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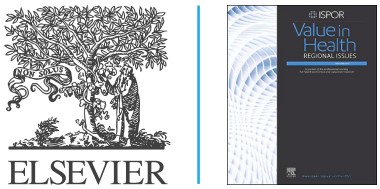
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Expert Corner

Defining the Cost-Effectiveness Threshold Locally: What Is the Most Appropriate Number for my Jurisdiction?

Manuel Antonio Espinoza, MD, MSc, PhD, Karl Claxton, PhD

ABSTRACT

Objectives: To examine the conceptual foundations of the cost-effectiveness threshold (CETs), estimation methodologies, international empirical evidence, and provide recommendations for different jurisdictions. This perspective also extends the discussion by examining the dynamic nature of thresholds over time, its role as a pricing signal to the pharmaceutical industry, and its implications for disinvestment.

Methods: Perspective based on the review of the health economics literature on CET estimation, categorizing approaches into demand-side, supply-side, efficiency-path, and implicit threshold methods. We analyzed the extent to which different methods consistently respond to the fundamental theoretical grounds and generate a set of recommendations for 3 types of jurisdictions.

Results: Decision rules inform allocatively efficient choices only if the CET is a reliable estimate of the healthcare system's opportunity cost. Empirical estimates consistently suggest that thresholds commonly used in practice overestimate true opportunity costs in most settings. Empirical thresholds in high-income countries typically range from 0.25 to 0.8 of gross domestic product (GDP) per capita, whereas in low- and middle-income countries estimates average approximately 0.5 GDP per capita. Furthermore, its value has practical consequences for pharmaceutical pricing, disinvestment decisions, and the management of budget impact.

Conclusions: Jurisdictions with sufficient data should estimate empirical supply-side CETs and update them at regular intervals. Those with limited data should adopt conservative, evidence-informed values—below 1 GDP per capita—rather than aspirational benchmarks. We recommend that jurisdictions should also consider how the threshold interacts with severity modifiers, budget impact, disinvestment, and price negotiation to ensure it serves its full range of functions within a coherent decision-making framework.

Keywords: budget impact, cost-effectiveness threshold, disinvestment, health technology assessment, incremental cost-effectiveness ratio, net health benefit, opportunity cost, pharmaceutical pricing, severity weighting, willingness-to-pay.

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Introduction

Health systems worldwide face a persistent challenge: the demand for healthcare services and new medical technologies consistently outpaces available resources. Decision makers must make choices about which interventions to fund, and these decisions carry real consequences—allocating resources to 1 program inevitably means forgoing health benefits elsewhere. This opportunity cost is the cornerstone of economic evaluation in health.

Cost-effectiveness analysis (CEA) has emerged as the principal tool to inform such decisions. By comparing incremental costs and benefits of competing interventions, expressed as an incremental cost-effectiveness ratio (ICER), CEA identifies programs offering the greatest health value—typically quantified as quality-adjusted life-years (QALYs)—for a given expenditure. Its use is now embedded in health technology assessment (HTA) processes worldwide.[1,2]

Central to CEA is the cost-effectiveness threshold (CET)—against which the ICER is compared. Despite its pivotal role, the threshold is often poorly understood, inadequately justified, or borrowed from other jurisdictions without regard for local conditions.[3,4] This perspective examines the conceptual foundations of the CET, illustrates how threshold choice affects conclusions, surveys estimation approaches, synthesizes international evidence, and provides tailored recommendations for different jurisdictions. Importantly, we extend the analysis beyond the static estimation problem to examine several underrepresented dimensions, including the dynamic nature of the threshold, severity modifiers, pricing signals, disinvestment, budget impact, and the political economy of threshold adoption.

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The Cost-Effectiveness Framework

CEA compares a new health technology (N) with an existing standard of care (S). The ICER summarizes this comparison as the additional cost per unit of health benefit:

$$ICER = \Delta C/\Delta B = (C_N - C_S) / (B_N - B_S)$$

in which ΔC denotes the incremental cost and ΔB denotes the incremental health benefit. The ICER expresses the marginal cost per unit of benefit gained. To determine whether a technology is cost-effective, the ICER is compared with a prespecified CET (λ), the maximum acceptable cost per unit of benefit. The standard decision rule is as follows:

Adopt technology N if ICER ≤ λ, ie, ΔC/ΔB ≤ λ.

If the ICER falls below the threshold, the technology is cost-effective and should, in principle, be adopted. An equivalent and analytically convenient formulation is the net health benefit (NHB) framework.[5] The NHB expresses the value of adoption directly in units of health:

$$NHB = \Delta B - (\Delta C / \lambda)$$

A technology is cost-effective if NHB > 0, meaning the incremental benefit (ΔB) exceeds the health equivalent of its incremental cost (ΔC/λ). The NHB framework avoids mathematical instability when the ICER is negative, enables direct ranking of technologies, and facilitates probabilistic sensitivity analysis via the cost-effectiveness acceptability curves, as well as value of information analysis. Both frameworks hinge critically on the value of λ.

Let us reexamine the decision rule as a welfare proposition, starting from ICER ≤ λ and rearranging:

$$\Delta C\ (1 / \lambda) \leq \Delta B$$

The left-hand side (ΔC/λ) represents the benefit forgone elsewhere in the health system due to the additional expenditure required by the new technology. When a budget-constrained system adopts a cost-increasing technology, the committed resources are no longer available for alternative uses. Even if additional resources are made available for a particular investment the question still remains, what health benefits could be achieved elsewhere in the healthcare system with that additional resource. If those displaced resources would have generated (ΔC/λ) QALYs in their next-best use, this quantity is the opportunity cost of adoption in benefit terms. The right-hand side (ΔB) is the incremental health benefit from the new technology. The inequality says as follows: adopt the technology if and only if the benefits it generates exceed the benefits left behind. For this decision rule to be meaningful, λ must represent the opportunity cost of a unit of benefit in the healthcare system.

