

The Use of Cost-Effectiveness Thresholds for Evaluating Vaccinations in LMICs and the Implications of Health Opportunity-Based Thresholds

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Background

- LMICs faces budget constraints
 - Vaccine funding decisions remain challenging
- CETs commonly guide interpretation of CEA
- 1-3x GDP per capita often used as CET
- Health opportunity-based thresholds gaining interest
- Application in vaccination programs remain limited

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Methodology

Literature Review

- Global Health CEA Registry 2017-2022
- LMIC vaccine CEAs that reported:
 - An ICER
 - Explicit CET use
 - Cost-effectiveness conclusion

Quantitative Analysis

- Country-specific CETs calculated based on estimates from:
 - Woods et al., (Value in Health, 2016)
 - Ochalek et al. (BMJ Global Health, 2021)
 - Pichon-Riviere et al. (The Lancet Global Health, 2023)
- Compared original vs. new conclusions
- Chi-square test and logistic regression

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Results

- Review of **68** studies, covering **413** unique vaccine intervention evaluations

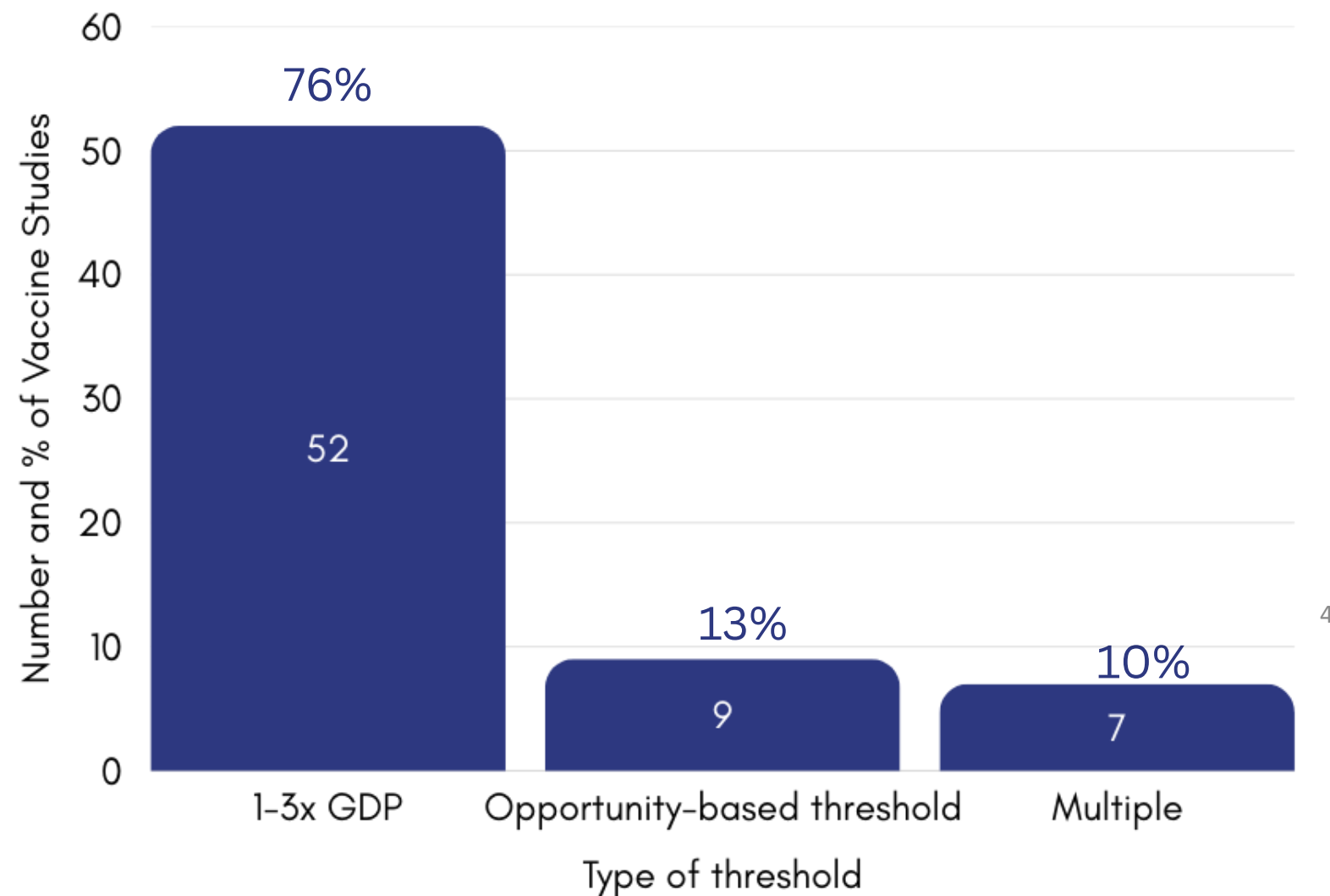


Figure 1. Distribution of Cost-Effectiveness Thresholds by Study (n=68)

