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**Nossal Institute for Global Health**



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## **ONE HEALTH ECONOMICS**

Jun 11 – 13, 2023 | Novotel Hotel and Resorts Marina Sriracha, Chonburi, Thailand

# **Other potential methods of the One Health Economics**

**OHE**

**Asst.Prof.Sitaporn Youngkong, PhD**

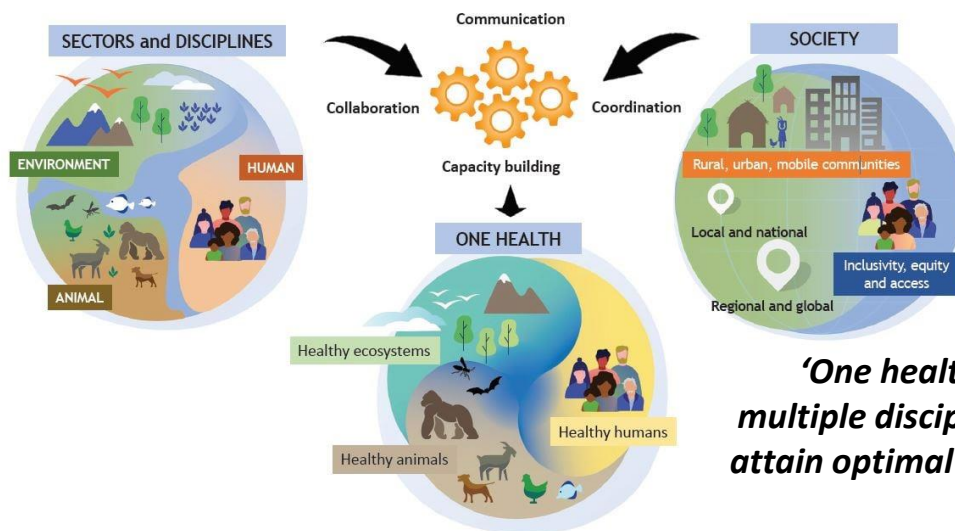
**Division of Social and Administrative Pharmacy, Department of Pharmacy**

**Faculty of Pharmacy, Mahidol University**

***Jun 13, 2023***

# Special characteristics of One Health interventions

- Intervention should be a complex multi-component interventions with mutual interest and benefit(s).
- Joint definition of measurable deliverables that will allow evaluation of the social, economic contributions and benefits of the program.
- There should be joint active participation and collaboration with shared resources (i.e., technical, personnel and financial).



***‘One health’ approach involves the collaborative efforts of multiple disciplines working locally, nationally, and globally to attain optimal health for people, animals and the environment – World Bank, 2012***

# Potential outcome metrics used to evaluate One Health interventions

Outcome Metric	Definition	Sectors Represented	Advantages	Disadvantages
Disability-adjusted life years (DALY)	Number of years lost to morbidity, disability or premature death	Human health	Measures overall human disease burden and accounts for long-term/chronic effects	Does not capture effects on animal health, ecosystem health, or impact on poverty levels in a population
Pre- and post-prevalence rate	Proportion of population that has particular disease at a specified point in time or over a specified period of time	Animal health Human health	Conveys magnitude of disease spread and transmission patterns of individual populations	Does not demonstrate relative severity or distribution of disease
Pre- and post-mortality rate	Number of deaths in a given period or area, or from a particular disease	Animal health Human health	Measures direct severity of disease	Does not convey secondary effects (i.e. impact on governance, poverty levels, effects of diseases with high morbidity rates that are not fatal)
Outbreak duration	Time span between initial disease occurrence and end in a population	Animal health Human health	Comparable across interventions and diseases	Does not represent severity, or lack thereof, of disease spread (i.e. a long duration that has few cases)
Cost	Monetary price associated with intervention efforts or lack thereof (i.e. vaccination campaign, loss of ecosystem services, loss in animal productivity)	Animal health Human health Ecosystems	Easy to compare across sectors and interventions	Does not account for a more cost-effective option in relation to disease mitigation that appears more expensive
Monetary unit (cost-benefit analysis)	Assigns cost to all monetary and non-monetary outcomes (i.e. treatment costs, social impact, livelihood) to compare scenarios	Animal health Human health	Broad scope of application, allowing information to extend to different sectors of the economy. This is particularly attractive when outcomes have a value to society that is not necessarily equal across locations and populations; for instance, ecosystem services that hold differential worth.	Sometimes difficult to monetize biological and environmental effects (i.e. differing values across societies and cultures, ethical concerns regarding the monetization of ecosystem values)
Monetary unit (cost-effectiveness analysis)	Identifies most cost-effective option, expressed in terms of monetary cost per unit (i.e. cost per DALY gained)	Animal health Human health Ecosystems	Overcomes difficulty of attributing monetary units to health and environmental effects as seen in CEA	Requires initial set of standards (i.e. budget constraints, assigned threshold) and alternatives to which to be compared, problematic with lack of agreement on alternatives or control measures, difficulty comparing interventions that do not use same units of evaluation
Productivity	Effectiveness of goods and services production of animal or environmental sectors	Animal health Human health Ecosystems	May indicate changes in health status of animals or ecosystem, represents in-direct, secondary effects of outbreak on poverty or biodiversity	Not easily comparable across interventions, sectors or regions
Perception	Qualitative measure of whether expectations of intervention were met or general reaction towards outbreak response by policy and non-policy stakeholders	Animal health Human health Ecosystems	May highlight transmission pathways through human behavior, attitudes towards intervention or disease, areas of positive and negative externalities	Subjective measure that is not directly comparable across individuals

# Why do we need the other approaches for OHE?

- **Evidence on cost and effectiveness of the intervention is always requested for the policy decision makings to ensure that resources are allocated efficiently – however, it would not be used as the sole basis for decisions.**
- **Need of the other measurement approaches which are holistic enough to capture the various costs and benefits of One Health.**
- **There may be other significant benefits of the one health interventions that are not captured by the QALY or zDALY.**

## ONE HEALTH ECONOMICS

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# Cost-Consequence Analysis (CCA)

OHE

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**Division of Social and Administrative Pharmacy, Department of Pharmacy**

**Faculty of Pharmacy, Mahidol University**







***Jun 13, 2023***

# Characteristics of Cost-Consequence Analysis

- CCAs have been recommended for complex interventions that have multiple effects & public health interventions which have an array of health and non-health benefits that are difficult to measured in a common unit.
- Provides information to decision maker in a disaggregated format – the benefits and costs are not combined to a single ratio – and decision maker must make their own choice.
- Does not provide guidance nor prescribe a decision rule.

*CCAs may be useful in feasibility or pilot studies when it is not clear which Costs and outcomes will be most relevant to future definitive trials.*

# Economic evaluation for One Health

Methods	Cost	Outcomes	Results
<b>Cost-minimization analysis (CMA)</b>		- (assume to be equal)	Cost per case
<b>Cost-benefit analysis (CBA)</b>			<ul style="list-style-type: none"> <li>■ Net benefit</li> <li>■ Benefit-to-cost ratio</li> <li>■ Return on investment (ROI)</li> </ul>
<b>Cost-effectiveness analysis (CEA)</b>		<ul style="list-style-type: none"> <li>■ health outcome in natural unit</li> <li>■ Life year gained</li> </ul>	ICER (cost per LYG)
<b>Cost-utility analysis (CUA)</b>		Outcome in a common unit e.g. QALY	ICER (cost per QALY)
<b>Cost-consequence analysis (CCA)</b>		Multi-dimensional list of outcomes	<ul style="list-style-type: none"> <li>■ Cost difference</li> <li>■ Outcome difference</li> </ul>

# Cost-Consequence Components

## ***Costs***

### ***Direct costs***

- Cost of implementing a program or cost of an intervention
- Other related medical costs
- Accommodation
- Transportation
- etc.

