East, Central and Southern Africa Health Community

Fostering Regional Cooperation for Better Health

THANZI LA ONSE

Methods options for HBP

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Evidence. Ideas. Change.

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UNIVERSITY OF MALAWI

Acknowledgements

Thank you to Professor Peter Smith and Jessica Ochalek

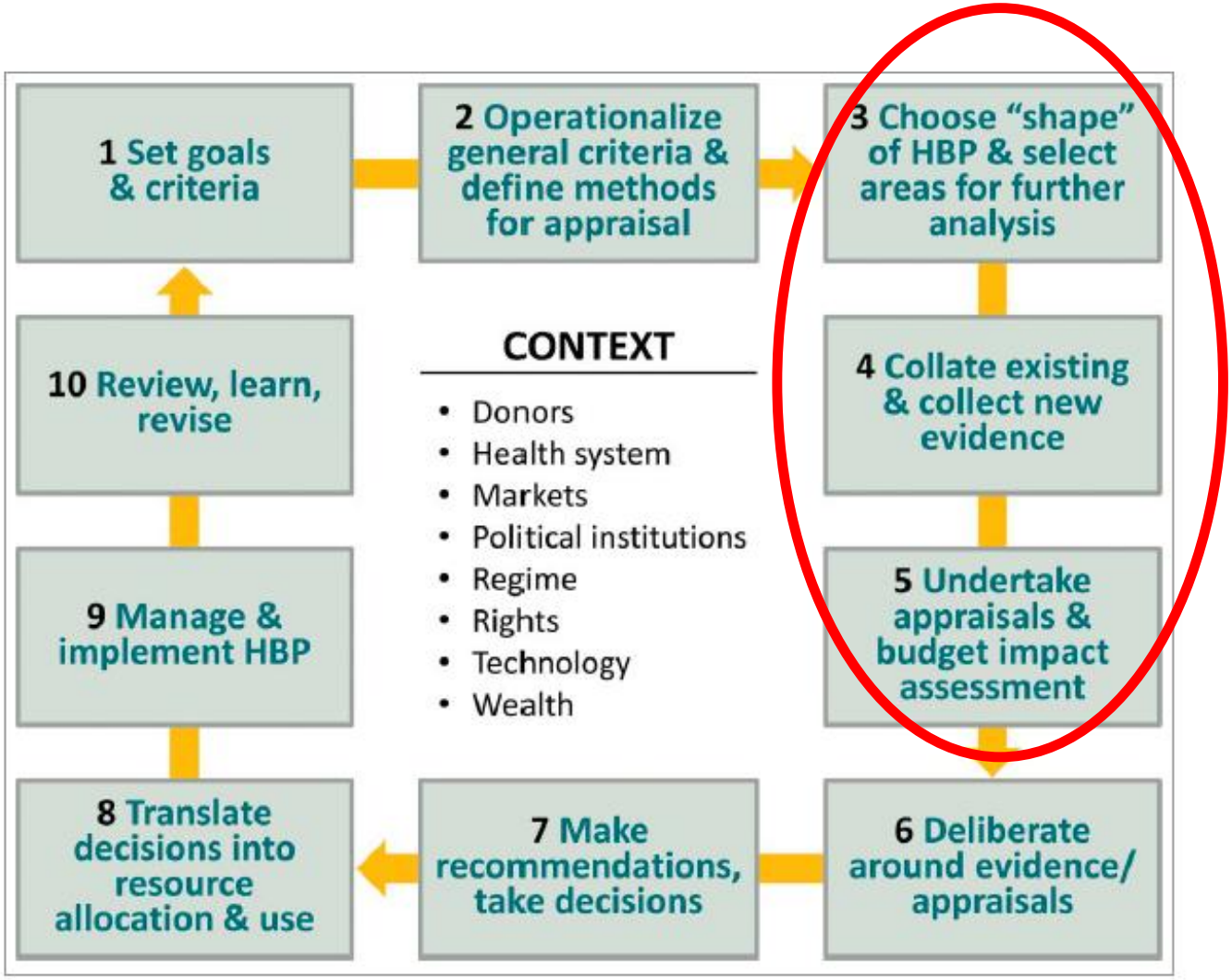
“Nobody knew that healthcare could be so complicated.”

Donald J. Trump, 27 February 2017

Purpose of this session

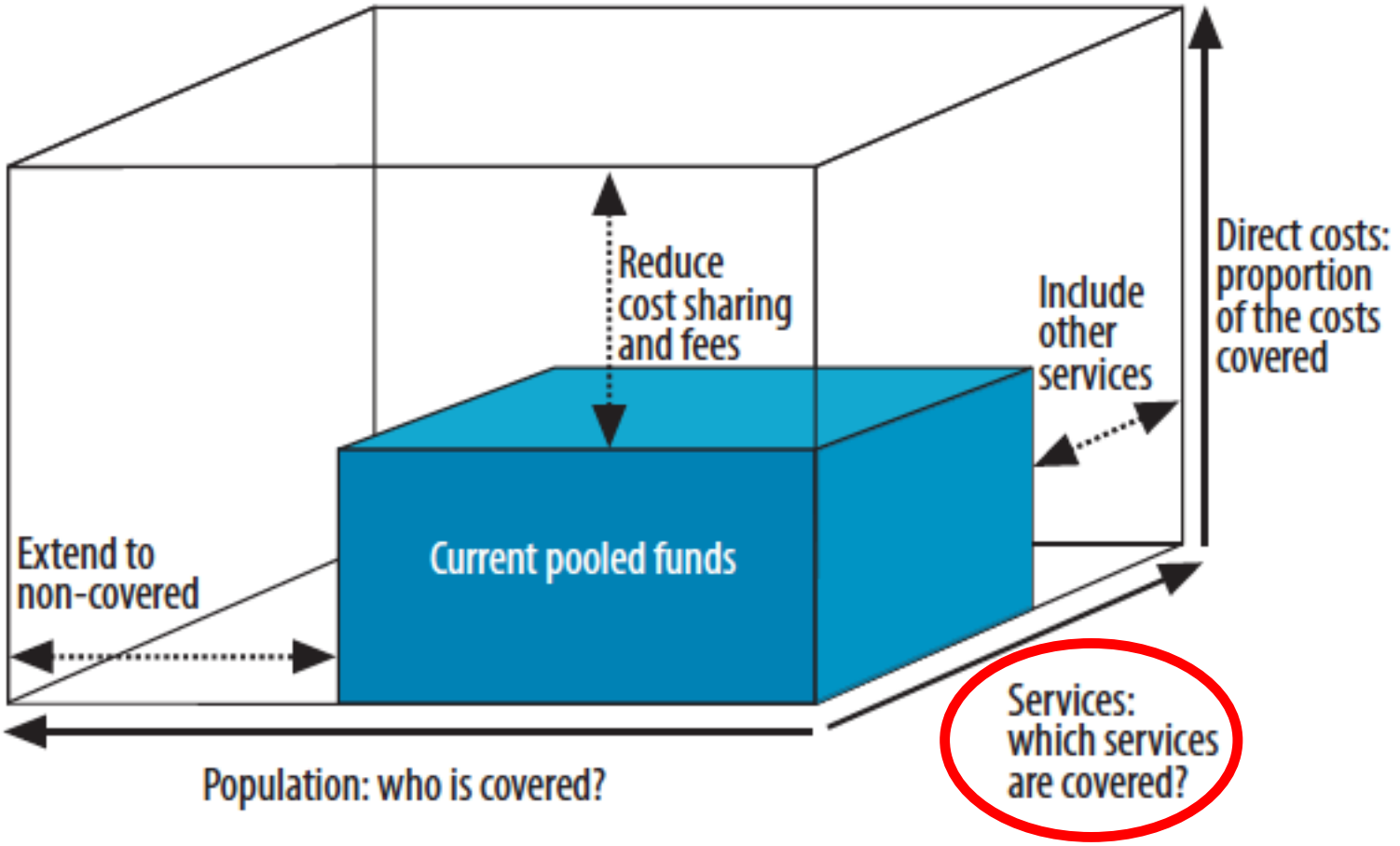
- To explain the role, the strengths and the limitations of analytic methods in informing the specification of the health benefits package
- To explore the most promising avenues for future development of methods
- Not intended as a methods tutorial

Ten Core Elements of Setting a Health Benefits Package



Glassman, A., Giedion, U., Sakuma, Y. and Smith, P. (2016), "Creating a health benefits package: what are the necessary processes?", *Health Systems and Reform,* 2(1), 31-50.

