

How to deal with results? Decision-making based on health economic results in countries without a willingness to pay threshold

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CURRENT OPINION

Are Current Cost-Effectiveness Thresholds for Low- and Middle-Income Countries Useful? Examples from the World of Vaccines

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Abstract The World Health Organization's CHOosing Interventions that are Cost Effective (WHO-CHOICE) thresholds for averting a disability-adjusted life-year of one to three times per capita income have been widely cited and used as a measure of cost effectiveness in evaluations of vaccination for low- and middle-income countries (LMICs). These thresholds were based upon criteria set out by the WHO Commission on Macroeconomics and Health, which reflected the potential economic returns of interventions. The CHOICE project sought to evaluate a variety of health interventions at a subregional level and classify them into broad categories to help assist decision makers, but the utility of the thresholds for within-country decision making for individual interventions (given budgetary constraints) has not been adequately explored. To examine whether the 'WHO-CHOICE thresholds' reflect funding decisions, we examined the results of two recent reviews of cost-effectiveness analyses of human papillomavirus and rotavirus vaccination in LMICs, and we assessed whether

the results of these studies were reflected in funding decisions for these vaccination programmes. We found that in many cases, programmes that were deemed cost effective were not subsequently implemented in the country. We consider the implications of this finding, the advantages and disadvantages of alternative methods to estimate thresholds, and how cost perspectives and the funders of healthcare may impact on these choices.

Key Points for Decision Makers

We found that an analysis estimating a vaccination programme to be 'very cost effective' in a particular country was not sufficient to lead to funding.

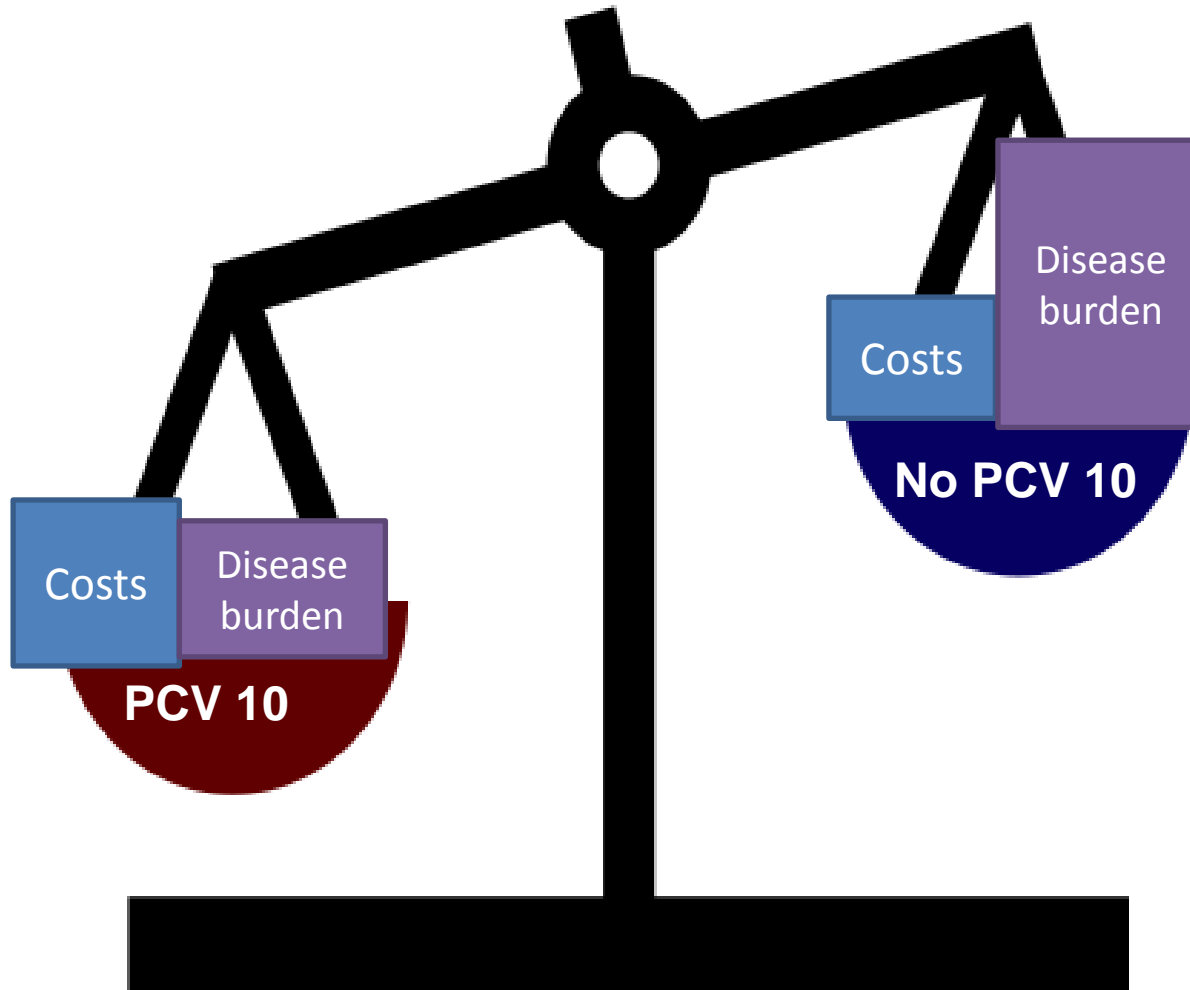
It is likely that other factors beyond cost effectiveness, including the overall budgetary impact, are particularly important for decision making in low- and middle-income countries.

