Applied Health Economics and Health Policy
https://doi.org/10.1007/s40258-025-01023-1

SCOPING REVIEW

Towards a Multi-sectoral Approach to Population Health: A Scoping Review of Cross-sectoral Evaluations of Health Interventions

Rositsa Koleva-Kolarova[1] · Emily Hulse[2,9] · Bertalan Németh[3] · Maureen Rutten-van Mölken[4,5] · Rhiannon Tudor Edwards[6] · Balázs Babarczy[3,7,10] · Balázs Nagy[3,7,10] · Sarah Wordsworth[1,8] · Apostolos Tsiachristas[9,11] on behalf of the Invest4Health consortium

Received: 25 April 2025 / Accepted: 11 December 2025

Abstract

Background Health interventions, particularly those targeted at health promotion and disease prevention, often have a range of impacts that span beyond the healthcare sector. Making the case for investment in these interventions may require an inventory of costs and outcomes across multiple sectors beyond the health sector.

Objectives To perform a scoping review of economic evaluations that used existing approaches for cross-sectoral evaluation of healthcare interventions and provide an understanding of how these approaches have been applied in empirical studies.

Methods Scoping reviews, a type of evidence synthesis, follow a systematic approach to map evidence on a topic and identify main concepts, theories, sources, and knowledge gaps. We used the PRISMA extension for scoping reviews and a pearl-growing search approach. A forward citation searching in Google Scholar and Web of Science of an initial set of selected papers that recommend cross-sectoral evaluations of health interventions was performed, complemented by free-word search in Google and Google Scholar. Cross-sectoral evaluations of health interventions that consider costs and outcomes beyond healthcare were included.

Results From the 204 identified cross-sectoral evaluation studies of health interventions, the vast majority (85%) were cost-effectiveness and cost-utility analyses taking the societal costing perspective. Other approaches included social return on investment (6%), cost-benefit analysis (4%), cost study (3%), and combined approaches (2%). Two-thirds of the studies evaluated a treatment-based intervention while the remainder evaluated preventive interventions. In addition to healthcare, studies evaluated mostly costs related to productivity and non-direct medical costs, e.g., transport costs. Outcomes were focused on clinical results and patient-reported health and well-being.

Conclusions There is a limited number of published cross-sectoral evaluations of health interventions despite the need of public and private investors for global value assessment. Issuing guidance on performing cross-sectoral evaluations and highlighting their need by health technology assessment agencies may improve existing evidence and therefore novel forms of investment in population health interventions.

1 Introduction

Health interventions, particularly those targeted at health promotion and disease prevention, often have a range of impacts that span beyond the healthcare sector. Furthermore, other sectors outside the healthcare system (e.g., education, environment, employment, social security) can have an impact and contribute to health. However, reimbursement decision making of healthcare services is predominantly based on their clinical benefit and specific cost-effectiveness relative to directly comparable interventions [1, 2]. Some jurisdictions (e.g., the Netherlands, Portugal, Norway, Denmark, Sweden Spain, Germany, Hungary, Ireland, etc.) advise a broader focus of economic evaluations of healthcare interventions. However, in most cases, there remains a paradox of a continued use of a narrow focus of intervention assessment despite well-documented impacts outside the healthcare sector [3, 4], which is especially observed for evaluations of public health and prevention interventions [5]. In addition, a barrier for investing in health interventions can occur when their benefits are realised in other sectors [6], therefore creating misaligned incentives between payers

Extended author information available on the last page of the article

Published online: 23 February 2026

Key Points

Despite the need expressed by public and private investors especially across non-health sectors for global value assessment and recommendations by HTA bodies, the number of cross-sectoral evaluations of health interventions remains limited.

A clear guidance accompanied by a "multiple sector impact inventory" with proposed methods for measurement and valuation of outcomes and costs in sectors beyond health could facilitate the improved adoption of cross-sectoral economic evaluations of health interventions.

and beneficiaries, referred to as 'wrong pocket problem'. The need for cross-sectoral evaluations is more apparent in local decision making, where local authorities (e.g., counties or municipalities) are responsible for comprehensive services related to public health, social care, schooling, housing, etc. [7].

Approaches have been developed to facilitate cross-sectoral evaluation, i.e., the assessment of the impact of healthcare interventions in sectors outside healthcare (e.g., workforce, education, criminal justice, and environment), including social return on investment (SROI), and cost-benefits analysis (CBA). Yet each of these individual approaches has its own challenges for implementation. These methodological challenges include difficult valuation of opportunity cost, lost productivity due to morbidity and unrelated downstream costs, and double counting of outcomes, to list a few. Furthermore, additional data challenges can occur from a lack of available data on all relevant outcomes and costs, or a lack of country-specific unit costs outside the healthcare sector [8, 9]. The latter was documented in a recent review for prevention of alcohol addiction, which found that the challenge of consistently and accurately measuring non-health costs was still prevalent in several studies [10]. Insufficient and unsystematic reporting of the methods and results in studies employing such evaluation approaches as well as the lack of standardisation in reporting of societal impact have been observed [7, 11]. To mitigate these challenges, health technology assessment (HTA) agencies in some countries (e.g., the Netherlands [12]) recommend the adoption of the societal costing perspective in economic evaluations of health services and interventions to include productivity gains, reduction in informal care costs, expanding the consideration of spill-over effects, e.g., change of caregiver quality of life, and future unrelated medical costs. Nevertheless, there are still many effects of prevention outside the healthcare sector that are not yet addressed and the spill-over effects to specific sectors that could be considered in investment decisions are not explicitly incorporated (e.g., the employment sector in which productivity gains are taking place).

Applied studies aimed at cross-sectoral evaluation of preventive and health promotion interventions need improvement to ensure that they are theoretically sound and feasible. Coupled with the challenges mentioned previously, this may highlight the need for guidance on how to perform such evaluations to inform investment decisions across sectors. Robust evidence from cross-sectoral evaluations would facilitate the decision-making process as stakeholders' resource investment and impact on local budgets will be considered, and offset against local priorities and needs, in addition to valuing the outcomes that are relevant to local populations.

To contribute towards the development of such guidance, we aimed to perform a scoping review of economic evaluations that used existing approaches for cross-sectoral evaluation of healthcare interventions and provide an understanding of how these approaches have been applied in empirical studies.

2 Methods

A scoping review of empirical evaluations of health interventions that incorporated outcomes and costs in sectors beyond healthcare was performed to provide an overview of underlying evaluation approaches. The review adhered to the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) guidelines [13].

2.1 Search and Selection of Sources

A search method, previously described by Hinde et al [14, 15] as "pearl-growing", was applied to review the literature on cross-sectoral evaluations of health interventions. The rationale of this search method is that instead of the traditional literature search of combining key terms and Medical Subject Headings (MeSH) in a search strategy to be used in search engines, the search will start with a pool of relevant papers (called by Hinde et al. [14, 15] "initial pearls"). This pool constitutes a more targeted approach. In pearl-growing, the pool of literature is grown through both references and citations until all relevant papers have been retrieved. Forward citation searching was used in this review. Hinde et al. [14, 15] have previously demonstrated that pearl-growing resulted in the identification of a number of papers comparable to the number identified by traditional

search. A search using pearl-growing is dependent on the expertise of authors on the published literature rather than the searcher's knowledge of applicable terms.

In this review, a set of initial papers was used, which included the recommendations on economic evaluations in healthcare by:

(a) The Second Panel on Cost-Effectiveness in Health and Medicine that recommends the use of an "impact inventory" in order to capture outcomes and opportunity costs across all relevant sectors [16].

(b) Publications of the European Union (EU)-funded PECUNIA project, which aimed to establish standardised costing and outcome assessment measures across the EU to optimise national healthcare provision and enhance efficient and evidence-based collaborative care models and inter-sectoral funding. Initial papers were identified through the project website [17].

(c) The Social Value Self-Assessment tool, which was developed by Social Value United Kingdom (UK) as a guide to estimate Social Return on Investment [18].

(d) The Cost-Benefit Analysis tool developed by the Greater Manchester Combined Authority (GMCBA) that incorporates potential outcomes and costs and a pricing approach for their valuation [19];

(e) The Framework for Economic Evaluations When Costs and Effects Fall on Multiple Sectors and Decision Makers developed by Walker et al [6].

(f) A review of HTA guidelines and the recommendations regarding the societal perspective evaluation of healthcare interventions [20].

The initial set of papers was a starting point for the review since these publications specifically advised going beyond healthcare in terms of costs and outcomes when evaluating the impact of health interventions taking a cross-sectoral approach. The initial papers were selected if they considered the broader cross-sectoral perspective of economic evaluations in healthcare and provided tools, frameworks and recommendations on performing the assessments. Furthermore, these publications specifically focused on the spill-over effects of health interventions in different sectors. We aimed to select papers that were not published very recently as this would usually result in fewer citations. Textbooks and conceptual theoretical papers were not included as they did not provide applied examples or specific guidance in implementing cross-sectoral evaluation.

Web of Science and Google Scholar were used to perform forward citation search of the selected initial papers. These searches were supplemented by free-text searching in Google and Google Scholar (in March 2024) for economic evaluations of healthcare interventions including cross-sectoral impact (see Online Appendix 1 for search terms). EndNote was used for managing downloads and de-duplication.

The reports that used the Social Value Self-Assessment tool were identified through the report database on the Social Value UK webpage by filtering for topics related to mental and physical health and wellbeing.

2.2 Eligibility Criteria

Scientific papers and consultancy/advisory reports were selected if they evaluated the impact of health interventions by using an empirical cross-sectoral evaluation and reported impact on costs and outcomes, or only costs, beyond the healthcare sector (e.g., healthcare and at least one other government sector). In this review we referred to a health intervention as a "intervention' to apply to any activity undertaken with the objective of improving human health by preventing disease, by curing or reducing the severity or duration of an existing disease, or by restoring function lost through disease or injury [21]. We were interested in evaluation frameworks that allow for assessing the impact of health interventions in other sectors as broader assessments could support cross sectoral investment in health services. Indeed, non-health interventions in other sectors could impact health; however, to keep the review manageable we focused only on health interventions. Only articles and reports written in English and fully accessible were included in the Google and Google Scholar free-word searches. We did not apply a restriction on the year of publication. The citation trail followed a chronological order, and anachronistic citations were not included. Publications and reports that evaluated non-healthcare interventions (e.g., improvements in housing or schooling) were excluded to keep the scope of the review manageable and feasible.

2.3 Data Extraction and Charting

Publications citing the initial papers were identified through Google Scholar and Web of Science, downloaded into EndNote, de-duplicated, and screened for inclusion eligibility based on their title and abstract by one reviewer (RKK). Full text screening was performed by one reviewer (RKK, EH, or BN) and second and third reviewers (AT, SW) were involved to screen full text in case of doubt or disagreement. Data extraction was performed by two reviewers (RKK, BN) and a third reviewer (EH) double extracted a set of all included papers to ensure that the target of inter-reviewer agreement was 95% as done previously in another review [22].

We extracted data from all included papers on: (a) source that the study was retrieved from, which included either through an initial paper or through free-text search in Google and Google Scholar, (b) type of intervention—prevention or treatment; c) evaluation approach, e.g., cost-effectiveness

analysis (CEA), cost-utility analysis (CUA), cost-benefit analysis (CBA), social return on investment (SROI), cost study, (d) included sector, (e) type of costs and outcomes, (f) measurement methods of costs and outcomes, and (g) valuation method, if applied. Economic evaluation approaches were grouped based on the outcome of assessment in the study. For example, if a case study used quality-adjusted life years (QALYs) as an outcome measure, it was classified as a cost-utility analysis. We considered all approaches (cost-effectiveness, cost-utility, cost-consequence, cost-minimisation, cost-benefit, SROI, cost study) for evaluating health interventions.

2.3.1 Empirical Application of Different Approaches

The included initial papers recommended different types of approaches to evaluating the cross-sectoral costs and outcomes of health interventions. While some initial papers such as the Second panel [16] and the review by Avsar et al [20] had more general recommendations, e.g., listed the sectors that might be considered in economic evaluations, others like the GMCBA [19] had unit costs and a structured excel file that can facilitate the performance of CBA. Similarly to GMCBA, PECUNIA [17] had developed a resource use instrument that includes service lists and coding system, and is accompanied by unit cost templates and compendium, that can be used to evaluate the costs of health interventions going beyond the healthcare sector. Social Value UK [18] have developed a 'value map', which is a resource use measurement template that can be used to perform SROI analyses. Walker and colleagues [6] have also developed a framework consisting of a generic impact inventory, that can be utilised in performing cross-sectoral evaluations.

The recommendations and the tools provided by the initial papers (i.e., the impact inventory [16], the resource use instrument [17], the value map [18], etc.) were used to develop a bespoke data extraction template, which included the sectors considered (e.g., health, workforce, education, social care, justice, transport, environment, other), source of outcomes and costs data, measurement and valuation methods for costs and outcomes. In addition, we used the recommendations and tools in initial papers to categorise data items as described below.

2.3.2 Data Items

The measurement methods for costs and outcomes were categorised based on the method of data collection into (a) primary data collection on health and wellbeing, including trial data, patient-reported outcome tools used in the included study; and (b) published sources. The valuation method of costs and outcomes were grouped into: (a) estimation, such as, methods using an arbitrary proxy; b) assumption based on the assessors' own judgements; (c) price, such as one set in a market or paid by a consumer; (d) unit cost, such as the national average cost of a unit of service; (e) valuation of resource use in other sectors, for example human capital approach for estimating productivity losses, well-being valuation method or willingness to pay for valuing health gains, etc.