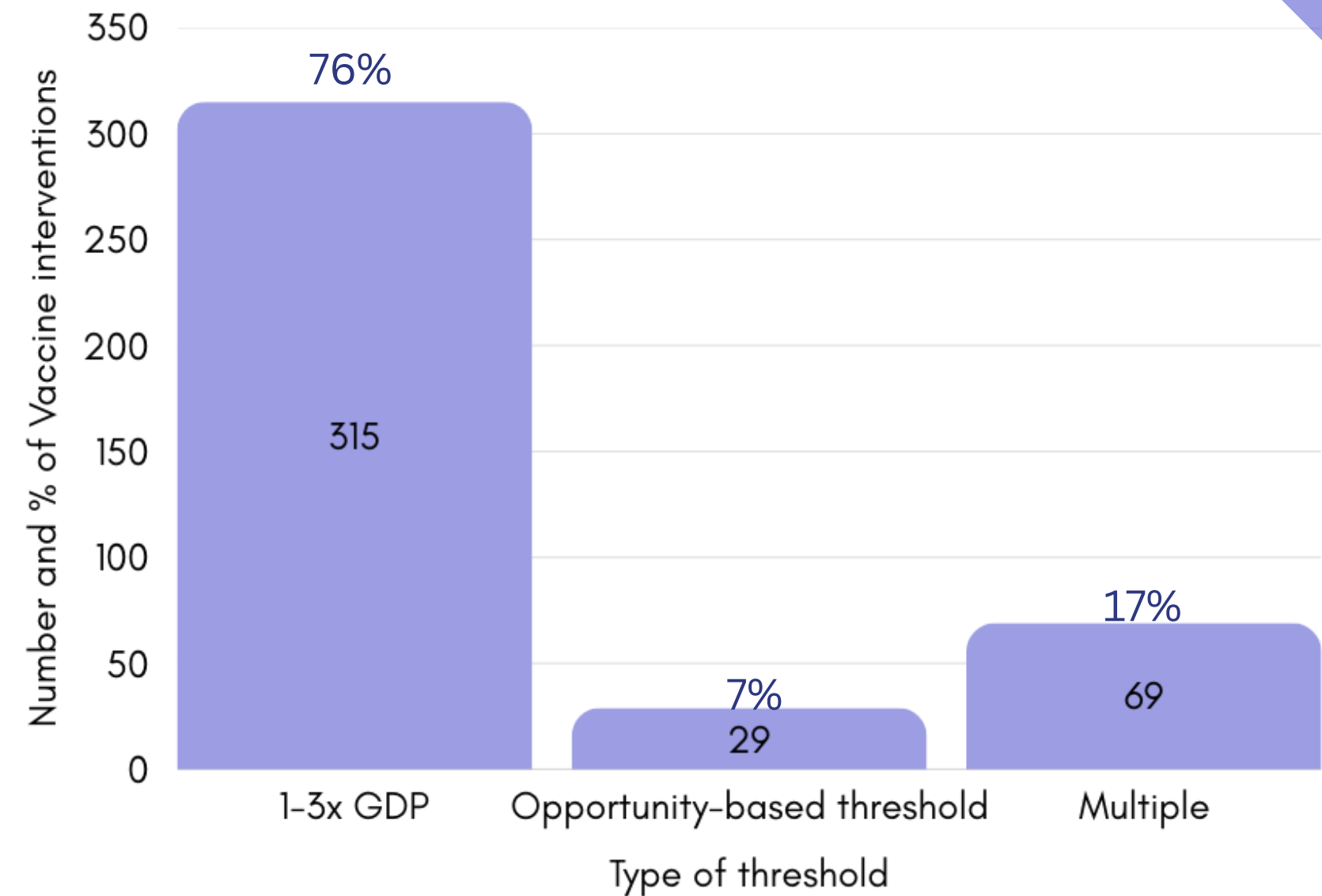


Figure 2. Distribution of Cost-Effectiveness Threshold Use by Vaccine Interventions (n=413)

Results

- **76%** vaccine interventions initially cost-effective
- Declined to **45-48%** with upper bound CET
- Further dropped to **21-39%** using lower bound CET

Table 1. Cost-effectiveness conclusions of vaccinations at different CET, per income level

Income level	Number of evaluations	Study conclusion % cost effectiveness	Woods % cost effectiveness		Ochalek % cost effectiveness		Pichon Riviere % Cost effectiveness	
			Upper bound	Lower bound	Upper bound	Lower bound	Upper bound	Lower bound
Low income	89	72%	39 %	19%	39%	19%	39%	24%
Lower middle income	183	72%	37 %	10%	37%	10%	37%	17%
Upper middle income	141	84%	62%	38%	62%	38%	62%	52%
Total	413	76%	48%	21%	45%	39%	48%	31%

1. Country specific upper and lower bound threshold from Woods et al., 2016 Value Health; 2. Country specific upper and lower bound threshold from Ochalek et al. 2018. BMJ Global Health. 3. Country specific upper and lower bound threshold from Pichon-Riviere et al., 2023. Lancet Global Health.

Results

- Significant statistical association observed by income group
- UMICs mostly likely to change cost effectiveness conclusions

Table 2. Association between change in cost-effectiveness and country income level

Income level	Univariable			Multivariable		
	Odds Ratio	(95% CI)	p-value	Odds* Ratio	(95% CI)	p-value
Low-income	Reference	-	-	Reference	-	-
