CHAPTER 5

Policies to Strengthen Treatment Programs: Evaluating the Costs and Benefits of Alternative Policy Scenarios

The assumptions used to project the future of the NAPHA (National Access to Antiretrovirals Program for People Living with AIDS) policy represent a minimal, least-cost approach to meeting the political mandate of the Ministry of Public Health (MOPH) to make treatment available to all. However, more could be done to improve treatment in several ways. Moreover, some of these additional expenditures, though increasing the complexity and cost of antiretroviral therapy (ART) policy, might improve its effectiveness at low enough cost to be worthwhile from a cost-effectiveness perspective.

Alternative ART Policy Scenarios

In addition to the NAPHA policy scenario described in chapter 4, the report considers two enhancements to NAPHA and a third policy that combines these two enhancements (table 5.1). The enhancements address what are perceived by knowledgeable Thai and international observers to be potential weak points in NAPHA and, indeed, in all publicly financed and provided ART programs worldwide.

Early analyses of the effectiveness and cost-effectiveness of publicly provided ART assumed that many HIV-infected patients would be recruited to treatment when their immune systems first dropped below an eligibility threshold (usually CD4 counts less than 200 to

Table 5.1 Typology of Four Major Policy Alternatives for ART Policy Scenarios for the NAPHA program

		Encourage VCT and early recruitment into ART	
Encourage adherence through demand-side incentives such as PHA groups, accompagnateurs, and conditional transfers		*No*	*Yes*
	No	NAPHA (D1): Current implementation of NAPHA (recruit mainly symptomatic HIV-infected persons through the public health system)	VCT (D2): Earlier recruitment through VCT of people at higher CD4 counts, without improved adherence
	Yes	Adherence (D3): Improved adherence without earlier recruitment (keep current recruitment of symptomatic HIV-infected persons through the public health system)	VCT and adherence (D4): Improved adherence and earlier recruitment (recruit earlier through VCT of persons with higher CD4 counts)

Source: Authors.

250 cubic millimeters so that the benefits of ART would be maximized. However, experiences in Thailand as well as in several other countries—such as Botswana, Brazil, Malawi, and countries of the Organisation for Economic Co-operation and Development (OECD)—show that the vast majority of patients are identified as eligible for ART only when their opportunistic infections lead them to the hospital, when their CD4 counts are already well below the threshold at which they would most benefit from care (see chapter 3). It is thus useful to analyze an alternative version of NAPHA that includes much more vigorous promotion of voluntary counseling and testing (VCT) in an effort to attract patients into treatment when they first become eligible for it. The column labeled VCT (D2) in table 5.2 presents the parameter values used to capture this policy in the policy model. By lowering the price of VCT and increasing its accessibility, the government would elicit more demand for VCT.[1] Among those tested, some would find they are HIV positive; some of those would have CD4 counts low enough to be eligible for treatment. Our VCT scenario (D2) estimates the costs and effects of this alternative version of the NAPHA policy in relation to both the baseline and the basic NAPHA scenario (D1).

A major challenge for ART programs is to attain and sustain high levels of adherence among patients. MOPH-sponsored training programs for public sector ART providers are currently teaching the importance of adherence. But experience around the world suggests that as ART treatment is scaled up, it is increasingly difficult to attain high levels of adherence among new patients and to sustain them among all patients. One promising approach with which Thailand has already experimented is to subsidize and to facilitate the organization of nongovernmental organizations (NGOs) that provide emotional, physical, and sometimes even financial support to patients. In this report, we refer to public sector delivery that has been strengthened by the addition of these demand-enhancing programs as *augmented*. Our augmented scenario (D3) is intended to capture the incremental benefits and costs of such a program.

We also model a program we call *both* (D4), which includes the costs of both expanded VCT and augmented adherence and models a synergistic benefit between them. The typology of these policy alternatives is presented in table 5.1 and their parameter values are given in table 5.2.

The major change introduced into the parameter list to capture the VCT scenario (D2) is an increased rate of growth of VCT. Instead of remaining constant, as in the NAPHA scenario, the number of VCT centers grows at 15 percent per year. In the augmented scenario (D3), VCT numbers remain constant but public sector facilities transform rapidly (at 20 percent per year) from offering provider-driven care to delivering augmented care. In the both scenario (D4), VCT centers grow at 10 percent per year while augmented care crowds out ordinary public treatment facilities at 20 percent per year.[2]

Effects of Alternative ART Policies

Projections of the effect of the VCT or the augmented policy on the future trajectory of the epidemic amount to careful calculations of the consequences of the assumptions presented in chapter 3 regarding the average effect on an individual's disease progression of either early recruitment or NGO support. Figure 5.1 displays