Three dimensions to consider when moving towards universal coverage



World Health Organization (2010), *World Health Report 2010*, WHO: Geneva

The role of analytic methods in informing the HBP

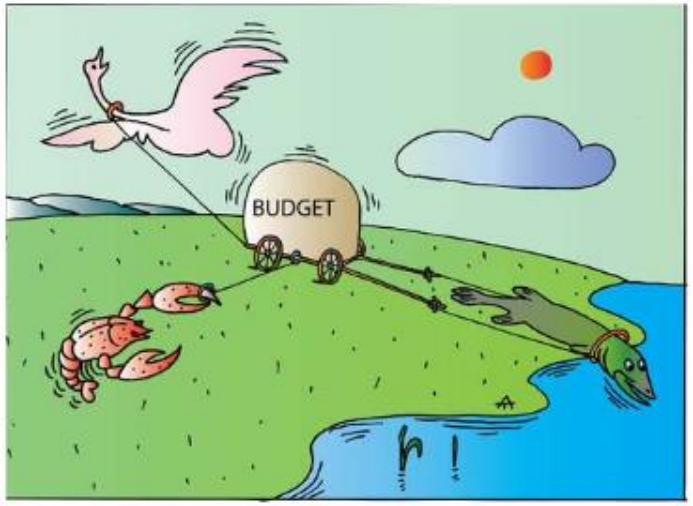
- Creation of HBP serious issue, with consequences for the health, life prospects and finances of affected individuals
- Ultimately a profound political problem
- Analytic methods can contribute by:
  - Acting as a ‘referee’ between competing claims for limited resources
  - Protecting politicians and other policy makers from impossible demands of competing claims for health services
  - Clarifying priorities and trade-offs (e.g. equity)
  - Facilitating accountability, transparency and consistency
  - Using evidence to best effect
  - Focusing attention where it is most needed
  - Demonstrating that health service funds are spent wisely

Analytic methods in context

- Should always be informed by legitimate policy choices
- Their key role is to apply chosen criteria consistently and universally
- Methods seek to maximize the ‘value’ obtained from limited health system resources
- Transparency should be intrinsic to analysis
- Recognize limitations to data, research and analytic capacity
- Analytic evidence should usually be considered alongside other contextual evidence and constraints.

Why set priorities using economic criteria?

- All health care systems make **choices about the allocation of health care resources**
- The underlying problem is one of **scarcity of resources**:
  - Not everything that offers a benefit can be feasibly funded
- The key notion of **Forgone Benefits** (Opportunity Costs)
- The underlying problem is one of scarcity of resources:
  - If resources are spent on one intervention, they are forgone for use elsewhere




NHS
TREATMENTS
One in, one out?

Key choices when applying analytic methods

- What is 'value'?
  - Health
  - Financial protection
  - Other
- What are available resources?
- What are other constraints to choices?
- How is 'equity' to be interpreted?
- What time period is under consideration?

Outline of methods

1. Cost-effectiveness analysis
   - The cost-effectiveness “threshold”
   - Measurement of health benefits
   - Measurement of costs
2. Extended cost-effectiveness analysis
3. Multiple objectives
4. Non-budgetary constraints
5. Assessment of evidence relevance and limitations
6. Setting analytic priorities

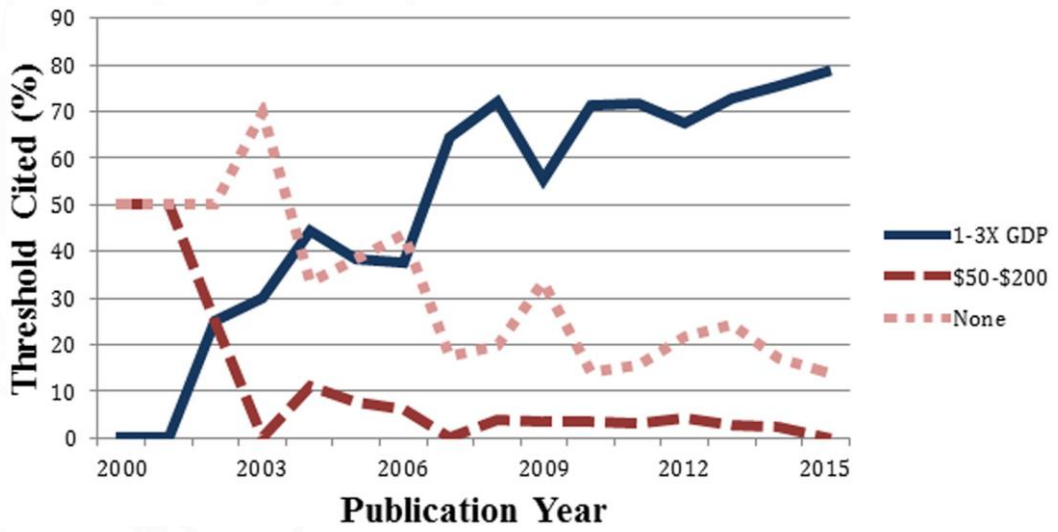
The cost-effectiveness “threshold”

- Should reflect opportunity cost
- I.e., the opportunity cost of a new intervention funded:
  - with additional resources
    - What are the health effects of other things we could choose to do if the resources were made available for other uses?
  - from existing resources
    - What are the health effects of those things we will need to give up are likely to give up if we commit these resources?
- Need to know what the health care system is currently able to afford to generate gains in health

Estimating how much the health care system is currently able to afford to generate gains in health

- What is the health care system currently able to afford to generate gains in health?
  - Recent estimates from higher income countries
    - UK £12,936 per QALY (Claxton et al 2015)
    - Australia AUS$28,033 per QALY (Edney et al 2018)
    - Spain €21,000 and €24,000 per QALY (Vallejo-Torres et al 2016)
    - Netherlands, Norway, South Africa
  - Potential implications for other HCS (Woods et al 2016)
  - Using published estimates of the mortality effect of health care expenditure from country level data (Ochalek et al 2015)

Thresholds commonly used in practice



Source: Leech, A. A., Kim, D., Cohen, J., & Neumann, P. J. (2018). Use and Misuse of Cost-Effectiveness Analysis Thresholds in Low- and Middle-Income Countries: Trends in Cost-per-DALY Studies. *Value in Health*. https://doi.org/https://doi.org/10.1016/j.jval.2017.12.016

Given that the WHO provided no clear rationale for the 1 to 3 times GDP per capita cost-effectiveness threshold, it is perhaps unsurprising that none of the CEAs we reviewed did so either. Instead of relying on the 1 to 3 times GDP per capita as a convention, the global health economics field should develop context-specific thresholds corresponding to opportunity cost. In line with recent analyses, the routinely used threshold of 1 to 3 times GDP per capita is too high and is more salient for LMICs that have more stringent resource constraints [11], [13]. Because of differences in culture, resource constraints, and data availability, threshold and valuation estimates should not be equivalent across economies [2].

