



2018 SKILLS BUILDING PROGRAM

# BIG DATA, ARTIFICIAL INTELLIGENCE AND DECISION SCIENCE IN HEALTH AND NUTRITION

# HEALTH SERVICES PRIORITISATION TOOL

## INTRODUCTION AND TRAINING OBJECTIVES

*Groups:*

Cote 'd Ivoire

Mali

Ghana

Zimbabwe

South Africa National  
*NDoH, CMS, NHLS*

South Africa  
Provincial

*In partnership with*



# Objectives of the workshop



## Explore and better understand the following **concepts**:

- What Universal Health Coverage is and is not
- Priority setting and the trade-offs when defining health benefits packages (HBPs)
- How allocative efficiency analyses can inform priority setting and the design of HBPs
- What local data can be collected to run the HSP tool
- What questions the HSP tool can answer at a national level to inform priority setting

## Gain the following **practical skills**:

- How to link and compare local services and activities to globally selected interventions
- How to run HSP tool analyses and interpret the results
- How to answer priority setting questions using the HSP tool



Throughout the three days we will have a mixture of the following types of sessions:

1. Presentations on key concepts
2. Practice sessions using the tool and groupwork
3. Questions and discussions to share ideas

This link <https://bit.ly/2xy6IVG> for resources

Google Chrome is preferred browser

# Focus of day 1



- Universal health coverage
- Cost-effectiveness and allocative efficiency analyses
- International health benefits packages
- Overview of HSP tool and brief practice running the tool
- Background on default international data used in the HSP tool

# Focus of day 2



- How to link local activities to default HSP tool interventions
- Using country data to run the tool and format of input data
- How to add interventions or overwrite data in the tool
- How to deal with missing data

# Focus of day 3



- Practice running projects using the HSP tool
- Interpreting results from the tool and extracting key policy recommendations
- How the tool can be accessed and running country analyses
- Feedback on the tool and future directions for development



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## HEALTH SERVICES PRIORITISATION TOOL

### Planning for UHC, Current Situation and Challenges

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# The Global Push for Universal Health Coverage



## SUSTAINABLE DEVELOPMENT GOALS

**3.8** Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all.



HEALTH IS A HUMAN RIGHT. NO ONE SHOULD GET SICK AND DIE JUST BECAUSE THEY ARE POOR, OR BECAUSE THEY CANNOT ACCESS THE HEALTH SERVICES THEY NEED

*Dr Tedros Adhanom Ghebreyesus, Director-General WHO*

# Universal Health Coverage (UHC)



Ensuring that all people can use the promotive, preventative, curative, rehabilitative and palliative health services they need, of sufficient quality to be effective, while also ensuring that the use of these services does not expose the user to financial hardship

Three dimensions:

- **equity in access** to health services - those who need the services should get them, not only those who can pay for them;
- the **quality of health services** is good enough to improve the health of those receiving services;
- **financial-risk protection** - ensuring that the cost of using care does not put people at risk of financial hardship.

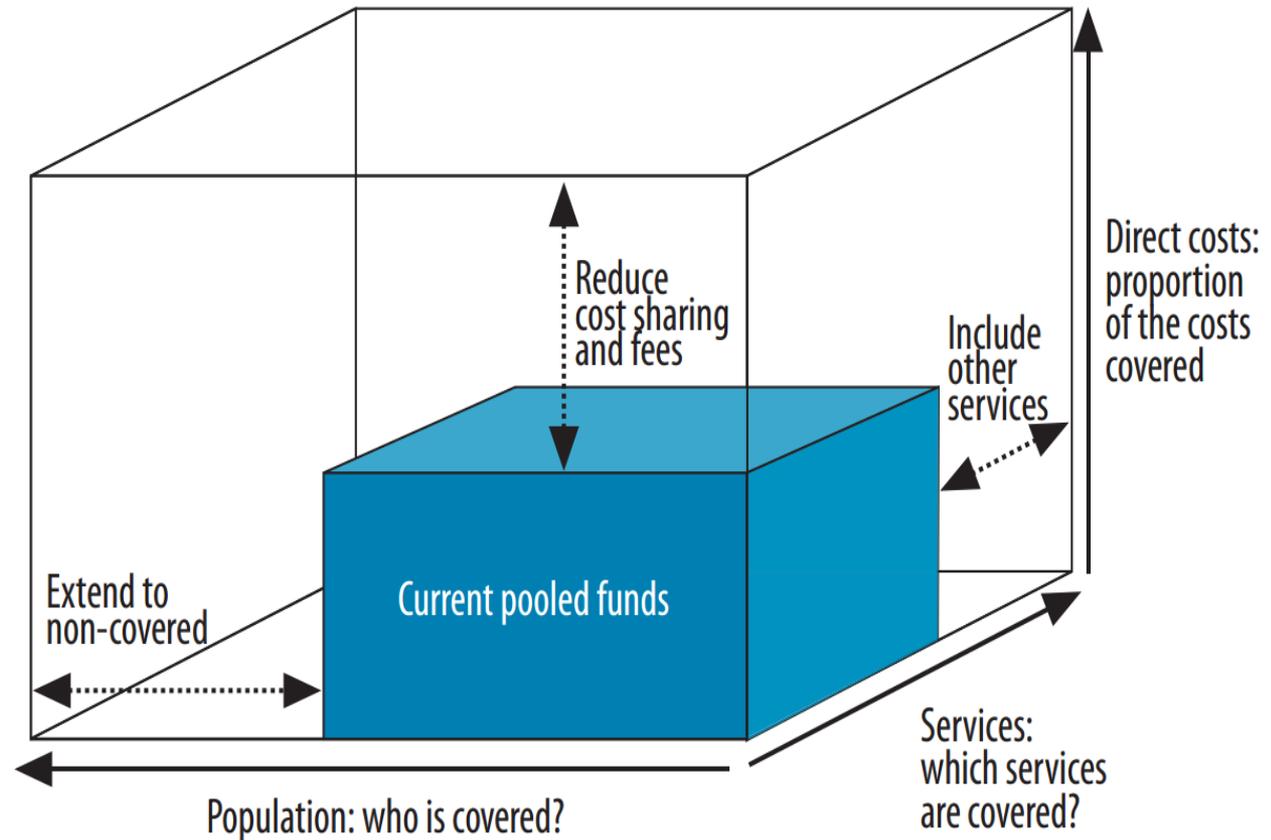


# Recap: The UHC cube: a balancing act between coverage and costs

How much of the  
cost is covered?

Who is covered?

What is covered?



# Current situation: UHC



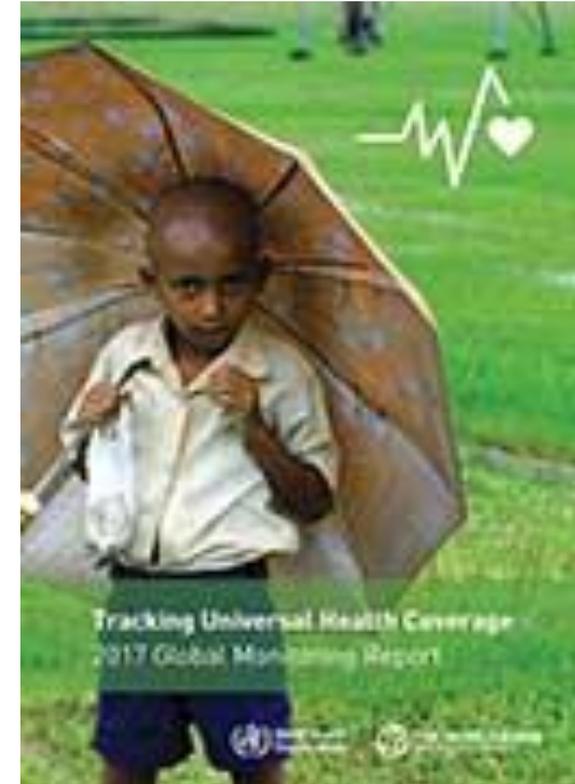
## Coverage of essential services:

- 50% of global population do not have full coverage of essential services
- 1 billion with uncontrolled hypertension
- 200 million have inadequate coverage for family planning
- 20 million infants fail to start or complete DTP vaccine

## Financial protection:

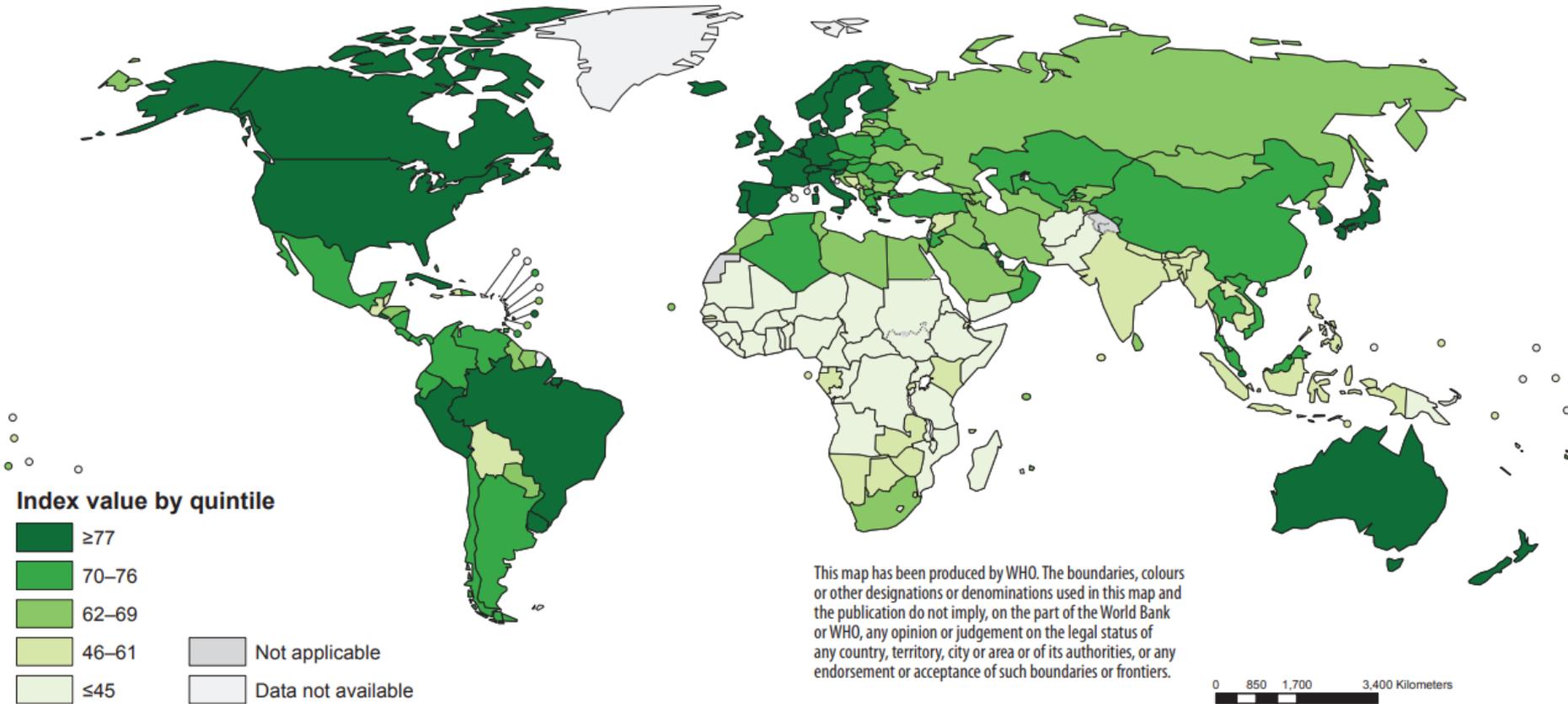
9.2% mean incidence of catastrophic OOP spending\*

5.9% mean annual average growth of catastrophic OOP spending in Africa\*



\*Using 10% household expenditure threshold

# Global push



SDG: Sustainable Development Goal; UHC: universal health coverage.

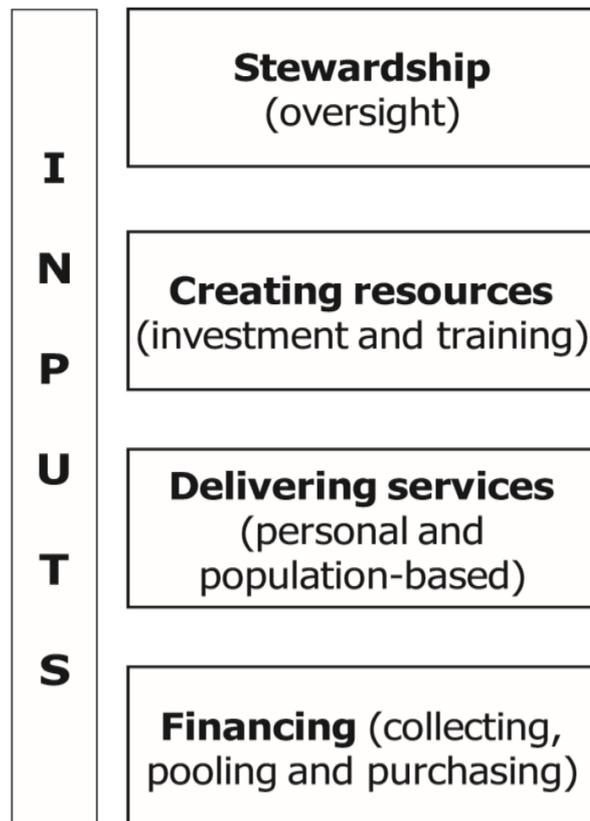
*Tracking UHC Global Monitoring report (2017)*

## UHC service coverage index by country, 2015: SDG indicator 3.8.1

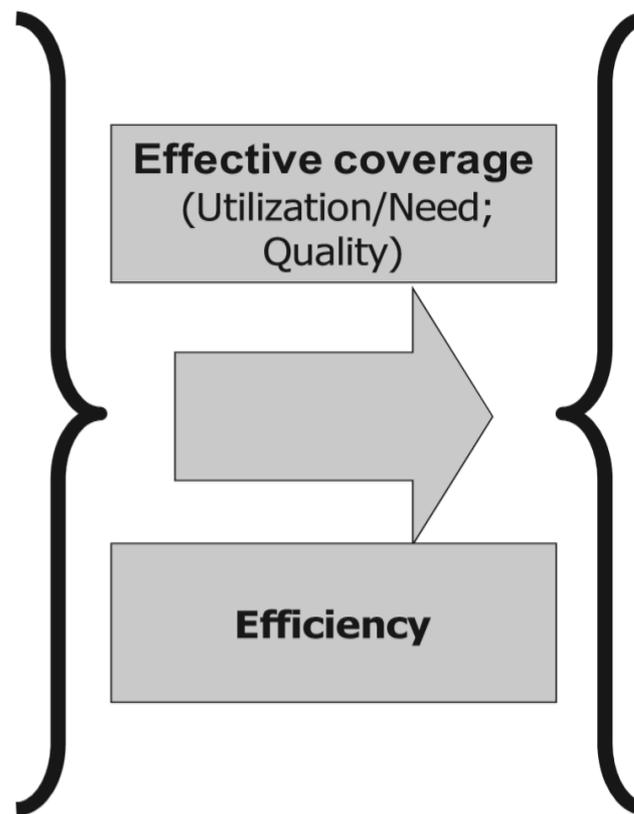
# The WHO Health System Framework: towards UHC



