



Expanding Access to ART in India and Thailand:

Presentation by
Mead Over, World Bank
Conference Health Financing in developing countries
CERDI
Clermont-Ferrand, France
December 1, 2005

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The Hope of ART

Kamman: “The miracle of ART”

It is a surprise and a miracle for many and also for myself that with almost all possible OIs, I can still survive and have a life of this quality.

Parichart: “Before ART I did not want to live any longer”

I am a widow with a 9-year old son. Before ART I did not want to live any longer, now I have recovered my will to live again. [Other PHAs] should know that someone seriously ill, with all kind of OIs, like me, can survive. They should have hope.

Vasna: “If I could go back, I would not join ART”

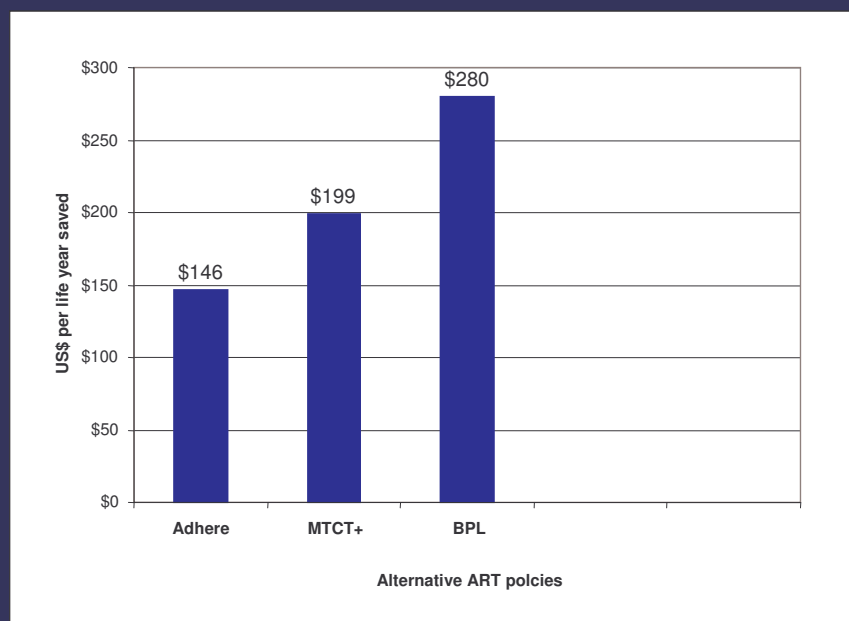
I am confused about ART. I do not understand why my weight went up and disturbed by the fact that the fat growth is misplaced. If I could go back, I would not join ART until my health was at its worst.

Testimonies collected by Dr. Seri Phongphit, from PHAs in Chiang Mai.

Outline of the presentation

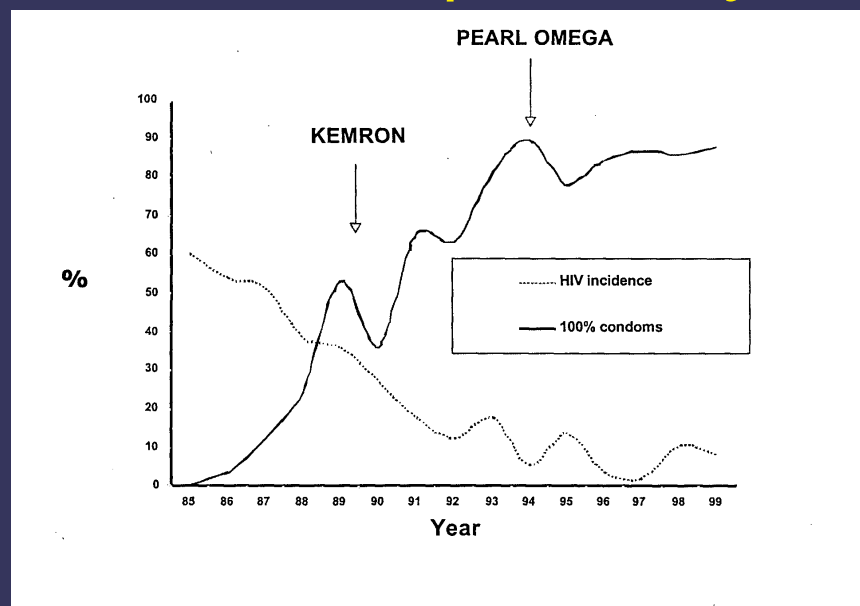
- Findings from India & Thailand
- Provision of ART in Thailand
- Objectives of the study
- Analytical framework
- Asian Epidemic Model with ART
- Detailed findings from Thailand
- Conclusions

In India ART now costs less than
\$300 per year saved



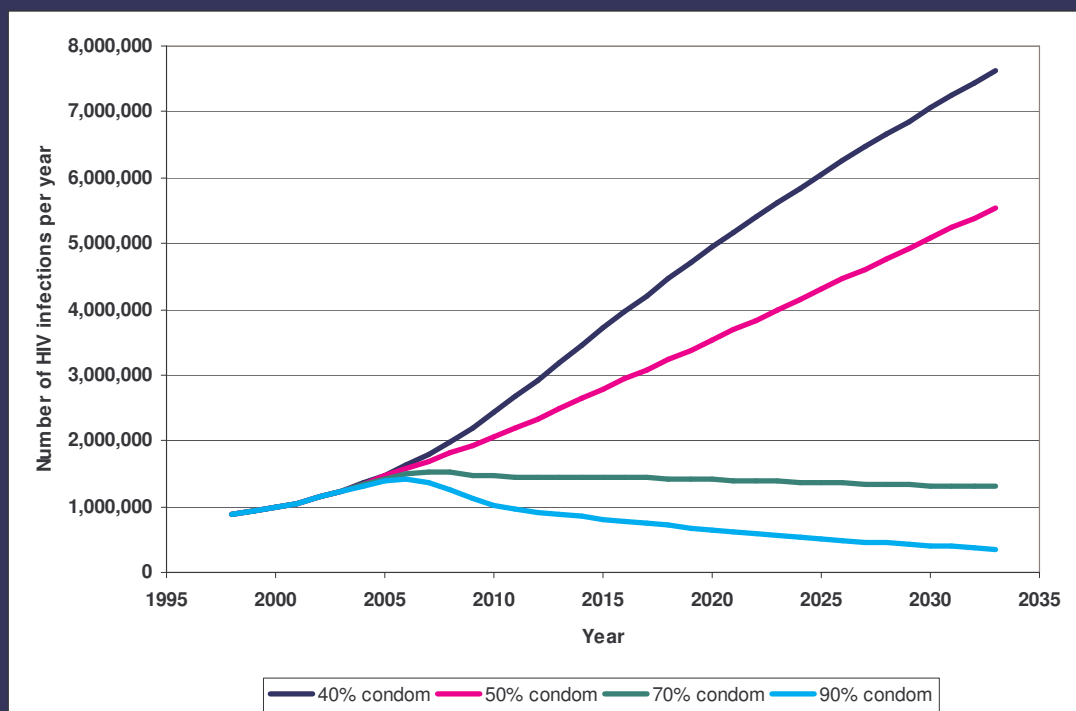
Note: Costs and effects are discounted at 10%

But suppose ART availability causes complacency ...



Source: Jha et al, 2002

Impact of risk behavior on the number of new HIV infections in India



Findings from “Expanding Access to ART in Thailand”

1. NAPHA is cost-effective and yields large benefits in terms of life-years saved (LYS)
2. Expanded policy options increase LYS, but are less cost-effective
3. Since most ART patients are poor, public financing will help assure equitable access
4. Public financing can generate positive spillovers and limit negative spillovers of ART

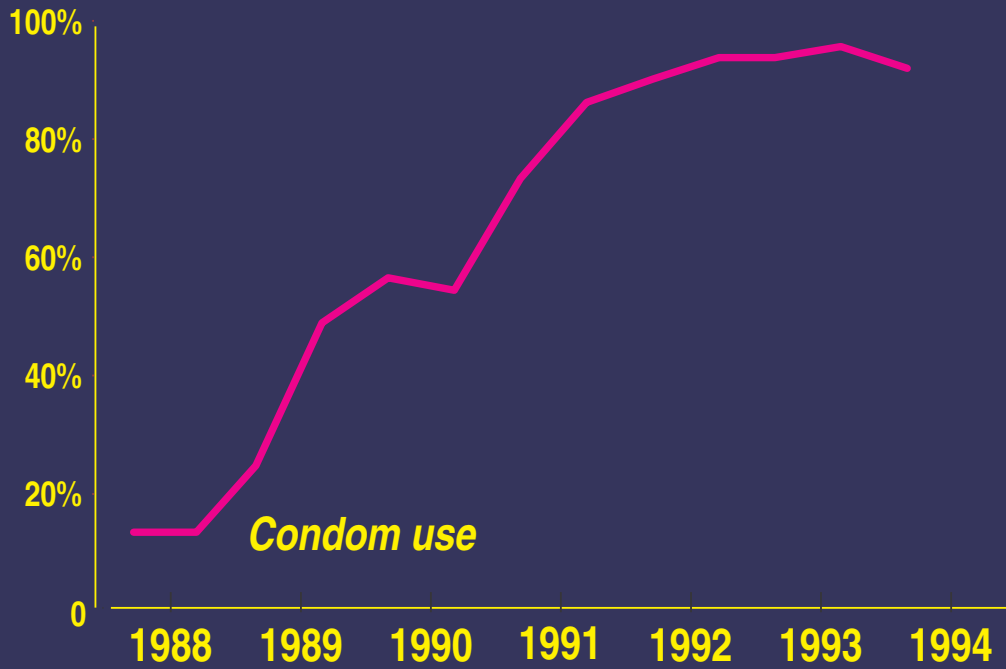
Current State of the Thai Epidemic (Only Adults)

AEM projections for the year 2005:

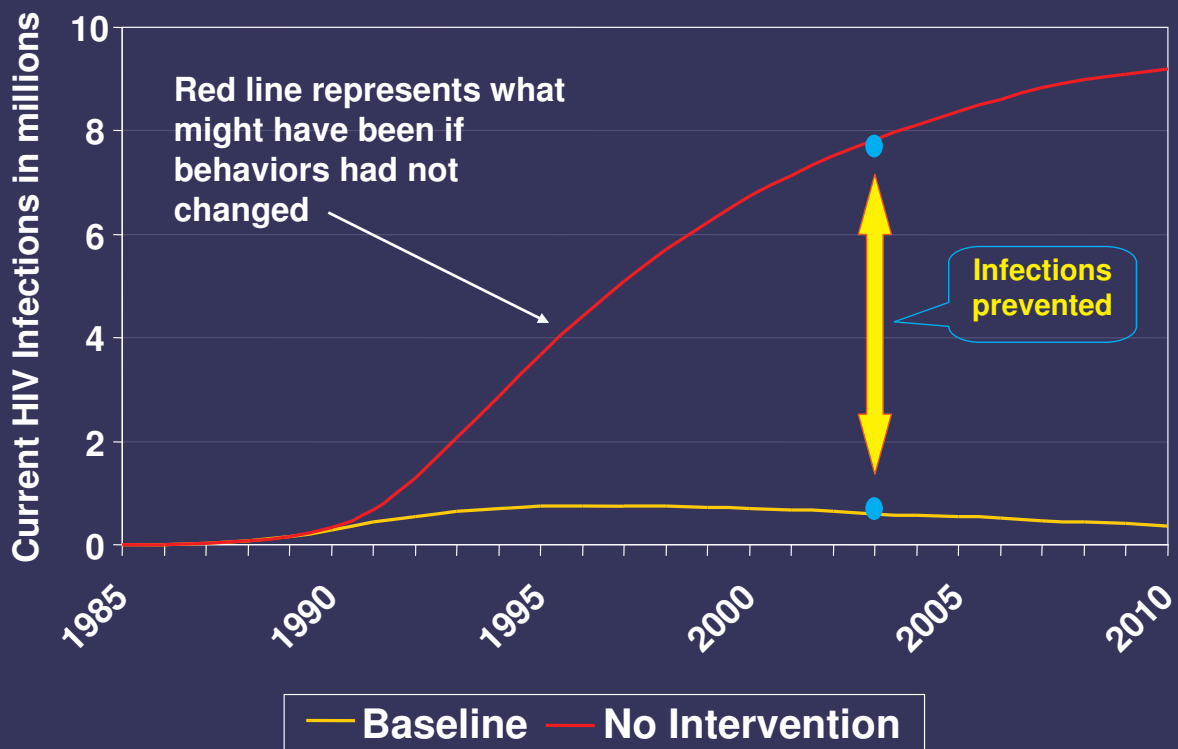
- 1,090,000 adults infected since start
- 530,000 adults deaths of AIDS
- 560,000 adults living with HIV or AIDS
- 14,000 new adult AIDS cases
- 41,000 adults living with AIDS illness.