If λ is the cost of generating one additional QALY, then

$$\lambda = 1/(\partial B / \partial C)$$

in which ∂B/∂C is the marginal health productivity of health expenditure. If the threshold does not correspond to this opportunity cost, it is no longer economically informative. A threshold set too high approves technologies whose costs exceed the benefit they generate, producing a net health loss. A threshold set too low rejects genuinely beneficial technologies. As Claxton et al[3] demonstrated for the English National Health Services (NHS), the empirically estimated opportunity cost (£12 936 per QALY) was substantially below National Institute for Health and Care Excellence's (NICE) operational threshold of £20 000 to £30 000 per QALY, implying that many approved technologies caused more harm than good to the broader NHS patient population.

To illustrate how threshold choice influences cost-effectiveness conclusions, we present a stylized example using 6 hypothetical technologies evaluated in a high-income country setting, with costs and benefits expressed in US dollars. We calculate NHB under 2 reference thresholds: USD 50 000/QALY and USD 150 000/QALY. A positive NHB indicates the technology is cost-effective under that threshold; a negative NHB indicates it is not (Table 1).

The results illustrate several key points. First, the number of technologies classified as cost-effective changes across thresholds. Second, the relative ranking of technologies is not invariant to the threshold—a technology with modest benefits at low cost may outperform one with large benefits at high cost under a stringent threshold, but not under a generous one. Third, the direction and magnitude of these changes are directly driven by the relationship between incremental cost and the threshold value. Different thresholds lead to different decisions, different budgetary commitments, and ultimately, different levels of population health. Therefore, if the main goal of the health system is to produce health with the available resources, defining the right threshold becomes an ethical imperative.

Approaches to Estimating the Cost-Effectiveness Threshold

Demand-side approaches: Willingness to pay for health

Demand-side approaches estimate the monetary value that individuals or society places on a unit of health benefit—typically 1 QALY. Rooted in welfare economics, the demand-side threshold reflects society's valuation of health relative to other goods and services, aggregated across individuals.[6] The most common technique is the stated-preference willingness-to-pay (WTP) survey, for example, using contingent valuation or discrete choice experiments. Revealed preference methods, such as the value of a statistical life derived from wage-risk trade-offs in labor markets, provide an alternative indirect approach.[7]

A systematic review by Ryen and Svensson[7] found WTP/QALY estimates ranging from below USD 10 000 to over USD 200 000, reflecting differences in elicitation method, population, and income level. Recent country-specific estimates illustrate this diversity. For example, Chugh et al[8] reported a WTP/QALY of US$2535 (approximately 1 to 1.52 times gross domestic product [GDP] per capita) in India using time trade-off methods; Kouakou et al[9] estimated CAN$47 049 to CAN$73 937 per QALY in Quebec, Canada, using contingent valuation and discrete choice experiments; and a systematic review by Hashempour et al[10] found a median WTP/QALY of approximately US$1921 (0.4 times GDP per capita) across studies conducted in Iran. Demand-side thresholds tend to exceed other estimates we will examine below because they capture what individuals would ideally spend to improve their own health. They can inform judgements about whether healthcare expenditure should be increased, but only when they are compared with a "supply side" estimate of how much it currently costs to improve health by one QALY. How much increase in health expenditure might be justified requires evidence on how the cost gaining a QALY increases with healthcare expenditure.[11]

This distinction matters for how demand-side estimates might be used in practice. In predominantly out-of-pocket systems, WTP estimates may serve as a more tangible reference, because they approximate values people already reveal through their own spending on care. In tax-financed systems, WTP

Table 1. Net health benefit (NHB) and cost-effectiveness ranking of 6 hypothetical technologies under 2 thresholds (USD 50 000 and USD 150 000 per QALY gained).

Technology	Incr. Cost (USD)	Incr. QALYs	ICER (USD/QALY)	NHB (λ = 50 000)	Rank	NHB (λ = 150 000)	Rank
Technology A	$25 000	0.80	$31 250	+0.30	2	+0.63	2
Technology B	$80 000	0.90	$88 889	−0.70	5	+0.37	4
Technology C	$10 000	0.60	$16 667	+0.40	1	+0.53	3
Technology D	$180 000	1.20	$150 000	−2.40	6	0.00	6
Technology E	$42 000	0.40	$105 000	−0.44	4	+0.12	5
Technology F	$120 000	2.00	$60 000	−0.40	3	+1.20	1

Note. NHB = ΔB − (ΔC/λ). NHB > 0 denotes cost-effective; NHB < 0 denotes not cost-effective. Rank 1 = most cost-effective. λ_1 = USD 50 000/QALY; λ_3 = USD 150 000/QALY.
ICER indicates incremental cost-effectiveness ratio; NHB, net health benefit; QALY, quality-adjusted life year; USD, US dollar.

evidence instead enters as one argument in the political debate over whether to expand the health budget through taxation, alongside competing claims on public revenue. In either case, how much weight such arguments carry depends on local political dynamics rather than economic reasoning. WTP evidence can inform the political conversation about whether the budget should grow, but it cannot substitute for the opportunity-cost evidence required to decide how an existing budget should be allocated.

Supply-side approaches: Opportunity cost of healthcare spending

Supply-side approaches estimate the CET as the health displaced when the system spends 1 additional unit of currency on a new technology. The foundational contribution was Claxton et al,[3] who estimated the marginal cost of a QALY in the English NHS at approximately £12 936, studying the relationship between NHS program budget expenditures and population mortality outcomes. This was substantially below NICE's threshold of £20 000 to £30 000 per QALY and spawned a growing international literature.

