

THE LONG RUN

COSTS AND

FINANCING

OF HIV/AIDS IN CAMBODIA

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Acronyms

AEM	Asian Epidemic Model	HSS	HIV Sentinel Surveillance Program
AIDS	Acquired Immune Deficiency Syndrome	M&E	Monitoring and Evaluation
AIM	AIDS Impact Model	MOH	Ministry of Health
ANC	Antenatal Clinic	MSM	Men who have Sex with Men
ART	Antiretroviral Therapy	NAA	National AIDS Authority
BSS	Behavioral Surveillance Surveys	NAC	National AIDS Council
CoC	Continuum of Care	NCHADS	National Centre for HIV/AIDS, Dermatology & STDs
CSW	Commercial Sex Worker	NGO	Non-Governmental Organization
CUP	100% Condom Use Program	OECD	Organization for Economic Co-operation and Development
DHS	Demographic and Health Survey	PLHA	People Living with HIV and AIDS
DU	Drug Users	PMTCT	Prevention of Mother to Child Transmission
EPP	Epidemiologic Projection Package	RNM	Resource Needs Model
FHI	Family Health International	SSS	Sexually Transmitted Disease Surveillance
FSW	Female Sex Workers	STI	Sexually Transmitted Infections
GDP	Gross Domestic Product	UNAIDS	Joint United Nations Programme on HIV/AIDS
HIV	Human Immunodeficiency Virus	WHO	World Health Organisation
IDU	Injecting Drug Users		
IgG BED-CEIA	Immunoglobulin G-capture BED-enzyme immunoassay		

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Context and Rationale for the Cambodia 2031 Study

In many respects, Cambodia has made exceptional progress in addressing HIV/AIDS since it was first detected in 1991. While the estimated number of new infections grew to reach almost 15,500 annually in the early 1990s, it had been reduced to about 2,100 by 2009. In addition, about 93% of those who are eligible to be on anti-retroviral treatment are being treated. Meanwhile spending has increased rapidly, from US\$21 million in 2003 to \$51.8 million in 2008.

Despite these successes, Cambodia still has a serious and potentially devastating epidemic. Currently about 2,100 Cambodians a year become infected with HIV. These new HIV infections continue to be largely driven by unprotected heterosexual sex between men and female sex workers. Furthermore, approximately 90% of Cambodia's AIDS program is funded by development partners, which raises serious concerns about sustainability of the country's response.

Cambodia's HIV/AIDS epidemic will continue for many years in the future and significant costs will be associated with the prevention, care, and treatment of HIV/AIDS. The nature and magnitude of those costs and how they can be financed will depend on a number of factors. These include, among other things, epidemiological factors and trends, the policy choices made by government about addressing the epidemic, corresponding scale, coverage, and quality of interventions, and the availability of resources in the future from government, the private sector, civil society, individuals, and insurance.

An international exercise, called *aids2031*, has been carried out by a consortium of partners to help assess:

- the long run trajectory of HIV/AIDS;
- what efforts can be pursued to reduce the number of new cases of HIV; and
- how countries will be able to finance the measures they need to address HIV/AIDS in the future at lower costs and in more effective, efficient, and sustainable ways.

Cambodian stakeholders led this case study throughout the entire exercise. This study applied and validated at the national level the costing, priority-setting, and financial mobilization tools that were developed by the *aids2031* project globally. It is hoped that this study will

lead to a better understanding of the future course of HIV/AIDS in Cambodia and the policy options facing the government, civil society, and international partners for addressing the epidemic.

Methods Employed in the Cambodia Study

The methodology for carrying out this study has centered on three elements:

- projection of the course of the epidemic under different program scale-up scenarios;
- estimating the resources required for addressing the HIV/AIDS epidemic as it unfolds according to the different scenarios; and,
- assessing how the resources required in the future might be financed.

Six broad scenarios were developed to estimate future resource needs: "Current Coverage," "Best Coverage," "Hard Choice 1," "Hard Choice 2," "Structural Change" and "Worst Case."¹ These six scenarios are described briefly below:

Current Coverage: In this scenario, the current levels of coverage for prevention, care, treatment and mitigation services remain at current levels.

Best Coverage: This scenario assumes that Cambodia achieves universal access to key prevention, care and treatment, and support services by 2015 and continues at that level to 2031.

Hard Choice 1: Because of limited resources, it is assumed under this scenario that Cambodia focuses on scaling up only the prevention programs for the most at risk populations, such as sex workers, men having sex with men, and injecting drug users. Other interventions are assumed to remain at current coverage levels.

Hard Choice 2: This scenario is similar to Hard Choice 1. However, the Hard Choice 2 scenario includes an additional component: the Linked Response Program. The Linked Response Program is a model which currently is being expanded and which aims to improve the linkages of maternal and child services to the HIV Continuum of Care for pregnant women at the operational district level. This strategy aims to ensure that patients can receive comprehensive reproductive health and HIV/AIDS prevention, care, and treatment, while paying special attention to strengthening and

¹ These scenarios will be referred to afterwards by their names but without quotation marks.

scaling-up services for prevention of mother to child transmission (PMTCT).

Structural Change: This scenario focuses on interventions that can reduce vulnerability to HIV/AIDS and produce a more sustainable response. This includes programs to increase the coverage of mass media, access to primary education and empowering women.

Worst Case: The Worst Case scenario was developed to examine what would happen if some of the current interventions were scaled down. It is assumed in this scenario that care and treatment will remain at current levels of coverage but prevention programs are scaled-back.

Following these six scenarios, HIV/AIDS projections were made using the Goals model in Spectrum version 3.33 (released by the Futures Institute in April 2009). For this exercise, the data used was from the most recent epidemiologic, behavioral and demographic sources, with projections of further scale-up starting in 2010. Data required for the projections was collected from available national and international sources, including: the Cambodian Demographic and Health Survey (DHS) (2000 and 2005), The Sexually Transmitted Infections Survey of 2005 (STI 2005), and the Behavioral Sentinel Surveillance (BSS) Surveys (1997–2007). Regional or international default values were used for parameters that were not available specifically for Cambodia (e.g., HIV transmission rate).

By combining the demographic output generated by Spectrum's AIDS Impact Model (AIM), along with data on unit costs and assumptions about future levels of coverage, it was then possible to generate the Cambodia Resource Needs Model (RNM). The RNM estimates the costs of prevention related activities, care and treatment services, mitigation and policies, administration and program management, monitoring and evaluation (M&E) and operational research.

Once resource requirements were established, an evaluation was made of how those resources might be financed. The likely gap in finances was assessed under three separate assumptions—that international donors would scale back their financing to cover only 50% of resources needed by 2015, 2020, or 2025. The feasibility of the government's ability to make up for lost resources by increasing its financial commitment to the country's HIV/AIDS response was also examined.

Main Findings

Table 1 shows the projected number of new cases of HIV infections in 2031 under the six scenarios, as well as the number of cumulative infections that will occur between 2009 and 2031. If we assume that Cambodia maintains current levels of coverage (Current Coverage scenario), the number of new adult infections in Cambodia is projected to fall from about 2,100 cases in 2009 to about 1,500 cases in 2031. In the Best Coverage Scenario, where the maximum coverage rates are much higher than in the Current Coverage scenario, new HIV infections decline to a low of about 1,000 in 2031. In the Hard Choices 1 and 2 and Structural Change scenarios, the number of new infections falls between these two scenarios. In the Worst Case Scenario, new adult infections increase annually and reach about 3,800 in 2031, an increase of about 80% over 2009.

The underlying message of the epidemiological projections is critical. Even under the Best Coverage scenario, about 1,000 people will still become newly infected with HIV in 2031. In the Worst Case scenario, however, the number of new adult infections will reach almost 4 times the annual number of new adult infections under the Best Coverage scenario. Cumulatively, the number of new HIV infections between 2010 and 2031 could vary by more than 2.5 times, and may be as low as 14,100 in the Best Coverage scenario or as high as 36,700 in the Worst Case Scenario. Thus, the decisions made today in Cambodia will have a critical impact on the long-term course of Cambodia's epidemic.

While the number of new HIV infections does vary significantly, HIV prevalence is not likely to differ greatly under the 6 different scenarios. This is in part because those scenarios which increase prevention coverage also increase treatment coverage, and thus have countervailing impacts on the prevalence of HIV. The projections also indicate that even with high levels of ART coverage, the number of AIDS deaths will exceed the number of new HIV infections and that HIV prevalence will therefore continue to decline.

As also shown in Table 1, assumptions about how Cambodia responds to the epidemic over the next few years will also have dramatically different results in terms of the resources required to address HIV/AIDS. The most expensive scenario would be Best Coverage, at US\$114 million in 2031 and a total of US\$2.3 billion over the twenty-two years, 2009 to 2031. Even

assuming that Cambodia is able only to maintain its current level of coverage (Current Coverage scenario), the country would require about US\$63 million in 2031, or US\$1.4 billion between 2009 and 2031. There would be a \$900 million difference in costs between the Best Coverage scenario and the Current Coverage scenario over the period that was examined.

The way Cambodia allocates its resources will also have an impact on the overall cost-effectiveness of the country's approach. For example, as shown in Table 1, Cambodia's Hard Choice 1 and 2 scenarios would have the lowest cost per HIV infection averted, at between US\$5,000 and \$13,000/HIV infection averted. Conversely, the Best Coverage scenario would have the greatest impact but the lowest cost-effectiveness (US\$56,000/HIV infection averted). The reason for this difference in cost-effectiveness is that the Hard Choice 1 and 2 scenarios would involve focusing resources predominantly on the most cost-effective interventions, whereas the Best Coverage scenario would fully fund all interventions, regardless of their cost-effectiveness.

The Cambodian HIV/AIDS program today is largely financed with external assistance, which covers about 90% of program costs. Interviews with development partners revealed that external assistance for Cambodia's HIV/AIDS program will likely decline as a

proportion of all resources, although it was uncertain how quickly this reduction in assistance would occur.

With that in mind, we constructed three scenarios for development assistance for HIV/AIDS in the future. In each of the following three scenarios, it was assumed that donor assistance would decline from 90% to 50% of all HIV/AIDS resources, although the scenarios varied by how quickly that reduction would occur.

- **Optimistic Scenario**—donors gradually reduce financing for HIV/AIDS from 90% to 50% of the program between 2009 and 2025
- **Moderate Scenario**—donors reduce financing from 90% in 2009 to 50% in 2020
- **Pessimistic Scenario**—donors sharply reduce funding of the HIV/AIDS program from 90% in 2009 to 50% in 2015

The financial gap³ will vary significantly depending on how quickly donors scale-back and how quickly the Cambodian government is able to increase its own contributions. Without any additional resources from the Cambodian government, the annual gap would vary between US\$9 million (assuming donors scale-back gradually) and US\$21 million (assuming donors scale-back rapidly).

We then assessed the feasibility that the Cambodian government could fill these financial gaps. In particular,

Table 1: Comparison Between Different Scenarios, by Main Indicators

Indicators	Current Coverage	Best Coverage	Hard Choice 1	Hard Choice 2	Structural Change	Worst-case scenario
New HIV infections in 2031	1,543	988	1,471	1,397	1,214	3,739
Cumulative HIV infections (2010–2031)	27,540	14,117	18,619	18,258	23,765	36,746
Cost in 2015 (million \$)	61.5	100.6	64.4	66.9	79.9	59.1
Cost in 2031 (million \$)	63.0	114.0	65.6	67.8	87.8	55.3
Average cost per averted infection ²	Ref.	56,000	5,000	13,000	43,000	*

Note: *The Worst Case scenario does not prevent any new infections when compared with Current Coverage.

² The cost per averted infection was calculated by taking the different resource requirements for each scenario relative to the resources required under the current coverage scenario. This was divided by the difference of number of new HIV cases between each particular scenario and the current coverage scenario.

³ The financial gap referenced here is the largest single year difference between resources needed under Hard Choices #2 scenario and the resources available, assuming that donors scale back their contribution to 50% of all resources.

we examined the feasibility of government spending on HIV/AIDS, relative to all social spending, rising from 1.5% to 2.5%. This increase in government spending on HIV/AIDS would be adequate to meet the costs of the HIV/AIDS program (Hard Choice #2) if it occurred in conjunction with a slow scale-back of donor funds (development partners reduce their funding to 50% of all resources by 2025). In fact, this combination of events would eliminate any short or long-term gap in funding and would still allow the country to strive for universal access. However, this gradual scale-up of the Cambodian government's financial contribution is projected to be inadequate if development partners scale-back too rapidly (development partners reduce their funding to 50% of all resources by 2015). In other words, the long-term success of Cambodia's response depends greatly on the ability of the government and development partners to plan and manage their long-term allocation of resources.

Main Policy Recommendations

The implications of this review for Cambodia's policy makers include a number of key areas for action, as noted below.

First, Cambodia will need to focus investments on HIV/AIDS in those areas that are most cost-effective. This may lead to an approach similar to that of the Hard Choice scenarios, where the country has to carefully evaluate each intervention and reduce or eliminate those that are not substantially contributing to the overall national program in cost-effective ways.

Second, despite some considerable successes against HIV/AIDS in Cambodia, there remains substantial room

for improving program efficiency. Thus, it will be valuable for Cambodia to focus on a number of efficiency enhancing measures that could include, for example, integrating supervision and training; improving adherence to drug treatment and the quality of treatment; improving procurement and the logistics management of drugs, reagents, and consumables; leasing laboratory equipment, instead of buying it; and reducing unnecessary spending for administration and technical assistance.

Third, on the financing side, Cambodia will need to better manage the flow of external resources to its HIV/AIDS program; it will also need to significantly increase its own allocation to HIV/AIDS. This will require that the Cambodian government improve its long-range planning with its development partners, to minimize any impact associated with the withdrawal of external funds. At the same time, the government will have to increase its own domestic contributions to the HIV/AIDS program, probably by raising the share of social spending which is allocated to HIV/AIDS.

Finally, it is critical that Cambodia continues to periodically assess the cost-effectiveness of different possible interventions in its HIV/AIDS program, so that it can better set priorities and mobilize resources accordingly. This should be done with an eye towards ensuring that Cambodia in the long run is achieving the best possible outcomes, at the least cost, and that it has the financing to sustain its program. The failure to achieve these goals could put at risk Cambodia's remarkable progress to date against HIV/AIDS.

Background

HIV/AIDS is a long-term epidemic that will continue to require significant resources for prevention, care, and treatment. The nature and magnitude of those costs and how they can be financed, however, will depend on a number of factors. These include, among other things, epidemiological factors and trends, the policy choices made by government and development partners about addressing the epidemic, corresponding scale, coverage, and quality of interventions, and the availability of resources in the future from government, development partners, the private sector, civil society and individuals.

An international exercise, called *aids2031*, has been carried out by a consortium of partners to help assess the long run trajectory of HIV/AIDS, what can be done to reduce the number of new cases of HIV, and how countries will be able to finance the measures they need to address HIV/AIDS in the future at lower costs and in more effective, efficient, and sustainable ways than they do now. *aids2031* focuses on how the nature of the epidemic can be changed between now and 2031, fifty years after AIDS was first reported.

One of the nine *aids2031* working groups covers the costs and financing of the epidemic. This Working Group, led by Results for Development, focuses on modeling and analyzing the long term costs and financing of the epidemic and examining scenarios in which major policy shifts now can improve the future expenditure and financing situation. In this context, the Working Group's three main objectives are to:

- **Estimate the long term costs of HIV/AIDS**, given assumed trends in the epidemic and a range of prevention, treatment, and mitigation scenarios; and to explore how certain policy actions or other factors in the next few years might significantly raise or lower those long-run costs.
- **Use existing evidence to make recommendations in setting priorities for resource allocation** for future HIV/AIDS prevention, treatment, and mitigation activities. Given that future financial resources will inevitably be constrained, how can we use these funds in the most effective manner at the household, community and national levels? Are there ways in which efficiency can be substantially increased, so that we are able to avoid more infections and treat more people with the same amount of money?

- **Construct and evaluate scenarios for financing the global response to the AIDS epidemic between now and 2031**, which take into account existing spending patterns and the prospects for mobilizing resources from all possible sources—traditional and innovative, domestic and external, public and private.

The Costs and Financing Working Group has carried out these analyses at the global and regional levels. To complement these analyses, the *aids2031* Working Group also commissioned case studies in two developing countries, one in Africa (South Africa) and the other in Asia (Cambodia).

This study applies and validates at the national level the costing, priority-setting, and financial mobilization tools that have been developed. It is hoped that the study will add value for country stakeholders by helping them gain a better understanding of the future course of the epidemic and the policy options facing the government, civil society and development partners. The study was guided by a Steering Committee, whose members are shown in Annex 1.