For local decision makers, the criterion for understanding cost effectiveness should have some relation to the budget available for allocation.

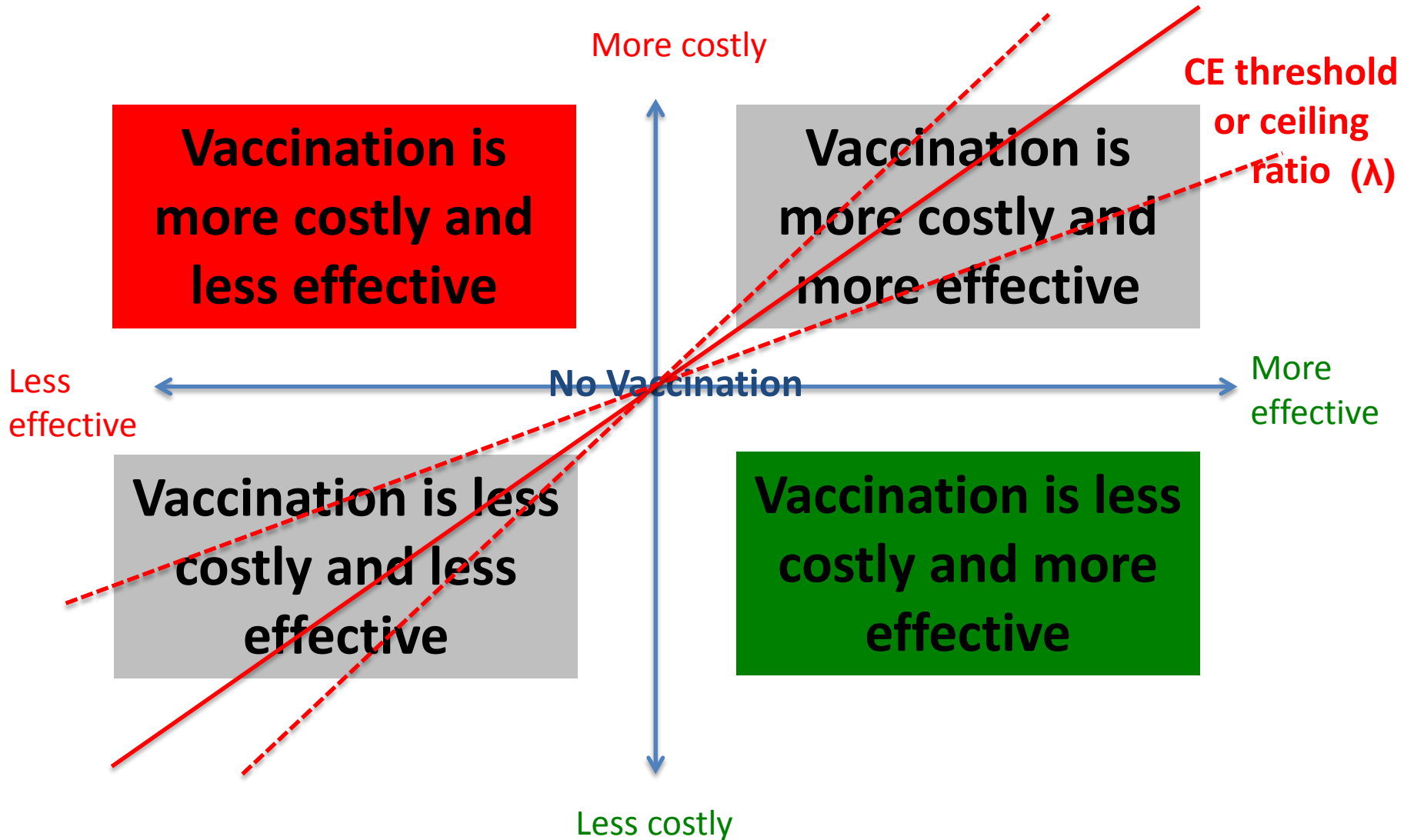
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Cost-effectiveness analysis

