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Health Economic Evaluations Incorporating Broader Perspectives: A Targeted Literature Review

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Objectives

- There is growing recognition of the need to incorporate broader perspectives, including ecological impacts and social equity, in the economic evaluations for healthcare decision-making.
- The purpose of this review is to identify and evaluate healtheconomic evaluations (HEEs) that incorporate broader perspectives.

Methods

- A targeted literature review was conducted on 12 June 2024 to identify HEEs incorporating broader perspectives, such as ecological impacts and social equity.
- Searches on PubMed and Web of Science were performed using a combination of MeSH terms and keywords. The search terms were:
  - ((cost-effectiveness* OR "budget impact"* OR "economic evaluation"* OR "economics evaluation"*) AND (equity* OR ecological* OR environmental* OR sustainability*)).
- Inclusion criteria (Table 1) focused on English-language publications in peer-reviewed journals since 2014.
- Titles and abstracts were screened independently by two reviewers, and this was followed by a full-text review.
- The quality of the included studies was assessed using the CHEERS checklist[1].

Table 1. Inclusion criteria (PICOS framework):

Population (P)	No restriction, any populations affected by health interventions
Intervention (I)	No restriction, any health interventions
Comparison (C)	No restriction, any comparisons
Outcome (O)	ICER incorporating broader outcomes such as ecological impacts or social equity
Study design (S)	Economic evaluations including CEA, CUA, CBA, and studies incorporating broader perspectives like ecological and equity analyses.

Abbreviations: CBA, cost-benefit analysis; CEA, cost-effectiveness analysis; CUA, cost-utility analysis; ICER, incremental cost-effectiveness analyses ratio.

Results

- As shown in the PRISMA diagram (Figure 1), 286 references were retrieved from PubMed (n = 79) and Web of Science (n = 207); duplicate studies (n = 13) were excluded before screening.
- After abstract and title screening, 249 studies were excluded. Full-text review of the remaining 24 articles led to the further exclusion of 7 studies; thus, 17 studies were selected for inclusion in the analysis.
- The 17 included studies are summarised in Table 2, with distributional cost-effectiveness analysis (DCEA) emerging as the most frequently used approach (n = 9).

Key findings

- The focus on equity:
  - Most studies (n = 15) focused on equity, exploring how interventions impacted different socioeconomic or ethnic groups.
  - While most studies (n = 12) showed improvements in equity outcomes, particularly for disadvantaged populations, a few raised concerns; an example being the exacerbation of inequalities with poorly designed interventions, as seen in the NHS Health Check study[6] and Norwegian cycle intervention[8].
  - DCEA emerged as the most used method for addressing equity concerns; however, there is significant variability in its application, with few standardised methodologies across studies.
- Ecological considerations: Despite the growing recognition of ecological impacts, only two studies integrated this perspective. Both studies focused on switching to reusable inhalers for patients with chronic respiratory diseases and explored the potential interventions to reduce carbon emissions.
- Methodologies: Most of the studies (n = 12) adapted existing Markov models to include additional perspectives, such as equity or ecological factors. For example, incorporating different transition probabilities for each income quintile reflects the varying effectiveness of the intervention based on socioeconomic status.

Discussion

- The results of this review provide insights into the current development of HEEs that incorporate broader perspectives; however, the following key limitations should be considered:
  - The study is a targeted review not a full systematic literature review (SLR).
  - Only two databases, PubMed and Web of Science, were searched during the review.
  - Only peer-reviewed journals were assessed and studies that were not in English were excluded.
  - It is likely that the search has overlooked grey literature, posters and reports by research bodies, governments, and non-governmental organisations which present research into equity and ecology in HEEs.
- Our results align with previous SLRs which assessed the incorporation of equity into HEEs[2,3]. Both SLRs concluded that the methods described by the papers included in their review could feasibly be used to value future interventions.
- There is a lack of ecological consideration in cost-effectiveness analyses, which is demonstrated both by the results of this literature review, as well as the absence of studies to which our results can be compared. This indicates an area for future research.