Objectives

This exercise translates the objectives of the global review into the Cambodian context and has the following objectives:

- Estimate the long term costs of HIV/AIDS for Cambodia, given assumed trends in the epidemic and a range of prevention, treatment, and mitigation scenarios;
- Construct and evaluate scenarios for financing the response to the HIV/AIDS epidemic between now and 2031 in the Cambodian setting; and,
- Use existing evidence to make recommendations in setting priorities for resource allocation in Cambodia to address HIV/AIDS.

Methodology

The Scenarios

Six broad scenarios were developed to explore the financial and epidemiological consequences of different policy choices: Current Coverage, Best Coverage, Hard Choice 1, Hard Choice 2, Structural Change and Worst Case scenarios. The detailed assumptions that were used to develop these scenarios are given in Annex 2.

Current Coverage: In this scenario, the coverage of key interventions remains at the current level. That is, the current level of all prevention programs and care and treatment programs for AIDS patients in 2009 and 2010 will be maintained until 2031.

Best Coverage: This scenario assumes that Cambodia achieves universal access to key prevention, care and treatment, mitigation and support services by 2015 and continues at that level to 2031. “Universal access” means 90% coverage of ART among those in need and 50%, 70%, and 85% of prevention coverage among IDU, MSM and entertainment workers respectively. These figures were based on what was perceived as being feasible, given existing constraints in having target populations self-identify and accessing these services.

Hard Choice 1: Because of limited resources, it is assumed under this scenario that Cambodia focuses on scaling up only the prevention programs for the most at risk populations, such as commercial sex workers, men having sex with men, and injecting drug users. Other populations perceived to be at lower risk, such as general workers, would remain at current levels of coverage. Treatment coverage would achieve “Best Coverage” levels.

Hard Choice 2: This scenario is similar to Hard Choice 1 in that it focuses on high risk groups. However, the Hard Choice 2 scenario includes an additional component which focuses on lower risk populations: the Linked Response Program. The Linked Response Program is a model that has been applied in recent years with promising results. The Linked Response Program aims at improving the linkages of maternal and child services to the HIV Continuum of Care for pregnant women at the operational district levels. The objective of this program is to increase the coverage of HIV prevention, care and treatment and reproductive health, including maternal health and prevention of HIV transmission from mother to child services, by strengthening patients’ referrals and follow-up within and between community-based organizations and various facility-based services.

Structural Change: This scenario focuses on interventions that can reduce vulnerability to HIV/AIDS and produce a more sustainable response. This includes programs to increase the coverage of mass media, access to primary education and empowering women.

Worst Case: The Worst Case scenario was developed to examine what will happen if some of the current interventions are scaled down. While this may seem unrealistic, the reality of the current global financial crisis makes this scenario one that unfortunately needs to be considered. In this scenario, treatment coverage remains constant at current levels but prevention spending would decline. Interventions such as condom distribution, STI treatment, community mobilization and mass media would all need to be scaled back.

HIV/AIDS Projections

With the six scenarios, HIV/AIDS projections were made using the Goals model in Spectrum version 3.33 (released by Futures Institute in April 2009). For this exercise, the base year of coverage was set at 2010. Data required for the projections was collected from all validated sources, including the Cambodian Demographic and Health Survey (DHS) 2005, STI 2005 report, (STI 2005) and the Behavioral Sentinel Surveillance (BSS) Reports. For parameters that were not available, regional or international default values were used. One important piece of information required for the HIV projection is HIV prevalence among the general population. This data was documented by the National Center for HIV/AIDS Dermatology and STDs (NCHADS) in 2007. NCHADS projected HIV prevalence from 1980 to 2015 by using the Asian Epidemic Model (AEM) and the whole exercise was conducted by a group of local and international experts working in the field of HIV/AIDS in Cambodia. The AEM report is currently available at www.nchads.org.

HIV/AIDS Costing

Financial resources required for the HIV/AIDS program is the function of population in need, coverage, and unit cost, as discussed further below.

- **Population in need:** The output of the Spectrum and Goals models were used to estimate the total population in need of different services.
- **Coverage:** Each of the six scenarios present different levels of coverage for the various interventions.
- **Unit cost:** Unit costs were based on data from in-country published sources and default values were used where in country data were not available.

The demographic and epidemiologic outputs generated by AIM were then combined with information on

coverage and unit cost to populate the Resource Needs Model (RNM). The RNM was then used to estimate the resources needed for prevention related activities, care and treatment services, mitigation and policies, administration, M&E, management and research.

HIV/AIDS Financing

There were three major steps to this part of the exercise:

- Review the financing of HIV/AIDS in the past;
- Forecast resources available to finance HIV/AIDS programs in Cambodia between 2010 and 2031; and
- Examine how resources that could be available for HIV/AIDS in the future compare to the future costs of the Cambodian HIV/AIDS program.

For HIV/AIDS resources, two perspectives were looked at: domestic sources and external sources. To collect information on current and future resources available for the country's HIV/AIDS response, we interviewed NGOs (3), Government Ministries (5), Development Partners (7) and Private Companies (5).

In terms of forecasting financing for the HIV/AIDS program, it was also very important to examine what might happen to external financing, since it represents such a large share (90%) of the present financing of HIV/AIDS in Cambodia. Even taking account of the comments received from those interviewed, it was not possible to make well-founded estimates of the specific amount of donor assistance that might be available for HIV/AIDS in the future. However, the feedback from development partners provided a unanimous conclusion that this assistance will decline into the future, possibly at a very rapid pace.

Government expenditure represents the largest share of domestic resources. To forecast resources available to finance HIV/AIDS programs in Cambodia in the future, we carried out an analysis of "fiscal space." "Fiscal space," for the purpose of this analysis, is defined as government resources that could be made available to finance the HIV/AIDS program. The

discussion on private sources focused on other different potential sources of financing for HIV/AIDS, including insurance.

We explored three possible scenarios for a reduction in donor funding to Cambodia's HIV/AIDS response. Each of these scenarios, based on interviews with development partners, assumed a reduction in the proportion of all funds being provided by development partners, from 90% of all resources to 50%. What did vary in these scenarios was the speed at which development partners would scale-back their contributions.

- **Optimistic scenario:** donors would slowly reduce their financing as a proportion of all HIV/AIDS funding from 90% in 2009 to 50% by 2025;
- **Moderate scenario:** donors would gradually reduce their financing as a proportion of all HIV/AIDS funding from 90% in 2009 to 50% by 2020; and
- **Pessimistic scenario:** donors would rapidly reduce their financing as a proportion of all HIV/AIDS funding from 90% in 2009 to 50% by 2015.

For each of these scenarios, we then estimated the size of the gap that the government would face in the funding of the HIV/AIDS program, if government maintained the present share of total government expenditure that is allocated to the social sectors and the present share of the social sector budget that is allocated to HIV/AIDS.⁴

Finally, we estimated the gap again, taking into account the modifications of scaling up domestic spending on HIV/AIDS. We examined what the financing gap for Cambodia's HIV/AIDS program would look like if government increased its support of HIV/AIDS from 1.5% to 2.5% of social spending, with an assumption of GDP growth of 7%, and social spending going up proportional to any rise in GDP.

⁴ The gap analysis in this paper focuses predominantly on the ability of financing to cover the resources needed for the "Hard Choices #2" scenario. This scenario was selected because it was determined to be the most likely.

The Status of the Epidemic and the National Response

The Epidemiological Situation

Epidemiological data on HIV/AIDS in Cambodia are derived mainly from the HIV/AIDS Surveillance Program. This program has three major data sources: the HIV Sentinel Surveillance (HSS) Surveys, the Behavioral Surveillance (BSS) Surveys, and the Sexually Transmitted Diseases Surveillance (SSS) Surveys. The HSS was conducted to estimate HIV prevalence in different sentinel groups, and was used to monitor the trend of the epidemic and to provide guidance and evaluation of the intervention program. The BSS was also conducted to complement the HSS, because behavioral indicators can be used as one of the early indicators of successful intervention programs. Behavioral data were also used to perform consistency checks with the findings from the HSS. The SSS was used to monitor the success of the intervention program. STIs provide a useful biological marker of change in sexual behavior, because their relatively short duration reflects more current sexual activity than HIV does. High levels of STIs are therefore a warning system that high levels of sexual mixing are continuing, whereas lower rates of STIs may reflect improvement in the quality of STI care, better provision of services, or changes in risk behavior (UNAIDS and WHO Working Group, 2000).

HIV Sentinel Surveillance

To date, nine rounds of the HSS have been conducted with the latest being implemented in 2010. Initially, the program selected nine provinces as sentinel sites. Subsequently, the sentinel sites have been expanded from year to year, in an effort to achieve a representative sample for the entire country. The latest HSS results in 2006 showed that prevalence was highest

(14%) in brothel-based female sex workers (FSWs) and lowest (0.9%) among pregnant women attending ante-natal clinics (ANCs). Figure 1 shows the national trends of HIV prevalence for pregnant women from 1995 to 2006 after being adjusted for population size, quality control result and smoothed with Estimation Projection Packages (EPP).

Figure 2 shows the national trends of HIV prevalence among FSWs in two major age groups (under 20 years and 20 years or older) from 1998 to 2006. These groups are subdivided into two groups, because the under-20 year group provides a rough estimate of incidence. This is because this younger group has had sexual exposure for a limited number of years. There was a downward trend in each of these groups.

Behavioral Surveillance Survey (BSS)

By 2009 Cambodia had conducted seven rounds of BSS in the five major provinces: Phnom Penh, Sihanouk Ville, Battambang, Siem Reap, and Kampong Cham. The female risk groups included direct sex workers (SWs) and indirect sex workers (IDSWs) (beer promotion workers). Later on, karaoke women and beer garden staff were included in the BSS. The male group consisted of military personnel, police, and moto-taxi drivers.

Analysis of the trend of sexual risk behaviors in different sentinel groups provides a good picture of the change in the pattern of risk behaviors in Cambodia. Consistent condom use with different partners and numbers of partners was used as an indicator of behavior change, although many other variables are also included in the BSS system. Over the past years, reported consistent condom use has dramatically increased in both SWs and IDSWs prior to 2003 and remaining relatively flat

Figure 1: Estimated HIV Prevalence Among ANC Women, by ANC Location

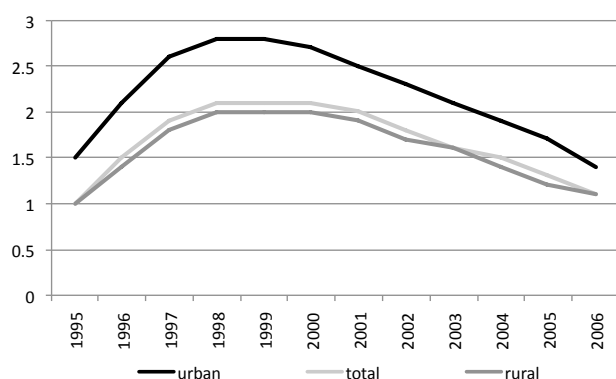
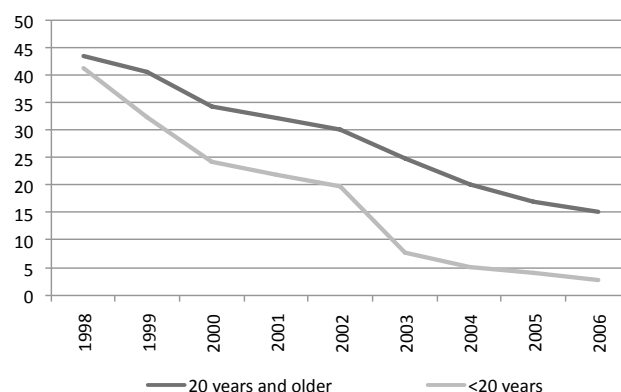


Figure 2: HIV Prevalence Among Different Age Groups of FSW, 1998–2006



thereafter. SWs reported a 124% increase in consistent condom use between 1997 (42%) and 2007 (94%), and IDSWs reported a steady upward trend, resulting in a 453% increase between 1997 (15%) and 2007 (83%) (NCHADS BSS 2007). The same pattern of behavior change has also been observed in the moto-taxi drivers (Figure 3).

HIV Incidence

The prevalence of HIV infection gives a snapshot of the magnitude of the disease burden for public health. However, HIV incidence, which is the proportion of people who acquire the disease over a given period of time, is the fundamental marker of the success or failure of programs aimed at preventing transmission. A study to estimate HIV incidence among HIV sentinel surveillance groups was conducted by testing all positive specimens in the HSS from 1999 to 2002 using a peptide-based capture enzyme immunoassay (IgG BED-CEIA) to determine the proportion of recent HIV infections. The same testing method was used to test the latest HSS positive specimens in 2006. Trend analysis showed that HIV incidence declined from 10.2% in 1999 to 1.7% in 2006 among FSWs. HIV incidence among pregnant women attending antenatal clinics also declined from 0.6% in 1999 to 0.17% in 2006 (Figure 4 and Figure 5).

Estimation and Projections

Starting in 1999, at the end of each round of HSS, NCHADS convened a consensus meeting to which both local and international experts have been invited. One of the objectives of the 2007 consensus meeting was to develop a mathematical model to estimate the number of current HIV infections among the general female and male populations in Cambodia. First, an

Figure 3: Prevalence of Consistent Condom Use with Sex Workers in the Last One Month, 1997–2007

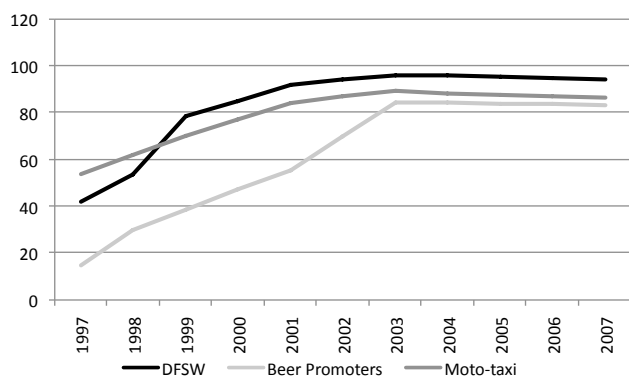
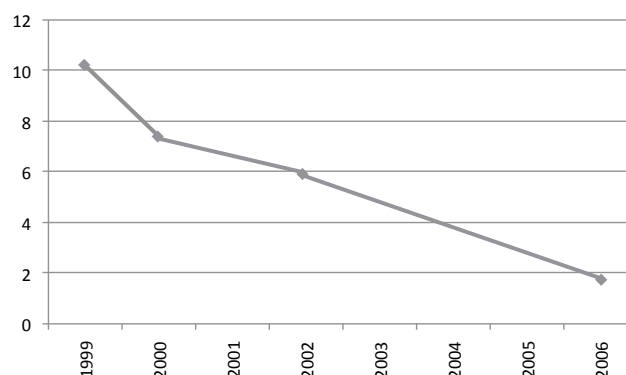


Figure 4: Incidence per 100 Person-Years Among Pregnant Women Attending Antenatal Clinics in Cambodia, 1999–2006



estimation of the annual national prevalence among pregnant women was performed with EPP. Second, national prevalence among pregnant women was adjusted downward to compensate for the overestimation of national prevalence among the general population of women. Third, the number of HIV infections during that year was estimated to be the product of the total general population of women in that year and the estimated prevalence in this group. The male-to-female ratios of HIV prevalence were derived from the tuberculosis clinic data, with a two year lead time, which were applied to the general population female estimates to derive an estimated HIV prevalence curve among the general population of men aged 15–49 in Cambodia. This method estimated that in 2006, there were 65,000 people aged 15–49 years of age living with HIV/AIDS (PLHA) in Cambodia, an overall prevalence of 0.9% among that population (Figure 6).

