

Joint vaccine training programmes: lessons from Asia and WHO



Global needs for vaccine economics training and capacity building

Raymond Hutubessy

Senior economist, Immunization, Vaccines and Biologicals Department, World Health Organization



Building health economics capacity globally: the experience of NUS

Yik Ying Teo,

Professor and Dean, Saw Swee Hock School of Public Health, National University of Singapore



LSHTM's networks around vaccine economics training and capacity building

Mark Jit

Professor of Vaccine Epidemiology, London School of Hygiene & Tropical Medicine

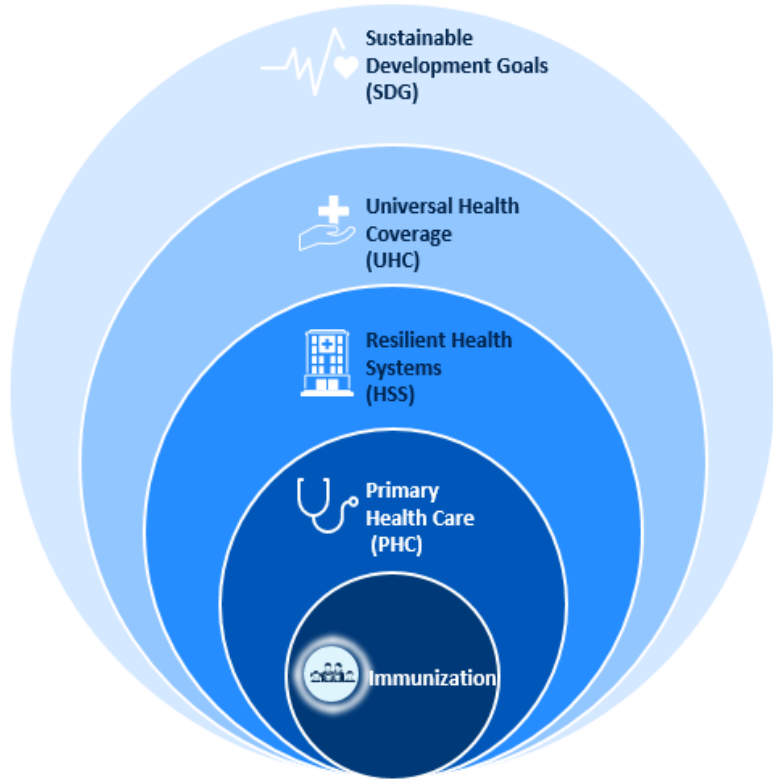
Global needs for vaccine economics training and capacity building

Raymond Hutubessy

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Immunization is a core to PHC, UHC and SDG



WHAT DO YOU NEED TO GET, BE AND STAY HEALTHY?

CAN YOU GET HELP FROM A WELL-TRAINED HEALTH WORKER?

CAN YOU GET TREATMENT THAT HELPS YOU GET BETTER, AND IS SAFE?

CAN YOU GET THE MEDICINES AND OTHER HEALTH PRODUCTS YOU NEED?

WHO WILL PAY FOR IT?

ARE THERE POLICIES IN PLACE TO MAKE QUALITY SERVICES AVAILABLE TO EVERYONE, EVERY TIME?

DOES YOUR GOVERNMENT HAVE THE INFORMATION IT NEEDS TO MAKE THE RIGHT DECISIONS ABOUT THE WHOLE SYSTEM?

THE WORLD HEALTH ORGANIZATION IS WORKING AROUND THE WORLD SO THAT ALL PEOPLE AND COMMUNITIES RECEIVE THE QUALITY SERVICES THEY NEED, AND ARE PROTECTED FROM HEALTH THREATS, WITHOUT SUFFERING FINANCIAL HARDSHIP.

THAT'S WHAT WE CALL

UNIVERSAL HEALTH COVERAGE

World Health Organization

www.who.int/uhc

Immunization linked to 14 of the 17 SDGs

(key examples)



Immunisation expects to prevent **medical impoverishment**, mainly among poorest people



Immunisation is one of the most **cost-effective ways** to ensure long and healthy lives