Thailand succeeded in increasing condom use to high levels a decade ago...

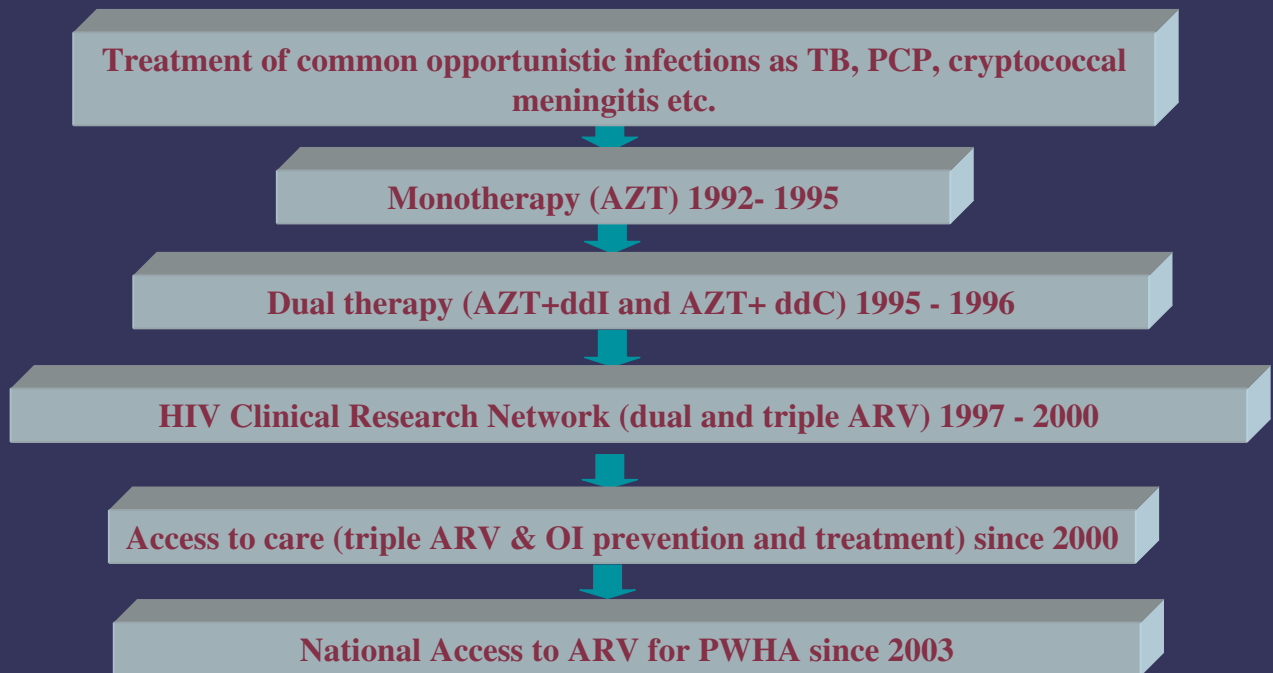
Condom use among sex workers



Thailand – Enormous current benefits of prior prevention efforts



Access to HIV/AIDS Medical Care in Thailand

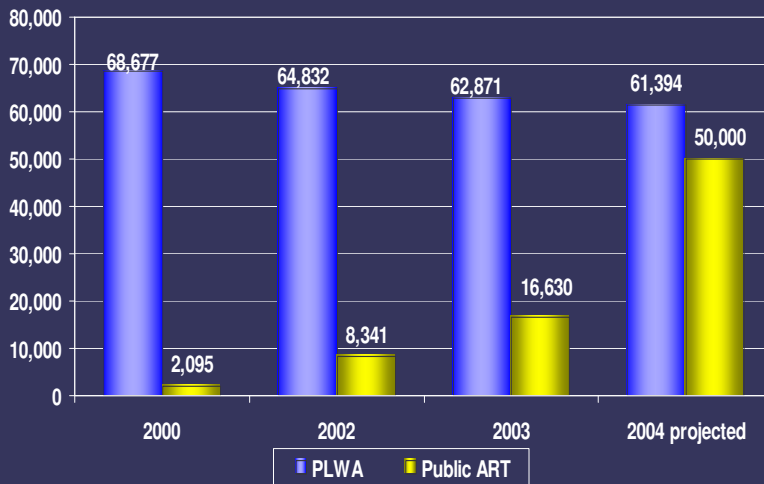


Financing of care for PHAs

- NAPHA: separate vertical program under MOH (covers cost drugs, monitoring + testing for ART)
- All other PHA care (including OI treatment) provided under 1 of 3 health insurance schemes (SSS; CSMBS; UC)
- Bulk of financing from public budget (64% in 2003); 22% from households; 9% from Global Fund; 2% jointly from SSS and CSMBS.

Provision of ART in Thailand: current status

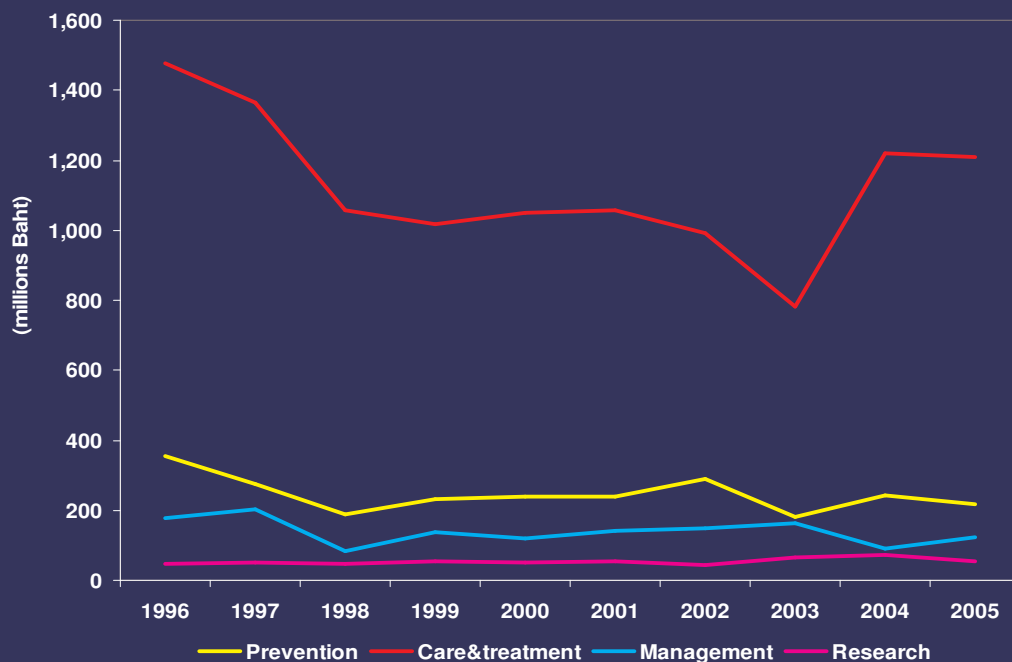
People living with AIDS and Public ART Provision in Thailand



In 2004:

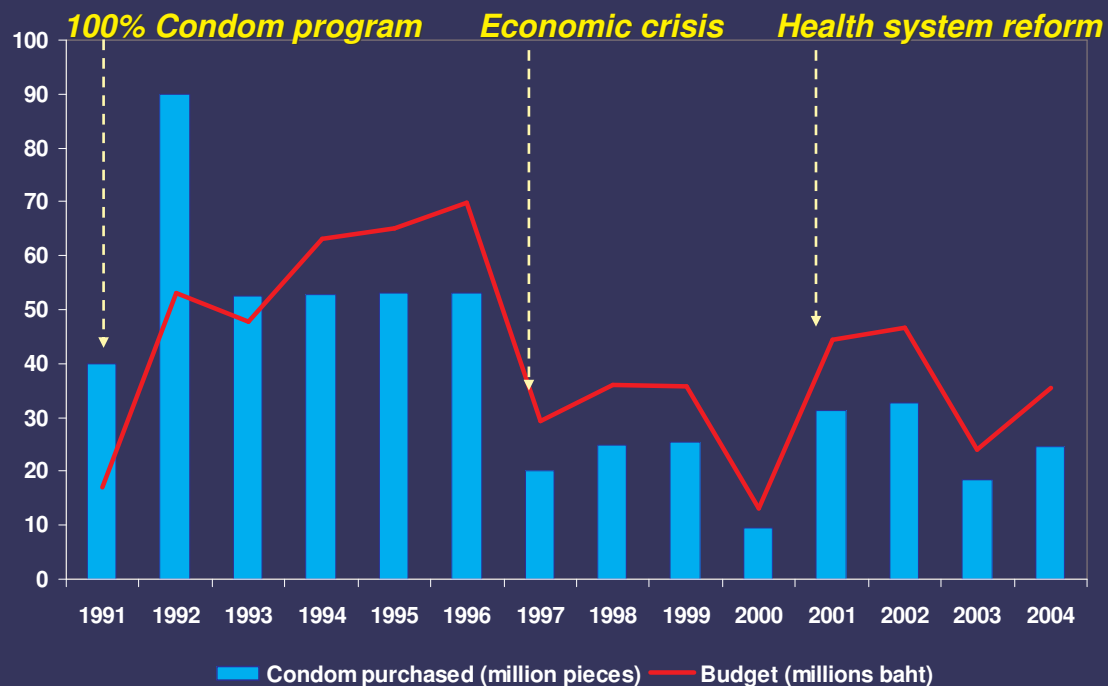
- ✍ Persons with AIDS 61,394
- ✍ New HIV infections 19,500
- ✍ New AIDS cases 49,500
- ✍ Persons on ART 50,986 (as of January 2005)