The Asian Epidemic Model (AEM) was then used to derive estimates of HIV prevalence in the future. Figure

Figure 5: Incidence per 100 Person-Years Among Female Sex Workers in Cambodia, 1999–2006

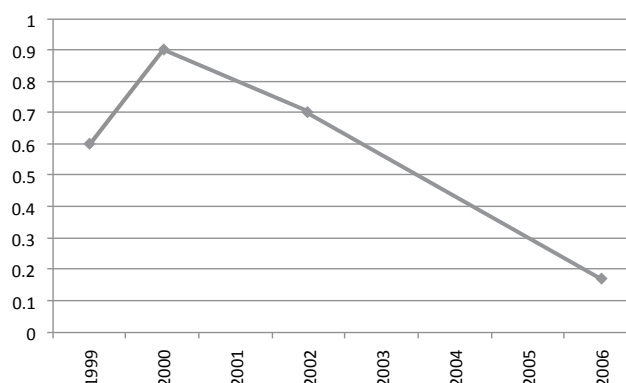
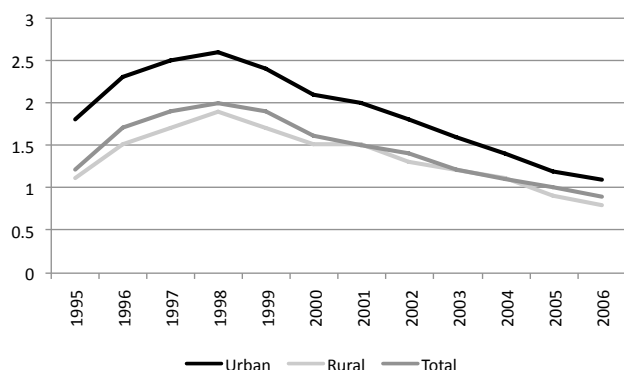


Figure 6: Estimated Prevalence of HIV Infection among Persons Aged 15–49, by Urban or Rural Locations in Cambodia, 1995–2006



7 shows HIV prevalence among persons aged 15–49 years. It is projected that HIV prevalence among the general population aged 15–49 will continue along the current trend and will gradually decline and reach 0.6% in 2012. This slow decline is due in part to the increase of the survival rate of PLHA due to increased access to ART. These projections assume no significant increase or decrease in HIV/AIDS funding and coverage levels.

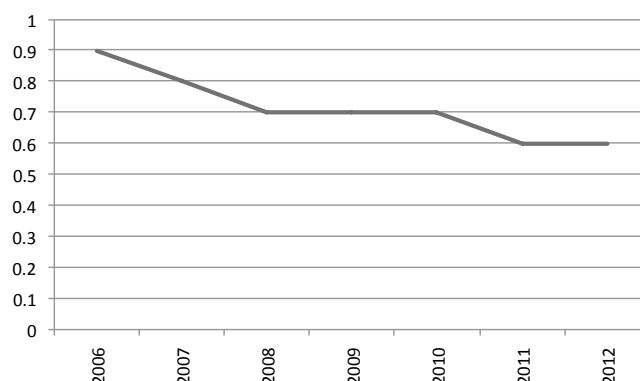
Using the prevalence estimates projected by AEM, it was next possible to project the number of people living with HIV from 2006 to 2012 (Figure 8). As the graphic shows, the number of people living with HIV was projected to decline from 67,200 in 2006 to 51,200 in 2012.

The National Response and Lessons Learned

Organizational Structure and Management

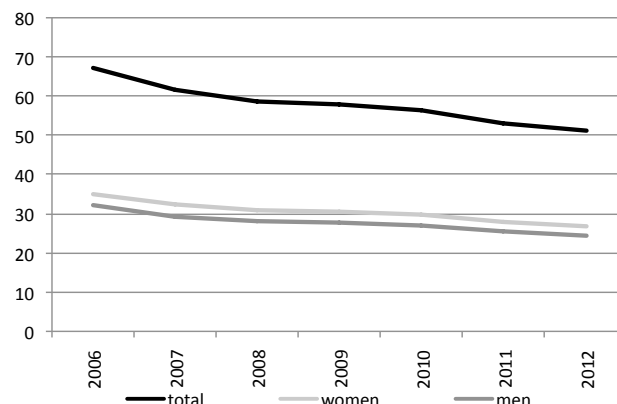
The Royal Government of Cambodia first established the National AIDS Committee (NAC) in 1993. The NAC originally consisted of the ministers from 12 ministries and the vice-governors of provinces, cities, and the Phnom Penh Municipality. The NAC has the responsibility of developing and implementing preventive measures and guiding the Royal Government of Cambodia concerning HIV/AIDS issues. A secretariat to the NAC was also established, which consisted of members of the Ministry of Health. The role of the secretariat was to conduct HIV/AIDS activities and to cooperate with WHO and other international organizations providing financial and technical support. The secretariat was chaired by the Undersecretary of Health (NAC, 1993).

Figure 7: AEM-projected Prevalence of HIV Infection Among the General Population Aged 15–49 Years from 2006–2012 (with ART Available)



Early in the HIV epidemic in Cambodia, the Ministry of Health made a strong political commitment to the prevention of HIV/AIDS and the care of People Living with HIV/AIDS (PLHA). The unit within the ministry responsible for implementing the health sector response to HIV/AIDS prevention and care changed names over time. From 1993 to 1997 the unit was called the National AIDS Program. Since 1998, this unit has been called the National Center for HIV/AIDS, Dermatology and STDs, or NCHADS (NAC, 1993). In 1999 the National AIDS Authority (NAA) was created and was mandated to be responsible for coordination of the government's expanded approach to the epidemic across all sectors. The NAA works with a Policy Board made up of the secretaries of state from 12 line ministries. A Technical Board is responsible for overseeing the implementation of HIV/AIDS programs and policies. At the provincial level, the NAA supports Provincial AIDS Committees, which serve as

Figure 8: AEM-projected Number of People Aged 15+ Living with HIV/AIDS in Cambodia, 2006–2012 (thousands)



policy-setting groups and are chaired by the provincial governors (NCHADS, 2000b).

The National HIV/AIDS and STI Strategic Plan

Since the establishment of the National AIDS Program in 1993 and its upgrade to being NCHADS in 1998, the center has developed five consecutive HIV/AIDS national strategic plans: the 1993–1998 Comprehensive National Plan for AIDS Prevention and Control in Cambodia (NCHADS, 1993); the 1998–2000 National Strategic Plan for STD/HIV/AIDS Prevention and Care in Cambodia (NCHADS, 1998b); the 2001–2005 Strategic Plan for HIV/AIDS and STI Prevention and Care in Cambodia (NCHADS, 2000b); the 2004–2007 Strategic plan for STI/AIDS and prevention and care in health sector; and, the 2008–2010 Strategic Plan for STI/HIV/AIDS prevention and care in the Health Sector, Cambodia.

Each subsequent plan reflected the changing focus of interventions over time, according to the stage of the HIV/AIDS epidemic in Cambodia. For example, the first strategic plan (1993–1998) emphasized prevention measures such as health education for the high-risk and general populations, condom promotion, prevention of transmission through blood transfusion, and surveillance. A major emphasis was to convince people to recognize the epidemic and to increase their awareness of the need to implement prevention measures. The second strategic plan (1998–2000) added voluntary testing and counseling. The third and fourth strategic plans (2001–2007) added care and treatment of PLHA. The fifth strategic plan expanded the HIV/AIDS care and treatment program to link it to other components of the health sector such as maternal and child health and tuberculosis so that it could contribute to overall health system strengthening in Cambodia, through the “Linked Response Program,” which was discussed earlier and is also discussed further below.

Major Lessons Learned

100% Condom Use Program (CUP)

The 100% CUP, based on the model successfully implemented in Thailand, was piloted in Cambodia in 1998. Since then, this program has been expanded nationwide (to 22 of 24 provinces), requiring consistent condom use with all clients at brothels and for all types of commercial sex. The key elements of the Cambodia 100% CUP include involvement and commitment by a

wide range of stakeholders including: policymakers, local government officials, owners of sex establishments and NGOs. The program also includes an outreach program, peer education, regular mapping of sex establishments, regular examinations and free STI care and treatment for sex workers, ensuring availability and accessibility of condoms and monitoring condom use. Reliable data from Thailand and Cambodia demonstrate a decline of STIs and HIV prevalence among sex workers after implementation of these programs (Rojanapithayakorn, 1996; World Health Organization/Western Pacific Region, 2001; Regional Office for the Western Pacific & NCHADS, 2001). Since launching the 100% CUP in 1998 in Cambodia, the incidence of syphilis has declined from 9% in 1998 to 1.8% in 2000 among sex workers in Sihanouk Ville (one of the first 100% CUP pilot sites in Cambodia) and trichomoniasis from 2% to 0.9%, concurrent with an increase in condom use from 53% to 96%. However, one of the limitations of the 100% CUP is the lower coverage of the indirect sex workers (karaoke workers, beer promotion girls, masseuses, etc.), a large group of women who have not been subject to the regulatory aspect of the program. This issue has been raised in many reports (Lowe, 2003; O'Reilly et al., 2003; NCHADS, 2003). According to the NCHADS outreach program, 50% of the estimated 20,000 sex workers in Cambodia are indirect sex workers (NCHADS, 2002b). More innovative strategies need to be implemented to reach this group.

Surveillance Program

Cambodia is among the few developing countries that has an effective surveillance system, including HIV Sentinel Surveillance, Behavioral Sentinel Surveillance, and STI Sentinel Surveillance (Walker et al., 2000). Data from biological and behavioral surveillance have been very useful for program monitoring, planning, and intervention. Data from the HSS and BSS have been used to monitor and evaluate the intervention programs (health education program to high-risk populations, STI services, 100% CUP) that NCHADS and other organizations have implemented. Using predictions based on HSS and BSS data, NCHADS was able to plan for the expected increasing burden of HIV/AIDS in subsequent years. The surveillance program conducted by NCHADS has played a very important role in resource mobilization by the Cambodian government, donors, multilateral agencies, and NGOs.

Continuum of Care Program

As indicated in the third version of the Cambodia National Strategic Plan (2001–2005) and the Midterm Assessment of this National Strategic Plan in July 2003, care for PLHA has become a priority. Although the country has experienced a decline in both prevalence and incidence among high-risk populations (e.g., MSM, IDU, DU), a large number of HIV infected adults and children have developed AIDS symptoms, resulting in an increasing burden upon the already overtaxed health care system.

According to an NCHADS estimate, there were about 33,500 AIDS patients in need of Antiretroviral Therapy (ART) in 2009 and by October 2009, 93% of them received ART through the national Continuum of Care (CoC) program. The Continuum of Care, including voluntary confidential counseling and testing, institutional care (opportunistic infections, tuberculosis, and antiretroviral drugs), and home-based and community care, has grown significantly since its establishment. The number of counseling-and-testing sites has increased from 5 in 1997 to about 235 by October of 2009. Home-based care was first introduced in Cambodia in 1997, initiated by WHO in Phnom Penh. It has now been increased to 375 home-based care teams in 20 provinces and cities supported by both the government and NGOs. Home-based care was developed to provide HIV/AIDS care services, which reduces the burden on public health care facilities and provides a broad package of medical, psychological, and social support services to PLHA and their families.

Linked Response Program

Having recognized several potential benefits of enhanced collaboration within the health system, the Ministry of Health developed a strategy to improve patients' care through teamwork and coordination. A Standard Operating Procedure (SOP) for the Linked Response (LR) for Prevention, Care and Treatment of

HIV/AIDS and Sexual and Reproductive Health Issues was developed by the National Center for HIV/AIDS, Dermatology and STI (NCHADS), and The National Maternal and Child Health Center (NMCHC), in consultation with partners and civil society organizations. The SOP was officially endorsed by the Ministry of Health on 19 December 2007.

The Linked Response Program is a strategy implemented at district level to increase the coverage of HIV prevention, care and treatment, and reproductive health, including maternal health and PMTCT services, by strengthening patients' referrals and follow-up within and between community-based organizations and various facility-based services. This strategy aims to ensure that patients can receive comprehensive reproductive health and HIV/AIDS prevention, care, and treatment, while paying special attention in its initial phases to strengthening and scaling-up services for prevention of mother to child transmission (PMTCT).

Through the Linked Response Program, HIV prevention and education and testing at ANC are made available at all facilities; ARV prophylaxis services are expanded; ART is facilitated for women who need it; and, safe delivery services are made available closer to their home. In addition, their HIV-exposed infant(s) are closely followed-up, early infant diagnosis (using DNA PCR) is performed, and pediatric AIDS care services are ensured. Referral and follow-up between facilities at the local, district and provincial level, strengthened referral mechanisms within and between community-based support services, and improved connections between civil society organizations and health facilities each support the provision of services.

The MoH and its partners began a Linked Response demonstration project in two provinces in 2008 (Prey Veng and Takeo). This program has now been expanded to 11 provinces in the country.

Epidemic Trends and Resource Requirements

Introduction to Epidemic Trends and Resource Requirements

This section examines the future course of the epidemic and resource requirements to address it. As discussed earlier, it reviews epidemiological projections that were made using the six scenarios that were constructed for this exercise. It then looks at the costs of each scenario, the distribution of costs and the cost-effectiveness of the scenarios.

Current Coverage Scenario

The Current Coverage scenario is a scenario representing the continuation of the current level of response toward HIV/AIDS in Cambodia. That is, the current level of all prevention programs and care and treatment programs for persons living with HIV/AIDS in 2009 and 2010 will be maintained until 2031.

With all assumptions shown in Annex 3, the Goals model generates a trend of HIV prevalence among the general population from 1987 to year 2031 (Figure 9). It has been found that the HIV prevalence will decline from about 1% in 2006 (it was 0.9% in AEM projection in 2007) to about 0.4% in 2031.

The Goals model also showed that the number of new HIV cases in this scenario would also decrease (Figure 10). The percent drop of the new HIV cases in 2031 compared to its peak is about 90%. In other words, the number of new HIV infections in 2031 (1,543) is only

Figure 9: HIV Prevalence in the Current Coverage Scenario Generated by the Goals Model (thousands)

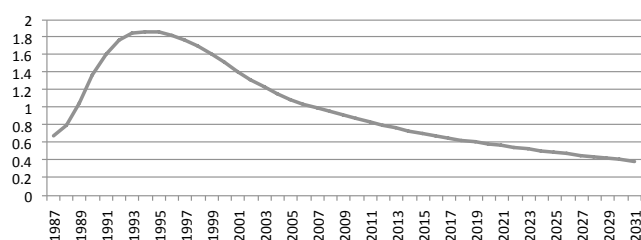


Figure 10: New Cases of HIV Infection in the Current Coverage Scenario Generated by the Goals Model (thousands)

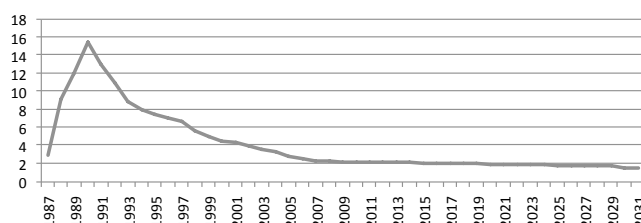


Figure 11: HIV Prevalence in the Best Coverage Scenario Generated by the Goals Model (thousands)

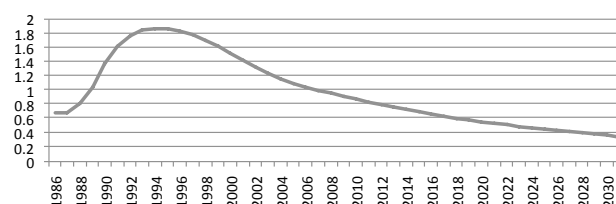
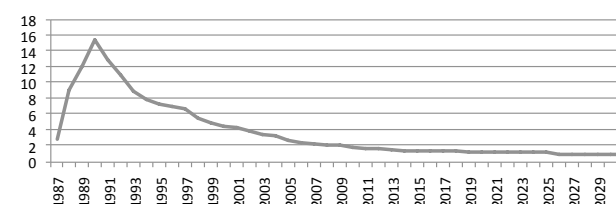


Figure 12: New Cases of HIV in the Best Coverage Scenario Generated by the Goals Model (thousands)



about 10% of the number of new HIV infections at the epidemic's peak (15,475 in 1990).

Best Coverage Scenario

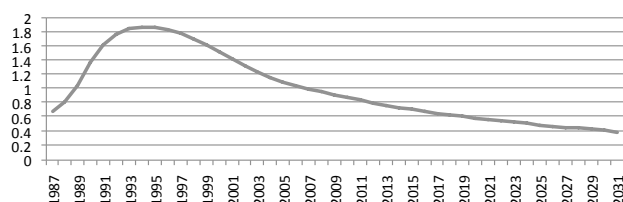
As the name suggests, the Best Coverage scenario represents a scenario in which Cambodia reaches its universal access targets for HIV/AIDS prevention, treatment and mitigation. This target is assumed to be achieved by 2015, with universal access being maintained thereafter. This is the most ambitious scenario analyzed in this paper.

Under this scenario, HIV prevalence is projected to drop to only 0.3% in 2031 (Figure 11). It is worth noting that even in this Best Coverage scenario, HIV prevalence would not be completely eliminated. This is due in part to the fact that universal access to treatment will keep those who are infected alive for an extended period of time.

Although the final prevalence of HIV generated by the Best Coverage scenario is not very different from the Current Coverage scenario (0.3% vs. 0.4% in 2031), the numbers of new HIV cases within these scenarios are significantly different. The number of new HIV infections in 2031 would be 36% lower in the Best Coverage scenario than in the Current Coverage scenario, with 1,543 new HIV infections vs. 988 new HIV infections in 2031 (Figure 12).