Consequences of using a “threshold” that is too high

- Does not reflect how much health the HCS currently delivers
  - Reduction in health outcomes
  - Underestimates the value of increased health expenditure

Health benefits and costs

- What are the **health benefits** and **costs**?
  - Impact on length of life and quality of life
  - Comparable across different disease areas
  - Disability adjusted life years (DALYs) averted or quality adjusted life years (QALYs) gained

Health benefits and costs

- What are the **health benefits** and **costs**?
- Costing tools beginning to emerge:
  - WHO OneHealth http://www.who.int/choice/onehealthtool/en/
  - JLN Costing Toolkit http://www.jointlearningnetwork.org/resources/costing-manual-tool-kit
- Costing also essential for
  - calculating budget impact
  - pricing and provider payment

Health benefits and costs

- What are the **health benefits** and **costs**?
- Summary measure of cost-effectiveness
  - Incremental cost-effectiveness ratio (ICER)
    - Cost per disability adjusted life year (DALY) averted
    - Cost per quality adjusted life year (QALY) gained

	Expected cost ($)	Expected DALYs averted
B	700	5
A	500	4

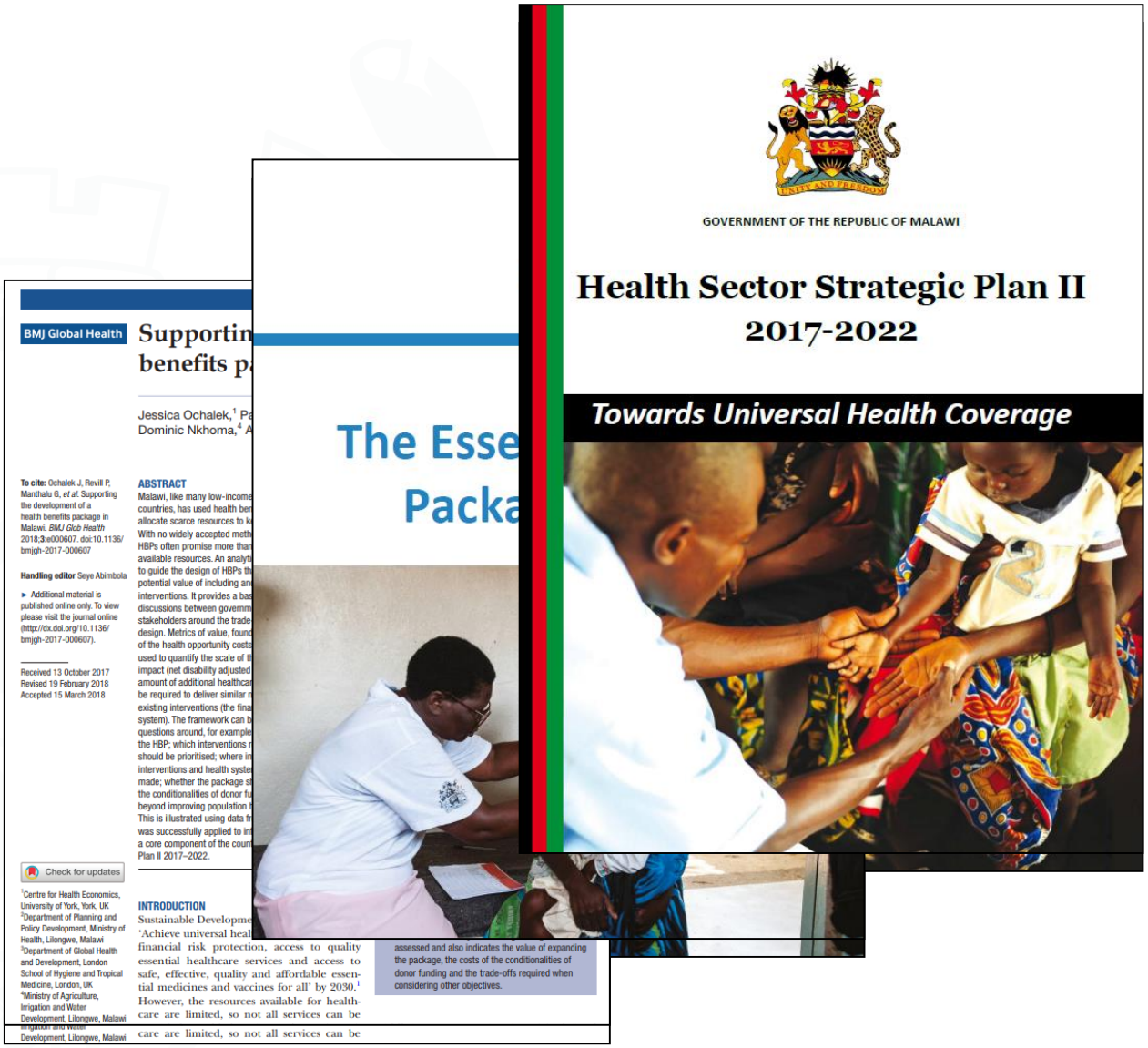
- Incremental cost of B compared to A = C_B-C_A= $200
- Incremental benefit of B = H_B-H_A=1
- ICER = (C_B-C_A)/(H_B-H_A) = $20,000/1 = $200/DALY averted
- Should we change to B or stick with A?

Accounting for the scale of costs and benefits

- Going beyond a categorical (yes/no) assessment of cost-effectiveness
- Need a measure of the scale of the potential health impact of including an intervention in the HBP net of associated health opportunity costs
  - Net health impact (net QALYs gained or DALYs averted)
    - Difference between DALYs averted by an intervention and DALYs that could have been averted with any additional HCS resources required to implement it, or, if the intervention saves HCS costs, it is the DALYs averted by the intervention plus the DALYs that can also be averted with the cost savings offered
  - Financial value to the HCS (amount of additional healthcare resources that would be required to deliver the equivalent net DALYs averted with other interventions)

Accounting for the scale of costs and benefits

- Which interventions represent ‘best buys’ for the HCS and should be prioritised?
- How can objectives beyond improving population health be considered?
- Where should investments in scaling up interventions and health system strengthening be made?



* Ochalek, J, Revill, P, Manthalu, G, McGuire, F, Nkhoma, D, Rollinger, A, Sculpher, M & Claxton, K 2018, 'Supporting the development of a health benefits package in Malawi' BMJ Global Health, vol 3, no. 2,

** Government of the Republic of Malawi, Health Sector Strategic Plan II 2017-2022: Towards Universal Health Coverage, 2017.

Accounting for the scale of costs and benefits

- **Which interventions represent ‘best buys’ for the HCS and should be prioritised?**
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Which interventions to include?

- In a hypothetical simple world we would include the interventions that are cost-effective at our benchmark (e.g., $61/DALY averted)

Intervention	Cost-effectiveness ratio
A	**20**
B	**20**
C	**40**
D	**60**
E	80

What interventions to prioritise?

- A and B same cost effectiveness ratio
- A averts fewer net DALYs than B or C per patient

Intervention	Cost per patient	DALYs averted per patient	patient population	Cost-effectiveness ratio	Net DALYs averted at 100% implementation
A	**100**	**5**	**1**	**20**	**3**
B	**400**	**20**	**1**	**20**	**13**
C	**600**	**15**	**1**	**40**	**5**
D	**900**	**15**	**1**	**60**	**0**
E	800	10	1	80	-3

What interventions to prioritise?

- Varying the size of the patient population

Intervention	Cost per patient	DALYs averted per patient	patient population	Cost-effectiveness ratio	Net DALYs averted at 100% implementation
A	**100**	**5**	**1,000**	**20**	**3,361**
B	**400**	**20**	**500**	**20**	**6,721**
C	**600**	**15**	**10,000**	**40**	**51,639**
D	**900**	**15**	**1,000**	**60**	**246**
E	800	10	10,000	80	-31,148

Prioritising interventions in terms of impact on overall population health (net DALYs averted)