2.4 Synthesis of Results and Data Analysis

The sectors and approaches for performing economic evaluation as proposed by the initial papers were used to organise and analyse the extracted data in themes. Data were collated into variables that indicated the methods for measurement and valuation of outcomes and costs. All descriptive data were aggregated, and summary measures were created for each column: evaluation approach, sector, outcomes type, outcome measurement, outcome valuation, cost type, cost measurement, cost valuation method. Basic descriptive statistics (e.g., frequencies) and narrative synthesis were used to summarise and highlight important characteristics of the studies.

3 Results

A total of 2287 records were screened, and 204 publications and reports were included in the data extraction and synthesis process [23–226] (Fig. 1). Treatment-based interventions were evaluated in 66% of the included studies, while 34% of papers evaluated preventive interventions.

3.1 Evaluation Approaches and Included Sectors Beyond Healthcare

The most common evaluation approach used was CUA (67%), CEA (10%), combined CEA and CUA (8%), SROI (6%), CBA (4%) and cost study (3%); the remainder of papers were a different combination of two of these approaches (Fig. 2, Appendix Table 2). Most empirical evaluations resulted from the Second Panel on Cost-Effectiveness in Health and Medicine [23–201], followed by the Social Value Self-Assessment tool [202–212] and the Framework for Economic Evaluations [6] developed by Walker et al [213–217], while a similar number of papers resulted from the PECUNIA [223–225], Google and Google Scholar searches [219–222]. One paper [226] resulted from the review of HTA guidelines and the recommendations regarding the societal perspective evaluation of healthcare interventions [18] (Fig. 3). The included papers most commonly (90%) considered workforce as an additional sector,

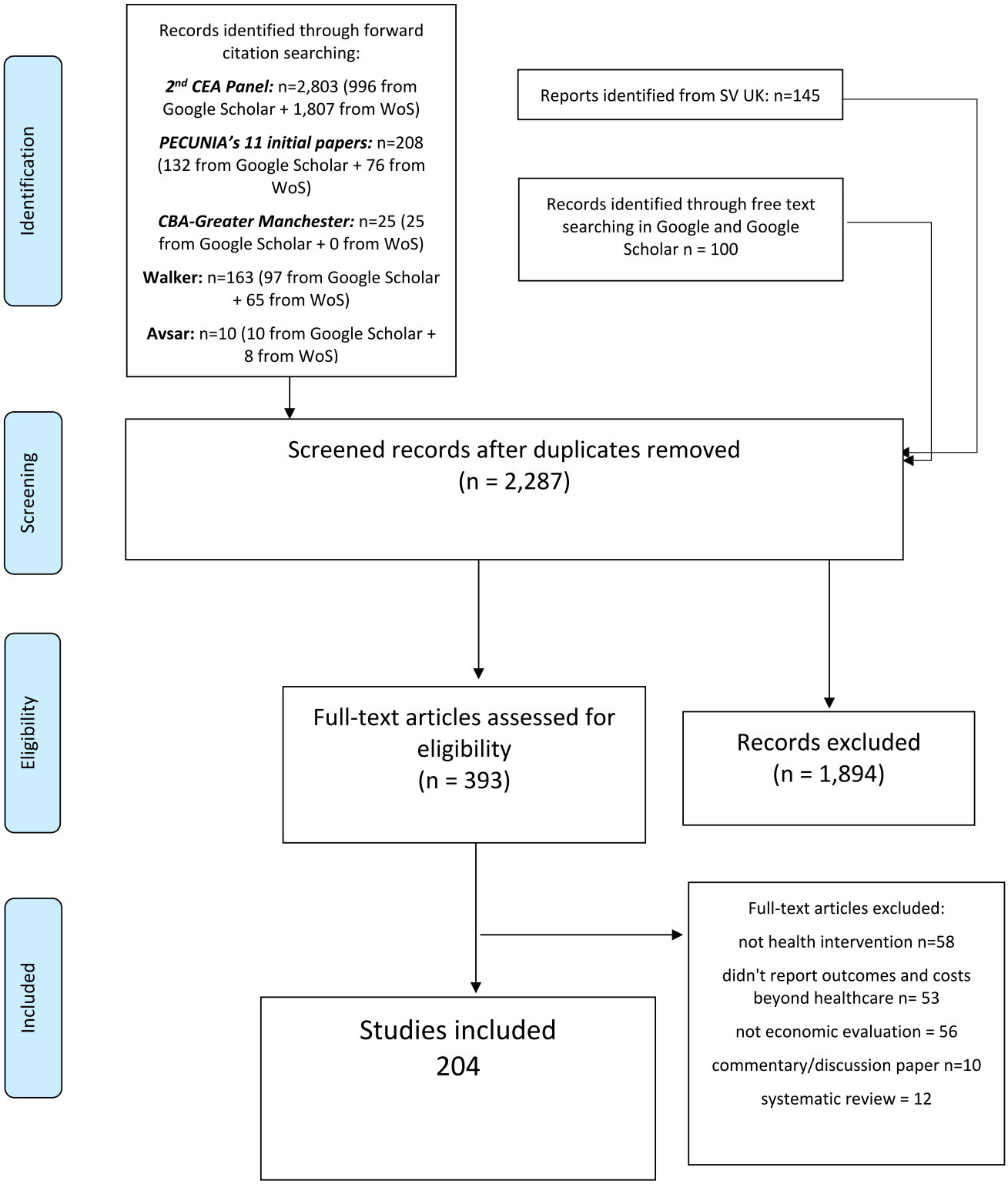

Fig. 1 PRISMA diagram. *2nd CEA* Panel the Second Panel on Cost-Effectiveness in Health and Medicine, *Avsar* a review of HTA guidelines and the recommendations regarding the societal perspective evaluation of healthcare interventions by Avsar et al, *CBA-Greater Manchester*—the Cost-Benefit Analysis tool developed by the Greater Manchester Combined Authority, *SV UK*—Social Value United Kingdom, *Walker framework*—Framework for Economic Evaluations when Costs and Effects Fall on Multiple Sectors and Decision Makers developed by Walker et al

using different methods to measure and value productivity, and 33% of papers considered multi-sectoral analysis of costs and outcomes (e.g., including three or more sectors) (Fig. 4). The other included sectors were related to transport, education, social care, justice, environment and other non-medical sectors (insurance, facility and equipment, housing, training of health professionals, activities of daily living, childcare, assistive devices, modifications to housing or transport) (Fig. 4, Appendix Table 2).

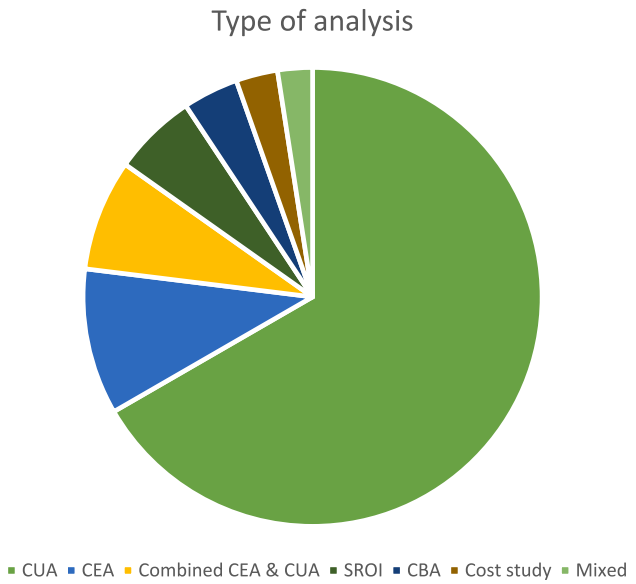

Fig. 2 Type of evaluation approach. Mixed includes combined CUA & SROI, CUA & CBA, CEA & CBA, CEA & SROI. *CBA* cost-benefits analysis, *CEA* cost-effectiveness analysis, *CUA* cost utility analysis, *SROI* including social return on investment

3.2 Measurement and Valuation of Outcomes

As Fig. 5 shows, the most frequently reported outcome (80%) was quality-adjusted life years (QALYs) or disability-adjusted life years (DALYs), often measured using the EQ-5D questionnaire or estimated through lifetables and published utilities (Fig. 5). The second most commonly used outcome was related to clinical effectiveness—morbidity and mortality (16%)—followed by life expectancy (5%), well-being (5%) (e.g., intangibles, measures that were related to suffering, stress, happiness, confidence, life control, relationships, maintaining dignity, or sense of self), and improvements in physical and mental health (4%) (Figs. 5, 6). Most well-being measures were captured by a questionnaire and there was a variety of instruments used including CORE-10, ÖMPSQ 10, PAM score, and ICECAP-A. There was a variety of patient-reported outcomes measures including EQ-5D, CHU-9, GAD-7, IPAQ-short, International Physical Activity Questionnaire Item, and PHQ-9 used to measure quality of life. For improved mental health, most studies overlapped with those of well-being outcomes and therefore used similar tools as those listed above or domain-specific quality of life tools for mental health (e.g., a self-designed survey based on EQ-5D, GAD-7/ General Anxiety Disorder-7, or SF-12).

3.3 Measurement and Valuation of Recourse Use in Different Sectors

Healthcare costs were measured in all studies, and measurement and valuation tools adopted included WHO-CHOICE, CDC data such as CDC Vaccine Price List, Medical Expenditure Panel Survey, International Medical Products Price Guide, unit costs from reimbursement claims. The most common additional cost that was measured was productivity

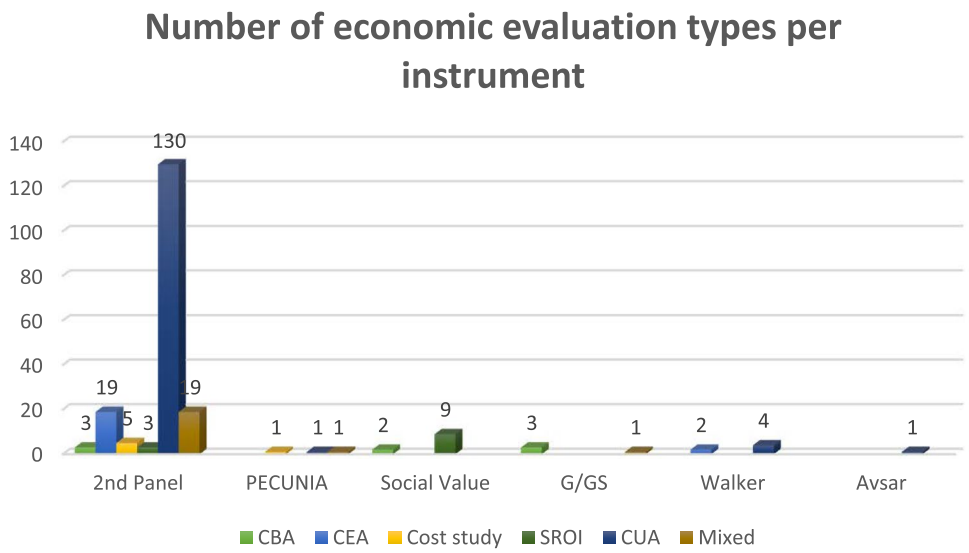

Fig. 3 Type of studies in relation to the initial papers. *CBA* cost-benefits analysis, *CEA* cost-effectiveness analysis, *CUA* cost utility analysis, – including social return on investment

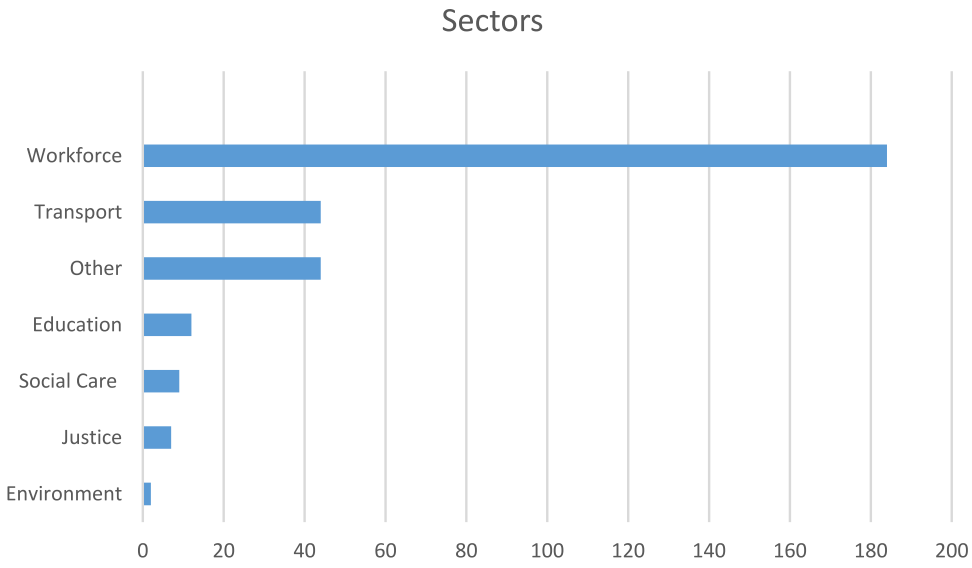

Fig. 4 Sectors covered in the included studies. Other sectors include insurance, facility and equipment, housing, training of health professionals, activities of daily living, childcare, assistive devices, modifications to housing or transport