Vaccines protect child health and support **cognitive development**



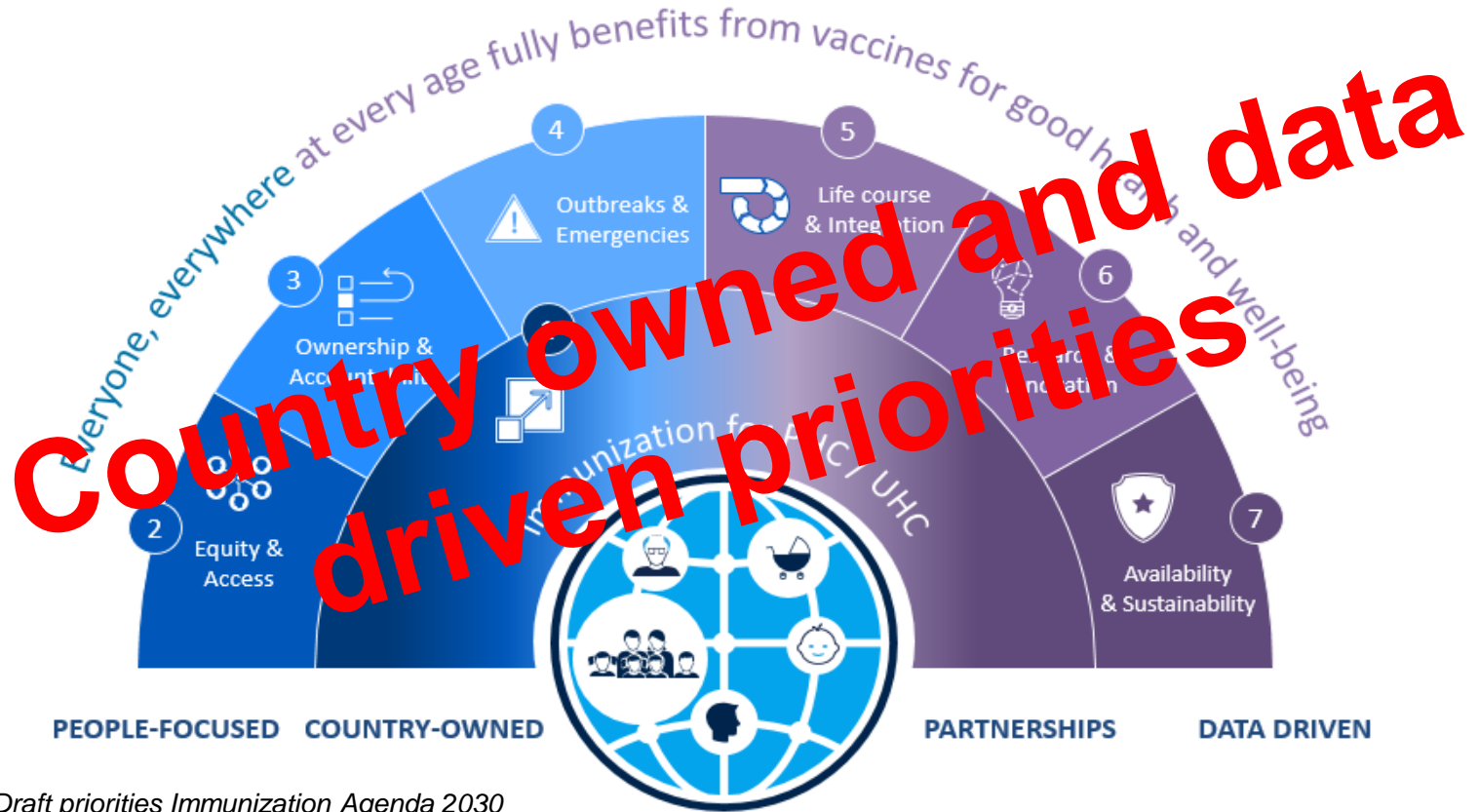
Immunisation plays a role in **empowering girls** and women through vaccine and programmatic support



Immunisations brings **basic healthcare to underserved communities**



UHC is central to the Immunization Agenda 2030



Systematic reviews vaccine economic analyses

- Studies show systematically
- Most tools developed in HIC
- Lack of studies from LMICs
- Need for capacity building

HUMAN VACCINES & IMMUNOTHERAPEUTICS
2017, VOL. 9, NO. 6, 1-10
<https://doi.org/10.1080/21645515.2017.1392422>



REVIEW



Global economic evaluation of oral cholera vaccine: A systematic review

Siew Li Teoh^a, Surachai Kotirum^{a,b}, Raymond C. W. Hutubessy^c, and Nathorn Chaiyakunapruk^{a,d,e,f}

^aSchool of Pharmacy, Monash University Malaysia, Selangor, Malaysia; ^bSocial and Administrative Pharmacy Department, Faculty of Pharmacy, Rangsit University, Muang, Pathumthani, Thailand; ^cWorld Health Organization, Initiative for Vaccine Research, Geneva, Switzerland; ^dCenter of Pharmaceutical Outcomes Research (CPOR), Department of Pharmacy Practice, Faculty of Pharmaceutical Sciences, Naresuan University, Phitsanulok, Thailand; ^eSchool of Pharmacy, University of Wisconsin, Madison, USA; ^fAsian Centre for Evidence Synthesis in Population, Implementation and Clinical Outcomes (PICCO), Health and Well-being

ABSTRACT
World Health Org requires cost-effective global economic studies from inception to studies were app included studies, evaluated mass v most common in price. OCV vaccine cholera and poor is low.