Hard Choice 1 Scenario or "Targeted Interventions Only"

The Hard Choice 1 scenario was set up to examine what the HIV/AIDS epidemic will look like if the coverage of

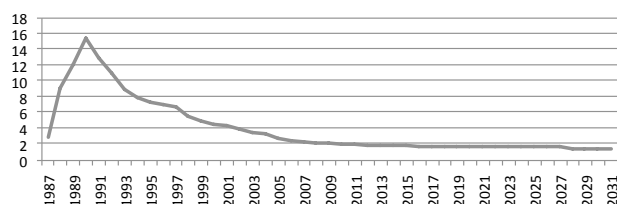
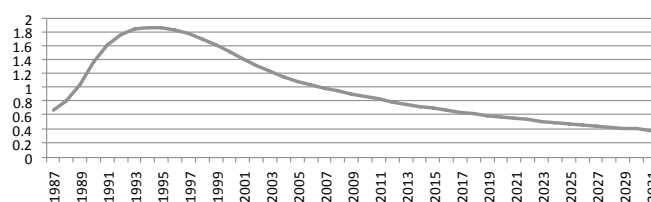
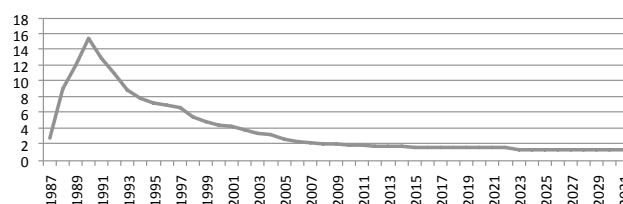
Figure 13: HIV Prevalence in the Hard Choice 1 Scenario Generated by the Goals Model (thousands)

interventions for high-risk groups would be increased, while maintaining current program coverage for other low- and medium-risk groups (Figure 13). HIV prevalence for the Hard Choice 1 scenario is not different from the prevalence generated for the Current Coverage scenario.

While HIV prevalence is not different between the Current Coverage and the Hard Choice 1 scenario, there is a significant difference in the projected number of new HIV infections (Figure 14: Trend of New Cases of HIV in the Hard Choice 1 Scenario, Generated by the Goals Model). Hard Choice 1 reduces new HIV infections in 2031 from 1,543 (Current Coverage) to 1,471. This is not as significant an impact, however, as the number of new HIV infections under Best Coverage (988).

Hard Choice 2 Scenario

The second Hard Choice scenario is similar to the Hard Choice 1 scenario. However, Hard Choice 2 includes an additional component—the Linked Response program. As noted earlier, the Linked Response program is a proposed model which aims at improving the linkages of services, especially for pregnant women, at the operational district levels. The introduction of the Linked Response program will result in an increase of the coverage of mother to child transmission programs, since mothers who come for their antenatal care will be tested for HIV and if they are positive, they will be referred to appropriate HIV/AIDS care and treatment.

Figure 14: New Cases of HIV in the Hard Choice 1 Scenario, Generated by the Goals Model (thousands)**Figure 15: HIV Prevalence in the Hard Choice 2 Scenario Generated by the Goals Model (thousands)****Figure 16: New Cases of HIV in the Hard Choice 2 Scenario Generated by the Goals Model (thousands)**

Based on the projection model, HIV prevalence generated by the Hard Choice 2 scenario is not different from that generated by the Hard Choice 1 scenario (Figure 15). For example, the HIV prevalence among the general population in Cambodia in 2031 in the Hard Choice 2 scenario is about 0.4%.

In terms of HIV incidence, however, the number of new cases projected in the Hard Choice 2 scenario is lower than that of the Hard Choice 1 scenario (Figure 16). Hard Choice 2 reduces the number of new HIV infections in 2031 (1,397) relative to the Current Coverage scenario (1,543) and the Hard Choice 1 scenario (1,471), but does not reduce it as much as in the Best Coverage scenario (988).

Structural Change Scenario

This scenario is an exploratory scenario for the response to HIV/AIDS. This scenario focuses more on increasing the coverage of mass media, access to primary education and empowering women. Actually, the Goals

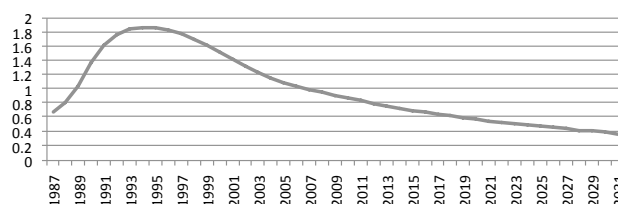
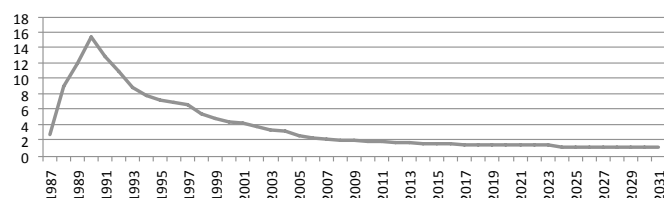
Figure 17: HIV Prevalence in the Structural Change Scenario Generated by the Goals Model (thousands)

Figure 18: New HIV Cases in the Structural Change Scenario Generated by the Goals Model (thousands)



model does not explicitly include any parameters on empowering women. However, we translated the action of empowering women into an effect on HIV/AIDS prevention by assuming that empowering women will contribute to an increase of condom use among low-risk groups or among spousal relationships. Again, a higher percentage of condom use will result in lower STI prevalence among all risk groups. The trend of HIV prevalence in the Structural Change scenario is not very different from previous scenarios (Figure 17).

While there is no reduction in HIV prevalence, there is an overall reduction in the number of new HIV infections (Figure 18). In this case the number of new HIV infections in 2031 (1,214) is projected to be lower than in Current Coverage (1,543), Hard Choice 1 (1,471) or Hard Choice 2 (1,397), although the impact is less than in Best Coverage (988).

Worst Case Scenario

The Worst Case scenario was developed to explore what would happen if some of the current interventions were scaled down from current levels of coverage. However, it is assumed in this Worst Case scenario that care and treatment will be similar to that in the Current Coverage scenario.

From the output of the Goals model, although the coverage of most intervention programs will drop, we can see that prevalence will go down very slowly from 0.9% in 2009 to 0.5% 2009 to 2031 (Figure 19).

Figure 19: HIV Prevalence in the Worst Case Scenario Generated by the Goals Model (thousands)

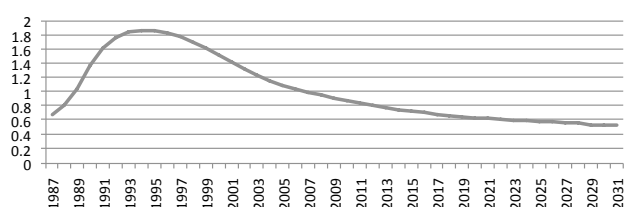
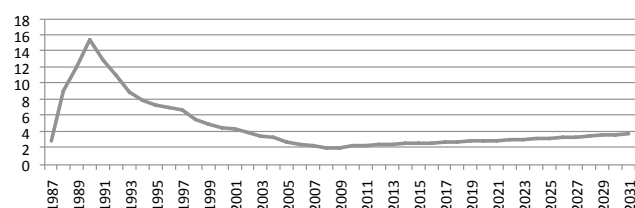


Figure 20: New HIV Infections in the Worst Case Scenario Generated by the Goals Model (thousands)



However, there is a completely different picture if we look at the incidence trend. The model projects that the number of new HIV cases will start increasing as soon as the level of coverage of the prevention interventions starts to drop (Figure 20).

Total Cost for the HIV/AIDS Program

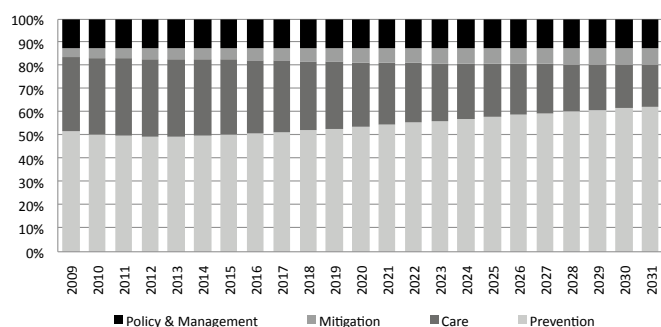
As shown in Table 2, in terms of total budget need for the HIV/AIDS program, the most expensive of the five proposed scenarios is the Best Coverage scenario.⁶ For example, under the Best Coverage scenario, Cambodia would need more than US\$100 million in 2015 for its HIV/AIDS program and this amount would increase up to US\$114 million by the year 2031. However, in order to maintain current levels of coverage, the country would need only US\$61.5 million in 2015, rising to only US\$63 million by 2031.⁷ The differences in cumulative costs across scenarios are substantial, with as little as US\$1.3 billion and as much as US\$2.3 billion being required over these 23 years.

Table 2: Estimates of Total Costs of the HIV/AIDS Program by Year under Selected Scenarios (in USMillions)

	2009	2015	2031	Cumulative
Current Coverage	53.7	61.5	63.0	1,400.0
Best Coverage	53.7	100.6	114.0	2,261.3
Hard Choices #1	53.7	64.4	65.6	1,460.1
Hard Choices #2	53.7	66.9	67.8	1,506.1
Structural Change	53.7	79.9	87.8	1,811.7
Worst Case	53.7	59.1	55.3	1,304.1

⁶ The cost analysis does not include an assessment of resources required under the Worst Case scenario, as it was uncertain which programmatic areas would be reduced or eliminated if there was a significant reduction from current levels of resources.

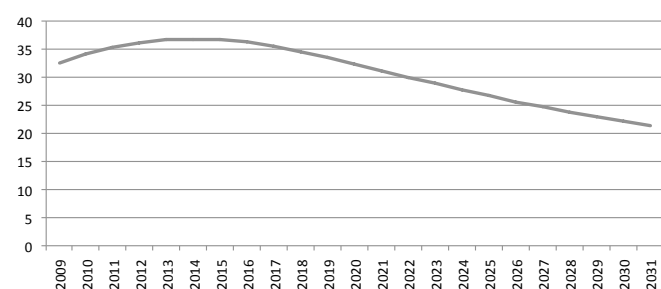
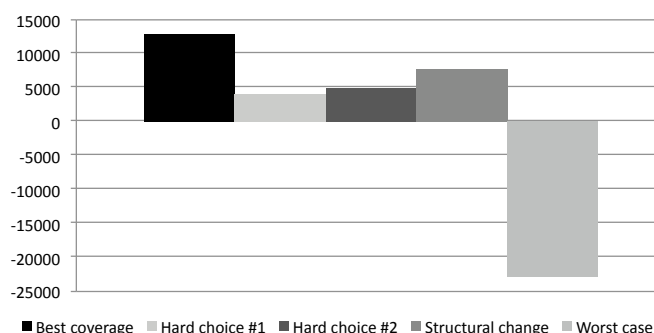
⁷ Note that all the cost figures shown are in current (2010) US dollars, and therefore the projected costs are not adjusted for inflation. The reason for this was that the introduction of inflation would create a significant level of long-term uncertainty unrelated to the actual resource requirements.

Figure 21: Hard Choice 2 Spending by Categories

Total Cost for Prevention and Care/Treatment Programs

When looking specifically into prevention and care/treatment, the cost for prevention is higher than the cost allocated for care/ treatment in all scenarios. Figure 21 demonstrates how costs are projected to change on prevention, care/treatment, mitigation and policy over time under the Hard Choices #2 scenario. While prevention resources are projected to rise as a proportion of all spending (from 52% in 2009 to 62% in 2031), care and treatment services decline as a proportional of all spending over time (from 32% in 2009 to 18% in 2031).

As illustrated in Figure 22, the number of people receiving treatment is projected to increase over the next 5 years. However, given that current levels of ART coverage are already quite high, the additional number of people being placed on treatment is not likely to be significant. In subsequent years the number of people receiving treatment is projected to decline, as treatment failure and death are projected to exceed the number of new people needing treatment. Such a decline is significantly different from what is being observed in places such as South Africa, where the number of persons requiring treatment is projected to increase radically into the future.

Figure 22: Hard Choice 2 Number of People Receiving Treatment (thousands)**Figure 23: Cumulative Number of Averted Infections by Different Scenario (Current Coverage vs. Each Scenario)**

Averted HIV Infections by Different Scenarios

In terms of the number of new HIV infections averted, if Current Coverage is used as the baseline, then the Best Coverage scenario has the highest number of cumulative averted infections. However, the “Best Coverage” scenario can only be pursued if there are adequate resources. If there are not sufficient resources, it may be necessary to identify a strategy that is less costly but still effective (Figure 23). As this figure shows, the “Worst Case” scenario could have devastating consequences, with almost 23,000 additional infections occurring relative to the “Current Coverage” scenario.

Summary

Table 3 summarizes the costs and impacts of the different scenarios discussed. Of the six different possible scenarios previously identified, the “Best Coverage” represents the most effective response overall. However, the “Best Coverage” scenario is also the most expensive, requiring that spending increase to US\$114 million by 2031. On the one hand, the “Best Coverage” scenario may represent a feasible scale-up of resources, as it would give the government two decades to double the country’s HIV and AIDS resources (funding for Cambodia’s response increased 6-fold between 2001 and 2007). Nonetheless, as already indicated, Cambodia is currently facing severe limits on its access to international funds and is likely to observe further cuts in the future. In addition, there are needs for additional financing for cost-effective investments in other health areas, such as nutrition and child health. Thus, if international donors do begin to rapidly and significantly scale-back their contributions to the country’s HIV/AIDS

response, Cambodia could potentially face the prospect of significantly reducing both its treatment and prevention programs. If, as we predict, Cambodia's HIV/AIDS program does face a more limited financial future, it will be necessary to look towards scenarios that would involve more careful setting of priorities and making difficult decisions about what should and should not be funded into the future. Of course, there are many reasons why Cambodia should focus on maximizing the value of all HIV/AIDS expenditures, in any case.

The "Worst Case" scenario would assume essentially "flat-line" funding for the next two decades. Because the demand for services is expected to continue to grow, this scenario would represent a drop in coverage. As previously discussed, this scenario would be the least desirable option to consider, as it is projected that this would lead to a rise in new HIV infections and less treatment.

The "Current Coverage" scenario would involve only a small increase in HIV/AIDS funding (from US\$52 million in 2008 to US\$63 million in 2031). However, both "Hard Choices" scenarios are preferable, as they require comparable levels of funding (US\$66–\$68 million by 2031) with a greater impact on the epidemic (both in terms of infections averted and persons receiving treatment).

In summary, Cambodia clearly would like to achieve the Best Coverage scenario, as this would minimize the number of new HIV infections (bringing new HIV infections in 2031 to less than 1,000 and reducing HIV prevalence to only 0.3%) and would assure universal access to prevention, care/treatment and mitigation programs. However, to assure the achievement of this Best Coverage scenario, it would be necessary for the country to more than double in real terms its available

resources over the next two decades. While generating \$114 million to achieve this scenario would clearly be the most desirable, it does represent a significant increase in resources that may not be achievable.

On the other hand, the Worst Case scenario would represent a troubling reversal of the epidemic in Cambodia. New HIV infections would jump to over 3,800 in 2031. Cambodia would need to abandon its effort to achieve universal access and there would be no further increase in ARV coverage. Clearly this scenario represents a dire future for Cambodia and its response to HIV and AIDS.

The Current Coverage scenario is also an unattractive option for Cambodia, since it suggests that the country would not make any progress over the next two decades. This scenario also means that the country would not improve on its allocation of resources, thus implying that its resources would not be spent more cost-effectively over time.

In the case of Hard Choice 1, Hard Choice 2 and Structural Change, resources would still need to be expanded (albeit modestly), but they would be allocated in a much better way. These three interventions are also projected to be the most cost-effective strategies for dealing with HIV and AIDS in the future. In the case of Hard Choices 1, resources would be focused predominantly on treatment and on those prevention programs which are most likely to reach those populations at highest risk (FSW and their clients, MSM and IDU). Hard Choices 2 would expand upon this approach, linking the response to include a greater focus on women who are already being reached through antenatal services. Finally, the Structural Change scenario would focus more on longer-term changes in behavior norms.

