

Community action for preventing HIV in Cambodia: evaluation of a 3-year project

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The 'Community Action for Preventing HIV/AIDS Project' was implemented in four provinces in Cambodia (2001–04) to support a comprehensive set of HIV prevention efforts. Implementation was strictly monitored in terms of inputs, outputs and outcomes. We examine changes in these variables during the project period to assess the extent to which they were related to the project. Inputs and outputs were monitored regularly by supervision and quarterly project reports. Baseline and follow-up surveys were conducted on 10 target groups to measure changes in outcome indicators related to sexual risk behaviours, uses of HIV voluntary counselling and testing (VCT), self-reported sexually transmitted infections (STIs) and other indicators. The analyses use data from surveys and from project monitoring.

Spending on HIV-related work at provincial level increased markedly, including investments in VCT, STI facilities and staff training. Yearly expenditure increased about 7-fold compared with years immediately preceding the project. VCT centres increased from 3 to 12, numbers of counsellors from 10 to 27, and numbers of client visits more than doubled. STI laboratory facilities increased from 0 to 6 with coverage of STI check-ups among sex workers increasing from 70% to 93% and a decline in men attending STI clinics. The survey results indicate significant changes in a number of major outcome indicators such as consistent condom use related to sex work (>80%), HIV testing and counselling after HIV tests, especially among police (42 to 72%, $P < 0.001$) and brothel-based sex workers (48 to 89%, $P < 0.001$). Self-reported STIs declined in most groups. Finally, the programmatic systems for planning, managing and monitoring implementation of activities at both central and provincial level, as well as technical guidelines, developed under the project have become the standard for the national programme.

In conclusion, the project appears to have been comprehensive and a number of favourable changes in output and outcome indicators occurred. It seems likely that the project made a substantial contribution to these positive outcomes, though the extent is not clear. The project is likely to have powerful long-term effects through strengthening of capacity and establishment of systems for the national programme.

Keywords Evaluation, risk behaviours, outcome indicators, HIV, Cambodia

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KEY MESSAGES

- The project achieved a high level of consistent condom use with commercial sex in all groups, substantial improvements in HIV-related counselling and testing as well as in self-reporting of STIs.
- National HIV/AIDS programmes should have a functioning monitoring and evaluation system in place together with technical guidelines and standard operational procedures for management, administration and accounting in order to properly monitor the effectiveness of programmes.
- This project demonstrated the vital importance of decentralized planning, management and accountability, with government institutions playing the leading role.

Introduction

National HIV programmes comprise multiple interventions aimed at reducing the spread of HIV and providing care and support for those affected. Resources and capacities are always limited, however, and there are many challenges in setting priorities. Different types of trials and operational research have been used to demonstrate the effects of given interventions in particular settings. The 'gold standard' for determining the efficacy of specific interventions is the randomized controlled trial (RCT). An RCT can provide information about the effects of interventions under trial conditions when conducted with well-defined and well-controlled interventions (Susser 1996). An RCT in rural Tanzania to evaluate the impact of case management of sexually transmitted infections (STIs) on new HIV infection found a significant reduction in HIV incidence of 40% (Grosskurth *et al.* 1995), while a study in Rakai district, Uganda, found no effect on HIV incidence though it had an impact on STI prevalence and incidence (Wawer *et al.* 1999). Furthermore, a cluster randomized trial of community-based peer education and clinic-based treatment of STIs in Eastern Zimbabwe did not indicate a positive impact at the community level in spite of greater programme activities and knowledge in the intervention communities (Gregson *et al.* 2007). However, different effects might be obtained when the interventions are implemented as programmes, and such differences are likely to be partly due to the fact that the effectiveness of HIV prevention depends very much on local contexts. The epidemiological context, i.e. the stage and magnitude of the epidemic, exposure patterns and the cultural and socio-economic contexts all influence the distribution of risk (Grassly *et al.* 2001).

Efforts to prevent HIV have had limited effectiveness to date, and this has led to an important debate on priorities in prevention. Low effectiveness can be related both to limited understanding of the local epidemiological context and to failures in tackling structural factors that support risky behaviour. Since structural changes take time, preventive efforts need to be guided in the short term by proper knowledge of local contexts. The generation of this type of knowledge forms a core component of monitoring and evaluation systems (UNAIDS 2000; Grassly *et al.* 2001). These are seen as vital instruments for answering questions about what works in prevention, but still few countries have such systems in place.