Table 5.2 Policy Assumptions for the VCT, Augmented, and Both Scenarios

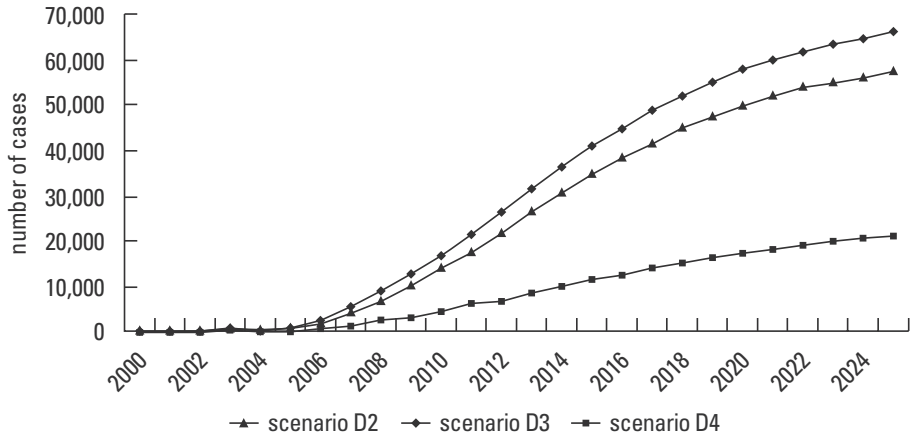
	Scenario		
Parameter	***VCT (D2)***	***Augmented (D3)***	***Both (D4)***
1. Price of VCT (baht)	30	30	30
2. Weight of short-run VCT demand in total (%)	100.0	100.0	100.0
3. Growth rate of VCT facilities (%)	15.0	0.0	10.0
Prices of ART (baht)			
4. Public	650	650	650
5. Augmented public	1,880	650	650
6. Private	9,534	9,534	9,534
7. No ART	30	30	30
Quantities of ART in 2003 (number of facilities)			
8. Public	860	860	860
9. Augmented public	100	100	100
10. Private	100	100	100
11. No ART (residual)	10,282	10,282	10,282
Other ART supply parameters			
12. Growth rate of ART facilities (%)	2.5	1.5	2.5
13. Growth rate of augmented ART facilities (%)	5.0	20.0	20.0
14. Growth rate of private ART facilities (%)	4.0	2.0	3.0
15. Starting number of treatment slots per public facility (average)	54	54	54
16. Starting number of treatment slots per augmented public facility (average)	56	56	56
17. Proportion of treatment capacity designated to symptomatic patients before asymptomatic patients with CD4 < 200 cells/mm^3 are accepted (%)	90.0	90.0	90.0
18. Growth rate of all public health facilities	2.0	2.0	2.0
19. Number of treatment slots in 2002	8,341	8,341	8,341
20. Number of treatment slots in 2003	16,663	16,663	16,663

Source: MOPH data and authors' estimates.

the projected consequences of these policies in relation to the basic NAPHA policy. All three enhancement policies substantially increase the number of people living with HIV/AIDS (PHAs). The augmented policy without early recruitment is estimated to be about three times as effective in this regard as the early recruitment policy. But adding early recruitment (D2) to augmentation (D3) adds an additional 10,000 people to the ranks of people surviving with HIV/AIDS in 2025.[3]

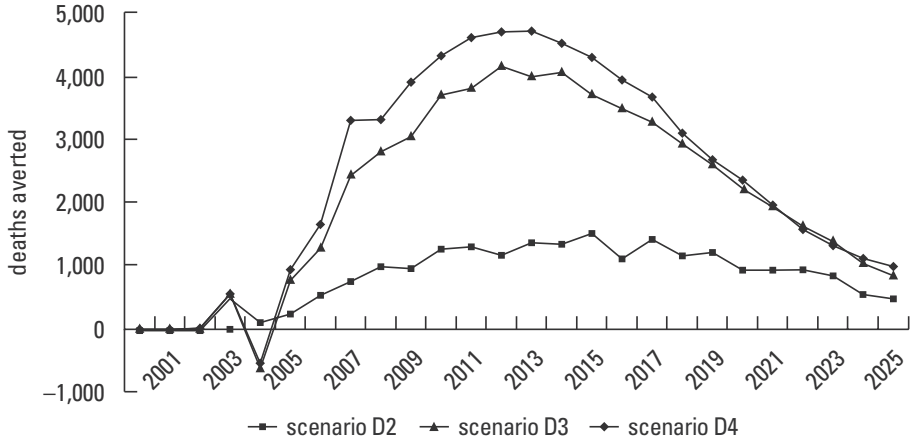
Figure 5.2 shows that all three alternative policies postpone deaths that would have occurred under the NAPHA policy. Again, the aug-

Figure 5.1 Projected Current HIV Cases under Alternative Scenarios Relative to NAPHA



Source: Authors.
Note: Scenario D2 = VCT policy; scenario D3 = augmented public policy; scenario D4 = both (VCT + augmented) policy.

Figure 5.2 Projected Deaths Averted under Alternative Scenarios Relative to NAPHA

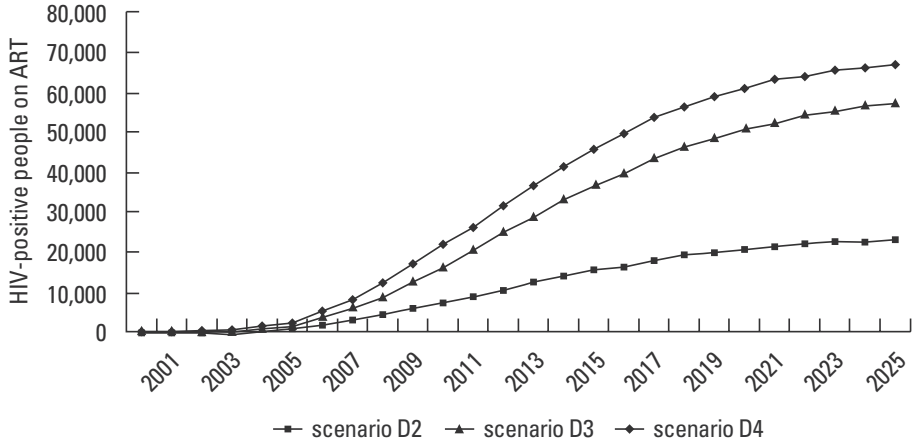


Source: Authors.
Note: Scenario D2 = VCT policy; scenario D3 = augmented public policy; scenario D4 = both (VCT + augmented) policy.

mented policy (D3) is superior to the VCT policy (D2), and the both policy (D4) dominates the other two. In 2010, for example, the NAPHA policy would avert about 15,000 deaths in comparison with the baseline. Figure 5.2 shows that in 2010 the both policy (D4) would avert an additional 4,400 deaths, an improvement of about 30 percent.