Review

Global economic evaluations of rotavirus vaccines: A systematic review



Surachai Kotirum^{a,b}, Naon Vutipongsatorn^{a,c}, Khachen Kongpakwattana^a, Raymond Hutubessy^d, Nathorn Chaiyakunapruk

^aSchool of Pharmacy, Monash University & ^bSocial and Administrative Pharmacy Dept ^cFaculty of Pharmacy, Silpakorn University ^dWorld Health Organization, Initiative for ^eCenter of Pharmaceutical Outcomes Resa ^fSchool of Pharmacy, University of Wisconsin ^gHealth and Well-being Cluster, Global Asia



Review

A systematic review of the social and economic burden of influenza in low- and middle-income countries



Natasha de Francisco (Shapovalova)^{a,*}, Morgane Donadei^d, Raymond Hutubessy^{a,c}

^aHealth Systems and Innovation, World Health Organization, 20 Avenue Appia, CH-1211 Geneva, S ^bModelling and Economics Unit, Public Health England, London, UK ^cDepartment of Infectious Disease Epidemiology, London School of Hygiene and Tropical Medicine, ^dVaccines, Immunization and Biologicals, World Health Organization, 20 Avenue Appia, CH-1211 C

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Keywords:
Systematic review
Influenza
Cost
Broader economic impact

ABSTRACT

Objectives: The economic burden of and middle-income countries (LMIC) systematic review is to assess the economic and to quantify the economic opportunity costs in terms of impact. **Methods:** We conducted an all languages key words for the time period 1950 non-medical), indirect costs (produ different influenza outcomes such as pandemic influenza.

Economic evaluations of *Haemophilus influenzae* type b (Hib) vaccine: a systematic review

Bunchai Chongmelaxme^a, Maythika Hammanee^b, Wariya Phooaphirak^c, Surachai Kotirum^{a,d}, Raymond Hutubessy^e and Nathorn Chaiyakunapruk^{a,c,f,g}

^aCenter of Pharmaceutical Outcomes Research (CPOR), Department of Pharmacy Practice, Faculty of Pharmaceutical Sciences, Naresuan University, Phitsanulok, Thailand; ^bFaculty of Pharmaceutical Sciences, Prince of Songkla University, Hat-Yai, Songkla, Thailand; ^cSchool of Pharmacy, Monash University Malaysia, Selangor, Malaysia; ^dSocial and Administrative Pharmacy Department, Faculty of Pharmacy, Rangsit University, Muang, Pathumthani, Thailand; ^eWorld Health Organization, Initiative for Vaccine Research, Geneva, Switzerland; ^fSchool of Pharmacy, University of Wisconsin, Madison, WI, USA; ^gAsian Centre for Evidence Synthesis in Population, Implementation and Clinical Outcomes (PICCO), Health and Well-being Cluster, Global Asia in the 21st Century (GA21) Platform, Monash University Malaysia, Bandar Sunway, Selangor, Malaysia



Collaboration between France and WHO to realize the vision of the WHO Academy

11 June 2019 | News release | Geneva

Today Emmanuel Macron, President of the French Republic and Dr Tedros Adhanom Ghebreyesus, WHO Director-General met at WHO Headquarters in Geneva.

They signed a Declaration of Intent to establish the WHO Academy that will revolutionize lifelong learning in health. The Academy aims to reach millions of people with innovative learning via a state-of-the-art digital learning experience platform at a campus in Lyon and embedded in the six WHO regions. The WHO Academy Lyon hub will feature high-tech learning environments, a world-class health emergencies simulation centre and collaboration spaces for learning co-design, research and innovation.