Figure 1. Targeted literature review search and selection details

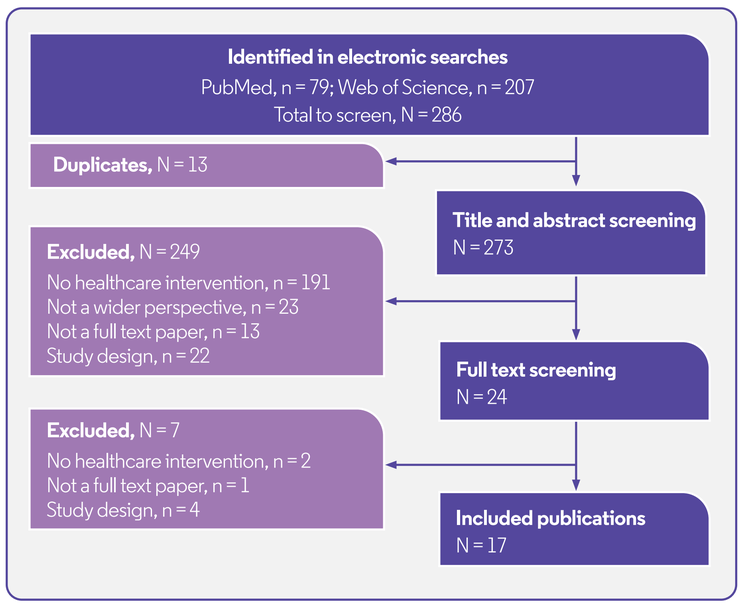

Table 2. Studies included in final review

Author, year, country	Disease	Methods	Costs/outcomes	Conclusion of wider analysis
Blakely et al. 2014, New Zealand[4]	HPV	CEA stratified by sex, ethnicity, and area-based socioeconomic deprivation tertile	Health system costs for health states and intervention costs/QALYs	The intervention could reduce ethnic and socioeconomic disparities in HPV-related disease
Dixit et al. 2023, India[5]	Rheumatic fever and rheumatic heart disease	ECEA	Health system costs and OOPE/QALYs	Rheumatic heart disease cases prevented were four times higher and reduced OOP costs for the poorest quartile compared with the richest quartile
Goshua et al. 2023, US[6]	Sickle cell disease	Atkinson Index–based DCEA formulation	Health system costs and OOPE/QALYs	Gene therapy is cost ineffective per conventional CEA standards but creates greater equity
Kowal et al. 2023, US[7]	COVID-19	DCEA	Lifetime healthcare and societal costs and intervention costs/QALYs	Medicare funding of COVID-19 treatments in the US could improve overall health while reducing existing health inequalities.
Kypridemos et al. 2018, UK[8]	CVD	CEA + equity	Healthcare costs and productivity losses/CVD, non-CVD deaths, QALYs	The current NHS Health Check implementation seems neither equitable nor cost effective. Optimal implementation may save costs but lack equity, while targeted implementation could achieve both Adding structural policies addressing CVD risk factors may improve equity and save costs
Lal et al. 2017, Australia[9]	Obesity	DCEA	Intervention, healthcare, patient OOP, and deadweight (total net revenue loss in economic welfare due to new tax) costs and tax revenue/HALYs	A sugar-sweetened beverage tax produced the most HALYs and saved the greatest costs for people in the most disadvantaged quintiles in Australia
Lamu et al. 2021, Norway[10]	CHD, stroke, T2D, and cancer	ECEA, transition probabilities are predicted based on each income quintile using the Norwegian national travel survey to account for the difference in intervention effectiveness based on income	Norwegian public sector costs/QALYs	Incremental cost per QALY falls with income quintile, ranging from $10,098 to $23,053 per QALY gained in the richest and poorest quintile, respectively. The analysis showed the cycle-network expansion is likely to be cost effective, but with equity concerns
Laxy et al. 2020, US[11]	Diabetes	CEA	Healthcare costs and intervention costs/QALYs	Health and equity impact from the intervention would be low and savings from a narrow Medicaid perspective would be much smaller than from a healthcare system perspective
Love-Koh et al. 2021, Brazil[12]	General health	DCEA	Direct programme costs and indirect comorbidity costs/DALYs	The intervention is likely to be cost effective but the inequality impacts are small and highly uncertain
Meunier et al. 2024, UK[13]	Diabetes (macular oedema)	DCEA	Health state costs and intervention costs/QALYs	Long-acting therapies with fewer injections may reduce costs, improve health, and increase equity.