### ***Indirect costs***

- Productivity or Income loss

## ***Consequences***

- Health outcomes (e.g., disease symptoms, life expectancy, etc.)
- Quality of life
- Wellbeing
- Cost saving
- Impact on society
- etc.



# Example of summary costs and consequences - 1

	Intervention 1	Intervention 2	Differences
<b>Costs</b>	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
Cost of intervention	USD (USD, USD)	USD (USD, USD)	USD (USD, USD)
Transportation	USD (USD, USD)	USD (USD, USD)	USD (USD, USD)
Accommodation	USD (USD, USD)	USD (USD, USD)	USD (USD, USD)
Costs to patient	USD (USD, USD)	USD (USD, USD)	USD (USD, USD)
Income loss among target population	USD (USD, USD)	USD (USD, USD)	USD (USD, USD)
<b>Outcomes</b>			
Primary clinical outcome	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
Secondary clinical outcome	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
QALYs using EQ-5D-5L	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
Quality of life	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
Patient satisfaction	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
Social impact to target populations	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)

# Example of summary costs and consequences - 2

Cost components	Drug A		Drug B	
	units	costs	units	costs
<b>Direct medical care use/costs</b>				
Drug A/B				
Other drugs				
Physician visits				
Hospital stays				
Home care				
Other medical care (e.g. dialysis)				
<b>Direct nonmedical care use/costs</b>				
Transportation				
Crutches and other equipment				
Paid caregiver time				
<b>Indirect resource use/costs</b>				
Time missed from work for patient				
Time missed from work for unpaid caregiver				
Time missed from other activities for patient				
Time missed from other activities for unpaid caregiver				
<b>Total direct and indirect costs</b>				
<b>Symptom impact</b>				
Patient distress days				
Patient disability days				
<b>Quality-of-life impact</b>				
Quality-adjusted life-years decrement				
Quality-of-life profile measure scores				

Source: Mauskopf JA, et al. The role of cost-consequence analysis in healthcare decision-making. *Pharmacoeconomics* 1998; 13(3): 277-88.

# Example of CCA studies - 1

**Evaluation a yoga-based program compared with self-care for managing musculoskeletal conditions in the workplace.**

- **The 8-week yoga program (weekly 60-minute classes held after work in the manual handling training room of each site).**
- **Participants received an instructional DVD and illustrated booklet for home practice.**
- ***Costs:* cost of intervention (yoga instructors and equipment) & productivity loss costs.**
- ***Consequences:* back pain, psychological well-being, & health-related quality of life assessed at baseline, 8 weeks, and 6-month follow-up.**

# Example of CCA studies - 1

## Evaluation a yoga-based program compared with self-care for managing musculoskeletal conditions in the workplace.

**Table 10.1** Two cost scenarios for yoga classes

Cost scenarios	Description of costs
Scenario 1 (actual study cost scenario including instruction, travel, room set-up, and administration)	<ul style="list-style-type: none"> <li>◆ Instruction costs at £91 per session</li> <li>◆ Equipment costs at wholesale prices</li> <li>◆ Recruitment costs at £19</li> <li>◆ No venue costs</li> </ul>
Scenario 2 (instruction costs only at typical rates)	<ul style="list-style-type: none"> <li>◆ Instruction costs at £64 per session</li> <li>◆ Equipment costs at wholesale prices</li> <li>◆ Recruitment costs at £19</li> <li>◆ No venue costs</li> </ul>

**Table 10.8** Cost-consequence balance sheet at six-month follow-up

COSTS	Scenario 1 £	Scenario 2 £		
Employer perspective (yoga)	67.98	50.93		
Employer perspective (self-care)	67.27	67.27		
Mean difference in costs between groups	0.71	-16.34	v	
CONSEQUENCES	back pain (RDQ)	back pain (Keele)	wellbeing (WHO-5)	HRQOL (EQ5D-5L)
Mean difference between groups	-0.93	-0.51	1.32	0.038
p-value	p = 0.196	p = 0.071	p = 0.132	p = 0.323

**Table 10.4** Differences in intervention costs between groups

Scenario	Equipment cost per yoga participant £	Operational cost per yoga participant £	Intervention cost per yoga participant £	Intervention cost per self-care participant £	Difference in intervention cost per participant between groups £
1	7.26	57.72	64.98	2.00	62.98
2	7.26	40.67	47.93	2.00	45.93

## Cost-effectiveness of yoga for managing musculoskeletal conditions in the workplace

N. Hartfiel,<sup>1</sup> G. Clarke,<sup>2</sup> J. Havenhand,<sup>3</sup> C. Phillips<sup>4</sup> and R. T. Edwards<sup>5</sup>

<sup>1</sup>Centre for Health Economics and Medicines Evaluation, Bangor University, Bangor, Wales, <sup>2</sup>School of Healthcare Sciences, Bangor University, Bangor, Wales, <sup>3</sup>Department of Marine Sciences, University of Gothenburg, Gothenburg, Sweden, <sup>4</sup>College of Human and Health Sciences, Swansea University, Swansea, Wales, <sup>5</sup>Centre for Health Economics and Medicines Evaluation, Bangor University, Bangor, Wales

**Table 4.** Healthcare and societal perspectives: differences in costs and QALYs

	Healthcare perspective	Societal perspective
<b>Intervention costs</b>		
Yoga total	<b>£56.52/person</b>	<b>£56.52/person</b>
Equipment cost	£18.63/person	£18.63/person
Instruction cost	£37.89/person	£37.89/person
Usual-care total	<b>£2.00/person</b>	<b>£2.00/person</b>
Difference in total intervention costs between groups: £54.52/person		
<b>Healthcare resource use costs (based on participant self-report at 8 weeks/6 months)*</b>		
Yoga ( <i>n</i> = 39)		
Total cost	£229	£229
Visits/person <sup>b</sup> (CI)	0.13 (−0.02 to 0.28)	0.13 (−0.02 to 0.28)
Cost/person (CI)	£5.87 (£−0.76 to £12.50)	£5.87 (£−0.76 to £12.50)
Usual-care ( <i>n</i> = 30)		
Total cost	£802	£802
Visits/person <sup>b</sup> (CI)	0.60 (0.02 to 1.18)	0.60 (0.02 to 1.18)
Cost/person (CI)	£26.73 (£1.18 to £52.49)	£26.73 (£1.18 to £52.49)
<b>Production loss costs (based on electronic staff records)</b>		
Yoga ( <i>n</i> = 56)		
Total cost		
Missed days/person (CI)	N/A	£228
Cost/person (CI)	N/A	0.04 (−0.03 to 0.11)
Usual-care ( <i>n</i> = 53)		
Total cost	N/A	£4.07 (£−3.91 to £12.05)
Missed days/person (CI)	N/A	£4,902
Cost/person (CI)	N/A	0.81 (−0.29 to 1.91)
		£92.49 (−32.77 to £217.75)
Difference in sickness absence costs between groups (difference: 4 participants, 41 days)	N/A	£4,674 total cost <b>£88.42/person</b>
Difference in sickness absence costs between groups with 1.28 multiplier (difference: 4 participants, 41 days)	N/A	£5,983 total cost <b>£113.18/person</b>
<b>Total cost</b>		
Yoga	<b>£62.49/person</b>	<b>£66.56/person</b>
Usual-care	<b>£28.73/person</b>	<b>£121.22/person</b>
Difference in costs between groups	<b>£33.76/person</b>	<b>−£54.66/person</b>
Bootstrapped 95% CI	−£8 to £56	−£389 to £32
QALYs (complete cases)	0.027	0.027
Bootstrapped 95% CI	−0.003 to 0.057	−0.003 to 0.057
QALYs (imputed cases)	0.016	0.016
Cost/QALY (ICER—complete cases)	£1,246	Yoga dominant
Cost/QALY (ICER—imputed cases)	£2,103	Yoga dominant
Cost-effectiveness probability—complete cases (£20 000/QALY threshold)	95%	98%

Source: Hartfiel N, et al. Cost-effectiveness of yoga for managing musculoskeletal conditions in the workplace. *Occupational Medicine* 2017; 67: 687–95.