A cost-effectiveness evaluation compares the incremental costs and outcomes of PCV10 vaccination to a situation “without PCV 10”



Rank Strategies for iCERs: **No vaccination** vs **Vaccination**



Overall questions

- How are thresholds or ceilings determined?
- How should decision makers deal with CE result?
How to interpret them?
 - WHO-CHOICE approach
- Experience from the world of vaccines in LMICs?
- Potential use of CE thresholds?
 - Advantages and disadvantages
- Way forward and alternatives for CE thresholds?

How to determine CE thresholds?

Value of λ determined by:

A. Pre-defined method:

- League table approach

B. Normatively defined methods:

- Preference approach
- Human capital approach

League table approach

- Budget defined first and distributed across program with increasing CE until funds are exhausted

Table 1. National league table for Guinea^{a,b} (reproduced from Jha et al.^[50] with permission)

Disease group and intervention	Cost per person (\$US)	Cost per year of life saved (\$US)
Treat pneumonia in children	3	4
Rehydration for mild diarrhoea in children	4	9
Treat pneumonia, malaria and diarrhoea in children	5	11
AIDS education via media	0.01	16
Short-course treatment for TB at health centre	81	16
Treat malaria in children	4	18
Caesarean section for obstructed delivery	58	24
Vaccinate children	23	34
Treat severe pneumonia in children	95	42
Surgery for appendicitis	91	49
Treat severe malnutrition in children	96	57
Distribute impregnated bed nets	4	58
Short-course treatment for TB at hospital	317	58
Distribute/promote condoms among bar ladies	58	65
Treat complicated measles	56	65
Deworming and vitamin A/iodine supplements	3	91
Treat rheumatic fever	43	93

Preference elicitation approach

- Based on WTP for improvements in health or WTA as compensation to take life-threatening risks
 - People require more compensation for a loss than the amount they would pay for an equivalent gain (WTA estimates > WTP estimates)
 - WTA studies - λ would be 1.4-2.8 times GDP (Evans 2004)
 - WTP: 0.15 x GNI in Ethiopia for malaria vaccines (Cropper, 2004)

Human capital/National income based approach

- Based on average income of individuals within society such as:
 - National accepted thresholds:
 - US – \$US 50K/QALY (1982)
 - Canada - \$Can 20-100K/QALY (1992)
 - UK - £20-30K/QALY (2002)
 - Netherlands - €20-80K/QALY (2010)
 - Thailand – Baht 100K/QALY (2008)
 -consistent with 1-2x capita GNI (Garber & Phelps (1997))
 - WHO- CHOICE
 - Value of extra healthy year is worth “*more than extra market income earned in a year*” (CMH, 2001)
 - CMH applied per-capita income:
 - “very cost-effective” - 1x GDP/capita
 - “cost-effective” – 3x GDP/capita

CHOosing Interventions that Cost-Effective

www.who.int/choice/cost-effectiveness

- Types of policy question

1. What are most cost-effective strategies for a particular disease or risk factor?
2. How much can efficiency be improved by (e.g. compared to current situation)?
3. What are the best/better 'buys' in health (sector-wide overview)?