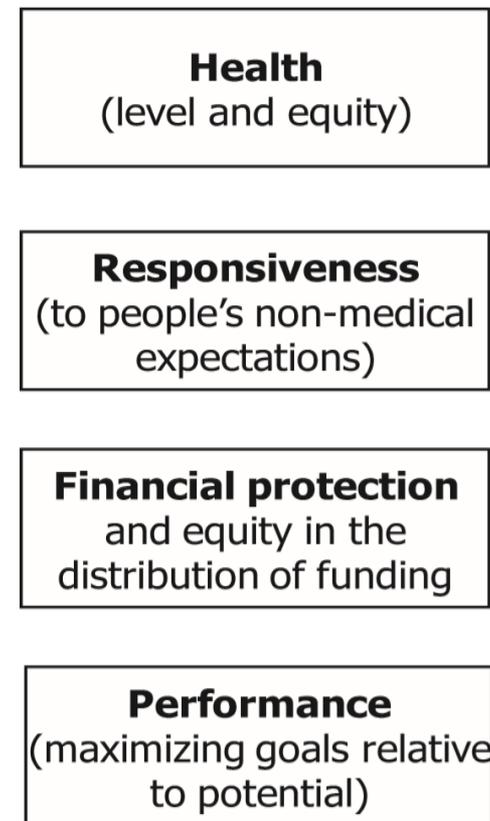
## FUNCTIONS THE SYSTEM PERFORMS



## INTERMEDIATE OBJECTIVES



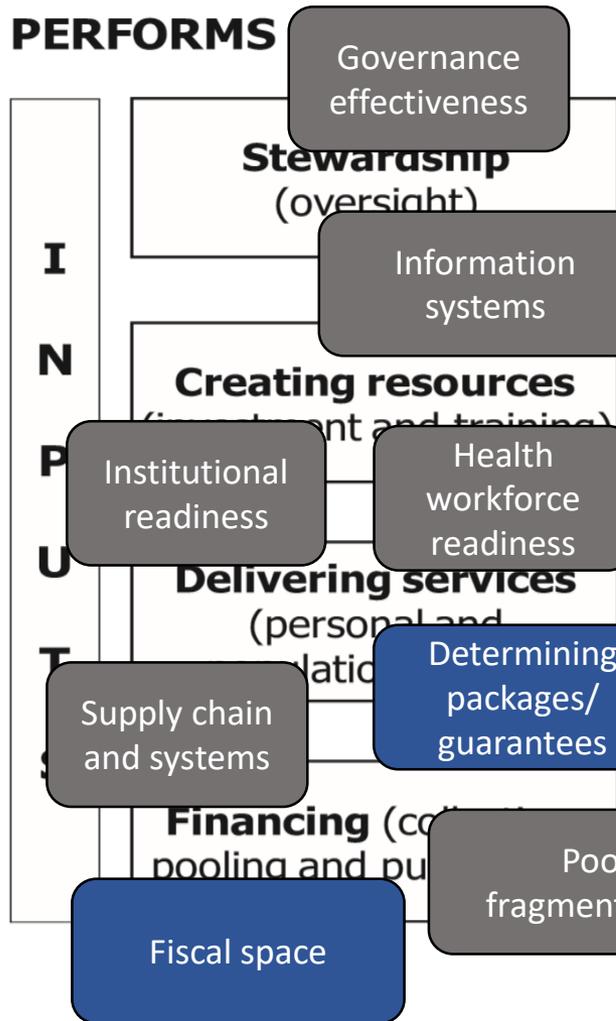
## GOALS / OUTCOMES OF THE SYSTEM



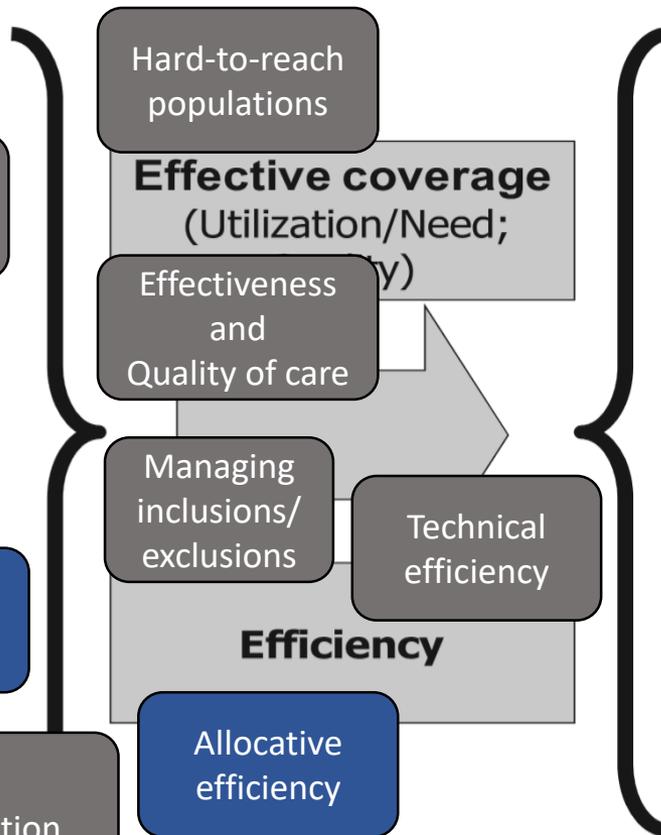
# UHC: critical challenges



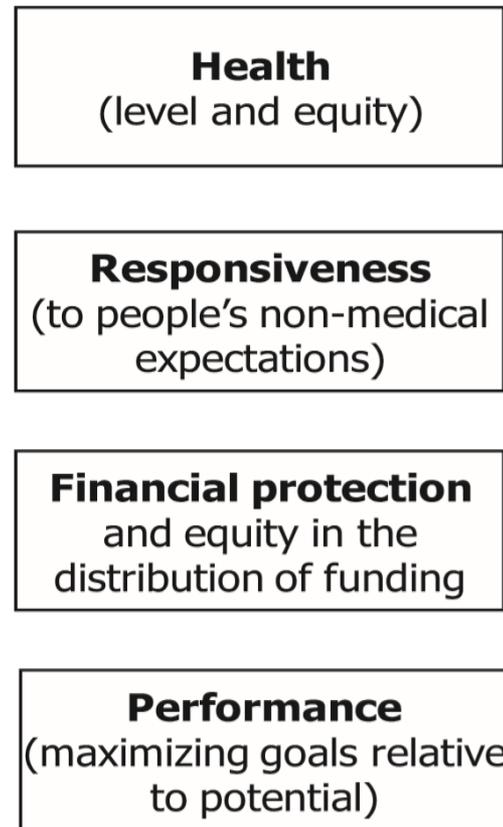
## FUNCTIONS THE SYSTEM PERFORMS



## INTERMEDIATE OBJECTIVES



## GOALS / OUTCOMES OF THE SYSTEM





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# BIG DATA, ARTIFICIAL INTELLIGENCE AND DECISION SCIENCE IN HEALTH AND NUTRITION

# HEALTH SERVICES PRIORITISATION TOOL

## Setting priorities

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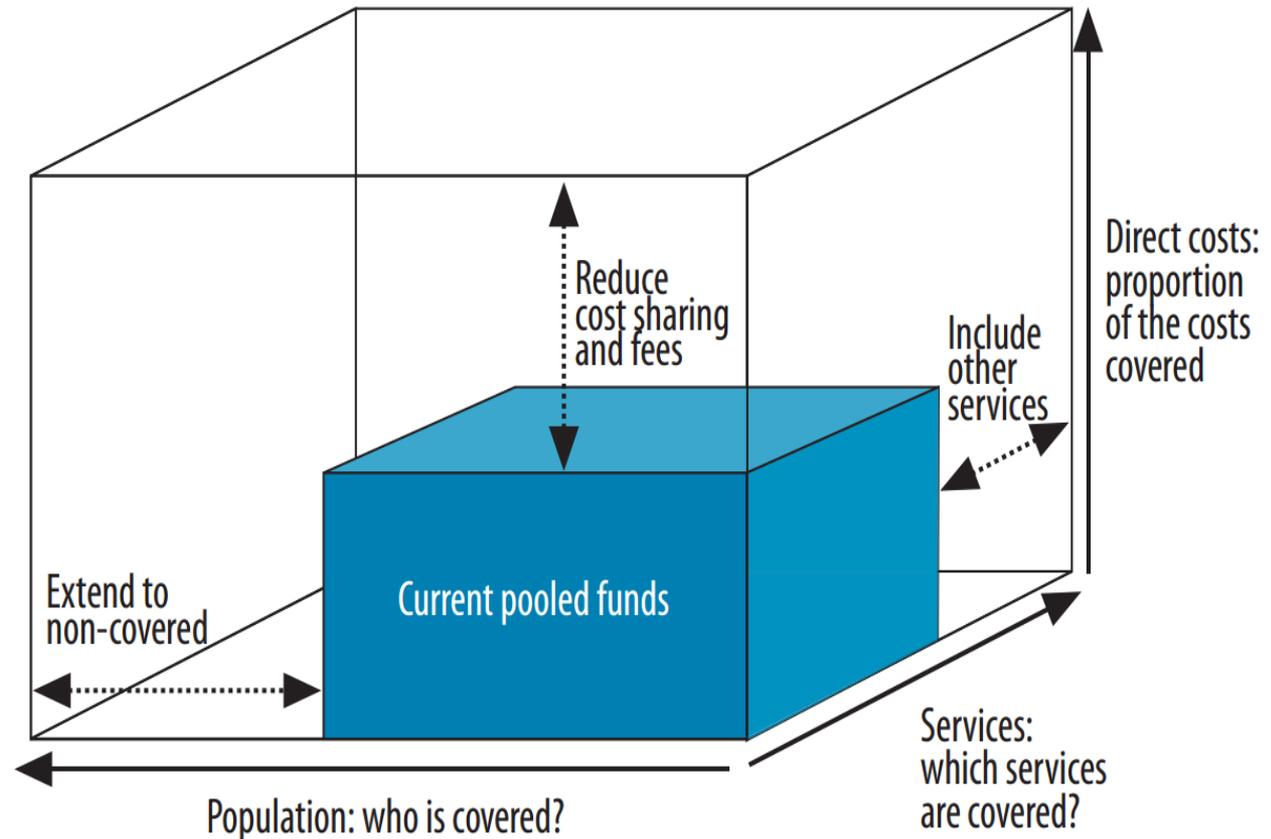
# Setting priorities for what is covered

“Doing” UHC is all about making decisions: Priority Setting

How much of the cost is covered?

Who is covered?

What is covered?



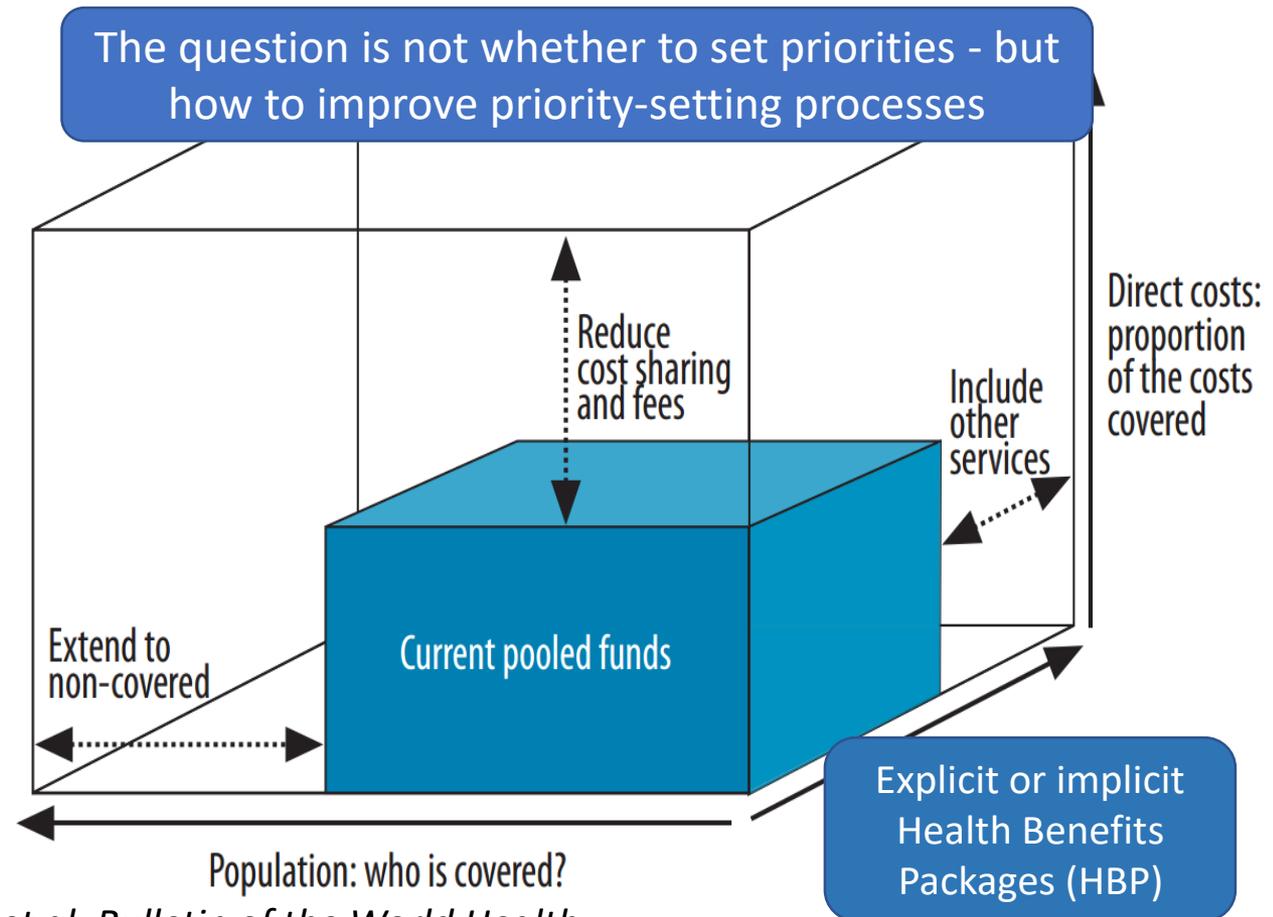


# Setting priorities for what is covered

## “Doing” UHC is about making decisions: Priority Setting

### Priority setting:

“The task of determining the priority to be assigned to a service, a service development or an individual patient at a given point in time. Prioritisation is needed because claims (whether needs or demands) on healthcare resources are greater than the resources available.”



# How can health benefits packages help achieve UHC outcomes and functions?



- Provides clear definition of “what” should be done
- Maximizes health, enhances value for money
  - Introduces greater evidence into public spending decisions
  - Incentivizes the development of cost-effective new technologies
  - Informs pricing negotiations
- Informs budget expansions or as input to sizing of fiscal transfers
- Cuts costs, reduces waste and harm
- Provides the means to regulate private health insurance
- Enhances equity and reduces care variations

# Advantages of defining an explicit HBP:



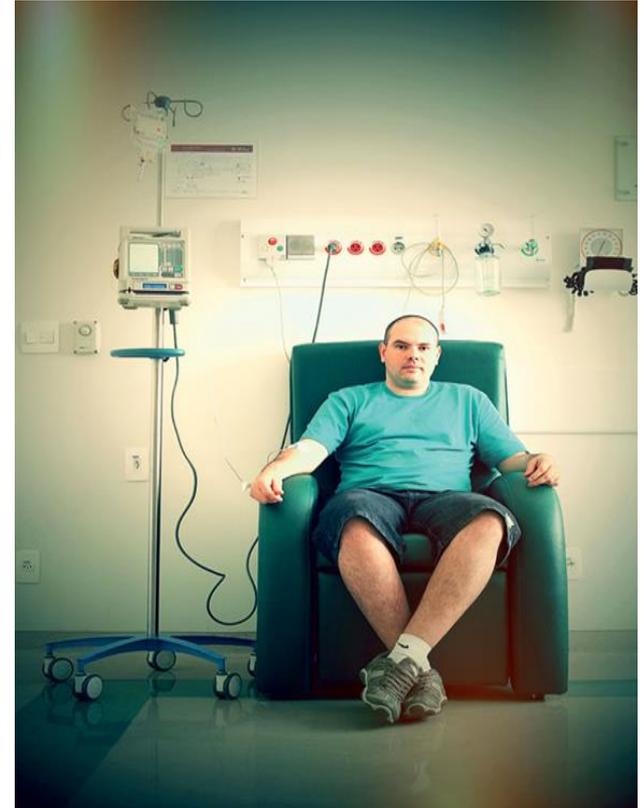
## Creates and facilitates:

- explicit entitlements for patients, particularly poor and marginalized groups with a clear definition of “what” should be done
- Identification of whether funds are being spent wisely on services that create the maximum benefit for society
- transparency around public subsidy/funding for non-HBP services
- important resource allocation decisions, such as regional funding allocations
- adherence to budget limits, which might otherwise be attained only through arbitrary restrictions on access and services
- mitigation of risk that providers will require informal payments from patients to secure access to high-value services.
- information for provider commissioning or payment
- preconditions for a market in complementary health insurance for services not covered, with a number of potential benefits for the health system as a whole

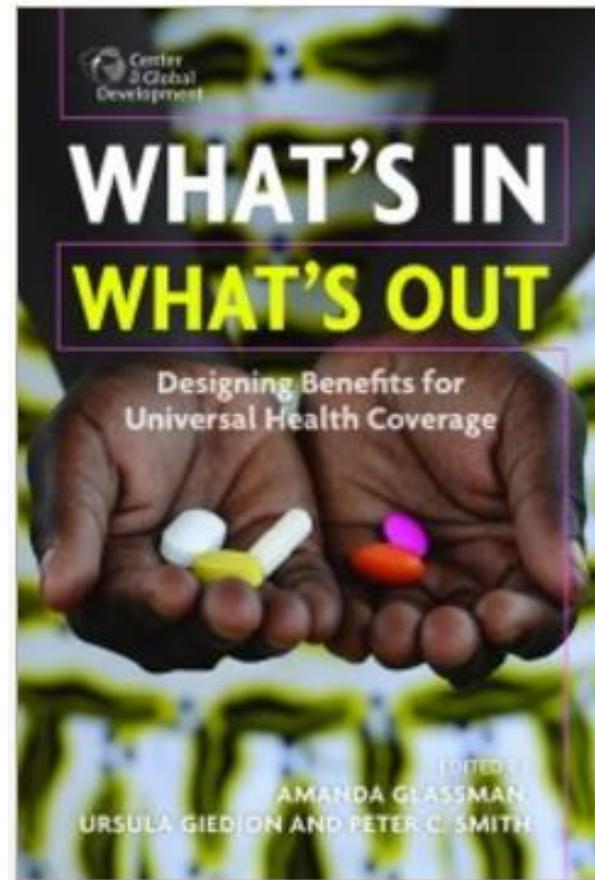
# Difficulties in defining an explicit HBP in LMICs



- Countries may lack the analytic and administrative capacity to set a HBP with any assurance
- The data necessary to set the HBP may be absent or subject to serious distortions and bias
- Service delivery constraints that preclude changing the current pattern of services
- Legal statutes that appear to proscribe any limits on access to publicly funded services
- The need to make the HBP explicit may create political tensions by alienating certain patient or provider interest groups



# Designing benefits for UHC



<https://www.cgdev.org/publication/whats-in-whats-out-designing-benefits-universal-health-coverage>

<https://youtu.be/bRsGP-m4VfQ>

# Defining what is covered:



<b>World Bank developing country group</b>	<b>Low- and Middle-Income Countries with Health Benefit Packages in health insurance schemes and tax-funded systems</b>
Central and Eastern Europe	<b>Health insurance schemes:</b> Azerbaijan, Bulgaria, Croatia, Estonia, Georgia, Hungary, Kyrgyz Republic, Lithuania, Macedonia, Moldova, Poland, Romania, Russian Federation, and Slovenia <b>Tax-funded systems:</b> Armenia, Kazakhstan, Slovak Republic, and Tajikistan
Latin America and Caribbean	<b>Health insurance schemes:</b> Argentina, Chile, Colombia, Dominican Republic, Nicaragua, Peru, and Uruguay <b>Tax-funded systems:</b> Argentina, Bolivia, Brazil, Honduras, Mexico, and Nicaragua
Asia	<b>Health insurance schemes:</b> Lao PDR, Philippines, and Vietnam <b>Tax-funded systems:</b> Cambodia, China, India, Malaysia, and Thailand
Middle East and North Africa	<b>Health insurance schemes:</b> Egypt, Israel, Lebanon, Malta, Syria, Tunisia, United Arab Emirates, West Bank and Gaza, and Yemen <b>Tax-funded systems:</b> Bahrain, Djibouti, Jordan, Morocco, Oman, Qatar, and Saudi Arabia
Sub-Saharan Africa	<b>Health insurance schemes:</b> Ghana, Kenya, Namibia, Nigeria, Senegal, South Africa, Tanzania, and Uganda <b>Tax-funded systems:</b> Uganda and Zambia

*Source: Glassman & Chalkidou, "Priority-Setting in Health: Building institutions for smarter public spending (2012)"*

# Example: AUGE in Chile



## Increasing production and utilization of high-value services to maximize health

- Identification of 56 (now 80) prioritized health problems (based on multiple criteria)
- 75% burden of disease
- Associated clinical guidelines based partially on cost-effectiveness (446)
- Associated interventions (8005)
- Guarantees of access, financial protection, timeliness of care
- Other health interventions provided but without guarantees

# Example: AUGE in Chile



Health problem	Hospitalization rate 2000-2006	Case-fatality rate 2000-2006
Hypertension	10% drop	11% drop
Type 1 diabetes	7% drop, especially among patients older than 30 years; steepest drop seen among ISAPRE beneficiaries	48% drop
Type 2 diabetes	13% increase, especially among older adults (older than age 65); steeper increase (72%) among ISAPRE beneficiaries, possibly because of better access to care or—to some extent—to population aging	Hospital death rate dropped 5%—a noteworthy finding given that this is an older, higher-risk population
Epilepsy	8.9% combined increase for all age groups; 11.4% observed increase among patients younger than age 15 (target population of AUGE); eightfold increase among ISAPRE beneficiaries	98% drop in fatality in all cases; no data are available to distinguish that rate between the population of AUGE beneficiaries for this disease (younger than age 15)
Depression	26% increase for the entire population, 45% increase among adolescents; fivefold increase among ISAPRE beneficiaries	98.6% drop
HIV/AIDS	24% global drop, a large part of which comes from children and adolescents who are beneficiaries of FONASA	56% drop

# Discussion



1. In your country, are the health services and interventions available explicitly defined?
2. Does the definition of available services and interventions differ by
  - a) Programme area
  - b) Technology type (eg drugs or surgical interventions)
  - c) Platform of delivery (eg primary care)
3. Are there current policy initiatives to improve the explicitness and definition of the health benefits package?
4. What are the challenges to improving the explicitness and definition of the health benefits package in your country?