Type of AIDS Budget



Source: Bureau of AIDS, TB and STIs, Ministry of Public Health, 2005

Condom Budget and Condom Purchased, 1991-2004

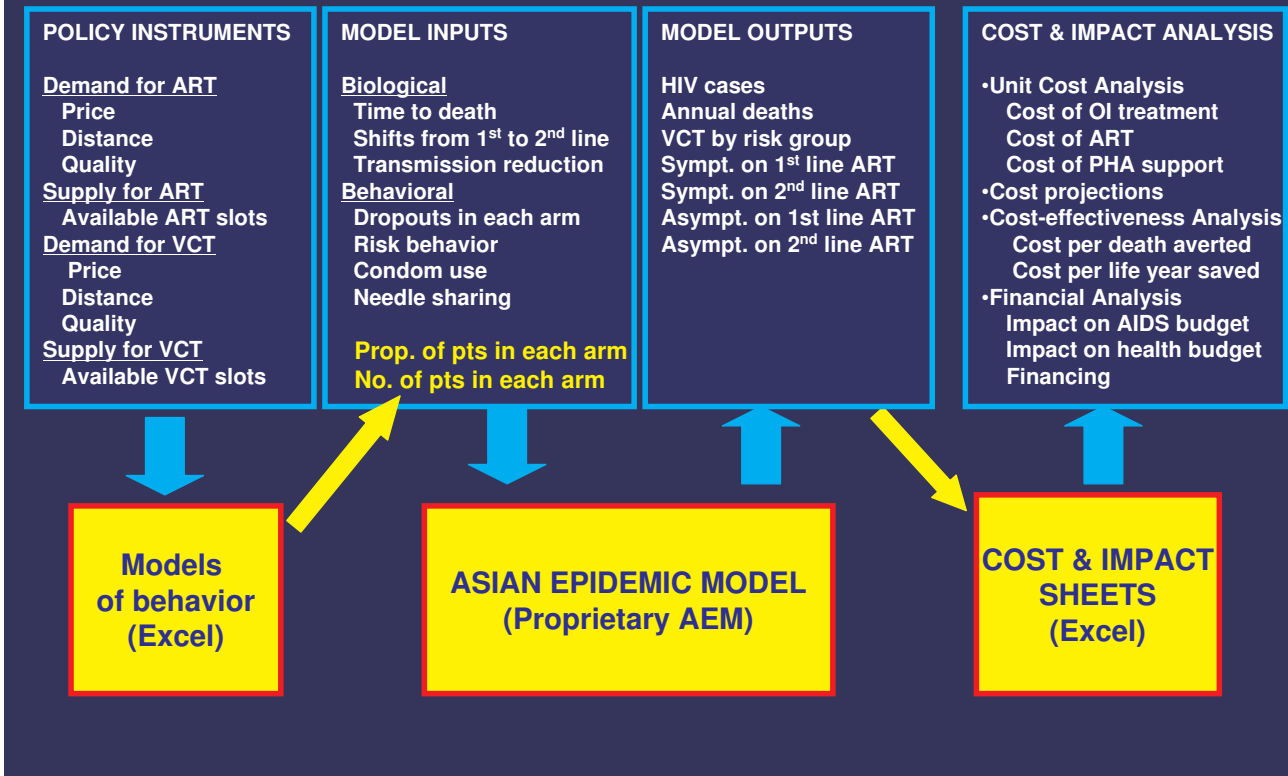


Source: VD Division, Bureau of AIDS, TB and STIs, Ministry of Public Health

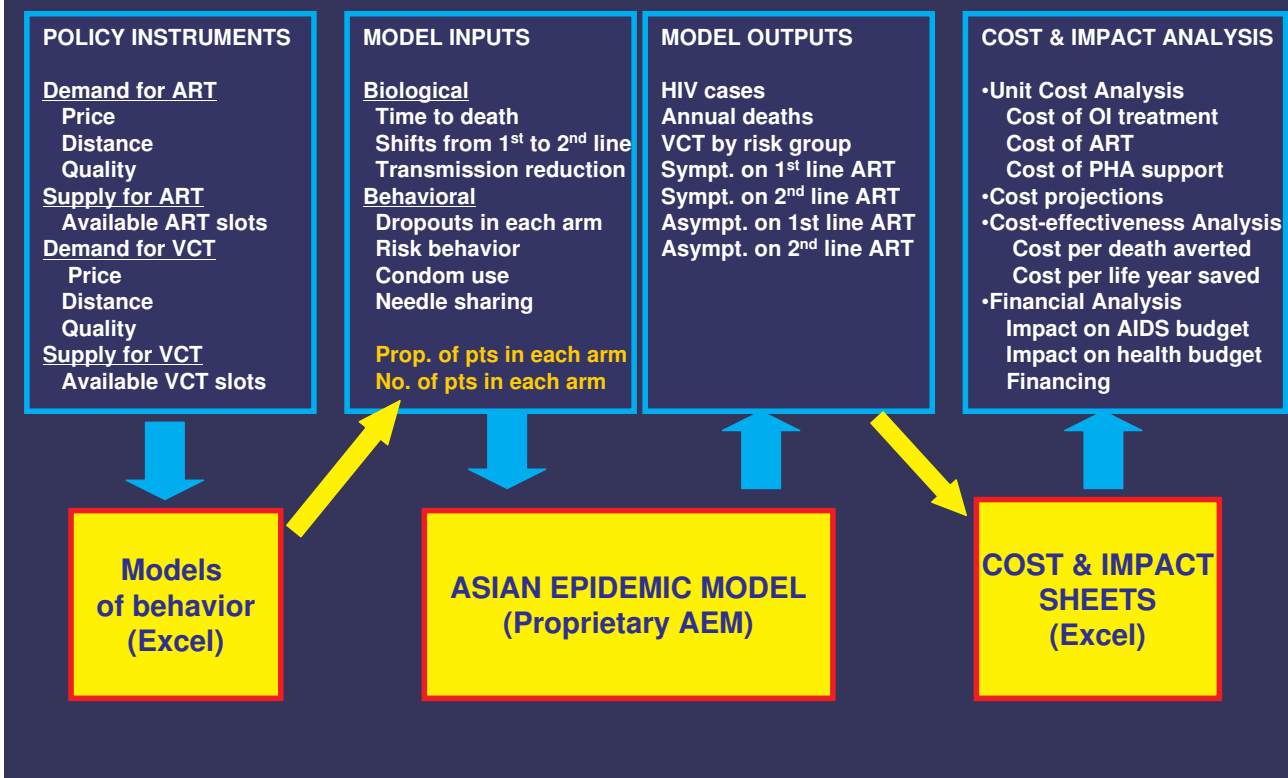
Objectives of the Thai study

- Advise RTG on benefits, costs and consequences of current ART policy
- Help design policies to make NAPHA implementation as effective as possible at
 - Achieving treatment benefits
 - Promoting prevention
 - Maintaining financial sustainability
- Highlight information needs for successful ART scale-up

Modeling: Policy to Impact



Modeling: Policy to Impact



Impact of current policy:

- Measured against a **baseline** projection of what would have happened had the RTG not introduced NAPHA nor subsidized production of GPO-vir (cell (a)).

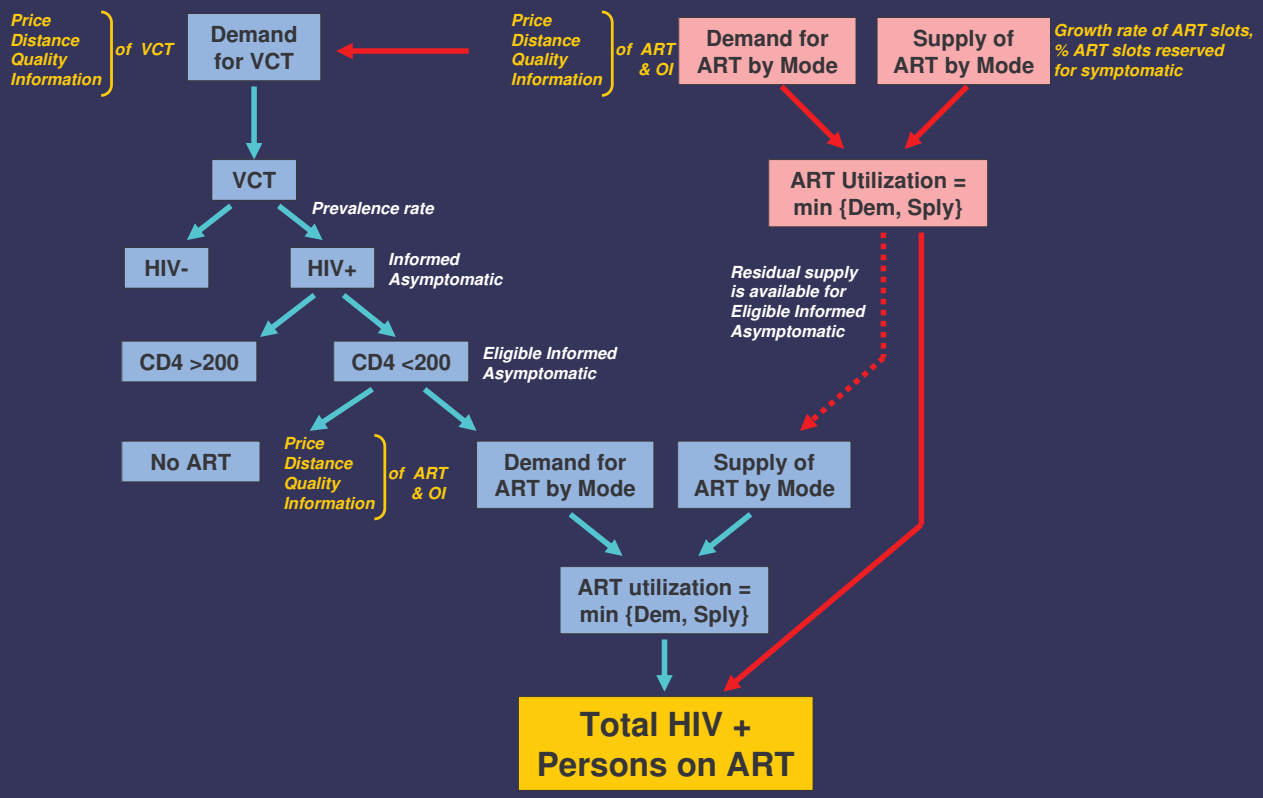
		NAPHA	
		No	Yes
GPO-vir	No	(a) BASELINE	
	Yes		(d) NAPHA

Impact of policy options

		VCT (early recruitment)	
		No	Yes
Encourage adherence	No	NAPHA (D1)	More VCT (D2)
	Yes	More Adherence (D3)	VCT + Adherence (D4)