Lower-middle income	1.01†	(0.58 – 1.78)	0.97	1.03†	(0.58,1.83)	0.93
	1.04‡	(0.59-1.84)	0.86	1.05‡	(0.59, 1.89)	0.86
Upper-middle-income	2.00†	(1.05, 3.81)	0.03	2.20†	(1.13, 4.28)	0.02**
	2.07‡	(1.08, 3.94)	0.02	2.27‡	(1.16, 4.41)	0.02**

*Odds ratio estimated with logistic regression, adjusted for perspective of analysis

**<0.05 – statistically significant

Conclusion

- 1-3x GDP per capita remain widely used in vaccine CEAs
- Choice of thresholds impact cost-effectiveness conclusions
- Over-reliance on GDP-based thresholds may:
 - overestimate vaccine cost-effectiveness
 - overlook affordability
- Opportunity cost-based CETs may⁷ offer more realistic alternative

Recommendation

- Need to reassess CET practices in vaccination CEAs
- Explore and adopt more context-relevant CETs
- Country investment in institutional capacity to apply appropriate CET
- Context-appropriate thresholds enable equitable, efficient health decisions

References

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2. Ochalek, J., Lomas, J., & Claxton, K. (2018). Estimating health opportunity costs in low-income and middle-income countries: A novel approach and evidence from cross-country data. *BMJ Global Health*, 3(6), e000964.
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4. Woods, B., et al. (2016). Country-Level Cost-Effectiveness Thresholds: Initial Estimates and the Need for Further Research. *Value in Health*, 19(8), 929–935.

Thank You!



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