Table 3: Comparison Between Different Scenarios, by Main Indicators

Indicators	Current Coverage	Best Coverage	Hard Choice 1	Hard Choice 2	Structural Change	Worst-case scenario
New HIV infections in 2031	1,543	988	1,471	1,397	1,214	3,739
Cumulative HIV infections (2010–2031)	27,540	14,117	18,619	18,258	23,765	36,746
Cost in 2015 (million \$)	61.5	100.6	64.4	66.9	79.9	59.1
Cost in 2031 (million \$)	63.0	114.0	65.6	67.8	87.8	55.3
Average cost per averted infection (million \$)	Ref.	56,000	5,000	13,000	43,000	*

Note: *the Worst Case Scenario does not prevent new infections when compared with Current Coverage.

V. Financing and Fiscal Space for HIV/AIDS over the Longer Term

Introduction to Fiscal Space Analysis

Fiscal space is defined as “room in a government’s budget that allows it to provide resources for a desired purpose without jeopardizing the sustainability of its financial position or the stability of the economy.” The fiscal space with which one is concerned for this report is influenced by assumptions regarding the level of resources required to properly address HIV/AIDS, as well as the potential sources of such resources.

Fiscal space analysis is critical at this point because Cambodia is facing both an increasing demand for resources and a decreasing willingness on the part of international donors to fund Cambodia’s HIV/AIDS program. The feasibility of each combination of scenarios depends in part on: the ambitiousness of the country’s response to HIV/AIDS, the effectiveness of the resources in addressing the country’s epidemic, and the commitment of the country to devote its limited resources to the country’s response.

Economic Performance and Long-Term Economic Forecast for Cambodia

To understand the future prospects for financing HIV/AIDS efforts and to project the availability of resources for HIV/AIDS in the future, it is valuable to get a brief overview of the Cambodian economy and its progress over the last few decades. During this period, Cambodia has progressed through four defined periods of economic change:

- restoration and rehabilitation (1993–1998)
- investment in the economic foundation (1999–2003)
- high growth (2004–2008)
- slow growth (2009–Current)

During the restoration and rehabilitation phase, Cambodia was both at peace and at war. Fighting with the Khmer Rouge continued. The national budget allocated to defense and security was three times higher than that for social spending. A new public financial management system was introduced together with a new law on taxation. However, there was a very serious macroeconomic imbalance. The budget deficit was financed by national sources, official development assistance (ODA) and the inflow of foreign direct investment (FDI). Inflation was reigned in from 121% in 1991 to -0.7% in 1993. Despite many

setbacks, economic growth during 1994–1998 averaged 6.3%. The high performing sectors at that time were forest, rubber, utilities, public administration and banking.

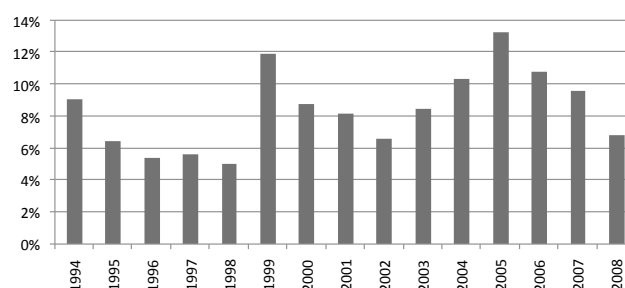
Between 1993 and 2003, the Royal Government of Cambodia (RGC) introduced the Triangular Strategy involving the: (i) restoration of peace and security; (ii) integration of Cambodia into the region and the world; and (iii) promotion of socio-economic development. Cambodia embarked on wide-ranging reforms, by focusing on macroeconomic management, public financial management and financial sector reforms, and rehabilitation and reconstruction of physical infrastructure, especially the national road network. Economic growth during 1999–2003 averaged 8.8%. The high performing sectors were rice and cash crop production, utilities, construction, tourism, telecommunications and transportation and real estate.

During the period of high growth, Cambodia’s economy grew by an average of about 10% per year. Economic growth was led by the rapidly growing banking sector and FDI inflows. The high performing sectors were rice and cash crops, mining, textiles, utilities, construction, tourism, telecom and transportation, finance and real estate.

Between 1993 and 2008 Cambodia’s per capita GDP more than tripled from US\$229 to US\$739. However, economic growth has been much slower since then (Figure 24)

For example, in 2009 the economy was estimated to have grown by only 2.1% and economic growth is projected to be only 3% in 2010. Nonetheless, according to the government’s projections, Cambodia is expected to maintain a growth rate of 7 per cent in the medium and longer term.

Figure 24: Cambodia’s Economic Growth 1994–2008



Source: MEF 2009

Current Health Financing

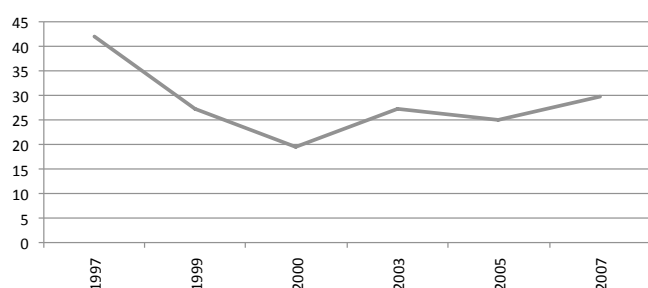
To assess the “fiscal space” for financing HIV and AIDS and how the future costs of the HIV/AIDS program will be financed, it is also important to briefly examine recent trends in health sector expenditure.

The Cambodian health sector remains heavily reliant on out-of-pocket expenditures, which account for 63% of all health care spending (down from 72% in 2000). Per capita out-of-pocket health spending declined between 1997 and 2000, but actually increased again between 2000 and 2007 (Figure 25). Cambodia's 2005 DHS Survey found that of those who had been sick in the previous month, 48% sought care in the private sector, 21% went to the non-medical sector and only 22% went to the public sector (the remaining 9% reported that they did not seek any treatment).

Despite the relatively small reliance on the public sector, there has been a trend towards greater public sector financing of the health sector. The government's spending on health out of the total public expenditures has risen rapidly, from only 8% in 2000 to over 13% in 2007. Between 2000 and 2007, the Cambodian government tripled its spending on health, from US\$26.6 million to US\$85.4 million.

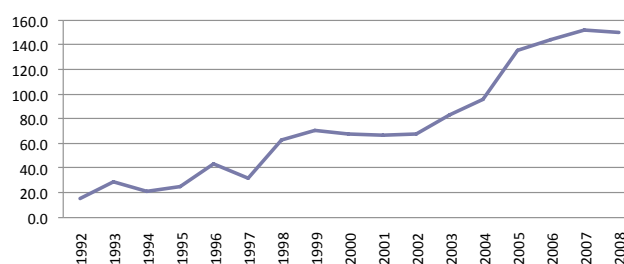
Donor financing for the health sector accounts for 24% of total health spending (up from 20% in 2000). Donors financed almost twice as much health spending as the government. Donor spending increased remarkably during 2002–2005 due to better coordination between donors and the government. From 2006 to 2007 development assistance for health, however, increased only slightly. In 2008, external funding of Cambodia's health sector leveled off, along with the overall decreases in the country's official development assistance (Figure 26).

Figure 25: Per Capita Out-of-Pocket Spending (US\$)



Source: MEF 2009, CSES 2007, CDC 2008, WHO 2007

Figure 26: External Financing for Health in Cambodia (US\$Million)



Source: CDC 2008

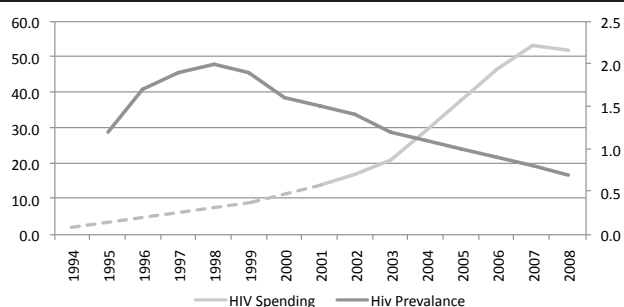
Social Health Insurance (SHI) was developed to address the issue of high out-of-pocket spending. However, the development of this sector has been limited to date. Coverage is at an early stage and SHI could not financially stand on its own. SHI is similar to the Health Equity Fund (HEF) and is designed to help people who live under the poverty line to access treatment at a referral hospital. Both sources of finance remain very small.

HIV/AIDS Spending

Despite a decline in HIV prevalence from 2.0% in 1998 to 0.9% in 2006, over 250,000 people have been infected with HIV since the beginning of the epidemic in 1991, and it is estimated that about 102,000 people have died of AIDS-related deaths to date. (NCHADS). As shown in Figure 27, there has been a continual increase in spending on HIV/AIDS over the last decade, even as the rate of prevalence and new infections was falling. This reflects the scale-up of the HIV/AIDS program, the costs of reaching increasing numbers of people engaging in high-risk behaviors, and the costs of anti-retroviral treatment.

It was estimated that US\$800,000 were spent on HIV/AIDS in 1994. Spending increased to US\$9 million in 1999 and to US\$14 million in 2001 (Mean CV et al 2002).

Figure 27: HIV Prevalence and Spending



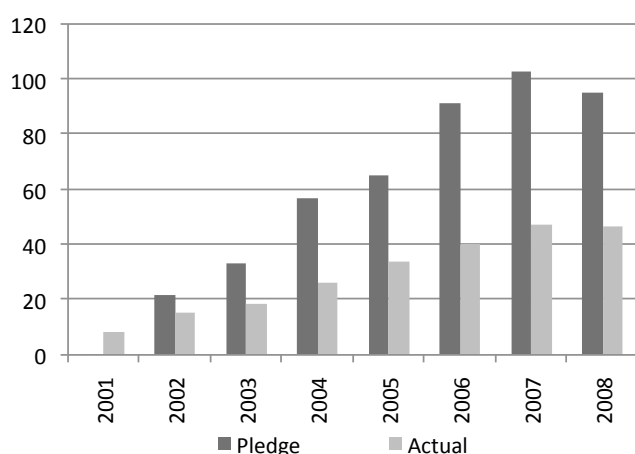
Sources: NCHADS, NASA (2008, 2009), Mean CV and Godwin P (2002)

The entry of Global Fund resources into Cambodia in 2005 has bumped up spending significantly. However, HIV spending leveled off in 2008.

Interviews with donors indicated that for a number of reasons, contributions for Cambodia's HIV/AIDS program are likely to decline (See Annex 4 for a list of development partners interviewed). For example, donors indicated that due to other competing priorities, the ongoing global economic crisis, and Cambodia's relatively low prevalence of HIV, it is unlikely that external funding would be sustained beyond the current levels. Thus, it is likely that donor funding for HIV/AIDS (both in absolute terms and relative to all health spending) will decline into the future. However, despite attempts to get donors to quantify their likely future contributions, it was not possible to define how rapidly international donors would scale back their contributions to HIV/AIDS in Cambodia.

The dependency of the Cambodian HIV/AIDS program on external financing has been complicated by the unpredictability of donor resource flows. This can be understood by looking at a comparison of pledges and actual spending. Available information from 2001 to 2008 shows that actual spending was only about half of pledges (Figure 28). The data also suggests that the lower the pledge, the more likely the donor was to not honor an important share of the pledge. The mismatch between pledged and actual financing may reflect the limited capacity of Cambodia's institutions to absorb the funds, a failure to coordinate between the government and donors, or a failure by donors to live up to their commitments.

Figure 28: Pledged and Actual HIV/AIDS Spending Financed by External Sources (US\$Million)



From 2006 to 2008, the share of total spending on HIV/AIDS that went to prevention was reduced from 45% to 38%, while the share on care and treatment was increased from 21% to 29%. External resources for HIV/AIDS followed this trend. This pattern of external financing also reflects the fact that the Royal Government contributed only 10% of total HIV/AIDS spending, with government funds being used for blood safety (80%) and administration.

3. Future HIV/AIDS Financing

This section examines forecasts for the financing of HIV/AIDS. It is based on a review of two sources of financing: (1) government sources; and (2) external sources. The forecasting of government sources relies on assumptions of economic growth and policy toward the social sectors, as well as policy directions for HIV/AIDS. The forecasting of external donor sources will be based on the emerging global agenda and the recent trend in pledges of donor assistance to Cambodia.

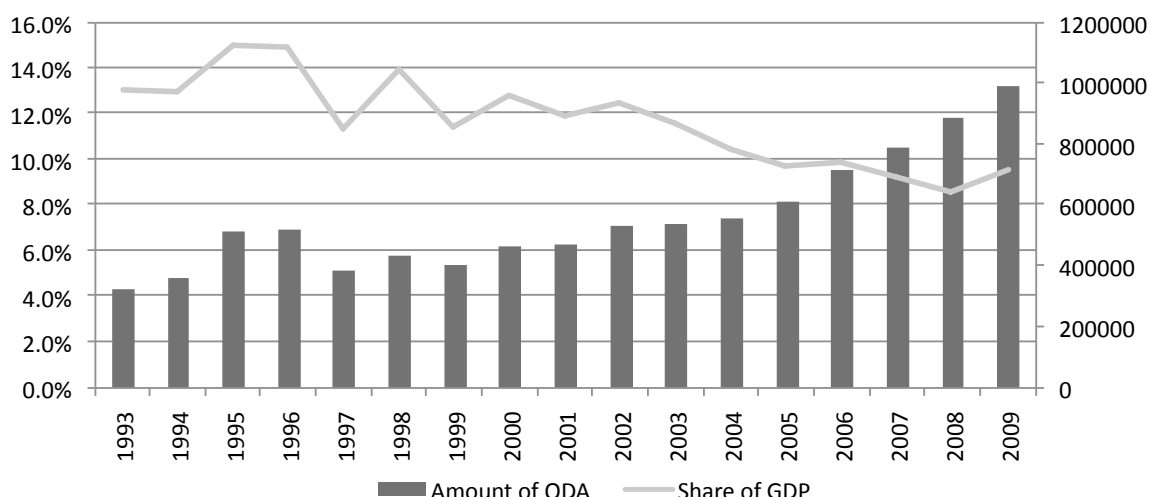
External Sources

Disbursement of ODA to Cambodia increased significantly during the last 15 years. In 2008, ODA disbursement reached almost US\$ 1 billion (Figure 29). However, the Council for the Development of Cambodia (CDC) predicted that the commitment of ODA is likely to be reduced significantly in 2009 and 2010, reflecting the impact of the global economic crisis, especially among the Organisation for Economic Co-operation and Development (OECD) countries (CDC 2009).

In the longer term, a number of donors may decide that Cambodia does not need their continued assistance at the same level and they may phase out of Cambodia. DfID, for example, will close its offices in 2011 and will discontinue its health program in the country by 2013. For the purposes of this exercise, we are projecting a decline in donor resources for HIV/AIDS, as discussed further below.

As shown in Figure 29, external financing, as a share of GDP, has gradually fallen, from a peak of about 15% in 1995. There is no clear relationship between the growth rate of GDP and the growth rate of ODA. Rather, what does seem clear is the continuous decline in ODA as a share of GDP since 1995.

Data analysis suggests that there is no clear rationale for the amount of donor assistance allocated to the health sector. In such an analysis, we could not estab-

Figure 29: Amount of ODA (US\$M) and Share of GDP

Sources: CDC 2009

lish a relationship to either economic growth or as a complement to government spending. Rather, the decisions on donor assistance for health appear to be independent among multiple agencies (Lane 2007). It is very difficult to project health expenditure, since different donors pledge for different time periods.

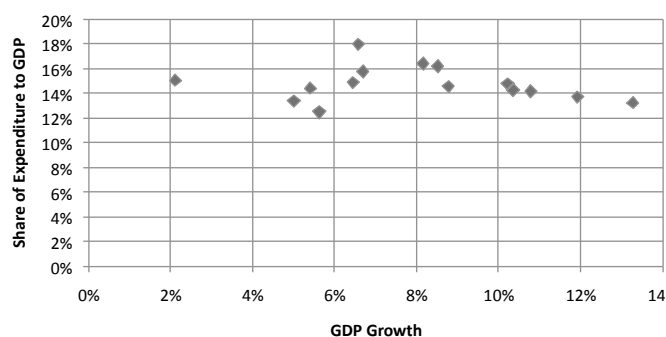
Government Sources

The Cambodian economy was hard hit by the global financial crisis and the government responded by introducing several policies to mitigate the impacts. The garment, tourism and construction sectors that supported growth were severely affected by this crisis. Exports declined 26.4% and 60,000 people lost their jobs in the garment sector alone. Tourist arrivals grew slightly at 7.5%, but dropped in terms of money spent because regional tourists spent less. Construction activities have slowed down and approved investment projects decreased 82%. Revenue collection was less than planned and forced government to rationalize and reduce some unnecessary spending. This means that the high growth period ended in 2009. As a result, there have been some important structural changes in the economy.