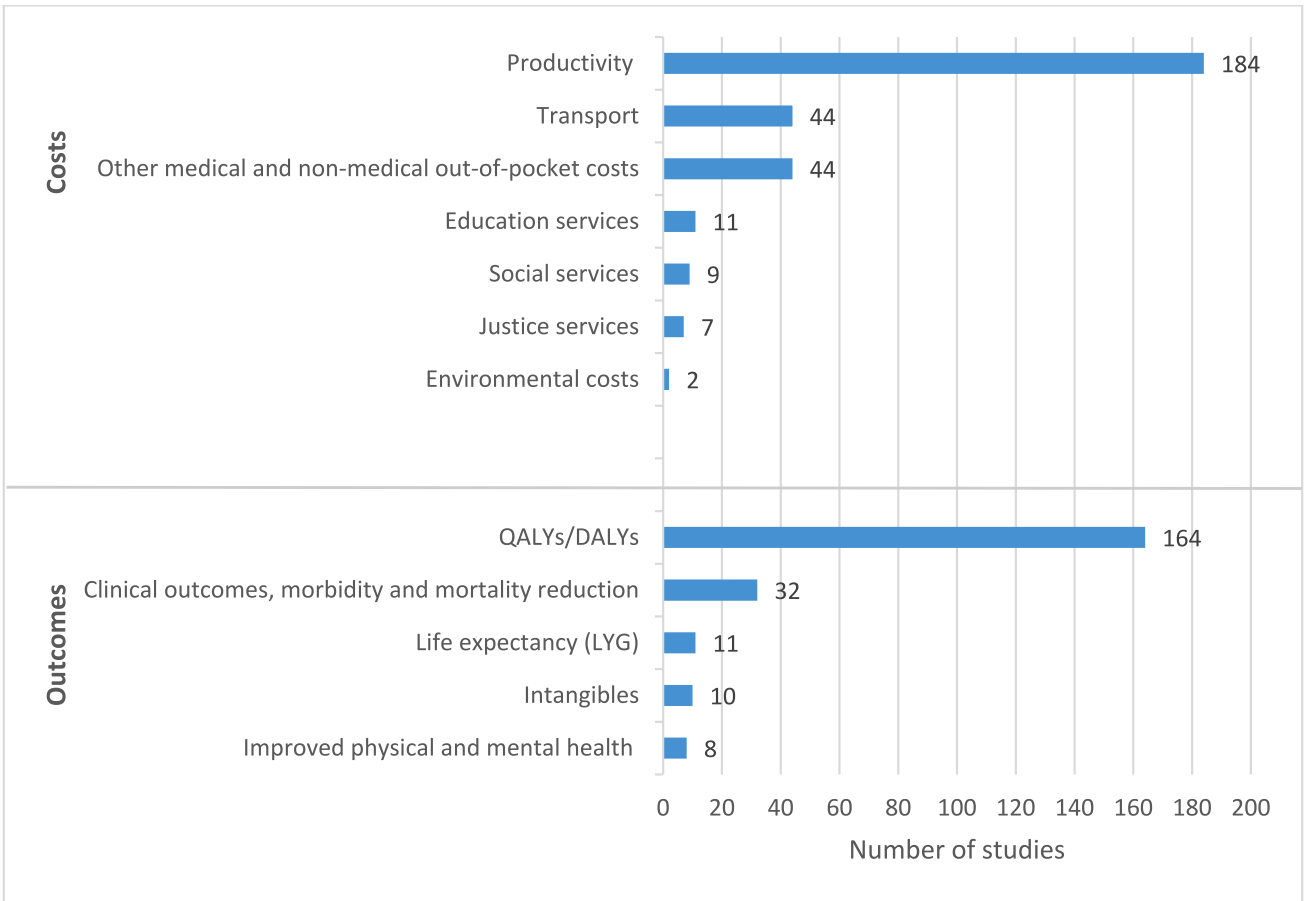

Fig. 5 Frequency of costs and outcomes across the included studies. *DALY* disability-adjusted life year, *LYG* life years gained; *QALYs* quality-adjusted life years

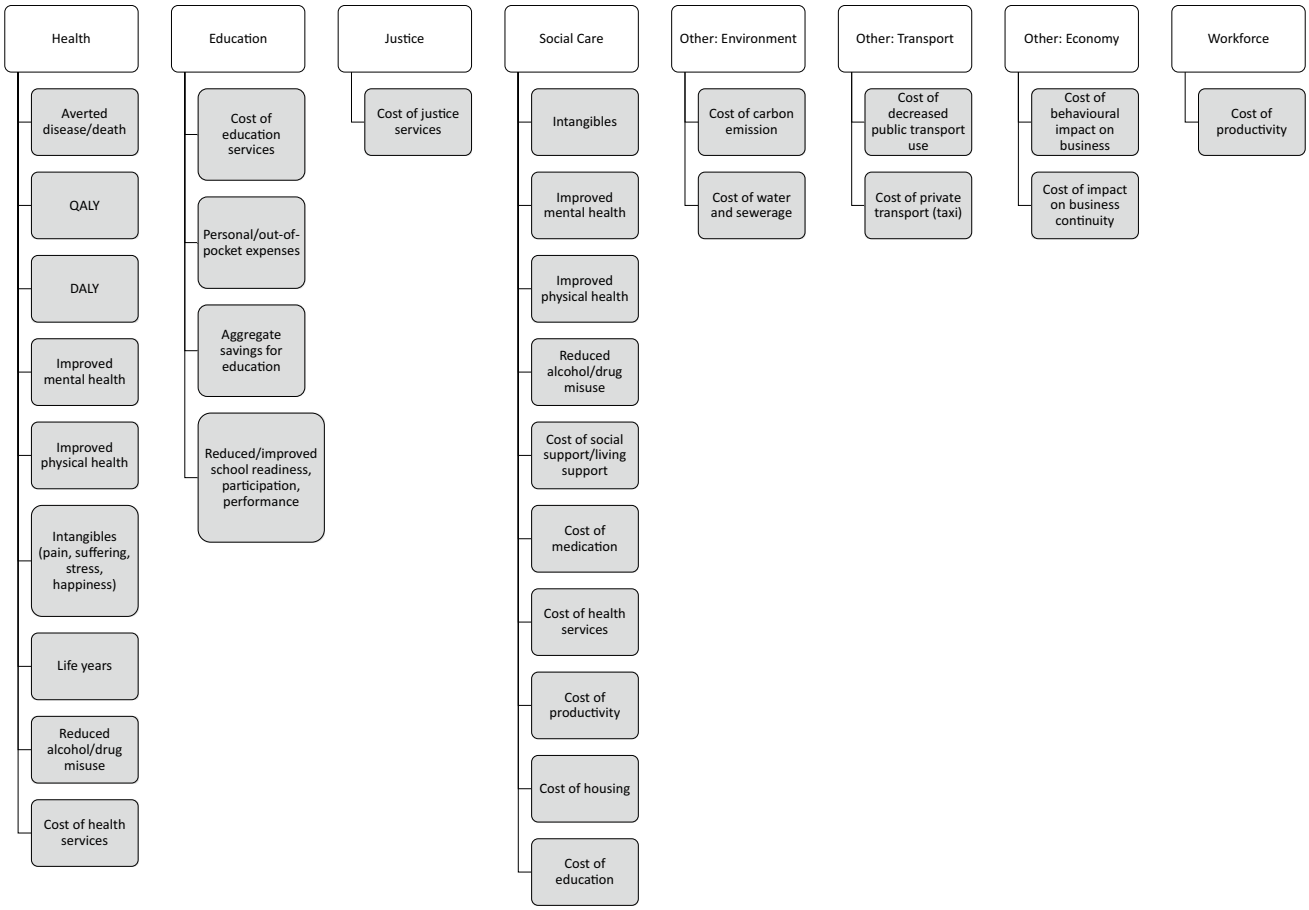

Fig. 6 Outcomes and costs included in different sectors

found in 90% of all studies. Frequently, statistical data from the Bureau of Labour Statistics, Census data, OECD labour force participation rate, or OECD average wage data were used to derive estimates for wages and were used to estimate productivity loss based on reports from patients/carers or assumptions. The descending frequency of other costs were transport (22%), other medical and non-medical out-of-pocket expenses (22%), education services (5%), social services (4%), justice services (3%) , and environment (1%) (Fig. 5, Table 1).

4 Discussion

Our scoping review identified 204 papers and reports of cross-sectoral evaluations of healthcare interventions. Most included costs and outcomes in the healthcare sector in combination with another sector (e.g., workforce), while 33% of papers included three or more sectors. Given that the scoping review included evaluation papers of preventing or treating a particular health condition, QALYs and DALYs were the most frequently used outcomes. Our review found that currently economic evaluations of health interventions seldom include a cross-sectoral approach and assess the impact in multiple non–healthcare-related sectors, which limits the societal perspective.

Although the societal perspective is recommended in many HTA guidelines, the costs and benefits of economic evaluations in healthcare are still restricted to loss of productivity by patients or carers (i.e., overall economy) and the gains for specific employers rather than specific sectors outside healthcare. A recent review of guidelines by HTA agencies found that direct medical and non-medical costs to patient and carers were still the most commonly recommended, followed by indirect costs, e.g., productivity, while wider impact has not been recommended by examined guidelines [20]. Similarly, the Second Panel on Cost-Effectiveness in Health and Medicine [16] advocated the use of a budget/impact inventory to capture outcomes and costs across several sectors. However, findings from our review and others [227–229] suggest that evaluations currently do not take a multi-sectoral approach. The number of economic evaluations considering a societal perspective is increasing but the perspective is still narrowly defined to

Table 1 Examples of reported measurement and valuation methods of costs and outcomes

Type of cost/outcomes	Measurement	Valuation	References
QALY/DALY	Questionnaire (EQ-5D, CHU-9, CORE), primary data collection, statistical data	Utility value sets, published utility scores, life tables	[23–27, 29, 30, 32, 33, 37–40, 42, 44, 46–57, 59–61, 63, 65–68, 70, 72–74, 76–79, 81–85, 87–109, 111–113, 115–122, 124–128, 131–133, 135–141, 143–149, 151–156, 158, 159, 161–169, 171–179, 181, 183–187, 189–198, 213–215, 218, 222, 223, 225, 226]
Clinical outcomes (LYG, averted cases/deaths)	Trial data, primary data collection, statistical data	Estimation, assumption	[26, 34–36, 40, 43, 45, 46, 49–51, 58, 62, 69, 75, 80, 86, 105, 116, 117, 120, 142, 150, 153, 157, 160, 170, 174, 185, 186, 198–200, 202–205, 208–212, 214, 216–220, 223]
Healthcare cost	Primary data collection, statistical data	Unit cost, list price, DRG	All papers include healthcare costs
Productivity cost	Primary data collection, statistical data	Human capital approach, published statistical data on country-specific wage and employment	[23–40, 42–54, 57–77, 79, 81–84, 86–94, 96–99, 101–117, 119–136, 138, 139, 141–153, 155–201, 204, 206, 209–211, 213, 216–226]
Transport cost	Primary data collection, statistical data	Published literature and statistical data on country specific mileage and fuel prices	[28, 31, 32, 37, 40, 41, 48, 51, 52, 67–69, 73, 78, 79, 81, 85, 86, 96, 100, 108, 112, 114, 123, 124, 127, 137, 146, 150, 153–155, 159, 161, 172, 177, 182, 186, 191, 201, 212, 217, 218, 221]

DALY disability-adjusted life year, *DRG* diagnosis related group, *LYG* life years gained; *QALYs* quality-adjusted life years

productivity and direct medical and non-medical costs borne by patients and carers [227–229]. Similarly, the initial papers have proposed approaches for capturing the wider impact of health interventions across multiple sectors, but our review suggests that economic evaluations in healthcare are still very much confined to a limited societal perspective. The PECUNIA project [17] proposed a standardised costing and outcome assessment measures. However, the utilisation in practice is yet to be seen as the project has concluded only recently. Social return on investments has a map for measuring proposed value; however, many evaluations did not follow it nor sought further verification through the assurance process offered by Social Value UK [18]. As with any SROI, which necessarily involves subjective judgements to be made, there is a risk of error. In a relatively small cohort size, this risk is magnified. Since SROI is a principle-based methodology, this verification step is valid but was not taken by a majority of the included studies using the Social Value Self-Assessment tool [18].

Health technology assessment bodies, including the National Institute of Health and Excellence (NICE), are increasingly raising the importance of capturing the value of health interventions in terms of benefits to health and broader public welfare, as well as costs falling in other sectors outside of healthcare. It has been recognised that changes in health can affect productivity of the affected person but also of family and caregivers, and thus consumption, for example, which warrants broadening the scope of economic evaluations in healthcare [227]. Internationally and in Europe (e.g., Portugal, Norway, Denmark, Sweden Spain, Germany, Hungary, Ireland), HTA agencies are increasingly recommending the inclusion of a societal perspective in economic evaluations of healthcare, with some agencies (e.g., the Netherlands) providing specific guidance on methods and approaches to be utilised [20]. A particular example are the formal guidelines in the Netherlands for performing a societal cost-benefit analysis in the social domain [12]. However, there is no specific guidance in these national recommendations on how to measure costs and outcomes in specific sectors (e.g., spillovers) that could inform investment decisions for stakeholders across different sectors. Our findings are similar to a previous study, which found that the most common non-health impacts included in economic evaluations of health interventions were productivity or transportation, as well as direct and non-direct medical costs; however, the included societal perspective is still limited [227]. Similarly, a study on the economic impacts of epidemics recognised that a multi-sectoral lens is lacking in most evaluations [228]. However, there is a promising trend of guidance from other scholars in adopting this approach, for example a commentary and a review have provided a modified impact inventory to help evaluators consider broader consequences of COVID-19 [3, 229].