#	Intervention	ICER	Population DALYs averted per 1,000	Cases per annum	Implementation level	Total cost	Cumulative cost	Total DALYs averted	Net DALYs averted (full imp.)
38	Male circumcision	$ 22		45	4,073,429	100%	$ 146,729,553	$ 146,729,553	39,634,464	**25,423,008**
30	Management of obstructed labor	$ 12		86	91,844	100%	$ 1,099,805	$ 147,829,358	2,497,118	**2,025,734**
4	Isoniazid Preventive Therapy for HIV+ no TB	$ 1		887	55,132	100%	$ 79,518	$ 147,908,876	1,118,463	**1,097,909**
5	First line treatment for new TB Cases for adults	$ 3		393	14,465	100%	$ 178,018	$ 148,086,894	1,045,196	**1,001,800**
7	First line treatment for new TB Cases for children	$ 3		393	12,285	100%	$ 116,948	$ 148,203,842	887,697	**850,840**
23	Management of pre-eclampsia (Magnesium sulphate)	$ 6		168	20,022	100%	$ 45,439	$ 148,249,281	534,719	**482,789**
9	Clean practices and immediate essential newborn care (home)	$ 3		368	671,464	100%	$ 415,687	$ 148,664,968	237,281	**226,760**
33	Households owning at least one ITN/LLIN	$ 13		77	6,751,618	100%	$ 13,736,789	$ 162,401,757	228,063	**179,981**
43	Cesearian section	$ 32		31	33,982	100%	$ 671,704	$ 163,073,461	327,465	**156,536**
2	Mass media	$ 1		903	16,879,044	100%	$ 7,608,778	$ 170,682,239	150,390	**147,674**
28	Labor and delivery management	$ 11		89	918,437	100%	$ 1,281,436	$ 171,963,675	170,442	**139,385**
27	PMTCT	$ 11		94	52,791	100%	$ 600,432	$ 172,564,107	157,074	**129,751**
6	First line treatment for retreatment TB Cases for adults	$ 3		393	1,808	100%	$ 99,632	$ 172,663,740	130,651	**125,227**
29	Cesearian section (with complication)	$ 12		86	5,051	100%	$ 171,925	$ 172,835,665	137,341	**111,415**
8	First line treatment for retreatment TB Cases for children	$ 3		393	1,536	100%	$ 65,831	$ 172,901,496	110,963	**106,356**
…	…	…	…	…	…	…	…	…	…	…
1	Cotrimoxazole for children	cost saving			127,265	100%	$ 219,803	$ 248,642,789	318	**22,564**
15	Malaria treatment: Uncomplicated (children, <15 kg)	$ 4		260	1,042,154	100%	$ 4,576,454	$ 253,219,243	14,115	**13,231**
16	Malaria treatment: Uncomplicated (children, >15 kg)	$ 4		260	1,042,154	100%	$ 4,768,246	$ 257,987,489	14,115	13,231
17	Malaria treatment: Uncomplicated - 2nd line (children, <15 kg)	$ 4		260	1,042,154	100%	$ 35,322	$ 258,022,811	14,115	13,231
18	Malaria treatment: Uncomplicated - 2nd line (children, >15 kg)	$ 4		260	1,042,154	100%	$ 70,685	$ 258,093,496	14,115	13,231
35	Under five children who slept under ITN/LLIN	$ 13		77	494,267	100%	$ 1,005,632	$ 259,099,129	16,696	13,176
42	Schistosomiasis Mass drug administration	$ 29		35	388,695	100%	$ 76,527	$ 259,175,656	23,754	12,562
45	Antibiotics for pPRoM	$ 40		25	64,291	100%	$ 38,796	$ 259,214,452	29,509	10,473
37	Blood safety	$ 15		66	39,554	100%	$ 1,625,986	$ 260,840,439	11,866	8,914
32	Vaginal Delivery, with complication	$ 12		83	137,766	100%	$ 803,890	$ 261,644,329	10,026	8,056
44	Maternal Sepsis case management	$ 39		26	64,291	100%	$ 2,730,718	$ 264,375,047	20,052	7,324
21	Malaria treatment: Pregnant Women - complicated	$ 5		198	15,613	100%	$ 139,592	$ 264,514,639	5,574	5,116
10	Case management of MDR TB cases	$ 3		297	70	100%	$ 12,249	$ 264,526,889	5,182	4,898
63	GIT, Intestine cancer	$ 804		1	156	100%	$ 2,711	$ 264,529,599	0	0
65	Cervical cancer (first line)	$ 1,087		1	2,477	100%	$ 161,625	$ 264,691,224	1	-15
61	Ischemic heart disease	$ 453		2	128,130	100%	$ 4,193	$ 264,695,417	7	-45
52	IPT (pregnant women)	$ 110		9	734,750	100%	$ 34,712	$ 264,730,129	99	-79
57	Diabetes, type I	$ 296		3	23,063	100%	$ 4,303,914	$ 269,034,043	25	-95
49	High Cholesterol	$ 68		15	222,947	100%	$ 6,702,709	$ 275,736,752	921	-98
50	Basic psychosocial support, advice, and follow-up, plus anti-epileptic medication	$ 82		12	506,371	100%	$ 1,265,925	$ 277,002,677	689	-237
56	Treatment of depression	$ 265		4	168,790	100%	$ 331,621	$ 277,334,298	115	-382
58	Diabetes, Type II	$ 296		3	138,381	100%	$ 4,210,622	$ 281,544,920	149	-568
66	Treatment of acute psychotic disorders	$ 1,646		1	168,790	100%	$ 958,081	$ 282,503,000	27	-693
62	Treatment of bipolar disorder	$ 557		2	523,250	100%	$ 10,361,966	$ 292,864,966	182	-1,466
67	Treatment of schizophrenia	$ 1,646		1	2,363,066	100%	$ 13,413,129	$ 306,278,095	376	-9,704
55	Hypertension	$ 159		6	845,659	100%	$ 1,337,730	$ 307,615,825	44,495	-70,870

Accounting for the scale of costs and benefits

- Which interventions represent ‘best buys’ for the HCS and should be prioritised?
- **How can objectives beyond improving population health be considered?**
- Where should investments in scaling up interventions and health system strengthening be made?

How can objectives beyond improving population health be considered?

6.2.21 The concept that underlies the Committee decision-making is that of the opportunity cost of programmes that could be displaced by the introduction of new technologies. This way, NICE seeks to maximise the health benefit gained from a fixed NHS budget. This principle is correct if the sole purpose of the health service is to improve health. While this may be the primary purpose of the NHS, it is acknowledged that care delivered by the NHS could have other benefits that are considered socially valuable but are not directly related to health and are not easily captured in a cost per QALY analysis. Techniques exist to consider the trade-off between health benefits and non-health benefits quantitatively. These techniques require that all relevant criteria are identified in advance, quantified and then weighted to reflect aspects of social value in a way that can be regarded as legitimate by all stakeholders. At present the introduction of such techniques into the Committee's decision-making is considered unsuitable. Therefore the Committee will take non-health objectives of the NHS into account by considering the extent to which society may be prepared to forego health gain in order to achieve other benefits that are not health related.

How can objectives beyond improving population health be considered?

- Objectives may include promoting financial protection, reducing health inequalities or recognising the impact of interventions on wider social objectives such as productivity, etc.
  - In principle, possible to extend the measures of benefit and opportunity cost to include other considerations (e.g., extended CEA, distributional CEA)
  - In practice, challenging based on available evidence
- Inform trade-offs based on changes in population health

Health maximising package

- Aim: health maximisation
- Constraint: budget

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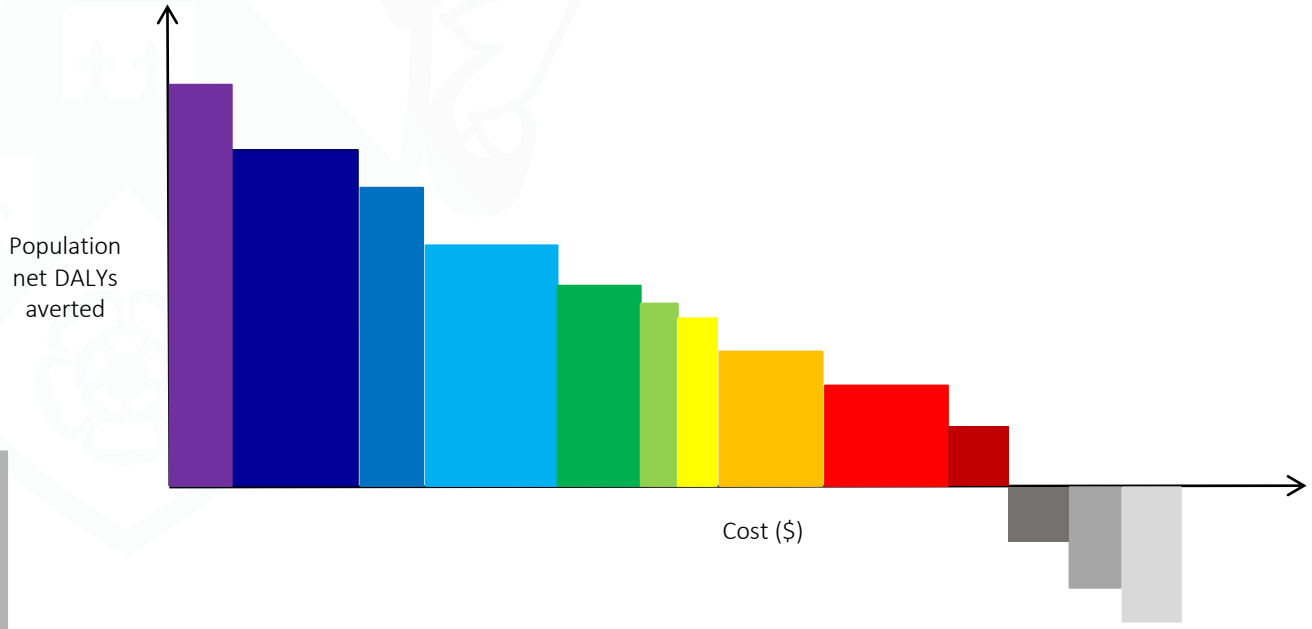
Population net DALYs averted reflects burden of disease: i.e. population net DALYs averted by an intervention = net DALYs averted per person * # of people requiring intervention