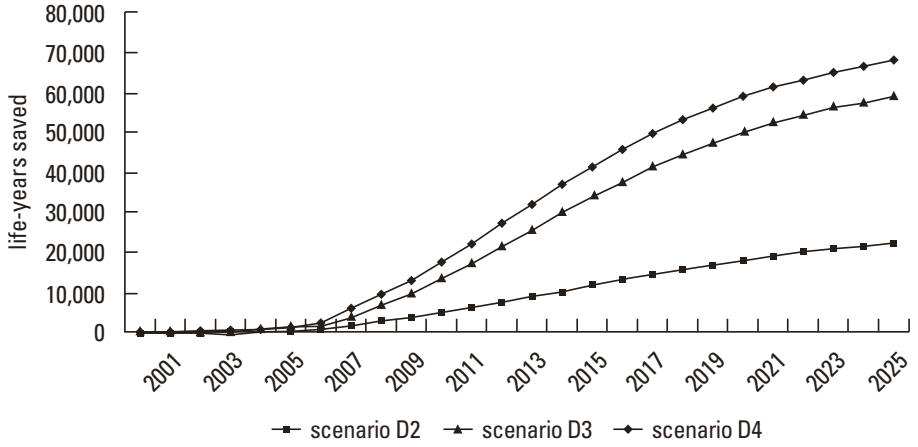
These social (and private) gains are the result of keeping more people on ART. Figure 5.3 shows how many additional people will be on ART in each year in comparison with the NAPHA scenario. The ranking is the same, with the augmented scenario (D3) keeping about 60,000 additional people on ART, more than twice as many as would

Figure 5.3 Projected HIV-Positive People on ART under Alternative Scenarios Relative to NAPHA



Source: Authors.
Note: Scenario D2 = VCT policy; scenario D3 = augmented public policy; scenario D4 = both (VCT + augmented) policy.

Figure 5.4 Projected Annual Life-Years Saved under Alternative Scenarios Relative to NAPHA



Source: Authors.
Note: Scenario D2 = VCT policy; scenario D3 = augmented public policy; scenario D4 = both (VCT + augmented) policy.

be added in the VCT scenario (D2). Again, the both scenario (D4) accumulates the largest number of ART patients.

The result of these enhancement policies is to increase the number of life-years saved in each year. These incremental benefits are shown in figure 5.4 to be quite high. We showed in chapter 4 that by starting people on ART in 2002 (the NAPHA scenario) about 210,000 more people would be alive in 2020. Figure 5.2 shows that the VCT, augmented, and both policies save (respectively) 18,000, 50,000, and

60,000 additional life-years in that year. Thus, the alternative policies offer the possibility of improving the benefits in 2020 by almost 30 percent.

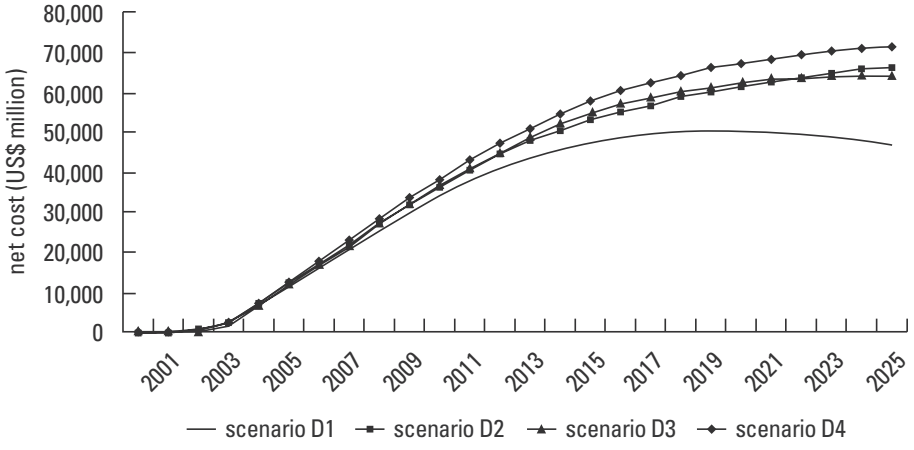
These projections tell us the incremental benefits of the enhanced policies. Now we turn to consideration of their incremental costs.

Costs of Alternative ART Policies

Figure 5.5 shows the projections of the net cost of the NAPHA policy and of the three enhanced policies. The *net cost* is defined as the total cost of ART plus the cost of any VCT expenses, minus the cost of any reduced expenditure on the treatment of opportunistic infections. The bottom line in the figure gives the projection of the net cost of the NAPHA scenario, which is very similar to the projected gross cost of NAPHA (D1) given in figure 4.14. The two estimates are similar because VCT costs are small in the NAPHA policy and savings from reduced opportunistic infections are small relative to the magnitude of ART costs.