In addition to the relatively limited number of evaluations involving multiple non–healthcare-related sectors, a lack of transparency and consensus across the methodologies used in the evaluations was observed in our review, which could be a barrier for assessing study quality in a consistent manner in the future. Multiple guidelines and checklists on reporting CEA are available (CHEERS [230], ISPOR [231], Drummond [232], CHEC (-extended) [233]), but it is unclear if adherence is lagging in cross-sectoral reporting. In addition, it should be noted that these checklists have not been specifically developed for reporting and evaluating cross- and multi-sectoral evaluations of health interventions focused on prevention and promotion. Therefore, more standardised quality-appraisal systems of CEA, CBA, and SROI could be developed (including a GRADE- [Grading of Recommendations, Assessment, Development, and Evaluations]like tool), which could provide an opportunity to improve their protocol and thus better inform decision makers in reviewing, interpreting and vetting their evidence.

A recent systematic review summarised the concepts used to evaluate the societal impact of health interventions and established an analytical framework to comprehensively organise and describe the different elements of societal impact [11]. Like our findings, they reported that published economic evaluations seldom considered the impact of health interventions on non-healthcare sectors, such as criminal justice and education. In our review, we found that the most common sector considered was workforce and that cross-sectoral evaluation of the impact of health interventions is attempted by one-third of the studies included. While Seddik and colleagues [11] provided a framework to standardise and harmonise the reporting of societal impact, our review provided more details on the scope of cross-sectoral evaluations and the way the included studies operationalised the different frameworks and approaches they have used for assessing the broader societal spill-over effects of health interventions.

Our scoping review adds to the available body of literature reports on cross-sectoral evaluations of health interventions. The results of this scoping review of empirical evaluations that used existing approaches for cross-sectoral evaluation of health interventions, and the application of these approaches, could inform the next step in developing guidance for cross-sectoral evaluation. The guidance will include "sectoral impact inventory", to assess the direct impacts, opportunity costs and impacts in non-healthcare sectors of health interventions aimed at health promotion, disease prevention and treatment, financed by different investors and impacting different stakeholders from a multidimensional and multi-sectoral perspective. Our results could also be used by decision makers and stakeholders involved in current multi-sectoral evaluations of health interventions to consider which sectors, outcomes, and costs to include, as well as the methods to evaluate costs and outcomes.

A limitation of our scoping review was not undertaking a quality assessment of included economic evaluations. It has been recognised that the choice of checklist can affect conclusions regarding the methodological quality and rigor of studies [234], and existing checklists have no particular emphasis on evaluating and reporting of cross-sectoral impact. In addition, no checklist dedicated to cross- and multi-sectoral evaluation of health interventions related to promotion and prevention is currently available. That we have possibly missed cross-sectoral evaluations of non-health interventions is a further limitation. These cross-sectoral evaluations could have complemented the types of outcomes and costs and methods identified in our scoping review by narrowing the scope down to only health interventions. We might have also missed some cross-sectoral evaluations of health interventions due to the applied 'pearl growing' search method; however, we applied free-word search in Google and Google Scholar to diminish the number of potentially missed studies.

5 Conclusion

There is a limited number of cross-sectoral evaluations of health interventions despite the recommendations expressed by HTA bodies, especially across non-health sectors for global value assessment and recommendations. Developing a clear guidance including a "multiple sector impact inventory" with proposed methods for measurement and valuation of outcomes and costs in other sectors beyond healthcare, could facilitate the improved adoption of cross-sectoral economic evaluations of health interventions.

Appendix

See Table 2.

Table 2 Evaluation approaches and considered additional sectors

	References
Evaluation approaches	
Cost-utility analysis	[25, 27, 29, 30, 33, 37–40, 42, 44, 46–53, 55–57, 60, 61, 63, 65–67, 70, 72–74, 77, 78, 81–85, 87–107, 111–113, 115, 116, 118–122, 124–128, 131–133, 135–141, 144–149, 151, 152, 154–156, 158, 159, 161–169, 172–179, 181, 183, 184, 187, 189–198, 213–215, 218, 225, 226]
Cost-effectiveness analysis	[36, 41, 45, 58, 62, 69, 71, 75, 80, 110, 130, 157, 160, 170, 180, 182, 199–201, 216, 217]
Combined cost-effectiveness and cost-utility analysis	[23, 24, 26, 54, 59, 68, 76, 79, 108, 109, 117, 143, 153, 171, 185, 186, 223]
Social return on investment	[43, 150, 188, 202–205, 208–212]
Cost-benefit analysis	[34, 35, 64, 206, 207, 219–221]
Cost study	[28, 114, 123, 129, 134, 224]
Combined type of studies	[31, 32, 86, 142, 222]
Considered sectors in the economic evaluations	
Workforce	[23–40, 42–54, 57–77, 79, 81–84, 86–94, 96–99, 101–117, 119–136, 138, 139, 141–153, 155–201, 204, 206, 209–211, 213, 216–226]
Transport	[28, 31, 32, 37, 40, 41, 48, 51, 52, 67–69, 73, 78, 79, 81, 85, 86, 96, 100, 108, 112, 114, 123, 124, 127, 137, 146, 150, 153–155, 159, 161, 172, 177, 182, 186, 191, 201, 212, 217, 218, 221]
Education	[24, 70, 75, 80, 161, 192, 193, 197, 204, 205, 218, 222]
Social care	[176, 202–205, 207–209, 211]
Justice	[55, 56, 64, 95, 137, 140, 203]
Environment	[123, 127]
Other non-medical sectors	[30–33, 37, 41, 52, 65, 67–69, 73, 75, 81, 84, 85, 96, 100, 108, 111, 117, 118, 124, 134, 136, 137, 146, 153, 154, 156, 157, 176, 182, 192, 193, 197, 201, 209, 214, 215, 218, 220, 221, 226]
Multi-sectoral analysis of costs and outcomes (including three or more sectors)	[24, 28, 30–33, 37, 40, 41, 48, 51, 52, 64, 65, 67–70, 73, 75, 79, 81, 84–86, 96, 100, 108, 111, 112, 114, 117, 123, 124, 127, 134, 136, 137, 146, 150, 153–157, 159, 161, 172, 176, 177, 182, 186, 191–193, 197, 201, 203–205, 209, 211, 217, 218, 220–222, 226]

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s40258-025-01023-1.

Funding This research was funded by the Invest4Health project that has received funding from the European Union's Horizon Europe Research and Innovation programme, under Grant Agreement 101095522. UK participants in Horizon Europe Project Invest4Health are supported by UKRI: Bangor University (Grant number 10065737); University of Oxford (Grant number 10065737); Hywel Dda University Health Board (Grant number 10063637).

Declarations

Conflicts of Interest/Competing Interests The authors declare no conflicts of interest that are directly relevant to the content of this article.

Ethics Approval This study did not require approval by a medical ethics committee.

Code Availability No programming was used in this study.

Consent to Participate Not applicable.

Consent for Publication Not applicable.

Availability of Data and Material Search strategies used for the review are available in the supplementary files. The Excel file used for the data extraction during the review can be made available upon request.

Authors' Contributions AT outlined the concept and broad methods for this study. RKK, EH and BN conducted the literature review and together with AT and SW wrote the manuscript. All authors provided multiple rounds of critical feedback.

References

1. Wouterse B, Van Baal P, Versteegh M, Brouwer W. The value of health in a cost-effectiveness analysis: theory versus practice. Pharmacoeconomics. 2023;41(6):607–17.
2. National Institute of Health and Excellence (NICE). Technology appraisal guidance. at https://www.nice.org.uk/about/what-we-do/our-programmes/nice-guidance/nice-technology appraisal-guidance. Accessed 11 Sep 2024.
3. Kim DD, Silver MC, Kunst N, Cohen JT, Ollendorf DA, Neumann PJ. Perspective and costing in cost-effectiveness analysis, 1974–2018. Pharmacoeconomics. 2020;38(10):1135–45.
4. Gongora-Salazar P, Rocks S, Fahr P, Rivero-Arias O, Tsiachristas A. The use of multicriteria decision analysis to support decision making in healthcare: an updated systematic literature review. Value Health. 2023;26(5):780–90.
5. Craig P, Dieppe P, Macintyre S, Michie S, Nazareth I, Petticrew M. Developing and evaluating complex interventions: the new Medical Research Council guidance. BMJ. 2008:a1655.
6. Walker S, Griffin S, Asaria M, Tsuchiya A, Sculpher M. Striving for a societal perspective: a framework for economic evaluations when costs and effects fall on multiple sectors and decision makers. Appl Health Econ Health Policy. 2019;17(5):577–90.
7. Frew E, Breheny K. Methods for public health economic evaluation: a Delphi survey of decision makers in English and Welsh local government. Health Econ. 2019;28(8):1052–63.
8. Grosse SD, Pike J, Soelaeman R, Tilford JM. Quantifying family spillover effects in economic evaluations: measurement and valuation of informal care time. Pharmacoeconomics. 2019;37(4):461–73.
9. Neumann PJ, Kim DD, Trikalinos TA, Sculpher MJ, Salomon JA, Prosser LA, et al. Future directions for cost-effectiveness analyses in health and medicine. Med Decis Making. 2018;38(7):767–77.
10. Hill SR, Vale L, Hunter D, Henderson E, Oluboyede Y. Economic evaluations of alcohol prevention interventions: is the evidence sufficient? A review of methodological challenges. Health Policy. 2017;121(12):1249–62.
11. Seddik AH, Paulissen J, Marapin R, Fuhler S, Johal S, Rosenlund M, et al. A comprehensive view of the methods used to measure the societal impact of healthcare interventions: a systematic review. Value in Health. 2025;28(8):1288–99.
12. Werkwijzer voor kosten-batenanalyse in het sociale domein. https://www.mkba-informatie.nl/mkba-voor-gevorderden/richtlijnen/werkwijzer-voor-kosten-batenanalyses-hetsociale-domein/. Accessed 22 Apr 2025.
13. Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. Ann Intern Med. 2018;169(7):467–73.
14. Hinde S, Spackman E. Bidirectional citation searching to completion: an exploration of literature searching methods. Pharmacoeconomics. 2015;33(1):5–11.
15. Hinde S, Spackman E, Claxton K, Sculpher MJ. PHP117 the cost-effectiveness threshold: the results of a novel literature review method. Value Health. 2011;14(7):A354.
16. Sanders GD, Neumann PJ, Basu A, Brock DW, Feeny D, Krahn M, et al. Recommendations for conduct, methodological practices, and reporting of cost-effectiveness analyses: second panel on cost-effectiveness in health and medicine. JAMA. 2016;316(10):1093.
17. PECUNIA.https://www.pecunia-project.eu/, Accessed Dec 2023.
18. Social Value UK. https://socialvalueuk.org/, Accessed Dec 2023.
19. Greater Manchester Combined Authority. https://greatermanchester-ca.gov.uk/what-we-do/research/research-cost-benefit-analysis/, Accessed Dec 2023.
20. Avşar TS, Yang X, Lorgelly P. How is the societal perspective defined in health technology assessment? Guidelines from around the globe. Pharmacoeconomics. 2023;41(2):123–38.
21. Smith PG, Morrow RH, Ross DA, editors. Field Trials of Health Interventions: A Toolbox. 3rd edition. Oxford (UK): OUP Oxford; 2015 Jun 1. Chapter 2, Types of intervention and their development. Available from: https://www.ncbi.nlm.nih.gov/books/NBK305514/.
22. Koleva-Kolarova R, Buchanan J, Vellekoop H, Huygens S, Versteegh M, Mölken MR-v, et al. Financing and reimbursement models for personalised medicine: a systematic review to identify current models and future options. Appl Health Econ Health Policy. 2022;20(4):501–24.
23. Aguiar-Ibáñez R, Hardern C, Van Hees F, Lee D, Patel A, Chhabra N, et al. Cost-effectiveness of pembrolizumab for the first-line treatment of patients with unresectable or metastatic MSI-H/dMMR colorectal cancer in the United States. J Med Econ. 2022;25(1):469–80.
24. Aspvall K, Sampaio F, Lenhard F, Melin K, Norlin L, Serlachius E, et al. Cost-effectiveness of internet-delivered vs in-person cognitive behavioral therapy for children and adolescents with obsessive-compulsive disorder. JAMA Netw Open. 2021;4(7):e2118516.
25. Azad NS, Leeds IL, Wanjau W, Shin EJ, Padula WV. Cost-utility of colorectal cancer screening at 40 years old for average-risk patients. Prev Med. 2020;133:106003.
26. Bangs AC, Gastañaduy P, Neilan AM, Fiebelkorn AP, Walker AT, Rao SR, et al. The clinical and economic impact of Measles-Mumps-Rubella vaccinations to prevent measles importations from US pediatric travelers returning from abroad. J Pediatr Infect Dis Soc. 2022;11(6):257–66.
27. Beck AJCC, Retèl VP, Bunting G, Sethi RKV, Deschler DG, Van Den Brekel MWM, et al. Cost-effectiveness analysis of using the heat and moisture exchangers compared with alternative stoma covers in laryngectomy rehabilitation: US perspective. Head Neck. 2020;42(12):3720–34.
28. Boutelle KN, Strong D, Liang J, Rhee KE, Rock CL, Wilfley D, et al. Comparative costs of a parent-only and parent and child treatment for children with overweight or obesity. Obesity. 2021;29(2):388–92.
29. Brettschneider C, Gensichen J, Hiller TS, Breitbart J, Schumacher U, Lukaschek K, et al. Cost-effectiveness of practice team-supported exposure training for panic disorder and agoraphobia in primary care: a cluster-randomized trial. J Gen Intern Med. 2020;35(4):1120–6.
30. Brown GC, Brown MM, Rapuano S, Boyer D. Cost-utility analysis of VEGF inhibitors for treating neovascular age-related macular degeneration. Am J Ophthalmol. 2020;218:225–41.
31. Brown GC, Brown MM, Rapuano SB, Boyer D. A cost-benefit analysis of VEGF-inhibitor therapy for neovascular age-related macular degeneration in the United States. Am J Ophthalmol. 2021;223:405–29.
32. Brown GC, Brown MM, Gierhart D, Olk RJ. Prevention surpasses treatment: 5-year follow-up, cost-utility, and cost–benefit of zeaxanthin therapy for neovascular age-related macular degeneration. Ophthalmol Ther. 2023;12(5):2583–608.
33. Buchanan J, Wordsworth S, Clifford R, Robbe P, Taylor JC, Schuh A, et al. Using genomic information to guide ibrutinib treatment decisions in chronic lymphocytic leukaemia: a cost-effectiveness analysis. Pharmacoeconomics. 2017;35(8):845–58.
34. Carrico J, Talbird SE, La EM, Poston S, Poirrier J-E, DeMartino JK, et al. Cost-benefit analysis of vaccination against four preventable diseases in older adults: Impact of an aging population. Vaccine. 2021;39(36):5187–97.