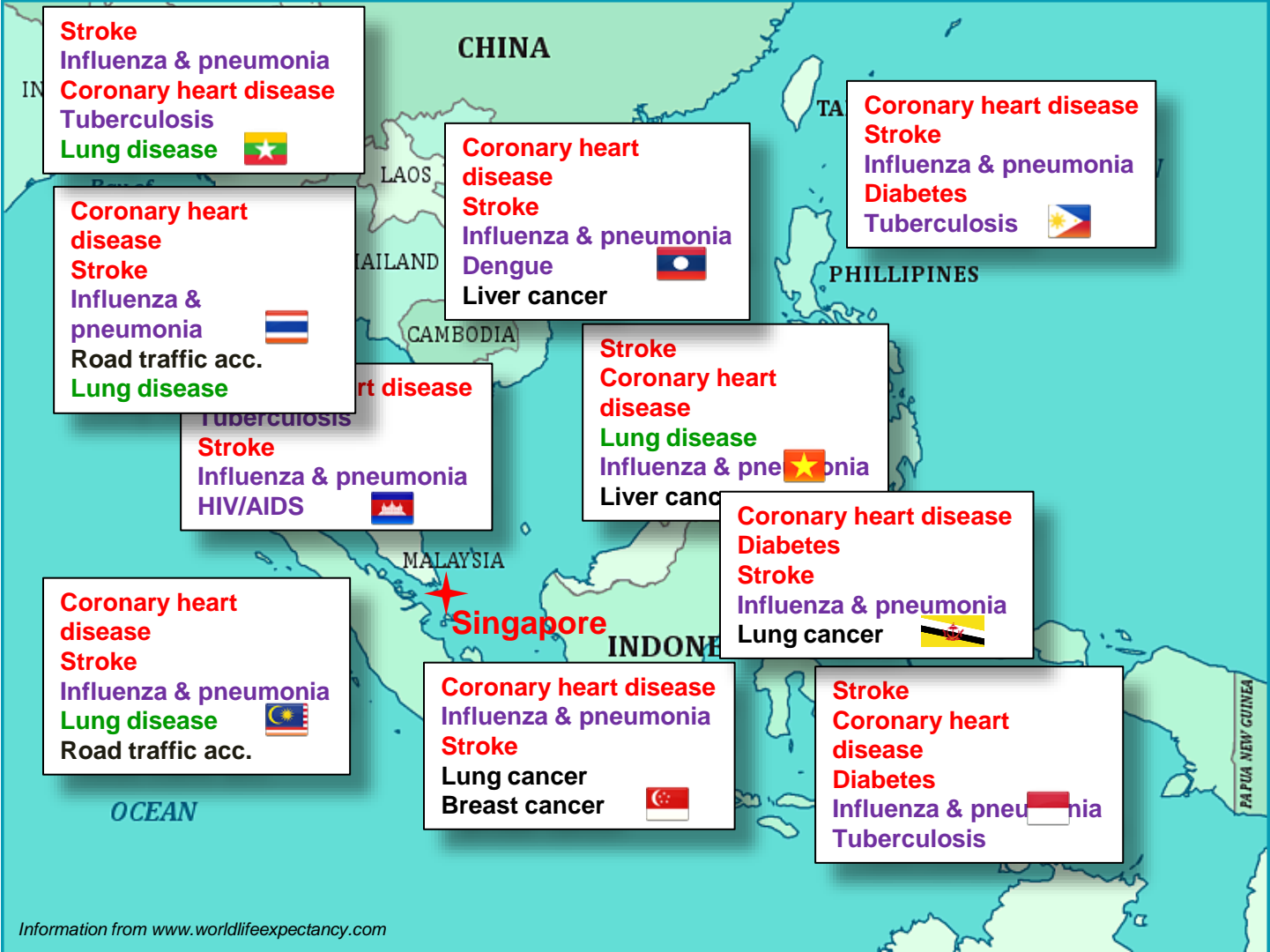
The Academy will bring together adult learning science, behavioural science and cutting-edge learning technologies such as artificial intelligence and virtual reality with WHO's norms, standards and evidence to deliver high-impact accredited and tailored multilingual learning to meet diverse needs.



Building Health Economics Capacity Globally

YY Teo
Professor, Dean
Saw Swee Hock School of Public Health

Turning Discovery into Healthier Communities





Health Intervention and Policy Evaluation Research (HIPER)

To institutionalise evidence-informed health priority setting for universal health coverage at global, regional and country levels through:

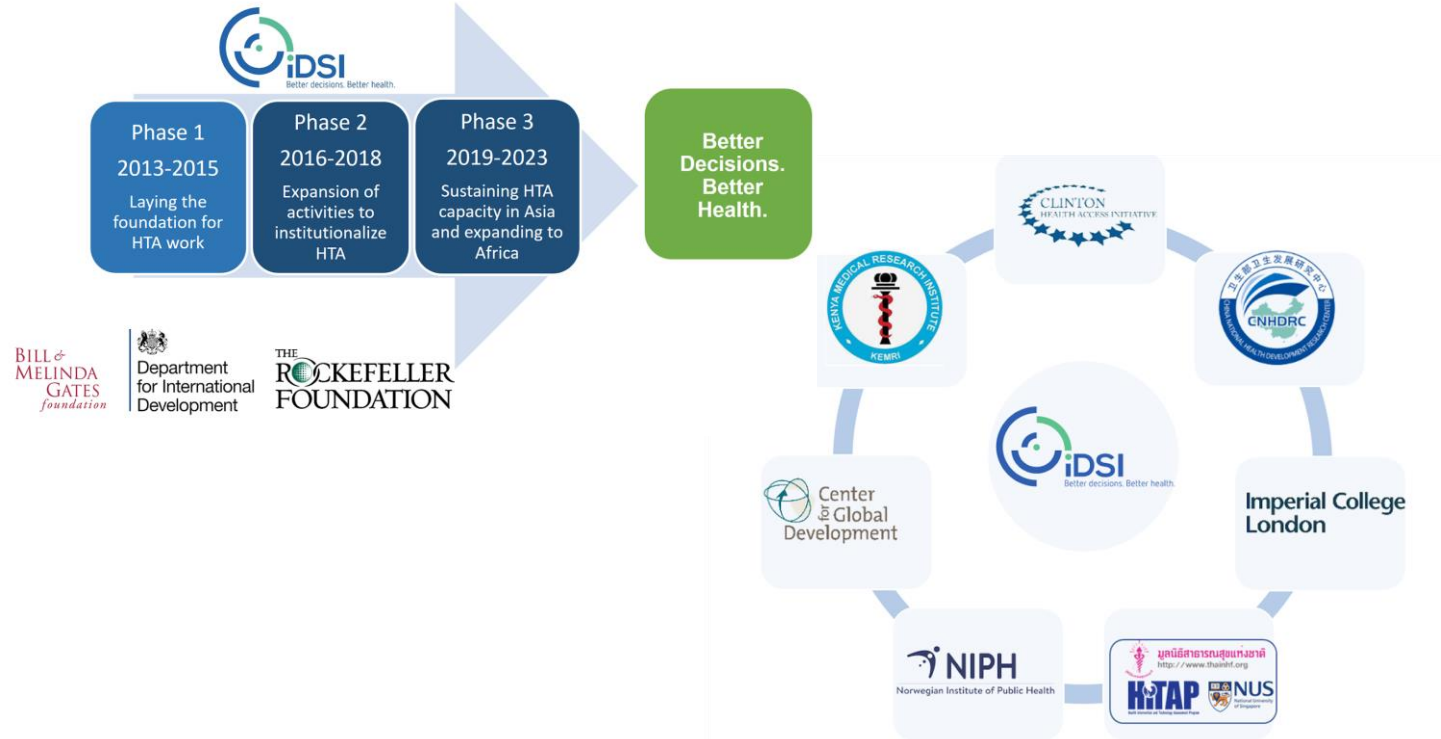
- **In-country support:** working with governments in Asia and Africa to established health technology assessment (HTA) system
- **Development of global public goods:** online resources, free decision analysis software, guidelines etc.
- **Service Advice and Research:** consulting and evaluation
- **Knowledge transfer and exchanges:** HTAsiaLink, study visit arrangement, trainings and workshops etc.