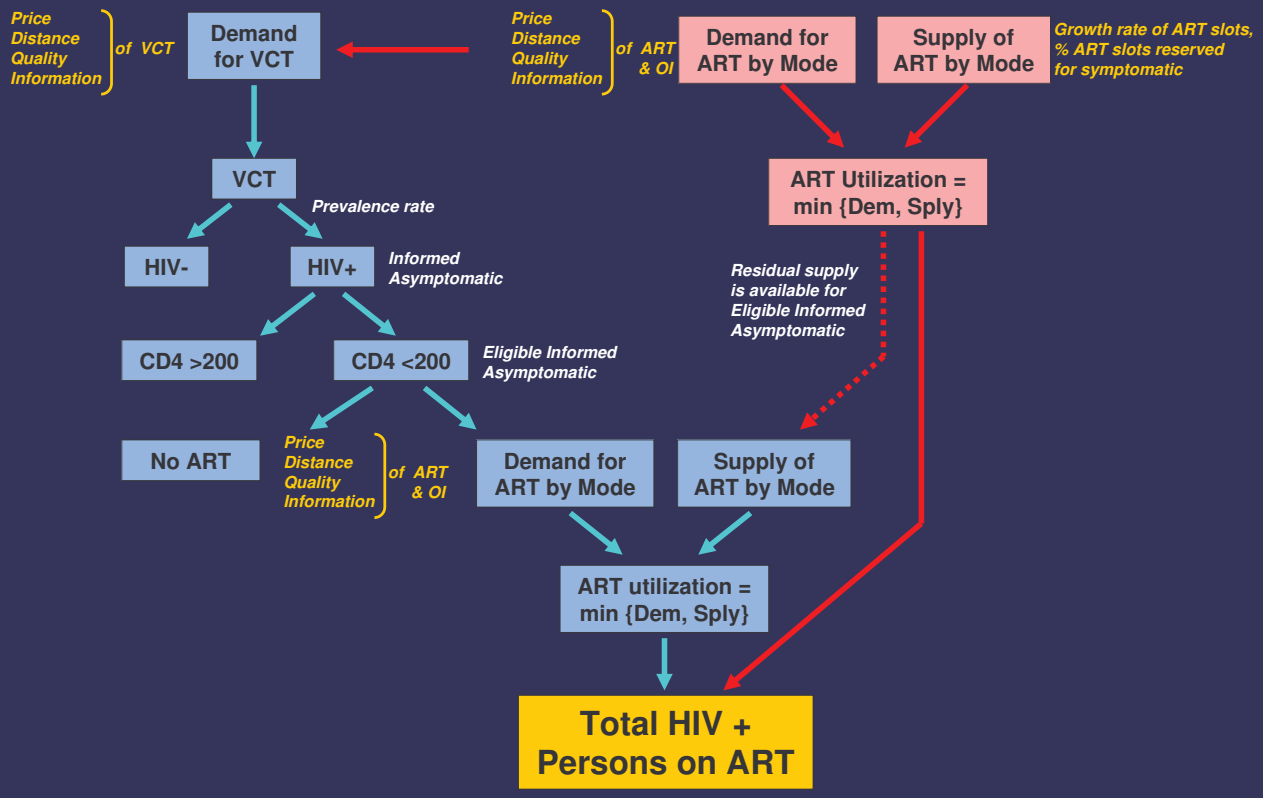
Demand and Supply of ART by Asymptomatic HIV+

Demand and Supply of ART by Symptomatic HIV+



Demand and Supply of ART by Asymptomatic HIV+

Demand and Supply of ART by Symptomatic HIV+



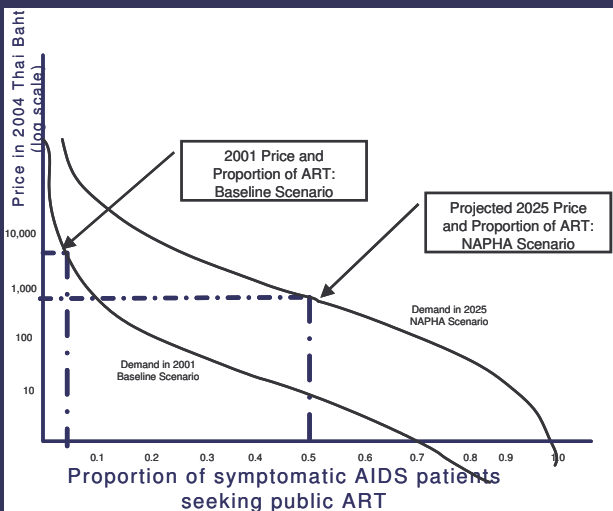
Specifying the Demand for ART

Public ART	$q_{pub_art} = \frac{e^{(\alpha_{pub} + \beta \cdot \ln(P_{pub_art}) + \gamma \cdot \ln(D_{pub_art}))}}{\sum_{x \in \{pub, apub, priv, no\}} e^{(\alpha_x + \beta \cdot \ln(P_x) + \gamma \cdot \ln(D_x))}}$
Augmented Public ART	$q_{apub_art} = \frac{e^{(\alpha_{apub} + \beta \cdot \ln(P_{apub_art}) + \gamma \cdot \ln(D_{apub_art}))}}{\sum_{x \in \{pub, apub, priv, no\}} e^{(\alpha_x + \beta \cdot \ln(P_x) + \gamma \cdot \ln(D_x))}}$
Private ART	$q_{priv_art} = \frac{e^{(\alpha_{priv} + \beta \cdot \ln(P_{priv_art}) + \gamma \cdot \ln(D_{priv_art}))}}{\sum_{x \in \{pub, apub, priv, no\}} e^{(\alpha_x + \beta \cdot \ln(P_x) + \gamma \cdot \ln(D_x))}}$
No ART	$q_{no_art} = \frac{e^{(\alpha_{no_art} + \beta \cdot \ln(P_{no_art}) + \gamma \cdot \ln(D_{no_art}))}}{\sum_{x \in \{pub, apub, priv, no\}} e^{(\alpha_x + \beta \cdot \ln(P_x) + \gamma \cdot \ln(D_x))}}$

Demand for Public ART

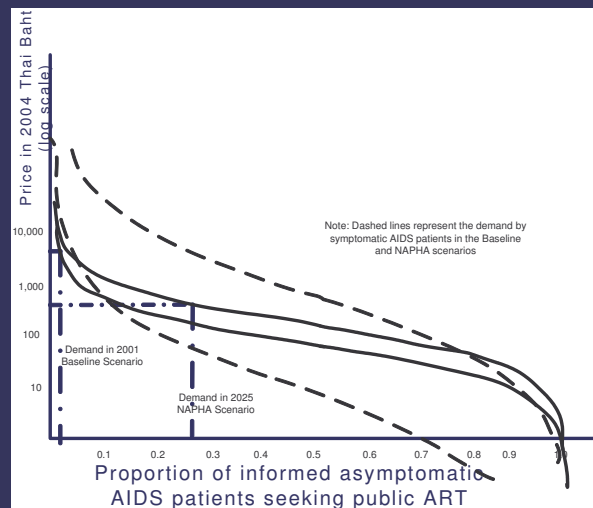
Panel (A)

Demand by symptomatic AIDS patients



Panel (B)

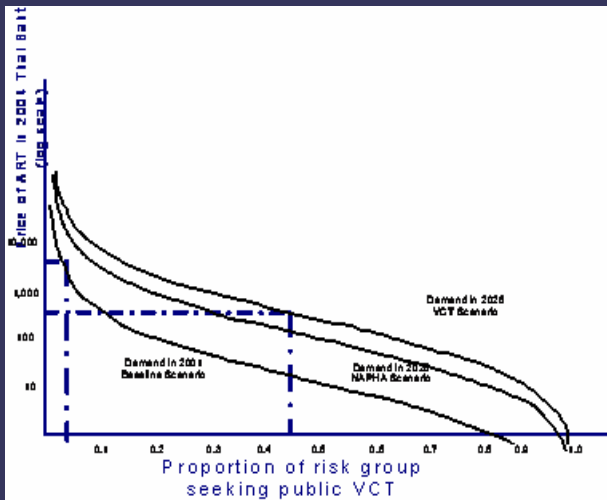
Demand by asymptomatic HIV positives who are informed of their status and eligible for treatment



Demand for VCT

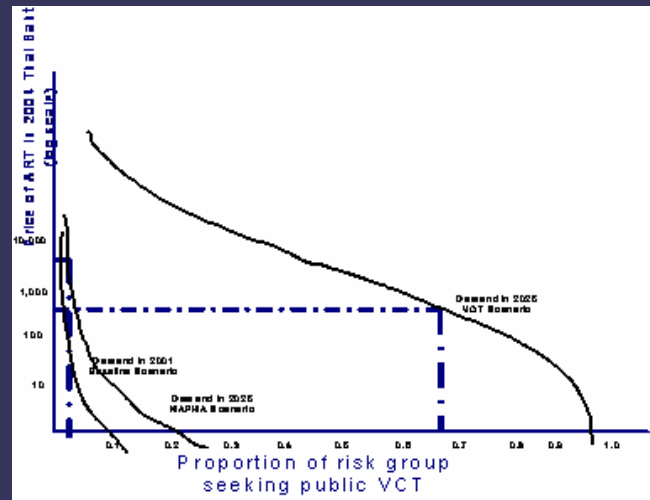
Panel (A)

Demand by the high risk group
(Elastic w.r.t. ART price, not VCT distance)



Panel (B)

Demand by the low risk group
(Elastic w.r.t. VCT distance, not ART price)



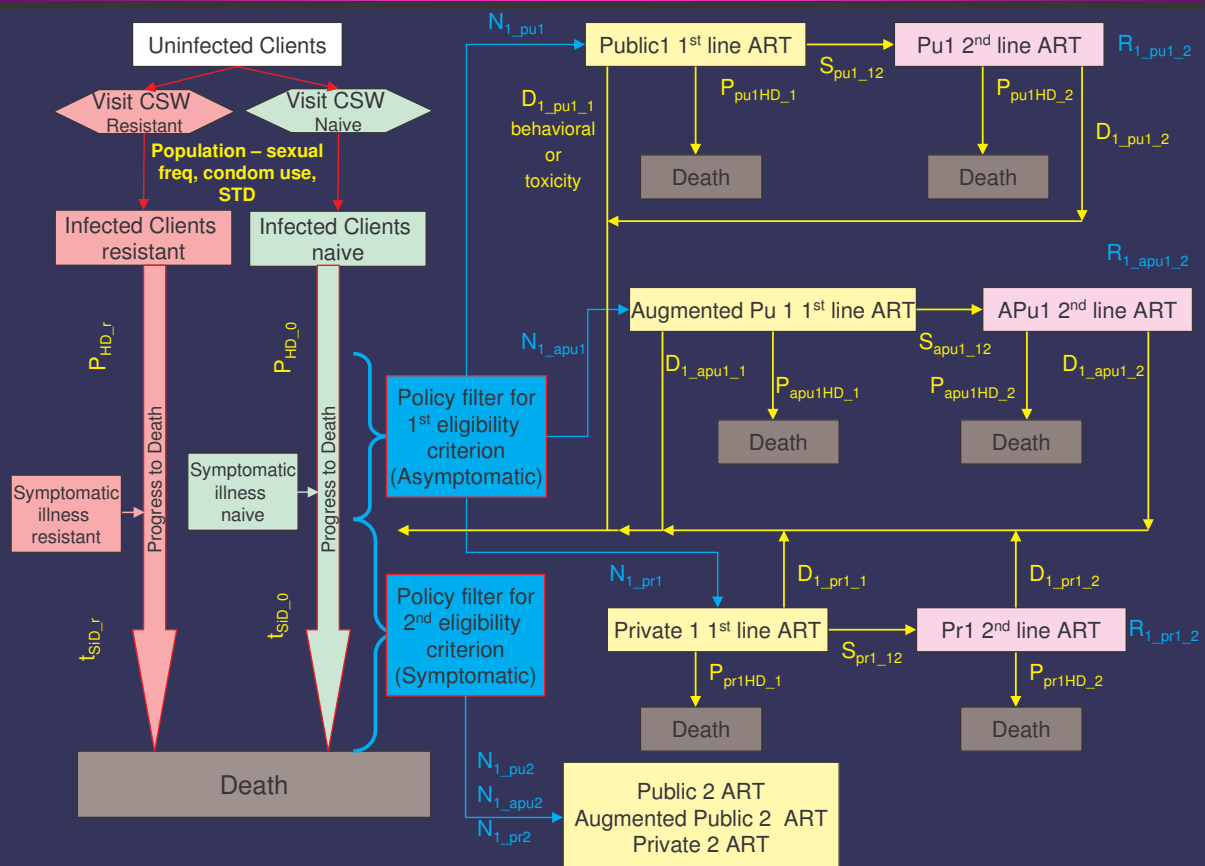
The Asian Epidemic Model

- Deterministic process model that replicates HIV dynamics in Asian settings
- Major transmission routes:
 - commercial sex, injecting drug use, male-male sex, intramarital/extramarital sex, mother to child
- Key inputs
 - sizes of important populations
 - behaviors over time
 - transmission parameters