The main empirical strategies used include the following: (1) the outcome elasticity approach, estimating the elasticity of health outcomes with respect to health expenditure using panel data and instrumental variable regression[3,12-16]; (2) the marginal productivity approach, estimating the health production function and its marginal returns[17-19]; and (3) cross-country extrapolation, applying high-income country estimates and international income elasticities to derive thresholds for settings without local data.[20,21] Vanness et al[22] extended supply-side estimation to the United States, simulating health opportunity costs from insurance coverage loss due to rising premiums, and estimated a threshold of approximately USD 104 000 per QALY—substantially below the commonly cited USD 150 000 to 200 000 range. Espinosa et al[14] applied the outcome elasticity approach to Colombia's managed-competition healthcare system, instrumenting health expenditure with drug-price regulation to address endogeneity across insurers, regions, and diagnosis groups. A notable strength of this study is its identification strategy in a multipayer, capitation-based setting in which centralized budget data are unavailable. It estimated a threshold of approximately USD 5180.8 per QALY gained (approximately 0.8 GDPpc), providing one of the first supply-side CET estimates for a middle-income country with a decentralized health system.

Across high-income countries, supply-side estimates typically range from 0.25 to 0.8 of GDPpc. For low- and middle-income countries (LMICs), Woods et al[20] and Ochalek et al[21] found average opportunity-cost-based thresholds of approximately 0.5 GDPpc—substantially below the WHO's 1 to 3 GDP guidance.

The efficiency-path approach

A distinct and more recent approach was developed by Pichon-Riviere et al,[23] who proposed a conceptual framework grounded in the relationship between health expenditure growth and life expectancy growth at the population level. Rather than estimating the marginal productivity of existing health spending directly, this method derives the CET by asking: given a country's goals for how rapidly health expenditure and life expectancy should grow over time, what is the maximum ICER for new technologies that would keep a health system on its desired efficiency path?

Applied to 174 countries, this approach produced CET estimates per QALY ranging from USD 87 (Democratic Republic of the Congo) to USD 95 958 (USA), with thresholds below 1 GDP per capita in 97% of countries and below 0.5 GDP per capita in 51% of countries. These results are consistent with supply-side estimates in suggesting that the WHO's 1 to 3 GDP guidance overestimates affordable thresholds in most settings, particularly for LMICs. The efficiency-path approach has practical advantages in relying on widely available data, but critics have noted that historical trends are subject to substantial confounding, which may limit the validity of deriving opportunity costs from this relationship alone.[24]

The implicit threshold approach

A pragmatic approach infers an implicit threshold from past HTA decisions by analyzing the ICER distribution of approved and rejected technologies.[25] This is in fact the foundation of the NICE threshold range which was based on the values implied by early NICE decisions.[26] Although this requires no health expenditure data, it is subject to confounding by nonefficiency criteria, missing data, and inconsistency in past decision making, risking perpetuation of existing inefficiencies.

Taken together, a clear hierarchy emerges among these approaches. Only the supply-side approach directly operationalizes the theoretical construct required by the cost-effectiveness decision rule: the marginal opportunity cost of displaced health under a fixed budget.[3,27] The demand-side approach estimates a

welfarist construct—willingness to pay—that lies outside this opportunity-cost logic and should not serve as the decision rule for allocating a fixed budget.[7,28] The implicit threshold approach assumes past funding decisions tracked true opportunity costs. However, the evidence that adopted thresholds sit well above empirically estimated opportunity costs shows this assumption cannot be held, making implicit estimates biased upward.[20,29] The efficiency-path approach likewise generates a number from expenditure and life-expectancy trends rather than from marginal productivity, placing it outside the opportunity-cost framework as well.[23,24] We therefore treat supply-side estimation as the only approach consistent with the cost-effectiveness theory.

Beyond Static Estimation: Dynamic and Operational Dimensions of the Threshold

The dynamic nature of the threshold over time

Existing threshold estimates are typically derived from data at a single point in time; yet, the opportunity cost of healthcare spending is inherently dynamic. As health systems grow and face demographic change, the marginal productivity of expenditure evolves, and a threshold estimated in 2015 may not adequately represent opportunity costs in 2025.

The practical implication is that empirically estimated thresholds should be treated as parameters requiring periodic reestimation. Athanasakis et al[15] have explicitly recommended that their Greek threshold estimate be revised regularly to reflect changes in resource availability, technical efficiency, and service demand. McCabe et al[30] argued early on that the value of the threshold should be reconsidered regularly to capture changes in efficiency and budget over time. For example, in the United Kingdom, there are estimates that cover 14 years of expenditure data showing how the threshold varies over time.[29,31,32] We recommend that jurisdictions with the capacity for supply-side estimation commit to updating their threshold at defined intervals—for example, every 5 years—and that interim adjustments be considered when major budget expansions, contractions, or health system restructuring occur.

The threshold as a pricing signal to industry

The CET does not operate solely as a passive criterion for approving or rejecting technologies, it also functions as a reference price for the pharmaceutical industry. When a health system establishes a credible, transparent threshold, manufacturers calibrate their local pricing strategies to it. This dynamic has been most clearly observed in Thailand, where the Health Intervention and Technology Assessment Program set an explicit threshold initially at 100 000 Thai baht per QALY (approximately 0.8 GDP per capita), which was subsequently revised upward twice. The Thai threshold has been described as a powerful tool in price negotiations, with documented price reductions of 72% for tenofovir and 69% for oxaliplatin.[33] Isaranuwatchai et al[34] examined the impact of Thailand's CET increases on manufacturer-submitted drug prices and reimbursement decisions, finding that increases in the CET did not significantly alter the prices submitted by manufacturers or the likelihood of a positive reimbursement decision. This suggests that once a credible threshold is established, the pricing anchor persists even as the threshold changes.