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## HEALTH SERVICES PRIORITISATION TOOL

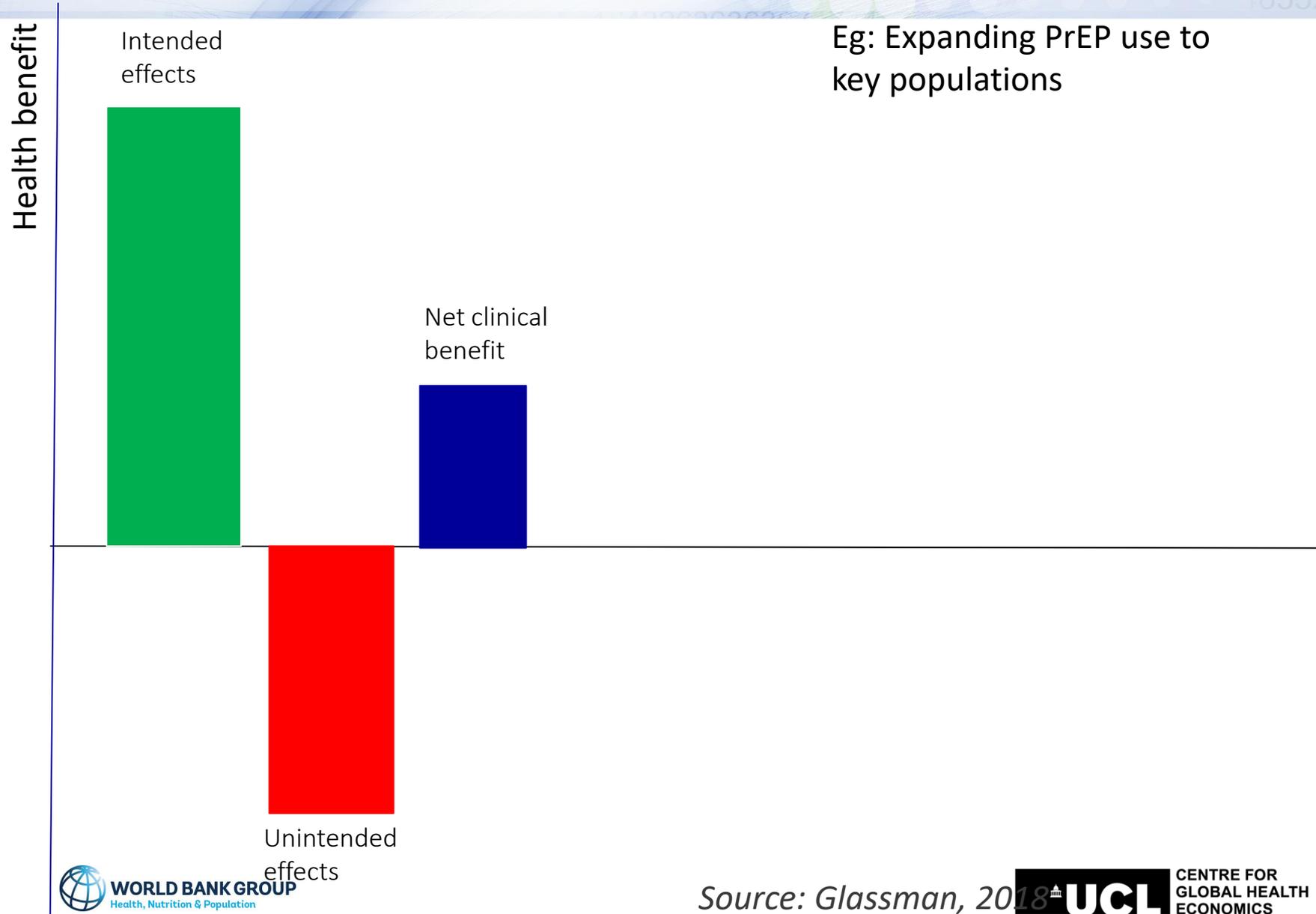
Overview of cost-effectiveness analysis and  
allocative efficiency analysis

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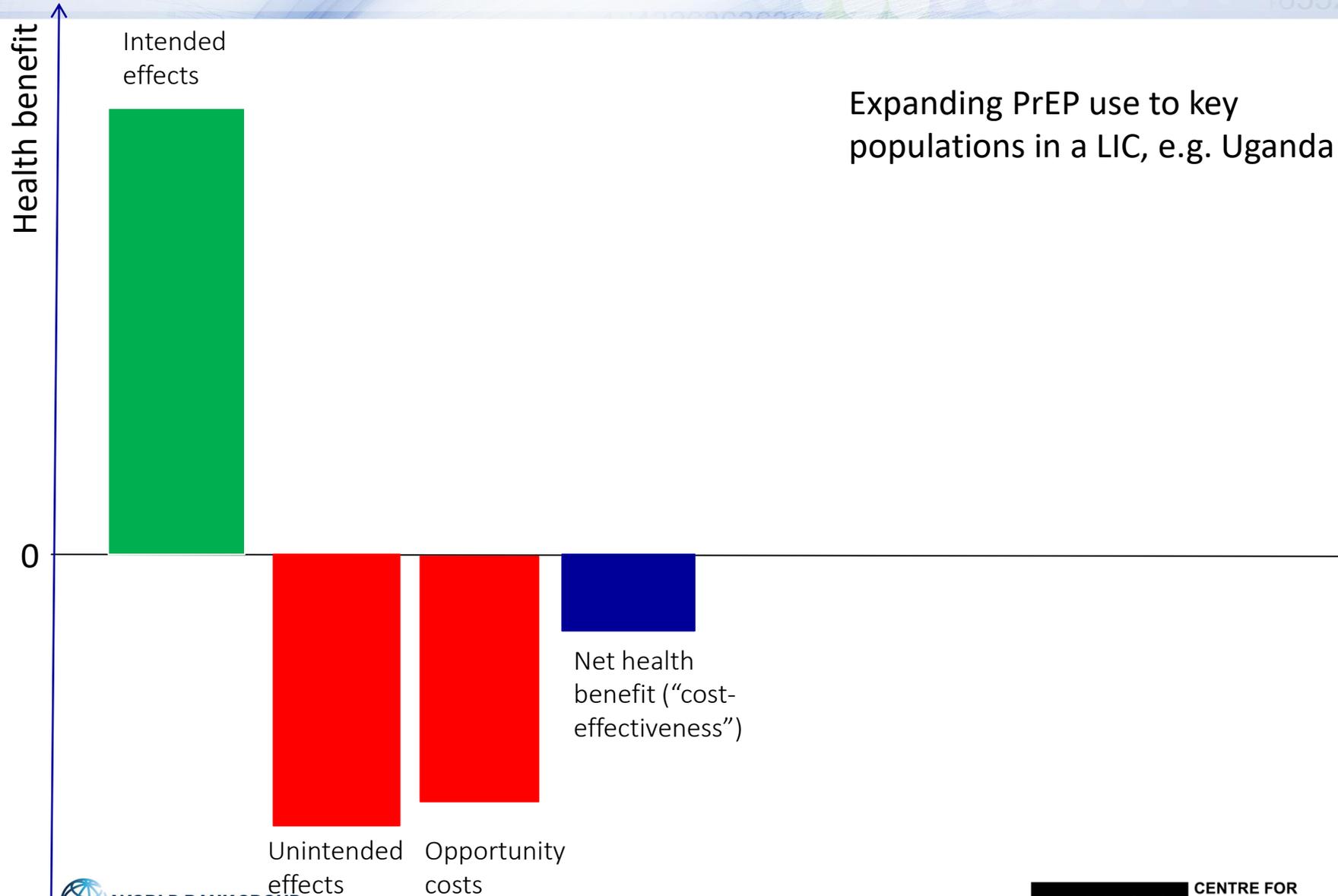


# Recap: Understanding value in health care



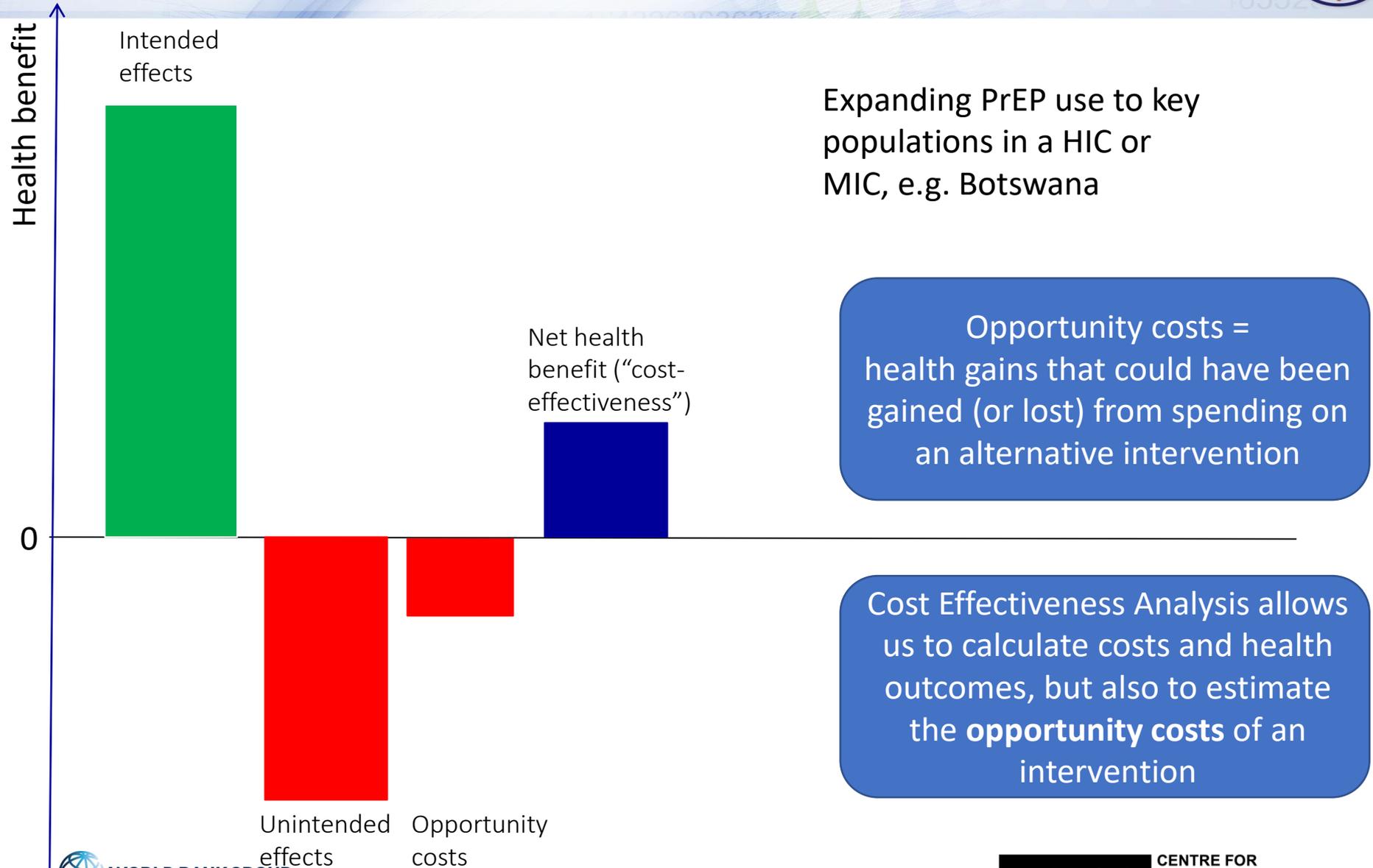
Eg: Expanding PrEP use to key populations

# Recap: Understanding value in health care





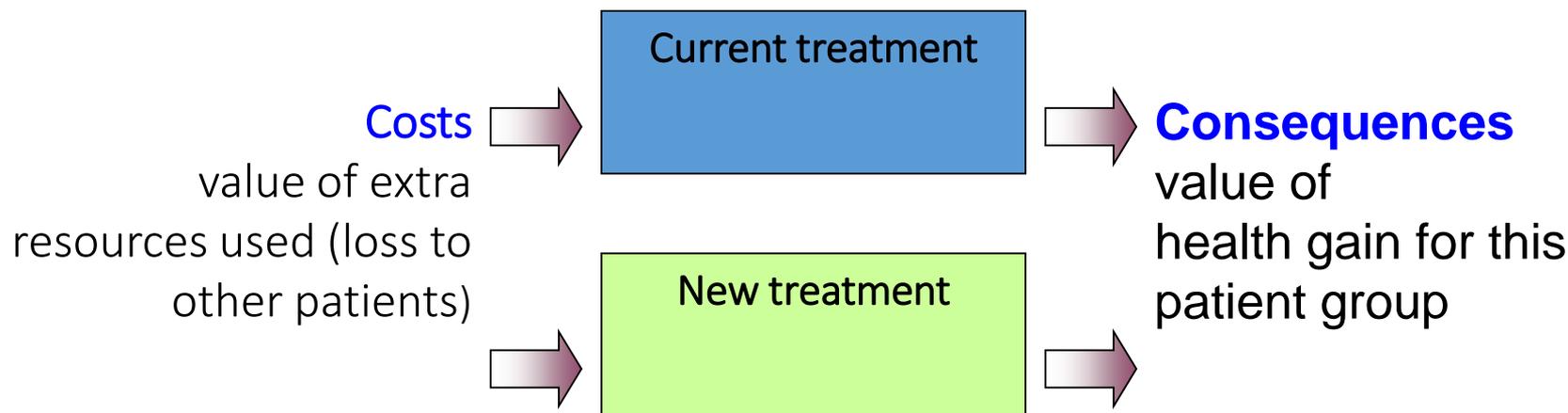
# Understanding value in health care





“... the comparative analysis of alternative courses of action in terms of both their costs and consequences.”

Drummond, Stoddart & Torrance, 1987



*Analysis should be conducted separately for each subgroup of patients.*

# Recap: Assessing efficiency: the ICER

Weighing up the benefits, harms and costs

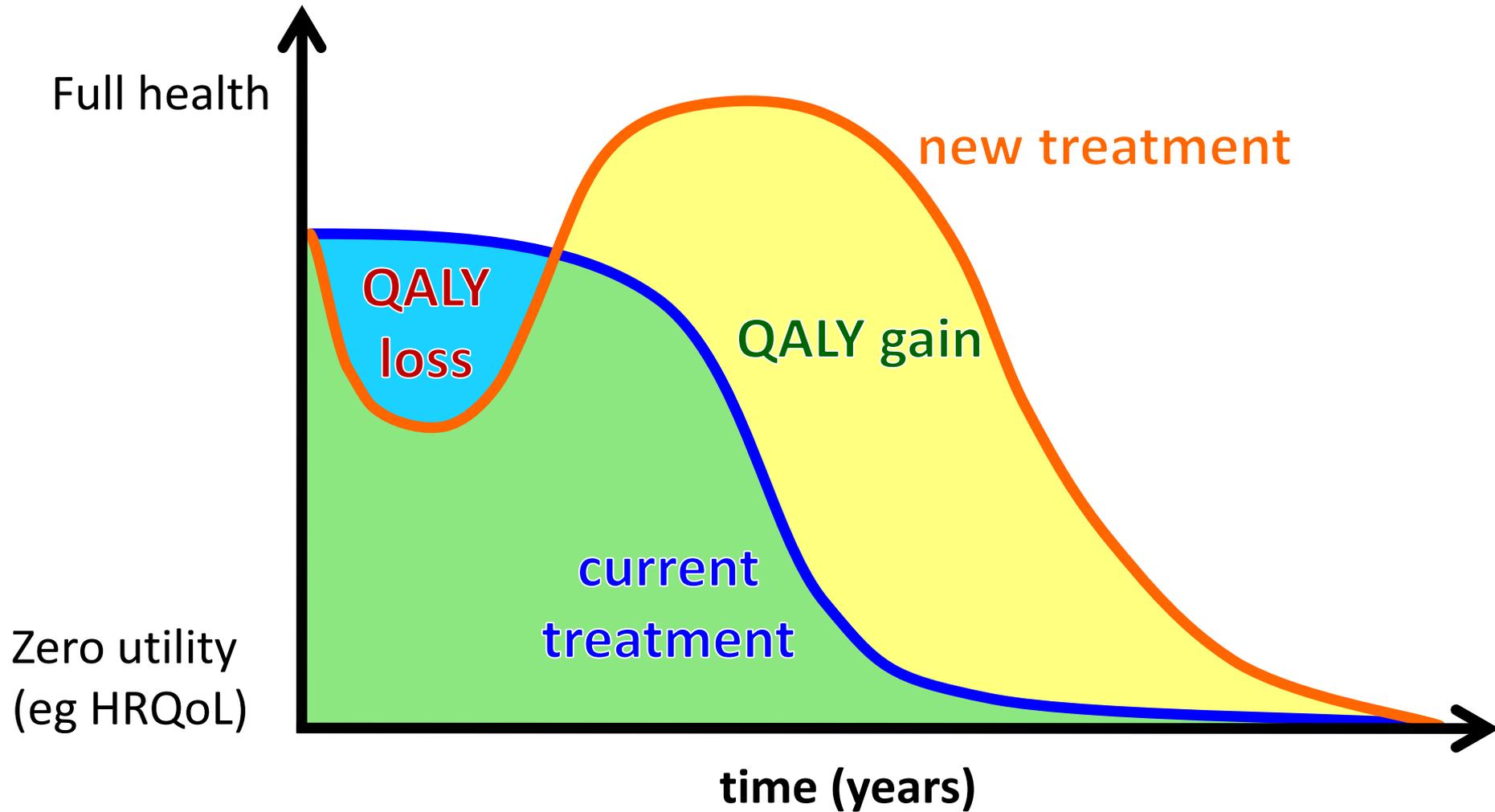


$$\frac{\text{cost}_{\text{new}} - \text{cost}_{\text{current}}}{\text{health gain}_{\text{new}} - \text{health gain}_{\text{current}}}$$