HIV epidemics in Asia differ greatly in magnitude, but they have mainly been driven by the sex industry, drug injecting or a combination of both (Ruxrungtham *et al.* 2004). In Cambodia, the primary HIV transmission route has mainly been from

female sex workers to male clients and then to their female sex partners, i.e. from husbands to wives or from men to other casual partners. However, the number of men in Cambodia buying sex has declined and condom use in such relationships has increased dramatically. Reported consistent condom use with clients among brothel-based female sex workers (FSWs) increased from 38.2% in 1997 to 90% in 2001. Also condom use with sex workers among military increased from 57% to 86% and among moto-taxi drivers from 67% to 79%, while buying sex dropped from 81% to 32% and from 52% to 18%, respectively (Saphonn *et al.* 2004). Incidence rates have declined in the main target groups, i.e. FSWs and the police (Saphonn *et al.* 2005). Nevertheless, HIV incidence and prevalence among sex workers remains high compared with other countries in the region, and the prevalence in the general adult population is the highest in Southeast Asia (Saphonn *et al.* 2004; Sopheab *et al.* 2006b). According to the latest national HIV Surveillance Survey (HSS), the prevalence of HIV among FSWs is 20.8%; among independent female sex workers (IFSWs), 11.7%; policemen, 2.5%; pregnant women attending antenatal clinics, 2.2%; and general population aged 15–49 years, 1.9%.

Since the initial phase of the HIV epidemic, Cambodia's National Center for HIV/AIDS, Dermatology and STDs (NCHADS) under the Ministry of Health, has designed national strategies and interventions to control the epidemic in the country. These strategies were documented in the consecutive HIV/AIDS National Strategic Medium Term Plans (MTP) 1993–98, 1998–2000 and 2001–05, and the revised strategic plan, 2004–07 (NCHADS 1993, 1997, 2000). Each strategic plan reflects a package of interventions that have changed over time in relation to the stage of the HIV epidemic in Cambodia. The first MTP focused primarily on prevention while the present strategy also puts a high priority on care (Saphonn *et al.* 2004). Cambodia's national strategies are now aimed at reducing HIV transmission in high-risk groups through STI treatment and increased condom use, improving HIV counselling and testing, and increasing the provision of HIV care (NCHADS 2004b).

The 'Community Action for Preventing HIV/AIDS' project was established in Cambodia in late 2001 and was funded by the Japan Fund for Poverty Reduction through the Asian Development Bank (JFPR) (NCHAIDS 2005). The project identified four provinces in which a significant proportion of the population was highly mobile, i.e. migrated to either the capital, Phnom Penh, or along the Cambodia–Thai border, or inside Thailand, potentially putting them at risk of higher risk behaviour and further HIV/STI transmission. The project was aimed at supporting a comprehensive set of HIV prevention activities and

strengthening the capacity of the national and provincial HIV authorities and selected non-government organizations (NGOs) to develop community-based prevention and care programmes (JFPR 2005). In this paper, we examine changes in preventive project input, output and outcome indicators during the project period in order to assess the extent to which these changes were related to the actual implementation of the project.

Methods

Project strategy and implementation

The main preventive strategies in the project were in line with the national strategy for HIV and STI prevention. They consisted of behavioural change communication (BCC: activities related to development and dissemination of appropriate, culturally and socially acceptable HIV educational messages and materials targeting high-risk groups and the general population, using both printed and electronic media); the 100% condom use programme (a multi-sectoral approach involving local authorities, health staff, police, government officials, brothel owners, sex workers, outreach and peer educators) with the aim of promoting condom use in all brothels and sex-related establishments (Saphonn *et al.* 2004; Rojanapithayakorn 2006); provision of STI services for both high-risk groups and the general population; and strengthening voluntary counselling and testing (VCT) services. Also, the HIV care component developed and established a comprehensive continuum of care for people living with HIV infection, a model that coordinated different services (opportunistic infection and antiretroviral drug treatment, laboratory support, home-based care and community support). The project was implemented by the provincial health departments of Battambang, Koh Kong, Prey Veng and Svay Rieng, and was directly managed by NCHADS. Annual comprehensive operational work-plans were developed by the respective provinces and consolidated by NCHADS. Technical guidelines for project components, programmatic planning and monitoring, the accounting system and standard operating procedures were established to ensure the efficiency, accountability and transparency of project implementation (JFPR 2005).

Project monitoring and evaluation methods

For efficient management, a specific software programme and charts of accounts were developed to monitor expenditure. Standardized work-plan formats were adapted to match the charts of accounts for ease of monitoring inputs (e.g. staff, funds, facilities) against outputs defined as services/activities delivered (e.g. number of staff trained, supervision, new STI clinics and VCT centres established). In addition to the project outputs, which were monitored regularly during supervision and compiled in provincial quarterly reports, a set of core outcome indicators were defined as part of the project monitoring and evaluation system to measure changes over the project period (e.g. HIV knowledge, always condom use, self-reported STI symptoms and treatment practices, report of HIV testing and counselling). The level of monitoring and evaluation efforts and preventive project indicators are illustrated in Figure 1. Indicators included related to sexual behaviour, consistent

condom use (always using condoms in sexual acts during the past 3 months), condom availability, HIV testing and counselling, STI symptoms and treatment-seeking behaviour, HIV knowledge, and questions about stigma. The stigma questions were asked only in the follow-up surveys and contained hypothetical questions on willingness to care for an infected family member, to buy food from infected sellers, to allow infected teachers to continue teaching, and to keep it a secret if a family member was infected. (The details of these indicators are shown in Tables 4–5 below.)

