Impact of Health System Financing on Rotavirus Vaccination Costs in Hong Kong, The Netherlands & Australia

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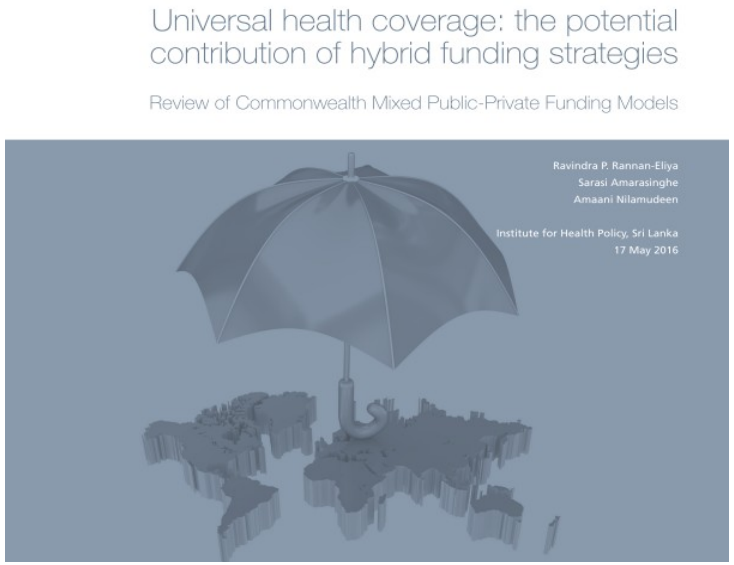
Overview

- *Health system financing models*
- *7 Rotavirus vaccination scenarios*
- *Costs per Fully Immunized Child (FIC) from Societal perspective*
- *Sensitivity analyses*
- *Conclusions*

Background

- Healthcare organization & financing systems vary
  - **Bismark Model** (assumed for The Netherlands)
  - **Beveridge Model** (partially applies to Australia)
  - **Hybrid Model** (Hong Kong +/- Australia)
- Childhood immunization delivery systems vary
- How do these differences impact on the cost of providing rotavirus vaccination in:
  - Hong Kong
  - The Netherlands
  - Australia

Funding Models to provide Universal Health Coverage



Rannan-Eliya R. Universal health coverage: the potential contribution of hybrid funding strategies.

http://www.chpa.co/Documents/ReportUniversalhealthcoverageareviewofCommonwealthmixedfundingmodels_000.pdf

Empirical evidence suggests some "mixed funding (hybrid) models" can achieve better health outcomes at lower cost than two widely recognised models

Bismarck Model
Social health insurance

- Public insurance scheme that pays for services, usually by private providers
- Insurance contributions from government, employers & individuals
- Government contributions for those who cannot pay
- Examples: *The Netherlands*, *Germany*, *Japan*, *Korea*

Beveridge Model
Tax-funded system

- General revenue taxation pays for bulk of all health care services delivered **predominantly**, although not exclusively, through a public sector delivery system

- Examples : *United Kingdom*, *Sweden*, *New Zealand*

Mixed or Hybrid funding models

- Less researched
- Developed "**spontaneously**"
- **High degree of UHC with public spending of 2-3% GDP**
- Health indicators comparable or better than some high-income countries
- Examples: *Hong Kong*, *Sri Lanka*, *Malaysia*, *Australia* (partial)

Comparative health indicators

Key indicators for selected mixed model systems and comparable peers (2013)

	Hong Kong	Ireland	Australia	UK	New Zealand	Germany
Health system type	Mixed	Mixed	Mixed	Beveridge	Beveridge	Bismarck
Infant mortality rate (deaths/1,000 live births)	1.8	3.2	3.4	3.9	5.2	3.2
Life expectancy at birth (years)	84	81	83	81	82	81
Skilled birth attendance (%)	99	100	99	99	97	99
Hospital discharges per 100 people	18	13	17	13	15	25
Doctor consultations per person	11	4	7	5	4	10
Government health spending (%GDP)	2.6	5.5	5.9	7.0	7.6	8.4
Private health spending (% of total health expenditure)	36	32	33	16	17	23

Source: World Health Statistics 2015 (World Health Organization 2015), and Food and Health Bureau, Government of the Hong Kong Special Administrative Region (http://www.fhb.gov.hk) for additional statistics for Hong Kong [accessed 10 May 2016].

