evaluation" (Table 1).

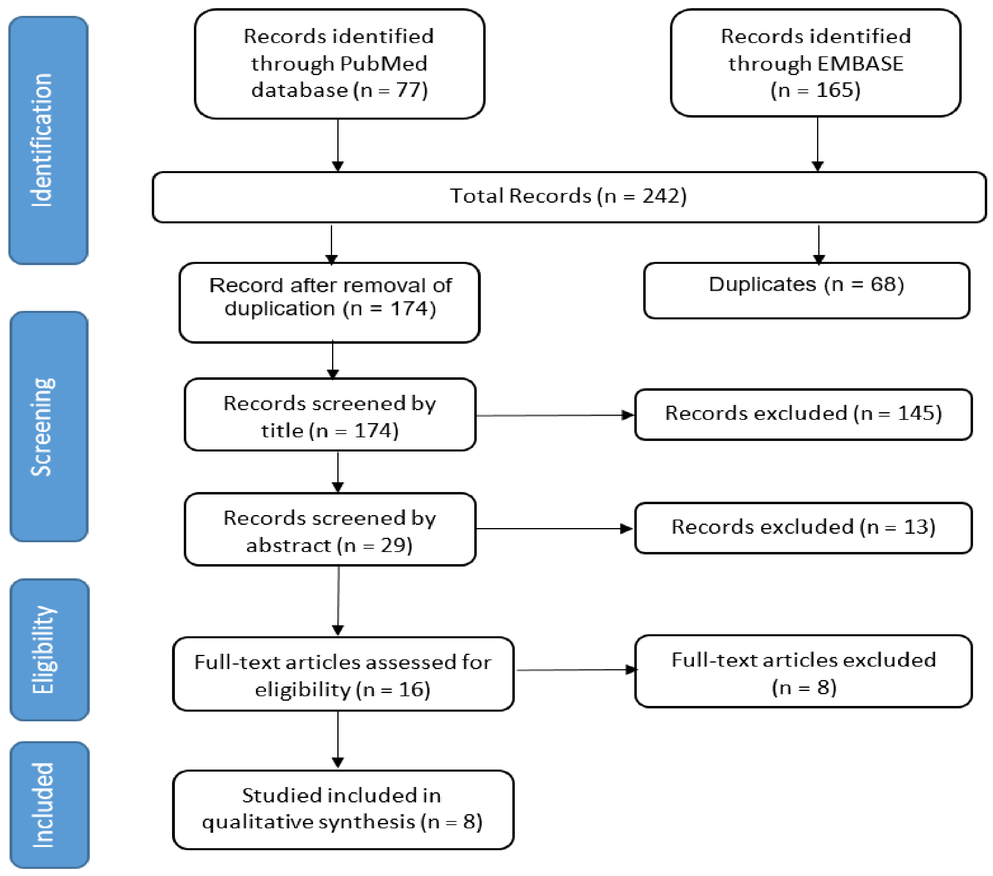


**Figure 1.** Prisma Flow diagram. Results of the literature search and study screening.

| Article | Major concepts |
|---|---|
| Incorporating environmental impacts into the economic evaluation of health care systems: perspectives from ecological economics. Hensher M. Resour Conserv Recycl. 2020 Mar:104623. | - Importance to include greenhouse gas (GHG) estimation into HTA.<br>- GHG intensity in different health care sectors might be estimated by using life-cycle assessment or bottom-up approaches.<br>- It is important to consider the level of pharmaceutical pollution reaching ecosystem (including plastic waste).<br>- Methods to incorporate EI into HTA: contingent valuation; choice experiments; environmental damage schedules; multicriteria decision analysis; cost-benefit analysis; avoided costs; replacement costs; factor income; travel cost; hedonic pricing.<br>- Relevant for health care might be represented by the social cost of carbon. |
| Moving towards a more environmentally sustainable pharmaceutical industry: recommendations for industry and the transition to green HTA. Firth I, Hitch J, Henderson N, Cookson G. Expert Rev Pharmacoecon Outcomes Res. 2023 Jul-Dec;23(6):591-595. | - Importance of estimates the carbon emission in pharmaceutical supply chain.<br>- Recommendations to pharmaceutical industry to reduce its Carbon Footprint (CF).<br>- Importance to include EI in HTA. |
| The inclusion of comparative environmental impact in Health Technology Assessment: practical barriers and unintended consequences. Pekarsky BAK. Appl Health Econ Health Policy. 2020 Oct;18(5):597-599. | - Importance to include GHG into HTA and Health Economic Evaluation (HEE).<br>- Barrier to routine integrate GHG emission impact into HEE/HTA: lack of alignment in objective between GHG evaluation and HEE/HTA.<br>- To include GHG into HTA is important to incorporate GHG accountants and climate change economists on expert committees. |
| Incorporating carbon into health care: adding carbon emissions to health technology assessments. McAlister S, Morton RL, Barratt A. Lancet Planet Health. 2022 Dec;6(12):e993-e999. | - 4 approaches to internalise carbon emission in HTA using : as modifier a decision; as criterion in a multi decision criteria analysis, monetisation and inclusion in a cost-benefit analysis, or being included as additional cost in a cost-effectiveness analysis. |