Baseline and follow-up surveys

For the project, a behavioural survey was conducted in the four provinces during January–February 2002 to provide a baseline for selected outcome indicators (Sopheab *et al.* 2006a). In principle, the survey used cluster sampling with a take-all approach per cluster for FSWs and IFSWs, military, police, casino workers and fishermen; time location sampling was used for moto-taxi drivers. Multistage cluster sampling was used to select the representative samples from the household males and females in the community (Sopheab *et al.* 2006a). A follow-up survey was conducted after the project, during August–September 2004, using the same sampling design and data collection tools to those in the baseline survey. Groups included in the baseline were military personnel, policemen, moto-taxi drivers, fishermen, casino workers, deminers (people whose primary job were to clear mine-fields specifically in Battambang province), male and female vocational training students, household males and females; FSWs and IFSWs. IFSWs are not brothel-based, being employed by beer halls and karaoke establishments and occasionally providing sex services to clients to supplement their income. Two groups, deminers and vocational training students, were dropped from the follow-up survey because they were not in fact targeted by the project. The refusal rate among female casino workers was 7% in the baseline survey and 14% in the follow-up survey, 4% among moto-taxi drivers at baseline, and less than 3% in both baseline and follow-up among the other groups.

Data analysis

Data were coded and entered into Excel (baseline data) or EpiData (Odense, Denmark) (follow-up data). Stata 8.0 for Windows (Stata Corporation, Texas, USA) was used for data analysis. T-tests and Chi-square tests were used for continuous and categorical variables, respectively, to test the significance of changes in indicators before and after the project, taking into account the cluster effects in the analysis. The surveys were approved by Cambodia's National Ethics Committee and Ministry of Health.

Triangulation

In addition to the surveys, other data sources from the accounting system, detailed work-plan, quarterly project reports, mid-year review project reports, monitoring reports, before and after health facility survey reports on VCT and STI services (NCHADS 2004a; Prom 2005) related to the project were checked and synthesized to provide a better understanding of the contribution made by the project. Furthermore, all four provincial

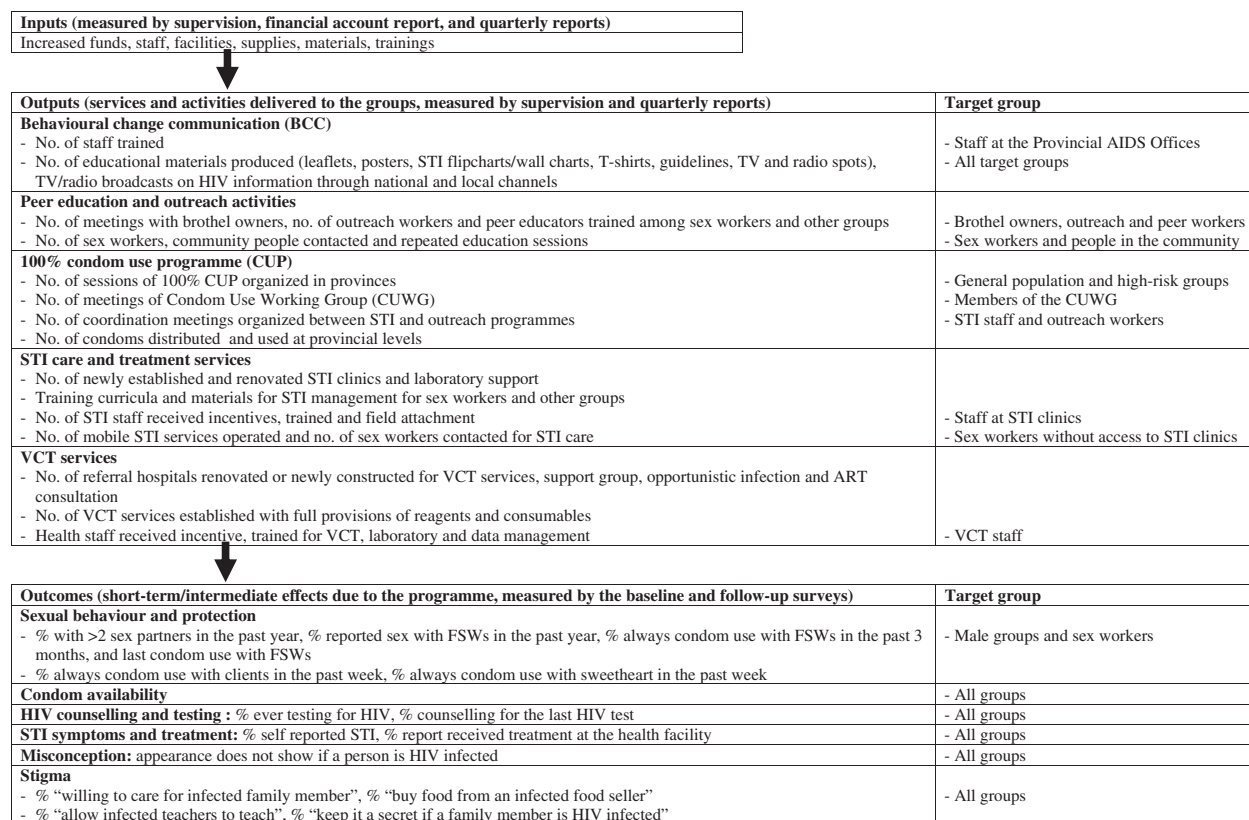


Figure 1 Illustration of levels of monitoring and evaluation efforts: project inputs, outputs and outcomes of 'Community Action for Preventing HIV in Cambodia'

budget allocations prior to the project were retrieved for comparison with the budget allocation for this project.