According to the Ministry of Economy and Finance, growth is estimated at 2.1% for 2009, reflecting the global economic slowdown. The economic forecast for this exercise will be based on government estimations and projections, particularly the National Strategic Development Plan (NSDP—2009–2013). These include

medium term projections that Cambodia will have an average 7% growth rate from 2011 to 2013. Given more potential and the low base of development in Cambodia, the growth rate of 7% is used to forecast future available resources. We used a 7% growth rate through 2031 as a minimum baseline for long-term projections.

Historical data indicate that government tried to smooth spending rather than condition spending on the revenue collection effort or economic growth. Generally, governments tend to spend less during high growth periods and more during recession in order to stimulate economic growth. In recent years, when economic growth has been more than 10%, expenditures were maintained at around 14% of GDP. For this exercise, we will use the assumption that government expenditure will stay at about 15% of GDP (Figure 30).

Figure 30: GDP Growth Rate and Share of Expenditure to GDP

Sources: MEF 2009

In the budget allocation process, spending is allocated based on the share for a sector to total government expenditure. Analysis of past data suggests that when total public expenditure increased to more than 16% of GDP, the share of social spending tended to increase to more than 30% of total spending. Similarly, when the share of total public expenditure was below 14% of GDP, social spending was more than 35% of total spending. In this light, we will assume that with total public expenditure of about 15% of GDP, social spending will account for around 30% of total expenditure.

Currently, government spending on HIV/AIDS is only around 1.5% of social spending. Due to the decreases in external funding, the government needs to maintain or increase its funding to the HIV/AIDS program. The assumption that we will use initially for this exercise is that government could maintain spending on HIV/AIDS at 1.5% of social spending, which is its maximum historical share.

Private Sources

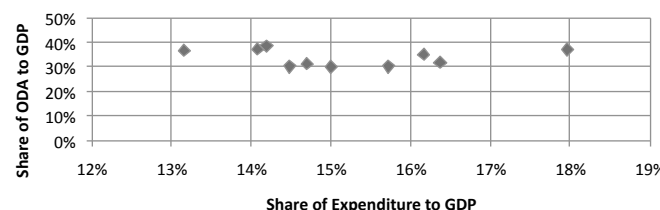
Cambodian business leaders do not typically engage in social activities and it is most prudent to assume that this will not change in the near term. This is partly because there is limited leadership in promoting such activities. Some local business leaders prefer to put their money into charity, occasionally upon request of policy leaders, particularly upon the appeal of the Cambodian Red Cross. Moreover, some prefer to have their own programs, which target vulnerability, including people living with HIV. None of the domestic firms we surveyed have any programs that are specifically oriented to HIV/AIDS. Foreign firms, such as Microsoft in Cambodia, do not contribute their resources domestically.

Projections of Resource Availability and Needs

Alternative Scenarios for Domestic Financing

Taking account of the factors noted above, projections were made of government resources that would be available for HIV/AIDS from 2009 to 2031. These projections of future availability of resources available for HIV/AIDS only take account of sources from government and development partners and exclude the private sector. The following explains the assumptions in the base case scenario for the public sector financing likely to be available for HIV/AIDS:

Figure 31: Percent of Expenditure to GDP and Share of Social Spending to Total Public Expenditure



- GDP will grow at 7% per annum
- Public expenditure as a percentage of GDP will be 15%
- Social spending is 30% of public expenditures
- HIV and AIDS spending will be 1.5% of social spending through 2031

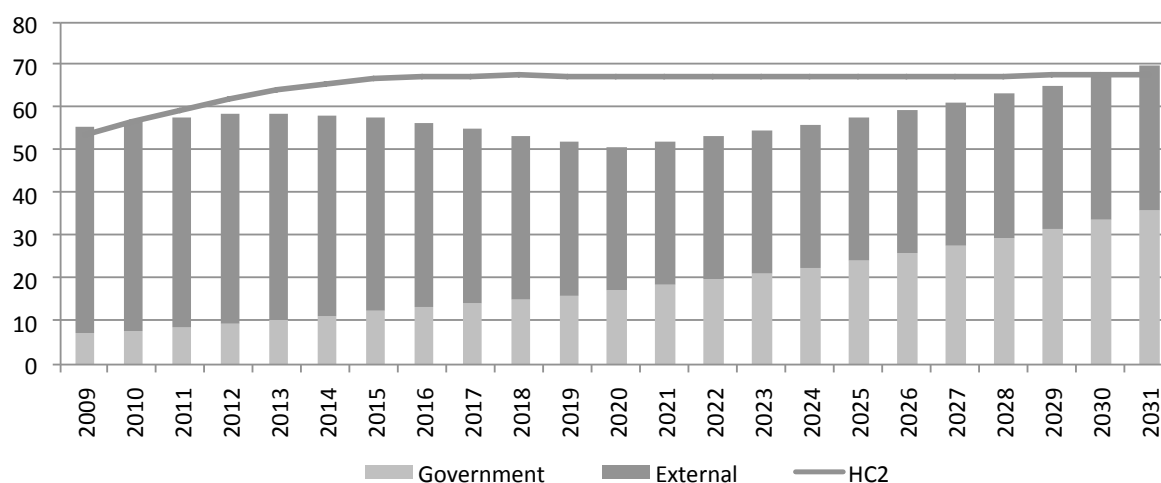
As for development partners, it was assumed in the base case that:

- Donor funding would gradually decline from 90% of all HIV and AIDS funds to 50% by 2020
- After 2020, external funds would remain constant at 50%

The results of the projection based on the above assumptions are presented in Figure 32. In this case, government resources available for HIV/AIDS are projected to increase almost 5 fold from 2009 to 2031 (from US\$7.4 million per year to US\$36.2 million per year). However, the external funds are projected to gradually decline. In this scenario the rise of government funds would be insufficient to compensate for the loss of external funds until 2030. At the same time, even in this “hard choices” scenario, the level of resources required to carry out the HIV/AIDS program would continue to grow, leaving a widening gap. In this case, the gap would grow to US\$16.5 million per year by 2020 before shrinking to zero in 2031.

In analyzing the extent to which donors are expected to “scale down” their commitments to Cambodia’s HIV/AIDS program, it is useful to consider both an “optimistic” and a “pessimistic” scenario. In the baseline scenario and the “optimistic” and “pessimistic” scenarios, the final result is projected to be the same (i.e., donors scale-back from 90% of all funding to 50% of all funding). However, the scenarios differ in how rapidly this would occur. In the baseline scenario it was assumed that donors would reach a 50% share by 2020. However, in the “optimistic scenario,” donors would

Figure 32: Resource Needs for HIV/AIDS under Hard Choice 2 Compared to Projected Resources under the Baseline Financing Scenario (US\$Millions)



scale-back more gradually, accounting for 50% of all HIV/AIDS resources only by 2025. On the other hand, the “pessimistic scenario” assumes that the scale-back occurs more suddenly, with donors accounting for 50% of all resources by 2015.

Figure 33 shows the results in the pessimistic scenario, in which donors scale-back rapidly. In this case the country would be left with a much larger gap in its funding, rising to as large as US\$21.2 million by 2015. In this pessimistic scenario, the total resources available in Cambodia would drop from US\$52 million currently to only US\$45.2 million by 2015. While the growth in Cambodia’s economy would eventually allow the country to recover from the loss of international donor

funds, this would not occur until two decades later. In such a pessimistic scenario, the coverage of people on treatment, as well as the population currently being reached with prevention services, would almost certainly drop.

Figure 34 presents a more optimistic scenario in which international donors scale-back more gradually. While there would still be a gap between the level of resources available and the level of resources required (under “Hard Choices #2”), this gap is projected to peak at US\$9.4 million and to be completely eliminated by 2031. This graphic illustrates that a more gradual decrease in international donor funds would allow the country to sustain its HIV/AIDS response. While the

Figure 33: Resource Needs for Hard Choice 2 Compared to Projected Resources Available under the Pessimistic Financing Scenario (US\$Millions)

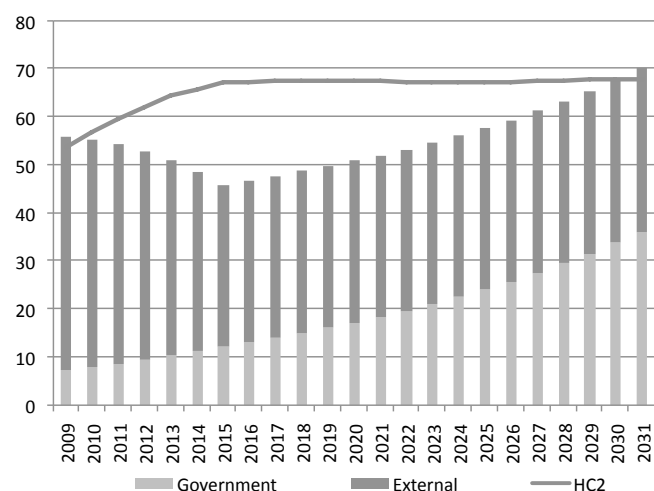


Figure 34: Resource Needs for Hard Choice 2 Compared to Projected Resources Available under the Optimistic Financing Scenario (US\$Millions)

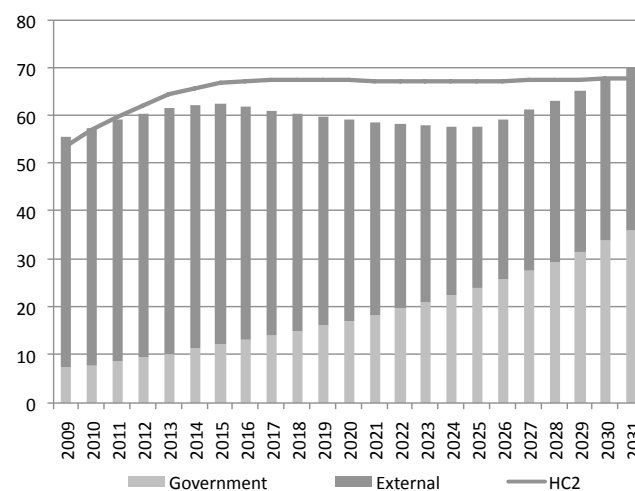
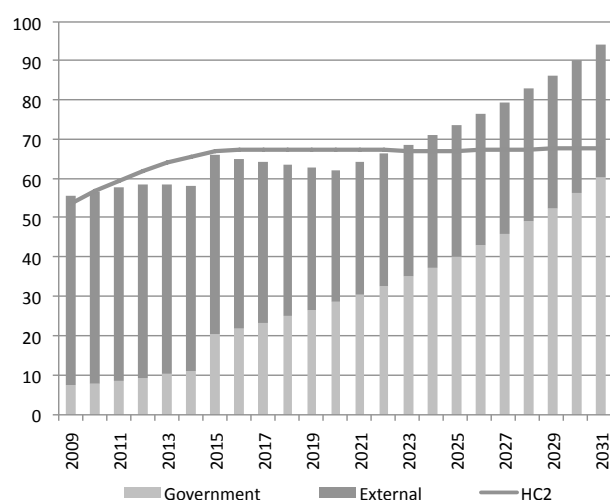


Figure 35: Resource Needs for Hard Choice 2 Compared to Projected Resources Available under the Moderate Financing Scenario (US\$Millions)



donor funds would be reduced from accounting for 90% of all HIV/AIDS funds to 50% by 2025, the impact in this case would be less dramatic.

Alternative Financing Scenarios

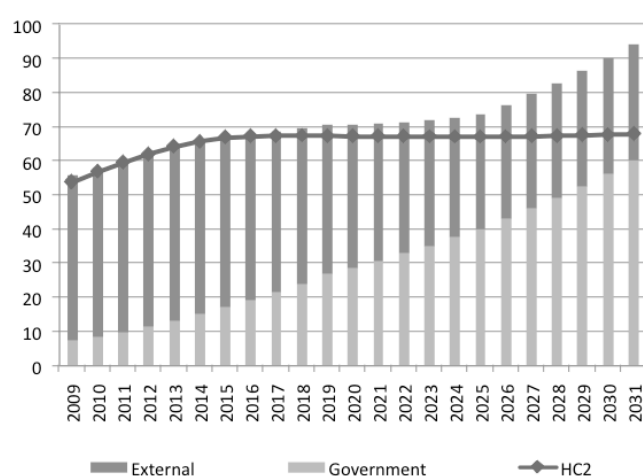
In the three scenarios above, it was assumed that Cambodia's national economy grows at 7% per annum, that public expenditures as a percentage of GDP remains at 15%, that social spending represents 30% of public expenditures and HIV/AIDS spending represents 1.5% of all social spending.

However, it is possible that some of these variables could be changed through policy decisions, if the government sought to more rapidly take over financing of its HIV/AIDS response. For example, Cambodia could increase its GDP growth (although presumably the country already makes this a priority). Alternatively the country could increase public expenditures as a percentage of GDP, by expanding the ability of the government to collect revenues. Cambodia could also potentially increase social spending (by decreasing spending in other areas, such as defense, for example). Finally, Cambodia could raise HIV/AIDS spending as a proportion of all social spending.

For the purpose of the analysis, we evaluated the potential impact of gradually increasing government spending on HIV/AIDS as a percentage of social spending (from 1.5% to 2.5% of social spending by 2019). As shown in Figure 35, there would still be a lack of sufficient resources over the next decade, but this would eventually be reversed in the decade that follows. By 2024, the moderate financing scenario would provide more than enough resources to fund the needs defined under "hard choices 2 scenario," as shown in Figure 35.

If Cambodia were to combine solutions, both in terms of encouraging a more gradual scale-back by international donors to the optimistic scenario and by gradually and steadily committing more domestic resources to HIV/AIDS (from 1.5% to 2.5% of social spending by 2019), the future would look like Figure 36. In this combined scenario, there would be no financing gap in pursuing "Hard Choices #2" and the funds available would exceed the funds required by 2019. By 2031, the resources required would be more than adequate to meet the "Hard Choices 2" scenario and would nearly be sufficient to fully fund the \$114 million in 2031 required to achieve universal access.

Figure 36: Resource Needs for Hard Choice 2 Compared to Projected Resources Available under the Optimistic Financing Scenario, plus Additional Government Fiscal Effort



VI. Conclusions and Recommendations

Cambodia has had major success in terms of reducing the number of new HIV infections and providing access to treatment for a large percentage of its infected population. These successes cannot be underestimated. The number of new HIV infections in Cambodia has dropped from over 15,000 in the early 1990s to only about 2,000 per year currently.

Development partners have prioritized Cambodia for their HIV and AIDS funding, in part because of an initial concern that the country could incur an epidemic which was unprecedented in this region of the world. However, due to the current global financial crisis and a shifting in donor priorities, as well as the donors' views that an epidemic take-off has now been averted, the levels of financial commitment to Cambodia's HIV and AIDS program are expected to diminish. What remains unknown is how fast this scale-back will occur.

This paper summarizes some of the new challenges faced by Cambodia. As its epidemic evolves, and domestic and international financial commitments are reprioritized, it is critical that Cambodian policymakers be prepared to ensure sustainable financing of its HIV/AIDS program. This will require careful planning, in both the short and long term.

The financial models presented in this report explore various assumptions about resource requirements and availability. Six different scenarios were developed which incorporate different assumptions regarding resource requirements and three different scenarios were developed to examine future resource availability. Some of these scenarios represent potentially dire consequences for Cambodia, producing financial gaps that would require significant reductions in the levels of coverage for HIV/AIDS services. In the direst of circumstances, the country would not be able to expand its current treatment program and might not be able to sustain even current levels of treatment coverage. Meanwhile, prevention programs would be cut back, leading to another wave of new HIV infections. Children currently receiving support under Cambodia's orphan programs would find themselves losing such support.

The most hopeful scenario developed assumed that the donor scale-back in Cambodia would be gradual and would be offset by the Cambodian government's scale-up of its own contributions. In this scenario, there would be no gap in financial resources to achieve the

"Hard Choice #2" scenario and funding would eventually be sufficient to nearly achieve universal access. The key to this hopeful scenario involves careful planning and collaboration between international donors and the government of Cambodia.

Regardless of which scenario actually plays out, Cambodia faces some hard choices in regard to short-term and long-term funding. Both the Government of Cambodia and development partners should fund only those interventions that are proven to be cost-effective. Efficiency should be emphasized, especially for those "big ticket items," such as the purchase of antiretroviral drugs.