Prof Yot
Teerawattananon,
Advisor, HIPER

NUS Partnership with iDSI

Member of International Decision Support Initiative (iDSI)





Models of HTA Capacity Building

1. Health Leadership in UHC through HTA

- Target current and next-generation **Health Ministers and Director-Generals** of national health agencies
- Priority Setting agenda with direct link to Universal Health Coverage
- Longitudinal strategy rather than “touch-and-forget”



2. Technical HTA training to enable actual implementation

- Target actual implementers, analysts and policy makers
- Intention to enable actual analysis and execution of HTA
- Focus on **uptooling technical skills**, **harmonizing frameworks**, and **networking**
- **Upcoming HTA workshops**
 - Conducting economic evaluation using person-level data (24-25 July)
 - HTA for Vaccines (28 August)
 - Philippines HTA training workshop (7-9 January 2020)
 - Bali Real World Evidence workshop (6-10 April 2020)



Capacity building: some realities

- **Local short- or Executive courses**
 - Usually benefits larger number of participants, cost-efficient design
 - Little risk of brain drain
 - Topical or disciplinary focus tends to be restricted to one or few topics
 - **No formal accreditation or certification**
 - **Courses attended typically cannot count for credit transfers in University applications**

- **Overseas scholarships for outstanding candidates**
 - Deep knowledge transfer
 - Culminates in formal, accredited certification
 - Usually benefits small number of candidates
 - **Problem of brain drain, high rates of re-settlement post-tenure**

3. 3-6-12 Stacking for Certification

- **Stacking of modules towards accredited certifications**
 - **3 modules**: NUS Graduate Certificate
 - **6 modules**: NUS Graduate Diploma
 - **12 modules**: NUS Master of Public Health (MPH)
- **10 year limit for stacking to entry to formal programme**
- **Modules can be part of capacity building short courses**
- **Assessments, credit-bearing transcripts for participants planning to stack, versus attendance-based short courses**
- **Formal admissions to Grad Dip. or MPH required**
- **CAP requirements apply for all certifications**
- **Modules can be counted for credit transfers in subsequent university applications**

Possible module combinations

- **First 3 modules, usually modules of relevance/interest**
 - **Healthcare Priority Setting with Health Economics and HTA**
 - Economics Methods in Health Technology Assessment
 - Modeling Techniques in Health Technology Assessments
 - Clinical Epidemiology & Evidence Synthesis
 - Applied Health Econometrics
 - Health Economics and Financing
 - Introduction to Health Policy & Policy Analysis
 - Programme Design, Monitoring & Evaluation
 - **Global Health**
 - SPH5413: Women, Children and Adolescent Health
 - SPH5406: Contemporary Global Health Issues
 - SPH5402: Management of Healthcare Organisations
 - SPH5403: Medical & Humanitarian Emergencies

Notable Alumni



Dr Margaret Chan
1984/85 MSc (Public Health)
Former Director-General (2006-2017)
World Health Organization (WHO)



Dr Constance Chan
1991/92 MMed (Public Health)
Director of Health, Department of Health,
Hong Kong S.A.R, China



Prof Chia Kee Seng
1984/85 MSc (Occupational Medicine)
Founding Dean, NUS Saw Swee Hock
School of Public Health



Dr Hj. Md. Khalifah Pg. Hj. Ismail
2000/01 MMed (Occupational Medicine)
Director-General of Health Services,
Ministry of Health, Brunei Darussalam



Dr Prak Piseth Raingsey
1993/94 MMed (Public Health)
Director of Preventive Medicine
Department,
Ministry of Health, Phnom Penh,
Cambodia



Dr Luong Mai Anh
2000/01 MMed (Occupational Medicine)
Deputy Director-General,
Health Environment Management Agency,
Ministry of Health of Vietnam



Prof Leo Yee Sin
2011/13 Master of Public Health
Director, Institute of Infectious Diseases &
Epidemiology, Tan Tock Seng Hospital;
Clinical Director, Communicable Disease
Centre, Ministry of Health, Singapore