Results

Changes in inputs and outputs (provision of services, budget allocation)

The project led to a substantial increase in funding at provincial level. Prior to the project, in 2001, the total expenditure in the four provinces for the whole year was US\$73 470, which increased to more than US\$100 000 in only the first 6 months of 2002 (JFPR 2005). Thereafter, the yearly project spending on behaviour change communication, the 100% condom use programme, STI care and treatment, and VCT during the project period was US\$483 000. This expenditure does not include approximately US\$163 000 per year for establishing the continuum of care and its operation. This indicates the intensity of the project in comparison to the previous years of very limited funding.

Table 1 summarizes the two main output indicators related to the VCT and STI services. For instance, the number of VCT centres increased from 3 to 12 and the numbers of client visits more than doubled. Also, six STI laboratory facilities were established, made functional and fully equipped with necessary laboratory materials; there were no laboratory facilities prior to the inception of the project. The coverage of STI check-ups for

sex workers increased from 70% to more than 90%. More than 1200 FSWs were reached by the STI mobile services; again before the project this kind of service did not operate.

Though the JFPR project finished in 2004, the continuation of the interventions was secured with funding from the Department for International Development (DFID), UK, to sustain prevention and care activities in the next 5 years. Also grants from the World Bank and Global Fund for Malaria, Tuberculosis and HIV/AIDS will ensure the long-term sustainability of the programme. Moreover, an important aspect of this project implementation was the development of both technical guidelines for various project components (100% condom use, STI services, outreach activities and continuum of care), and standard operating procedures for management, administration, accounting and control of implementation. Draft guidelines and operating procedures had already been developed; these were further refined, tested and established as approved, official national guidelines for overall programme implementation; standard operating procedures established under the project similarly became standard for the programme.

Changes in sexual behaviour and condom availability

There were 3844 and 3593 participants in the baseline and follow-up surveys, respectively. The socio-demographic characteristics of the groups are shown in Table 2 for men and Table 3 for women. For men, all groups were on average about

Table 1 Changes in outputs (service provision) over the project period, 2002–04

Output indicators	2002	2004
STI services		
No. of STI clinics for sex workers	6	7
Health centres integrated with STI services	75	80
STI laboratory facilities	0	6
No. of STI visits among sex workers	3350	5997
No. of sex workers reached by STI mobile services	–	1207
No. of STI visits among general population	6902	7056
Coverage of STI check-up for sex workers	71.4%	92.5%
Proportion of men attending STI clinics	27.0%	9.0%
Voluntary counselling services		
No. of VCT sites	3	12
No. of trained counsellors	10	27
No. of trained laboratory technicians	10	20
No. of health staff who received counselling training	–	351
No. of clients who visited VCT sites	4017	10 568

– Indicates data not available.

Source: Cambodia Health Facility Survey, 2002 & 2004, ADB-JFPR: REG 9006 project monitoring and Cambodia final report and analysis of project impact, 2001–2004.

2 years older in the follow-up survey except the fishermen. This was probably a closed cohort since the sample design was identical in the two surveys, i.e. the surveys were repeated in the same places. There has been no new recruitment by the military or police during the past 10 years in Cambodia, since the end of the civil war. For women, there were no changes in mean age for direct FSWs and indirect IFSWs. Possible explanations may be the turnover of older sex workers, mobility and particularly the new entries of young women into the sex industry.

Tables 4–5 show changes in the outcome indicators between the baseline and follow-up surveys in both male and female groups. The proportion of men buying sex differed sharply between the groups with mobile occupations (military, police and moto-taxi drivers, casino workers) and the other groups surveyed. Sex with sex workers during the past 12 months was reported by 20–51% of the former groups and ≤10% among men in the general population and fishermen. However, the proportions of the various groups who bought sex did not change significantly over time. Consistent condom use remained very high with commercial sex. Two groups who were particularly focused on by the project, casino workers and fishermen, improved their condom protection substantially. For example consistent condom use with girlfriends during the past 3 months: among casino workers increased from 20% to 58% ($P=0.04$), and among fishermen from 17% to 50% ($P=0.02$). Finally, consistent

condom use among fishermen with sex workers increased from 57% to 84%, but was not statistically significant ($P=0.12$).

For women, consistent condom use with clients among FSWs was stable at a very high level. Fewer of them reported having regular clients (60% vs. 48%). Furthermore, consistent condom use with regular clients (those who visit the same sex workers at least five consecutive times) increased from 87% to 93%. In all groups, fewer women reported having boyfriends and women in the general population still worried about being infected by their husbands (41% vs. 37%).