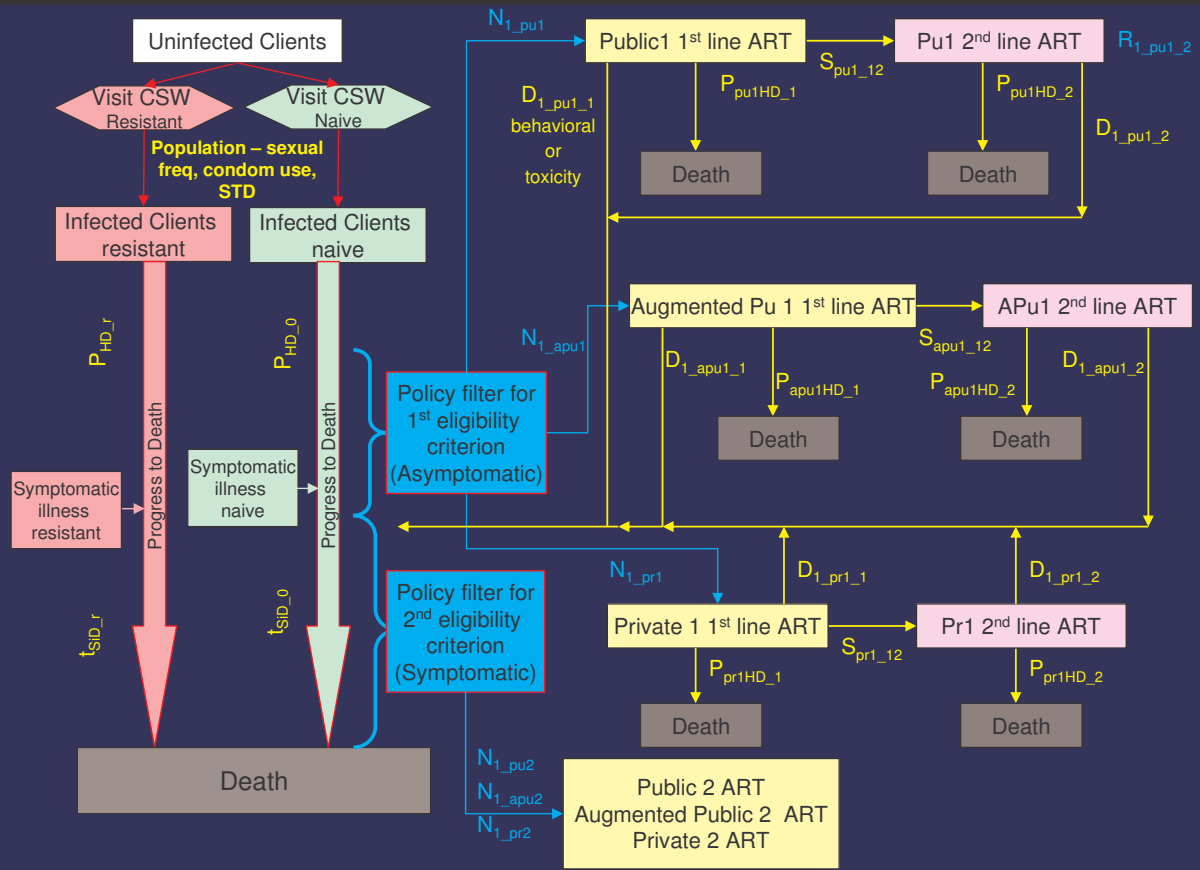
Integrating ART into the AEM:

- **2 criteria for recruitment into treatment:**
 - Asymptomatic/Symptomatic
- **3 treatment groups (x 2 criteria)**
 - Public (public health system)
 - Augmented public (public system supplemented by PHA and NGO support)
 - Private (private hospitals and private doctors; varied quality)
- **2 regimens in each treatment group**

Client compartment of AEM model with ART



Client compartment of AEM model with ART



FINDINGS

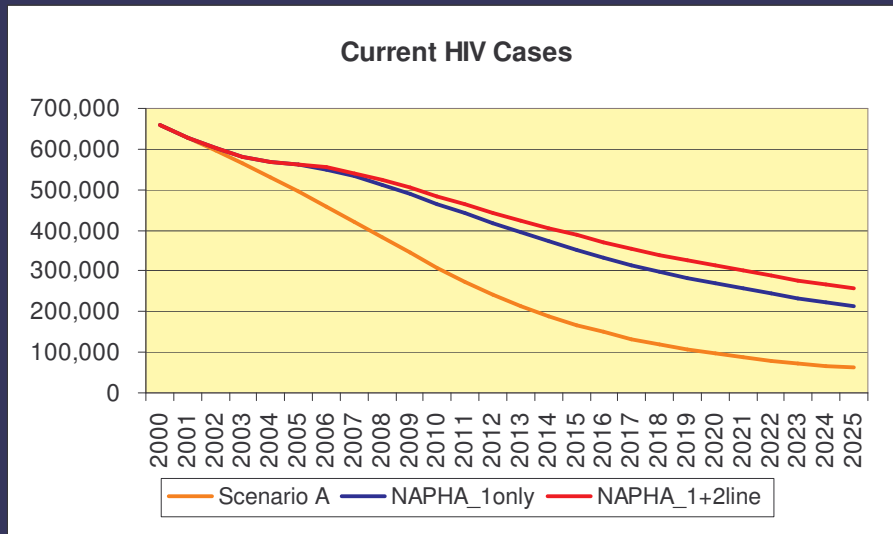
Findings from “Expanding Access to ART in Thailand”

1. NAPHA is cost-effective and yields large benefits in terms of life-years saved (LYS)
2. Expanded policy options increase LYS, but are less cost-effective
3. Since most ART patients are poor, public financing will help assure equitable access
4. Public financing can generate positive spillovers and limit negative spillovers of ART

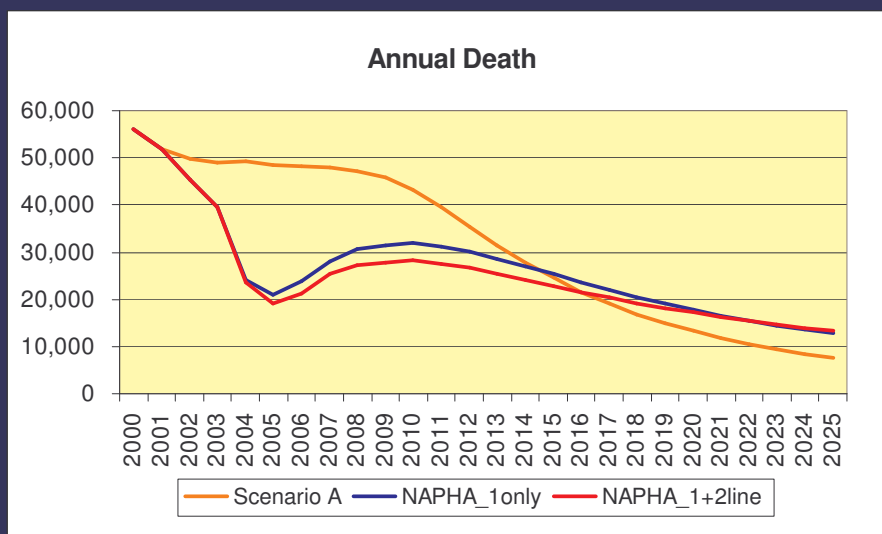
Finding #1

- NAPHA is cost-effective and yields large benefits in terms of life-years saved (LYS)
- Program with 1st line only is more affordable and more cost-effective (but yields lower benefits in terms of LYS)

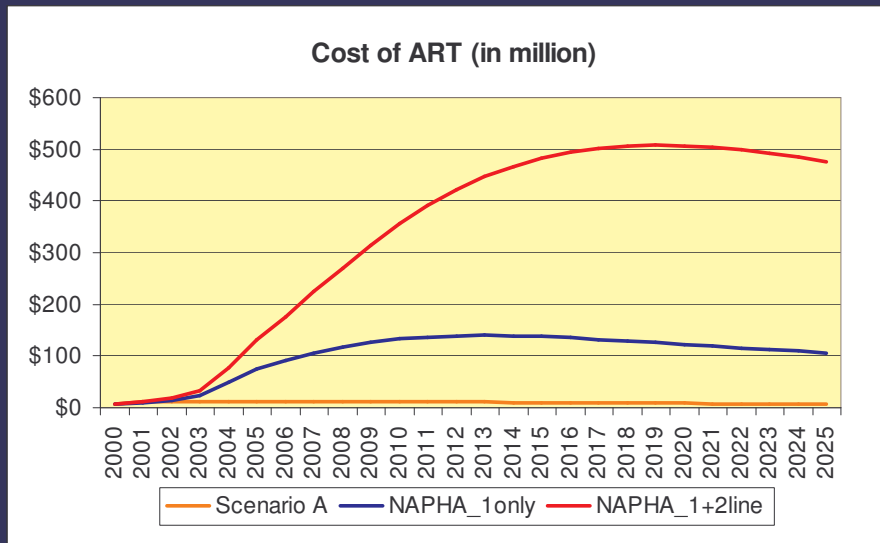
NAPHA will increase the prevalence of HIV