**Datok (Dr) Lokman Hakim Bin
Sulaiman**
1989/90 MSc (Public Health)
Former Deputy Director-General of Health
(Public Health), Ministry of Health, Malaysia

International Advisory Panel



Professor David Heymann
Chairman, Public Health England
Head, Center for Global Health Security, Chatham House
WHO Executive Director (CDC, 1998-2003)



Baron Professor Peter Piot
Director, London School of Hygiene and Tropical Medicine
Executive Director, UNAIDS
Assistant Secretary-General, United Nations



Professor Margaret Hamburg
President, American Association for the Advancement of
Science (AAAS)
Commissioner, US FDA (2009-2015)
Commissioner, New York City Department of Health and
Mental Hygiene (1991-1997)



Professor Kenneth Warner
Avedis Donabedian Distinguished University
Professor of Public Health
Dean, School of Public Health (2005-2010)
University of Michigan

Academic Partnerships

- **London School of Hygiene and Tropical Medicine**
- Christian Medical College Vellore
- Chulalongkorn College of Public Health Sciences
- Faculty of Medicine Siriraj Hospital, Mahidol University
- Taiwan Medical University
- University of Health Sciences, Phnom Penh
- Cambodian National Institute of Public Health

Exploring:

- Hong Kong University School of Public Health
- Laos Tropical and Public Health Institute
- EHESP French School of Public Health

Summary

- Understanding Priority Setting with HTA and M&E at the **Leadership level** (MOHs, hospitals, public agencies)
- Technical training of analysts and policy makers to **enable actual implementation**
- Innovative academic model of overseas modular stacking to deliver **true localized capacity building** with lower risk of brain drain



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AWARD CONFERENCE

M8Alliance
Academic Health Centers, Universities and National Academies



WORLD
HEALTH
SUMMIT



ASEAN
University
Network

Health Promotion Network



iDSI
Better decisions. Better health.

Discussion



LSHTM's networks around vaccine economics training and capacity building

Mark Jit^{1,2,3}

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²Modelling and Economics Unit, Public Health England

³School of Public Health, University of Hong Kong

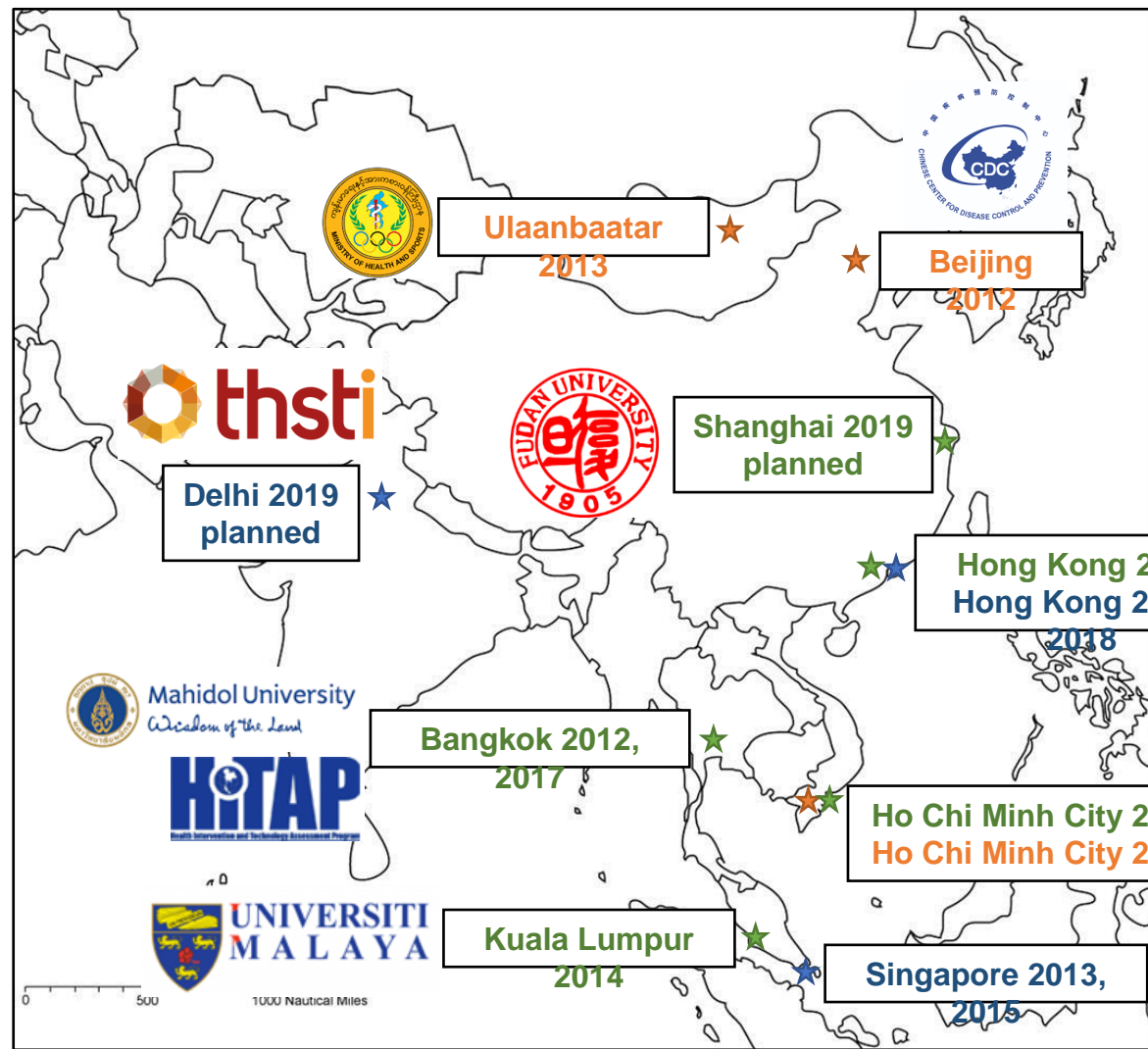
I have no conflicts of interest to declare.