Furthermore, Espinosa et al[35] found that in countries where the CET is applied, the results have been favorable in minimizing technology prices and supporting financial sustainability; and Wang et al[36] showed that the presence of an explicit threshold in the United Kingdom was associated with lower submitted ICERs compared with Australia, where no explicit threshold exists. Therefore, the pricing-signal function of the threshold has a direct implication for health systems: adopting a credible and defensible threshold—even a conservative one—may incentivize differential pricing that improves access, whereas the absence of any threshold leaves health systems without leverage in negotiation.

Severity modifiers and the interaction with the threshold

Several HTA agencies do not apply a single uniform CET to all decisions. Instead, many have introduced decision modifiers that adjust the effective threshold based on characteristics of the disease or population being treated. The most prominent example is disease severity weighting, which allows higher cost-per-QALY ratios for technologies addressing more severe conditions.

Norway pioneered a systematic severity-weighted approach, assigning 3 categories based on absolute QALY shortfall, with CETs ranging from NOK 275 000 to NOK 825 000 per QALY.[37,38] The Netherlands uses proportional shortfall to define severity categories.[39] In England, NICE replaced its earlier "end-of-life" modifier—which allowed a threshold of up to £50 000 per QALY for treatments extending life in patients with short life expectancy. A broader severity modifier was adopted in 2022, applying QALY weights of 1.2 or 1.7 based on absolute and proportional shortfall measures.[40,41] Sweden applies 4 severity categories with thresholds ranging from SEK 250 000 to SEK 1 000 000 per QALY.[42]

The existence of severity modifiers raises important questions for the opportunity-cost framework. If the CET represents the marginal productivity of the health system, any departure from it—however well intentioned—entails a health opportunity cost: approving a technology at a higher effective threshold displaces more productive expenditure than the threshold would suggest. As McCabe et al[30] noted, the use of equity weights to sustain a positive recommendation when the ICER is above the threshold requires knowledge of the equity characteristics of those patients who bear the opportunity cost. We recommend that jurisdictions considering severity modifiers do so transparently, with explicit quantification of the health forgone and a clear justification grounded in societal preferences, ideally measured or documented in quantitative and/or mixed-methods studies.

The threshold and disinvestment

The threshold literature has focused almost exclusively on the adoption decision—whether to fund new technologies. Yet, the logic of the supply-side CET implies a symmetrical case for disinvestment. If the threshold represents the marginal productivity of the health system, then currently funded technologies whose cost-effectiveness is worse than the threshold are, by definition, less productive than the marginal activity and should be candidates for defunding or reassessment.

Despite this logical implication, disinvestment remains rare in practice. Elshaug et al[43] identified it as a growing priority for health systems internationally and documented the political, clinical, and social challenges involved. Garner and Littlejohns[44] reported that over a decade, NICE identified more than 800 clinical interventions for potential disinvestment, but actual implementation was limited. MacKean et al[45] proposed the concept of health technology reassessment as a value-neutral framework for systematically reviewing technologies already in use. Internal barriers to disinvestment including cognitive biases, institutional inertia, and resistance from clinicians and patients, have been identified as key obstacles.[46]

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Jurisdictions that adopt an empirical CET should simultaneously develop a process for periodic reassessment of currently funded interventions and create mechanisms for reallocating resources from low-value to high-value activities. Without this complementary function, the threshold operates asymmetrically. This symmetry, however, is a theoretical benchmark rather than an empirical certainty. The opportunity-cost logic assumes that resources freed through disinvestment can be redeployed frictionlessly to their next-best use, an assumption that is not guaranteed to hold in practice. Disinvestment typically carries transaction costs absent from adoption decisions—including contractual and workforce commitments, retraining, and the disruption of care for patients already receiving a treatment. These costs represent an additional loss that is not reflected in the threshold used for adoption decisions and should be acknowledged as a distinct consideration when applying the CET to disinvestment.

Budget impact and the threshold

Even when a technology is judged cost-effective against the threshold, its total budget impact may be so large as to strain the health system's capacity to absorb it. This distinction between cost-effectiveness (a marginal concept concerning value per unit) and affordability (an aggregate concept concerning total expenditure) has generated growing attention.[47,48]

Charlton[49] has argued persuasively that the apparent link between budget impact and opportunity cost is largely broken when the effects of a technology's adoption are disaggregated, and that modifying the CET based on budget impact raises ethical concerns related to numerical discrimination, penalizing technologies that benefit larger populations. Pearson[47] proposed that budget impact analysis should operate alongside but separately from cost-effectiveness assessment, with affordability considered as a distinct criterion in the deliberative process. In practice, NHS England introduced a budget impact threshold of £20 million per year, above which a dialog between the manufacturer and health system is triggered to manage financial impact.[50]

What countries should do when a technology whose ICER is below the threshold requires a large proportion of the health budget such that its adoption without additional financing would displace essential services on a scale far exceeding the marginal displacement reflected in the CET? As indicated by Lomas et al,[51] an intervention labeled "cost-effective but unaffordable" means simply non-cost-effective when the true "nonmarginal" opportunity cost is taken into consideration, which is the correct estimate we should use when new technologies have large budget impact. We recommend complementing the CET with explicit budget impact thresholds when they are linked to managed-entry agreements or instalment-based adoption. This approach aims to avoid situations in which cost-effective technologies are either dismissed completely or implemented in ways that undermine the stability of the health system.