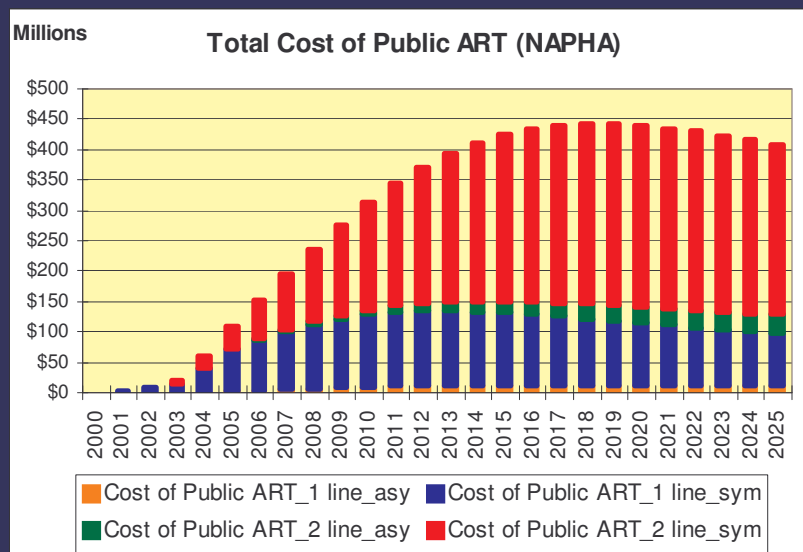
Under NAPHA deaths are postponed



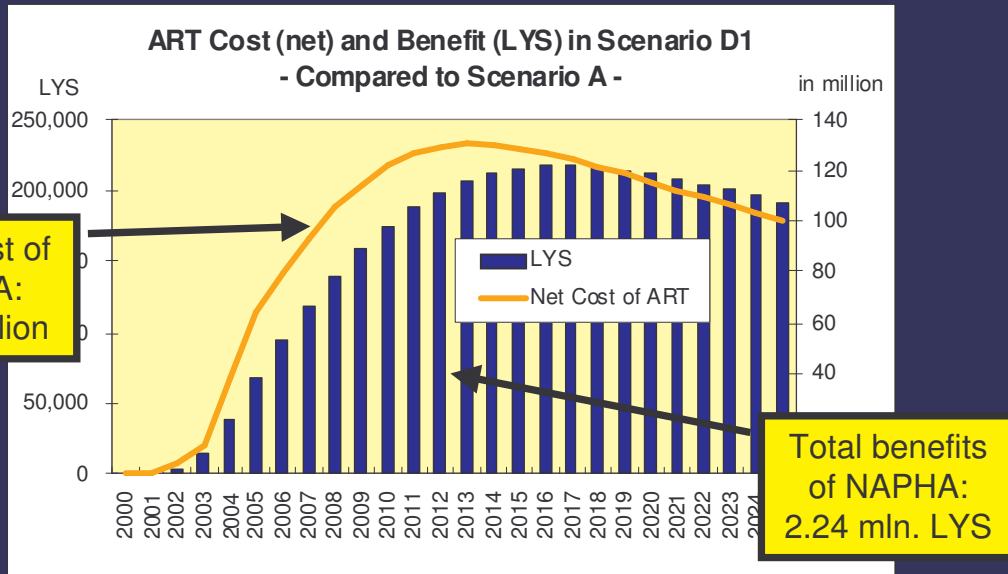
Cost of NAPHA with 2nd line reaches a ceiling at US\$500 million per year



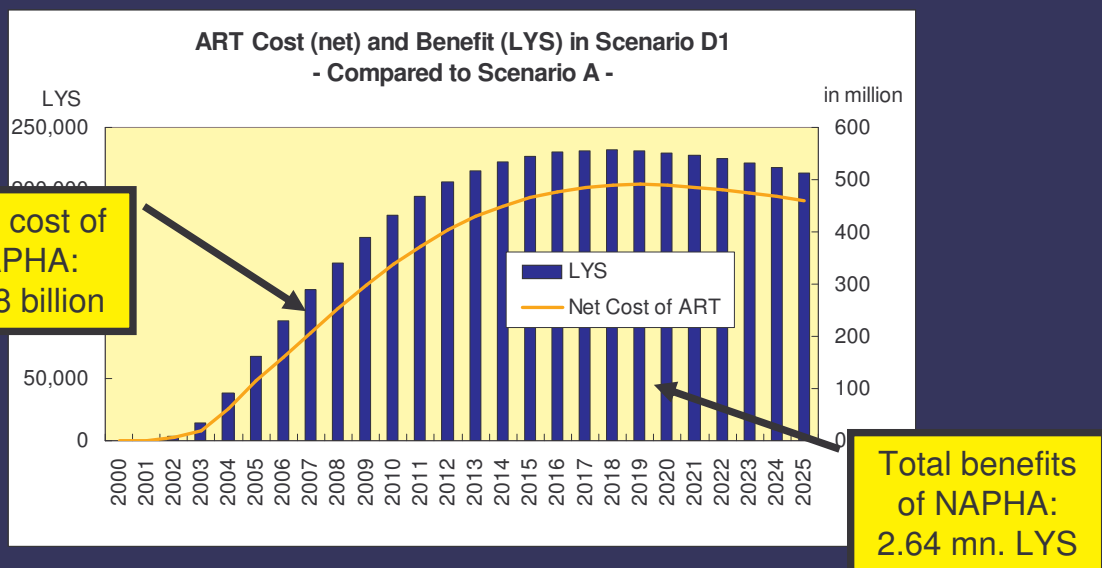
After 2010, most costs are for second-line therapy



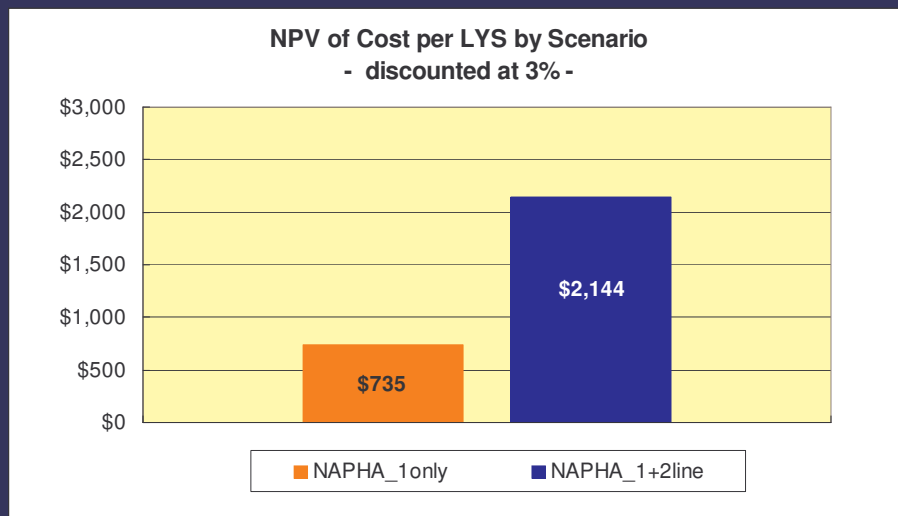
Comparing the flows of costs and benefits: 1st Line Only



Comparing the flows of costs and benefits: 1st & 2nd Lines



Cost-effectiveness of ART with second line

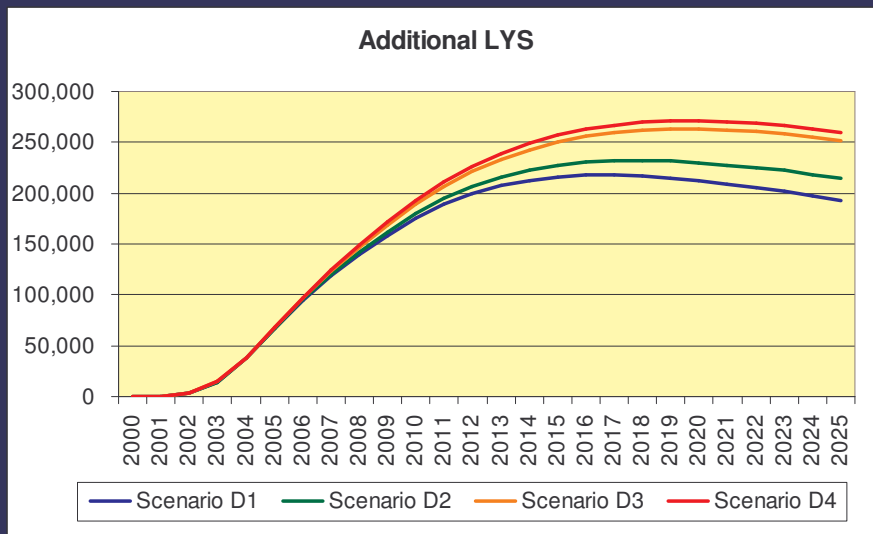


- $\$5.6 \text{ bn} / 2.6 \text{ mn LYS} = \$2,144/\text{LYS}$
- $\$4 \text{ bn} / 0.4 \text{ mn LYS} = \$10,000/\text{ILYS}$

Finding #2

- Expanded policy options increase LYS, but are less cost-effective

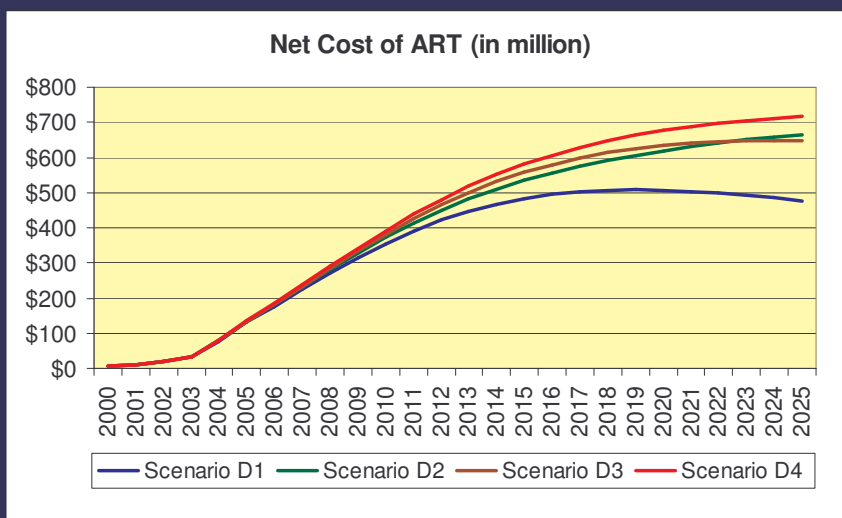
Adding early recruitment and enhanced adherence buys additional life years ...