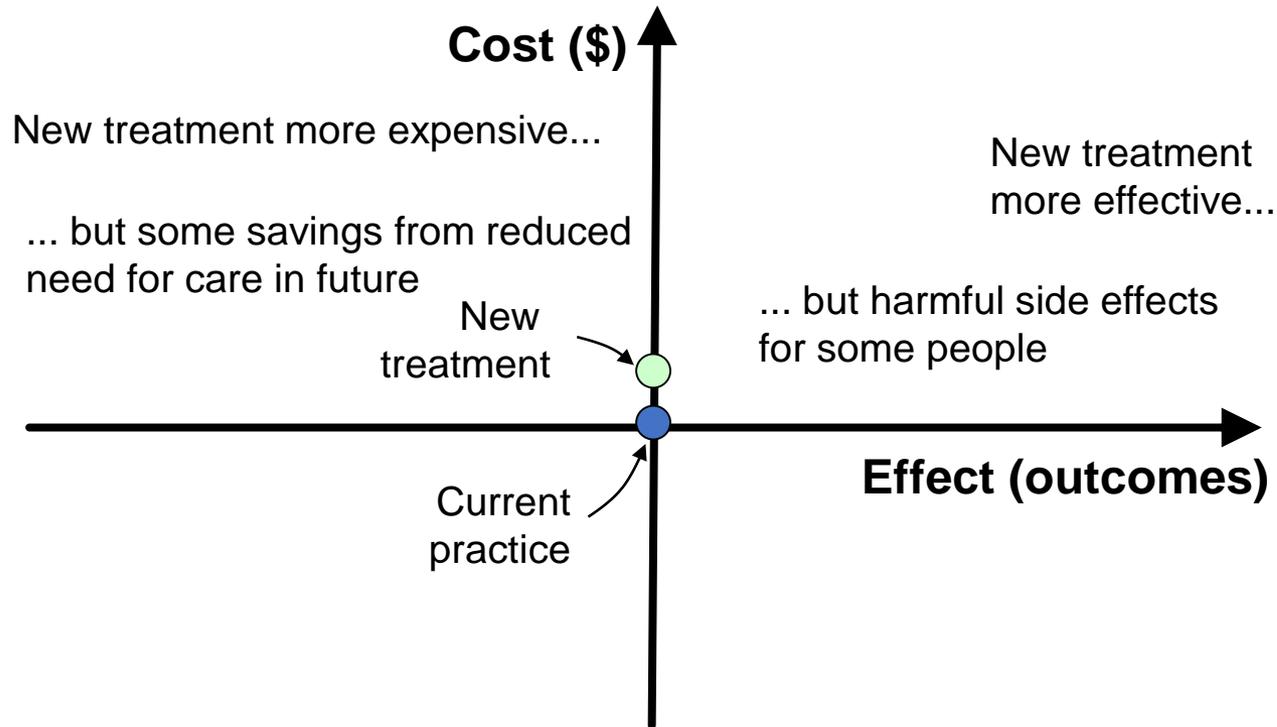
Health gain can be expressed in any metric that suits the nature of the decision or the needs of the decision maker – e.g. hospitalisations avoided, life years gained, no. of people successfully initiated on treatment.

A generalised measure that takes into account length and quality of life eg Quality Adjusted Life Years (QALYs) or Disability Adjusted Life Years (DALYs averted) allows comparability across decisions and consideration of allocative efficiency

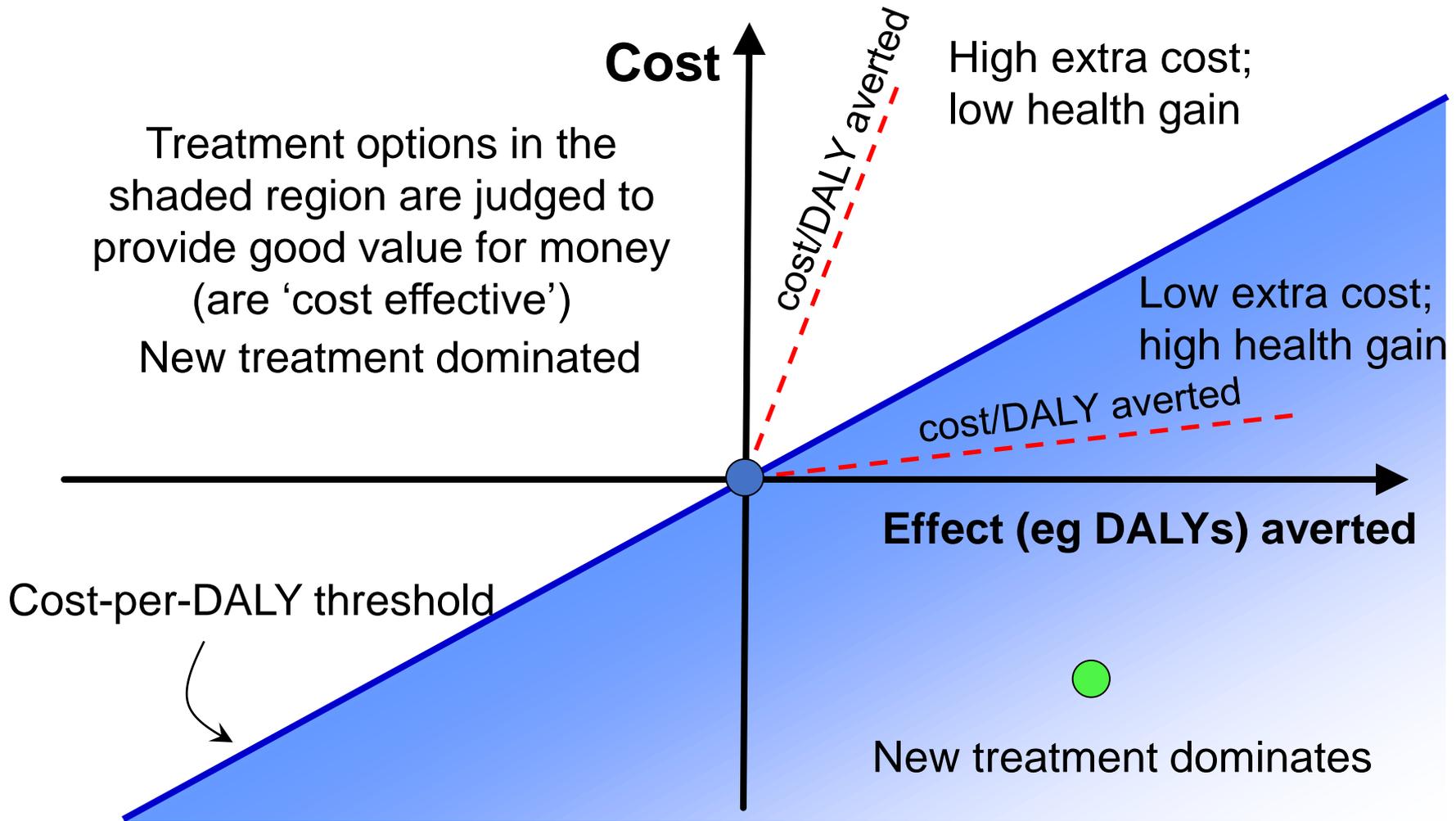
# Generalised measure of health outcome



# How do we use the ICER to assess value for money?



# How do we use the ICER to assess value for money?



# Work out this example yourself



$$\frac{\text{cost}_{\text{new}} - \text{cost}_{\text{current}}}{\text{health gain}_{\text{new}} - \text{health gain}_{\text{current}}}$$

	Cost (\$)	Outcome (DALYs averted)	Ratio
Programme 1 (standard)	10 <sup>A</sup>	2 <sup>B</sup>	
Programme 2 (new)	48 <sup>C</sup>	4 <sup>D</sup>	
Increment P2 over P1			

# Voting:



What is the cost effectiveness ratio of Programme 2 incremental to Programme 1?

- a) \$2.4 per DALY averted
- b) \$12 per DALY averted
- c) \$19 per DALY averted



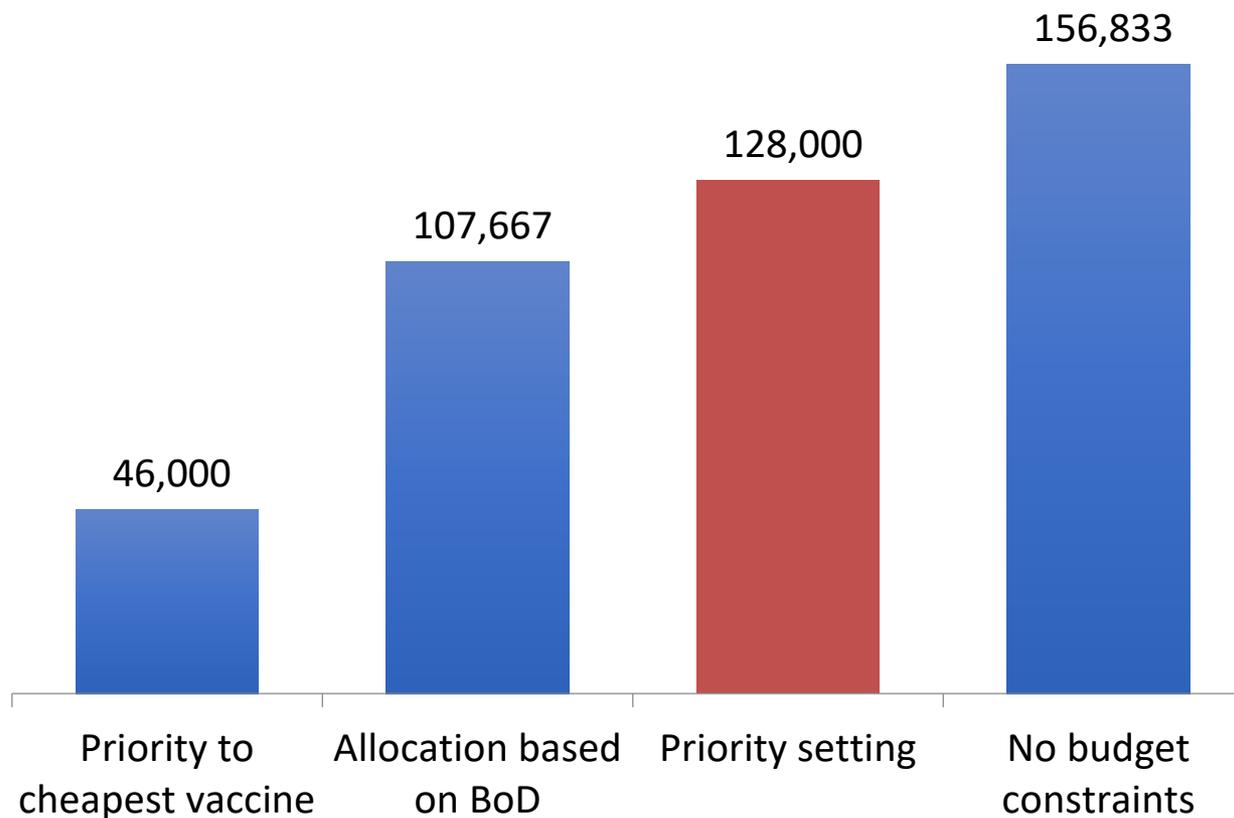
Answer

$$\text{cost}_{\text{new}} - \text{cost}_{\text{current}}$$

$$\text{health gain}_{\text{new}} - \text{health gain}_{\text{current}}$$

	Cost (\$)	Outcome (DALYs averted)	Ratio
Programme 1 (standard)	10 <sup>A</sup>	2 <sup>B</sup>	A/B = 5
Programme 2 (new)	48 <sup>C</sup>	4 <sup>D</sup>	C/D = 12
Increment P2 over P1	C-A = 38	D-B = 2	(38/2) = \$19 per DALY averted

# Recap – Vaccine prioritization exercise (Day 2)



# Examples: Using the ICER to determine access to individual technologies: HTA



- Antihypertensives in Ghana (*example from Day 1*)
- Drugs for Hepatitis B and C, osteoporosis, CVD, Alzheimer's disease in Thailand
- Sofosbuvir for the treatment of hepatitis C in England



## Results: ICER & budget impact

### Incremental cost-effectiveness analysis (per 100 people treated over lifetime horizon)

	Compared with no intervention		DALYs avoided	ICER (GHC/DALY)	Dominance
	Additional cost (GHC)	DALYs avoided			
TZD	290,933	453	642	0.45	Not dominated
CCB	5,498,126	614	32,482	8,938	Dominated
ACEi	4,847,175	282	Dominated		Dominated
ARB	3,398,147	171	Dominated		Dominated
BB	1,334,573	83	Dominated		Dominated

### Budget impact over 5 years

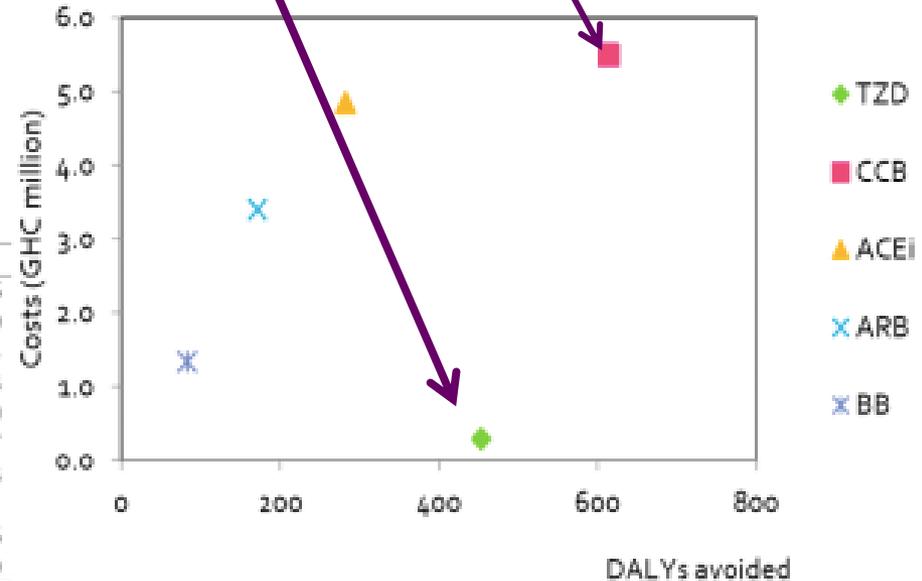
	Total costs (GHC discounted)				
	Year 1	Year 2	Year 3	Year 4	Year 5
NI	5,347,183	6,082,649	6,499,465	6,708,038	6,781,829
TZD	8,181,309	12,548,675	12,526,516	12,373,027	12,134,744
CCB	69,386,769	127,865,019	121,118,914	114,705,942	108,654,743
ACEi	64,168,270	117,113,688	110,582,387	104,394,251	98,589,550
ARB	47,124,757	84,772,356	80,167,115	75,758,854	71,599,337
BB	21,841,437	37,149,504	35,569,569	33,942,948	32,335,183
TZD vs NI	2,834,127	6,466,027	6,027,051	5,664,989	5,352,915
CCB vs TZD	61,205,459	115,316,343	108,592,399	102,332,914	96,519,999

### Policy scenarios

Change from CCB to TZD (10% shift) could save 18.4% of the total hypertensive expenditure, although with a slight deterioration of health outcomes



100 people treated over lifetime horizon





16552

# Thailand: ICER-informed decisions to inform coverage

Drugs under consideration	ICER (Baht/QALY)	Coverage decisions
pegylate interferon alpha 2a and 2b plus ribavirin for treatment of chronic hepatitis C sybtype 1 4 5 & 6	cost-saving	Yes
lamivudine or tenofovir for treatment of chronic hepatitis B	cost-saving	Yes
simvastatin for primary prevention of cardiovascular disease	82,000	Yes
Galantamine for treatment of mild-to-moderate Alzheimer's disease	157,000	No
donepezil, rivastigmine for treatment of mild-to-moderate Alzheimer's disease	180,000-240,000	No
osteoporosis drugs (alendronate, residronate, raloxifene) for primary and secondary prevention of osteoporotic fractures	300,000-800,000	No
atorvastatin, fluvastatin. pravastatin for primary prevention of cardiovascular disease	negative dominant	No
recombinant human erythropoietin (rHuEPO) treatment in chemotherapy-induced anemia	negative dominant	No
adefovir, entecavir, telbivudine, pegylate interferon alpha 2a for treatment of chronic hepatitis B	negative dominant	No

# Sofosbuvir: licensed indications in hepatitis C



Patient population	Treatment	Duration
Genotype 1, 4, 5 or 6	sofosbuvir + ribavirin + peginterferon alfa	12 weeks
	sofosbuvir + ribavirin (only for use in patients ineligible or intolerant to peginterferon alfa)	24 weeks
Genotype 2	sofosbuvir + ribavirin	12 weeks
	sofosbuvir + ribavirin + peginterferon alfa	12 weeks
Genotype 3	sofosbuvir + ribavirin	24 weeks
	sofosbuvir + ribavirin	24 weeks
Awaiting liver transplant	sofosbuvir + ribavirin	Until transplantation

*Solvaldi (sofosbuvir) Summary Product Characteristics [www.medicines.org.uk](http://www.medicines.org.uk)*

# Sofosbuvir: Cost effectiveness by indication



Hepatitis C genotype	Sofosbuvir with peginterferon alfa and ribavirin (ICER)	Sofosbuvir with ribavirin alone (ICER)
Genotype 1	£17,500 (vs PEG/RIV, TN) £10,300 (vs B+ PEG/RIV, TN) £15,400 (vs T+ PEG/RIV, TN) £12,600 (vs PEG/RIV, TE) £700 (vs B+ PEG/RIV, TE)	>£47,500 (vs no trmt, TE or TN, +/- cirr)
Genotype 2	Not licensed	£12,500 (vs PEG/RIV, TE) £46,300 (vs PEG/RIV, TN) £8,600 (vs no trmt, TE) £8,200 (vs no trmt, TN)
Genotype 3	£6,600 (vs PEG/RIV TN + cirr) £40,600 (vs PEG/RIV TN - cirr) <£19,000 (vs PEG/RIV TE +/- cirr)	£10,500 (no trmt) TN + cirr £28,000 (no trmt) TN - cirr £19,200 (no trmt) TE + cirr £31,000 (no trmt) TE - cirr
Genotype 4, 5 or 6	£39,100 (vs PEG/RIV TN , whole cohort) est. £20,000-£30,000 + cirr	No ICER generated, est > £39,100