# Example of CCA studies - 2

One Health 15 (2022) 100408



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Impact of the switch from four to three intradermal rabies post-exposure prophylaxis sessions in patients bitten by dogs: A cost-consequence analysis from the patients' perspective

Alicia Le Bras<sup>a,\*</sup>, Kevin Zarca<sup>a,b</sup>, Yiksing Peng<sup>c</sup>, Malen Chan<sup>c</sup>, Isabelle Durand-Zaleski<sup>a,b,d</sup>

<sup>a</sup> DRCI-URC Eco Ile-de-France, Assistance Publique-Hôpitaux de Paris, Paris, France

<sup>b</sup> Service de Santé Publique, Henri Mondor-Albert- Chenevier, Assistance Publique-Hôpitaux de Paris, Créteil, France

<sup>c</sup> Epidemiology and Public Health Unit, Institut Pasteur du Cambodge, 5, Bvd Monivong, BP 963, Phnom Penh, Cambodia

<sup>d</sup> CRESS, INSERM, INRA, Université de Paris, Paris, France

- The required number of sessions, either 4 or 3, affects both the costs & outcomes.
  - The aim of this study was to measure how the switch from 4 to 3 PEP sessions would affect both the cost & effectiveness in unvaccinated persons bitten by dogs (for exposure and severe exposure).
- Rabies is prevented if the victim receives timely & adequate PEP.
  - An issue of inappropriate compliance to the full course of PEP sessions was raised.

# Example of CCA studies - 2

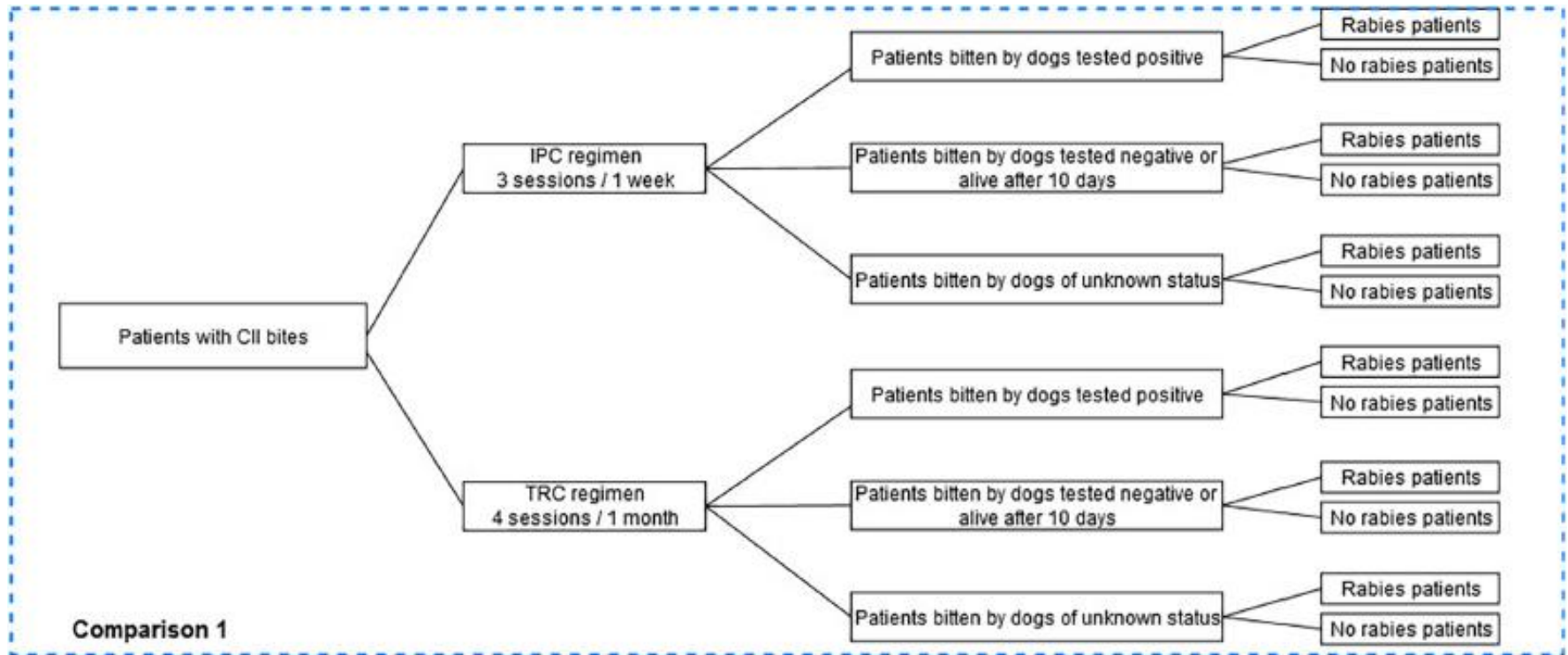


Fig. 1. Decision tree simulating patient trajectory of unvaccinated patients referring to the IPC for PEP after categories II/III bites, with or without ERIG. Comparison 1 compares the IPC regimen vs. TRC regimen in patients with category II bites. Comparison 2 compares the IPC regimen vs. TRC regimen in patients with category III bites.

Notes. \*Tested negative or alive at 10 days.

# Example of CCA studies - 2

## Costs

	Regimen Comparison 1:	
	Patients with Category II bites	
	Base case (%)	Distributions
Cost		
Wound cleaning received outside IPC	\$5.1	Gamma [shape = 0.67, scale = 7.52]
Transportation	\$4.6	Gamma [shape = 0.62, scale = 7.35]
Accommodation	\$0.6	Gamma [shape = 0.01, scale = 39.95]
Income loss among adult patients	\$3.0	Gamma [shape = 1.38, scale = 2.16]
Income loss among relatives of child patients	\$4.7	Gamma [shape = 0.85, scale = 5.6]
Income loss among relatives of adult patients	1.0	Gamma [shape = 0.24, scale = 4.1]

## Effectiveness

The probability of survival without rabies



# Example of CCA studies - 2

**Table 5**

Per-patient cost (including indirect costs) in 2018 USD associated with the IPC regimen and the TRC regimen in unvaccinated persons bitten by dogs\*.

		IPC regimen (3 sessions)		TRC regimen (4 sessions)	
		CII bites	CIII bites <sup>†</sup>	CII bites	CIII bites <sup>†</sup>
Patients bitten by					
• confirmed rabid dogs	CII bites, p = 0.91% CIII bites, p = 1.45%	\$80.3	\$81.2	\$89.3	\$90.1
• confirmed non-rabid dogs <sup>‡</sup>	CII bites, p = 84.28% CIII bites, p = 84.83%	\$43.6	\$75.9	\$43.6	\$75.9
• dogs of unknown status	CII bites, p = 14.80% CIII bites, p = 13.72%	\$47.4	\$72.0	\$56.4	\$90.9
<b>Total</b>		<b>\$44.5</b>	<b>\$75.5</b>	<b>\$45.9</b>	<b>\$76.8</b>

\* p represents the probabilities used in the model.

<sup>†</sup> Most patients received ERIG.

<sup>‡</sup> Tested negative or alive at 10 days.

The proportion of survival without rabies was 99.96% in patients who received an IPC regimen after a Category III bite, with a mean cost per patient of \$75.5 (Table 5). No deaths were reported among TRC regimen recipients after a Category III bite in our study, with a mean cost per patient of \$76.8. The reduction from four to three-PEP sessions resulted in a cost reduction of \$1.3 per patient, ranging from \$8.9 for a confirmed rabid dog or a dog of unknown status to 0\$ for a confirmed non-rabid dog, and 0.04% decrease in the probability of survival without rabies. The IPC regimen was therefore cheaper but less effective than the TRC regimen.