According to these projections, the VCT (D2) and the augmented (D3) policies have roughly similar costs, while the both (D4) policy is about 10 percent more costly than either. Even the most expensive of the policies never exceeds 30 percent of the projected national health budget, which itself is only 1.3 percent of the entire national budget.[4]

Figure 5.5 Projected Net Cost of ART for All Four Scenarios



Source: Authors.
Note: Scenario D1 = NAPHA policy; scenario D2 = VCT policy; scenario D3 = augmented public policy; scenario D4 = both (VCT + augmented) policy.

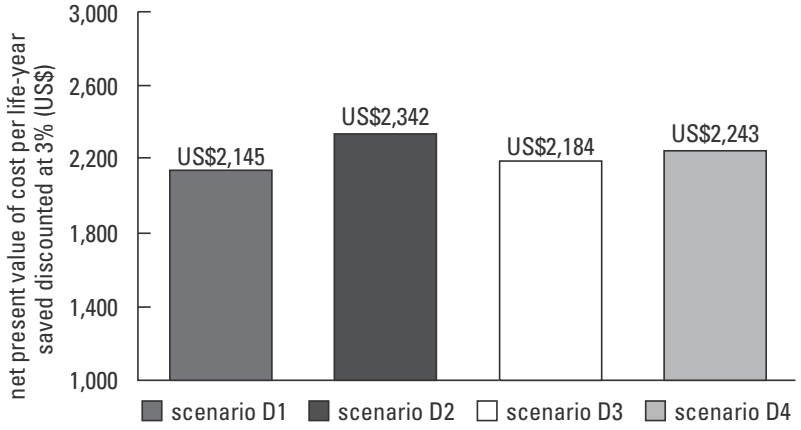
The Cost-Effectiveness of Alternative ART Policy Scenarios

Assembling the costs and effects of the four policies allows two types of analysis. First, one can analyze the cost-effectiveness of any of the four against the baseline. At this early stage in Thailand's implementation of NAPHA, such an analysis can guide current policy into a more cost-effective path. One can instead consider the NAPHA scenario (D1) as a new point of comparison and analyze the cost-effectiveness of the VCT (D2), augmented (D3), or both (D4) policy in comparison with that new baseline. The advantage of this approach is that, where an enhanced policy costs more per life-year saved, one can ask whether the additional life-years saved are worth the extra expenditure.

Figure 5.6 presents the first of these analyses. Of the four policies, the current baseline NAPHA policy (D1) is the most cost-effective. The second most cost-effective is the augmented policy (D3). This finding is not surprising because the augmented policy achieves two or three times as many incremental life-years saved at roughly the same cost as the VCT scenario (D2). Because it combines the two "pure" enhancement strategies, the cost per year of the both scenario (D4) lies between the costs per year of the other two scenarios.

If all four policies achieved the same objectives, it would be wise to choose the most cost-effective, eschewing the enhancements. However, we have already seen that the enhanced policies achieve more than the simple NAPHA policy. Each enhancement saves additional life-years at some additional cost. In comparison with the NAPHA

Figure 5.6 Cost-Effectiveness of NAPHA and Alternative Scenarios Relative to Baseline



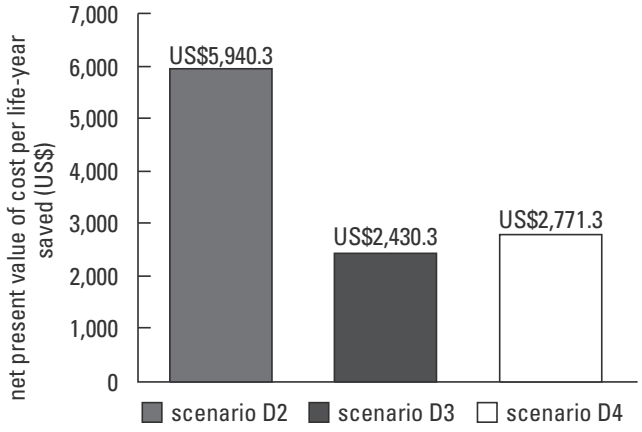
Source: Authors.
Note: Scenario D1 = NAPHA policy; scenario D2 = VCT policy; scenario D3 = augmented public policy; scenario D4 = both (VCT + augmented) policy.

scenario, the projections predict that the VCT scenario would save an additional 144,737 discounted life-years, whereas the augmented scenario would save an additional 414,840 life-years. Implementing both enhancements would save 490,844 life-years in addition to those saved by the NAPHA baseline policy.

The decision on whether to enhance NAPHA in any of these three ways should be based on the costs of these additional health benefits. The cost projections predict that the present value of the additional expenditures required to save the 144,737 life-years would be US$860 million (B 33.6 billion), or about US$5,941 (B 237,640) for every additional life-year for the VCT scenario. Because the augmented scenario is projected to cost an additional US$1 billion (discounted dollars), (B 40 billion) it could be used to add to the health benefits at a cost of US$2,430 (B 97,200) per additional life-year saved. The program combining both of these two enhancements would cost an additional US$1.3 billion (B 52 billion), or an average of US$2,77 (B 110,840) per additional life-year saved. These costs are displayed in figure 5.7.