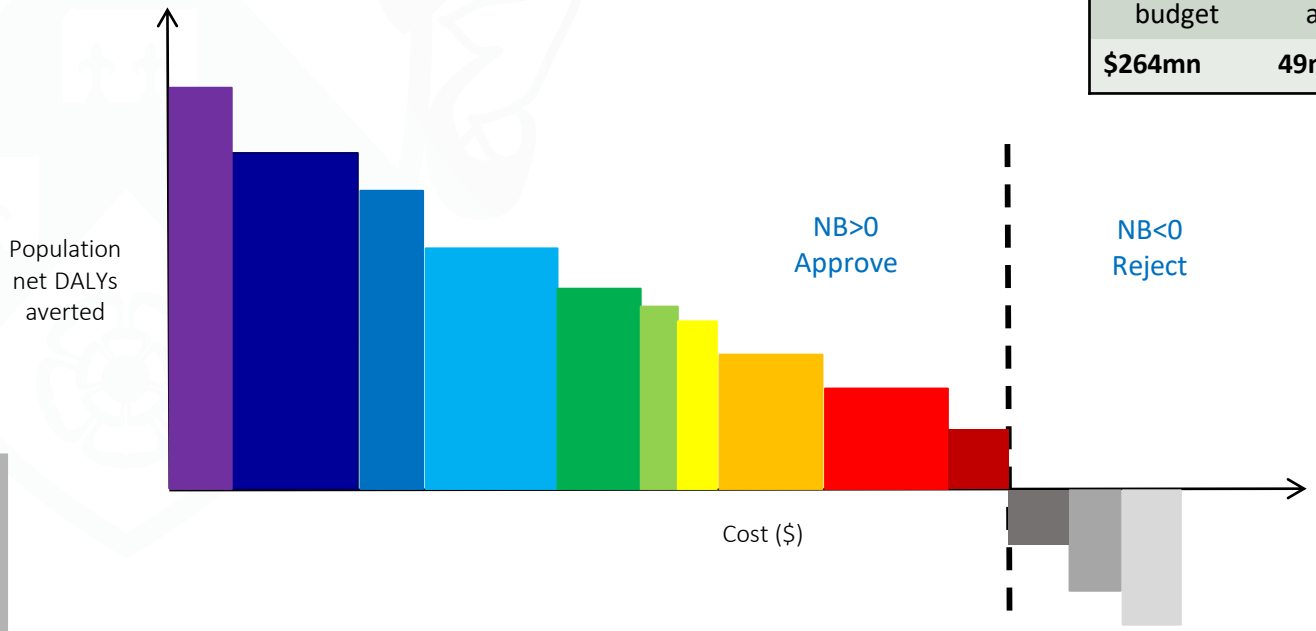
<u>ICERs do NOT</u>



Health maximising package

- Aim: health maximisation
- Constraint: budget

Malawi	
Total budget	Total DALYs averted
$264mn	**49mn**



Health maximising package

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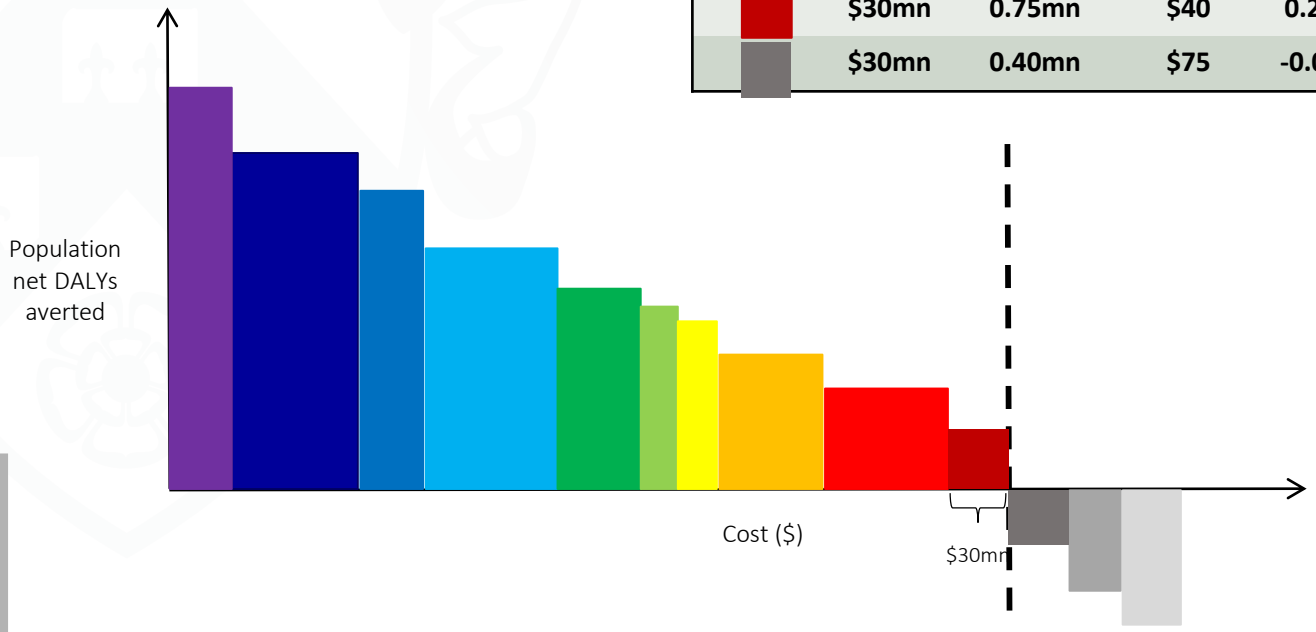
Quantifying the value of interventions					
Interven-tion	*Total* cost	*Total* DALYs averted	Cost per DALY averted	Net DALYs averted	$ value to the HCS
	$30mn	**0.75mn**	**$40**	**0.26mn**	**16mn**
	$30mn	**0.40mn**	**$75**	**-0.09mn**	**-6mn**



Quantifying health losses

- E.g. include dark grey
- May reach the poor or contribute toward financial protection goals