# Cost-Consequence Analysis (CCA)

## *Limitations of a CCA*

- No specific or definitive guidance on CE thresholds
- The weighting of the relative importance of different costs & benefits is left to decision-makers that might not always be in patients' or society's best interest
- Limited generalizability
- Decisions based on CCA may not be transparent

## *Advantages of a CCA*

- Easily understood and applied by decision-makers
- Able to present a broader range of health and non-health costs
- Alternative approaches to measuring costs and outcomes

# Exercise

- **From the 'VN Rabies-Economic Analysis' Excel file, please each group make a plan for cost-consequence analysis.**

## ONE HEALTH ECONOMICS

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# Social Return On Investment (SROI)

OHE

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***Jun 13, 2023***

# Return on Investment (ROI)

## Investment in general



Investment	1,000 THB
Sale	1,300 THB
Profit	300 THB (30%)

## Investment for society



Swimming lesson  
for kids (survival skill)

Opportunity lost!!



Benefits for:

- Kids
- Parents
- Society



# Social Return on Investment (SROI)

- Return on investment (ROI) is the number of times an investment is earned back by the investor – one of cost-benefit analysis (CBA).
- SROI is an extension of CBA - a framework for measuring and accounting for this much broader concept of **value** by incorporating **social, environmental and economic cost and benefits**.
- SROI measures **change** in ways that are relevant to the **people or organizations that experience or contribute to it**.

$$\frac{\text{Total social benefit}}{\text{Total operating expenses (or investment)}} \quad \text{OR} \quad \frac{\text{Total social benefit} - \text{Total operating expenses}}{\text{Total operating expenses}}$$

# SROI studies in Public Health

**Table 3** Findings from systematic review of SROI application in Public Health

Study characteristics	Number of studies	% of total
SROI type		
Evaluative type	26	65.00
Forecast type	14	35.00
Area of Public Health		
Child Health	4	10.00
Environmental Health	1	2.50
Health Care Management	2	5.00
Health Education	1	2.50
Health Promotion	12	30.00
Mental Health	11	27.50
Nutrition	3	7.50
Sexual Reproductive Health	6	15.00
Stakeholders included		
Only beneficiaries	21	52.50
Beneficiaries and implementers	3	7.50
Beneficiaries and promoters	2	5.00
Beneficiaries, implementers and promoters	3	7.50
All stakeholders	11	27.50
Data Source		
Qualitative alone	3	7.50
Qualitative + primary	8	20.50
Qualitative + secondary	9	22.50
Qualitative + primary + secondary	15	37.50
Quantitative (primary) alone	1	2.50
Quantitative (secondary) alone	3	7.50
Quantitative (primary + secondary)	1	2.50

# SROI: Principle

- Participation – involving stakeholders
- Understand what changes
- Value the things that matter and valuable
- “Do not” over-claim
- Be transparent
- Verify the result



# How to conduct SROI

**Establishing  
scope &  
identifying  
stakeholders**

**Mapping  
outcomes &  
establishing  
impact**

**Evidencing  
outcomes &  
giving them  
a value**

**Calculating  
SROI**

**Reporting**

# How to conduct SROI

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**Reporting**



## **What to consider:**

- **Purpose**
- **Background**
- **Resources**
- **The range of activities**
- **The intervention's implementation period of time**
- **Relevant stakeholders**

# How to conduct SROI

**Establishing  
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**Calculating  
SROI**

**Reporting**



**What to identify:**

- **Changes**
- **Displacement**
- **Deadweight**
- **Attribution**
- **Drop-off**

# How to conduct SROI

**Establishing  
scope &  
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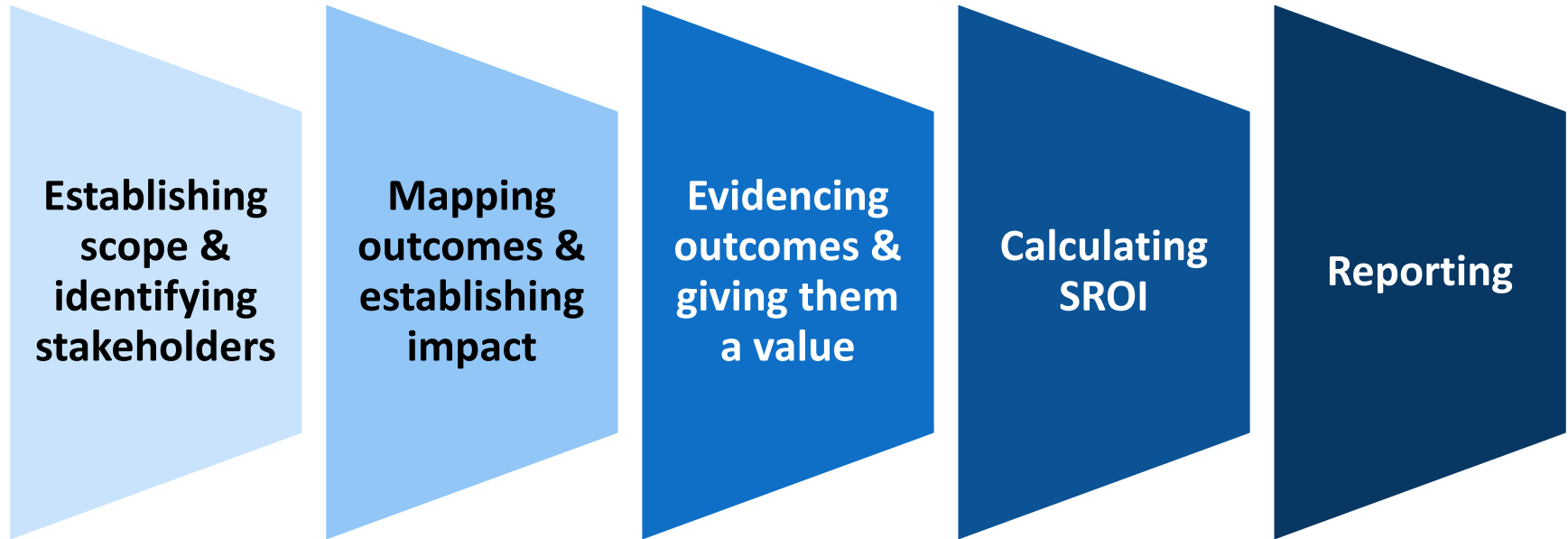
**Calculating  
SROI**

**Reporting**



- **Developing outcome indicators**
- **Collecting outcomes data**
- **Valuing each outcome**

# How to conduct SROI



$$\text{SROI ratio} = \frac{\text{Present value of impact of the intervention}}{\text{Value of inputs}}$$

# Special characteristics of SROI

- **Holistic consideration**
- **Using financial proxies to estimate monetary value of benefits that cannot be easily monitored (monetization).**
- **Can be applied for every level**
- **Including theory of change**
- **Having stakeholder engagement**
- **Can be also used for stakeholder relationship building and accountability framework.**