In view of those results, which program should Thailand undertake? The answer depends on the value that Thailand places on a life-year saved. Suppose that value is US$2,200 (B 88,000). This number is greater than the cost per life-year saved under NAPHA but less than the incremental cost per life-year saved under any of the three enhanced programs. In this case, assuming that Thailand has already exhausted all other opportunities to save years of life for less than US$2,200 (B 88,000), the country should choose the basic NAPHA modeled here.

Figure 5.7 Cost-Effectiveness of Alternative Scenarios Relative to NAPHA



Source: Authors.
Note: D2 = VCT policy; scenario D3 = augmented public policy; scenario D4 = both (VCT + augmented) policy.

It should leave the enhancements to the private decisions of individuals who are able to appreciate them and are willing to pay for their incremental costs out of their own pockets or from health insurance.

Suppose instead that Thailand attaches a value of US$4,000 (B 160,000), or about twice its gross national income per capita, to the life-year saved. Because some international experts suggest that a life-year could be valued as high as five times the per capita income, a valuation of US$4,000 (B 160,000) would not be extremely high for Thailand. In that case, Thailand should aspire to achieve the maximum health benefits suggested by this analysis, which are attainable only through the most generous program. The cost-effectiveness of enhancing the basic program with both (a) VCT and (b) PHA and NGO demand-side augmentation is quite attractive, at only US$2,771 (B 110,840) per additional life-year saved.

Regardless of the value that Thailand places on life-years, this analysis suggests that the country should not adopt a policy that improves only VCT recruitment without improving adherence. That scenario, labeled D2 in figure 5.7, is clearly dominated by the other two enhanced policies.

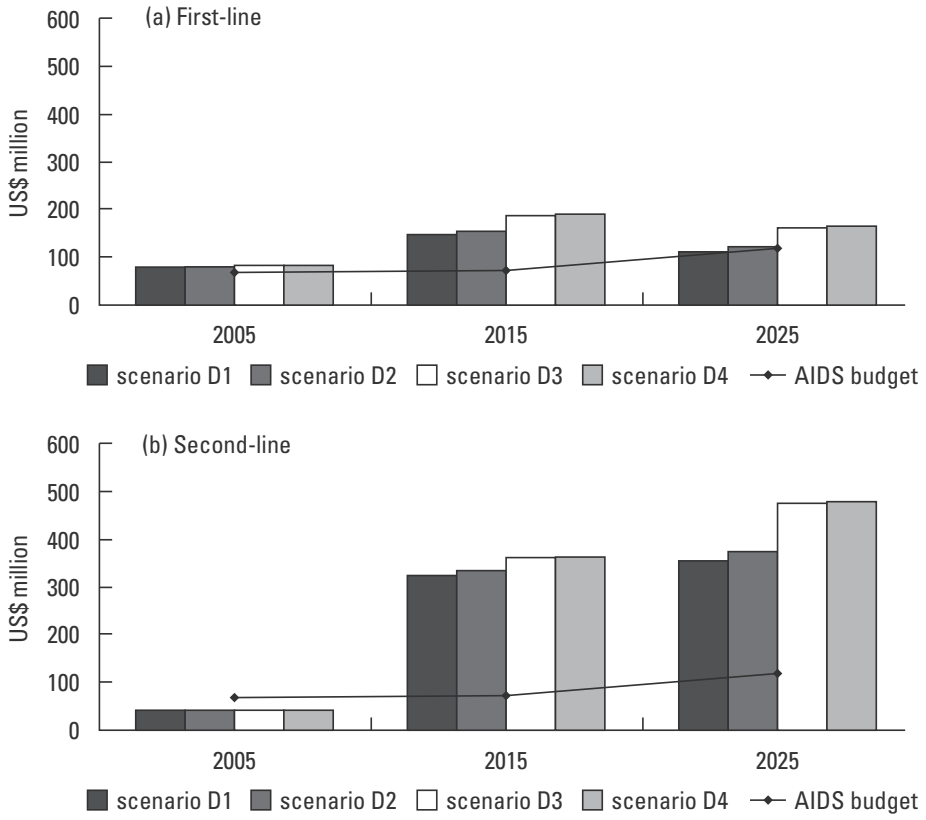
Fiscal and Financial Implications of ART Policy Scenarios

In chapter 4, we compared the projected annual flow of expenditures on public ART with the projected levels of the AIDS and health budgets through 2025. This section adds a similar analysis of the enhanced scenarios. It also compares the projected public expenditure per life-year to the incomes of the various income groups in Thailand, in order to assess the private affordability of treatment.

Compare All Four Scenarios with AIDS Budget

Figure 5.8 shows that the major budget implications of choosing one of the enhanced scenarios will not be felt until the outer years of the projection period, when the both scenario (D4) will cost about one-fourth more than the basic NAPHA scenario (D1). The figure also shows how these costs compare with a projection of the recent AIDS budget, which is assumed to grow at only the projected growth rate of gross domestic product—5.2 percent. Panel (a) of figure 5.8 indicates

Figure 5.8 ART Cost of NAPHA and Alternative ART Scenarios



Source: Authors.
Note: Scenario D2 = VCT policy; scenario D3 = augmented public policy; scenario D4 = both (VCT + augmented) policy.

that, unless the AIDS budget grows faster than gross domestic product, the cost of first-line ART can easily exhaust the AIDS budget; however, panel (b) shows that second-line therapy will have a substantially larger budget impact. Already by 2015 the projected cost of the second-line therapy alone will be more than three times greater than the projected level of recent AIDS budgets.