35. Carrico J, La EM, Talbird SE, Chen Y-T, Nyaku MK, Carias C, et al. Value of the immunization program for children in the 2017 US birth cohort. Pediatrics. 2022;150(3):e2021056007.
36. Chacon-Cruz E, Meroc E, Costa-Clemens SA, Clemens R, Verstraeten T. Economic evaluation of universal varicella vaccination in Mexico. Pediatr Infect Dis J. 2022;41(5):439–44.
37. Chatterton ML, Mihalopoulos C, O'Neil A, Itsiopoulos C, Opie R, Castle D, et al. Economic evaluation of a dietary intervention for adults with major depression (the "SMILES" trial). BMC Public Health. 2018;18(1):599.
38. Chatterton ML, Rapee RM, Catchpool M, Lyneham HJ, Wuthrich V, Hudson JL, et al. Economic evaluation of stepped care for the management of childhood anxiety disorders: results from a randomised trial. Aust N Z J Psychiatry. 2019;53(7):673–82.
39. Chaudhari VS, Issa AM. Cost-effectiveness of precision molecular diagnostic tests for stage II colorectal cancer. Ann Transl Med. 2022;10(23):1260.
40. Chen C, Hanson M, Chaturvedi R, Mattke S, Hillestad R, Liu HH. Economic benefits of microprocessor controlled prosthetic knees: a modeling study. J Neuroeng Rehabil. 2018;15(S1):62.
41. Choi SE, Brandeau ML, Bendavid E. Cost-effectiveness of malaria preventive treatment for HIV-infected pregnant women in sub-Saharan Africa. Malar J. 2017;16(1):403.
42. Chung GS, Hutton DW. Epidemiological impact and cost-effectiveness of universal meningitis b vaccination among college students prior to college entry. PLoS ONE. 2020;15(10):e0239926.
43. Coffield E, Nihiser A, Carlson S, Collins J, Cawley J, Lee S, et al. Shape up Somerville's return on investment: multi-group exposure generates net-benefits in a child obesity intervention. Prev Med Rep. 2019;16:100954.
44. Daar DA, Shah A, Mirrer JT, Thanik V, Hacquebord J. Proximal row carpectomy versus four-corner arthrodesis for the treatment of scapholunate advanced collapse/scaphoid nonunion advanced collapse wrist: a cost-utility analysis. Plast Reconstr Surg. 2019;143(5):1432–45.
45. Dang W, Yi A, Jhamnani S, Wang S-Y. Cost-effectiveness of multidisciplinary management program and exercise training program in heart failure. Am J Cardiol. 2017;120(8):1338–43.
46. Dazelle WDH, Ebner MK, Kazma J, Potarazu SN, Ahmadzia HK. Tranexamic acid for the prevention of postpartum hemorrhage: a cost-effectiveness analysis. J Thromb Thrombolysis. 2023;56(1):128–36.
47. De Jong MJ, Boonen A, Van Der Meulen-de Jong AE, Romberg-Camps MJ, Van Bodegraven AA, Mahmmod N, et al. Cost-effectiveness of telemedicine-directed specialized vs standard care for patients with inflammatory bowel diseases in a randomized trial. Clin Gastroenterol Hepatol. 2020;18(8):1744–52.
48. Deshmukh AA, Shirvani SM, Lal L, Swint JM, Cantor SB, Smith BD, et al. Cost-effectiveness analysis comparing conventional, hypofractionated, and intraoperative radiotherapy for early-stage breast cancer. JNCI J Natl Cancer Inst. 2017;109(11).
49. Di Fusco M, Marczell K, Deger KA, Moran MM, Wiemken TL, Cane A, et al. Public health impact of the Pfizer-BioNTech COVID-19 vaccine (BNT162b2) in the first year of rollout in the United States. J Med Econ. 2022;25(1):605–17.
50. Di Fusco M, Marczell K, Thoburn E, Wiemken TL, Yang J, Yarnoff B. Public health impact and economic value of booster vaccination with Pfizer-BioNTech COVID-19 vaccine, bivalent (Original and Omicron BA.4/BA.5) in the United States. J Med Econ. 2023;26(1):509–24.
51. Do N, Thielen FW. Cost-effectiveness of venetoclax plus obinutuzumab versus chlorambucil plus obinutuzumab for the first-line treatment of adult patients with chronic lymphocytic leukemia: an extended societal view. Value Health. 2023;26(4):477–86.
52. Donnelley CA, Von Kaeppler EP, Hetherington A, Shirley C, Haonga BT, Challa ST, et al. Cost-effectiveness analysis of prosthesis provision for patients with transfemoral amputation in Tanzania. Prosthet Orthot Int. 2022;46(5):523–31.
53. Duan KI, Rodriguez Garza F, Flores H, Palazuelos D, Maza J, Martinez-Juarez LA, et al. Economic evaluation of a novel community-based diabetes care model in rural Mexico: a cost and cost-effectiveness study. BMJ Open. 2021;11(4):e046826.
54. Engel L, Alvarez-Jimenez M, Cagliarini D, D'Alfonso S, Faller J, Valentine L, et al. The cost-effectiveness of a novel online social therapy to maintain treatment effects from first-episode psychosis services: results from the Horyzons randomized controlled trial. Schizophr Bull. 2024;50(2):427–36.
55. Enns B, Krebs E, Whitehurst DGT, Jutras-Aswad D, Le Foll B, Socias ME, et al. Cost-effectiveness of flexible take-home buprenorphine-naloxone versus methadone for treatment of prescription-type opioid use disorder. Drug Alcohol Depend. 2023;247:109893.
56. Fairley M, Humphreys K, Joyce VR, Bounthavong M, Trafton J, Combs A, et al. Cost-effectiveness of treatments for opioid use disorder. JAMA Psychiat. 2021;78(7):767.
57. Fanikos J, Goldstein JN, Lovelace B, Beaubrun AC, Blissett RS, Aragão F. Neer Type-II Distal Clavicle Fractures: a cost-effectiveness analysis of fixation techniques. J Bone Joint Surg. 2022;25(1):309–20.
58. Federer AE, Yoo M, Stephens AS, Nelson RE, Steadman JN, Tyser AR, et al. Minimizing costs for dorsal wrist ganglion treatment: a cost-minimization analysis. The Journal of Hand Surgery. 2023;48(1):9–18.
59. Feldman C, Dlamini SK, Madhi SA, Meiring S, Von Gottberg A, De Beer JC, et al. The cost-effectiveness of using pneumococcal conjugate vaccine (PCV13) versus pneumococcal polysaccharide vaccine (PPSV23), in South African adults. PLoS ONE. 2020;15(1):e0227945.
60. Fox HM, Hsue LJ, Thompson AR, Ramsey DC, Hadden RW, Mirarchi AJ, et al. Humeral shaft fractures: a cost-effectiveness analysis of operative versus nonoperative management. J Shoulder Elbow Surg. 2022;31(9):1969–81.
61. Fox HM, Ramsey DC, Thompson AR, Hoekstra CJ, Mirarchi AJ, Nazir OF. Economic evaluation of a novel community-based diabetes care model in rural Mexico: a cost and cost-effectiveness study. BMJ Open. 2020;102(3):254–61.
62. Francis T, Washington T, Srivastava K, Moutzouros V, Makhni EC, Hakeos W. Societal costs in displaced transverse olecranon fractures: using decision analysis tools to find the most cost-effective strategy between tension band wiring and locked plating. J Shoulder Elbow Surg. 2017;26(11):1995–2003.
63. Frasco MA, Shih T, Incerti D, Diaz Espinosa O, Vania DK, Thomas N. Incremental net monetary benefit of ocrelizumab relative to subcutaneous interferon β -1a. J Med Econ. 2017;20(10):1074–82.
64. Gass M, Wilson T, Talbot B, Tucker A, Ugianskis M, Brennan N. The value of outdoor behavioral healthcare for adolescent substance users with comorbid conditions. Subst Abuse Res Treat. 2019;13:1178221819870768.
65. Gattini D, Yan H, Belza C, Avitzur Y, Wales PW. Cost-utility analysis of 4% tetrasodium ethylenediaminetetraacetic acid, taurolidine, and heparin lock to prevent central line–associated bloodstream infections in children with intestinal failure. JPEN J Parenter Enteral Nutr. 2024;48(1):47–56.
66. Gaziano TA, Fonarow GC, Velazquez EJ, Morrow DA, Braunwald E, Solomon SD. Cost-effectiveness of sacubitril-valsartan in hospitalized patients who have heart failure with reduced ejection fraction. JAMA Cardiol. 2020;5(11):1236.