Comparative Evidence on Cost-Effectiveness Thresholds

Table 2[52-55] summarizes key threshold estimates from the international literature. We note that entries are illustrative of the range of values reported across approaches and settings rather than an exhaustive inventory of the literature. Readers seeking a more comprehensive review of country- and approach-specific threshold estimates are referred to Woods et al,[20] Ochalek et al,[21] Ryen and Svensson,[7] and Hashempour et al.[10] Across all approaches, a consistent finding emerges—most empirically estimated thresholds are substantially below the WHO's 1 to 3 GDP per capita benchmark, which has been acknowledged as an aspirational target based on demand-side considerations.[55] In high-income countries, supply-side estimates cluster between 0.25 and 0.8 of GDP per capita. For LMICs, they average around 0.5 GDP per capita including important dispersion, although in most cases below 1 GDP per capita. Countries that have adopted explicit thresholds, such as England, Thailand, The Netherlands, have done so through processes that combine empirical evidence with stakeholder deliberation and budgetary considerations.[4,28] Most others rely on implicit or borrowed thresholds.

Recommendations for Different Jurisdictions

The evidence leads to a clear conclusion: there is no universal CET applicable across jurisdictions. Opportunity costs are shaped by local healthcare productivity, budget levels, and epidemiological context. In this section we offer differentiated recommendations by data availability and income level. We acknowledge that some of these recommendations remain subject to ongoing debate within the health economics literature and are offered as a reasoned position rather than a settled consensus.

Jurisdictions with rich administrative data

Jurisdictions with access to longitudinal, disaggregated health expenditure and outcome data should pursue empirical supply-side threshold estimation, applying the outcome elasticity approach[3] with jurisdictional-specific data updated at regular intervals (eg, every 5 years). The threshold should be transparent, publicly justified, and departures explicitly linked to equity or severity considerations.

These jurisdictions should also develop complementary actions, including a process for health technology reassessment to identify existing low-value care against the threshold[43,44]; explicit severity modifiers grounded in societal preferences and accompanied by transparent quantification of the health opportunity cost of departures[37,40]; budget impact thresholds linked to managed-entry agreements rather than a criterion to support rejections[50]; and active use of the threshold as a reference price in negotiations with manufacturers.[35,36]

Jurisdictions with moderate institutional capacity

For most upper- and lower-middle-income countries, where institutional capacities are still under development, supply-side estimation may not yet be feasible. In the near term, an evidence-informed interim threshold less than 1 GDP per capita is a reasonable approximation of opportunity cost, consistent with available cross-country evidence.[20,21] Countries should simultaneously invest in program budgeting exercises and health outcomes data linkage to build the infrastructure for empirical estimation. Regional and bilateral collaboration to share methodological expertise is strongly encouraged.

These jurisdictions can also benefit from the pricing-signal function of the threshold. Thailand's experience demonstrates that even a relatively low threshold, when applied credibly and transparently, can support effective price negotiation and improve affordability.[33] Adopting any defensible threshold is preferable to operating without one, as the absence of a benchmark leaves health systems without leverage against manufacturers' global pricing strategies.

Low-income countries with limited data

For low-income countries with sparse administrative data, uncritical adoption of the WHO's 1 to 3 GDP guidance should be avoided. This benchmark has been consistently shown to overestimate affordable opportunity cost.[3,13,14] The empirically grounded estimates advanced by Woods et al[20] and Ochalek et al[21] offer more defensible bases for anchoring a CET in these

Table 2. Comparative overview of cost-effectiveness threshold estimates across countries and approaches.

Country/ setting	Key study	Methodological approach	Estimated threshold
England (UK)	Claxton et al[3]; Martin et al[29]	Supply-side (outcome elasticity)	£6000-£12 936/QALY (~0.2-0.4 of GDP per capita, 2015)
Spain	Vallejo-Torres et al[13]; Vallejo-Torres[16]	Supply-side (outcome elasticity)	€22 000–€34 000/QALY (~0.84-0.88 GDP per capita, 2018-2025)
Australia	Edney et al.[12]	Supply-side (outcome elasticity)	AUD 28 033/QALY (0.36 of GDP per capita, 2018)
Colombia	Espinosa et al[14]	Supply-side (outcome elasticity, IV panel data)	USD 4487.5/YLL avoided (0.67 of GDP per capita, 2022); USD 5180.8/QALY gained (0.77 of GDP per capita, 2022)
Sweden	Siverskog and Henriksson[19]	Supply-side (marginal productivity)	SEK 500 000-700 000/LY (1.02–1.43 GDP per capita, 2019)
Netherlands	van Baal et al[17]; Stadhouders et al[18]	Supply-side (marginal productivity)	€80 000-90 000/QALY (1.67-1.88 GDP per capita, 2019)
United States	Vanness et al[22]	Supply-side (insurance simulation)	~USD 104 000/QALY (1.46 GDP per capita, 2021)
Thailand	Teerawattananon et al[33]	Supply-side (league table/opportunity cost)	THB 160 000/QALY (0.84 of GDP per capita, 2014)
China	Ochalek et al[21]; Xu et al[52]	Supply-side (marginal productivity)/ Demand-side (WTP)	CNY 28 000-52 000/DALY (38.2%-0.7 of GDP per capita, 2020); WTP: ~CNY 128 000/QALY (1.34 GDP per capita, 2024)
South Africa	Edoka and Stacey[53]	Supply-side (outcome elasticity)	~ZAR 38 500/DALY (0.4 of GDP per capita, 2020)
Greece	Athanasakis et al[15]	Supply-side (outcome elasticity, QALE)	~USD 23 604/QALY (0-95 of GDP per capita, 2024)
174 countries	Pichon-Riviere et al[23]	Efficiency-path (LE growth/health expenditure)	USD 87-95,958/QALY; <1 GDPpc in 97%
Multiple LMICs	Ochalek et al[21]	Supply-side (cross-country extrapolation)	~0.5 GDPpc on average
WHO guidance	WHO-CHOICE[54], Bertram et al[55]	Demand-side (WTP/VSL)	1-3 GDPpc
India	Chugh et al[8]	Demand-side (WTP, time trade-off)	US$2535/QALY (78.5%-1.19 GDP per capita, 2024*)
Iran	Hashempour et al[10]	Demand-side (WTP, systematic review of 7 studies)	Median ~US$1921/QALY (~0.4 GDPpc); range US$1032-14 173 (0.22-1.98 GDPpc)
Canada (Quebec)	Kouakou et al[9]	Demand-side (WTP; contingent valuation and discrete choice experiment)	CAN$47 049/QALY (0.62 of GDP per capita, 2024) (CV) to CAN$73 937/QALY (0.98 of GDP per capita, 2024) (DCE)