As discussed earlier, recent AIDS or health sector budgets provide no sure way of judging the affordability of any project. Suppose Thailand has the opportunity to invest in life-saving therapy at a cost of US$2,430 (B 97,200) per life-year and has exhausted other opportunities to lengthen the productive lifetimes of its citizens at this cost. Its decision on whether to spend this money should be based not on any putative criterion of affordability but simply on whether it values healthy life-years at least this highly. If it does, then it should either tax or borrow to finance these expenditures.

Affordability to Private Households

An alternative to public financing for ART would be to finance all or part of its cost through user fees. Table 5.3 shows the private affordability of ART by household income level. According to the socioeconomic survey data for 2002, the mean nominal income per household for the poorest 20 percent was US$4,043 (B 161,720), of which US$1,678 (B 67,120) was spent on nonfood expenditure and US$300 (B 12,000) on medical expenditure in an average year. The highest income quintile, in contrast, has about 10 times more income and spends about 12 times more on medical expenses in the average year.

Comparing the cost of ART with these household averages is difficult. First, households with AIDS patients might have been different from households without such patients—either poorer or richer—even before the AIDS patient became sick.[5] Second, the sickness is likely to reduce the productivity of the patient and therefore the

Table 5.3 Affordability of First- and Second-Line ART by Household Income

	Quintile				
	1 (poorest)	*Q2*	*Q3*	*Q4*	*5 (richest)*
Mean household income (US$)	4,042.70	6,678.10	9,806.10	15,434.00	40,253.20
Nonfood expenditure, household (US$)	1,678.40	3,127.90	4,983.90	8,525.30	25,597.60
Medical expenditure, household (US$)	300.00	512.30	754.70	1,165.50	3,633.00
Cost of ART (first-line)	842.20	842.20	842.20	842.20	842.20
Cost of ART (second-line)	6,960.20	6,960.20	6,960.20	6,960.20	6,960.20
Cost of ART (first-line) as					
Share of household income (%)	21	13	9	5	2
Share of nonfood expenditure (%)	50	27	17	10	3
Share of medical expenditure (%)	281	164	112	72	23
Cost of ART (second-line) as					
Share of household income (%)	172	104	71	45	17
Share of nonfood expenditure (%)	415	223	140	82	27
Share of medical expenditure (%)	2,320	1,359	922	597	192

Source: Authors' calculations based on Thailand socioeconomic survey in 2002.
Note: All monetary amounts are in 2004 U.S. dollars.

income of the household. Third, household membership itself is flexible: households can recruit new members to help care for a sick person or can seek temporary alternative homes for household members who need to be free of the burden of the sickness. The AIDS patient may move to a new household, perhaps to be closer to a treatment site or a valued caregiver.

Setting aside these concerns, we note that the annual cost of first-line ART is substantially greater than average annual medical expenditures only in the poorest 40 percent of the households. Accordingly, for the top half of the households in the income distribution, first-line ART is affordable. Even for the poorest half of the households, the US$842 (B 33,680) cost of first-line therapy compares with the medical expenses of the sickest households for a single year.

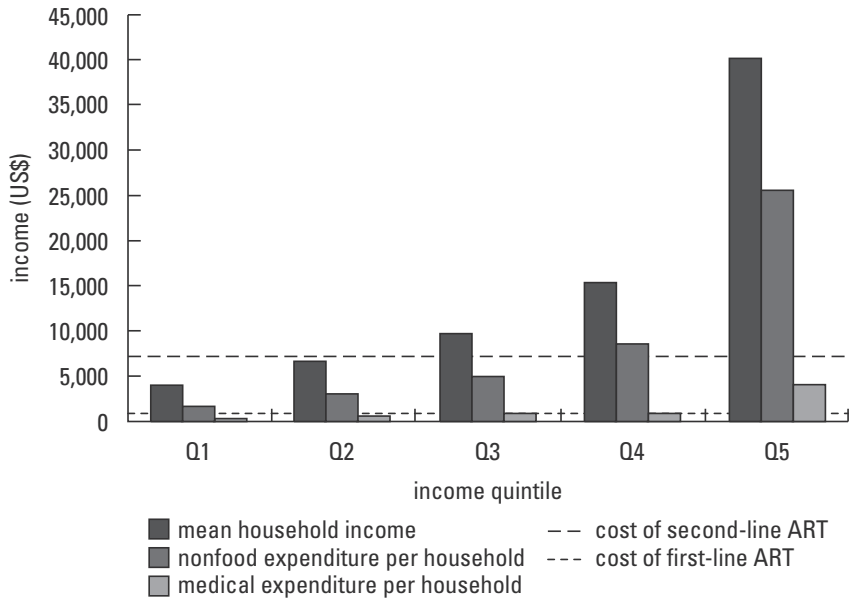
The problems for the poorest households are likely to be caused by two unusual features of the cost of treatment:

- The treatment must continue for the rest of the patient's life. For households in the lowest 80 percent of the income distribution that might be able to raise the resources to pay US$842 (B 33,680) for one year, payment for the second and third year will become onerous.
- Laxity in treatment will lead to treatment failure, the development of resistant strains of the virus, the spread of those resistant strains to others, and the requirement that the patient move to second-line therapy. All these repercussions are extremely negative for the patient and, in the case of the transmitted resistant strain of the virus, for society.

To the extent that a higher price for first-line therapy leads to a higher failure rate for first-line therapy, it increases the costs of AIDS to the individual and to society.