The implications of this review for Cambodia's policy makers include a number of key areas for action:

- First, Cambodia will need to focus investments on HIV/AIDS in those areas that are most cost-effective. This may lead to an approach similar to that of the Hard Choice scenarios, where the country has to carefully evaluate each intervention and reduce or eliminate those that are not substantially contributing to the overall national program in cost-effective ways.
- Second, despite important successes against HIV/AIDS in Cambodia, there remains room for improving program efficiency. It will be valuable for Cambodia to focus on a number of efficiency enhancing measures that could include, for example, integrating supervision and training; improving adherence to drug treatment and the quality of treatment; improving procurement and the logistics management of drugs, reagents, and consumables; leasing laboratory equipment, instead of buying it; and reducing unnecessary spending for administration and technical assistance. The development in partnership with donors of an annual comprehensive work plan is a step, for example, to improving efficiency by reducing duplication.
- Third, on the financing side, Cambodia will need to better manage the flow of external resources to its HIV/AIDS program; it will also need to significantly increase its own allocation to HIV/AIDS. This will require that the Cambodian government improve its long-range planning with its development partners, to minimize any impact associated with the withdrawal of external funds. At the same time, the government will have to increase its own domestic

contributions to the HIV/AIDS program, probably by raising the share of social spending which is allocated to HIV/AIDS.

- Finally, it is critical that Cambodia continues to periodically assess the cost-effectiveness of different possible interventions in its HIV/AIDS program, so that it can better set priorities and mobilize re-

sources accordingly. This should be done with an eye towards ensuring that Cambodia in the long run is achieving the best possible outcomes, at the least cost, and that it has the financing to sustain its program. The failure to achieve these goals could put at risk Cambodia's remarkable progress to date against HIV/AIDS.

ANNEX 1 List of Steering Committee Members

H.E. Dr. Teng Kunthy, Secretary General of National AIDS Authority

H.E. Dr. Mean Chhi vun, Director of National Center for HIV/AIDS, STD and Dermatology

H.E. Hav Ratanak, Ministry of Economy and Finance

Mr. Tony Lisle, UNAIDS Cambodia

Mrs. Savina Ammassary, UNAIDS Cambodia

Mrs. Madelene Eichhorn, UNAIDS Cambodia

Mr. John Keating, UNAIDS Cambodia

Dr. Peter Cowly, FHI

Dr. Sok Khana, Ministry of Health

Dr. Bun Sreng, Ministry of Health

Mr. Prateek Gupta, USAIDS

Dr. Nicole Seguy, WHO Cambodia

Mr. Hav Dina, Ministry of Planning

Mr. Duong Chantha, CDC Cambodia

Dr. Ly Vanthy, CDC-GAP Cambodia

Mr. Keo Chen, CPN+

Dr. Oum Sopheap, KHANA

Dr. Toomas Palu, World Bank

ANNEX 2 Assumptions Used in the Resource Needs Model (RNM)

In principle, aids 2031 projections using the Resource Needs model (RNM) have been built on the UNAIDS Global Resource Needs Estimates (GRNE). They primarily take into account three main components: population size in need, program coverage of prevention and care, and their unit costs which are used as important inputs for calculating the resources required for program planning until 2031. Doing this exercise, the population size estimates and the coverage are based on the reports and relevant documents from both government and non-government sources available, while the unit costs in the model are mostly based on the National AIDS Spending Assessment report (NASA), as well as relevant local and international literature [1, 2]. Still, some inputs have been based on the consensus of the expertise and experience of Cambodia's national team, which include the epidemiological and economic teams and the Steering Committee's inputs.

Four areas of intervention have been examined when working on each scenario. They include prevention, care and treatment services, mitigation, and policy and program management. However, only prevention and care components have been the main focus of the exercise, while mitigation and policy and program management components to some extent have been kept constant in terms of resource allocation.

Size of Target Populations

Size of different target populations is important in doing this exercise. Three main high risk populations that have played a major role in HIV epidemics in Cambodia

are summarized in Table 2.1. Direct female sex workers (FSW), brothel based sex workers and indirect female sex workers (IFSW) and informal female sex workers have been estimated based on the latest data of sex entertainment services in 2009 by NCHADS (BCC Unit). MSM both hidden and visible have been estimated based on the latest population size estimate from FHI and a Consultation Workshop on size estimate which suggests 2% of the adult male population are MSM [3]. The population size of the injecting drug users and drug users have been estimated based on the multiplier method and the harm reduction report [4, 5]. It should be noticed that an annual growth rate of 1.7% has been suggested by the team, reflecting the change of the size of the population over time [6].

Table 2.1: Estimates of the Most-at-risk Population Sizes, 2009

Target population	Estimated numbers
Sex workers	
Direct sex workers	3000
Indirect sex workers	3100
Total	6100
Men who have sex with men (MSM)	
MSM (visible)	3000
MSM (hidden)	21000
Total	24000
Drug users	
Injecting Drug users	3000
Non injecting drug users	1300
Total	4300

Program Coverage

Current Coverage Scenario

According to Sopheab et al, on average only 60% of FSW visited STI clinics each month in 2005, indicating to some extent the limited prevention program targeting high risk groups [7]. Therefore, given the recent controversy of the 100% condom use program, we have 60% coverage of the program intervention for direct female sex workers (FSW) and about 20% among indirect female sex workers (IFSW) in 2009. Then, it is assumed this proportion will be constant over time.

Furthermore, the percent of other risk groups reached by interventions and the proportion of consistent condom use among different groups was based on the BSS, STI and drug use study reports [8–10]. The main inputs used for the scenario of the current intervention coverage are summarized in Table 2.2.

Table 2.2: Current Coverage Scenario: Inputs for Resource Needs Model

The main inputs	2009	2010	2015	2025	2031
Sex workers					
Direct sex workers					
% sex workers reached by intervention per year	60	60	60	60	60
% using condoms among those reached by intervention	90	90	90	90	90
Indirect female sex workers					
% sex workers reached by intervention per year	20	20	20	20	20
% using condoms among those reached by intervention	80	80	80	80	80
Men who have sex with men (visible)					
% MSMs reached by intervention per year	60	63	77	77	77
% using condoms among those reached by intervention	85	85	85	85	85
Hidden MSM					
% reached by intervention per year	20	20	20	20	20
Injecting drug users					
% of IDUs receiving harm reduction intervention	10	10	10	10	10
% of IDUs receiving Counseling and Testing	50	50	50	50	50
% of IDUs receiving Needle and Syringe Exchange	6.9	6.9	6.9	6.9	6.9
Police and Military					
% reached by intervention per year	90	90	90	90	90
Youth					
% primary students with teachers trained in AIDS	60	60	60	60	60
% secondary students with teachers trained in AIDS	60	60	60	60	60
% out-of-school youth reached	30	30	30	30	30
PMTCT					
% of pregnant women attending ANC tested for HIV	25	25	25	25	25
% HIV positive pregnant women treated with ARV	80	80	80	80	80
% HIV positive pregnant women that receive infant formula	20	20	20	20	20
Voluntary counseling and testing					
% of adult population receiving VCT each year	5	5	5	5	5
ART coverage					
% of adults in need of ART receiving first line treatment	85	85	85	85	85

Based on the consensus among the national team, it is agreed that 5% of people received VCT annually. By the end of 2008, there were 212 VCT centers nationwide and it is expected that the number of VCT centers will be 215 by 2010 [11, 12]. The number of PLHA who are adults and children currently on ART has been increasing since 2004. From 2009, adults in need of ART are used as the inputs for PLHA currently on ART. This is just a proxy estimate because it is assumed that those in need will be completely covered by the ART program in that year and the following years. It should be noted that the number of adults in need of ART in 2009 and the following years is estimated based on the Asian Epidemic Model 2007 [13]. It is assumed that the proportion of adults receiving ART would be about 85% over time until 2031.

Best Coverage Scenario

As stated earlier, this scenario assumed Cambodia would reach universal access or reach its highest coverage for HIV prevention and care by 2015, and that this would be maintained through 2031. As shown in Table 2.3, the main

Table 2.3: Best Coverage Scenario: Inputs for Resource Needs Model					
Main inputs	2009	2010	2015	2025	2031
Sex workers					
Direct sex workers					
% sex workers reached by intervention per year	60	64	85	85	85
% using condoms among those reached by intervention	90	90	90	90	90
Indirect female sex workers					
% sex workers reached by intervention per year	20	27	60	60	60
% using condoms among those reached by intervention	80	80	80	80	80
Men who have sex with men (visible)					
% MSMs reached by intervention per year	90	90	90	90	90
% using condoms among those reached by intervention	85	85	85	85	85
Hidden MSM					
% reached by intervention per year	50	50	50	50	50
Injecting drug users					
% of IDUs receiving harm reduction intervention	10	10	10	10	10
% of IDUs receiving Counseling and Testing	50	53	70	70	70
% of IDUs receiving Needle and Syringe Exchange	7	9	20	20	20
Police and Military					
% reached by intervention per year	90	91	95	95	95
Youth					
% primary students with teachers trained in AIDS	80	80	80	80	80
% secondary students with teachers trained in AIDS	80	80	80	80	80
% out-of-school youth reached	50	50	50	50	50
PMTCT					
% of pregnant women attending ANC tested for HIV	25	29	50	50	50
% HIV positive pregnant women treated with ARV	80	83	95	95	95
% HIV positive pregnant women that receive infant formula	20	20	20	20	20
Voluntary counseling and testing					
% of adult population receiving VCT each year	5	9	32	38	43
ART coverage					
% of adults in need of ART receiving first line treatment	85	85	90	90	90

prevention inputs with high coverage have been assumed among the most-at-risk populations (i.e. sex workers, MSM and injecting drug users). In addition, the high coverage related to voluntary counseling and testing, PMTCT, and ART services has also been assumed under this Best Coverage model.

Hard Choice 1 Scenario

The Hard Choice 1 scenario is similar to the Best Coverage scenario in terms of prevention coverage of the high risk groups and coverage of treatment and care services (Table 2.4). However, prevention coverage of low risk groups is similar to the Current Coverage scenario.

Table 2.4: Hard Choice 1 Scenario: Inputs for Resource Needs Model

Main inputs	2009	2010	2015	2025	2031
Sex workers					
Direct sex workers					
% sex workers reached by intervention per year	85	85	85	85	85
% using condoms among those reached by intervention	90	90	90	90	90
Indirect female sex workers					
% sex workers reached by intervention per year	60	60	60	60	60
% using condoms among those reached by intervention	80	80	80	80	80
Men who have sex with men (visible)					
% MSMs reached by intervention per year	90	90	90	90	90
% using condoms among those reached by intervention	85	85	85	85	85
Hidden MSM					
% reached by intervention per year	50	50	50	50	50
Injecting drug users					
% of IDUs receiving harm reduction intervention	10	10	10	10	10
% of IDUs receiving Counseling and Testing	70	70	70	70	70
% of IDUs receiving Needle and Syringe Exchange	7	7.1	8	8	8
Police and Military					
% reached by intervention per year	90	90	90	90	90
Youth					
% primary students with teachers trained in AIDS	60	60	60	60	60
% secondary students with teachers trained in AIDS	60	60	60	60	60
% out-of-school youth reached	30	30	30	30	30
PMTCT					
% of pregnant women attending ANC tested for HIV	25	25	25	25	25
% HIV positive pregnant women treated with ARV	80	80	80	80	80
% HIV positive pregnant women that receive infant formula	20	20	20	20	20
Voluntary counseling and testing					
% of adult population receiving VCT each year	5	5	5	5	5
ART coverage					
% of adults in need of ART receiving first line treatment	85	85	85	85	85

Hard Choice 2 Scenario

This scenario is similar to the Hard Choice 1 scenario described above, except a concept of Linked Response has been integrated into prevention and care (Table 2.5). Based on this model, it has been assumed that the Linked Response will significantly contribute to increasing prevention of mother to child transmission. As a result, a high proportion of pregnant women attending ANC will be tested for HIV, as well as become recipients of ART.

Table 2.5: Hard Choice 2 Scenario: Inputs for Resource Needs Model

Main inputs	2009	2010	2015	2025	2031
Sex workers					
Direct sex workers					
% sex workers reached by intervention per year	85	85	85	85	85
% using condoms among those reached by intervention	90	90	90	90	90
Indirect female sex workers					
% sex workers reached by intervention per year	60	60	60	60	60
% using condoms among those reached by intervention	80	80	80	80	80
Men who have sex with men (visible)					
% MSMs reached by intervention per year	90	90	90	90	90
% using condoms among those reached by intervention	85	85	85	85	85
Hidden MSM					
% reached by intervention per year	50	50	50	50	50
Injecting drug users					
% of IDUs receiving harm reduction intervention	10	10	10	10	10
% of IDUs receiving Counseling and Testing	70	70	70	70	70
% of IDUs receiving Needle and Syringe Exchange	7	7.1	8	8	8
Police and Military					
% reached by intervention per year	90	90	90	90	90
Youth					
% primary students with teachers trained in AIDS	60	60	60	60	60
% secondary students with teachers trained in AIDS	60	60	60	60	60
% out-of-school youth reached	30	30	30	30	30
PMTCT					
% of pregnant women attending ANC tested for HIV	25	34	80	80	80
% HIV positive pregnant women treated with ARV	80	83	95	95	95
% HIV positive pregnant women that receive infant formula	20	20	20	20	20
Voluntary counseling and testing					
% of adult population receiving VCT each year	5	5	5	5	5
ART coverage					
% of adults in need of ART receiving first line treatment	85	85	85	85	85

Structural Change Scenario

The concept of Structural Change refers to the improvement in infrastructure related to the program, reductions in social marginalization, stigma and discrimination through social mobilization; empowerment of women; and advocacy. It is believed that enabling structural changes can reduce vulnerability to HIV related issues and produce a more sustainable HIV/AIDS response. However, this scenario is expected to take time before its effect would have an impact on the HIV/AIDS program. Under this scenario, it is assumed that there will be an impact on the increase in a number of program coverage indicators, including hidden MSM, HIV education in schools, PMTCT, and VCT, as shown in Table 2.6.

Table 2.6: Structural Change Scenario: Inputs for Resource Needs Model

Main inputs	2009	2010	2015	2025	2031
Sex workers					
Direct sex workers					
% sex workers reached by intervention per year	60	60	60	60	60
% using condoms among those reached by intervention	90	90	90	90	90
Indirect female sex workers					
% sex workers reached by intervention per year	20	20	20	20	20
% using condoms among those reached by intervention	80	80	80	80	80
Men who have sex with men (visible)					
% MSMs reached by intervention per year	60	63	77	77	77
% using condoms among those reached by intervention	85	85	85	85	85
Hidden MSM					
% reached by intervention per year	40	40	40	40	40
Injecting drug users					
% of IDUs receiving harm reduction intervention	10	10	10	10	10
% of IDUs receiving Counseling and Testing	50	50	50	50	50
% of IDUs receiving Needle and Syringe Exchange	6.9	6.9	6.9	6.9	6.9
Police and Military					
% reached by intervention per year	90	90	90	90	90
Youth					
% primary students with teachers trained in AIDS	60	62	70	80	80
% secondary students with teachers trained in AIDS	60	62	70	80	80
% out-of-school youth reached	30	32	40	50	50
PMTCT					
% of pregnant women attending ANC tested for HIV	25	26	30	50	50
% HIV positive pregnant women treated with ARV	80	83	95	95	95
% HIV positive pregnant women that receive infant formula	20	20	20	20	20
Voluntary counseling and testing					
% of adult population receiving VCT each year	5	6	16	19	21
ART coverage					
% of adults in need of ART receiving first line treatment	85	85	85	85	85

Unit Costs

In this analysis, three data sources were used. First, we reviewed the unit cost data that was used in the 2006 RNM exercise. Next, we collected unit costs based on the actual data collected by Cambodia's 2006 and 2008 NASA reports. Third, we looked at the default values which are contained in the RNM. These unit costs are largely based on data from other countries within the Asia region. The final column contains the consensus value that was used for the 2031 estimations. Table 2.7 summarizes the unit costs for different interventions. Some

Table 2.7: Unit Costs for Different Interventions

	RNM	NASA	Default	Consensus
Cost per sex worker reached (direct)	22.40	6.04	15.83–21.12	22.40
Cost per sex worker reached (indirect)	22.40		15.83–21.12	22.40
Cost per male condom distributed				0.11
Cost per MSM reached	22.40	5.16	15.83–21.12	22.40
Cost per MSM reached (visible)	22.40		15.83–21.12	22.40
Cost per MSM reached (hidden)				50.00
Cost per IEC campaign/activity	2,000.00			300.00
Cost of counseling and testing IDUs	33.57		22.33–44.82	33.57
Cost of needle & syringe distributed & destroyed for IDU	0.27		0.27	0.27
Cost of drug substitution per IDU	185.00		292.00–587.00	185.00
Cost of community outreach and peer education per DU	22.33		22.33–33.42	22.33
Cost per police & military officer reached	18.09		3.36–4.14	18.09
Cost per migrant reached	18.09		3.36–4.14	18.09
Cost per street child reached	40.00		15.23–21.12	40.00
Cost per person reached in the community mobilization				0.23
Cost per teacher trained in primary school education	92.80		35.27–199.01	92.80
Cost per teacher trained in secondary school education	92.80		35.27–199.01	92.80
Cost per tertiary student reached				10.00
Cost of peer education for out of school youth	9.41		8.00–10.81	20.00
Cost per person in employment reached (peer education)	18.09		3.36–4.14	10.00
Cost of STI treatment	7.14		8.34–27.85	7.14
Cost of STI treatment in clinics	20.73		8.34–27.85	20.73
Cost per VCT at new site	29.77	12.16	10.60–23.28	29.77
Cost per VCT at existing site	11.25	12.16	10.60–23.28	11.25
Cost per woman screened (PMTCT)				11.25
Cost per woman testing HIV+ and receiving antenatal ARV regimen				56.09
Cost per mother/infant of feeding and testing				11.25
Cost of screening a unit of blood for HIV				800.00
Cost per person receiving home-based care	46.32			46.32
Cost of OIs treated at health center	196.72			196.72
Prophylaxis for opportunistic infections	196.72	15.21		196.72
Cost of first line therapy	186.00	138.00	359.00	376.00
Brand-name ARVs	2,640.00			2,640.00
Cost of toxicity therapy	706.00			706.00
Cost of second line therapy	1,365.00		1,199.00	1,199.00

additional explanations about the cost estimates for some intervention are described below and a few are highlighted in Table 2.7.