Oosterhoff et al. 2020, Netherlands[14]	Consequences of obesity (modelled via BMI)	DCEA	Intervention, healthcare and productivity costs/QALYs	The initiative may be a cost-effective and equitable strategy
Quan et al. 2021, US[15]	HIV	DCEA	Intervention and health opportunity costs/QALYs	Equity-focused HIV strategies can significantly improve population health, reduce costs, and create greater equity for Black and Hispanic or Latino individuals
Baek et al. 2023, Vietnam[16]	NA	DCEA, cluster RCT with a DCEA based off mother's education level and household wealth	Intervention costs, mother's time to participate in the intervention, and OOP healthcare cost/Child Cognitive Score	The intervention could promote equity while improving child cognitive development with greater cost effectiveness in disadvantaged groups
Brown et al. 2018, Australia[17]	NA	ECEA	Cost of intervention and healthcare costs relevant to obesity/HALYs gained	Legislation to restrict TV advertising is likely to be cost effective, with greater benefits and cost savings for children with low SES
Feldhaus et al. 2021, Cambodia[18]	Diabetes	CEA with subgroup analysis	Cost of diabetes services, intervention and SOC costs, healthcare costs, OOP costs/DALYs	Increasing service availability and primary care capacity for diabetes care could significantly reduce the diabetes burden and strengthen the health system in the long term
Ortsäter et al. 2020, Germany[19]	Chronic respiratory diseases	Budget impact	Carbon emissions, healthcare and carbon emissions costs	Adopting RESPIMAT® re-usable may be a cost-saving option and reduce the societal cost of carbon emissions
Ortsäter et al. 2019, multinational[20]	Chronic respiratory diseases	Budget impact	Carbon emissions, healthcare and carbon emissions costs	Adopting RESPIMAT® re-usable would lead to a substantial reduction in CO_2 emissions and, from a societal perspective, cost savings

Abbreviations: BMI, body mass index; CEA, cost-effectiveness analysis; CHD, coronary heart disease; COVID-19, coronavirus disease; CVD, cardiovascular disease; DALY, disability-adjusted life year; DCEA, distributional cost-effectiveness analysis; ECEA, extended cost-effectiveness analysis; HALY, health-adjusted life year; HIV, human immunodeficiency virus; HPV, human papillomavirus; NA, not applicable; NHS, National Health Service; OOP, out-of-pocket; OOPE, out-of-pocket expenditure; QALY, quality-adjusted life year; RCT, randomised controlled trial; SES, socioeconomic status; SOC, standard of care; T2D, type 2 diabetes; TV, television; UK, United Kingdom; US, United States.

Conclusion

- This review highlights significant progress in incorporating broader societal impacts, particularly equity, into HEEs.
- However, substantial gaps remain, both in the assessment of ecological impacts and the need for standardised methodologies.
- A standardised research framework in these areas would improve the inclusivity of healthcare decision-making and ensure that health interventions align with broader societal goals, including sustainability and social equity.

Presented at ISPOR Europe 2024, Barcelona, Spain | November 17-20 2024

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Acknowledgments and Disclosures:

CB, MLN, JH, QX, MC and SCD are all employees of Clarivate. The study has been funded by Clarivate.