67. Gaziano TA, Pandya A, Sy S, Jardim TV, Ogden JM, Rodgers A, et al. Modeling the cost effectiveness and budgetary impact of polypills for secondary prevention of cardiovascular disease in the United States. Am Heart J. 2019;214:77–87.
68. Gibbons A, Leung EH, Yoo SH. Cost-effectiveness analysis of Descemet's membrane endothelial keratoplasty versus Descemet's stripping endothelial keratoplasty in the United States. Ophthalmology. 2019;126(2):207–13.
69. Gibbons A, Leung EH, Yoo SH. Cost-effectiveness of antifungal supplementation of corneal cold storage media. Ophthalmology. 2020;127(5):582–8.
70. Ginsburg GS, Pella JE, Slade E. Cost-effectiveness analysis of school-based treatments for anxiety disorders. J Ment Health Policy Econ. 2022;25(3):91–103.
71. Griffin S, Naavaal S, Scherrer C, Griffin PM, Harris K, Chattopadhyay S. School-based dental sealant programs prevent cavities and are cost-effective. Health Aff. 2016;35(12):2233–40.
72. Groessl EJ, Tally SR, Hillery N, Maciel A, Garces JA. Cost-effectiveness of a pharmacogenetic test to guide treatment for major depressive disorder. J Manag Care Spec Pharm. 2018;24(8):726–34.
73. Ha D, Kerr J, Ries AL, Fuster MM, Lippman SM, Murphy JD. A model-based cost-effectiveness analysis of an exercise program for lung cancer survivors after curative-intent treatment. Am J Phys Med Rehabil. 2020;99(3):233–40.
74. Hammer O-L, Jakobsen RB, Clementsen S, Fuglesang H, Bjornelv GW, Randsborg P-H. Cost-effectiveness of volar locking plate compared with augmented external fixation for displaced intra-articular wrist fractures. J Bone Joint Surg. 2020;102(23):2049–59.
75. Hampson G, Roberts SLE, Lucas A, Parkin D. An economic analysis of human milk supplementation for very low birth weight babies in the USA. BMC Pediatr. 2019;19(1):337.
76. Harvie HS, Sung VW, Neuwahl SJ, Honeycutt AA, Meyer I, Chermansky CJ, et al. Cost-effectiveness of behavioral and pelvic floor muscle therapy combined with midurethral sling surgery vs surgery alone among women with mixed urinary incontinence: results of the Effects of Surgical Treatment Enhanced With Exercise for Mixed Urinary Incontinence randomized trial. Am J Obstet Gynecol. 2021;225(6):651.e1-e26.
77. Heiden BT, Mitchell JD, Rome E, Puri V, Meyers BF, Chang S-H, et al. Cost-effectiveness analysis of robotic-assisted lobectomy for non-small cell lung cancer. Ann Thorac Surg. 2022;114(1):265–72.
78. Hendrickson WK, Havrilesky L, Siddiqui NY. Cost-effectiveness of bacteriuria screening before urogynecologic surgery. Am J Obstet Gynecol. 2022;226(6):831.e1-e12.
79. Hrebinko KA, Bryce CL, Downs-Canner S, Diego EJ, Myers SP. Cost-effectiveness of Choosing Wisely guidelines for axillary observation in women older than age 70 years with hormone receptor–positive, clinically node-negative, operable breast tumors. Cancer. 2022;128(12):2258–68.
80. Hsu P, Gay JC, Lin CJ, Rodeghier M, DeBaun MR, Cronin RM. Economic evaluation of regular transfusions for cerebral infarct recurrence in the Silent Cerebral Infarct Transfusion Trial. Blood Adv. 2021;5(23):5032–40.
81. Hu JQ, Sarkar R, Sella R, Murphy JD, Afshari NA. Cost-effectiveness analysis of multifocal intraocular lenses compared to monofocal intraocular lenses in cataract surgery. Am J Ophthalmol. 2019;208:305–12.
82. Hunter SF, Bindra J, Chopra I, Niewoehner J, Panaccio MP, Wan GJ. Cost-effectiveness of repository corticotropin injection for the treatment of acute exacerbations in multiple sclerosis. Clinicoecon Outcomes Res. 2021;13:883–92.
83. Jiao B, Fredricks DN, Srinivasan S, Hansen R. Economic evaluation of a point-of-care test for bacterial vaginosis among women with vaginal symptoms. Sex Transm Dis. 2023;50(5):310–6.
84. Johnson S, Buessing M, O'Connell T, Pitluck S, Ciulla TA. Cost-effectiveness of voretigene neparvovec-rzyl vs standard care for *RPE65* -mediated inherited retinal disease. JAMA Ophthalmol. 2019;137(10):1115.
85. Jukarainen S, Mildh H, Pettilä V, Häkkinen U, Peltola M, Ala-Kokko T, et al. Costs and cost-utility of critical care and subsequent health care: a multicenter prospective study*. Crit Care Med. 2020;48(5):e345–55.
86. Kacmarek CN, Yates BT, Nich C, Kiluk BD. A pilot economic evaluation of computerized cognitive behavioral therapy for alcohol use disorder as an addition and alternative to traditional therapy. Alcohol Clin Exp Res. 2021;45(5):1109–21.
87. Karmarkar T, Rodriguez-Watson CV, Watson E, Zheng H, Gaskin DJ, Padula WV. Value of triage treatment strategies to distribute hepatitis C direct-acting antiviral agents in an integrated healthcare system: a cost-effectiveness analysis. Value Health. 2022;25(9):1499–509.
88. Keim-Malpass J, Malpass HC. Cost utility of bronchial thermoplasty for severe asthma: implications for future cost-effectiveness analyses based on phenotypic heterogeneity. Clinicoecon Outcomes Res. 2022;14:427–37.
89. Khunte M, Wu X, Avery EW, Gandhi D, Payabvash S, Matouk C, et al. Impact of collateral flow on cost-effectiveness of endovascular thrombectomy. J Neurosurg. 2022;137(6):1801–10.
90. Khunte M, Wu X, Koo A, Payabvash S, Matouk C, Heit JJ, et al. Cost-effectiveness of thrombectomy in patients with minor stroke and large vessel occlusion: effect of thrombus location on cost-effectiveness and outcomes. J NeuroInterv Surg. 2023;15(1):39–45.
91. Khunte M, Wu X, Payabvash S, Zhu C, Matouk C, Schindler J, et al. Cost-effectiveness of endovascular thrombectomy in patients with acute stroke and M2 occlusion. J NeuroInterv Surg. 2021;13(9):784–9.
92. Klifto KM, Colbert SH, Richard MJ, Anakwenze OA, Ruch DS, Klifto CS. Platelet-rich plasma vs. corticosteroid injections for the treatment of recalcitrant lateral epicondylitis: a cost-effectiveness Markov decision analysis. J Shoulder Elbow Surg. 2022;31(5):991–1004.
93. Klifto KM, Othman S, Kovach SJ. Minoxidil, Platelet-Rich Plasma (PRP), or combined minoxidil and PRP for androgenetic alopecia in men: a cost-effectiveness Markov decision analysis of prospective studies. Cureus. 2021. https://doi.org/10.7759/cureus.20839.
94. Klifto KM, Tecce MG, Serletti JM, Kovach SJ. Comparison of nine methods of immediate breast reconstruction after resection of localized breast cancer: a cost-effectiveness Markov decision analysis of prospective studies. Microsurgery. 2022;42(5):401–27.
95. Krebs E, Enns B, Evans E, Urada D, Anglin MD, Rawson RA, et al. Cost-effectiveness of publicly funded treatment of opioid use disorder in California. Ann Intern Med. 2018;168(1):10–9.
96. Kumar A, Straka C, Courtney PT, Vitzthum L, Riviere P, Murphy JD. Cost-effectiveness analysis of stereotactic ablative radiation therapy in patients with oligometastatic cancer. Int J Radiat Oncology*Biology*Physics. 2021;109(5):1185–94.
97. Kunz WG, Almekhlafi MA, Menon BK, Saver JL, Hunink MG, Dippel DWJ, et al. Public health and cost benefits of successful reperfusion after thrombectomy for stroke. Stroke. 2020;51(3):899–907.
98. Kunz WG, Hunink MG, Almekhlafi MA, Menon BK, Saver JL, Dippel DWJ, et al. Public health and cost consequences of time delays to thrombectomy for acute ischemic stroke. Neurology. 2020. https://doi.org/10.1212/WNL.0000000000010867.

99. Kunz WG, Sporns PB, Psychogios MN, Fiehler J, Chapot R, Dorn F, et al. Cost-effectiveness of endovascular thrombectomy in childhood stroke: an analysis of the Save ChildS study. J Stroke. 2022;24(1):138–47.
100. Kuo S, Ye W, De Groot M, Saha C, Shubrook JH, Hornsby WG, et al. Cost-effectiveness of community-based depression interventions for rural and urban adults with type 2 diabetes: projections from program ACTIVE (adults coming together to increase vital exercise) II. Diabetes Care. 2021;44(4):874–82.
101. Lavelle TA, Kommareddi M, Jaycox LH, Belsher B, Freed MC, Engel CC. Cost-effectiveness of collaborative care for depression and PTSD in military personnel. Am J Manag Care. 2018;24(2):91–8.
102. LeBrun DG, Nwachukwu BU, Buza SS, Gruber S, Marmor WA, Dennis ER, et al. Particulated juvenile articular cartilage and matrix-induced autologous chondrocyte implantation are cost-effective for patellar chondral lesions. Arthrosc J Arthrosc Relat Surg. 2022;38(4):1252-63.e3.
103. Lee YY, Mihalopoulos C, Chatterton ML, Fletcher SL, Chondros P, Densley K, et al. Economic evaluation of the Target-D platform to match depression management to severity prognosis in primary care: a within-trial cost-utility analysis. PLoS ONE. 2022;17(5):e0268948.
104. Leeds IL, Canner JK, DiBrito SR, Safar B. Do cost limitations of extended prophylaxis after surgery apply to ulcerative colitis patients? Dis Colon Rectum. 2022;65(5):702–12.
105. Leeds IL, DiBrito SR, Canner JK, Haut ER, Safar B. Cost-benefit limitations of extended, outpatient venous thromboembolism prophylaxis following surgery for Crohn's disease. Dis Colon Rectum. 2019;62(11):1371–80.
106. Leeds IL, Namasivayam V, Bamogo A, Sankhla P, Thayer WM. Cost effectiveness of meningococcal serogroup B vaccination in college-aged young adults. Am J Prev Med. 2019;56(2):196–204.
107. Leeds IL, Xu Z, Loria A, Pantel HJ, Mongiu AK, Longo WL, et al. How far is too far? Cost-effectiveness analysis of regionalized rectal cancer surgery. Dis Colon Rectum. 2023;66(3):467–76.
108. Leung EH, Gibbons A, Koch DD. Cost-effectiveness of preoperative OCT in cataract evaluation for multifocal intraocular lens. Ophthalmology. 2020;127(7):859–65.
109. Leung EH, Gibbons A, Stout TJ, Koch DD. Intracameral moxifloxacin for endophthalmitis prophylaxis after cataract surgery: cost-effectiveness analysis. J Cataract Refract Surg. 2018;44(8):971–8.
110. Levy AR, Chen P, Johnston K, Wang Y, Popoff E, Tomazos I. Quantifying the economic effects of ravulizumab versus eculizumab treatment in patients with atypical hemolytic uremic syndrome. J Med Econ. 2022;25(1):249–59.
111. Li Y, Liang X, Yang T, Guo S, Chen X. Pembrolizumab vs cemiplimab for the treatment of advanced non-small cell lung cancer with PD-L1 expression levels of at least 50%: a network meta-analysis and cost-effectiveness analysis. Front Oncol. 2022;12:878054.
112. Lin J, Gibbons A, Smiddy WE. Cost-utility of anti–vascular endothelial growth factor treatment for macular edema secondary to central retinal vein occlusion. Ophthalmol Retina. 2021;5(7):656–63.
113. Lipton RB, Brennan A, Palmer S, Hatswell AJ, Porter JK, Sapra S, et al. Estimating the clinical effectiveness and value-based price range of erenumab for the prevention of migraine in patients with prior treatment failures: a US societal perspective. J Med Econ. 2018;21(7):666–75.
114. Pousette Lundgren G, Davidson T, Dahllöf G. Cost analysis of prosthetic rehabilitation in young patients with Amelogenesis imperfecta. J Dent. 2021;115:103850.
115. Maas ET, Juch JNS, Ostelo RWJG, Groeneweg JG, Kallewaard J-W, Koes BW, et al. Cost-effectiveness of radiofrequency denervation for patients with chronic low back pain: the MINT randomized clinical trials. Value Health. 2020;23(5):585–94.
116. Manchanda R, Sun L, Patel S, Evans O, Wilschut J, De Freitas Lopes AC, et al. Economic evaluation of population-based BRCA1/BRCA2 mutation testing across multiple countries and health systems. Cancers. 2020;12(7):1929.
117. Mattingly TJ, Slejko JF, Onukwugha E, Perfetto EM, Kottilil S, Mullins CD. Value in Hepatitis C Virus treatment: a patient-centered cost-effectiveness analysis. Pharmacoeconomics. 2020;38(2):233–42.
118. Meester RGS, Lansdorp-Vogelaar I, Winawer SJ, Zauber AG, Knudsen AB, Ladabaum U. High-intensity versus low-intensity surveillance for patients with colorectal adenomas: a cost-effectiveness analysis. Ann Intern Med. 2019;171(9):612–22.
119. Michaud TL, Kane RL, McCarten JR, Gaugler JE, Nyman JA, Kuntz KM. Using cerebrospinal fluid biomarker testing to target treatment to patients with mild cognitive impairment: a cost-effectiveness analysis. PharmacoEconomics Open. 2018;2(3):309–23.
120. Tahami Monfared AA, Ye W, Sardesai A, Folse H, Chavan A, Kang K, et al. Estimated societal value of lecanemab in patients with early Alzheimer's disease using simulation modeling. Neurol Ther. 2023;12(3):795–814.
121. Mori T, Crandall CJ, Ganz DA. Cost-effectiveness of denosumab versus oral alendronate for elderly osteoporotic women in Japan. Osteoporos Int. 2017;28(5):1733–44.
122. Mori T, Crandall CJ, Ganz DA. Cost-effectiveness of sequential teriparatide/alendronate versus alendronate-alone strategies in high-risk osteoporotic women in the US: analyzing the impact of generic/biosimilar teriparatide. JBMR Plus. 2019;3(11):e10233.
123. Muschol J, Heinrich M, Heiss C, Hernandez AM, Knapp G, Repp H, et al. Economic and environmental impact of digital health app video consultations in follow-up care for patients in orthopedic and trauma surgery in Germany: randomized controlled trial. J Med Internet Res. 2022;24(11):e42839.
124. Nagendra D, Koelper N, Loza-Avalos SE, Sonalkar S, Chen M, Atrio J, et al. Cost-effectiveness of mifepristone pretreatment for the medical management of nonviable early pregnancy: secondary analysis of a randomized clinical trial. JAMA Netw Open. 2020;3(3):e201594.
125. Neilan AM, Losina E, Flanagan AC, Panella C, Eskibozkurt GE, Eskibozkurt GE, et al. Clinical impact, costs, and cost-effectiveness of expanded severe acute respiratory syndrome coronavirus 2 testing in Massachusetts. Clin Infect Dis. 2021;73(9):e2908–17.
126. Noorbakhsh KA, Liu H, Kurs-Lasky M, Smith KJ, Hoberman A, Shaikh N. Cost-effectiveness of management strategies in recurrent acute otitis media. J Pediatr. 2023;256:11-7.e2.
127. Nwanna–Nzewunwa O, Agwang E, Carvalho M, Ajiko M-M, Oke R, Yoon C, et al. A cost-effectiveness analysis of surgical care delivery in Eastern Uganda-a societal perspective. BMC Health Serv Res. 2023;23(1):256.
128. Oh M, McBride A, Bhattacharjee S, Slack M, Jeter J, Abraham I. Economic value of knowing BRCA status: BRCA testing for prostate cancer prevention and optimal treatment. Expert Rev Pharmacoecon Outcomes Res. 2023;23(3):297–307.
129. Oliver-Fornies P, Sánchez-Viñas A, Gomez Gomez R, Ortega Lahuerta JP, Loscos-Lopez D, Aragon-Benedi C, et al. Cost analysis of low-volume versus standard-volume ultrasound-guided interscalene brachial plexus block in arthroscopic shoulder surgery. Cureus. 2023.
130. Ortega-Sanchez IR, Mott JA, Kittikraisak W, Khanthamaly V, McCarron M, Keokhonenang S, et al. Cost-effectiveness of seasonal influenza vaccination in pregnant women, healthcare