Public Health
England

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& TROPICAL
MEDICINE





LONDON SCHOOL of HYGIENE & TROPICAL MEDICINE



Vaccine economics-related courses co-organised by LSHTM

- ★ Vaccinology
- ★ Health economics
- ★ Infectious disease modelling

Online (Coursera MOOC) with HKU since 2014



香港大學
THE UNIVERSITY OF HONG KONG

LEARNING OBJECTIVES

1. To understand the key drivers of the cost of a vaccination programme
2. To understand measures of the economic benefits of vaccination




INSTITUT PASTEUR



NUS
National University of Singapore



Epidemics
The University of Hong Kong
★★★★★ 4.8 (50 ratings) | 2.8K Students Enrolled
Enroll for Free

Complementary content

How vaccines work
Understanding vaccine trials
Herd immunity
Post-licensure evaluation
Modelling and economics of vaccination
Vaccine confidence and hesitancy
Practical on how to introduce a new vaccine

Vaccinology

Health economics

Economics 101: opportunity costs, rationing, externalities
The role of economic evaluation in HTA
Measuring costs
Measuring health outcomes
Accounting for socioeconomic inequalities
Infectious disease economics

Infectious disease modelling

Introduction to SIR models
Introduction to R programming
Modelling vector-borne diseases
Capturing heterogeneity and uncertainty
Economics of infectious diseases
The role of modelling in policy

Hands-on practicals

BEAUti

Partitions Taxa Tips Traits Sites Clocks Trees States Priors Operators MCMC

Priors for model parameters and statistics:

Parameter	Prior	Bound	Description
kappa	* LogNormal [1, 1.25], initial=2	[0, ∞)	HKY transition-transversion parameter
frequencies	* Uniform [0, 1], initial=0.25	[0, 1]	base frequencies
alpha	* Exponential [0.5], initial=0.5	[0, ∞)	gamma shape parameter
clock.rate	? Not yet specified, initial=1	[0, ∞)	substitution rate
treeModel.rootHeight	* Using Tree Prior in [2.07, ∞)	[2.07, ∞)	root height of the tree
skyride.precision	* Gamma [0.001, 1000], initial=1	[0, ∞)	GMRF Bayesian skyride precision

Prior for Parameter clock.rate

Select prior distribution for clock.rate

Prior Distribution:

Initial value:

Upper:

Lower:

Cancel OK

SIR model of seasonal influenza

Parameters

Description	Value
Time step	0.200
Transmission coefficient child-child	0.550
Rate of recovery from infection	0.333

Mixing matrix (mixing relative to child-child contact rate)

	Children	Adults
Children	1	0.15
Adults	0.15	0.8

% immune from prior infection: Children 25%, Adults 40%

% vacc at start of season: Children 0%, Adults 0%

Vaccine efficacy (against infection): Children 40%, Adults 40%

% infections clinical: Children 40%, Adults 40%

Case fatality risk: Children 0.010%, Adults 0.020%

Initial Values

	Children	Adults
Susceptibles	7,495	23,995
Infecteds	5	5
Recovereds	2,500	16,000
Group size	10,000	40,000

time t (days)

Children: 1,323, 0.13

Adults: 1,323, 0.13

You are an advisor to the Ministry of Health in a high/low-income country in South-East Asia. The Ministry is considering introducing rotavirus/human papillomavirus vaccination, and you have been asked to give advice to inform the decision.

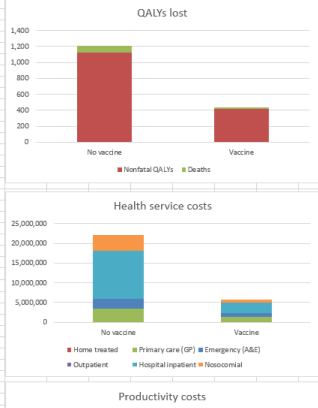
As a group, discuss the questions below and prepare a 10 minute presentation to Ministry of Health officials who will be making decisions about vaccination.