# Example of SROI study

Article

## Social Return on Investment of Home Exercise and Community Referral for People With Early Dementia

Gerontology & Geriatric Medicine  
Volume 8: 1–10  
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DOI: 10.1177/23337214221106839  
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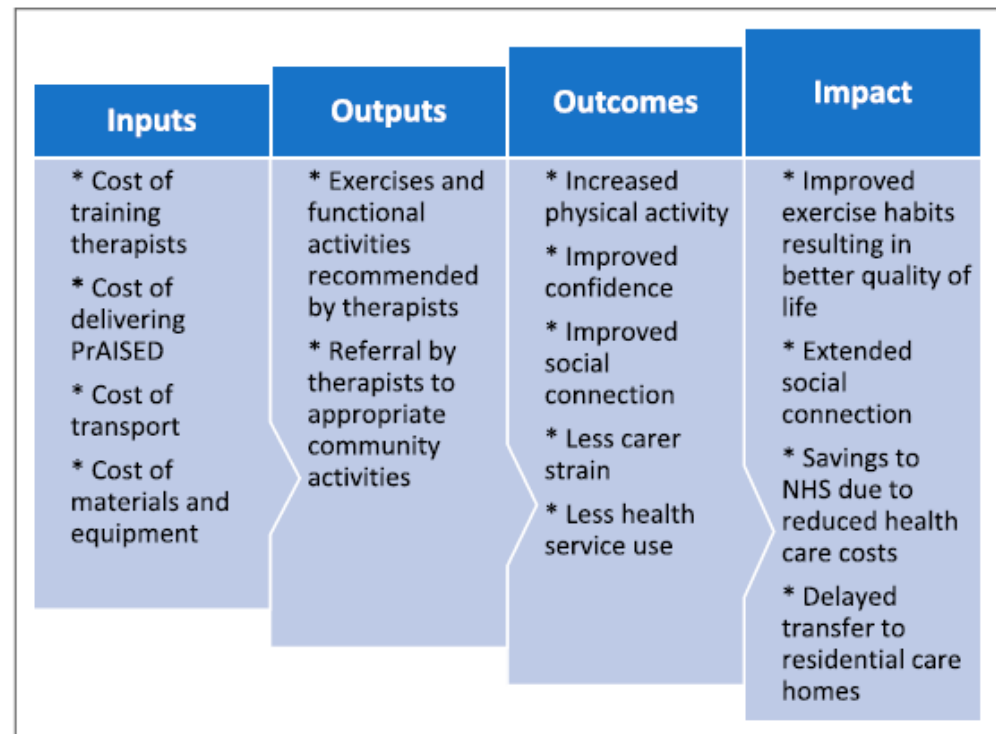


Figure 1. Theory of change model.

**Table 1. Outcome Measures for Three Key Stakeholders.**

Stakeholder	Outcome Measure	Completed by	Outcome
Patient participant	Disability assessment for dementia scale (DAD)	Carer participant	ADLs
Patient participant	International physical activity questionnaire	Carer participant	Physical activity
Patient participant	Berg balance scale	Patient participant	Balance
Patient participant	Timed up and go (TUG) test	Patient participant	Balance and mobility
Patient participant	Falls efficacy scale – International (FES-I)	Carer participant	Fear of falling
Patient participant	Health-related quality of life (EQ5D-3L)	Patient participant	Health-related quality of life
Carer participant	Carer strain index (CSI)	Carer participant	Carer strain
NHS	CSRI form	Carer participant	Costs of health care resource use

**Table 2. Valuing Outcomes for Patient and Carer Participants.**

Outcome Scenario	Participant Group	Outcome	Indicators	Quantity	Financial Value from Social Value Bank	Social Value per year	Social Value per Person
Base case	PrAISED	Physical activity	DAD	12/28 (43%) no deterioration or improved	£3537 per year - frequent mild exercise	£42,444	£1516
Conservative case	PrAISED	Physical activity	DAD	7/28 (25%) improved	£3537 per year - frequent mild exercise	£24,759	£884
Base case	Usual care	Physical activity	DAD	3/14 (21%) no deterioration or improved	£3537 per year - frequent mild exercise	£10,611	£758
Conservative case	Usual care	Physical activity	DAD	2/14 (14%) improved	£3537 per year - frequent mild exercise	£7074	£505
Base case	PrAISED	Improved confidence	FES-I	15/26 (58%) no deterioration or improved	£13,080 per year - feeling high confidence	£196,200	£7546
Conservative case	PrAISED	Improved confidence	FES-I	8/26 (31%) improved	£13,080 per year - feeling high confidence	£104,640	£4025
Base case	Usual care	Improved confidence	FES-I	4/12 (33%) no deterioration or improved	£13,080 per year - feeling high confidence	£52,320	£4360
Conservative case	Usual care	Improved confidence	FES-I	3/12 (25%) improved	£13,080 per year - feeling high confidence	£39,240	£3270
Base case	PrAISED	Social connection	EQ5D-3L	22/29 (76%) no deterioration or improved	£3753 per year - sense of belonging	£82,566	£2847
Conservative case	PrAISED	Social connection	EQ5D-3L	15/29 (52%) improved	£3753 per year - sense of belonging	£56,295	£1941
Base case	Usual care	Social connection	EQ5D-3L	6/13 (46%) no deterioration or improved	£3753 per year - sense of belonging	£22,518	£1732
Conservative case	Usual care	Social connection	EQ5D-3L	2/13 (15%) improved	£3753 per year - sense of belonging	£7506	£577
Base case	PrAISED	Less carer strain	CSI	17/25 (68%) no deterioration or less strain	£6784 per year – able to rely on family	£115,328	£4613
Conservative case	PrAISED	Less carer strain	CSI	10/25 (40%) less strain	£6784 per year – able to rely on family	£67,840	£2714
Base case	Usual care	Less carer strain	CSI	5/12 (42%) no deterioration or less strain	£6784 per year – able to rely on family	£33,920	£2827
Conservative case	Usual care	Less carer strain	CSI	3/12 (25%) less strain	£6784 per year – able to rely on family	£20,352	£1696
Outcome 1: Physical activity - difference between groups (base case)							£758
Outcome 1: Physical activity - difference between groups (conservative case)							£379
Outcome 2: Confidence - difference between groups (base case)							£3186
Outcome 2: Confidence - difference between groups (conservative case)							£755
Outcome 3: Social connection - difference between groups (base case)							£1115
Outcome 3: Social connection- difference between groups (conservative case)							£1364
Outcome 4: Carer strain - difference between groups (base case)							£1786
Outcome 4: Carer strain - difference between groups (conservative case)							£1018

Source: Harfiel N, et.al. SROI of home exercise and community referral for people with early dementia. *Gerontology & Geriatric Medicine* 2022; 8: 1-10.



# Example of SROI study

**Table 3.** Valuing Outcomes for the NHS.

Health Service Use						
PrAISED Patients (n = 33)						
Usual Care Patients (n = 16)	Baseline	12-mos	Quantity Difference	Cost per Visit	Total Cost	Average Cost per Patient
GP visits (PrAISED)	48	38	-10	£37/visit <sup>a</sup>	-£370	-£11.21
GP visits (usual care)	18	23	+5	£37/visit <sup>a</sup>	+£185	+£11.56
Nurse visits (PrAISED)	51	50	-1	£36/visit <sup>a</sup>	-£36	-£1.09
Nurse visits (usual care)	14	8	-6	£36/visit <sup>a</sup>	-£216	-£13.50
Outpatient services (PrAISED)	51	23	-28	£125/visit <sup>b</sup>	-£3500	-£106.06
Outpatient services (usual care)	28	12	-16	£125/visit <sup>b</sup>	-£2000	-£125.00
A&E services (PrAISED)	4	5	+1	£160/visit <sup>b</sup>	+£160	+£4.85
A&E services (usual care)	0	2	+2	£160/visit <sup>b</sup>	+£320	+£20.00
Inpatient hospital days (PrAISED)	1	15	+14	£1603/day <sup>b</sup>	£22,442	+£680.06
Inpatient hospital days (usual care)	0	18	+18	£1603/day <sup>b</sup>	£28,854	+£1803.38
PT/OT (PrAISED)	6	4	-2	£44/visit <sup>a</sup>	-£88	-£2.67
PT/OT (usual care)	4	21	+17	£44/visit <sup>a</sup>	+£748	+£46.75
Total (PrAISED)						£564
Total (usual care)						£1743
Difference between groups						£1179