Scenario D1: NAPHA with 2nd line
Scenario D2: VCT policy

Scenario D3: Adherence Policy
Scenario D4: VCT + Adherence

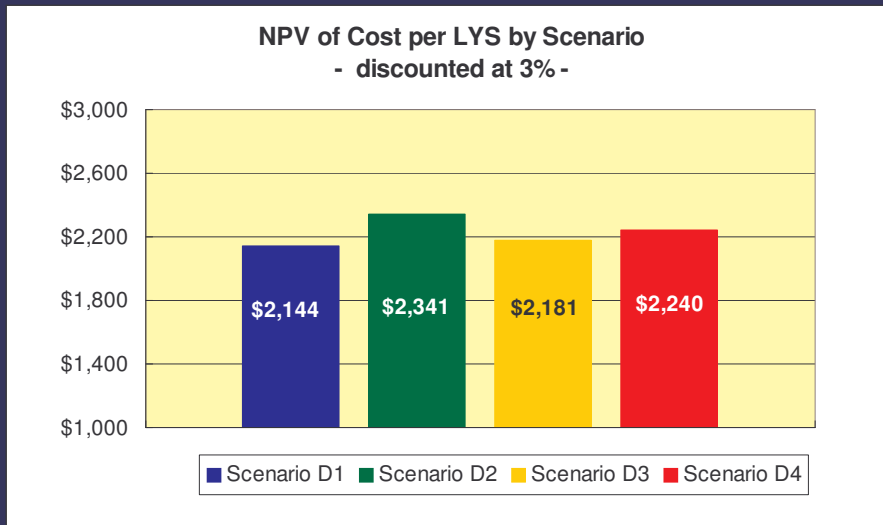
Enhanced versions of ART cost up to 40% more in outer years



Scenario D1: NAPHA with 2nd line
Scenario D2: VCT policy

Scenario D3: Adherence Policy
Scenario D4: VCT + Adherence

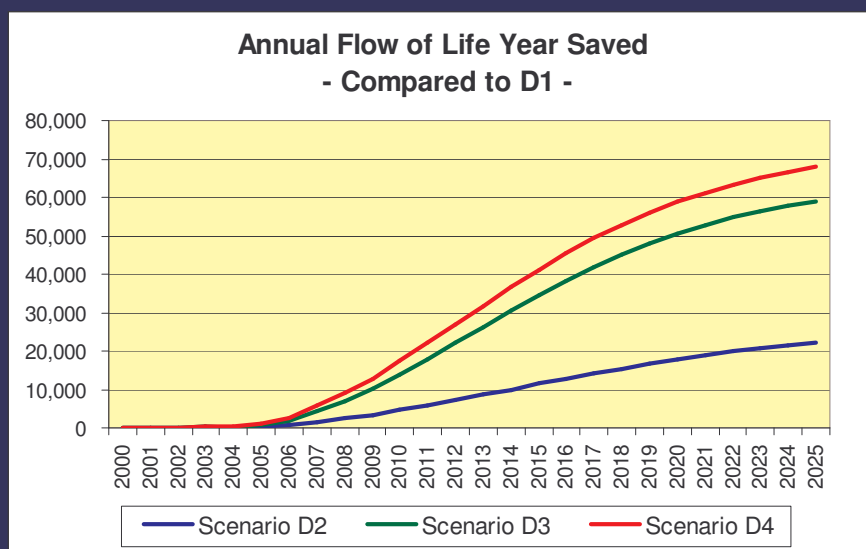
Enhanced versions of NAPHA are slightly less cost-effective ...



Scenario D1: NAPHA with 2nd line
Scenario D2: VCT policy

Scenario D3: Adherence Policy
Scenario D4: VCT + Adherence

Adding early recruitment and enhanced adherence buys additional life years ...



Scenario D2: VCT policy
Scenario D4: VCT + Adherence

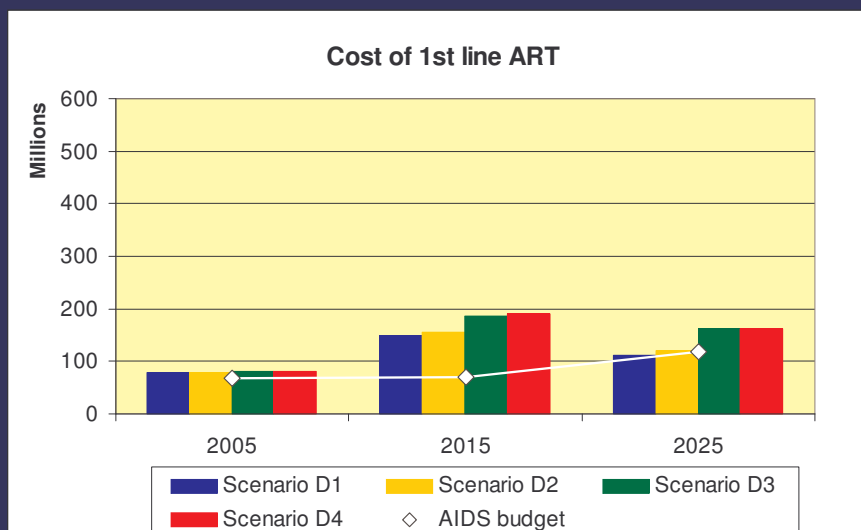
Scenario D3: Adherence Policy

Finding #3

- Since most ART patients are poor, public financing will help assure equitable access

Affordability:

Compare projected annual costs of 1st line ART to projected AIDS budget

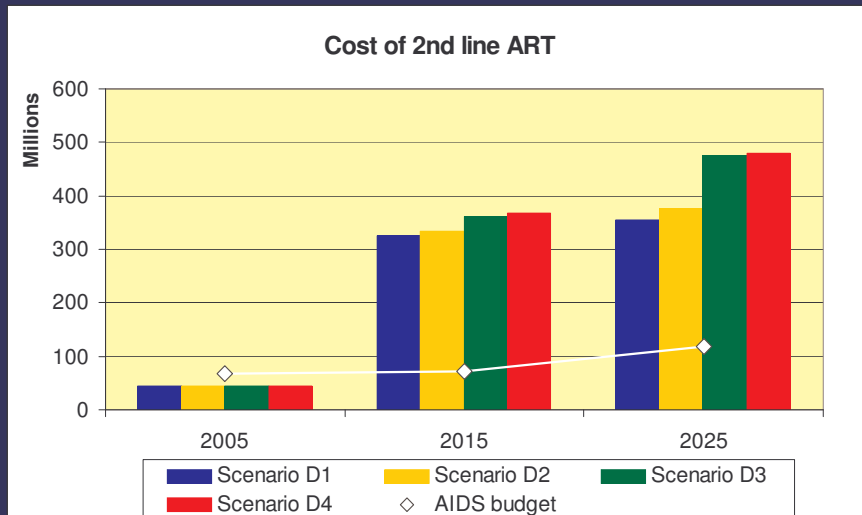


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Affordability:

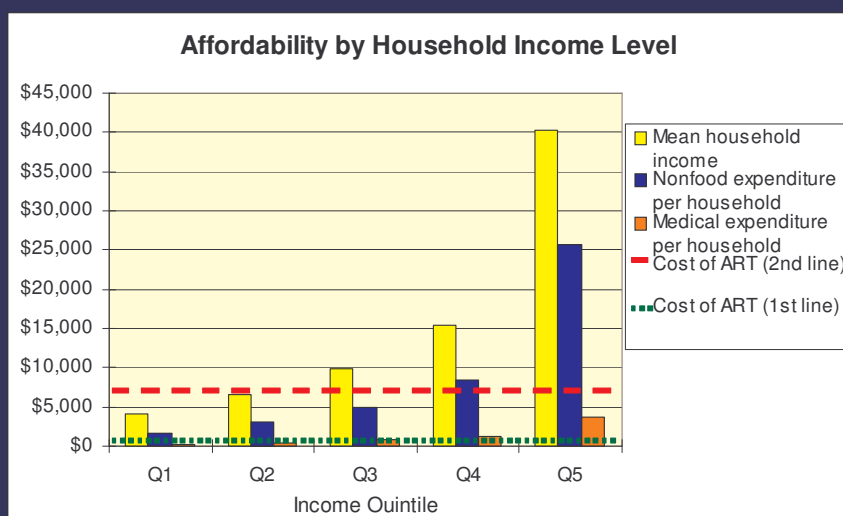
Compare projected annual costs of 2nd line ART to projected AIDS budget



Scenario D1: NAPHA
Scenario D2: VCT policy

Scenario D3: Adherence Policy
Scenario D4: VCT + Adherence

Equity: Annual treatment cost might be affordable for richer households



Finding #4

- Public financing can generate positive spillovers and limit negative spillovers of ART
- BUT this requires greater integration of treatment and prevention efforts

Externalities: Possible effects of ART on HIV transmission

		Direction of effect	
		Beneficial (Slow transmission)	Adverse (Speed transmission)
Type of Effect:	Biological	<p>Reduce infectiousness. ART may lower viral loads and may therefore lower the risk of transmission per sexual contact.</p>	<p>Select for resistance. Imperfect adherence to ART selects for resistant strains of the virus, which can then be transmitted.</p> <p>Longer duration of infectivity. The greater longevity of HIV infected people taking ART has the unintended negative consequence of increasing the period in which the patient can transmit the virus.</p>
	Behavioral	<p>Encourage prevention, especially diagnostic testing. ART may increase the uptake rates of prevention activities, particularly voluntary counseling and testing.</p>	<p>Off-setting behavior. People receiving ART, and HIV positives and negatives in the surrounding community, may engage in more risky behaviors than they would if ART were unavailable.</p>

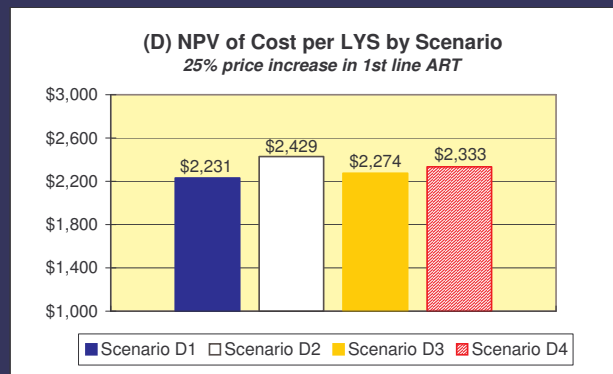
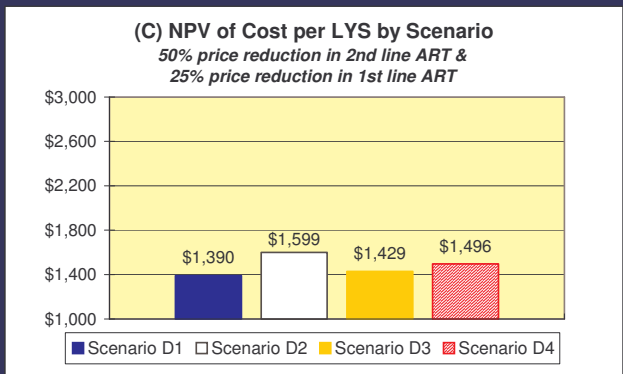
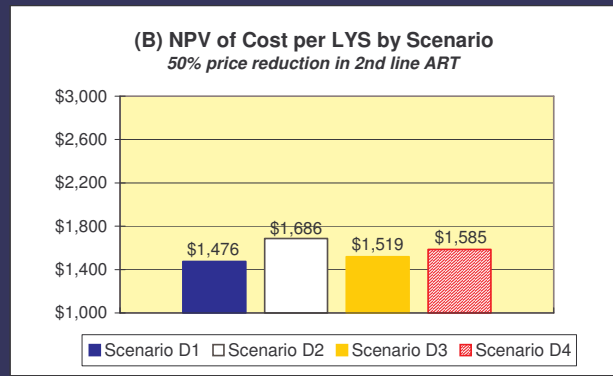
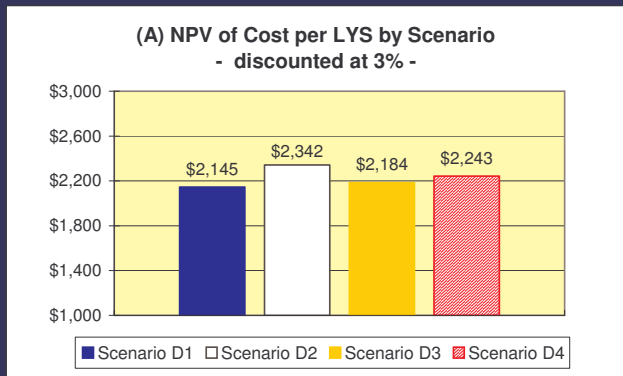
Source: M.Over, et al (2004)