- Levels of analysis

1. Regional databases: good for identifying priorities across the health sector
2. National databases: adjustment of regional data to reflect local demography, mortality and prices of health services / goods
3. Full contextualisation: detailed adjustment of regional data by local teams (e.g. epidemiology, effectiveness, resource utilisation)

CHOosing Interventions that Cost-Effective

- Sectoral, population-level economic evaluation ("generalized CEA")
 - effectiveness: healthy years gained / DALYs averted
 - resource costs: patient + programme level (int. \$)
- Evaluation of interventions relative to 'doing nothing' (null):
 - addresses allocative efficiency - what is the approp. mix?
- Use of a common set of tools and methods
 - enhances comparability between diseases / transferability of findings
- Results summarised in WHO regional C-E databases
 - available for country-level adaptation / analysis

Applications of WHO-CHOICE

- By disease / risk factor:
 - Communicable diseases: HIV, TB, malaria, childhood diseases
 - Non-communicable diseases: cancer, cardiovascular disease, diabetes, respiratory disorders, mental disorders, sensory loss disorders
 - Risk factors: alcohol and tobacco use, unsafe water, unsafe sex, under-nutrition etc.
- By geographical setting
 - Regional assessments: 14 epidemiologically-defined WHO sub-regions
 - Country applications: Argentina, Chile, Colombia, Costa Rica, Mexico, Peru, Estonia, Ghana, Guatemala, India, Kyrgyzstan, Spain, Sri Lanka, Thailand, Viet Nam, and many others...

Why update WHO CHOICE

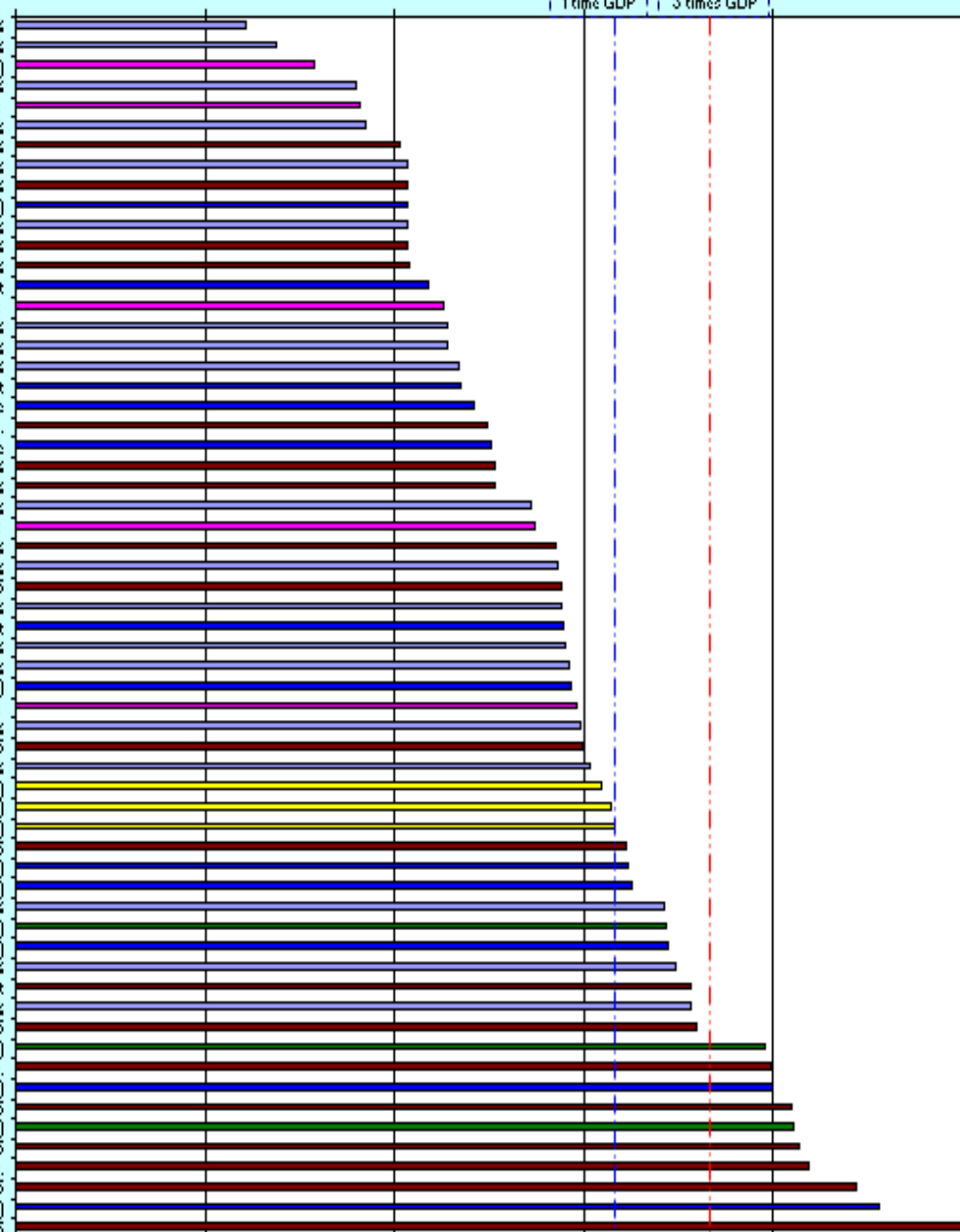
- Some analyses undertaken ± 10 years ago
 - New epidemiology available from GBD 2010 and other sources
 - Costing needs updating (e.g. outdated technology included)
- Increased interest from regions and countries
- Increased role of CEA within Universal Health Coverage planning
- Resolutions on Health Technology Assessment within multiple WHO Regions highlight its relevance