<sup>a</sup>Curtis & Burns, 2018

<sup>b</sup>NHS Improvement, 2018

# Example of SROI study

**Table 4.** Social Return On Investment Ratios.

Cost Scenario	Category	Difference Between Groups
Base case	Outcome 1 – increased physical activity	£758 per participant
Conservative case	Outcome 1 – increased physical activity	£379 per participant
Base case	Outcome 2 – improved confidence	£3186 per participant
Conservative case	Outcome 2 – improved confidence	£755 per participant
Base case	Outcome 3 – additional social connection	£1115 per participant
Conservative case	Outcome 3 – additional social connection	£1341 per participant
Base case	Outcome 4 – less carer strain	£1786 per participant
Conservative case	Outcome 4 – less carer strain	£1018 per participant
	Outcomes for NHS	£1179 per participant
Base case	Total social value for all stakeholders	£8024 per participant
Conservative case	Total social value for all stakeholders	£4672 per participant
Base case	Total cost	£1351 per participant
Conservative case	Total cost	£1351 per participant
Base case	SROI benefit/cost ratio	£5.94: £1
Conservative case	SROI benefit/cost ratio	£3.46: £1

# Challenges of using SROI analysis in One Health

- **There are lots of valuation techniques.**
- **Analyses may not have been conducted in a consistent and comparable manner.**



Melbourne School of Population and Global Health  
**Nossal Institute for Global Health**



**Mahidol University**  
*Wisdom of the Land*

**THEHUN**  
Thailand One Health  
University Network

## **ONE HEALTH ECONOMICS**

Jun 11 – 13, 2023 | Novotel Hotel and Resorts Marina Sriracha, Chonburi, Thailand

# **Policy Development**

**OHE**

**Asst.Prof.Sitaporn Youngkong, PhD**

**Division of Social and Administrative Pharmacy, Department of Pharmacy**

**Faculty of Pharmacy, Mahidol University**

***Jun 13, 2023***

# Policy decision making



Generating evidence is one of the policy development process.

Prior to generate the evidence, you have to know:

- Who are the decision-makers? How do they work?
- When will they need the information?
- Which information do they need or consider in their decision-making process?

# Key dimensions to support national policy decisions for investment

- Choice of whether to invest in programs/interventions is always a complex dynamic.



# Example of national coverage decisions for vaccines

- The National Immunisation Technique Advisory Group (NITAG) -**

*A multidisciplinary group of national experts responsible for providing independent, evidence-informed advice to health authorities on policy issues related to immunization and vaccines for all population groups.*

**Table 1**  
Characteristics of policy processes and National Immunization Technical Advisory Group (NITAG) by country with information available on immunization policy development<sup>a</sup>.

Country	NITAG	Core members	Defined term limit for members (years)	Declare conflicts of interest	Meetings per year	Nature of meetings	Meeting minutes published on the internet	Method of final decision making	Other group that makes immunization recommendations <sup>b</sup>
Australia	Yes				3	Closed	Yes		
Austria	Yes	16	3		3		No		
Belgium									Yes
Brazil	Yes								
Bulgaria									Yes
Cambodia									Yes
Canada	Yes	12	4	Yes	3	Closed	Yes	Vote	
Denmark									Yes
France	Yes	16			6-8	Closed	No		
Germany	Yes	17			2				
Greece									Yes
Ireland	Yes		No		6	Closed	No	Consensus	
Italy	Yes								
New Zealand	Yes								
Luxembourg									Yes
Norway									Yes
Papua New Guinea									Yes
Portugal									Yes
Spain	Yes		No					Consensus	
Slovakia									Yes
Slovenia									Yes
Sweden									Yes
Switzerland	Yes	15	4		5	Closed	No	Vote	
Thailand									Yes
The Netherlands	Yes								
UK	Yes	16	4	Yes	3	Closed	Yes	Vote	
USA	Yes	15	4	Yes	3	Open	Yes	Vote	

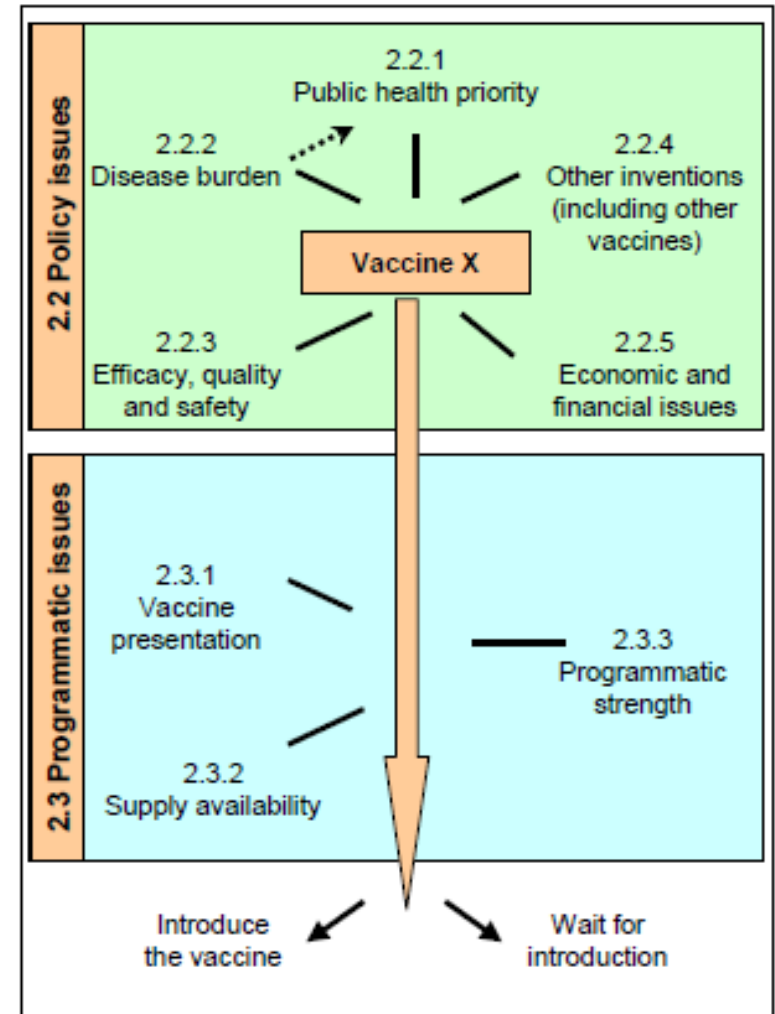
<sup>a</sup> Blank fields indicate that information was not available—also limited information was available on Argentina, China, Finland, Iceland, Mali, and Poland but not related to the information in this table.

<sup>b</sup> Unknown if these groups are NITAGs as defined in this paper.

# Example of national coverage decisions for vaccines

## Proposed considerations to support vaccine coverage decisions:

- Public health priority
- Burden of disease
- Vaccine characteristics  
(efficacy, quality and safety)
- Impact of immunization program
- Economic and financial issues
- Values and preferences
- Resource use
- Equity
- Feasibility / Readiness



World Health Organization. Vaccine introduction guidelines: Adding a vaccine to a national Immunisation programme: Decision and implementation. Geneva: World Health Organization, 2005.

Gonzalez-Lorenzo M, et.al. Conceptual frameworks and key dimensions to support coverage decisions for vaccines. Vaccine 2015. 33: 1206-17.