- The cost per male condom distributed by the public sector or social marketing is \$0.11. The estimate is based on the assumption that 4 million condoms would be distributed in 2008 (NASA 2008).
- The cost per mass media campaign is \$300, which is substantially lower than the previously proposed \$2000. This was estimated based on the costing exercise from the NASA 2008 report, in which the mass media cost about \$2 million in 2008.
- It is assumed that the cost for hidden MSM would be more expensive than the cost per visible MSM reached.
- The cost per person reached in the community mobilization intervention is \$0.23. This has been calculated by taking 4% of expenditure on community

mobilization from NASA 2008, divided by the adult population in 2009.

- It is proposed that the cost per person in employment reached by peer education be \$10, instead of \$18.09 proposed earlier.
- The cost of screening a unit of blood for HIV was \$800. It is based on the budget spent on blood safety of \$3.6 million in 2009 (NASA 2008).
- The cost of the first line ART per patient per year is \$376. This has been estimated by deducting the cost of OI treatment (\$196), home-based care (\$70) and VCT (\$11.2) from the total cost of providing care to a patient, which is \$660.
- The cost per person receiving home-based care is \$70. This estimate has been based on the standard operating procedure (SOP) of home based care from NCHADS. It is more expensive than the previously proposed \$46.32.

Annex 3 Assumptions Used in the Goals Model

Current Coverage Scenario

Parameters for the year 2009 and 2010 were collected mainly from behavioral sentinel surveillance, HIV sentinel surveillance, the Cambodia Demographic and Health Survey 2005 and the STI Survey 2005. Some other figures were derived from experts in the field.

Table 3.1: Main Input Parameters in Current Coverage Scenario for the Goals Model					
STI Prevalence (%)	2009	2010	2015	2025	2031
Males					
Low Risk	1.5	1.5	1.5	1.5	1.5
Medium Risk	2.1	2.1	2.1	2.1	2.1
High Risk	4.9	4.9	4.9	4.9	4.9
MSM	17	17	17	17	17
Females					
Low Risk	0.5	0.5	0.5	0.5	0.5
Medium Risk	6.1	6.1	6.1	6.1	6.1
High Risk	23.7	23.7	23.7	23.7	23.7
Condom Use (%)	2009	2010	2015	2025	2031
Low Risk	2.9	3.03	3.03	3.03	3.03
Medium Risk	42	42.11	42.11	42.11	42.11
High Risk	88.67	88.71	88.71	88.71	88.71
MSM	73.29	73.29	73.29	73.29	73.29
Behavioral Intervention Coverage (%)	2009	2010	2015	2025	2031
General population					
Community mobilization		0.5	0.5	0.5	0.5
Mass media		90	90	90	90
VCT		5	5	5	5
Condoms		39.2	39.2	39.2	39.2
Youth: in-school		60	60	60	60
Youth: out-of-school		30	30	30	30
Workplace programs		10	10	10	10
Most-at-risk populations					
Sex workers		60	60	60	60
MSM		40	40	40	40
IDU: outreach		10	10	10	10
IDU: needle sharing		6.9	6.9	6.9	6.9
ARV Treatment (%)	2009	2010	2015	2025	2031
Percent of adults in need of ART receiving it (0–100%)	85	85	85	85	85

Best Coverage Scenario

Due to the increase of coverage of HIV/AIDS behavioral and care and treatment interventions, it is assumed that STI prevalence will significantly drop over the years. In other words, all implementing programs are assumed to be effective. For instance, with a high proportion of condom use, STI prevalence among male and female high-risk groups will reach its lowest point (See Table 3.2).

Regarding AIDS care and treatment programs, the highest ART coverage that can be provided would be to 90% of those in need of ART by 2015, and this coverage will be maintained to 2031. Although it is estimated that more than 90% of those in need of ART received ART in 2009, we still assume that the highest coverage of ART is about 90%

Table 3.2: Main Input Parameters in Best Coverage Scenario for the Goals Model

STI Prevalence (%)	2009	2010	2015	2025	2031
Males					
Low Risk	1.5	1.33	0.5	0.5	0.5
Medium Risk	2.1	1.92	1	2	2
High Risk	4.9	4.42	2	2	2
MSM	17	14.83	4	4	4
Females					
Low Risk	0.5	0.5	0.5	0.5	0.5
Medium Risk	6.1	5.42	2	2	2
High Risk	23.7	20.58	5	5	5
Condom Use (%)	2009	2010	2015	2025	2031
Low Risk	2.9	15	20.04	20.04	20.04
Medium Risk	42	49.09	66.77	65.73	65.79
High Risk	88.67	91.12	95.81	95.81	95.81
MSM	73.29	90	90.91	90.91	90.91
Behavioral Intervention Coverage (%)		2010	2015	2025	2031
General population					
Community mobilization		0.75	2	2	2
Mass media		91.5	99	99	99
VCT		9.17	30	30	30
Condoms		42.67	60	60	60
Youth: in-school		63.33	80	80	80
Youth: out-of-school		33.33	50	50	50
Workplace programs		10.83	12	12	12
Most-at-risk populations					
Sex workers		64.17	85	85	85
MSM		45	70	70	70
IDU: outreach		16.67	50	50	50
IDU: needle sharing		9.08	20	20	20
IDU: drug substitution		3.33	20	20	20
ARV Treatment (%)	2009	2010	2015	2025	2031
Percent of adults in need of ART receiving it (0–100%)	85	85.83	90	90	90

since Cambodia is in the process of revising the criteria for classifying AIDS patients into “in need of ARV” category. This revision will result in a large increase of the number of people in need of ART.

Hard Choice 1 Scenario or “Targeted Interventions Only”

In this scenario, Cambodia will maintain the current coverage of all implemented programs in the area of HIV/AIDS prevention and care and treatment. Furthermore, the coverage of interventions that aim at curbing the spread of HIV/AIDS among the high-risk groups would be expanded. The main reason for establishing this first Hard Choice scenario is to test whether maximizing the current level of coverage of high-risk groups may significantly contribute to the further drop of HIV prevalence, as well as HIV incidence.

Table 3.3: Main Input Parameters in Hard Choice 1 Scenario for the Goals Model

STI Prevalence (%)	2009	2010	2015	2025	2031
Males					
Low Risk	1.5	1.5	1.5	1.5	1.5
Medium Risk	2.1	2.1	2.1	2.1	2.1
High Risk	4.9	4.42	2	2	2
MSM	17	14.83	4	4	4
Females					
Low Risk	0.5	0.52	0.64	0.86	1
Medium Risk	6.1	5.96	5.25	3.85	3
High Risk	23.7	20.58	5	5	5
Condom Use (%)	2009	2010	2015	2025	2031
Low Risk	2.9	6.5	5.05	2.17	0.43
Medium Risk	42	60	59.58	58.73	58.23
High Risk	88.67	95	96.31	96.31	96.31
MSM	73.29	95	95.45	95.45	95.45
Behavioral Intervention Coverage (%)		2010	2015	2025	2031
General population					
Community mobilization		0.5	0.5	0.5	0.5
Mass media		88.18	79.09	60.91	50
VCT		5	5	5	5
Condoms		39.2	39.2	39.2	39.2
Youth: in-school		60	60	60	60
Youth: out-of-school		30	30	30	30
Workplace programs		10	10	10	10
Most-at-risk populations					
Sex workers		60	85	85	85
MSM		45	70	70	70
IDU: outreach		20	70	70	70
IDU: needle sharing		7.08	8	8	8
IDU: drug substitution		0.33	2	2	2
ARV Treatment (%)	2009	2010	2015	2025	2031
Percent of adults in need of ART receiving it (0–100%)	85	85.83	90	90	90

Hard Choice 2 or “Targeted Interventions + Linked Response”

In term of AIDS care and treatment, we also assume the Best Coverage care and treatment for AIDS patients will be reached and maintained through 2031. For example, by 2015, 90% of those who need ART will receive ARV treatment.

Table 3.4: Main Input Parameters in Hard Choice 2 Scenario for the Goals Model

STI Prevalence (%)	2009	2010	2015	2025	2031
Males					
Low Risk	1.5	1.5	1.5	1.5	1.5
Medium Risk	2.1	2.1	2.1	2.1	2.1
High Risk	4.9	4.42	2	2	2
MSM	17	14.83	4	4	4
Females					
Low Risk	0.5	0.5	0.5	0.5	0.5
Medium Risk	6.1	5.91	4.98	3.12	2
High Risk	23.7	20.58	5	5	5
Condom Use (%)	2009	2010	2015	2025	2031
Low Risk	2.9	6.5	7.44	4.81	3.24
Medium Risk	42	60	61.34	61.22	61.16
High Risk	88.67	95	96.53	96.61	96.66
MSM	73.29	95	95.45	95.45	95.45
Behavioral Intervention Coverage (%)		2010	2015	2025	2031
General population					
Community mobilization		0.5	1.57	3.71	5
Mass media		88.18	79.09	60.91	50
VCT		5	5	5	5
Condoms		39.2	40.58	43.34	45
Youth: in-school		60	60	60	60
Youth: out-of-school		30	30	30	30
Workplace programs		10	10	10	10
Most-at-risk populations					
Sex workers		64.17	85	85	85
MSM		45	70	70	70
IDU: outreach		20	70	70	70
IDU: needle sharing		7.08	8	8	8
IDU: drug substitution		0.33	2	2	2
ARV Treatment (%)	2009	2010	2015	2025	2031
Percent of adults in need of ART receiving it (0–100%)	85	85.83	90	90	90

Structural Change Scenario

In the Structural Change scenario, all intervention programs targeting high-risk groups will be kept and maintained as in the Current Coverage scenario. However, the coverage levels of HIV/AIDS care and treatment will be assumed to be similar that of the Best Coverage scenario.

Table 3.5: Main Input Parameters in Structural Change Scenario for the Goals Model

STI Prevalence (%)	2009	2010	2015	2025	2031
Males					
Low Risk	1.5	1.5	1.5	1.5	1.5
Medium Risk	2.1	2.1	2.1	2.1	2.1
High Risk	4.9	4.9	4.9	4.9	4.9
MSM	17	17	17	17	17
Females					
Low Risk	0.5	0.5	0.5	0.5	0.5
Medium Risk	6.1	6.1	6.1	6.1	6.1
High Risk	23.7	23.7	23.7	23.7	23.7
Condom Use (%)	2009	2010	2015	2025	2031
Low Risk	2.9	15	18.6	18.6	18.6
Medium Risk	42	42.11	56.53	58.52	60.07
High Risk	88.67	88.71	92.47	92.47	92.47
MSM	73.29	73.29	73.29	73.29	73.29
Behavioral Intervention Coverage (%)		2010	2015	2025	2031
General population					
Community mobilization		0.75	2	2	2
Mass media		91.5	99	99	99
VCT		5	15	15	15
Condoms		42.67	60	60	60
Youth: in-school		63.33	70	76.25	80
Youth: out-of-school		33.33	40	46.25	50
Workplace programs		10.83	12	12	12
Most-at-risk populations					
Sex workers		60	60	60	60
MSM		40	40	40	40
IDU: outreach		10	10	10	10
IDU: needle sharing		6.9	6.9	6.9	6.9
IDU: drug substitution		0	0	0	0
ARV Treatment (%)	2009	2010	2015	2025	2031
Percent of adults in need of ART receiving it (0–100%)	85	85.83	90	90	90

Worst-Case Scenario

In the prevention component, it is assumed that there is an increase of STI prevalence among all groups, and at the same time there is also a drop in the percentage of condom use. The coverage of other interventions, such as community mobilization and mass media will also decrease over time (See Table 3.6). For instance, STI prevalence among female low risk, medium and high risk groups will gradually increase and reach 4%, 12% and 30%, respectively by the year 2031. The Worst-case scenario will be used as a reference group when comparing Hard Choice 2 “targeted Interventions plus Linked Response” and “Current Coverage scenarios.”

Table 3.6: Main Input Parameters in Worst-Case Scenario for the Goals Model

STI Prevalence (%)	2009	2010	2015	2025	2031
Males					
Low Risk	1.5	1.57	1.91	2.59	3
Medium Risk	2.1	2.19	2.62	3.48	4
High Risk	4.9	5.13	6.29	8.61	10
MSM	17	17.36	19.18	22.82	25
Females					
Low Risk	0.5	0.66	1.45	3.05	4
Medium Risk	6.1	6.37	7.71	10.39	12
High Risk	23.7	23.99	25.42	28.28	30
Condom Use (%)	2009	2010	2015	2025	2031
Low Risk	2.9	2.9	2.44	1.52	0.97
Medium Risk	42	42.11	32.98	15.08	2.62
High Risk	88.67	80	75.53	65.79	59.43
MSM	73.29	60	59.65	58.96	58.55
Behavioral Intervention Coverage (%)		2010	2015	2025	2031
General population					
Community mobilization		1	0.5	0.5	0.5
Mass media		50	50	50	50
VCT		5	5	5	5
Condoms		30	30	30	30
Youth: in-school		60	52.86	38.57	3
Youth: out-of-school		30	26.43	19.29	15
Workplace programs		10	8.81	6.43	5
Most-at-risk populations					
Sex workers		60	55.24	45.71	4
MSM		40	37.62	32.86	3
IDU: outreach		10	8.81	6.43	5
IDU: needle sharing		7	6.45	5.54	5
ARV Treatment (%)	2009	2010	2015	2025	2031
Percent of adults in need of ART receiving it (0–100%)	85	85	85	85	85

Annex 4 List of Organizations Contacted for Assessing Future HIV/AIDS Financing in Cambodia

NGOs

1. Khmer HIV/AIDS NGO Alliance (Khana)
2. HIV/AIDS Coordinating Committee (HCC)
3. Family Health International (FHI)

Government

1. Ministry of Economy and Finance
2. Ministry of Health
3. Council for Development of Cambodia
4. Ministry of Women's Affairs
5. Cambodia HIV/AIDS Authority

Private Company

1. Mong Rithy Group
2. Microsoft (Cambodia)
3. T.O. Computer
4. First Cambodia
5. Chub Rubber Plantation

Donors

1. Asian Development Bank
2. World Bank
3. USAID
4. AUSAID
5. UNAIDS
6. UNFPA
7. EU

The Results for Development Institute (R4D) is a nonprofit organization committed to accelerating social and economic progress in low and middle income countries. We provide policy analysis, key information, decision-making tools, and policy advice to governments, civil society organizations, and international funders in order to stimulate positive change. With expertise in areas including economics and finance, health policy, education, and governance, R4D works with leaders, globally and at country level, to design and test solutions to some of the world's biggest development challenges.

The National Center for HIV/AIDS, Dermatology and STDs (NCHADS) is the lead agency in Cambodia's Ministry of Health for addressing HIV/AIDS. NCHADS is committed to evidence-informed strategic priorities. Targeted prevention is the first priority. Addressing the burden of HIV/AIDS care within the constraints of the healthcare system is the second priority. NCHADS third priority concerns the need to sustain program effectiveness. NCHADS pays particular attention to integrating its HIV/AIDS efforts with the existing public healthcare delivery system through partnerships with international and local NGOs, other government departments, and the private sector.

aids2031 is a consortium of independent individuals and organizations dedicated to answering critical questions about how global and national responses to AIDS must be adapted and transformed in order to best address the epidemic over the next two decades to the year 2031, the 50th anniversary of the discovery of AIDS.

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