Note. GDP-per-capita ratios: unless otherwise indicated, ratios were computed by converting each local-currency threshold to US$ using the World Bank's official exchange rate, period average for the year (series PA.NUS.FCRF), and dividing by nominal GDP per capita (current US$, World Bank series NY.GDP.PCAP.CD) for the same year—the publication year of the cited study—to ensure a single, consistent, and documented methodology across entries. Ratios already expressed directly in terms of GDP per capita by the original authors (174 countries, multiple LMICs, WHO guidance, and Iran) are reported as stated in the source and were not recomputed because these are either multicountry or multistudy estimates for which a single reference year is not applicable.
AUD indicates Australian dollar; CV, contingent valuation; DALY, disability-adjusted life-year; DCE, discrete choice experiments; GDP, gross domestic product; GDPpc, GDP per capita; LE, life expectancy; LMICs, low- and middle-income countries; QALE, quality-adjusted life expectancy; QALY, quality-adjusted life-year; SEK, Swedish krona; THB, Thai baht; USD, US dollar; VSL, value of a statistical life; WTP, willingness to pay.
*India: World Bank GDP-per-capita data were not yet available for 2026 at the time of writing; the 2024 value (latest available) was used as a proxy.

jurisdictions because they follow a supply-side approach. Jurisdictions should consult the estimate applicable to their own setting, or the closest comparable country, rather than adopt a single universal value. The choice among available country-level estimates ultimately rests with each jurisdiction.

Crucially, the absence of refined local data should not justify deferring threshold adoption. A decision-making framework rooted in allocative efficiency is most needed where resource constraints are most acute. Departures from a strictly threshold-based approach are unavoidable in practice but should be transparently justified on grounds of affordability, equity, and feasibility to preserve procedural legitimacy.

The Consequences of Systematically Departing from the Threshold

If the CET is set correctly but routinely overridden—whether because of political pressure, industry lobbying, or the optics of denying access to particular treatments—the population health consequences can be substantial. When the operational threshold applied in practice exceeds the true opportunity cost of healthcare spending, each approved technology above the true threshold produces a net health loss: the resources consumed displace more health elsewhere in the system than the approved technology generates. Lomas et al[56] have argued that failure to account for opportunity costs constitutes a form of "opportunity cost neglect" that is endemic in health technology assessment and leads to systematically worse population health outcomes.

The political economy of threshold-setting is itself a barrier—lowering a threshold creates visible losers (patients denied specific technologies) and invisible beneficiaries (the wider population whose health is protected), generating opposition from those who perceive the threshold as rationing rather than an efficiency instrument.

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Conclusions

Cost-effectiveness is properly understood as a comparison of benefits gained against benefits forgone—a proposition that holds only when the threshold reflects the true opportunity cost of healthcare spending. The value adopted as a threshold is therefore consequential: it determines whether a given technology is judged to generate a net gain or a net loss for population health, and it governs the priority that can be assigned among competing alternatives when resources are finite. International evidence consistently demonstrates that widely used thresholds—particularly those derived from the WHO's 1 to 3 GDP per capita heuristic—substantially overestimate the opportunity cost of healthcare expenditure, especially in low- and middle-income settings. Jurisdictions with adequate data infrastructure should pursue empirical supply-side estimation, whereas those with more limited data should adopt conservative, evidence-informed benchmarks rather than aspirational guidelines.

It is sometimes argued that a low threshold is unhelpful because few technologies would satisfy it. This objection is insufficient: even above the CET, a gradient of relative efficiency enables prioritization, the threshold exerts downward pressure on manufacturer prices, and a transparent threshold strengthens procedural legitimacy, fostering accountability and public trust.

Beyond these established arguments, this review has highlighted several dimensions that are critical for the operationalization of the threshold in practice. The CET is not a static parameter but one that evolves with health system productivity, budget levels, and demographic change, requiring periodic reestimation. Its interaction with severity modifiers must be managed transparently, with explicit acknowledgment of the health opportunity cost entailed by departures. Its role as a pricing signal to industry is a practical benefit that makes threshold adoption valuable even in jurisdictions where the threshold cannot yet be estimated with precision. Its logical implication for disinvestment from low-value care must be pursued alongside technology adoption to avoid asymmetric application. Finally, the tension between cost-effectiveness and budget impact must be addressed through complementary analytical and institutional mechanisms rather than by distorting the threshold itself.

Getting the threshold right is not a technical formality—it is a matter of how well a health system converts its resources into population benefit. But getting the threshold right also means embedding it in a coherent framework that addresses pricing, severity, affordability, disinvestment, and the political challenges of evidence-based resource allocation.

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Author disclosure forms can be accessed below in the Supplemental Material section.