workers and adults >= 60 years of age in Lao People's Democratic Republic. Vaccine. 2021;39(52):7633–45.
131. Ospel JM, Kunz WG, McDonough RV, Van Zwam W, Pinckaers F, Saver JL, et al. Cost-effectiveness of endovascular treatment in large vessel occlusion stroke with mild prestroke disability: results from the HERMES collaboration. Stroke. 2023;54(1):226–33.
132. Ospel JM, McDonough R, Kunz WG, Goyal M. Is concurrent intravenous alteplase in patients undergoing endovascular treatment for large vessel occlusion stroke cost-effective even if the cost of alteplase is only US$1? J Neurointerv Surg. 2022;14(6):568–72.
133. Paoli AR, Gold HT, Mahure SA, Mai DH, Agten CA, Rokito AS, et al. Treatment for symptomatic SLAP tears in middle-aged patients comparing repair, biceps tenodesis, and nonoperative approaches: a cost-effectiveness analysis. Arthrosc J Arthrosc Relat Surg. 2018;34(7):2019–29.
134. Prados MJ, Liu Y, Jun H, Lam J, Mattke S. Projecting the long-term societal value of a disease-modifying treatment for Alzheimer's disease in the United States. Alzheimers Dement. 2022;18(1):142–51.
135. Premkumar A, Lebrun DG, Sidharthan S, Penny CL, Dodwell ER, McLawhorn AS, et al. Bariatric surgery prior to total hip arthroplasty is cost-effective in morbidly obese patients. J Arthroplasty. 2020;35(7):1766-75.e3.
136. Prosser LA, Harpaz R, Rose AM, Gebremariam A, Guo A, Ortega-Sanchez IR, et al. A cost-effectiveness analysis of vaccination for prevention of herpes zoster and related complications: input for national recommendations. Ann Intern Med. 2019;170(6):380–8.
137. Qian G, Rao I, Humphreys K, Owens DK, Brandeau ML. Cost-effectiveness of office-based buprenorphine treatment for opioid use disorder. Drug Alcohol Depend. 2023;243:109762.
138. Rajan PV, Ng MK, Klika A, Kamath AF, Muschler GF, Higuera CA, et al. The cost-effectiveness of platelet-rich plasma injections for knee osteoarthritis: a markov decision analysis. J Bone Joint Surg. 2020;102(18):e104.
139. Rajan PV, Qudsi RA, Dyer GSM, Losina E. The cost-effectiveness of surgical fixation of distal radial fractures: a computer model-based evaluation of three operative modalities. J Bone Joint Surg. 2018;100(3):e13.
140. Ramponi F, Walker S, Griffin S, Parrott S, Drummond C, Deluca P, et al. Cost-effectiveness analysis of public health interventions with impacts on health and criminal justice: an applied cross-sectoral analysis of an alcohol misuse intervention. Health Econ. 2021;30(5):972–88.
141. Richardson JS, Kemper AR, Grosse SD, Lam WKK, Rose AM, Ahmad A, et al. Health and economic outcomes of newborn screening for infantile-onset Pompe disease. Genet Med. 2021;23(4):758–66.
142. Risko N, Werner K, Offorjebe OA, Vecino-Ortiz AI, Wallis LA, Razzak J. Cost-effectiveness and return on investment of protecting health workers in low- and middle-income countries during the COVID-19 pandemic. PLoS ONE. 2020;15(10):e0240503.
143. Robles-Zurita JA, Briggs A, Rana D, Quayyum Z, Oldroyd KG, Zeymer U, et al. Economic evaluation of culprit lesion only PCI vs. immediate multivessel PCI in acute myocardial infarction complicated by cardiogenic shock: the CULPRIT-SHOCK trial. Eur J Health Econ. 2020;21(8):1197–209.
144. Rodriguez J, Martinez G, Mahase S, Roytman M, Haghdel A, Kim S, et al. Cost-effectiveness analysis of ^{6}8 Ga-DOTATATE PET/MRI in radiotherapy planning in patients with intermediate-risk meningioma. AJNR Am J Neuroradiol. 2023;44(7):783–91.
145. Rogers MJ, Stephens AR, Yoo M, Nelson RE, Kazmers NH. Optimizing costs and outcomes for carpal tunnel release surgery: a cost-effectiveness analysis from societal and health-care system perspectives. J Bone Joint Surg. 2021;103(23):2190–9.
146. Ross EL, Becker JE, Linnoila JJ, Soeteman DI. Cost-Effectiveness of Routine Screening for Autoimmune Encephalitis in Patients With First-Episode Psychosis in the United States. The Journal of Clinical Psychiatry. 2020;82(1).
147. Ross EL, Soeteman DI. Cost-effectiveness of esketamine nasal spray for patients with treatment-resistant depression in the United States. Psychiatr Serv. 2020;71(10):988–97.
148. Ross EL, Vijan S, Miller EM, Valenstein M, Zivin K. The cost-effectiveness of cognitive behavioral therapy versus second-generation antidepressants for initial treatment of major depressive disorder in the United States: a decision analytic model. Ann Intern Med. 2019;171(11):785–95.
149. Ross EL, Weinberg MS, Arnold SE. Cost-effectiveness of aducanumab and donanemab for early Alzheimer disease in the US. JAMA Neurol. 2022;79(5):478.
150. Sah P, Vilches TN, Moghadas SM, Pandey A, Gondi S, Schneider EC, et al. Return on investment of the COVID-19 vaccination campaign in New York City. JAMA Netw Open. 2022;5(11):e2243127.
151. Salcedo J, Hay JW, Lam J. Cost-effectiveness of rivaroxaban versus warfarin for treatment of nonvalvular atrial fibrillation in patients with worsening renal function. Int J Cardiol. 2019;282:53–8.
152. Sarraj A, Pizzo E, Lobotesis K, Grotta JC, Hassan AE, Abraham MG, et al. Endovascular thrombectomy in patients with large core ischemic stroke: a cost-effectiveness analysis from the SELECT study. J NeuroInterv Surg. 2021;13(10):875–82.
153. Sathish T, Oldenburg B, Thankappan KR, Absetz P, Shaw JE, Tapp RJ, et al. Cost-effectiveness of a lifestyle intervention in high-risk individuals for diabetes in a low- and middle-income setting: Trial-based analysis of the Kerala Diabetes Prevention Program. BMC Med. 2020;18(1):251.
154. Sawaya GF, Sanstead E, Alarid-Escudero F, Smith-McCune K, Gregorich SE, Silverberg MJ, et al. Estimated quality of life and economic outcomes associated with 12 cervical cancer screening strategies: a cost-effectiveness analysis. JAMA Intern Med. 2019;179(7):867.
155. Kim H-L, Kim K-A, Choi GH, Jang ES, Ki M, Choi HY, et al. A cost-effectiveness study of universal screening for hepatitis C virus infection in South Korea: a societal perspective. Clin Mol Hepatol. 2022;28(1):91–104.
156. Shafrin J, Skornicki M, Brauer M, Villeneuve J, Lees M, Hertel N, et al. An exploratory case study of the impact of expanding cost-effectiveness analysis for second-line nivolumab for patients with squamous non-small cell lung cancer in Canada: does it make a difference? Health Policy. 2018;122(6):607–13.
157. Schaffner M, Rochau U, Mühlberger N, Conrads-Frank A, Qerimi Rushaj V, Sroczynski G, et al. The economic impact of prevention, monitoring and treatment strategies for iodine deficiency disorders in Germany. Endocr Connect. 2021;10(1):1–12.
158. Sediqzadah S, Portnoy A, Kim JJ, Keshavan M, Pandya A. Cost-effectiveness of early intervention in psychosis: a modeling study. Psychiatr Serv. 2022;73(9):970–7.
159. Shah ED, Staller K, Nee J, Ahuja NK, Chan WW, Lembo A, et al. Evaluating the impact of cost on the treatment algorithm for chronic idiopathic constipation: cost-effectiveness analysis. Am J Gastroenterol. 2021;116(10):2118–27.
160. Shaker M, Abrams EM, Greenhawt M. A cost-effectiveness evaluation of hospitalizations, fatalities, and economic outcomes associated with universal versus anaphylaxis risk-stratified COVID-19 vaccination strategies. J Allergy Clin Immunol Pract. 2021;9(7):2658-68.e3.

161. Shaker MS, Mosnaim G, Oppenheimer J, Stukus D, Abrams EM, Greenhawt M. Health and economic outcomes of home maintenance allergen immunotherapy in select patients with high health literacy during the COVID-19 pandemic: a cost-effectiveness analysis during exceptional times. J Allergy Clin Immunol Pract. 2020;8(7):2310-21.e4.
162. Shami JJP, Pathadka S, Chan EW, Hui J, Sato R, Patil S, et al. Evaluating the cost-effectiveness of a sequential pneumococcal vaccination compared to single-dose vaccination strategy for adults in Hong Kong. Hum Vaccin Immunother. 2020;16(8):1937–44.
163. Sheikh SR, Kattan MW, Steinmetz M, et al. Cost-effectiveness of surgery for drug-resistant temporal lobe epilepsy in the US. Neurology. 2020;95(10):e1404–16. https://doi.org/10.1212/wnl.0000000000010185.
164. Sheinson D, Dang J, Shah A, Meng Y, Elsea D, Kowal S. A cost-effectiveness framework for COVID-19 treatments for hospitalized patients in the United States. Adv Ther. 2021;38(4):1811–31.
165. Shih Y-CT, Dong W, Xu Y, Etzioni R, Shen Y. Incorporating baseline breast density when screening women at average risk for breast cancer: a cost-effectiveness analysis. Ann Intern Med. 2021;174(5):602–12.
166. Shin YE, Kumar A, Hwang M, Mackey M, Wu W. Cost-utility analysis comparing direct oral anticoagulant and low molecular weight heparin therapies for secondary prevention of cancer-associated thrombosis. Clin Drug Investig. 2022;42(12):1075–83.
167. Simianu VV, Curran T, Gaertner WB, Sklow B, Kuntz KM, Kwaan MR, et al. A cost-effectiveness evaluation of surgical approaches to proctectomy. J Gastrointest Surg. 2021;25(6):1512–23.
168. Simianu VV, Gaertner WB, Kuntz K, Kwaan MR, Lowry AC, Madoff RD, et al. Cost-effectiveness evaluation of laparoscopic versus robotic minimally invasive colectomy. Ann Surg. 2020;272(2):334–41.
169. Ssegonja R, Sampaio F, Alaie I, Philipson A, Hagberg L, Murray K, et al. Cost-effectiveness of an indicated preventive intervention for depression in adolescents: a model to support decision making. J Affect Disord. 2020;277:789–99.
170. Steuten L, Mewes J, Lepage-Nefkens I, Vrijhoef H. Is procalcitonin biomarker-guided antibiotic therapy a cost-effective approach to reduce antibiotic resistant and *Clostridium difficile* infections in hospitalized patients? OMICS. 2018;22(9):616–25.
171. Stevens ER, Roberts E, Kuczynski HC, Boden-Albala B. Stroke warning information and faster treatment (SWIFT): cost-effectiveness of a stroke preparedness intervention. Value Health. 2019;22(11):1240–7.
172. Suh K, Cole BJ, Gomoll A, Lee S-M, Choi H, Ha C-W, et al. Cost EFFECTIVENESS OF ALLOGENEIC UMBILICAL CORD BLOOD-DERIVED MESENCHYMAL STEM CELLS IN PATIENTS WITH KNEE OSTEOARTHRITIs. Appl Health Econ Health Policy. 2023;21(1):141–52.
173. Sullivan PW, Li Q, Bilir SP, Dang J, Kavati A, Yang M, et al. Cost-effectiveness of omalizumab for the treatment of moderate-to-severe uncontrolled allergic asthma in the United States. Curr Med Res Opin. 2020;36(1):23–32.
174. Sun L, Cui B, Wei X, Sadique Z, Yang L, Manchanda R, et al. Cost-effectiveness of genetic testing for all women diagnosed with breast cancer in China. Cancers. 2022;14(7):1839.
175. Sussman M, Benner J, Neumann P, Menzin J. Cost-effectiveness analysis of erenumab for the preventive treatment of episodic and chronic migraine: results from the US societal and payer perspectives. Cephalalgia. 2018;38(10):1644–57.
176. Tahami Monfared AA, Tafazzoli A, Chavan A, Ye W, Zhang Q. The potential economic value of lecanemab in patients with early Alzheimer's disease using simulation modeling. Neurol Ther. 2022;11(3):1285–307.
177. Talbird SE, Anderson SA, Nossov M, Beattie N, Rak AT, Diaz-Mitoma F. Cost-effectiveness of a 3-antigen versus single-antigen vaccine for the prevention of hepatitis B in adults in the United States. Vaccine. 2023;41(23):3506–17.
178. Thaci B, Yee R, Kim K, Vokshoor A, Johnson JP, Ament J. Cost-effectiveness of peptide enhanced bone graft i-Factor versus use of local autologous bone in anterior cervical discectomy and fusion surgery. Clinicoecon Outcomes Res. 2021;13:681–91.
179. Thakore NJ, Pioro EP, Udeh BL, Lapin BR, Katzan IL. A cost-effectiveness framework for amyotrophic lateral sclerosis, applied to riluzole. Value Health. 2020;23(12):1543–51.
180. Thommes E, Coudeville L, Muhammad R, Martin M, Nelson CB, Chit A. Public health impact and cost-effectiveness of implementing a 'pre-vaccination screening' strategy with the dengue vaccine in Puerto Rico. Vaccine. 2022;40(50):7343–51.
181. Tveter AT, Kleven L, Osteras N, Nossum R, Eide REM, Klokkeide Å, et al. Is multimodal occupational therapy in addition to usual care cost-effective in people with thumb carpometacarpal osteoarthritis? A cost-utility analysis of a randomised controlled trial. BMJ Open. 2023;13(6):e063103.
182. Vodicka E, Zimmermann M, Lopez AL, Silva MW, Gorgolon L, Kohei T, et al. Japanese encephalitis vaccination in the Philippines: a cost-effectiveness analysis comparing alternative delivery strategies. Vaccine. 2020;38(13):2833–40.
183. Wan W, Nathan AG, Skandari MR, Zarei P, Reid MW, Raymond JK, et al. Cost-effectiveness of shared telemedicine appointments in young adults with T1D: CoYoT1 trial. Diabetes Care. 2019;42(8):1589–92.
184. Wan W, Skandari MR, Minc A, Nathan AG, Winn A, Zarei P, et al. Cost-effectiveness of continuous glucose monitoring for adults with type 1 diabetes compared with self-monitoring of blood glucose: the DIAMOND randomized trial. Diabetes Care. 2018;41(6):1227–34.
185. Wan W, Skandari MR, Minc A, Nathan AG, Zarei P, Winn AN, et al. Cost-effectiveness of initiating an insulin pump in T1D adults using continuous glucose monitoring compared with multiple daily insulin injections: the DIAMOND randomized trial. Med Decis Making. 2018;38(8):942–53.
186. Wang H, Kenkel D, Graham ML, Paul LC, Folta SC, Nelson ME, et al. Cost-effectiveness of a community-based cardiovascular disease prevention intervention in medically underserved rural areas. BMC Health Serv Res. 2019;19(1):315.
187. Wang L, Lauren BN, Hager K, Zhang FF, Wong JB, Kim DD, et al. Health and economic impacts of implementing produce prescription programs for diabetes in the United States: a microsimulation study. J Am Heart Assoc. 2023;12(15):e029215.
188. Sexton Ward A, Kabiri M, Yucel A, Silverstein AR, van Eijndhoven E, Bowers C, et al. The long-term social value of granulocyte colony-stimulating factors. Am J Manag Care. 2019;25(10):486–93.
189. Wateska AR, Nowalk MP, Zimmerman RK, Smith KJ, Lin CJ. Cost-effectiveness of increasing vaccination in high-risk adults aged 18–64 years: a model-based decision analysis. BMC Infect Dis. 2018;18(1):52.
190. Wheeler SB, Rotter J, Gogate A, Reeder-Hayes KE, Drier SW, Ekwueme DU, et al. Cost-effectiveness of pharmacologic treatment options for women with endocrine-refractory or triple-negative metastatic breast cancer. J Clin Oncol. 2023;41(1):32–42.
191. Wheeler SB, Rotter JS, Baggett CD, Zhou X, Zagar T, Reeder-Hayes KE. Cost-effectiveness of endocrine therapy versus radiotherapy versus combined endocrine and radiotherapy for older women with early-stage breast cancer. J Geriatr Oncol. 2021;12(5):741–8.