# Sofosbuvir: Recommendations for use in England and Wales



Hepatitis C genotype	Sofosbuvir with peginterferon alfa and ribavirin	Sofosbuvir with ribavirin alone
Genotype 1	Recommended	Not recommended
Genotype 2	Not licensed	Recommended for people with: <ul style="list-style-type: none"> <li>• Treatment naïve who are intolerant to or ineligible for interferon</li> <li>• Treatment-experienced</li> </ul>
Genotype 3	Recommended for people with: <ul style="list-style-type: none"> <li>• Treatment-naïve with cirrhosis; or</li> <li>• Treatment experienced</li> </ul>	Recommended for people with cirrhosis and who are intolerant to or ineligible for interferon
Genotype 4, 5 or 6	Recommended for people with cirrhosis	Not recommended

# What analytical approach? (1)



The question is not whether to set priorities -  
but how to improve priority-setting processes

*Chalkidou 2016*

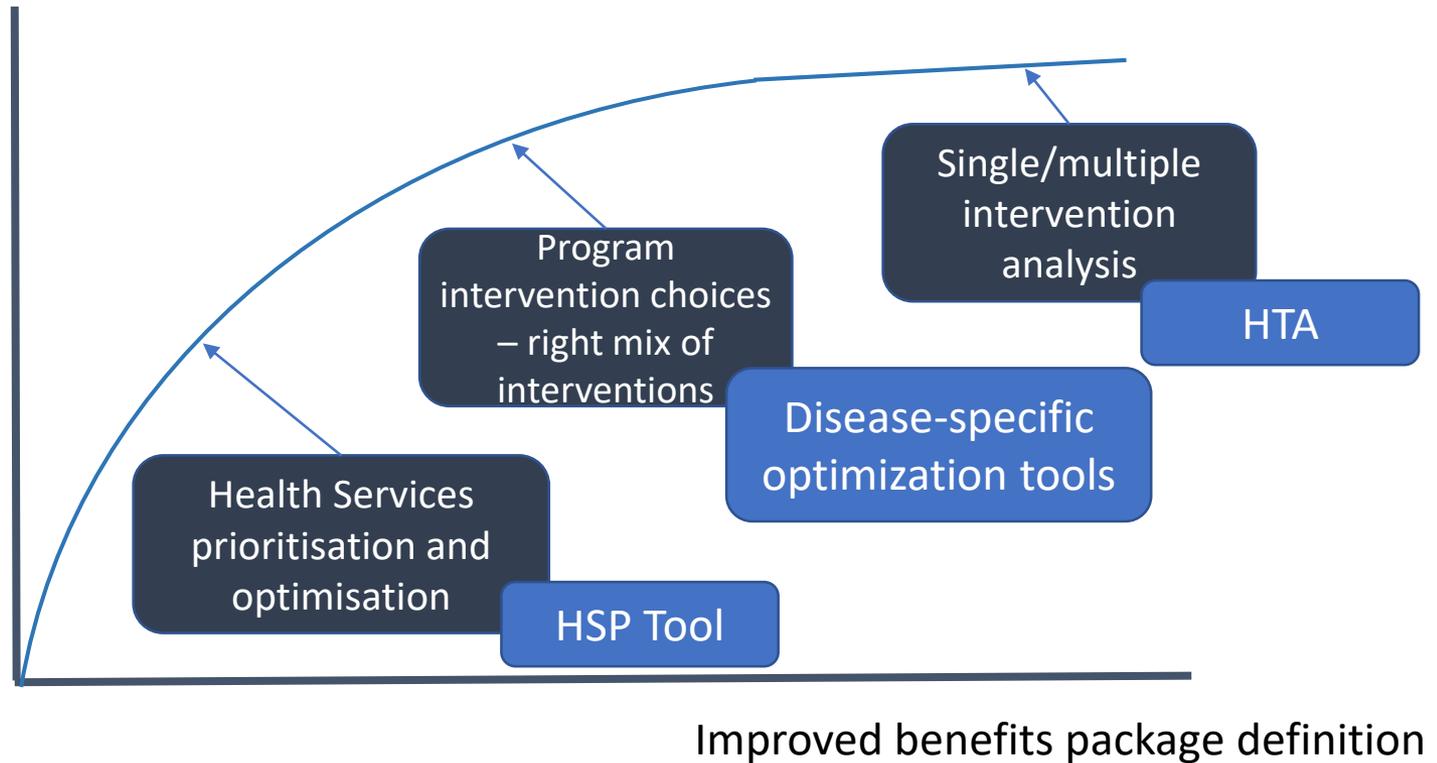
- At all levels of the health system, priority setting is constantly occurring
- Priority setting decisions will not “wait” for the right tool or approach, and no analytical approach will be appropriate for all decision types
- Aligning analytical approach to the requirements of the decision can improve priority-setting processes



# What analytical approach? (2)



- Optimised UHC objectives:
- efficiency
  - equity
  - financial protection



Analytical approach depends on extent to which existing benefit definition is meeting UHC objectives

An optimised benefits package is necessary but not sufficient for sustainable UHC



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# HEALTH SERVICES PRIORITISATION TOOL

## OVERVIEW OF THE HSP TOOL

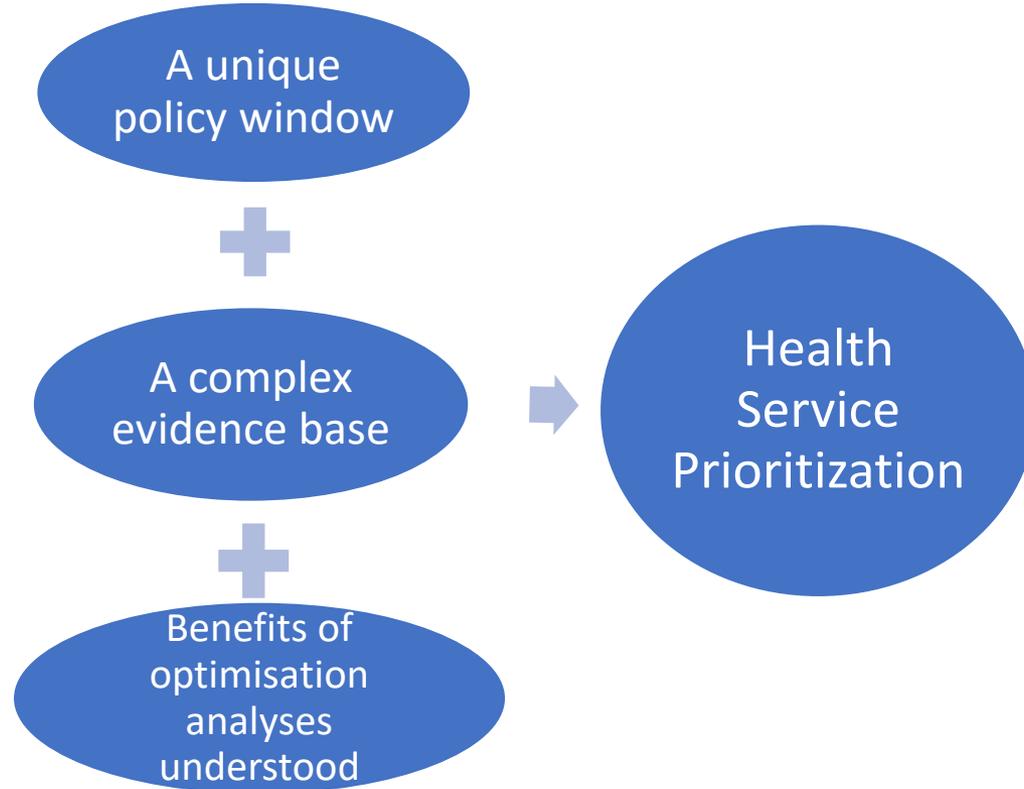
*In partnership with*



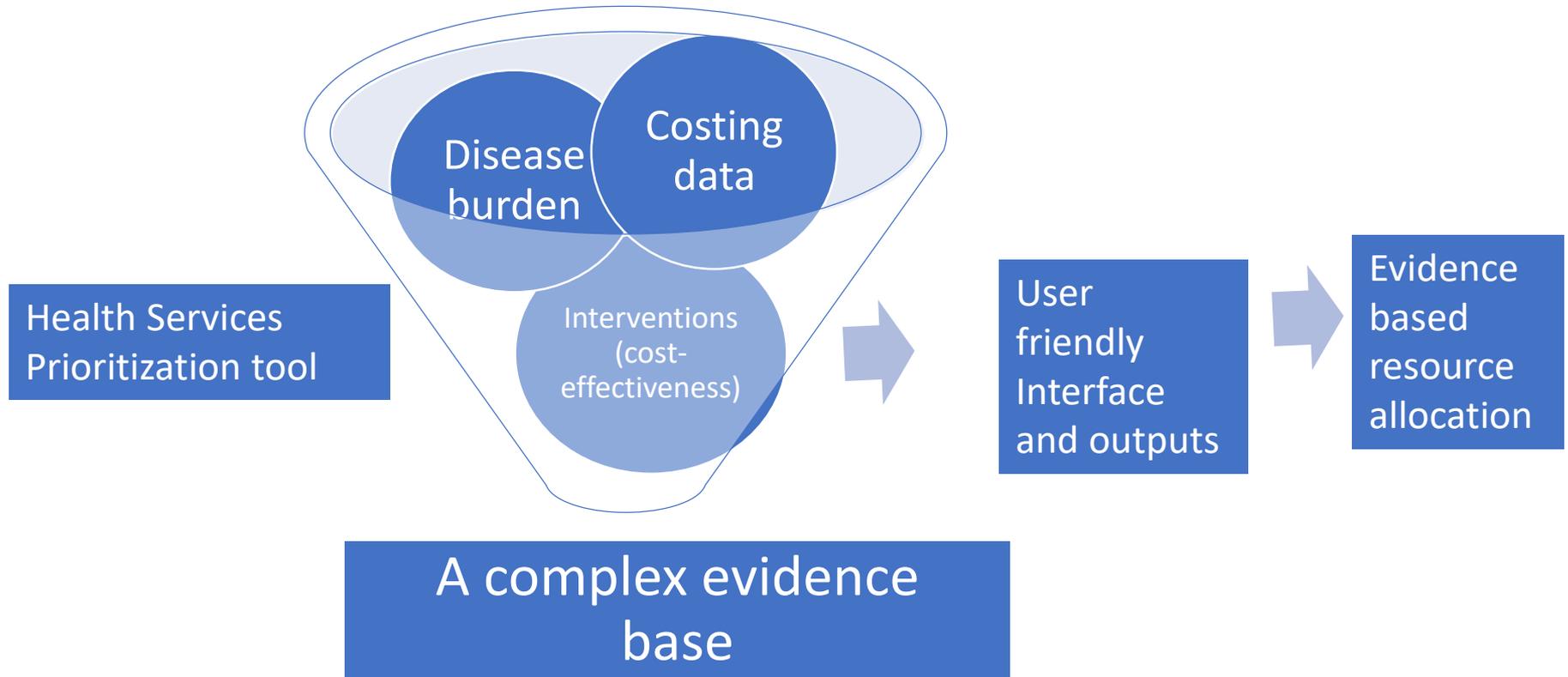


# How to prioritize health services given the limited fiscal space?

**We are much better positioned to answer this question now.**



# From evidence base to user-friendly outputs in order to better guide resource allocation





# What is the HSP tool?



The Health Services Prioritisation Tool (HSP tool) is an open-access, user-friendly, high-impact resource to assist with health service prioritisation for UHC at the country level

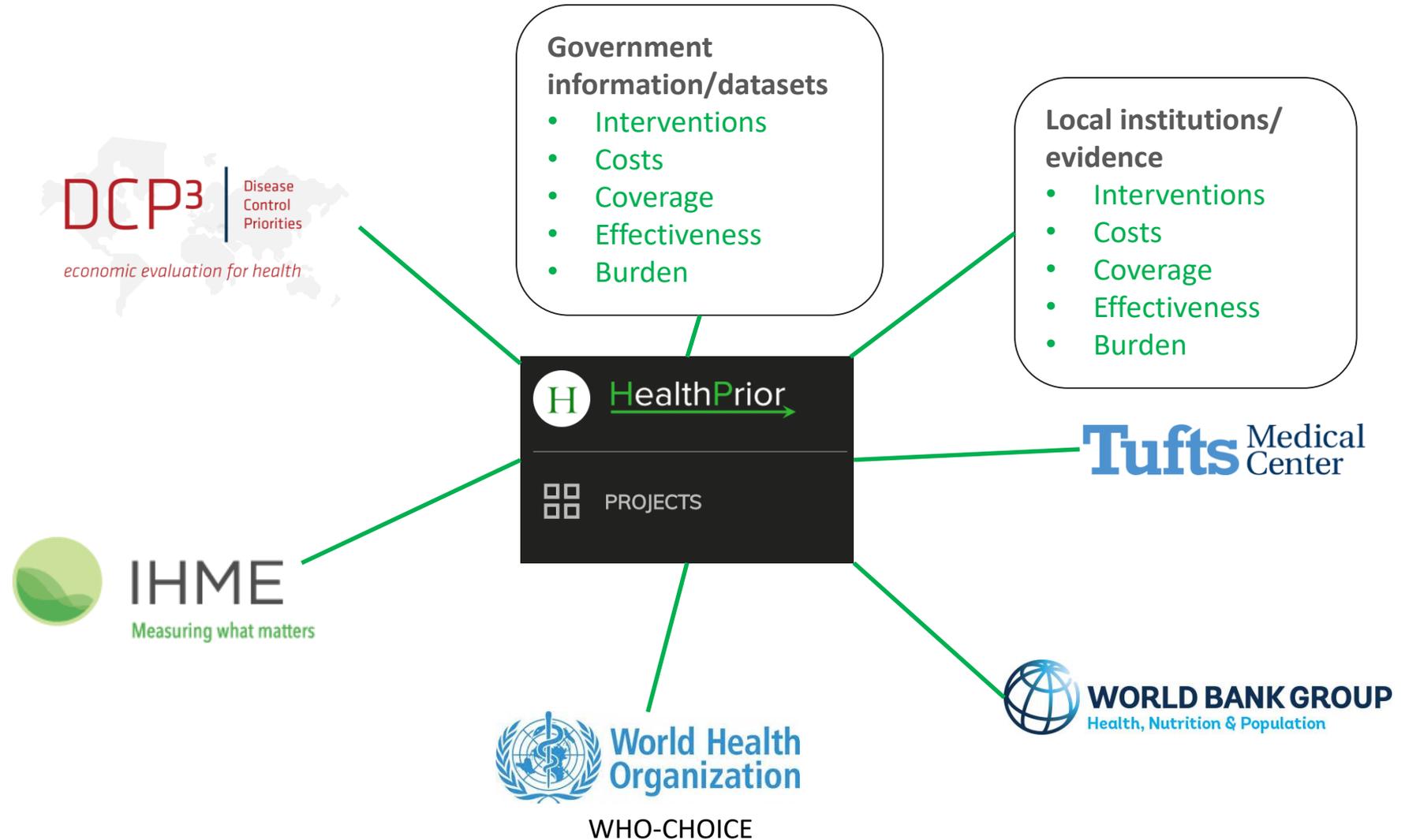
The tool has been developed as an online interface, and uses default data from IHME, DCP3, World Health Organisation, and World Bank among others

- It currently contains data on 218 internationally recommended interventions

HSP tool follows on from long-standing efforts to develop tools that help improve the allocative efficiency of national disease spending



# Inputs to the tool



# What is the idea?



With the support of the Bill and Melinda Gates Foundation, we have used our collective experience developing disease-specific optimisation models and developed the HSP tool to:

- Build on the foundations laid by the World Bank, World Health Organisation, iDSI, DCP, IHME, Tufts, NGOs and country stakeholders - and work in close partnership
- Consider the cost and impact of interventions across all diseases
- Consider both health and non-health (equity and financial risk protection) impacts in the tool
- Better assist countries in the process of defining or updating national health benefits packages given targets for UHC

# How does the HSP tool work in practice?



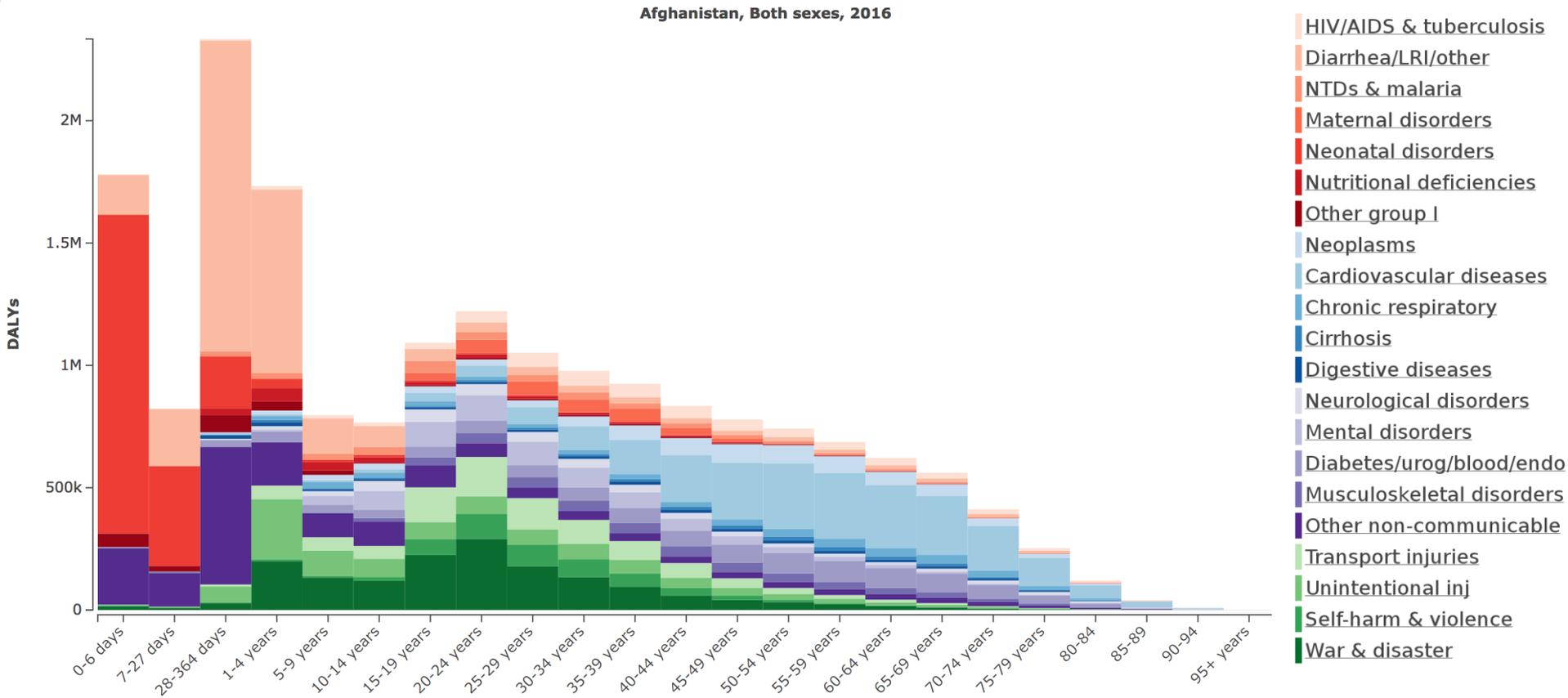
## Five steps to identifying local health service priorities using global evidence:

