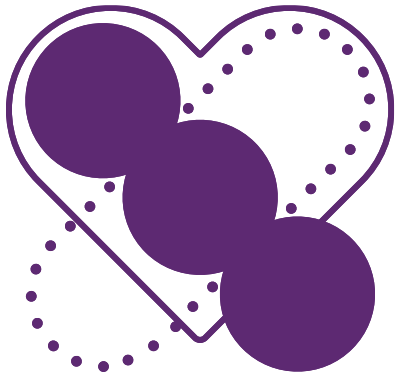
COLLEGE OF THE
Holy Cross



Strep A Vaccine Global Consortium

https://savac.ivi.int/

Introduction

Strep A has long been seen as a promising candidate for vaccine development.

Key question: How much should be spent to develop a vaccine?

Develop an economic model to calculate optimal R&D spending for vaccines and treatments against a known pathogen.

- Apply model to Strep A

Optimal spending is large but benefits more than 50 times larger

- Optimal spending about 35 billion $US
- Benefits about 2 trillion $US
- Equivalent to a return on investment of 23% per year for thirty years.

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Model Description

Table of R&D Projects

- Each column represent an approach to develop a vaccine or treatment
- Each entry under each column represents a project using that approach

Benefit of funding an additional project depends on

- Expected remaining harm
- Fraction of remaining harm a success would reduce
- Probability project succeeds

Cost of funding a project fixed

Model Solution

- Fund highest benefit projects until benefit less than cost
- Count number of funded projects
- Optimal Funding = # of funded projects *X* cost of funding a project

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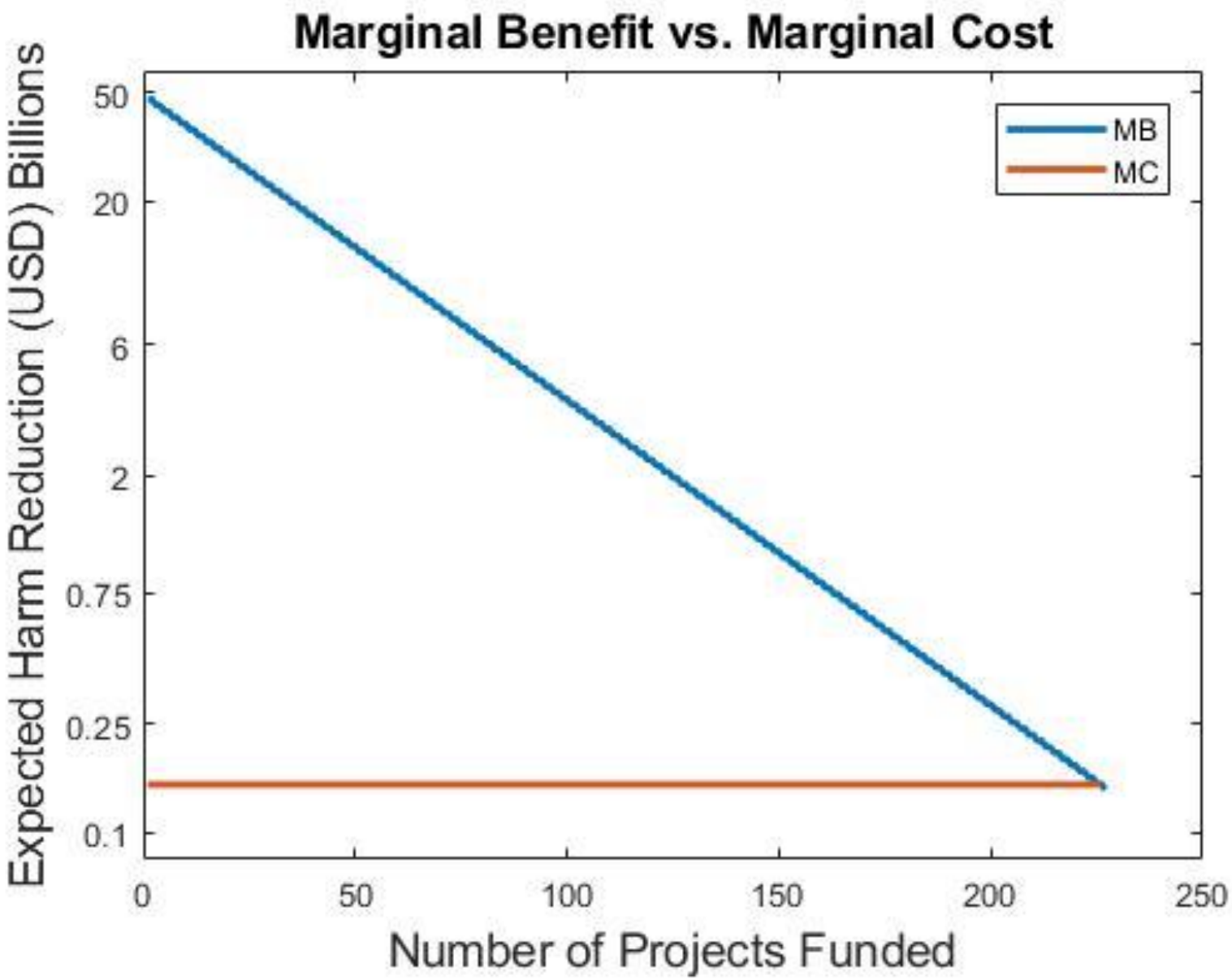
Marginal Benefit vs. Marginal Cost
Expected Harm Reduction (USD) Billions
50
20
6
2
0.75
0.25
0.1
0
50
100
150
200
250
Number of Projects Funded
MB
MC

Parameters (Group A Streptococcus)

Approaches	Value	Basis
Number of Approaches	2	M-protein/Other
Fraction of Harm Each Approach Can Alleviate	1/2	Assumption
Probability Project Succeeds		
Approach	90%	Consultation with experts
Overall	15%	Wong, Siah, Lo (2018), Struck (1996), Consultation with experts
Fraction of Harm Success Alleviates	30%	Cannon et al. (2018)
Total Dollar Value of Harm	2.1 trillion	Extrapolation Cannon et al. (2018), Ferranna (2021), VSLY Approach
Development Cost of Success Inclusive of Failures	1 billion	Gouglas et al. (2018), Andre (2002), Consultation with experts

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Results

Baseline Calibration	Projects Funded	Optimal Spending	Social Surplus	Rate of Return
	226	33.9 billion	1.85 trillion	23%
Sensitivity				
Harm Reduction = 70%	108	16.2 billion	1.87 trillion	29.4%
Success Probability = 5%	278	41.7 billion	1.84 trillion	21.5%
Total Strep A Harm 2x	252	37.8 billion	3.74 trillion	28.1%
Require 4 Approaches	396	59.4 billion	1.82 trillion	18.8%

Conclusions

Strep A vaccine R&D represents one of the best returns on investment for use of public funds

How can policy move us towards the optimal amount?

- Public funding of R&D projects

- Bond fund that invests in multiple R&D projects at one time
  - Greatly reduces risk
  - Government can guarantee principle on the investment

Equitable access is important

- Donations to international organizations to support vaccine purchase.

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