Methods 1

- Cost projection study using static model
- Incremental costs of RVV from a societal perspective
- Vaccine delivery flow charts for **3 current scenarios:**
  1. The Netherlands, RVV in National Immunization Program (NIP) with public sector delivery
  2. Hong Kong, RVV **NOT** in NIP with private sector delivery
  3. Australia, RVV in NIP with private sector delivery
- **4 hypothetical scenarios:**
  1. The Netherlands, RVV **NOT** in NIP with private sector delivery
  2. The Netherlands, RVV **for high-risk** vaccination in private sector delivery (prior situation)
  3. Hong Kong, RVV in NIP with public sector delivery
  4. Australia, RVV **NOT** in NIP with private sector delivery

Figure 1a

Generic Flowchart 1:

Delivery at private clinic

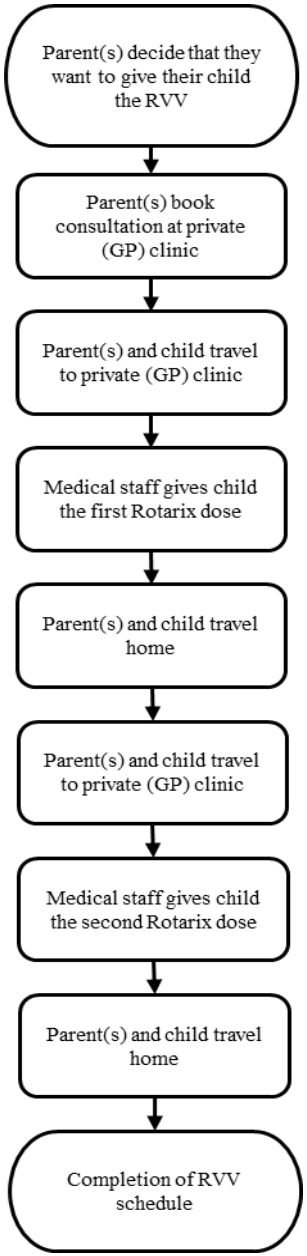


Figure 1b

Generic Flowchart 2:

Delivery at child health center

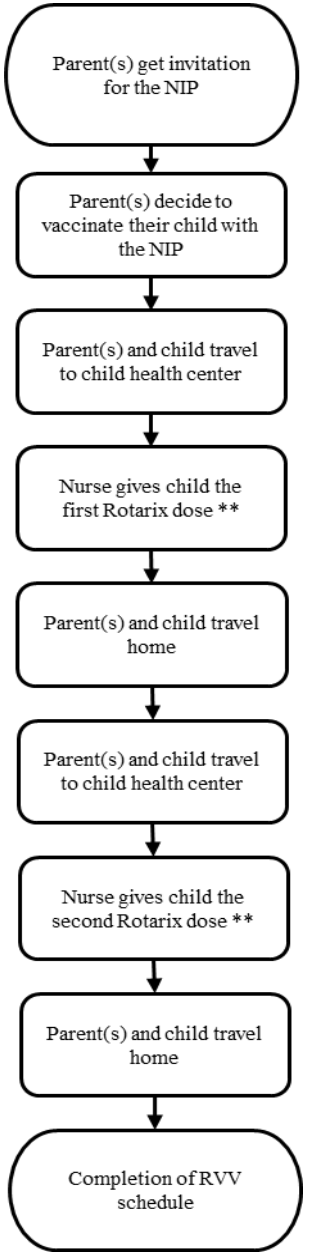
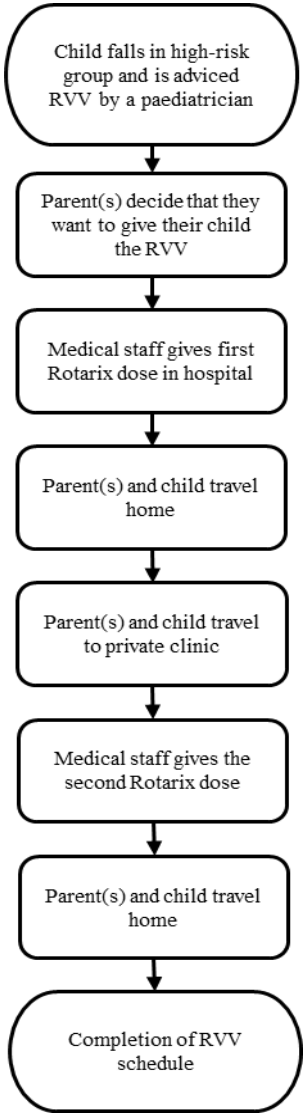


Figure 1c

Generic Flowchart 3:

High-risk targeted vaccination



Methods 2

- Costs in US$ identified using secondary data
- Sensitivity analyses conducted
  - procurement price
  - vaccine uptake
  - cold chain expansion
- Costs were divided into those paid by household, insurance & government