1. Automatically upload a country's disease burden
2. Import best evidence for health program cost and effectiveness
3. Calculate the cost and impact of globally recommended packages in context
4. Identify interventions with greatest estimated impact on burden of disease
5. Compare current spending and impact against alternative allocation scenarios

# How does the HSP tool work in practice?



## 1) Automatically upload a country's disease burden



# How does the HSP tool work in practice?



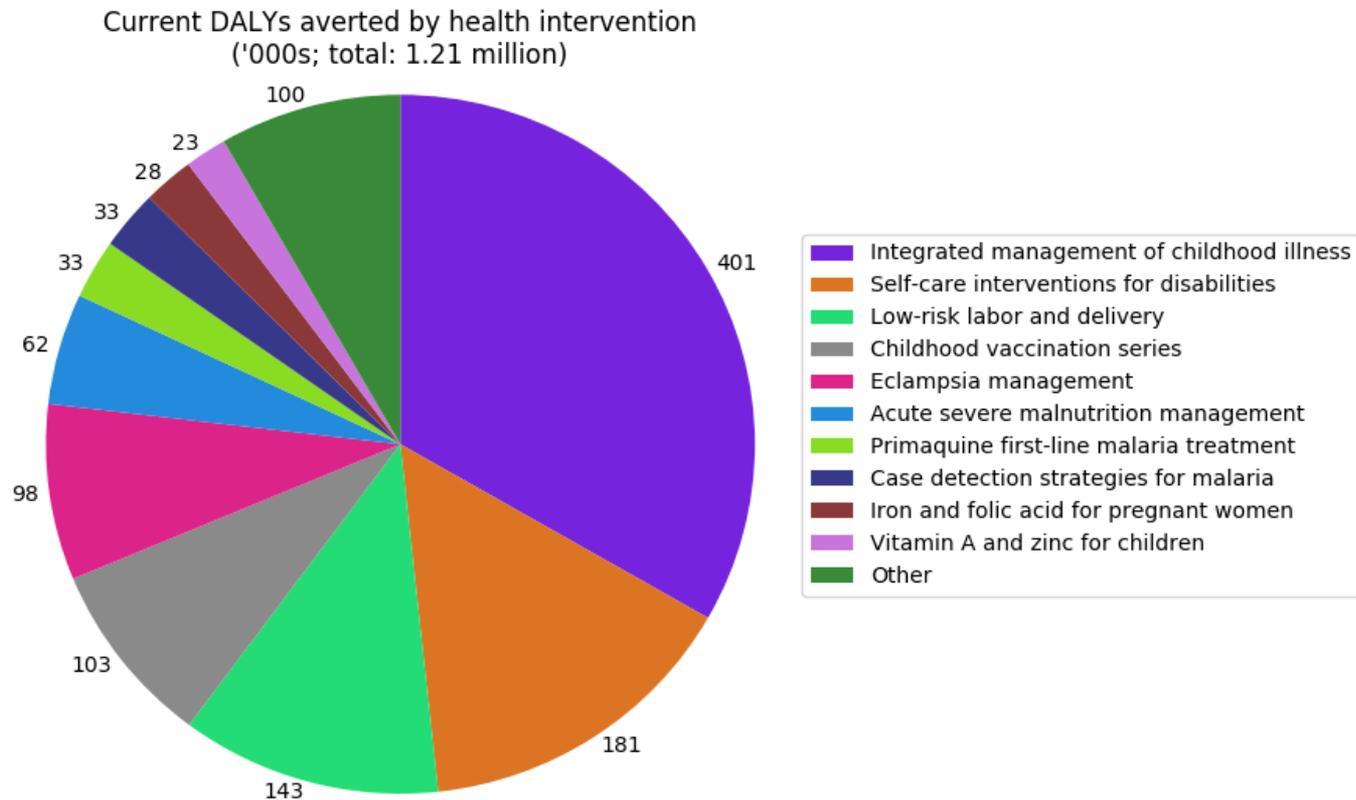
## 2) Import best evidence for health program cost and cost-effectiveness

Active	Intervention name	Delivery platform	Type	ICER	Unit cost	Equity	FRP	Actions
<input type="checkbox"/>	Antenatal and postpart	Community		308.99	0.249	0	1,475,077	
<input type="checkbox"/>	Education on hygiene	Community	Diarrheal	95	4.293	3	0	
<input type="checkbox"/>	Pneumococcus vaccin	Community	Communi	103	10.5	2	0	
<input type="checkbox"/>	Rotavirus vaccination	Community	Communi	0	10.5	2	0	
<input type="checkbox"/>	Cotrimoxazole for child	Community	HIV/AIDS	64	80.443	5	47,080.31	
<input type="checkbox"/>	Vitamin A and zinc for c	Community	Nutritio	88	2.061	1	1,984,169	
<input type="checkbox"/>	Mass marketing of inse	Community	Malaria	76	0.358	1	0	
<input type="checkbox"/>	Childhood vaccination :	Community	Communi	13	8.308	2	1,337,594	
<input type="checkbox"/>	Indoor residual sprayin	Community	Malaria	54	0.53	1	198,445.5	
<input type="checkbox"/>	Education of schoolchil	Community	Caries of	0	0.5	0	0	





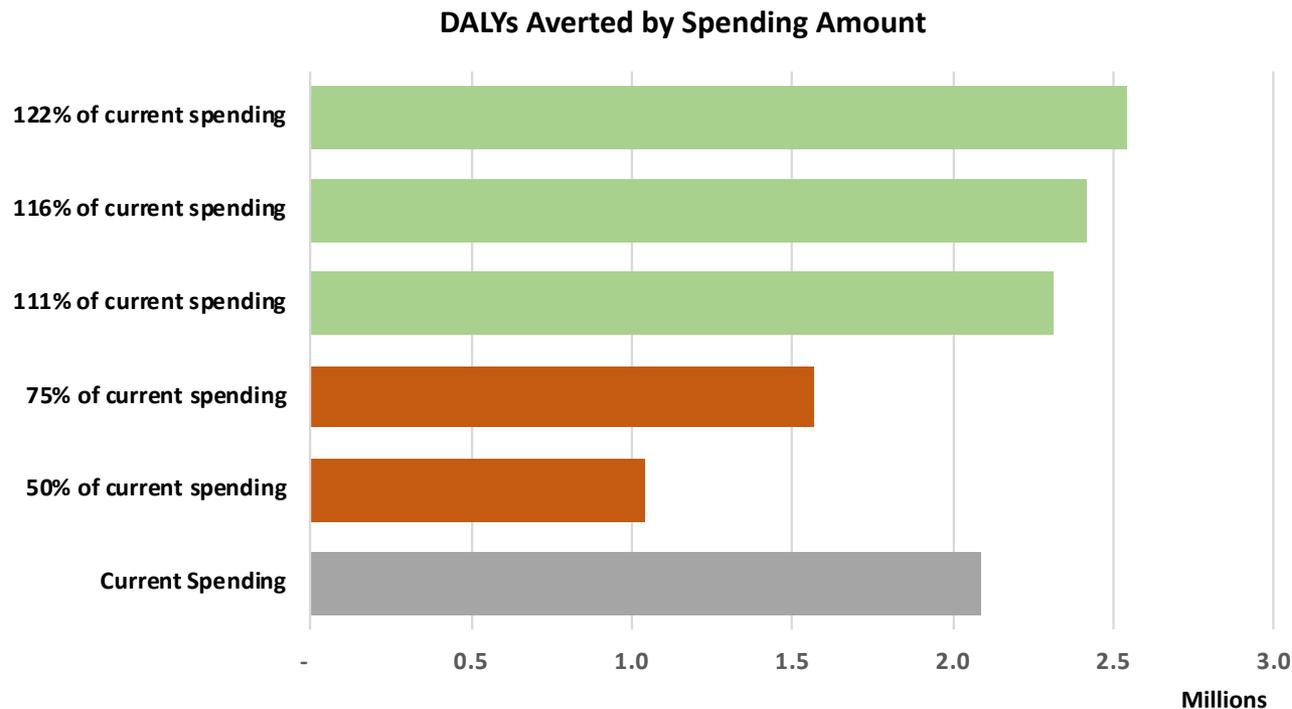
## 4) Identify interventions with greatest estimated impact on burden of disease



# How does the HSP tool work in practice?



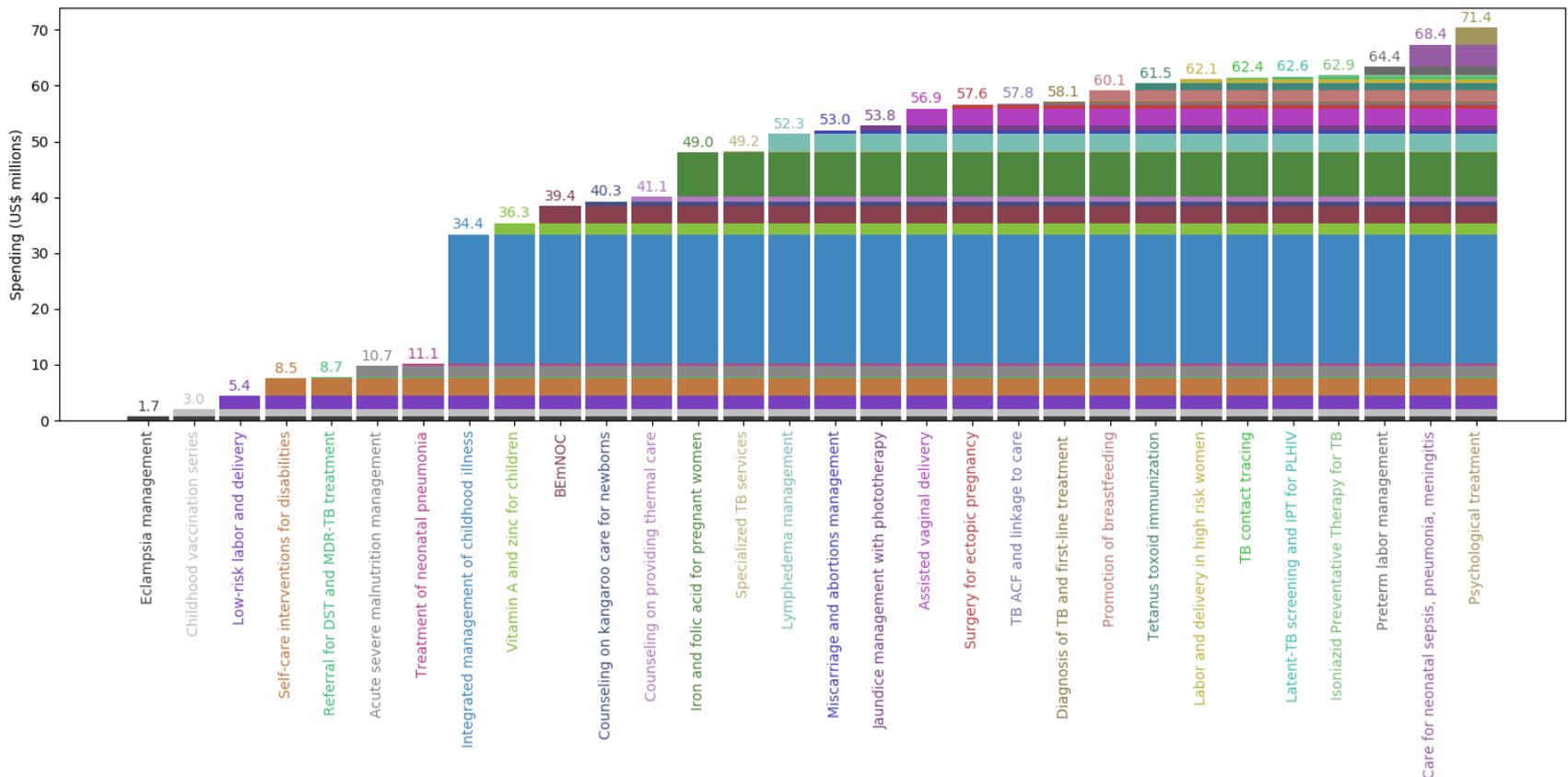
## 5) Compare current spending and impact against alternative investment scenarios



# How does the HSP tool work in practice?



## 5) Compare current spending and impact against alternative investment scenarios





Powerful graphical output in simple charts and diagrams to support a wide policy dialogue. The various outputs can support discussions about:

1. Current spending and impact of a national package of health services
2. Which services provide the largest impact and could be prioritised
3. Mismatch between focus of current spending and existing burden of disease
4. Impact of increasing or decreasing national health spending
5. Which services could be prioritised under different levels of spending

# Summary



- HSP tool is an open-access, user-friendly, online interface that can assist with health service prioritisation for UHC at the country level
- Builds on existing work by leading international organisations and seeks to compile and analyse the different data available
- Five steps are needed to identify local health service priorities using global evidence
  - Reduced burden of data collection: HSP tool uploads and uses the best available global data and relates these to national disease burdens
- Produces powerful graphical output in simple charts and diagrams to support a wide policy dialogue

# Questions



# Brief walkthrough – introduction to the interface





2018 SKILLS BUILDING PROGRAM

# BIG DATA, ARTIFICIAL INTELLIGENCE AND DECISION SCIENCE IN HEALTH AND NUTRITION

# HEALTH SERVICES PRIORITISATION TOOL

## Scope of Work for an Analysis using the HSP Tool

TW

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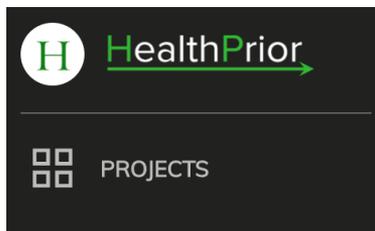


# Why a Scope of Work?



1. The Scope of Work (SOW) is an **agreement document** in which the analysis to be performed is described
2. It should be **specific and detailed**, so that:
  - The study team has clear guidance
  - The stakeholders are clear on what to expect from the analysis are well managed
3. The SOW should contain any **deliverables and end products** that are expected to be provided by the study team
4. The SOW should also contain a **time line** for all deliverables, and outline **roles and responsibilities** within the study team and other parties involved in supporting or overseeing roles

# Scope of the analysis



Indicative  
analysis

Preliminary  
analysis

Comprehensive  
analysis

Data availability

*Low (use pre-populated interventions, effects and costs)*

*Medium (mix of pre-populated and local interventions, effects and costs)*

*High (mainly local intervention, effect and cost data)*

Analytical  
time/resources

*Low (limited time and resources)*

*Medium (some dedicated time and resource commitment)*

*High (significant time and resource commitment)*

Requirements/  
policy question

*Initial policy questions on benefits package design and interventions and fiscal space*

*Limited but specific policy questions on HBP design and funding*

*Direct input to benefits package design and funding*

# Elements of a Scope of Work (Table of Contents)



- I. Background (or Problem Statement) - *brief description of the current status of health benefits and existing challenges and opportunities; relevant strategies or policies, program objectives, operational plans, targets or key performance indicators should be mentioned. Include readily available budget or expenditure information*
- II. Rationale - *why this analysis is proposed*
- III. Objectives – *analysis questions to be answered*
- IV. Specifications for the analysis – *the analysis framework*
- V. Deliverables – *detailed description of expected outputs*
- VI. Implementation and Coordination – *roles and responsibilities in the conduct of the analysis, and any coordination mechanisms*
- VII. Timeline – *list milestones and deliverables from start to end of the analysis*

# Objectives of the analysis (SoW questions)



Define what questions the HSP Tool will inform. Questions likely to include:

- What is the current allocation and impact of spending?
- How does the current allocation of spending compare with the burden of disease?
- Which interventions avert the most burden of disease?
- Which interventions are prioritised under different amounts of spending?



- Time horizons (reference year, etc.)
- Description of the target population (ideally 100% under UHC)
- HSP interventions to form baseline (eg the DCP3 EUHC package)
- Approach for addition/removal of interventions from baseline
- Proposed local data sources
- Critical data gaps and strategies to fill them
  - Additional data collection
  - Secondary data analysis, etc.
  - Common assumptions eg access to particular delivery platforms

# Tips for a realistic Timeline



Sequence work to occur in parallel

Allow sufficient time for study preparations and implementation:

- *Initial engagement on need for analysis (written request? rapid literature review?)*
- *SOW development*
- *Agreement on SOW (additional analysis questions?)*
- *Constitution of study team (focal points? contracting?)*
- *Data access/permissions (secondary data analysis?)*
- *Data matrix, costing tool and costing activities*
- *Data entry and validation of inputs*
- *Review of preliminary results, revision*

Allow for full review and QA of deliverables

Include Dissemination of findings in timeline



## Instructions:

Within country groups, identify components of the SoW for the HSP Tool to be applied in your country:

- Indicative, preliminary or comprehensive analysis?
- Key SoW questions (objectives of the analysis)
- Existing policies/schedules/HSPs that determine access to health interventions
- Relevant cost and coverage data sources
- Do we need to commission additional research / analysis on costs/current provision/intervention effectiveness?