Incremental Cost-effectiveness ratio (I\$ per DALY saved)

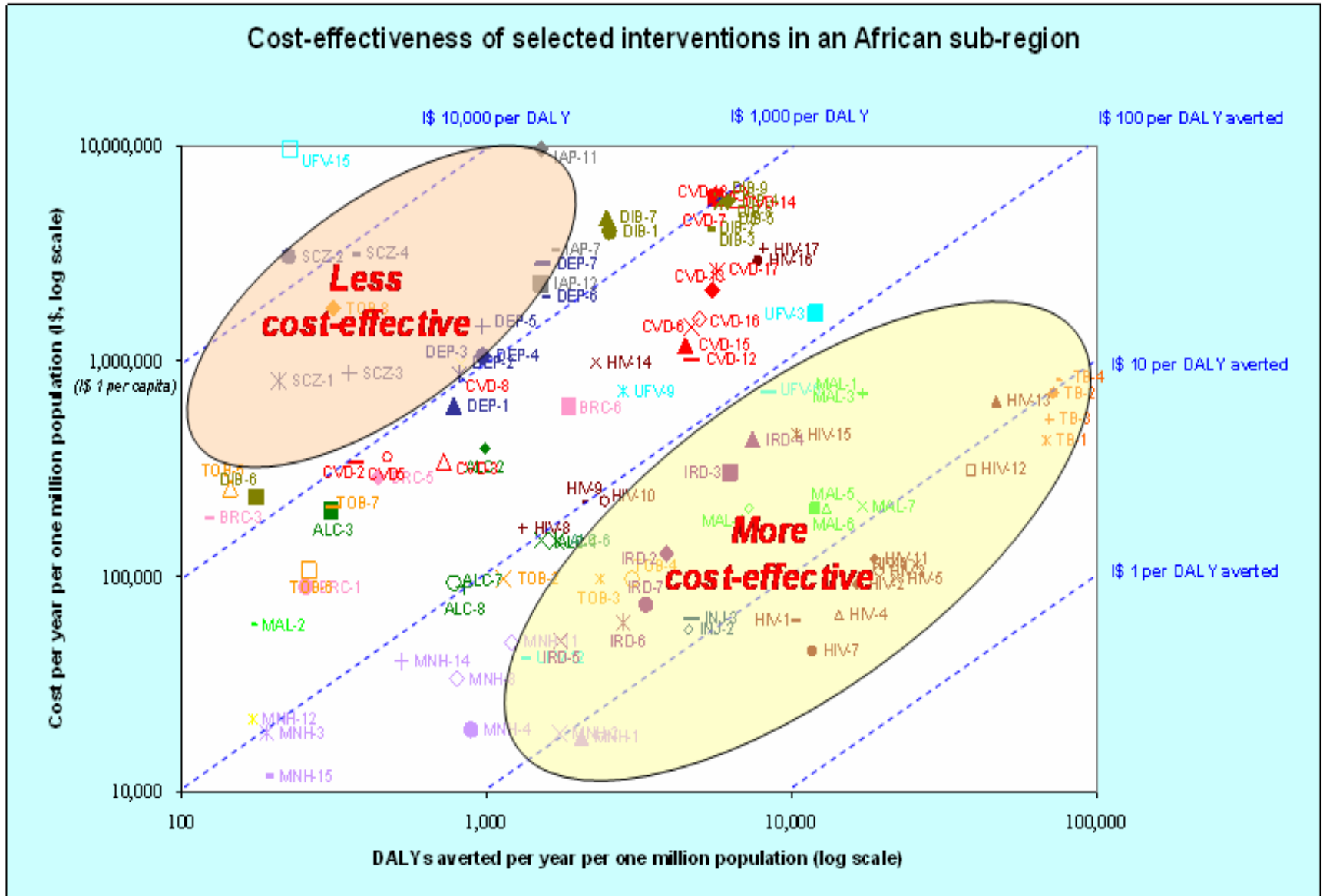
- SEN = Sensory loss disorder
- CAN = Cancer
- MH = Mental health
- RSP = Respiratory disease
- RTI = Road Traffic Injuries