Some assumptions

- Assume Australian GP accepts Medicare payments as full price for giving vaccine
- USD exchange rates for 2023
- Only Rotarix (RV1) was considered
  - most common used vaccine in study settings
  - Given orally in two doses (2-4 months of age)

Vaccine cost PER DOSE assumptions

- **Hong Kong**
  - Market price: US$46 (HKD359)
  - Governmental tender price * : US$36.8 (HKD287)
- **The Netherlands**
  - Market price per dose: US$75.5 (€69.6)
  - Governmental tender price * : US$40.7 (€37.5)
- **Australia**
  - Market price per dose: US$53.9 (AUS$80)
  - Governmental tender price * : US$33.5 (AUS$49.8)
- Vaccine wastage rate assumed: 5%

* obtained from previous economic evaluations

Sensitivity analyses

- Vaccine uptake
  - varied from 25% to 100% in 25% increments
- Vaccine procurement price
  - **Upper bound** price at 25% above
  - **Lower bound** price at 25% below
- Cold chain expansion
  - Proportion of Hong Kong MCHCs requiring storage expansion from 0% to 100% in 25% steps
  - In The Netherlands, well-baby clinics, where storage exceeded 0,5L but not 1L, were similarly tested from 0% to 100%
  - No expansion was assumed in other health facilities, as all other facilities required less than 1L cold storage expansion

Results

- Cost per FIC **lower in all three settings** when RVV **included in NIP**
- Main cost driver was **vaccine procurement** costs accounting for 48.5% to 95.2% of total costs in different scenarios
- **Public funding** by government covered most costs when RVV was included in the NIP
- **Private funding** by households, paid out-of-pocket, covered most of the costs when RVV was **not included in the NIP**