Regarding the availability of condoms, men in the general population were the only male group that reported that condoms were increasingly available in their neighbourhood. Similarly, more women in the general population and casino workers reported that condom availability had increased (61% vs. 74%, $P=0.05$, and 35% vs. 49%, $P<0.001$, respectively).

Changes in response to VCT services

The baseline survey did not include a question on willingness to be HIV tested, but in the follow-up survey about 50% of the mobile groups, 26% of household men, and 37% of the fishermen indicated willingness. HIV testing rates increased among all target groups though they were mostly limited, the exception being a marked increase among men in the general population (4% vs. 9%, $P<0.001$). However, there was a substantial increase in counselling after the last test for HIV, especially among moto-taxi drivers (58% vs. 78%, $P=0.007$) and police (42% vs. 72%, $P<0.001$). Similarly, a high proportion of women across all groups wanted to be HIV tested. More FSWs (49% vs. 67%, $P<0.001$) and casino workers (23% vs. 37%, $P=0.03$) reported having been tested for HIV at least once. Moreover, the proportion being counselled when tested for HIV increased among all target populations: among FSWs from 48% to 89% ($P<0.001$), IFSWs from 47% to 75% ($P<0.001$), casino workers from 11% to 46% ($P=0.006$) and women in the general population from 17% to 40% (Table 5).

Changes in STI symptoms and treatment-seeking behaviour

Self-reported STI symptoms among men declined across all groups: moto-taxi drivers from 4% to 1%, military from 6% to 1% and police from 5% to 3%, and remained very low for others. In spite of the high proportions of self-reported STI symptoms among women, a decline was observed among FSWs (from 66% to 41%, $P<0.001$), IFSWs (from 44% to 29%, $P<0.001$) and the general female population (from 29% to 19%, $P<0.001$). Nevertheless, only FSWs and women in the general population reported an increase in seeking STI treatment at public or private clinics/hospitals.

Misconceptions and stigma

In most groups, there was a clear reduction in misconceptions regarding “Appearance can show if someone is HIV infected”. This was particularly the case among casino workers and fishermen, where the proportions who responded correctly increased from 67% to 87% and from 61% to 79% ($P<0.001$), respectively. Among the stigma indicator questions, the question

Table 2 Socio-demographic characteristics of male groups, baseline and follow-up surveys

	Moto drivers		Military		Police		Casino workers		Household males		Fishermen	
	Baseline <i>n</i> = 455	Follow-up <i>n</i> = 448	Baseline <i>n</i> = 437	Follow-up <i>n</i> = 458	Baseline <i>n</i> = 428	Follow-up <i>n</i> = 443	Baseline <i>n</i> = 73	Follow-up <i>n</i> = 152	Baseline <i>n</i> = 620	Follow-up <i>n</i> = 639	Baseline <i>n</i> = 262	Follow-up <i>n</i> = 262
Age												
Mean age, years (median)	31.0 (31)	33.0 (33)	36.2 (36)	37.6 (39)	37.1 (37)	38.7 (39)	25.7 (24)	27.9 (26)	29.2 (28)	31.7 (31)	30.4 (30)	30.2 (30)
Age group, %												
15–24 years	25.0	17.6	5.2	5.0	0.9	0.4	52.1	38.2	40.2	33.7	33.3	36.6
25–29 years	20.0	17.9	10.8	8.5	7.2	2.5	31.5	24.3	13.2	12.1	12.0	12.6
30–39 years	40.7	42.4	52.0	43.5	60.5	51.5	12.3	31.6	28.7	28.8	33.7	29.0
≥40 years	14.3	22.1	32.0	43.0	31.3	45.6	4.1	5.9	17.9	25.5	20.9	21.8
Marital status, %												
Not married	19.8	15.0	20.7	13.1	11.9	9.0	78.1	60.1	36.5	30.4	31.0	29.4
Married	80.2	85.0	79.3	86.9	88.1	91.0	21.9	39.9	63.6	69.6	69.0	70.6
Education												
Mean education level, years (median)	7.3 (8)	7.5 (8)	6.9 (7)	6.9 (7)	8.5 (8)	9.1 (9)	8.2 (8)	9.0 (9)	6.1 (6)	6.2 (6)	4.2 (4)	5.0 (5)
Category of education level, %												
0–6 years	31.3	33.1	41.9	37.3	16.4	13.8	30.1	22.4	54.1	52.3	79.1	69.9
7–9 years	49.8	41.7	35.9	45.6	52.1	44.9	31.5	30.3	33.1	36.3	17.4	23.3
≥10 years	18.9	25.2	22.2	17.1	31.5	41.3	38.4	47.4	12.8	11.4	3.5	6.9
Income												
Mean monthly income, US\$ (median)	45 (38)	44 (38)	25 (20)	29 (25)	29 (23)	32 (28)	119 (106)	142 (138)	26 (15)	19 (13)	66 (50)	60 (50)
Income category (US\$), %												
<40	54.4	57.2	93.3	88.5	85.7	86.4	4.2	3.4	88.1	89.5	27.5	45.0
40–100	44.9	41.2	5.8	10.4	10.7	12.9	45.8	20.1	9.7	9.4	58.8	42.3
>100	0.7	1.6	0.9	1.1	1.6	0.7	50.0	76.5	2.2	1.1	13.7	12.7
Breadwinner of family, %	78.0	57.1	61.8	40.8	58.1	39.4	78.1	52.4	46.5	37.9	85.7	64.1
Away from home more than a month in total in past year, %	18.5	12.7	17.9	23.1	25.2	30.3	20.6	39.9	11.8	20.5	16.3	34.2