# Challenges in policy development for One Health

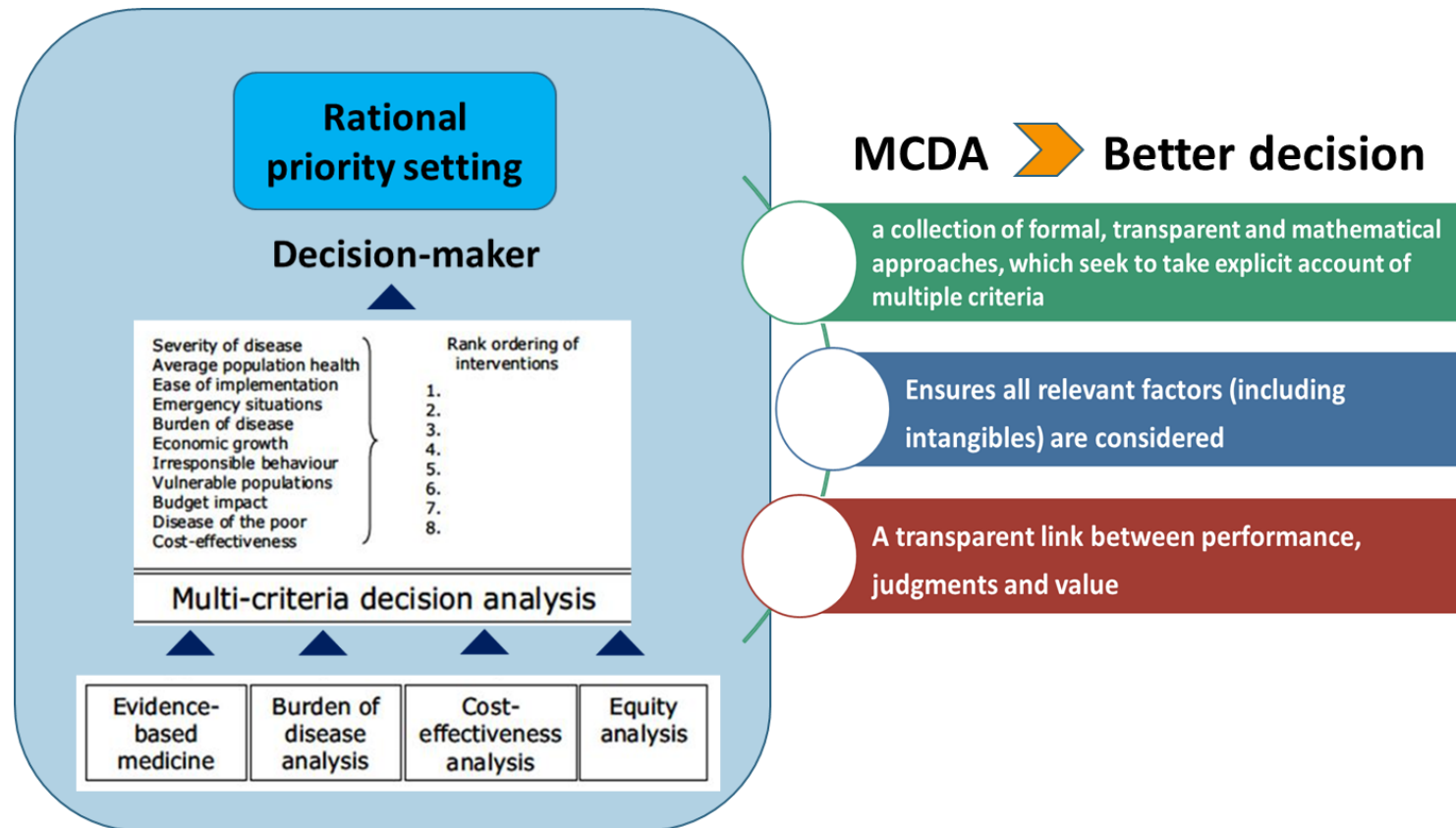
- **A number of criteria (or information) plays a significant role in decision making process – which criteria should be included in the consideration?**
- **Outcomes of the one health intervention might be the most interest of policymakers – How do we deal with different results from different outcome metrics? (also, across sectors)**
- **Most of decision-makers consider those criteria simultaneously – How to?**



**A more systematic, transparent and accountable approach for making policy recommendation**

# The need for Multi-Criteria Decision Analysis (MCDA)

- MCDA is an umbrella term to describe a collection of formal approaches which seek to take explicit account of multiple criteria in helping individuals or groups explore decisions that matter.



# Common steps of MCDA

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## ISPOR TASK FORCE REPORT

### Multiple Criteria Decision Analysis for Health Care Decision Making—An Introduction: Report 1 of the ISPOR MCDA Emerging Good Practices Task Force

Praveen Thokala, MASC, PhD<sup>1,\*</sup>, Nancy Devlin, PhD<sup>2</sup>, Kevin Marsh, PhD<sup>3</sup>, Rob Baltussen, PhD<sup>4</sup>, Meinert Boysen, MSc<sup>5</sup>, Zoltan Kalo, PhD<sup>6</sup>, Thomas Longreim, MSc<sup>7</sup>, Filip Mussen, PhD<sup>8</sup>, Stuart Peacock, PhD<sup>9,10,11</sup>, John Watkins, PharmD<sup>12,13</sup>, Maarten Ijzerman, PhD<sup>14</sup>

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Defining the decision problem

Selecting & structuring criteria

Weighting criteria

Providing evidence to measure performance

Scoring the criteria to evaluate performance of the intervention

Aggregating data for ranking, investing, & disinvesting

Dealing with uncertainty

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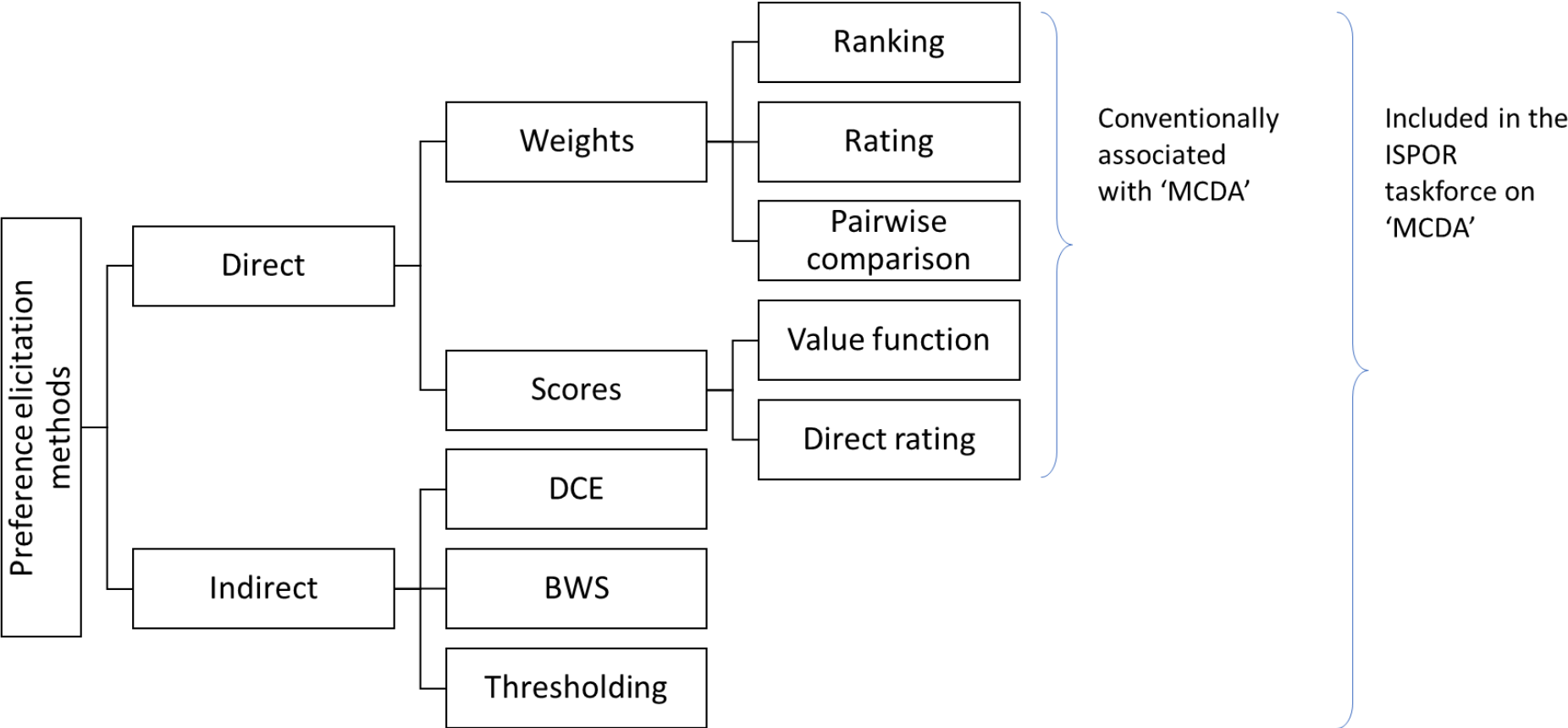
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# Preference elicitation