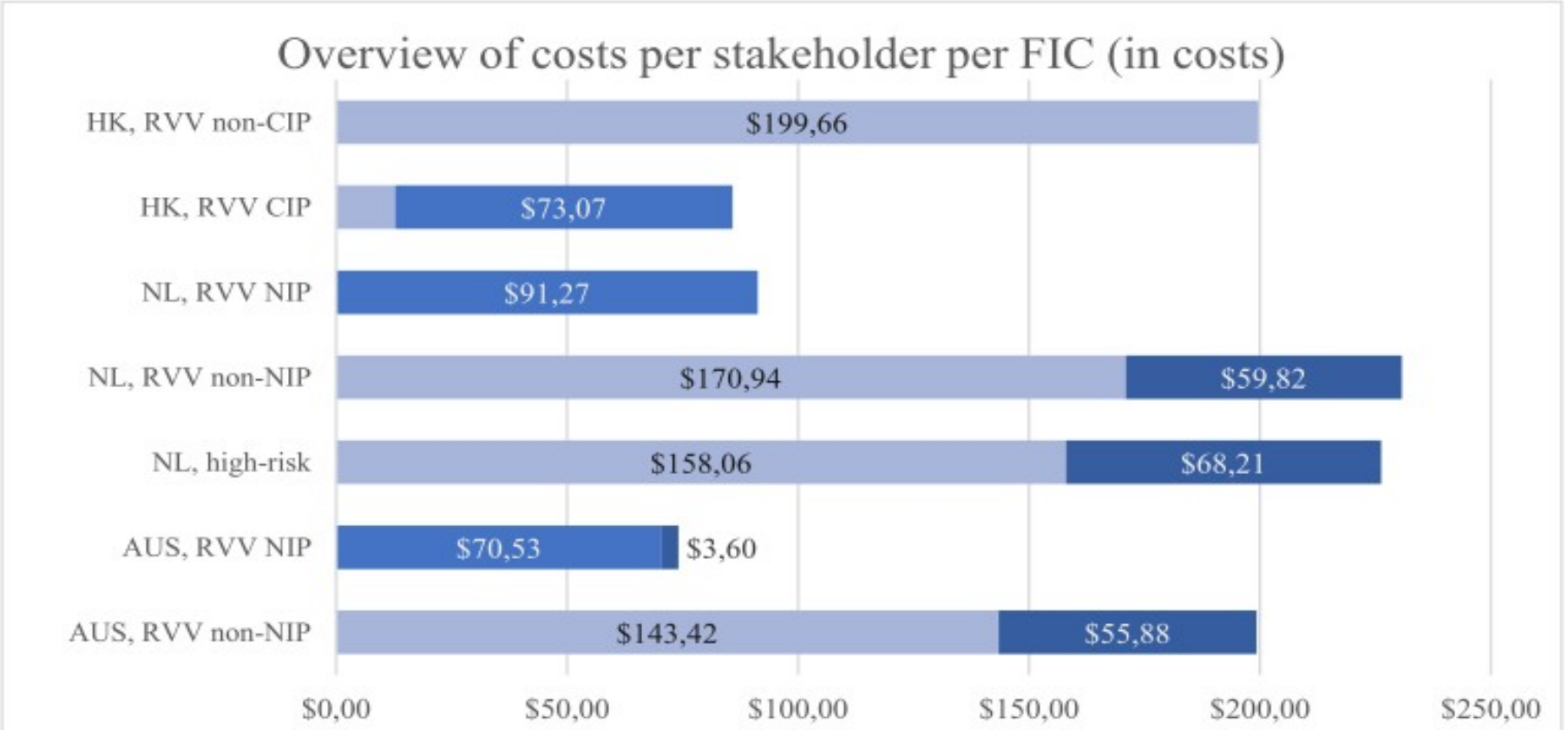
Costs assuming 100% uptake rate

Setting and base case	Uptake	Eligible children	Total societal costs (USD)	Costs per FIC incl*	Costs per FIC excl**	Total costs as % of HE
1. HK RVV non-CIP	100%	33191	$6,626,906	$200	$102.8	0.021%
2. HK RVV CIP	100%	33191	$2,848,943	$85.8	$8.36	0.0092%
3. NL, RVV NIP	100%	166968	$15,239,915	$91.3	$5.56	0.011%
4. NL, RVV non-NIP	100%	166968	$38,529,445	$231	$71.7	0.028%
5. NL, RVV high-risk	100%	166968	$37,779,471	$226	$67.24	0.027%
6. AUS, RVV NIP	100%	299722	$22,216,885	$74.1	$3.60	0.014%
7, AUS, RVV non-NIP	100%	299722	$59,733,580	$199	$85.90	0.037%

* Costs including vaccine costs

** Costs excluding vaccine costs

Costs per stakeholder per FIC per base case – 100% coverage



	AUS, RVV non-NIP	AUS, RVV NIP	NL, high-risk	NL, RVV non-NIP	NL, RVV NIP	HK, RVV CIP	HK, RVV non-CIP
Total costs to household	$143,42	$0,00	$158,06	$170,94	$0,00	$12,76	$199,66
Total cost to government	$0,00	$70,53	$0,00	$0,00	$91,27	$73,07	$0,00
Total cost to insurance	$55,88	$3,60	$68,21	$59,82	$0,00	$0,00	$0,00

Costs assuming estimated uptake

Setting and base case	Uptake	Eligible children	Total societal costs (USD)	Costs per FIC incl*	Costs per FIC excl**	Total costs as % of HE
1. HK RVV non-CIP	**40%**	13,277	$2,650,762	$200	$102.8	0.0085%
2. HK RVV CIP	**95%**	31,532	$2,707,747	$85.9	$8.40	0.0087%
3. NL, RVV NIP	**83.6%**	140,253	$12,740,570	$91.3	$5.56	0.0092%
4. NL, RVV non-NIP	**1%**	1670	$385,294	$231	$71.73	0.0003%
5. NL, RVV high-risk	**5.72%**	9551	$2,160,986	$226	$67.24	0.0016%
6. AUS, RVV NIP #	**90.5%**	299,722	$20,106,282	$74.1	$3.60	0.0124%

* Costs including vaccine costs
** Costs excluding vaccine costs
# No estimate for AUS NOT in NIP

Cost as % total Health Expenditure

- Greatest difference in Australia
  - Non-NIP costs = 0.037%
  - NIP costs = 0.014%
  - 0.023% reduction
- **Lowest % total HE** observed in Hong Kong with NIP inclusion
  - **0.0092%**

Complexity of Immunisation Programs & funding models

- **Hong Kong:** Hybrid funding model with network of MCH Clinics providing vaccines (in NIP) and through private clinics (not in NIP)
- **The Netherlands:** Public Health Insurance (Bismark) model but vaccines in NIP given through Well-Baby Clinics
- **Australia:** Medicare (partially hybrid system) but vaccines given by private GP with government reimbursement

Conclusion

- Including RVV in NIP was **cheaper** from a societal perspective **in all three settings**
- If **NOT** included in NIP, **private funding** of RVV resulted in higher out-of-pocket spending for households ~ **equity issues**
- Findings underscore **importance of including RVV in NIPs** to reduce household out-of-pocket spending in these high-income settings

Thank you

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