“Would you keep it a secret if a family member is infected?” appeared the most sensitive in the sense that the responses varied greatly by group. For the male group, it ranged from 5% (police) to 21% (casino worker), while for female group, it ranged from 6% (household female) to 39% (casino worker). However, in most groups, a very small proportion said that they would wish to keep it a secret. There was a strong positive association between stigma and level of education for both men and women in the general population (results not shown).

Discussion

This was the first project managed by the national programme in which implementation was properly recorded and strictly monitored in terms of inputs, outputs and outcomes. Clearly, the great investments in health facilities and staff capacity (i.e. VCT, STI clinics, laboratory support and staff training)

contributed significantly to the increase in monthly numbers of sex workers attending STI clinics and numbers of VCT visits etc. In fact, this was due not only to a substantial increase in the budget, but also to effective disbursement, clear technical guidelines for project components and standard operating procedures for project expenditure. Overall, the findings show a high level of consistent condom use with commercial sex in all groups, and a positive change in the counselling received after the last HIV test as well as in self-reporting of STIs among men and sex workers. The maintenance of a high level of condom use and the change in the use of HIV testing and counselling and STI services might be attributed to the intensive project intervention. Further follow-up measuring changes in HIV transmission will be needed to observe possible epidemiological impact of these changes.

According to the review by Ruxrungtham *et al.* (2004), the proportion of men visiting sex workers in Asia varies from country to country (about 5–20%). From the public health

Table 3 Socio-demographic characteristics of female groups, baseline and follow-up surveys

	Direct female sex workers		Indirect/independent female sex workers		Casino workers		Household females	
	Baseline n = 274	Follow-up n = 235	Baseline n = 154	Follow-up n = 309	Baseline n = 72	Follow-up n = 140	Baseline n = 433	Follow-up n = 433
Age								
Mean age, years (median)	22.9 (22)	23.5 (23)	21.4 (21)	22.0 (21)	24.5 (23)	25.7 (24)	29.8 (30)	31.4 (31)
Age group, %								
15–24 years	71.5	67.2	81.6	77.7	60.6	50.7	36.7	33.8
25–29 years	19.1	25.1	17.8	17.5	23.9	24.3	11.5	12.4
≥30 years	9.4	7.7	0.6	4.9	15.5	25.0	51.8	53.8
Marital status, %								
Not married	97.8	98.3	94.3	95.2	81.7	65.0	26.2	30.8
Married	2.2	1.7	5.7	4.8	18.3	35.0	73.8	69.2
Education								
Mean education level, years (median)	2.4 (2)	2.5 (2)	3.7 (3)	3.6 (3)	7.0 (7)	7.0 (7)	4.0 (4)	4.0 (4)
Category of education level, %								
0–6 years	89.5	88.9	83.4	84.1	40.9	45.0	79.0	80.7
7–9 years	9.4	10.2	14.7	13.6	39.4	35.7	19.4	15.8
≥10 years	1.1	0.9	1.9	2.3	19.7	19.3	1.6	3.6
Income								
Mean monthly income, US\$ (median)	97 (63)	88 (50)	57 (38)	52 (38)	157 (150)	175 (125)	10 (3)	14 (8)
Income category (US\$), %								
<40	33.0	30.6	52.3	54.4	0.0	2.2	95.8	91.9
40–100	38.5	42.6	35.5	36.8	35.2	32.1	3.7	6.9
>100	28.5	26.8	12.1	8.8	64.8	65.7	0.5	1.2

standpoint, the most important message for the Cambodian context is to maintain the low level of men buying sex and to adopt safer sexual practices, particularly in terms of consistent condom use, in order to reduce HIV transmission. Consistent condom use increased among fishermen, from relatively low use at the baseline survey, but the increase was not statistically significant due to the low number buying sex, and a high level was maintained among the other groups. However, the contribution from the project in maintaining this high condom use is difficult to assess. The sex workers' visits among men in the surveys were still high in some groups, though lower than in the Behavioral Surveillance Survey (BSS) 2003 data (Sopheab *et al.* 2005), but short-term changes in this kind of risk behaviour may not indicate stable trends. Even in the BSS report, the data showed a decline in visits to sex workers in 2001 but an increase again in 2003 (Sopheab *et al.* 2005), suggesting that such behaviour is complex and may fluctuate over time (Taylor 1995) due to the influence of many factors such as mobility and socio-economic conditions.