2018 SKILLS BUILDING PROGRAM

# BIG DATA, ARTIFICIAL INTELLIGENCE AND DECISION SCIENCE IN HEALTH AND NUTRITION

## HEALTH SERVICES PRIORITISATION TOOL

### WHAT DEFAULT DATA IS USED IN THE HSP TOOL?

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# Default interventions



There are 218 default interventions included in the HSP tool

- These are based on the EUHC package developed by DCP3 described earlier

The interventions are divided into four service platform levels:

- Community
- Health center
- First-level hospital
- Referral hospital

Population-based health services

(n = 13)

Community

(n = 59)

Health centers

(n = 68)

First-level hospitals

(n = 58)

Referral and specialty hospitals

(n = 20)

# Type of data used in the tool



Two main categories of data are used in the tool. These are:

**1. Burden of disease data, for each disease:**

- a. Prevalence
- b. Incidence
- c. Mortality
- d. Number of DALYS

**2. Intervention data:**

- a. Unit cost
- b. Coverage
- c. Effectiveness

# Default burden of disease data (i)



- Default data on burden of disease can be automatically uploaded for any country
- The data is from the Global Burden of Disease study conducted by the Institute for Health Metrics and Evaluation (IHME), and available for the most recent year (2016)
- Three broad groups of diseases are included in the GBD study:
  - Communicable, maternal, neonatal, and nutritional diseases
  - Non-communicable diseases
  - Injuries

## Default burden of disease data (ii)



- Estimates for the prevalence, incidence, mortality, and Disability-Adjusted Life Years (DALYs) of 270 causes of disease burden are available for every country
  - The modelled estimates are informed by data from local and national surveys
- Low- and high-bounds are available for all the estimates, so can consider best or worst case scenarios as well as a best-estimate
- DALYs consider both mortality and morbidity (amount of disability)
  - IHME DALYs are calculated using global life expectancy and global disability-weights, allowing for standardisation across countries

# Default unit cost data



- Default unit cost data are based on global estimates by DCP3
- These were extracted through a comprehensive literature review where unit costs from best quality studies were chosen and adjusted to low income and lower-middle income country settings
- For interventions where secondary data could not be extracted, DCP3 undertook bottom-up costing

# Default coverage data



- Default coverage data is also based on international estimates
- Where possible, coverage indicators are used from the WHO
- Generally, the following averaged baseline coverage across IHME disease groups are included:
  - Communicable, maternal, neonatal, and nutritional diseases: 40% in LICs and 50% in LMICs
  - Non-communicable diseases and injuries: 10% and 20% (avg. from CVDs, cancers and mental disorders)
  - Cross-cutting packages (e.g. palliative care/rehabilitation): 5% and 10%



- Incremental cost-effectiveness ratios (ICERs) are included for most interventions from the DCP3 systematic review process that selected best-quality evidence
  - Where ICERs are missing from the DCP3 data and unavailable in literature, country cost-effectiveness thresholds are used from Woods et al., 2016
- Where available, relative risk ratios have also been attached to certain interventions
  - The risk ratios were sourced through a literature review and extracted from Cochrane reviews, systematic reviews, RCTs and other studies

# Default non-health impact data



- Quantitative measures for financial risk protection and equity are being developed for the tool
- In the meantime, DCP3 scores for equity and financial risk protection impact of interventions have been included in the tool
- These cannot be used for country-level estimates of non-health impact, but DCP3 selection process for interventions included cost-effectiveness, priority to the worse off and financial risk protection
  - The default data can therefore be used to rank interventions by potential impact on equity and financial risk protection

# Default equity scores



- Equity scores from 1 to 3 were given to interventions by DCP3
- Framework: “health-adjusted average age of death” (HAAD)
  - Average DALYs experienced by an individual with disease X
- Places greatest weight on diseases that kill younger people and/or are more severe (i.e., high disability over long time period)
- Calculated HAAD by GBD 2015 cause using LIC demography and epidemiology → mapped interventions to primary cause
- HAAD cutoff of 40 years considered “worst off” (interpretation: healthy life expectancy among affected persons <40 years) given a top score of 1
  - HAAD cutoff between 40-50 years, score of 2
  - HAAD cutoff over 50 years, score 3

# Default financial risk protection scores

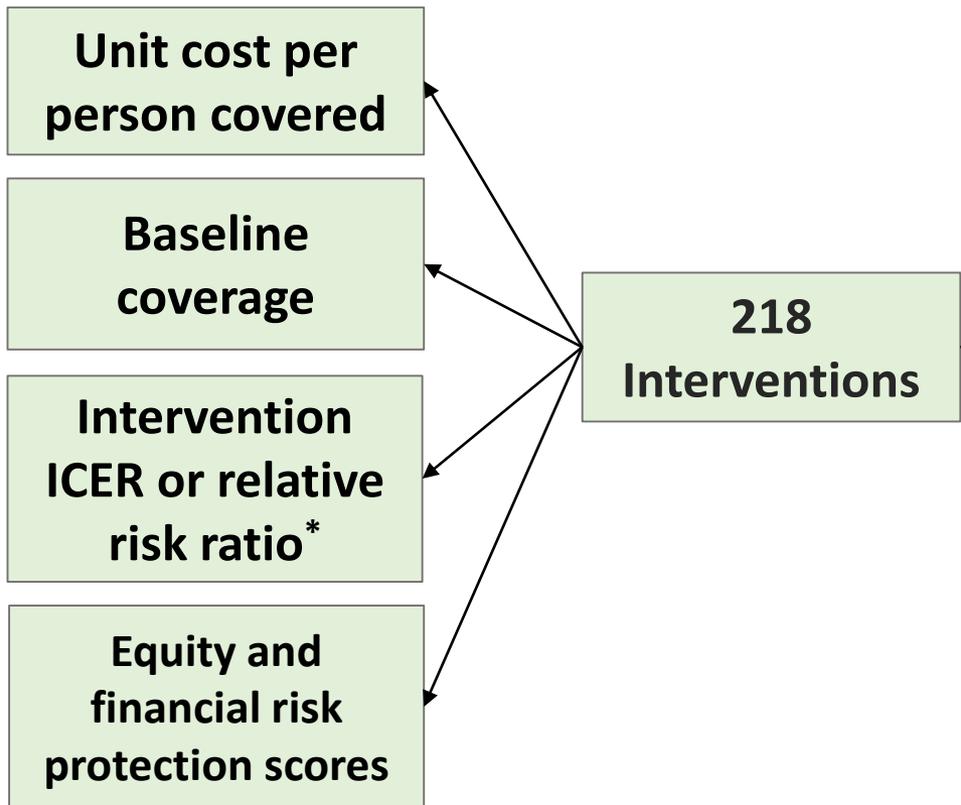


- FRP scores from 1 to 6 were given to interventions by DCP3
- DCP3 unable to conduct systematic quantitative assessment of FRP given time constraints, methodological issues, and data availability
- Developed composite indicator of FRP:
  1. Very high intervention unit cost ( $>$  average monthly income)
  2. Urgency of need for intervention (severe, acute, unpredictable)
  3. Average age of death from cause X is mid-adulthood or younger
  4. Disability weight  $> 0.1$  or larger
  5. Intervention crowds out high and probably ineffective private finance (e.g., basic cancer care, palliative care)

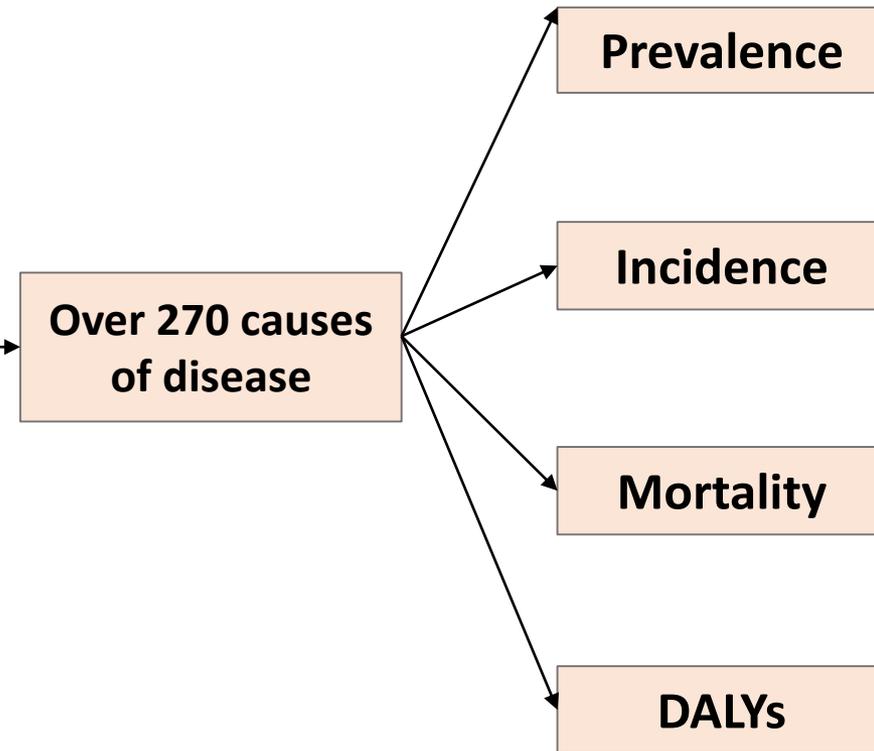
# Visualising data format and linkages



DCP3 and other published sources



IHME, Global Burden of Disease



\*Relative risk ratios included where available and reliable



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# BIG DATA, ARTIFICIAL INTELLIGENCE AND DECISION SCIENCE IN HEALTH AND NUTRITION

# HEALTH SERVICES PRIORITISATION TOOL

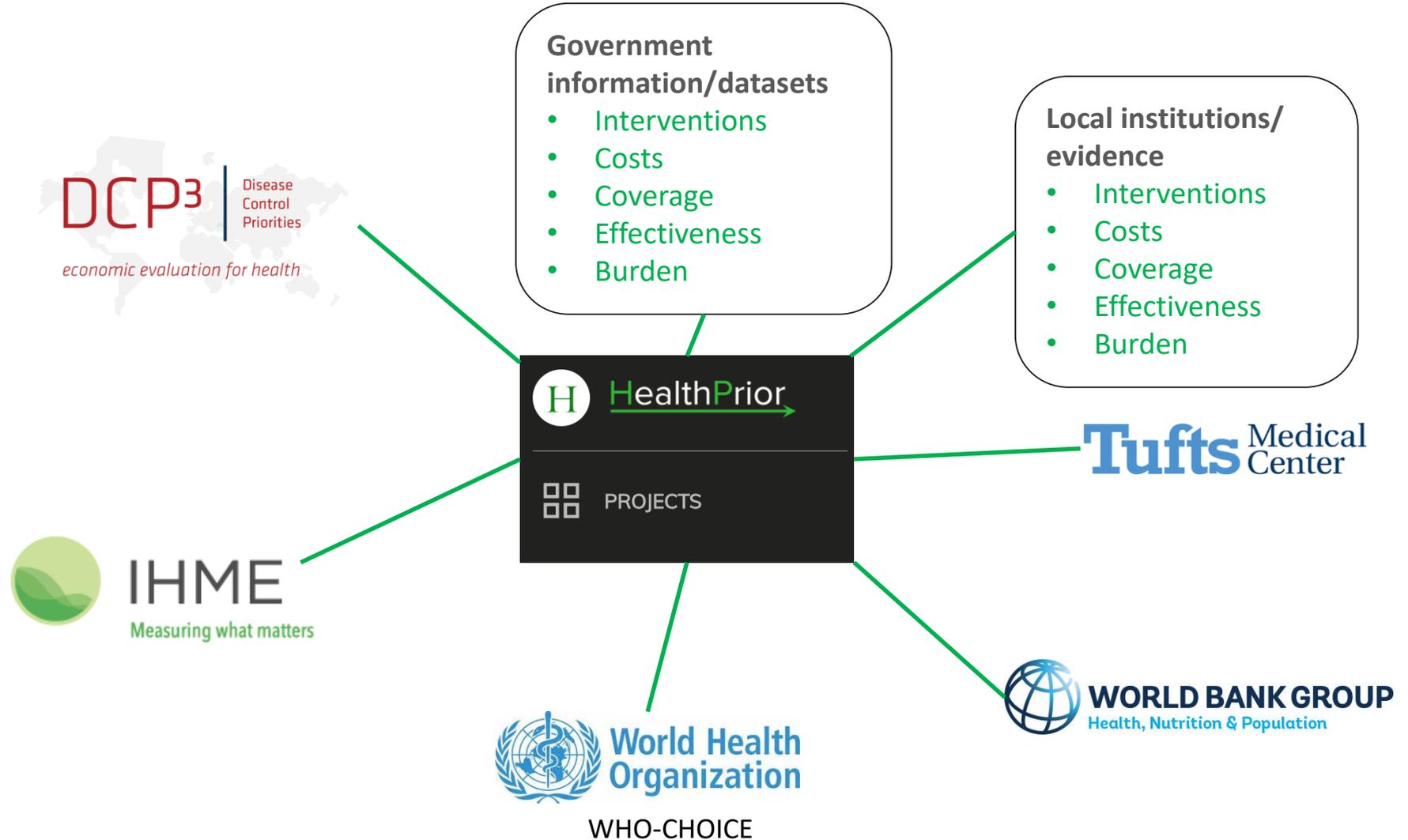
What's in the package?

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# Inputs to the tool



# Interventions in the HSP Tool



A baseline benefits package can be informed by various sources:

## **Internationally:**

- WHO program guidance (HIV, TB)
- WHO-CHOICE interventions
- WHO Essential Medicines List
- Lancet Essential Medicines list
- Disease Control Priorities recommended package

The HSP Tool uses the DCP3 package as baseline with functionality to add add/remove interventions

## **Locally:**

- Existing guidance and policies
- National Essential drugs list and standard treatment guidelines



# What about local guidance?

## Example: South Africa



- In 2017, IDSI conducted a review of local guidance used to determine access to care in the public and private sectors in South Africa in preparation for NHI
- 285 separate pieces of guidance across a range of indications and delivery platforms identified



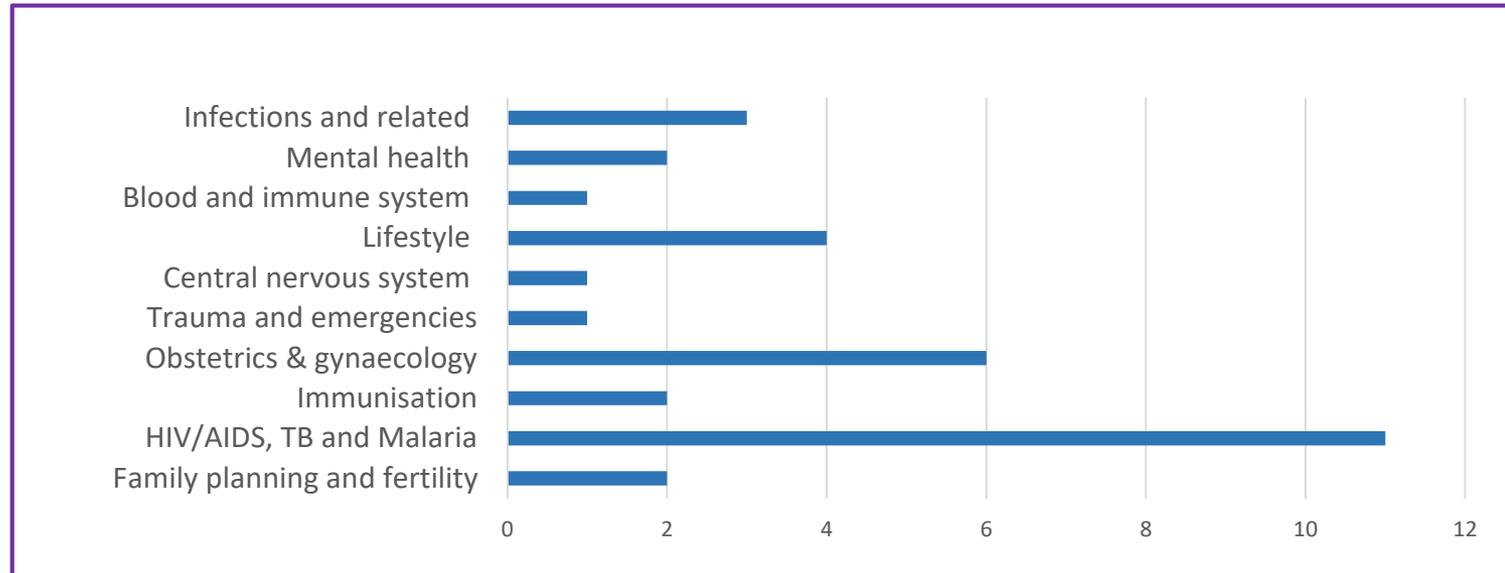
# What about local guidance?

## Example: South Africa

### Department of Health Guidance

	NDoH	Provincial DoH	Total
Multiple conditions and populations	5	1	6
Detailed	24	9	33
Brief	10	1	11
Poster/algorithm	2	4	6
Total	41	15	56

Program areas covered by DoH detailed guidelines (n=33)



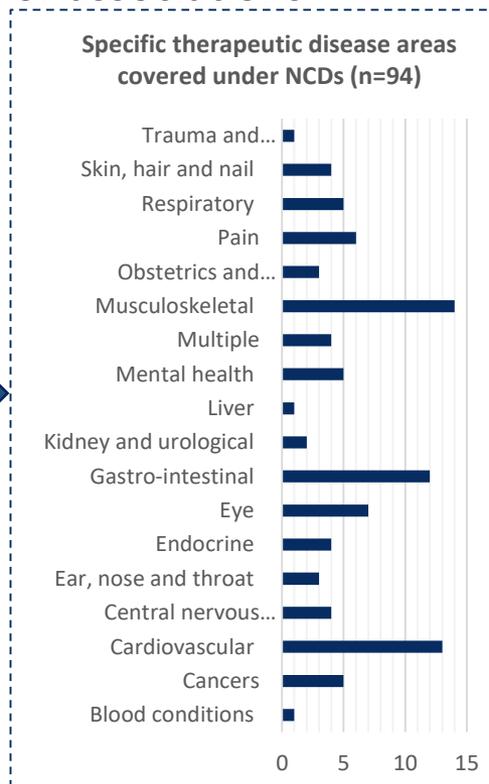
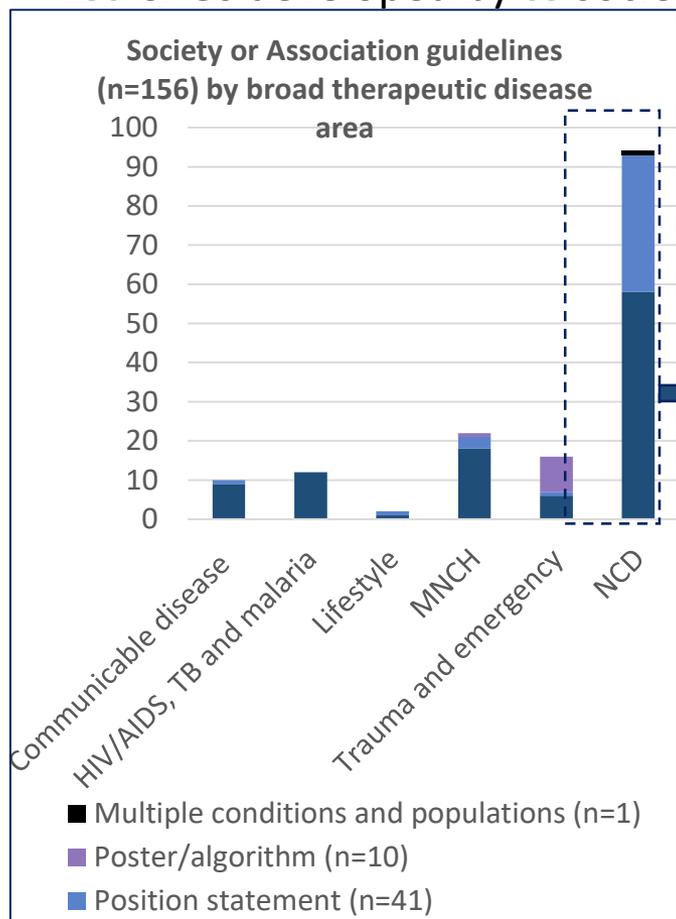


# What about local guidance?

## Example: South Africa

### Professional Society Guidance

156 CPGs developed by 63 societies or associations



**104 detailed guidelines** - focussed on NCDs (56%), MNCH (17%), HIV/AIDS, TB or Malaria (12%), and other communicable diseases/infections (9%).