SELECTED SENSITIVITY ANALYSES

Assumptions of Sensitivity Analysis

List of Sensitivity Analysis	Central	Pessimistic	Optimistic
1) 1st line only vs. 1st + 2nd line	1st + 2nd line	1st line only	
2) Behavioral change*		Adverse	Beneficial
3) Infectivity (Percentage reduction in infectivity while on ART)	75%	No reduction in infectivity	Full 100% reduction in infectivity
4) Resistance (% of those going to second line who carry resistant strains)	80%	100%	50%
5) Price of 1st line and 2nd line ART			
1st line	existing price	+ 25%	- 25%
2nd line	existing price	+ 25%	- 50%

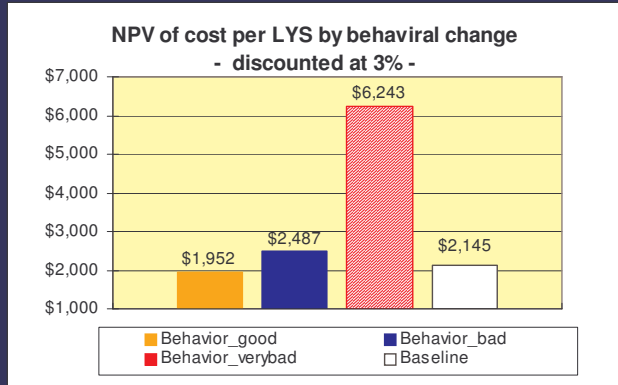
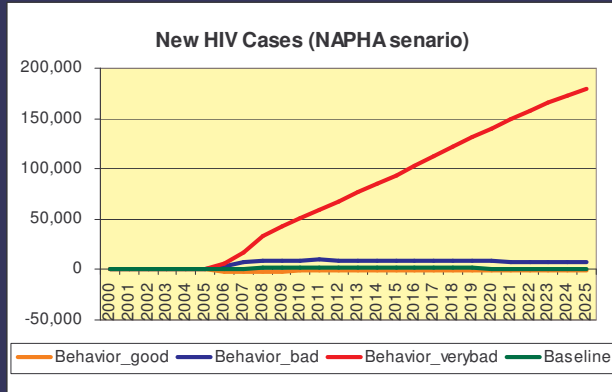
Sensitivity to Changes in ART Rx Prices



Assumptions of Sensitivity Analysis on Changes in Risk Behavior

Assumptions for Behavioral Change					
Condom use by Risk Groups		Central	Beneficial	Adverse	Very Adverse
High	CSW	85%	95%	75%	60%
	Clients	85%	95%	75%	60%
	MSM	85%	95%	75%	60%
	IDU	20%	30%	10%	10%
Low	General Male	35%	45%	25%	25%
	General Female	35%	45%	25%	25%
Risk Groups		Central	Beneficial	Adverse	Very Adverse
Percent of men who visit					
Direct sex workers		10%	5%	20%	20%
Indirect sex workers		10%	5%	20%	20%
STI prevalence (among CSWs)		1.8%	0.6%	3.4%	10.1%

Sensitivity to Changes in Behavior



Conclusions (1)

- Thailand's NAPHA program is affordable and is cost-effective, but....
- Expanding ART requires a long-term financial commitment
- Adherence support mechanisms are critical to make the best use of less expensive first-line ART

Conclusions (2)

- Public financing must ensure equitable access to ART and minimize negative spillovers
- If the success of ART rollout makes people or the government complacent about prevention, future costs could rise substantially
- Future government expenditure on ART are highly sensitive to negotiated agreements on the intellectual property rights for pharmaceuticals

The End

SELECTED COST INFORMATION

Cost of ARV drugs (1st and 2nd line regimens)

(In 2004 price)

ARV drugs	Monthly Cost		Annual Cost	
	Baht	USD	Baht	USD
First line regimens (MOPH guideline)				
(1) 3TC+d4T+NVP	1,200	\$30	14,400	\$360
(2) d4T+3TC+EFV	2,579	\$64	30,948	\$774
AZT+3TC+EFV	3,819	\$95	45,828	\$1,146
AZT+3TC+NVP	2,400	\$60	28,800	\$720
(3) d4T+3TC+IDV/r	3,500	\$88	42,000	\$1,050
AZT+3TC+IDV/r	4,740	\$119	56,880	\$1,422
Average cost	1,606	\$40	19,271	\$482
Second line regimens (WHO guideline)				
ABC+ddl+LPV/r	22,822	\$571	273,864	\$6,847
ABC+ddl+SQV/r	22,094	\$552	265,128	\$6,628
Average cost	22,458	\$561	269,496	\$6,737

Source: The Government Pharmaceutical Organization (2004) Price List 2004

Duncombe, C. (2004) Section Two in the Clinical Background Paper

Médecins Sans Frontières (2004) Untangling the Web of Price Reductions, April 2004

Cost of ART per patient

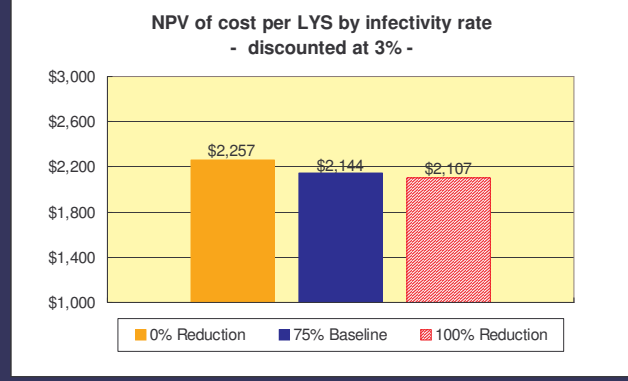
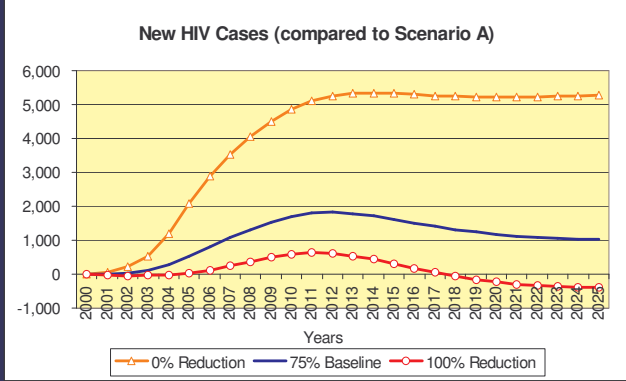
(USD in 2002 price)

Cost Items		Annual Cost per patient			
		1st line regimen		2nd line regimen	
		<i>Asymptomatic</i>	<i>Symptomac</i>	<i>Asymptomatic</i>	<i>Symptomac</i>
(1) ARV drugs		\$471	\$471	\$6,589	\$6,589
(2) Lab tests		\$196	\$214	\$24	\$43
(3) OI treatment		\$0	\$114	\$0	\$114
(4) OPD service		\$60	\$60	\$60	\$60
(5) IPD service		\$0	\$149	\$0	\$149
(6) ARVs + lab tests	(1) + (2)	\$667	\$685	\$6,614	\$6,632
(7) Hospital services	(4) + (5)	\$60	\$209	\$60	\$209
(8) Total ART cost	(3)+(6)+(7)	\$727	\$1,008	\$6,674	\$6,955

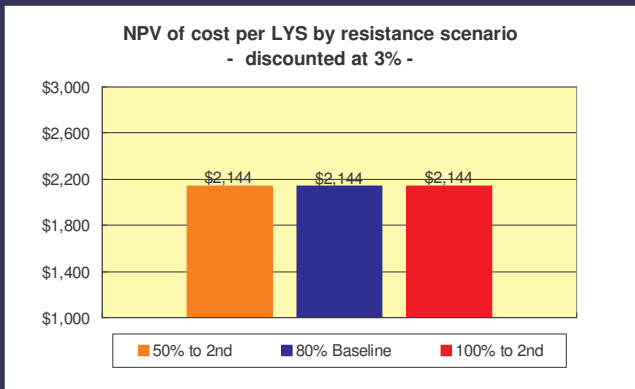
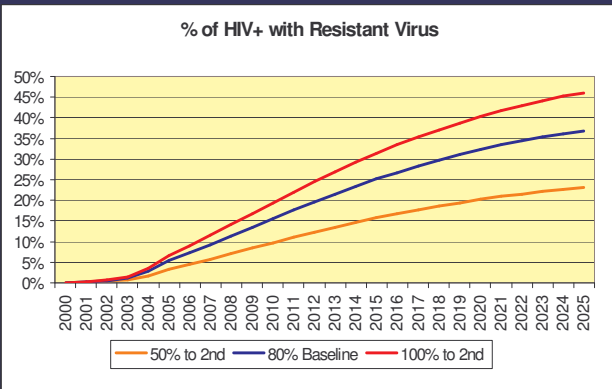
Source: Supakankunti S. et al (2004) Costing of "The National Access to Antiretroviral Programs for People Living with HIV and AIDS" in Thailand, Chulalongkorn University and WHO

ADDITIONAL SENSITIVITY ANALYSES

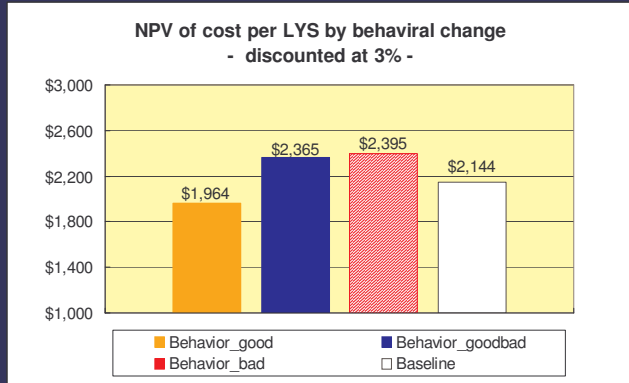
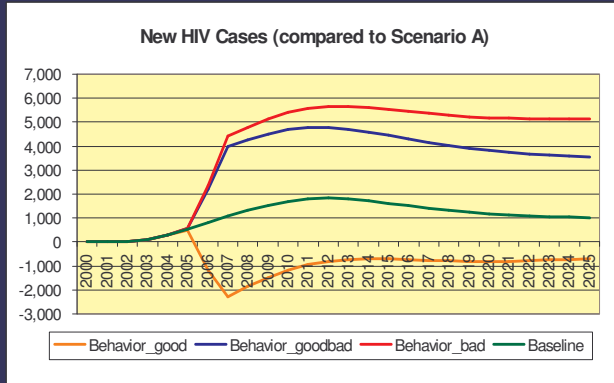
Sensitivity to Changes in Infectivity



Sensitivity to Changes in Resistance



Sensitivity to Changes in Behavior



Sensitivity to Changes in Progression Rates

Forthcoming