Voluntary HIV counselling and testing has been shown to play an important role in HIV prevention and care since it serves as an entry point to both. Findings from a randomized trial in three countries in sub-Saharan Africa supported the efficacy of VCT in reducing risk behaviours in the short term

(CTESG 2000) and showed that it was cost-effective compared with other preventive interventions (Campbell *et al.* 1997; Sweat *et al.* 2000). Therefore, the importance of this service has been reflected in the consecutive Cambodian Strategic Plans for HIV/AIDS and STI Prevention and Care since 1998. Since 2002, VCT in Cambodia has been strengthened intensively and expanded to more than 130 centres (VCT Unit, NCHADS, June 2006) compared with only six centres in place in 1995, the year when services were first established in the country. In areas where VCT was established in 2002 (at the start of the project), the numbers of VCT centres, trained counsellors and laboratory technicians increased; this was consistent with the survey findings showing that people being HIV tested and receiving counselling increased markedly. The project operated synergistically on different levels of intervention including the VCT mass media campaign, community outreach, counselling and the availability of the VCT centres. Moreover, the project monitoring data showed changes in outputs in terms of service delivery (Table 1). However, as the numbers of VCT centres and service demands increase, the quality of VCT services, including quality assurance, privacy and confidentiality, will need to be strengthened.

There was an increase in the monthly numbers of sex workers attending STI clinics through the project period (Table 1).

Table 4 Main outcome indicators and their values (in %) among male groups as measured in baseline and follow-up surveys

Indicators	Moto drivers		Military		Police		Casino workers		Household males		Fishermen	
	Baseline n = 455	Follow-up n = 448	Baseline n = 437	Follow-up n = 458	Baseline n = 428	Follow-up n = 443	Baseline n = 73	Follow-up n = 152	Baseline n = 620	Follow-up n = 639	Baseline n = 262	Follow-up n = 262
Sexual behaviours and protection												
Sex partners last year: % with 2 or more	–	29	–	18	–	28	–	50	5	5	10	13
Sex partners past month: % with 2 or more	9	12	9	5	9	9	13	12	1	2	2	4
Sex with FSWs past year	20	28*	22	18	23	24	51	51	5	6	10	14
Always condoms past 3 months when sex with FSWs	92	94	93	90	91	95	96	97	91	100	57	84
Last condom use when sex with FSWs	–	94	–	93	–	95	–	99	–	97	–	97
Sex with girlfriend past year	14	9	11	5	7	7	30	18	–	2	–	10
Sex with girlfriend past 3 months	–	6	–	4	–	6	–	17	7	1	9	7
Always use condom with girlfriend past 3 months	60	60	69	47	37	52	20	58*	20	25	17	50*
Last condom use when sex with girlfriend	73	74	70	63	54	63	53	64	68	27	68	60
Last condom use when last time sex with wife	–	13	–	10	–	12	–	8	–	10	–	4
Condom availability												
Condoms are available in this area	52	57	65	67	65	64	62	43	16	29	26	22
HIV testing and counselling												
Would like to be HIV tested	–	45	–	58	–	66	–	53	–	26	–	37
Tested for HIV ever ^a	16	21	27	32	53	50	33	40	4	9***	9	10
Counselled when HIV tested last time ^a	58	78**	34	36	42	72***	26	33	36	49	48	48
STI symptoms and treatment												
Self-reported STI (urethral discharge)	4	1	6	1	5	3	1	1	1	1	1	3
Treated at the public or private clinic/hospital	56	71	56	50	68	64	100	100	14	33	75	50
Misconception												
Appearance doesn't show if a person is HIV infected	89	85	87	94**	91	91	67	87***	89	92	61	79***
Stigma												
Willing to care for infected family member	–	92	–	95	–	96	–	97	–	93	–	91
Will buy food from the food seller infected by HIV	–	79	–	91	–	87	–	75	–	77	–	81
Allow HIV-infected teacher to continue teaching	–	92	–	94	–	94	–	93	–	85	–	90
Keep it a secret if a family member is infected	–	9	–	6	–	5	–	21	–	9	–	13

Baseline survey conducted in February–March 2002; follow-up survey conducted in August–September 2004 (period 2.5 years).

^aExcludes those reporting HIV testing in the HIV Sero Surveillance Survey.

– Indicates information was not collected.

* $P \leq 0.05$; ** $P \leq 0.01$; *** $P \leq 0.001$.