1 10 100 1000 10000 100000

1 time GDP 3 times GDP



WHO-CHOICE results for an African WHO subregion



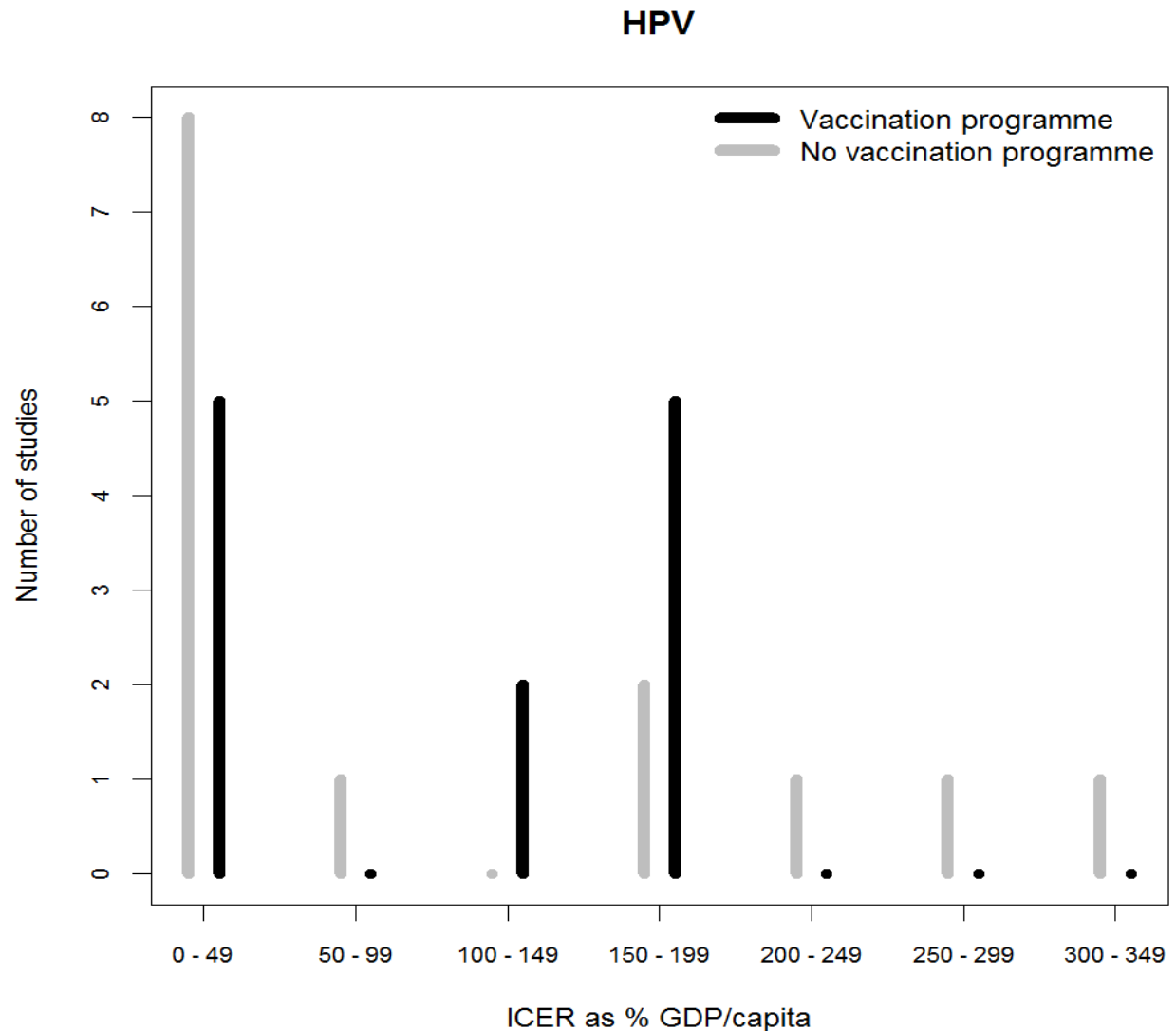
How have WHO-CHOICE thresholds for vaccines been used in LMICs?