The option of cofinancing ART with user fees deserves fuller treatment than is possible here. However, we stress that any price-induced reduction in adherence will have negative spillover effects. Comparison of first-line costs with household income and expenditure levels (in figure 5.9) suggests that even first-line therapy is difficult for the poorest households to finance, especially over the longer run. Careful attention should be given to determining which patients will

Figure 5.9 Affordability of ART by Income Level



Source: Authors.

adhere—despite paying a higher price—and which will not. Those who will not should receive free care—or should even be rewarded for good adherence. In other words, perhaps the price to some patients should be negative.

Although the cost of first-line therapy could be partially financed with user fees, second-line therapy is much more expensive, exceeding total household income for 40 percent of the population. A large proportion of those on first-line therapy will eventually need second-line therapy. Furthermore, poor adherence to first-line therapy speeds the development of resistance to those drugs and hastens the day when the patient must move to second-line therapy. Accordingly, from a social as well as an individual perspective, adherence support mechanisms such as the augmented public care we model in this report are likely to be cost-effective as well as therapeutically beneficial.

Given the potentially important contribution that NGO or PHA support groups might make to adherence, if they effectively augment public (and perhaps also private) care, the problem of financing should perhaps be posed as one of designing the optimal financing mechanism for these groups. If membership dues increase the stability and the accountability of these groups to their constituents, then perhaps this form of user fee should be explored in addition to—or instead of—fees paid directly to the health care system.

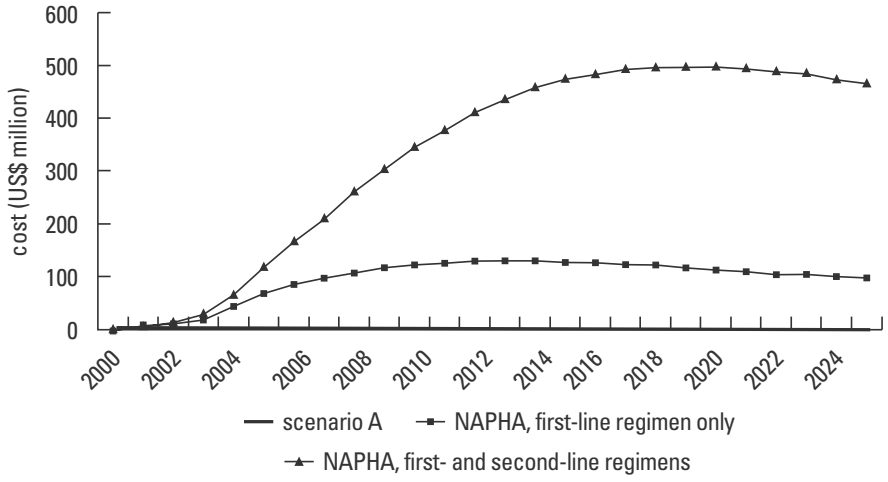
NAPHA Policy without Brand-Name Second-Line Pharmaceutical Products

In chapter 4, financial analysis of the NAPHA policy demonstrated that second-line drug costs account for most of the annual budget after a few years, though only a minority of patients use them. However, virtually all patients eventually need second-line therapy. Hence, excluding second-line drugs from NAPHA reduces the health benefits of the program and shortens the life expectancy of patients. Despite growing needs and demands from the PHA and international AIDS communities, at present the Thai government has not yet made an explicit decision regarding public provision of ART, beyond the currently available drug regimens for first-line therapy. In this section, we compare the benefits and costs of the basic NAPHA policy analyzed in chapter 4 with a version of the policy that excludes second-line therapy. We assume the resulting cost savings are absorbed entirely by the government, leaving no cost implications for the patient from this change. Consequently, the demand for VCT and for treatment does not change relative to our earlier scenarios.

Projected Costs

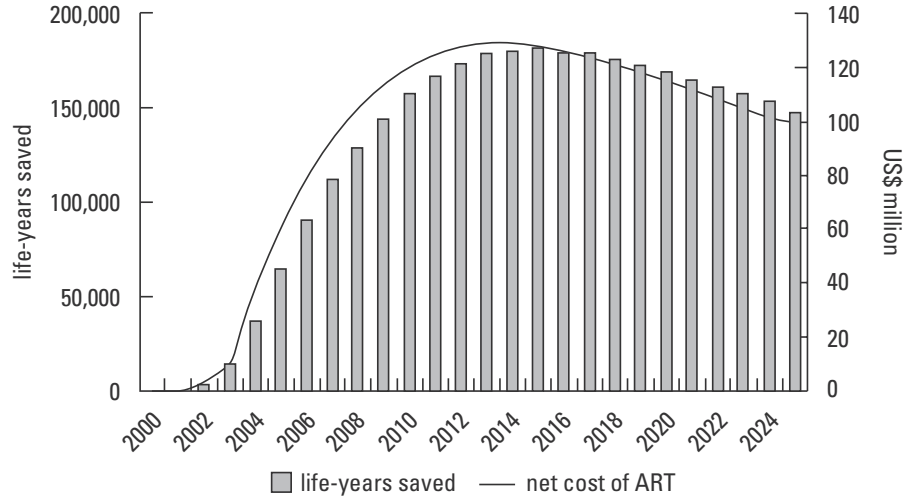
Figure 5.10 presents the projected cost of the NAPHA scenario with and without second-line therapy. The cost of NAPHA with second-line therapy is reproduced from figure 4.14. With second-line drugs, NAPHA costs increase sharply to an inflection point in 2008–09 and then level off to a ceiling of US$500 million (B 20 billion) by 2017. In contrast, the

Figure 5.10 Projected ART Costs of NAPHA Scenarios with and without Second-Line ART



Source: Authors.