Table 5 Main outcome indicators and their values (in %) among female groups as measured in baseline and follow-up surveys

Indicators	Direct female sex workers		Indirect/independent female sex workers		Casino workers		Household females	
	Baseline n = 274	Follow-up n = 235	Baseline n = 154	Follow-up n = 309	Baseline n = 72	Follow-up n = 140	Baseline n = 433	Follow-up n = 507
Sexual behaviours and protection								
Condoms always used past week with customers ^a	86	96	81	78	–	–	–	–
Have regular customers now	60	48	–	–	–	–	–	–
Condoms always used past month with regular customers	87	93	–	–	–	–	–	–
Had a boyfriend past year	48	35	54	49	16	14	4	2
Condoms always used past week with boyfriend ^b	63	65	56	58	–	–	–	–
Condom used last time with boyfriend	60	69	63	68	No sex	No sex	No sex	33
Sex for money in past year	–	–	37	34	0	0	–	–
Worried about being infected by husband (among those married)	–	–	–	–	–	–	41	37
Condom availability								
Condoms are available in this area	96	92	73	71	61	74*	35	49***
HIV testing and counselling								
Would like to be HIV tested	–	87	–	60	–	47	–	20
Tested for HIV ever ^b	49	67***	40	40	23	37*	5	4
Counselled when HIV tested ^b	48	89***	47	75***	11	46**	17	40
STI symptoms and treatment								
Self-reported STI (abnormal discharge)	66	41***	44	29**	24	20	29	19***
Treated at the public or private clinic/hospital	75	86*	46	47	35	32	46	51
Misconception								
Appearance doesn't show if a person is HIV infected	62	93***	65	92***	61	93***	72	91***
Stigma								
Willing to care for infected family member	–	80	–	93	–	92	–	90
Will buy food from the food seller infected by HIV	–	80	–	83	–	70	–	77
Allow HIV-infected teacher to continue teaching	–	93	–	95	–	94	–	89
Keep it a secret if a family member is infected	–	38	–	29	–	39	–	6

Baseline survey conducted in February–March 2002; follow-up survey conducted in August–September 2004 (period 2.5 years).

^aFor indirect sex workers, condom use with clients and boyfriends specified in the past 3 months.

^bExcludes those reporting HIV testing in the HIV Sero Surveillance survey.

– Indicates question was not asked for this group.

* $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$.

This high coverage suggests an improvement in STI services, laboratory support, and the referral of sex workers through the 100% condom use programme, an observation that was supported by the surveys: a substantial increase was observed in self-reported use of public STI clinics among both FSWs and females in the general population. The proportion of men attending STI clinics declined, and this was in agreement with a decrease in STI experience among male groups, suggesting a real reduction in STIs among men (JFPR 2005).

This study combined the baseline and follow-up surveys with information from the comprehensive monitoring system with the aim of linking information on inputs/outputs to project achievements in terms of outcomes. In monitoring and evaluation, according to Thomas *et al.* (2006), data collection in any HIV prevention programme has to serve at least three main purposes: (1) managing programme operation and service delivery, (2) monitoring to support ongoing programme or project implementation and improvement, and (3) evaluating the programme

or project outcomes, services and institution performance on the basis of a number of key performance indicators. Our approach to evaluation, using different data sources to triangulate the findings, is likely to strengthen validity. Nevertheless, a number of concerns should be raised about the extent to which the measured changes can be attributed to our project intervention.

The first concern relates to the before-after method and the possible biases inherent in cross-sectional surveys. Information bias such as in asking about past sexual practices and changes over time in perceptions of acceptable and desirable responses to indicator questions are possible (Guest *et al.* 2005). However, in the surveys conducted, this bias may have been reduced by the thorough training of interviewers in dealing with sensitive questions, the high retention rate of the data collection team, and the fact that the interviews were conducted in confidential and private settings and under close supervision from a national supervision team. Furthermore, the refusal to participate was low and does not seem to introduce significant bias, except among female casino workers—most of their refusals were due to the administrative arrangements at the casino facilities that did not allow enough time for women to be well informed and interviewed.

Another concern is the possible effect of multiple or overlapping interventions rather than the interventions specific to this particular project. During implementation of the project, however, no other HIV prevention activities were in place in these provinces. Three NGOs were funded by the project, namely Population Services International to support the 100% condom use campaign and condom marketing, Action IEC for technical support on HIV educational material designs, and WOMEN to conduct outreach activities to communities as part of the project in Prey Veng province. Therefore, it is unlikely that the positive changes during the project period were due to external interventions rather than the project itself.

The final concern relates to changes that may have happened if the project had not been implemented—simply the persisting effects of past preventive efforts. This might have happened to some extent, but we would anticipate lower levels of changes than we found in the present project considering the previously very low levels on inputs.

In summary, we have been able to show that the project was comprehensive and intensive and that a number of favourable changes in input, output and outcome indicators occurred. The nature of the evaluation design restricted us in respect of a clear indication of the extent to which the changes in outcomes could be directly attributed to the project alone. However, the project 'Community Action for Preventing HIV/AIDS' was extraordinarily intensive compared with interventions in the past, and based on the different types of data we can conclude that it made a substantial contribution to the positive changes observed. The project is also likely to have powerful long-term effects through the strengthening of capacity, such as training and the development of both technical guidelines for various project components and standard operating procedures for management, administration, accounting and control of implementation, which have been adopted and are now used as official national programme guidelines; all inputs that are

likely to strengthen the coverage, intensity and quality of future interventions.

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