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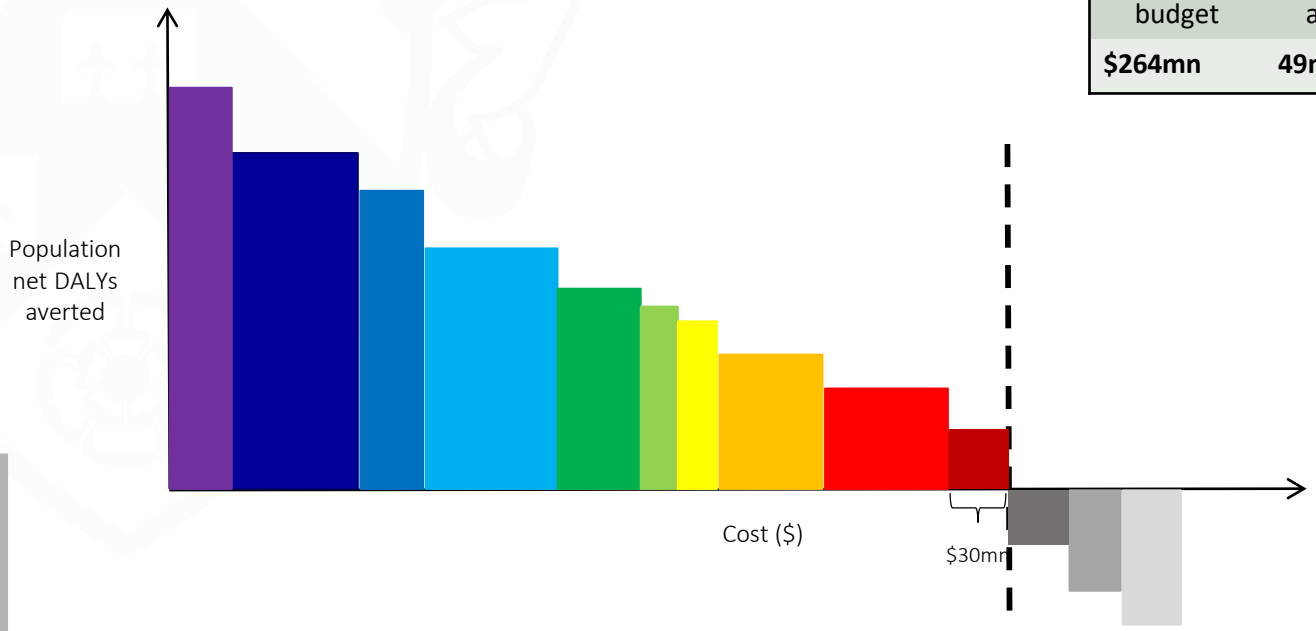

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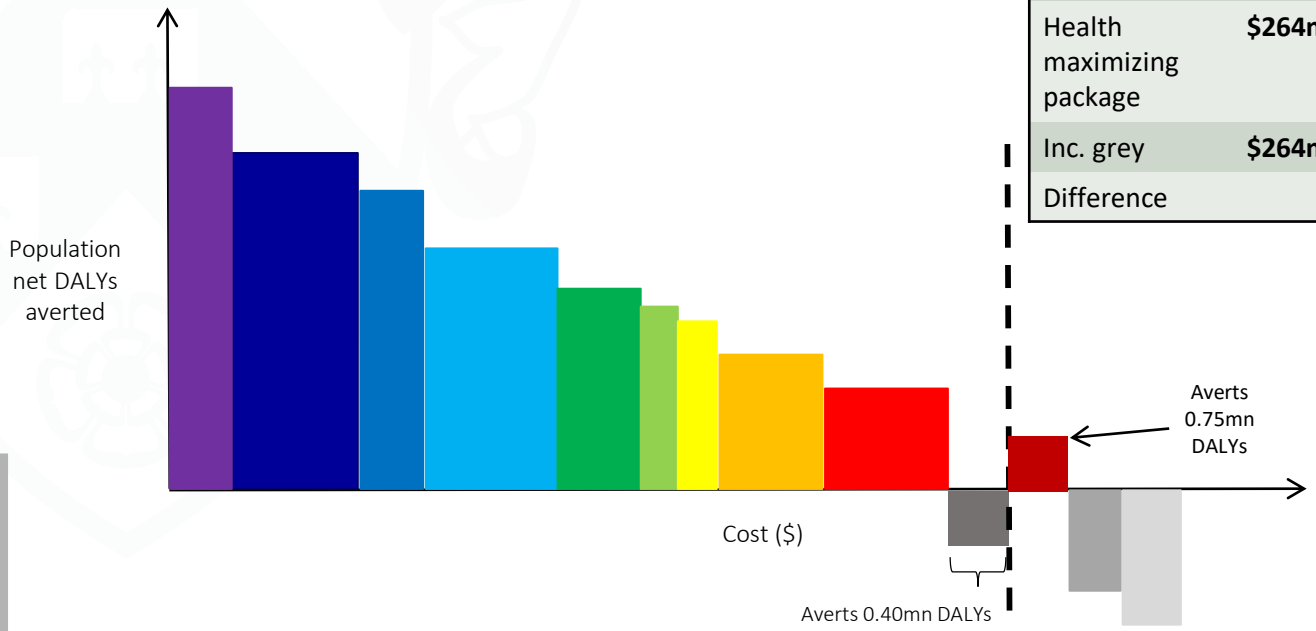
Malawi		
	Total budget	Total DALYs averted
Health maximizing package	**$264mn**	**49mn**
Inc. grey	**$264mn**	**48.65mn**
Difference		**-350,000**



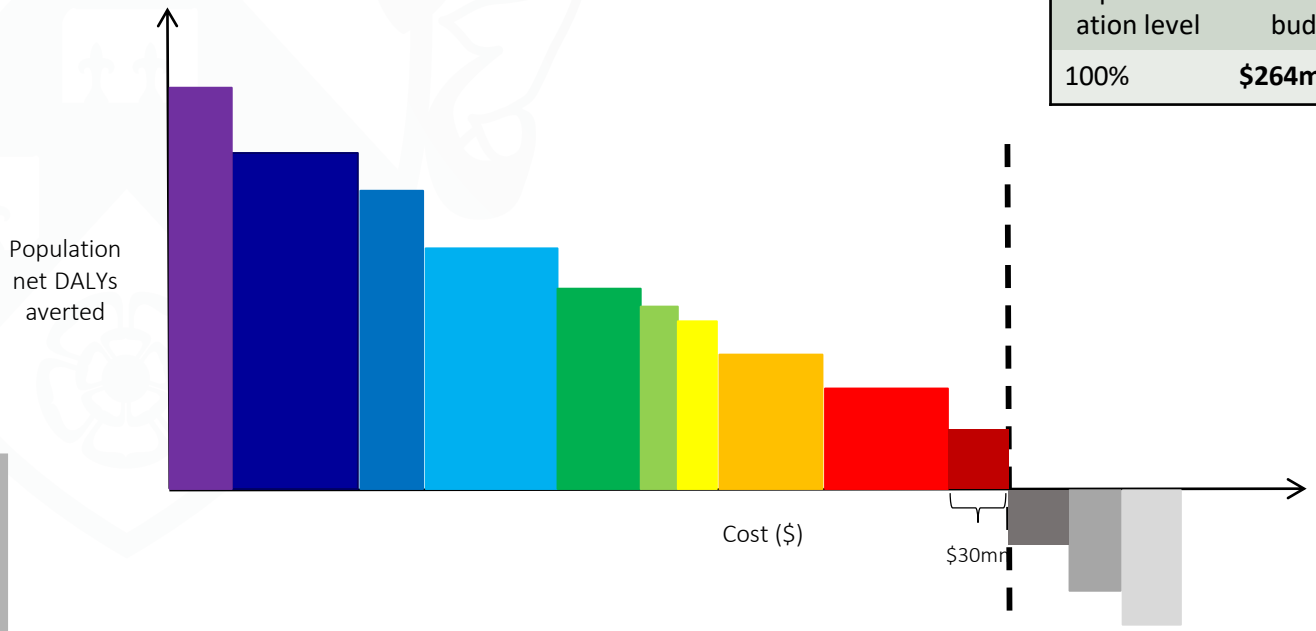
Accounting for the scale of costs and benefits

- Which interventions represent ‘best buys’ for the HCS and should be prioritised?
- How can objectives beyond improving population health be considered?
- **Where should investments in scaling up interventions and health system strengthening be made?**

Constraints to implementing interventions

- Demand and supply side constraints
- In Malawi, plausible levels of implementation closer to 50%

Malawi		
Implement-ation level	Total budget	Total DALYs averted
100%	**$264mn**	**49mn**