- In the absence of local thresholds in LMICs thresholds widely cited as a measure of iCEA used in a formulaic way (less for sector-wide CEA)
- Thresholds may not reflect budget affordability
- Thresholds many times lower than per capita income value e.g. Bath 100K/QALY is below WHO threshold for Thailand

Do WHO-CHOICE thresholds inform funding decisions in LMICs? (1)

HPV programme as function of ICER as GDP%

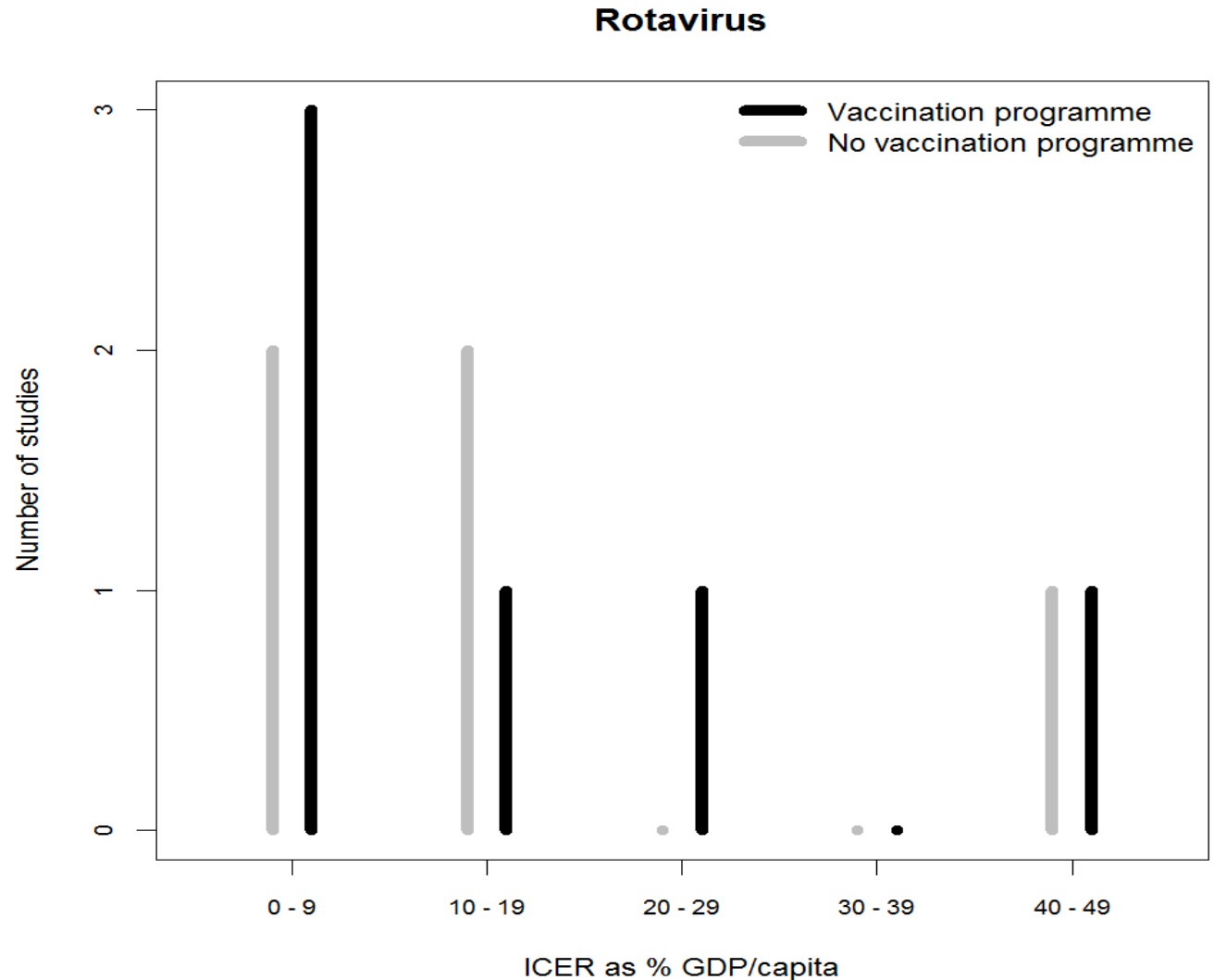
Newall et al.
Pharmacoeconomics,
2014, May 3.