| Article | Major concepts |
|---|---|
| How we might further integrate considerations of environmental impact when assessing the value of health technologies. Greenwood Dufour B, Weeks L, De Angelis G, Marchand DK, Kaunelis D, Severn M, Walter M, Mittmann N. Int J Environ Res Public Health. 2022 Sep 22;19(19):12017. | - Methods to incorporate EI into HTA: EI included as part of HTA Vs separate EI data.<br>- Necessity to include people with expertise in EI as core member on expert committees.<br>- Necessity to develop ad hoc frameworks.<br>- Collaboration between HTA agency and stakeholders to develop methods to synthetize EI information.<br>- Criteria to include EI into HTA: whether there are toxic substances associated with technology; waste management associated with technology; GHG emission, or potentially reduced by, technology. |
| How can environmental impacts be incorporated in health technology assessment, and how impactful would this be? Walpole SC, Weeks L, Shah K, Cresswell K, Mesa-Melgarejo L, Robayo A, Greaves F. Expert Rev Pharmacoecon Outcomes Res. 2023 Jul-Dec;23(9):975-980. | - Inclusion EI in HTA evaluation and challenges in incorporating this aspect in HTA.<br>- Concerns on the risk of incorporating EI into HTA due to several factors such as limited health system resources to environmental sustainability. |
| Environmental impact assessment in health technology assessment: principles, approaches, and challenges. Toolan M, Walpole S, Shah K, Kenny J, Jónsson P, Crabb N, Greaves F. Int J Technol Assess Health Care. 2023 Feb 23;39(1):e13. | - Approaches for HTA agencies to take environmental information into account: information conduit; parallel evaluation; integrated evaluation; environment-focused evaluation.<br>- Challenge for HTA agencies to include EI in the evaluation: developing appropriate analytical techniques; achieving consensus on EI should be included against other costs and benefits; developing recommendation; addressing the consequence of EI implementation in HTA. |
| Which value aspects are relevant for the evaluation of medical devices? Exploring stakeholders' views through a Web-Delphi process. Freitas L, Vieira ACL, Oliveira MD, Monteiro H, Bana E Costa CA. BMC Health Serv Res. 2023 Jun 8;23(1):593. | - Inclusion of EI of the production and use of the technology into device HTA.<br>- EI should be assessed for both therapeutic and diagnostic type of device.<br>- EI should be included into the existing frameworks. |

**Table 1.** Description of included studies investigating the role of Enviromental Impact (EI) into Health Technology assessment (HTA).

## Conclusion

HTA framework needs adjustments to incorporate environmental information, including environmental healthcare technology impact. EI assessment should be prioritize for the drug evaluation and the technologies with a favorable on EI should be prioritized in health policy choices. Clear and robust methods on EI assessment and inclusion in HTA process should be provided by HTA agencies and international societies. Further, manufactures should improve the data generation on the EI of their products, with new studies able to generate individual-level data on EI of technology. These evidence must be included in the processes of value definition for new technology (i.e., drugs, devices and diagnostic tests) in order to recognize their overall added value.

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