192. Williams M, Zantow E, Turrentine M. Cost effectiveness of latest recommendations for group B streptococci screening in the United States. Obstet Gynecol. 2020;135(4):789–98.
193. Williamson IO, Elison JT, Wolff JJ, Runge CF. Cost-effectiveness of MRI-based identification of presymptomatic autism in a high-risk population. Front Psychiatry. 2020;11:60.
194. Wu X, Khunte M, Gandhi D, Matouk C, Hughes DR, Sanelli P, et al. Implications of achieving TICI 2b vs TICI 3 reperfusion in patients with ischemic stroke: a cost-effectiveness analysis. J Neurointerv Surg. 2020;12(12):1161–5.
195. Wu X, Payabvash S, Matouk CC, Lev MH, Wintermark M, Sanelli P, et al. Cost-effectiveness of endovascular thrombectomy in patients with low Alberta Stroke Program Early CT Scores (< 6) at presentation. J Neurosurg. 2021;135(6):1645–55.
196. Yesantharao PS, Lee E, Klifto KM, Colakoglu S, Dellon AL, Reddy SK. A markov analysis of surgical versus medical management of chronic migraines. Plast Reconstr Surg. 2022;149(5):1187–96.
197. Yieh L, Dukhovny D, Zhou CG, Gievers L, Caughey AB. Cost effectiveness of neonatal resuscitation at 22 weeks of gestation. Obstet Gynecol. 2019;133(6):1199–207.
198. Yieh L, McEvoy CT, Hoffman SW, Caughey AB, MacDonald KD, Dukhovny D. Cost effectiveness of vitamin c supplementation for pregnant smokers to improve offspring lung function at birth and reduce childhood wheeze/asthma. J Perinatol. 2018;38(7):820–7.
199. Yuen T, Carter MT, Szatmari P, Ungar WJ. Cost-effectiveness of universal or high-risk screening compared to surveillance monitoring in autism spectrum disorder. J Autism Dev Disord. 2018;48(9):2968–79.
200. Yuen T, Carter MT, Szatmari P, Ungar WJ. Cost-effectiveness of genome and exome sequencing in children diagnosed with autism spectrum disorder. Appl Health Econ Health Policy. 2018;16(4):481–93.
201. Zeng W, Cui Y, Jarawan E, Avila C, Li G, Turbat V, et al. Optimizing immunization schedules in endemic cholera regions: cost-effectiveness assessment of vaccination strategies for cholera control in Bangladesh. Vaccine. 2021;39(43):6356–63.
202. Tong L, Sopheab H, Sovannary T. Evidence Based Operational Research on KHANA Integrated Care and Prevention Program in Cambodia. 2012.
203. Social Enterprise, Unit Department of Health. Measuring social value. How five social enterprises did it. 2010.
204. RM Insight. ESCAPE a Social Return on Investment (SROI) analysis of a Family Action mental health project. 2011-2012.
205. Edwards J. Impact evaluation and Social Return on Investment Analysis of The Green House therapeutic service for children and young people who have experienced sexual abuse. 2018.
206. Meijster T, Van Duuren-Stuurman B, Heederik D, Houba R, Koningsveld E, Warren N, et al. Cost-benefit analysis in occupational health: a comparison of intervention scenarios for occupational asthma and rhinitis among bakery workers. Occup Environ Med. 2011;68(10):739–45.
207. Deloitte LLP. The economic impact of care in the home services A report commissioned by the British Red Cross. 2012.
208. The Brain Injury Rehabilitation Trust (BIRT). BIRT Outcome & Impact Report 2014.
209. City Health Care Partnership CIC. Social Accounts 2014-2015.
210. Misje T. ThinkPiece: Social Return on Investment (SROI): SROI Analysis of Health Services delivered on the Streets of Moshi, Tanzania.
211. Clifford, J., Ward K., Ross, C. and R. Coram (2014) Horder Healthcare: Summary Social Impact Evaluation, Horder Healthcare and Milton Keynes Baker Tilly.
212. Social Ventures Australia Consulting. Spinal Cord Injuries Australia's National Walk On Program Social Return on Investment Evaluative Analysis. 2013.
213. Barry LE, Crealey GE, Cockwell P, Elliman SJ, Griffin MD, Maxwell AP, et al. Mesenchymal stromal cell therapy compared to SGLT2-inhibitors and usual care in treating diabetic kidney disease: a cost-effectiveness analysis. PLoS ONE. 2022;17(11):e0274136.
214. Mar J, Larrañaga I, Ibarrondo O, González-Pinto A, Hayas CL, Fullaondo A, et al. Cost-utility analysis of the UPRIGHT intervention promoting resilience in adolescents. BMC Psychiatry. 2023;23(1):178.
215. De Miguel Valencia MJ, Cabasés Hita JM, Sánchez Iriso E, Oteiza Martínez F, Alberdi Ibañez I, Álvarez López A, et al. Long-term cost-effectiveness analysis of sacral neuromodulation in the treatment of severe faecal incontinence. Colorectal Dis. 2023;25(9):1821–31.
216. McIntyre LF, Nherera LM, Schlegel TF. Resorbable bioinductive collagen implant is cost effective in the treatment of rotator cuff tears. Arthrosc Sports Med Rehabil. 2023;5(2):e367–74.
217. Riccio E, Sabbatini M, Capuano I, Pellegrino AM, Petruzzelli LA, Pisani A. Oral Sucrosomial® iron versus intravenous iron for recovering iron deficiency anaemia in ND-CKD patients: a cost- minimization analysis. BMC Nephrol. 2020;21(1):57.
218. Skjolde S. A decision-analytic model to project the expected lifetime costs and quality of life (QoL) for individuals receiving bilateral cochlear implants during first life year 2023.
219. Bültmann U, Sherson D, Olsen J, Hansen CL, Lund T, Kilsgaard J. Coordinated and tailored work rehabilitation: a randomized controlled trial with economic evaluation undertaken with workers on sick leave due to musculoskeletal disorders. J Occup Rehabil. 2009;19(1):81–93.
220. Chen P-C, Lee Y-C, Tsai S-T, Lai C-K. A cost–benefit analysis of the outpatient smoking cessation services in Taiwan from a societal viewpoint. Nicotine Tob Res. 2012;14(5):522–30.
221. Guo JJ, Wade TJ, Pan W, Keller KN. School-based health centers: cost–benefit analysis and impact on health care disparities. Am J Public Health. 2010;100(9):1617–23.
222. Neve OM, Boerman JA, Van Den Hout WB, Briaire JJ, Van Benthem PPG, Frijns JHM. Cost-benefit analysis of cochlear implants: a societal perspective. Ear Hear. 2021;42(5):1338–50.
223. Costa S, Guerreiro J, Teixeira I, Helling DK, Pereira J, Mateus C. Cost-effectiveness and cost-utility of hypertension and hyperlipidemia collaborative management between pharmacies and primary care in Portugal alongside a trial compared with usual care (USFarmácia®). Front Pharmacol. 2022;13:903270.
224. Lamoureux-Lamarche C, Berbiche D, Vasiliadis H-M. Health care system and patient costs associated with receipt of minimally adequate treatment for depression and anxiety disorders in older adults. BMC Psychiatry. 2022;22(1):175.
225. Wederfoort JLM, Voeten N, Smeins NNPM, Hommes JE, Essers BAB, Van Der Hulst RRWJ, et al. A dutch randomized controlled study shows autologous fat transfer with pre-expansion is more cost-effective in the long term than implants. J Plast Reconstr Aesthet Surg. 2023;84:398–412.
226. Milne RJ, Schousboe C, Campbell JA, Mottershead J. Societal versus healthcare perspectives on the cost effectiveness of ocrelizumab for treatment of primary progressive multiple sclerosis in Aotearoa New Zealand. Pharmacoeconomics. 2025;43(8):969–85.

227. Premji S, Griffin S. Assessing the health and welfare benefits of interventions using the wider societal impacts framework. Value Health. 2024;27(11):1479–87.
228. Smith KM, Machalaba CC, Seifman R, Feferholtz Y, Karesh WB. Infectious disease and economics: the case for considering multi-sectoral impacts. One Health. 2019;7:100080.
229. Nicola M, Alsafi Z, Sohrabi C, Kerwan A, Al-Jabir A, Iosifidis C, et al. The socio-economic implications of the coronavirus pandemic (COVID-19): A review. Int J Surg. 2020;78:185–93.
230. Husereau D, Drummond M, Augustovski F, De Bekker-Grob E, Briggs AH, Carswell C, et al. Consolidated health economic evaluation reporting standards (CHEERS) 2022 explanation and elaboration: a report of the ISPOR CHEERS II good practices task force. Value Health. 2022;25(1):10–31.
231. Berger ML, Mamdani M, Atkins D, Johnson ML. Good research practices for comparative effectiveness research: defining, reporting and interpreting nonrandomized studies of treatment effects using secondary data sources: The ISPOR Good Research Practices for Retrospective Database Analysis Task Force Report—Part I. Value Health. 2009;12(8):1044–52.
232. Drummond MF, Jefferson TO. Guidelines for authors and peer reviewers of economic submissions to the BMJ. BMJ. 1996;313(7052):275–83.
233. Odnoletkova I, Goderis G, Pil L, Nobels F, Aertgeerts B, et al. Cost-effectiveness of therapeutic education to prevent the development and progression of type 2 diabetes: systematic review. J Diabetes Metab. 2014;5:438. https://doi.org/10.4172/2155-6156.1000438.
234. Lim KK, Koleva-Kolarova R, Fox-Rushby J. A comparison of the content and consistency of methodological quality and transferability checklists for reviewing model-based economic evaluations. Pharmacoeconomics. 2022;40(10):989–1003.

Authors and Affiliations

Rositsa Koleva-Kolarova[1] · Emily Hulse[2,9] · Bertalan Németh[3] · Maureen Rutten-van Mölken[4,5] · Rhiannon Tudor Edwards[6] · Balázs Babarczy[3,7,10] · Balázs Nagy[3,7,10] · Sarah Wordsworth[1,8] · Apostolos Tsiachristas[9,11] on behalf of the Invest4Health consortium

✉ Rositsa Koleva-Kolarova
rositsa.koleva-kolarova@ndph.ox.ac.uk

1 Health Economics Research Centre, University of Oxford, Oxford, UK

2 Government Outcomes Lab, Blavatnik School of Government, University of Oxford, Oxford, UK

3 Syreon Research Institute, Budapest, Hungary

4 Institute for Medical Technology Assessment, Erasmus University Rotterdam, P.O. Box 1738, 3000 DR Rotterdam, The Netherlands

5 Erasmus School of Health Policy and Management, Erasmus University Rotterdam, Rotterdam, The Netherlands

6 Centre for Health Economics and Medicines Evaluation (CHEME), Bangor University, Bangor, UK

7 Center for Health Technology Assessment, Semmelweis University, Budapest, Hungary

8 National Institute for Health Research (NIHR) Oxford Biomedical Research Centre, Oxford, UK

9 Nuffield Department of Primary Care Health Sciences, University of Oxford, Oxford, UK

10 Center for Pharmacology and Drug Research & Development, Semmelweis University, Budapest, Hungary

11 Department of Psychiatry, University of Oxford, Oxford, UK