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REFERENCES

1. O'Rourke B, Oortwijn W, Schuller T, International Joint Task Group. The new definition of health technology assessment: a milestone in international collaboration. *Int J Technol Assess Health Care*. 2020;36(3):187–190.
2. Drummond MF, Schwartz JS, Jönsson B, et al. Key principles for the improved conduct of health technology assessments for resource allocation decisions. *Int J Health Technol Assess*. 2008;24(3):244–258.
3. Claxton K, Martin S, Soares M, et al. Methods for the estimation of the National Institute for Health and Care Excellence cost-effectiveness threshold. *Health Technol Assess*. 2015;19(14):1–503.
4. Sampson C, Zamora B, Watson S, et al. Supply-side cost-effectiveness thresholds: questions for evidence-based policy. *Appl Health Econ Health Policy*. 2022;20(5):651–667.
5. Stinnett AA, Mullahy J. Net health benefits: a new framework for the analysis of uncertainty in cost-effectiveness analysis. *Med Decis Making*. 1998;18(2 Suppl):S68–S80.
6. Santos AS, Guerra-Junior AA, Godman B, Morton A, Ruas CM. Cost-effectiveness thresholds: methods for setting and examples around the world. *Expert Rev Pharmacoecon Outcomes Res*. 2018;18(3):277–288.
7. Ryen L, Svensson M. The willingness to pay for a quality adjusted life year: a review of the empirical literature. *Health Econ*. 2015;24(10):1289–1301.
8. Chugh Y, Jyani G, Kar SS, et al. Estimating the willingness-to-pay per quality-adjusted life-year to aid health technology assessment in India. *Value Health*. 2026;29(3):457–466.
9. Kouakou CRC, He J, Poder TG. Estimating the monetary value of a Quality-Adjusted Life-Year in Quebec. *Eur J Health Econ*. 2024;25(5):787–811.
10. Hashempour R, AbolhasanBeigi Gallehzan N, Akhavan Rezayat S, Raei B, Esmaeili R, Emamgholipour Sefiddashti S. Willingness to pay for a quality-adjusted life year in Iran: a systematic review. *Cost Eff Resour Alloc*. 2026;24(1):48.
11. Lomas J, Longo F, Salas-Ortiz A, et al. *Estimating the Health Benefits of Increasing and Reallocating Expenditure on the National Health Service in England*. University of Sheffield; 2025.
12. Edney LC, Haji Ali Afzali H, Cheng TC, Karnon J. Estimating the reference incremental cost-effectiveness ratio for the Australian health system. *Pharmacoeconomics*. 2018;36(2):239–252.
13. Vallejo-Torres L, García-Lorenzo B, Serrano-Aguilar P. Estimating a cost-effectiveness threshold for the Spanish NHS. *Health Econ*. 2018;27(4):746–761.
14. Espinosa O, Rodríguez-Lesmes P, Orozco L, et al. Estimating cost-effectiveness thresholds under a managed healthcare system: experiences from Colombia. *Health Policy Plan*. 2022;37(3):359–368.
15. Athanasakis K, Agorastos G, Kyriopoulos I. Estimating a cost-effectiveness threshold for healthcare decision-making in the Greek NHS. *Health Policy*. 2024;146:105068.
16. Vallejo-Torres L. Estimating the incremental cost per QALY produced by the Spanish NHS: a fixed-effect econometric approach. *Pharmacoeconomics*. 2025;43(1):109–122.
17. van Baal P, Perry-Duxbury M, Bakx P, Versteegh M, van Doorslaer E, Brouwer W. A cost-effectiveness threshold based on the marginal returns of cardiovascular hospital spending. *Health Econ*. 2019;28(1):87–100.
18. Stadhouders N, Koolman X, van Dijk C, Jeurissen P, Adang E. The marginal benefits of healthcare spending in the Netherlands: estimating cost-effectiveness thresholds using a translog production function. *Health Econ*. 2019;28(11):1331–1344.
19. Siverskog J, Henriksson M. Estimating the marginal cost of a life year in Sweden's public healthcare sector. *Eur J Health Econ*. 2019;20(5):751–762.
20. Woods B, Revill P, Sculpher M, Claxton K. Country-level cost-effectiveness thresholds: initial estimates and the need for further research. *Value Health*. 2016;19(8):929–935.
21. Ochalek J, Lomas J, Claxton K. Estimating health opportunity costs in low-and middle-income countries: a novel approach and evidence from cross-country data. *BMJ Glob Health*. 2018;3(6):e000964.

