More R&D Spend, Less Health Value?

A Productivity Paradox in Global Health and a New Metric to Guide Realignment

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The Problem

We measure R&D inputs, not outcomes

Global health R&D priorities are often framed around disease burden and funding gaps.

Funding per DALY varies widely across diseases.

Yet we lack a way to assess whether that variation reflects efficient allocation or misallocation.

The Missing Link

No existing metric asks: Does higher R&D spending in a disease area actually produce more cost-effective interventions?

A New Metric: Category ICER

A metric that asks: Are we getting equal health value per R&D dollar across disease areas?

$$Category\ ICER = \frac{R\&D\ Spend\ per\ DALY}{(1\ -\ Mean\ Normalised\ ICER)}$$

↳ (portfolio cost-effectiveness adjustment)

Lower Category ICER=Higher Downstream Health Value

Efficiency Rule:

Optimal allocation equalizes Category ICERs across diseases. (under plausible conditions)

Systematic variation signals potential misalignment.

The Regime Distinction

Regime 1 — Mean Normalized ICER < 1 → Valid comparisons

Average interventions create net health.

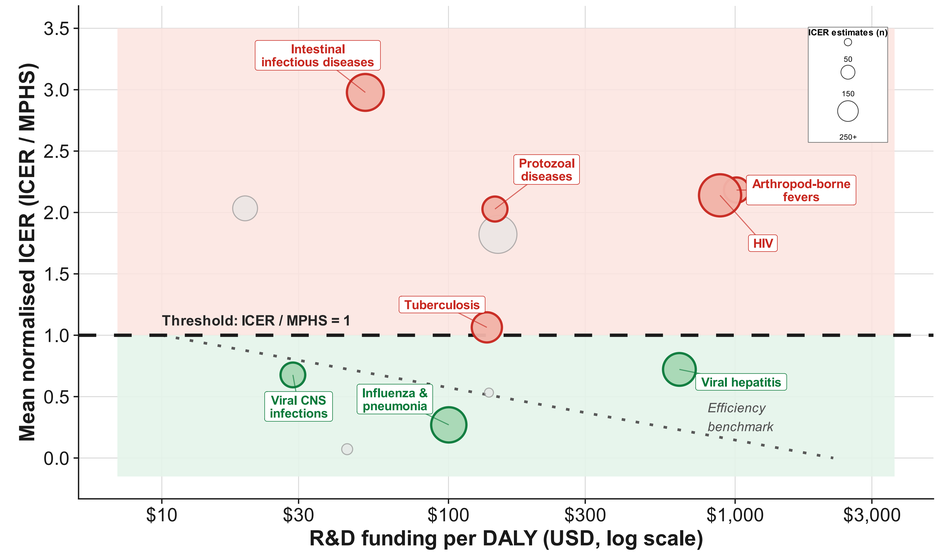
Regime 2 — Mean Normalized CER ≥ 1 → Diagnostic only

Average interventions displace more health than they generate.

Higher R&D funding is not associated with more cost-effective intervention portfolios

REGIME 2
Diagnostic only
Mean normalised ICER ≥ 1
Average portfolio fails the health-system threshold.
Use for diagnosis, not cardinal ranking.

REGIME 1
Valid comparisons
Mean normalised ICER < 1
Average portfolio clears the health-system threshold.
Use for Category ICER ranking.



Under the efficiency benchmark, higher R&D intensity should correspond to lower normalised ICERs; this pattern is not observed.
Source: GH CEA Registry (Tufts) · Head et al. 2020 · GBD 2021 · Woods et al. 2016

Observed funding intensity	Regime 1: $106 / DALY (valid comparisons)	Regime 2: $246 / DALY (diagnostic only)

2.3× higher in Regime 2 despite poorer average cost-effectiveness

2.3×
More R&D funding per DALY flows to Regime 2 — portfolios where the average intervention fails the cost-effectiveness threshold

~50×
Variation in Category ICER across Regime 1 diseases — far exceeding what efficient allocation predicts

—
The expected inverse relationship between funding intensity and cost-effectiveness is absent.

What this means for policy

Targeted Realignment: Shift marginal funding toward Regime 1.

Within-Category Focus: Prioritize high-value projects within each disease area.

Outcome-Based Strategy: Link R&D funding to downstream health value.

Drivers of Misalignment

Historical Priorities: Legacy patterns shape funding.

Scientific Tractability: Biological difficulty varies across diseases.

Macro-Level Budgeting: Cost-effectiveness rarely drives disease-level R&D allocation decisions.

Limitations

Data Representation: Published CEA evidence is incomplete.

Temporal Mismatch: R&D and ICER evidence may be separated by long lags.

Sample Size: Some disease categories have few ICER estimates.

Targeted DALYs: Means are arithmetic, DALY-weighted.

Public Good Dynamics: Spillovers and nonrivalry aspects are not fully captured.

TAKE-HOME MESSAGE

Better R&D allocation can improve health outcomes.

The Category ICER makes outcome-based R&D priority-setting tractable.

Data sources:
Tufts CEA Registry · Head et al. (2020) · GBD 2021 · Woods et al. (2016)