Figure 5.11 Projected Annual Costs and Benefits of NAPHA Scenario without Second-Line ART



Source: Authors.

NAPHA policy using only first-line drugs costs only about one-fifth as much as it would when second-line drugs are included. When second-line drugs are not included, the total cost peaks at about US$130 million (B 5.2 billion) per year in 2013, before leveling off.

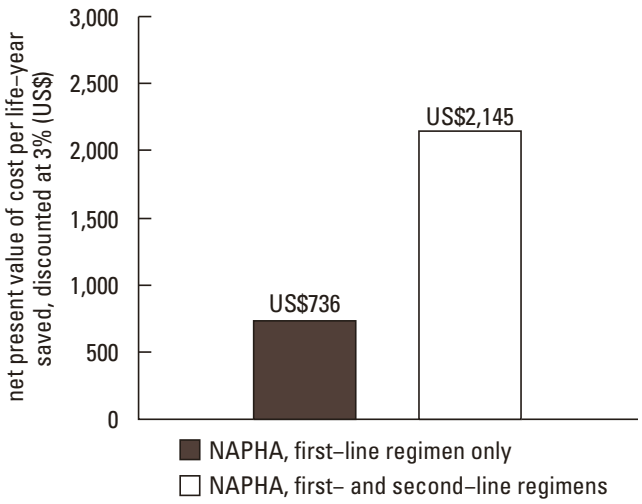
Projected Costs and Benefits

Excluding coverage for second-line drugs (and assuming patients do not buy them on their own) reduces the benefits of NAPHA as well as the costs. Figure 5.11 presents both the benefits (on the left vertical axis) and the costs (on the right vertical axis) of NAPHA without second-line drugs. In comparison with the similar figure 4.17, the line graph representing health benefits rises almost as high but declines more quickly, with only about 150,000 survivors in 2025 instead of the almost 200,000 survivors when second-line drugs are included. In contrast, the costs to the government remain about US$120 million (B 4,800) per year, or about one-fifth the value when second-line drugs are included.

Cost-Effectiveness Analysis

Figure 5.12 presents the cost per life-year saved of NAPHA without second-line therapy compared with the cost per life-year saved of NAPHA with second-line therapy (from chapter 4). The central finding is that NAPHA can save a year of life for US$2,145 (B 85,800).[6] The figure shows that NAPHA with first-line therapy only, at just

Figure 5.12 Cost-Effectiveness of NAPHA Scenarios with and without Second-Line ART



Source: Authors.

US$736 (B 29,440) per discounted life-year saved, is far more cost-effective than NAPHA with second-line therapy, which costs US$2,145 (B 85,800) per discounted life-year saved. (As before, a discount rate of 3 percent per year was used to compute the net present values of the future streams of costs and benefits.)

This result poses important questions for the Royal Thai government: Should it commit to public provision of the much more expensive second-line therapy in addition to first-line therapy? Or should it limit its commitment to providing only first-line therapy, with a promise to provide palliative care for those who fail first-line treatment? In the absence of significant change in the price of second-line drugs, the cost of saving an additional life-year through second-line therapy is high when compared with the substantial health benefits of first-line policy only. On a pure cost-effectiveness basis, a policy with first-line therapy only would be superior.[7]

Notes

1. The discussion of figure 4.8 presents the methods used to project the effect of improved VCT accessibility on the use of VCT.

2. The transformation of hundreds of public treatment locations into augmented public treatment locations would make it difficult to grow the VCT centers at 15 percent per year. So we decrease that target to 10 percent a year in this scenario.

3. As noted in chapter 4, these projections assume that the choice of treatment policy does not affect risk behavior. Consequently, these additional HIV-infected people are the result of improved survival and the fact that longer-lived HIV-infected people have more opportunity to transmit infections.

4. The cost projections in this study do not attach a shadow price to the cost of public sector resources. Because such shadow prices are typically about 10 percent, these projections could be understating the opportunity costs of AIDS programs by roughly 10 percent.

5. For example, in Kagera, Tanzania, households that experienced the death of a prime-age adult tended to be wealthier before the death than were other households (World Bank 1999).

6. The two cost-effectiveness estimates for Thailand reported in figure 5.12 are both greater than was estimated by a similar study of India, which concluded that ART would improve health at a cost of less than US$300 (B 12,000) per life-year in that country (Over and others 2004). The difference in costs is due partly to the higher clinical costs estimated for Thailand and, in the case of the US$2,145 figure (B 85,800), to the inclusion of second-line therapy, which was excluded from consideration in the India study.

7. If NAPHA without first-line therapy is taken as the base case, then the addition of second-line therapy will save a further 395,665 discounted life-years at an additional cost of nearly US$4 billion (B 160 billion) over a projected 23 years. Hence, the cost of the additional life-year gained by adding second-line therapy will be approximately US$10,000 (B 400,000) per life year. This is a great deal of money at Thailand's level of gross national income, especially in comparison with the US$736 (B 29,440) that the government would be paying for the substantial health benefits of the first-line-only NAPHA policy. Whether the government decides to finance second-line therapy depends on whether political constituencies support the free provision of second-line therapy and also on whether second-line drugs can be obtained at prices much lower than current prices.