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22. Vanness DJ, Lomas J, Ahn H. A health opportunity cost threshold for cost-effectiveness analysis in the United States. *Ann Intern Med*. 2021;174(1):25–32.
23. Pichon-Riviere A, Drummond M, Palacios A, Garcia-Marti S, Augustovski F. Determining the efficiency path to universal health coverage: cost-effectiveness thresholds for 174 countries based on growth in life expectancy and health expenditures. *Lancet Glob Health*. 2023;11(6):e833–e842.
24. Vallejo-Torres L, Claxton K, Edney LC, et al. Challenges of calculating cost-effectiveness thresholds. *Lancet Glob Health*. 2023;11(10):e1509.
25. Devlin N, Parkin D. Does NICE have a cost-effectiveness threshold and what other factors influence its decisions? A binary choice analysis. *Health Econ*. 2004;13(5):437–452.
26. Rawlins MD, Culyer AJ. National Institute for Clinical Excellence and its value judgments. *BMJ*. 2004;329(7459):224–227.
27. Culyer AJ. Cost-effectiveness thresholds in health care: a bookshelf guide to their meaning and use. *Health Econ Policy Law*. 2016;11(4):415–432.
28. Brouwer W, van Baal P, van Exel J, Versteegh M. When is it too expensive? Cost-effectiveness thresholds and health care decision-making. *Eur J Health Econ*. 2019;20(2):175–180.
29. Martin S, Claxton K, Lomas J, Longo F. The impact of different types of NHS expenditure on health: marginal cost per QALY estimates for England for 2016/17. *Health Policy (Amsterdam, Netherlands)*. 2023;132:104800.
30. McCabe C, Claxton K, Culyer AJ. The NICE cost-effectiveness threshold: what it is and what that means. *Pharmacoeconomics*. 2008;26(9):733–744.
31. Martin S, Lomas J, Claxton K, Longo F. How effective is marginal healthcare expenditure? New evidence from England for 2003/04 to 2012/13. *Appl Health Econ Health Policy*. 2021;19(6):885–903.
32. Martin S, Claxton K, Lomas J, Longo F. How responsive is mortality to locally administered healthcare expenditure? Estimates for England for 2014/15. *Appl Health Econ Health Policy*. 2022;20(4):557–572.
33. Teerawattananon Y, Tritasavit N, Suchonwanich N, Kingkaew P. The use of economic evaluation for guiding the pharmaceutical reimbursement list in Thailand. *Z Evid Fortbild Qual Gesundhwes*. 2014;108(7):397–404.
34. Isaranuwatchai W, Wang Y, Soboon B, et al. An empirical study looking at the potential impact of increasing cost-effectiveness threshold on reimbursement decisions in Thailand. *Health Policy Technol*. 2024;13(6):100927.
35. Espinosa O, Rodríguez-Lesmes P, Orozco L, et al. Use of cost-effectiveness thresholds in healthcare public policy: progress and challenges. *Appl Health Econ Health Policy*. 2024;22(6):797–804.
36. Wang S, Gum D, Merlin T. Comparing the ICERs in medicine reimbursement submissions to NICE and PBAC-does the presence of an explicit threshold affect the ICER proposed? *Value Health*. 2018;21(8):938–943.
37. Ottersen T, Førde R, Kakad M, et al. A new proposal for priority setting in Norway: open and fair. *Health Policy (Amsterdam, Netherlands)*. 2016;120(3):246–251.
38. Nord E, Johansen R. Concerns for severity in priority setting in health care: a review of trade-off data in preference studies and implications for societal willingness to pay for a QALY. *Health Policy (Amsterdam, Netherlands)*. 2014;116(2-3):281–288.
39. Reckers-Droog VT, van Exel NJA, Brouwer WBF. Looking back and moving forward: on the application of proportional shortfall in healthcare priority setting in the Netherlands. *Health Policy (Amsterdam, Netherlands)*. 2018;122(6):621–629.
40. National Institute for Health and Care Excellence (NICE). *NICE Health Technology Evaluations: The Manual*. London: National Institute for Health and Care Excellence (NICE); 2022.
41. Njoroge MW, Walton M, Hodgson R. Understanding the National Institute for Health and Care Excellence severity premium: exploring its implementation and the implications for decision making and patient access. *Value Health*. 2024;27(6):730–736.
42. Zhang K, Garau M. *International Cost-Effectiveness Thresholds and Modifiers for HTA Decision Making*. London: Office of Health Economics; 2020.
43. Elshaug AG, Hiller JE, Tunis SR, Moss JR. Challenges in Australian policy processes for disinvestment from existing, ineffective health care practices. *Aust N Z Health Policy*. 2007;4:23.
44. Garner S, Littlejohns P. Disinvestment from low value clinical interventions. *BMJ*. 2011;343:d4519.
45. MacKean G, Noseworthy T, Elshaug AG, et al. Health technology reassessment: the art of the possible. *Int J Technol Assess Health Care*. 2013;29(4):418–423.
46. Hoofman B. Internal barriers to efficiency: why disinvestments are so difficult. Identifying and addressing internal barriers to disinvestment of health technologies. *Health Econ Policy Law*. 2021;16(4):473–488.
47. Pearson SD. The ICER value framework: integrating cost effectiveness and affordability in the assessment of health care value. *Value Health*. 2018;21(3):258–265.
48. Ghabri S, Mauskopf J. The use of budget impact analysis in the economic evaluation of new medicines in Australia, England, France and the United States: relationship to cost-effectiveness analysis and methodological challenges. *Eur J Health Econ*. 2018;19(2):173–175.
49. Charlton V. The ethics of aggregation in cost-effectiveness analysis or, "on books, bookshelves, and budget impact". *Front Health Serv*. 2022;2:889423.
50. National Institute for Health and Care Excellence (NICE). *Proposals for Changes to the Arrangements for Evaluating and Funding Drugs and Other Health Technologies Appraised Through NICE's Technology Appraisal and Highly Specialised Technology Programmes*. London: NHS England; 2016.
51. Lomas J, Claxton K, Martin S, Soares M. Resolving the "cost-effective but unaffordable" paradox: estimating the health opportunity costs of non-marginal budget impacts. *Value Health*. 2018;21(3):266–275.
52. Xu L, Chen M, Angell B, et al. Establishing cost-effectiveness threshold in China: a community survey of willingness to pay for a healthy life year. *BMJ Glob Health*. 2024;9(1):e013070.
53. Edoka IP, Stacey NK. Estimating a cost-effectiveness threshold for health care decision-making in South Africa. *Health Policy Plan*. 2020;35(5):546–555.
54. World Health Organization (WHO). *Macroeconomics and Health: Investing in Health for Economic Development. Report of the Commission on Macroeconomics and Health*. Geneva: World Health Organization (WHO); 2001.
55. Bertram MY, Lauer JA, De Joncheere K, et al. Cost-effectiveness thresholds: pros and cons. *Bull World Health Organ*. 2016;94(12):925–930.
56. Lomas J, Ochalek J, Faria R. Avoiding opportunity cost neglect in cost-effectiveness analysis for health technology assessment. *Appl Health Econ Health Policy*. 2022;20(1):13–18.