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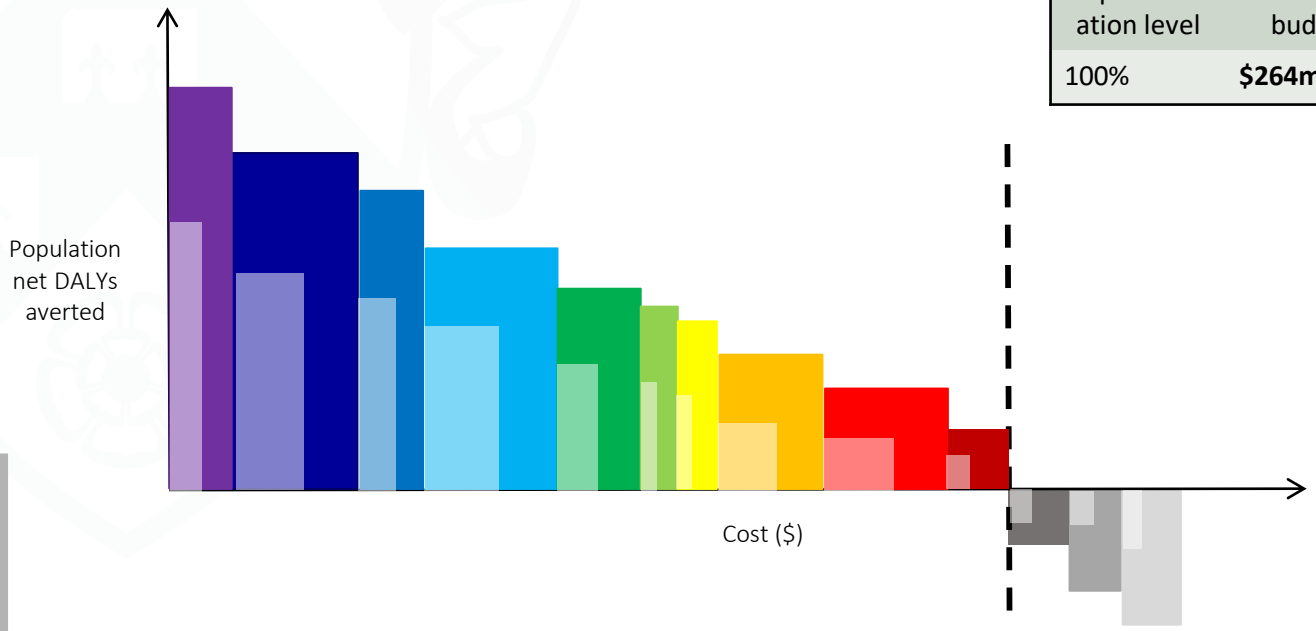

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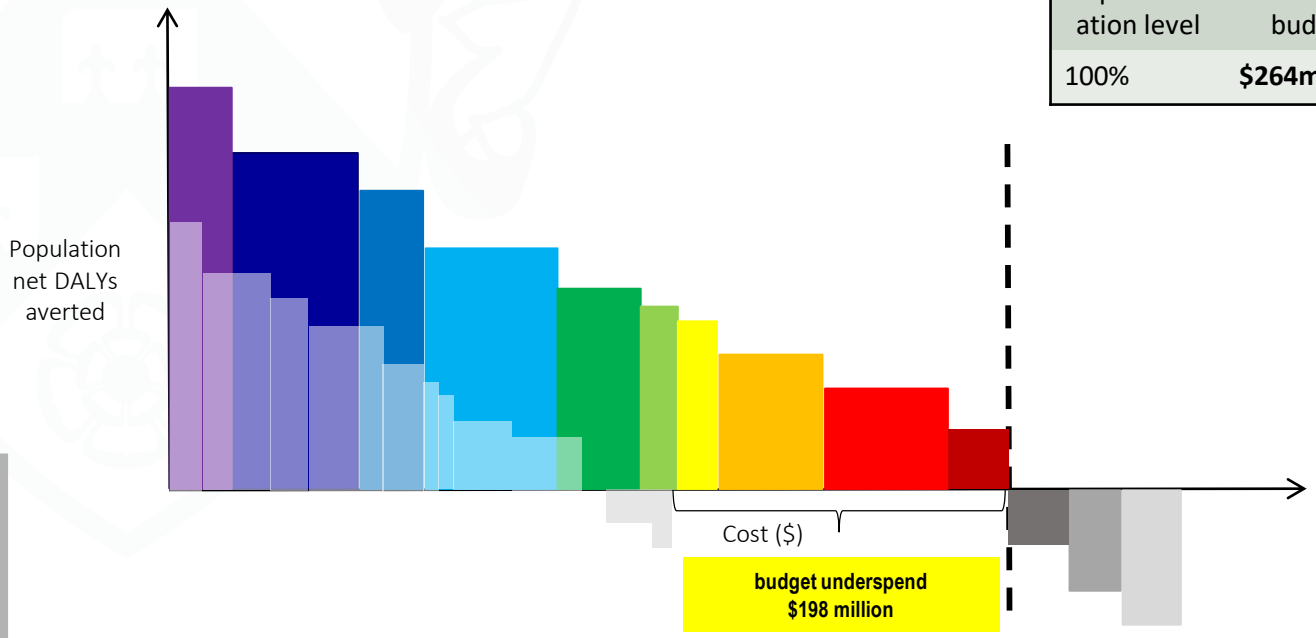

Scaling up interventions

- Which interventions, if scaled up, will offer the most returns in terms of health?
  - Difference between net DALYs averted at full implementation and realistic implementation
- What is the maximum we should be willing to spend to scale the intervention up?
  - Equal to the financial value to the HCS of scale up (i.e., monetary value of the health generated)

Scaling up interventions

- Which interventions, if scaled up, will offer the most returns in terms of health?
  - Difference between net DALYs averted at full implementation and realistic implementation
  - An example:

Table 3 Valuing scaleup: schistosomiasis mass drug administration

	Total DALYs averted	Total cost ($)	Net DALYs averted	Financial value to the healthcare system ($)
Full implementation	23754	76527	12562	770567
Actual implementation	3088	9949	1633	100174
Value of moving from actual to full implementation	20666	66578	10929	670393

DALY, disability adjusted life year.

Source: Ochalek, J, Revill, P, Manthalu, G, McGuire, F, Nkhoma, D, Rollinger, A, Sculpher, M & Claxton, K 2018, 'Supporting the development of a health benefits package in Malawi' BMJ Global Health, vol 3, no. 2

Application in policy in Malawi's HBP

- Criteria for HBP design used in Malawi:
  - health maximisation
  - equity
  - continuum of care
  - complementarities
  - exceptional donor funded interventions
- Operationalization
- Delivery

Quantifying and handling uncertainty in CEA

- Uncertainty intrinsic to all analysis
- Can arise from numerous sources:
  - Limitations in evidence from cost-effectiveness studies (e.g. sample size; target population; country setting; date of study)
  - Limitations in modelling methods used (model structure, parameters used)
  - Uncertainty about effectiveness with which health services will be delivered
  - Uncertainty about which population groups will use the treatment and heterogeneity in their benefits or costs
- Increasingly sophisticated methods for modelling and presenting uncertainty
- Often an important factor in decision-making, especially when deferral of decision is possible

Griffin, S. and Claxton, K. "Analyzing uncertainty in cost-effectiveness for decision-making", in Glied, S. and Smith, P. (eds) (2011), *The Oxford handbook of health economics*, Oxford: Oxford University Press.

2. Extended CEA

- Extends the principle of conventional CEA to reflect (a) equity and (b) financial protection
- Calculates measures of financial loss averted by including the treatment in the HBP
- Reports health gains and financial gains by income group
- Leaves reporting disaggregated to allow decision-makers to take the different outcomes into account – does not seek to summarize benefits

Stylized example of ECEA

Table 2. Extended cost-effectiveness analysis (ECEA) results for universal public finance of tuberculosis treatment to 40 + 10% coverage (per 1,000,000 population).

Outcome	Total	Income Quintile I	Income Quintile II	Income Quintile III	Income Quintile IV	Income Quintile V
TB deaths averted	90	36	27	18	9	0
Private expenditures averted	40,000	16,000	12,000	8,000	4,000	0
Poverty cases averted	34	34	0	0	0	0

Examining the efficient purchase of health, equity, and non-health benefits, we find: $ICER = \$520$ per death averted, $ICER_{FRP} = \$1{,}470$ per poverty case averted, and $ICER_{Eq} = \$125{,}000$ per equity ratio (when simple metric of the ratio between the health benefits among the poorest and the total sum of the health benefits is used). Scaling per \$1,000,000 spent, we obtain 1,800 deaths averted, 720 of which among the bottom income quintile, and 680 poverty cases averted, all of which among the bottom income quintile.