1. What information is needed to make the decision about vaccination?
2. How can be the burden of rotavirus/human papillomavirus associated disease in the country be determined?
3. If vaccination is introduced,
 - Which of the available vaccines should be used?
 - What age/risk groups should be targeted?
 - What kind of post-marketing surveillance should be introduced, and what should its purpose be?

Your presentation can be made by a single member of your group, or you may wish to have several or all members present sections of it.

You may wish to refer to the World Health Organization position paper on rotavirus/pneumococcal conjugate/human papillomavirus vaccination included in your course folder.

Outcomes PER COHORT	Undiscounted			Discounted		
	No vaccine	Vaccine	Difference	No vaccine	Vaccine	Difference
BURDEN						
Hospitalisations	13,973	2,891	10,683	12,806	2,709	10,097
Episodes	476,947	176,221	299,426	456,218	167,541	288,677
Deaths	328	0.70	2.58	310	0.66	2.44
* QALYS LOST						
Nonfatal QALYs	1,171	442	729	1,120	419	701
Deaths	95	20	75	89	19	71
Total	1,266	462	804	1,210	438	772
HEALTH SERVICE COSTS						
Vaccine	0	71,676,102	-71,676,102	0	71,148,735	-71,148,735
Home treated	0	0	0	0	0	0
Primary care (GP)	3,694,423	1,456,966	2,238,457	3,485,543	1,358,536	2,127,007
Emergency (A&E)	2,505,750	987,512	1,518,238	2,364,076	921,430	1,442,647
Outpatient	0	0	0	0	0	0
Hospital inpatient	13,011,817	2,771,009	10,240,808	12,276,139	2,596,912	9,679,227
Nosocomial	4,108,995	875,055	3,233,939	3,876,676	820,078	3,056,598
Total	23,320,985	77,785,645	-54,444,661	22,002,435	76,845,691	-54,843,256
Cost/QALY gained						
Cost/episode saved			67,742			71,048
Cost/hosp saved			182			190
Cost/life saved			5,097			5,432
Total			21,063,991			22,449,267
SOCIETAL COSTS						
Home treated	32,371,923	12,005,476	20,366,447	31,243,885	11,493,414	19,750,470
Primary care (GP)	9,461,012	3,728,570	5,732,442	8,926,094	3,479,061	5,447,032
Emergency (A&E)	0	1,220,975	-1,220,975	0	1,139,270	-1,139,270
Outpatient	0	0	0	0	0	0
Hospital inpatient	1,499,104	319,251	1,179,853	1,414,346	299,193	1,115,153
Nosocomial	473,401	100,810	372,585	446,636	94,482	352,154
Total	43,805,440	17,375,088	26,430,352	41,584,324	16,505,421	25,078,903
Cost/QALY gained			34,857			37,980



Upcoming courses

FUNDED BY
NIHR National Institute
for Health Research

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SCHOOL OF
HYGIENE
& TROPICAL
MEDICINE



SCHOOL OF PUBLIC HEALTH
THE UNIVERSITY OF HONG KONG
香港大學公共衛生學院



Infectious Disease Modelling Course

1. Course dates

August 12-14, 2019 (three days)

2. Venue

Room 825, School of Public Health, Fudan University, Shanghai, China. (Building 8, 130 Dong'an Road, Xuhui District, Shanghai, 200032)

3. Course overview

Infectious diseases remain a leading cause of morbidity and mortality worldwide. Mathematical models are increasingly used to understand the transmission of infections and to evaluate the potential impact of intervention programmes such as vaccination, antiviral use and pandemic preparedness.

The course is organized jointly by Fudan University School of Public Health, the London School of Hygiene & Tropical Medicine (LSHTM), and the Hong Kong University School of Public Health (HKU). An emphasis will be placed on developing a conceptual understanding of the basic methods and on their practical applications to inform public health decisions. Participants will also learn practical techniques for economic analysis and phylodynamic analysis of infectious disease data. The methods will be illustrated by hands-on experience of setting up models using R programming. The course is delivered in English.



Vaccinology

for Clinical and Public Health Practice

November 2019 - Delhi, India

Join this course to learn about

- The power of vaccines to prevent infectious diseases
- Good practice for effective vaccine policy making
- Multidisciplinary skills to understand the epidemiology, economics, and public perception of vaccines

Course structure



• Three-day lectures, seminars and hands-on training



• One-day policy symposium

Target audience



• Policy makers



• Researchers



• Health Professionals

Learn from the world-class teaching experts from



Saw Swee Hock
School of Public Health



In partnership with



Please register your interest by emailing vaccinology2019@hitap.net
Stay tuned for more details.

Supported by



Key lessons learnt

Build **strong and equitable partnerships** with local and regional collaborators.

Embed training courses within a **long-term commitment** to partnerships involving both research and capacity strengthening.

Incorporate **practical learning** and opportunities for learners to use their skills in their work.

Leverage well-connected regional hubs (e.g. NUS, HKU, HITAP) so that teaching courses can be used to **foster intra-regional networking and mutual learning**.

Long-term vision

Establish a series of complementary, financially sustainable courses embedded within ongoing partnerships to build capacity for decision-making around vaccines in

Asia.