Do WHO-CHOICE thresholds inform funding decisions in LMICs? (2)

RV programme
as function of
ICER as GDP%

Newall et al.
Pharmacoeconomics,
2014, May 3.



Possible explanations why CE evidence is not sufficient for vaccine implementation

- i. LMICs use implicitly (or explicitly) different thresholds than WHO-CHOICE
- ii. LMICs may not consider CE results because of lack of expertise to interpret them
- iii. LMICs consider other criteria more important e.g equity
- iv. LMICs are interested in CEAs but place different values on cost (e.g. productivity losses) and effects (e.g QoL resulting from death)

Way forward

- Instead of “hard” or explicit thresholds a more flexible approach:
 - informal range which decision makers use to understand what the approximate value is in their context
 - Interventions falling at the lower end of the range more likely to be funded (and visa versa)
- Could be used as bargaining tool e.g for price negotiations with suppliers

Advantages/Disadvantages of Thresholds approaches

	Advantages	Disadvantage
Human Capital Approach	<ul style="list-style-type: none">• Easy to determine	<ul style="list-style-type: none">• Do not reflect budget availability or other social preferences• Theoretical problematic
Preference Approach	<ul style="list-style-type: none">• May help inform questions on how much to spend	<ul style="list-style-type: none">• As not linked to available budget it can lead to continual growth in HC spending
League table approach	<ul style="list-style-type: none">• Explicit budget constraints	<ul style="list-style-type: none">• Requires to evaluate all potential programs*

*Alternative in absence of CE information available of all possible interventions

- Obtain rough but useable approximation of max CE of an intervention beyond which more CE interventions are likely to be displaced
- Or use average ICE for any recent health spending decision for which economic evaluations exist

Who pays and cost perspective

- In LMICs different funders (governments, ODA etc) may have different budgets and different ways of resources allocation hence single CE threshold in given country problematic
- Vaccine adoption decisions in LMICs distorted by low vaccine procurement prices thanks to GAVI's financial support
- Double counting using WHO CMH thresholds and inclusion of productivity costs

Conclusions

- Very cost-effective vaccination programs not sufficient to lead to/enable/allow for funding
- Other factors such as overall budget impact are important for decision makers, particularly in LMICs
- For local decision maker the criterion for understanding CE should have some relation to the budget availability for allocation

Thank you