Source: Verguet S, Jamison DT. Benefits beyond Health: Evaluating Financial Risk Protection and Equity through Extending Cost-Effectiveness Analysis. In: What's In, What's Out: Designing Benefits for Universal Health Coverage [Internet]. Washington D.C.: Brookings Institution Press; 2017 [cited 2019 Jan 8]. p. 141–53. Available from: https://muse.jhu.edu/chapter/2020975

3. Multiple objectives in CEA

- Increased interest in ‘multi-criteria decision analysis’ (MCDA)
- Reflects concern that health improvement may not be the only objective of concern
  - E.g. workforce productivity
- ECEA first steps toward a theoretically coherent approach
- MCDA a more heuristic and flexible approach that allows inclusion and aggregation of multiple objectives
  - Well-established outside health care sector
  - Guidelines on good practice

Issues with implementing MCDA

- Who should influence choice and weight of criteria?
- What should those criteria be?
- How should attainment on the criteria be measured?
- What should be the weight placed on each additional unit of attainment for each criterion?
- Can MCDA be applied to all interventions under consideration?
- Profound methodological challenges
- Profound implementation challenges

Source: Morton A, Lauer JA. Comparing Apples and Oranges: Strategies to Weigh Health against Other Social Values. In: What's In, What's Out: Designing Benefits for Universal Health Coverage [Internet]. Washington D.C.: Brookings Institution Press; 2017 [cited 2019 Jan 8]. p. 154–74. Available from: https://muse.jhu.edu/chapter/2020975

Table 4. Comparison of different methods

	CEA	MCDA	ECEA	CBA
Reflective of social values.	Methods assume that population health gain is the overriding objective.	In principle, method can take into account any possible social values, but care should be taken in structuring the criteria.	Method reflects a key concern in LMICs where avoidance of catastrophic financial payments is important alongside population health gain.	Methods involve modelling all-welfare relevant consequences. Opponents argue that CBA embeds unacceptable value tradeoffs.
Technically robust and justifiable.	Method is very well-established within the healthcare sector. Guidelines for good practice exist, including the international reference case, although methodological controversies remain.	Method is well-established outside the healthcare sector and popular within the healthcare sector. Several general (ie nonhealthcare specific) good practice guidelines exist, but healthcare specific guidelines are under in a process of development.	Method is new and established guidelines on good practice do not yet exist.	Method is well-established outside the healthcare sector Several general (ie nonhealthcare specific) good practice guidelines exist, but there is not yet a strong body of healthcare specific guidelines.
Easy to understand	Methods can be implemented at various levels of sophistication: more complicated models will be harder for lay people to engage with.	Ease of understanding is one of the principle selling points for these methods. However, appropriately structuring criteria and choosing aggregation rules is subtler than is often appreciated.	Same comments apply as in the case of CEA but with the proviso that some of the additional financial modelling (in particular the concept of insurance value) adds an additional layer of complexity.	Models can be very technical and expression of costs and benefits in monetary terms is often a stumbling block for lay engagement.
Have low cost of implementation.	Can be done at varying levels of intensity, from "quick and dirty" to more expensive and robust analyses.	Does not require specialised modelling resources but requires relatively intensive engagement from stakeholders to supply scores and weights.	Same comments apply as in the case of CEA but with the additional proviso that modelling of financial and payment aspects is required. Equity analysis requires disaggregated data which is often demanding.	Same comments apply as in the case of CEA and ECEA but requires a more extensive modelling of welfare consequences across a broader range of economic sectors.

4. Non-budgetary constraints

Six categories of impediment to implementing CEA recommendations (Hauck et al, 2017):

- Design of the health system (e.g. human resource constraints)
- Costs of implementing change
- System interdependencies between interventions (e.g. shared platforms)
- Uncertainty
- Weak governance
- Political constraints

An example: system interdependencies

	Treatment 1		Total			
Allocation fixed costs per case	882.4		882.4		Fixed costs	7,500,000
Variable costs per case	200.0		200.0		Var costs	1,700,000
Incremental benefits (QALYs)	7.0				TOTAL	9,200,000
Number of cases	8500		8500			
Total Cost/QALY	154.6					
Variable Cost/QALY	28.6					
	Treatment 1	**Treatment 2**	**Total**			
Allocation fixed costs per case	357.1	357.1	357.1		Fixed costs	7,500,000
Variable costs per case	200.0	500.0	378.6		Var costs	7,950,000
Incremental benefits (QALYs)	7.0	5.0			TOTAL	15,450,000
Number of cases	8500	12500	21000			
Total Cost/QALY	79.6	171.4	134.3			
Variable Cost/QALY	28.6	100.0	71.1			
Threshold	140					

Table 1: Six constraints and proposed solutions to incorporate them into Cost-effectiveness Analysis

Constraint	Solution
Health system design constraint	• Requires institutional adjustments, but can be incorporated into CEA analytically via: • Analyse supply- and demand-side responses • Incorporate multiple resource constraints into the mathematical modelling
Implementation costs	• Incorporate transition costs into the mathematical modelling • Disaggregate costs to highlight major cost components
System interactions	• Model interactions between interventions by incorporating economies of scope • Model intervention under alternative scenarios (with and without complementary intervention) • Present rage of CE ratios dependant on prevailing system configuration
Uncertainty	• Conduct probabilistic sensitivity analysis • Present extent of uncertainty via cost-effectiveness acceptability curves • Address structural uncertainty with sensitivity analyses • Commission additional research • Evaluate robustness of decisions under alternative future scenarios
Governance constraints	• Requires institutional adjustments, and difficult to incorporate into CEA analytically, but possibly: • Constrain the number of decisions that can be made in a given time period
Political constraints	• Requires institutional adjustments, possibly: • Devolve process of priority setting to agencies with politically determined terms of reference • Public involvement in decision making

5. Assessment of evidence relevance and limitations: Hawkins et al (2017)

- Increased interest in what constitutes ‘relevant’ evidence for CEA, and how it might be incorporated into creation of the HBP
- Relevance might be related to:
  - Treatment under scrutiny and its comparator
  - Quality of study
  - Population group
  - Geography
  - Date of study
  - Health system setting
- General principle is to allow all ‘relevant’ evidence to inform decision

Analytic approaches towards assessment of evidence

- Systematic reviews and searches
  - Eg snowballing; pearl growing
- Assessment of internal and external validity
  - validity testing tools eg EVAT external validity assessment tool
- Meta-analysis and other aggregation tools
- Sensitivity analysis
- ‘Value of information’ analysis
  - Identifying priorities for new or augmented data
- Creating evidence
  - Commissioning research
  - Monitoring and evaluation after implementation

6. Setting analytic priorities

- Limited local analytic capacity
- Need to prioritize topics
  - Always political priority topics!
  - But also topics where the budget impact is large
  - … or the cost-effectiveness is close to your likely threshold
- In principle, treatments currently in the HBP but candidates for exclusion should also be considered
- New evidence may prompt reconsideration
- New research studies
- Assessing monitoring evidence from implementation

Towards standardizing CEA – the international reference case

Principles of Economic Evaluation

- Transparency
- Comparators
- Use of Evidence
- Measure of outcome
- Measurement of costs
- Time horizon for costs and effects
- Costs and Effects outside health
- Heterogeneity
- Uncertainty
- Impact on other constraints and budget impact
- Equity implications

The Reference Case for Economic Evaluation (2015)

Tommy Wilkinson, Kalipso Chalkidou, Karl Claxton, Paul Revill, Mark Sculpher, Andrew Briggs, Yot Teerawattananon, Waranya Rattanavipapong

http://www.idsihealth.org/knowledge_base/the-reference-case-for-economic-evaluation/

Contribution of methods to creation of the HBP

- Clarify nature of choices to be made
- Make political preferences operational
- Create a ‘level playing field’ for patients, providers and manufacturers
- Promote consistency, transparency and stability
- Synthesize available evidence
- Identify priorities for new evidence
- Maximize ‘value’ secured from health system
- Promote confidence that health system finances are spent wisely

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