**41 position statements** - mainly developed by four societies (73%) and published on organisation's website (not journal)

# The Disease Control Priorities Recommended Benefits Package



## DCP3 Volume Topics

1. Essential Surgery - 2015
2. Reproductive, Maternal, Newborn and Child Health -2016
3. Cancer - 2015
4. Mental, Neurological, and Substance Use Disorders - 2015
5. Cardiovascular, Respiratory, and Related Disorders - 2017
6. Major Infectious Diseases- 2017
7. Injury Prevention and Environmental Health - 2017
8. Child and Adolescent Health and Development - 2017
9. Disease Control Priorities: Improving Health & Reducing Poverty - 2018

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*David A. Watkins, MD, MPH, Division of General Internal Medicine, University of Washington*

# DCP3 “essential packages”



- 21 lists organized around health topics or professional communities (e.g., maternal health, CVD, cancer)
- Identify all interventions that:
  1. Provide good value for money
  2. Are feasible to implement in low- and middle-income countries
  3. Address a significant disease burden
- Draw on systematic reviews of economic evaluations, epidemiological data, clinical effectiveness studies

Jamison DT, Lancet 2017.

# DCP3 “essential packages”



## Panel 3: Clusters of essential packages\*

### Age-related cluster (packages 1–5)

- 1 Maternal and newborn health
- 2 Child health
- 3 School-age health and development
- 4 Adolescent health and development
- 5 Reproductive health and contraception

### Infectious diseases cluster (packages 6–10)

- 6 HIV and sexually transmitted infections
- 7 Tuberculosis
- 8 Malaria and adult febrile illness
- 9 Neglected tropical diseases
- 10 Pandemic and emergency preparedness

### Non-communicable disease and injury cluster (packages 11–17)

- 11 Cardiovascular, respiratory, and related disorders
- 12 Cancer
- 13 Mental, neurological, and substance use disorders
- 14 Musculoskeletal disorders
- 15 Congenital and genetic disorders
- 16 Injury prevention
- 17 Environmental improvements

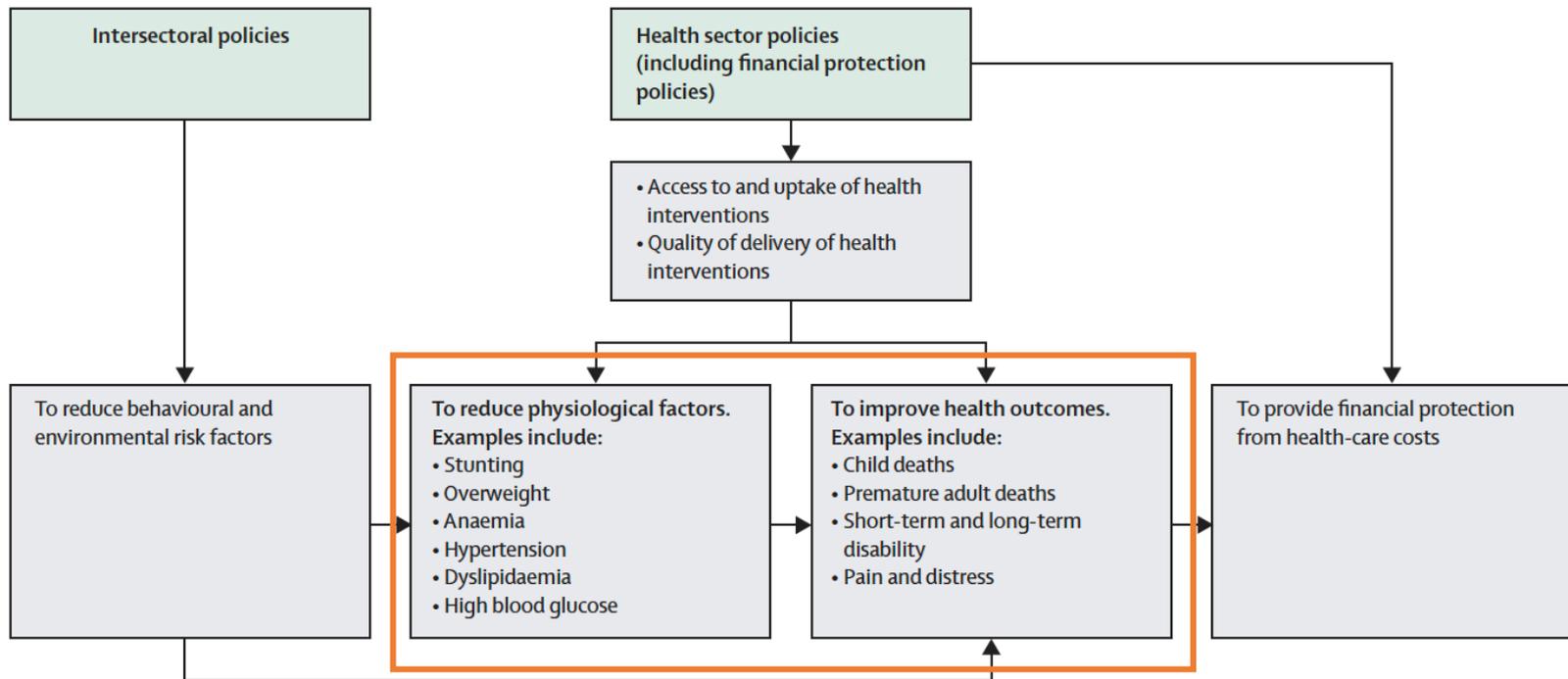
### Health services cluster (packages 18–21)

- 18 Surgery
- 19 Rehabilitation
- 20 Palliative care and pain control
- 21 Pathology

ibid.



# Identifying UHC interventions

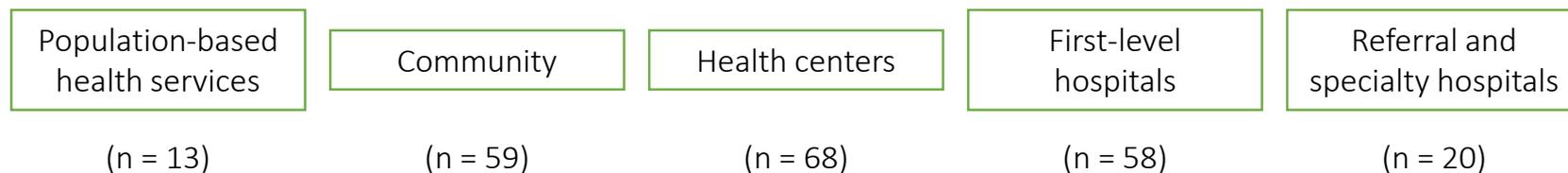


Jamison DT, Lancet 2017.

# “Essential UHC” (EUHC)



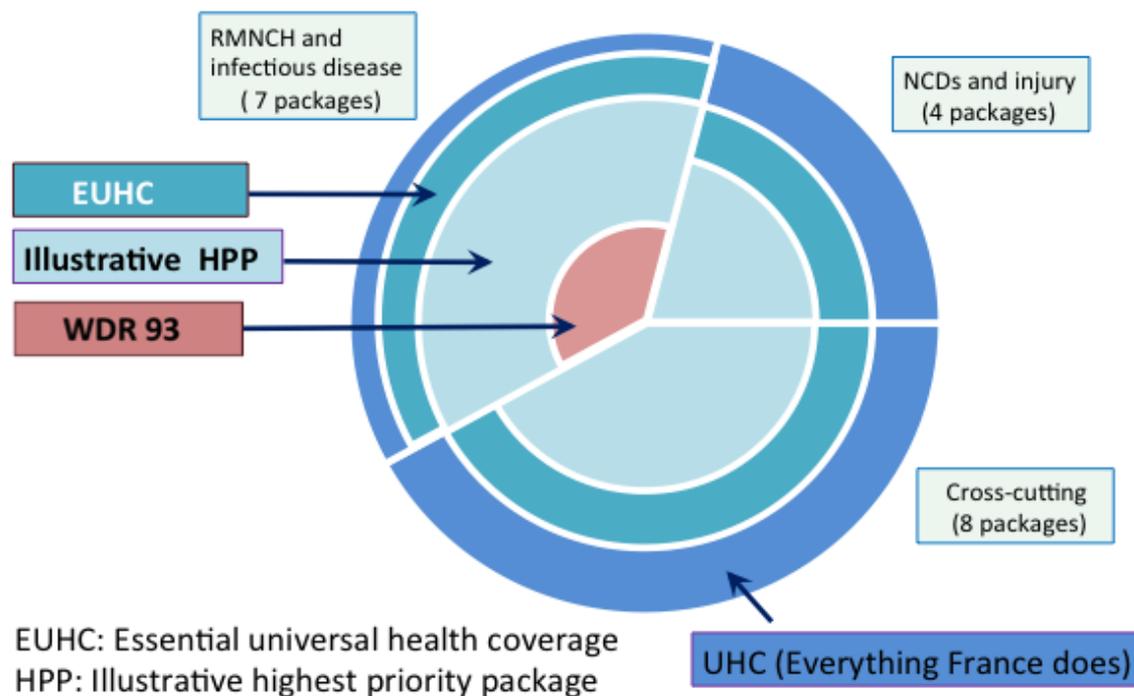
- Compiled all **essential health services** recommended throughout DCP3
- Harmonized definitions, eliminated redundancies
- Identified “platform” for delivery of each intervention:



- 350+ health sector interventions → 218 unique health services (EUHC)

Watkins DA, World Bank 2018.

# Expansion pathway

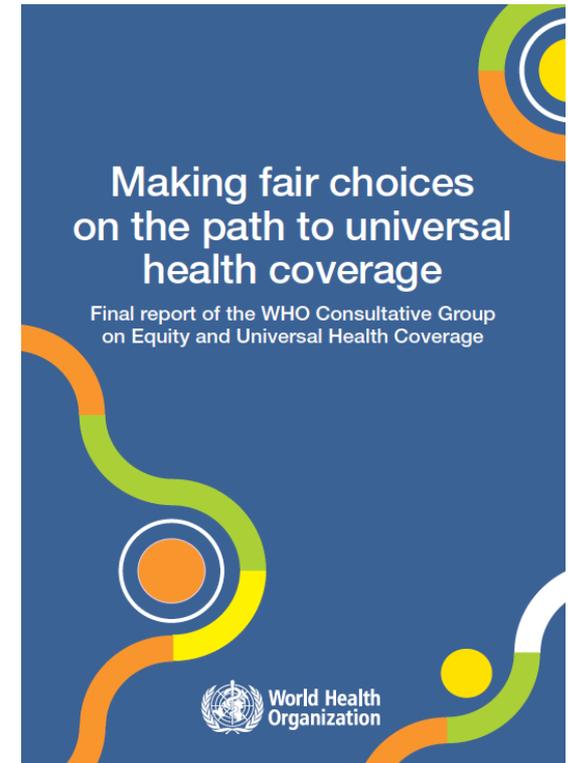


# Criteria for HPP selection



1. Very good value for money
2. Priority to the worst off
3. Provide substantial financial risk protection

HPP specifically considers context of low-income countries



Watkins DA, World Bank 2018; WHO, 2014.



- Cost-effectiveness (US\$ [2012] per DALY averted) when relevant
  1. Most interventions have CE ratios published; relevance to LICs variable
  2. Clustered interventions:
    - Mean cost/DALY averted  $\sim < 0.5x$  GDP per capita  $\rightarrow$  nearly all were included in HPP  
(approximate WTP threshold proposed by Claxton and colleagues)
    - Ordinal scale of 1-3 for less CE interventions (most were  $< 3x$  GDP in LMICs)
  3. Interventions without primary CE data were assigned score based on expert judgment
- Value for money when CEA (outcomes measured in DALYs/QALYs) not easily applicable; e.g., family planning, palliative care, intellectual losses

Watkins DA, World Bank 2018.

# NCD priorities for HPP



Population-based Health Interventions	Community	Health center	First-level hospital	Referral/specialty hospital
Mass media messages concerning healthy eating or physical activity	Basic outpatient rehabilitation services (priority to longitudinal care for individuals post injury)	Basic outpatient surgical care (minor injuries)	Basic inpatient surgical care (major injuries, GI/GU)	Breast cancer**
Mass media messages concerning use of tobacco and alcohol	School-based HPV vaccination (girls)	Basic palliative care	Advanced palliative care and surgical pain control	Colorectal cancer**
		Basic resuscitation	Advanced resuscitation	Childhood cancer**
		Basic acute MI care	Screening/treatment of early cervical CA	Advanced orthopedic surgical care
		Primary and secondary RF prevention	Basic acute rehabilitation services	Repair of cleft lip and cleft palate
		Heart failure*	Acute stabilization of chronic disease (*) exacerbations	Cataract extraction and insertion of intraocular lens
		CVD secondary prevention*	Sickle cell disease screening and care	
		Asthma and COPD*	Rheumatoid arthritis*	
		Depression and anxiety*		
		Schizophrenia*		
		Epilepsy*		
		Diabetes*		
		OST for IDU		

- Chronic disease management
- \*\* Using multimodal therapy with curative intent (early-stage cancer only)

# Cost analysis (1)



- Global health costing literature exhibits a wide variation in methods and data used
- Very few large-scale costing exercises to date; none as comprehensive as DCP3
- Counterfactual costs: what would we be spending today at higher intervention coverage (comparative statics)
- Long-run average costs: steady state; includes investments required to achieve higher levels of coverage and cover depreciation

Watkins DA, DCP3 Working Paper #20.



$$C_1 = \sum_{i=1}^n pop_i \times (cov_{i,1} - cov_{i,0}) \times cost_i$$

Incidence or prevalence  
(Global Burden of Disease  
or other sources)

Baseline coverage  
from WHO indicators  
database, literature,  
or proxies

Usually from literature  
(DCP3 systematic reviews)  
-- “most representative” cost  
-- adjusted to LI/LMI average

Other considerations:

- Health system strengthening costs added on as a function of unit cost
- Structure is able to infer current spending and total cost at full coverage

Watkins DA, DCP3 Working Paper #20.

# Cost analysis (3)



	Low-income countries		Lower-middle-income countries	
	HPP	EUHC	HPP	EUHC
Incremental annual cost* †	\$23 billion	\$48 billion	\$82 billion	\$160 billion
Incremental annual cost per person*	\$26	\$53	\$31	\$61
Total annual cost	\$38 billion	\$68 billion	\$160 billion	\$280 billion
Total annual cost per person †	\$42	\$76	\$58	\$110
Incremental annual cost as a percentage of current GNI per person*	3.1%	6.4%	1.5%	2.9%
Total annual cost (as percentage of GNI per person) ‡	5.1%	9.1%	2.8%	5.2%

Jamison DT. Lancet, 2017; Watkins DA, DCP3 Working Paper #20.

# Cost analysis (4)



HPP costs in LICs	Population-based interventions	Community	Health Center	First-level hospital	Referral and specialty hospital	Total
Total cost (100% pop coverage)	\$0.51	\$12	\$25	\$13	\$2.3	\$53
Incremental cost (20% increase in coverage)	\$0.10	\$2.5	\$4.9	\$2.7	\$0.45	\$11

Age-specific packages	Infectious diseases	NCDs and injuries	Cross-cutting health services
16%	26%	41%	17%



# What are DCP3 planning

- Further refinements to cost and impact modeling
  1. Updates to costing inputs
  2. All-ages mortality, YLDs
  3. Assessment of impact by platform and level of urgency
- Harmonization with WHO
  1. Definition of “intervention” and content of packages
  2. Analytic tools and methods
- Improvements to content and presentation (country experience)



2018 SKILLS BUILDING PROGRAM

# BIG DATA, ARTIFICIAL INTELLIGENCE AND DECISION SCIENCE IN HEALTH AND NUTRITION

## HEALTH SERVICES PRIORITISATION TOOL

### WALKTHROUGH: CREATING AN HSP TOOL PROJECT/DATA SPREADSHEET AND QUESTIONS

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2018 SKILLS BUILDING PROGRAM

# BIG DATA, ARTIFICIAL INTELLIGENCE AND DECISION SCIENCE IN HEALTH AND NUTRITION

# HEALTH SERVICES PRIORITISATION TOOL

## PRACTICE: CREATE A HSP TOOL PROJECT

*In partnership with*



# Instructions for practice session



1. Register and log-in to the HSP tool interface at **hptool.org**
  - **Create a username and password**
2. Create a new project
3. Copy your new project
4. Rename the copy of your new project
5. Download the renamed copy of your new project
6. Upload the downloaded copy of your new project
7. Delete all the projects created



2018 SKILLS BUILDING PROGRAM

# BIG DATA, ARTIFICIAL INTELLIGENCE AND DECISION SCIENCE IN HEALTH AND NUTRITION

# HEALTH SERVICES PRIORITISATION TOOL

## WALKTHROUGH: RUNNING A PROJECT IN THE HSP TOOL AND QUESTIONS

*In partnership with*





2018 SKILLS BUILDING PROGRAM

# BIG DATA, ARTIFICIAL INTELLIGENCE AND DECISION SCIENCE IN HEALTH AND NUTRITION

# HEALTH SERVICES PRIORITISATION TOOL

## PRACTICE: RUNNING A HSP TOOL PROJECT

*In partnership with*



# Instructions for practice session



1. Create a new project
2. Open your new project
3. Create a new set of data for burden of disease
4. Create a new set of interventions
5. Check the health packages tab
6. View the different graphs in full screen
7. Download the graphs generated
8. Once you are done, explore the tool freely
  - E.g. renaming burdens of disease or interventions



2018 SKILLS BUILDING PROGRAM

# BIG DATA, ARTIFICIAL INTELLIGENCE AND DECISION SCIENCE IN HEALTH AND NUTRITION

## HEALTH SERVICES PRIORITISATION TOOL

### INTERACTIVE DISCUSSION OF QUESTIONS AND IDEAS ARISING FROM DAY 1

*In partnership with*



# Questions and ideas from day 1



- Any questions about UHC, cost-effectiveness analyses or allocative efficiency?
- Any questions about international HBPs?
- Any questions about the HSP tool or the default data used to run it?