# Example of MCDA for setting priorities on vaccine introduction in Thailand

2016

Identified the potential vaccines for introduction

& Identified priority setting criteria

2016

Rapid reviewed (systematically) against the criteria to generate a performance matrix of the potential vaccines

2017

Presented preliminary results to the relevant stakeholders

& Made a policy recommendation

*Stakeholder participation*

Vaccines	Target population	Schedule
1. DTwP-H-Hib	Children 0-5 yrs	2, 4, 6 mo
2. DTaP-HB-Hib-IPV	Children 0-5 yrs	2, 4, 6 mo
3. TdaP	Pregnant women	Once
4. DTaP	Children 0-5 yrs	2, 4, 6 mo, 1, 5, 4 yr
5. PCV	Children 0-5 yrs	2, 4, 12-18 mo
6. Dengue	n/a	n/a
7. Varicella	Children 0-5 yrs	12-18 mo, 4 yr
8. Hep A	Children 0-5 yrs	Twice
9. Herpes	Elderly	Once
10. Rabies (pre-exp)	Children 0-5 yrs	Day 0, 7, 21
11. Influenza	Pregnant women	Seasonally
12. MR	Health professionals	Prior to work
13. Hib	Children 0-5 yrs	2, 4, 6 mo

**13 potential vaccines for introduction**

DISEASE

- Size of population affected by disease/ health problem
- Severity of disease

VACCINE

- Effectiveness
- Safety

- Estimated budget for target population
- Sustainability (Capacity to produce vaccine domestically)
- Cost – effectiveness
- Others (expert panel)

**Vaccine priority setting criteria**

# Example of MCDA for setting priorities on vaccine introduction in Thailand

## Multi-criteria decision analysis study

- **Criteria with scoring system**
  - Size of population affected by disease
  - Severity of disease
  - Effectiveness of vaccine
  - Safety of vaccine
  - Estimated budget impact
  - Capacity of local production

### Example

Criteria	Definition	Parameter	Scoring system
Size of population affected by disease	Number of people affected by the disease or health problem that is preventable by vaccine at a specified time.	Prevalence	5 = $\geq 10,000$ people 4 = 1,000 – 9,999 people 3 = 100 – 999 people 2 = 10 – 99 people 1 = 0 – 9 people

# Example of MCDA for setting priorities on vaccine introduction in Thailand

## Multi-criteria decision analysis study

- **Criteria without scoring system**
  - Value for money
  - Equity/ethical and social implication

Criteria	Definition	Information used
Value for money	<p>The maximization of health outcomes regarding vaccination (in target population of vaccine) given a certain budget</p> <p><i>Presented in symbol &amp; description: (T) = studied in the Thai context; (I) = studied in other countries; (+) = cost-effective; (-) = not cost-effective</i></p>	ICER (Incremental Cost-Effectiveness Ratio)
Equity/ethical and social implication	<p>Priorities for specific groups of populations (e.g., the high-risk group and children), reflect the moral values that should be considered by policymakers.</p> <p><i>Presented in description.</i></p>	

# Example of MCDA for setting priorities on vaccine introduction in Thailand

Vaccines/Criteria		Size of population	Severity of disease	Effectiveness	Safety	Budget impact	Capacity of local production	Total	Equity/Ethical	Value for money
1	Tdap	1	4	5	5	5	5	25	✓	± (I)
2	DTwP-HB-Hib + IPV 1 dose	4	4	5	5	5	2	25	✓	n/a
3	Rabies	1	5	5	5	5	4	25	✓	- (T)
4	DTwP-HB-Hib + IPV 5 doses	4	4	5	5	4	2	24	✓	+ (T)
5	Influenza	4	2	3	5	5	4	23	-	+ (I)
6	DTaP-HB-Hib-IPV	4	4	4	5	2	2	21	✓	n/a
7	PCV	3	5	3	5	2	2	20	✓	+ (I) / - (T)
8	Varicella	4	1	5	5	3	2	20	-	± (I)
9	Hep A	2	1	5	5	4	2	19	-	n/a
10	MR	1	1	5	5	5	1	18	-	n/a
11	DTaP	1	4	4	5	2	-	16	✓	± (I)
12	Dengue	5	1	2	5	1	1	15	✓	- (T)
13	Herpes	5	1	1	5	1	1	14	-	± (I)



# Conclusion



Vaccines/Criteria		Size of population	Severity of disease	Effectiveness	Safety	Budget impact	Capacity of local production	Total	Equity/Ethical	Value for money	Rank in ordering by committee
1	Tdap	1	4	5	5	5	5	25	✓	± (I)	1
2	DTwP-HB-Hib + IPV 1 dose	4	4	5	5	5	2	25	✓	n/a	1
3	Rabies (pre-exposure)	1	5	5	5	5	4	25	✓	- (T)	3
4	DTwP-HB-Hib + IPV 5 doses	4	4	5	5	4	2	24	✓	+ (T)	
5	Influenza	4	2	3	5	5	4	23	-	+ (I)	1
6	DTaP-HB-Hib-IPV	4	4	4	5	2	2	21	✓	n/a	3
7	PCV	3	5	3	5	2	2	20	✓	+ (I) / - (T)	2
8	Varicella	4	1	5	5	3	2	20	-	± (I)	2
9	Hep A	2	1	5	5	4	2	19	-	n/a	2
10	MR	1	1	5	5	5	1	18	-	n/a	1
11	DTaP	1	4	4	5	2	-	16	✓	± (I)	
12	Dengue	5	1	2	5	1	1	15	✓	- (T)	2
13	Herpes	5	1	1	5	1	1	14	-	± (I)	3

# Example of MCDA for setting priorities on vaccine introduction in Thailand

## The national policy implementation

### Priority vaccines for the period 2017-2021

Rank	Vaccine	Target population
1	Tdap	Pregnant women
	Influenza	Pregnant women
	DTwP-HB-Hib +IPV	Children 0 – 5 years
	MR	Health professionals
2	PCV	Children 0 – 5 years
	Dengue	(did not decide yet)
	Varicella	Children 0 – 5 years
	Hep A	Children 0 – 5 years
3	Rabies (pre-exposure)	Children 0 – 5 years
	DTaP-HB-Hib-IPV	Children 0 – 5 years
	Herpes	Elderly > 60 years

**Implementation plan**  
(through consultation meetings with the advisory committee on immunization practice)

2018-2021

2022-2026

2027 onwards

# Example of MCDA for setting priorities on vaccine introduction in Thailand

## The national policy implementation

### *Priority vaccines for the period 2017-2021*

Rank	Vaccine	Target population
1	Tdap	Pregnant women
	Influenza	Pregnant women
	DTwP-HB-Hib +IPV	Children 0 – 5 years
	MR	Health professionals

*Implementation plan  
(through consultation meetings  
with the advisory committee  
on immunization practice)*

**2018-2021**

- The first slot of priority vaccines was already included in the EPI program and the national list of essential medicines (= drug reimbursement list).

