

主論文の要旨

**Factors associated with HIV testing among the general  
male population in Cambodia: A secondary data  
analysis of the Demographic Health Survey in  
2005, 2010, and 2014**

カンボジアの一般男性におけるHIV検査受検に相関する  
因子の検討：2005年、2010年、2014年の人口保健調査の二次分析

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## **【Introduction】**

In Cambodia, the human immunodeficiency virus (HIV) is predominantly transmitted between spouses and casual partners, with men having higher mortality and morbidity from HIV infection. This study aimed to identify the rate of HIV testing and barriers to HIV testing among the general male population in Cambodia.

## **【Methods】**

The number of men who underwent HIV testing at Voluntary Confidential Counseling and Testing (VCCT) sites, and the number of HIV-positive men were extracted from VCCT data in 2006-2017. The Cambodia Demographic and Health Survey (CDHS) is a national survey involving representative samples of men and women aged 15-49 years. The data of male participants of CDHS data in 2005, 2010, and 2014 were used for this study. The number of male participants who completed the individual interview of the CDHS was 6,731 in 2005, 8,239 in 2010, and 5,190 in 2014. We used their sociodemographic information, HIV risk behaviors, and knowledge and coverage of prior HIV testing. The sampling weights were included in all statistical analyses using CDHS data. A logistic regression model was used to estimate the odds ratios of having an HIV test and the 95% confidence intervals. In multivariate analysis, all available factors were used for adjustment, and a dummy variable was applied for different periods of the CDHS. A p-value of <0.05 was considered statistically significant. The analysis was performed using Statistical Package for the Social Sciences (SPSS) version 24.0 (IBM SPSS Inc.).

## **【Results】**

1. Trend in number of men who had HIV testing at VCCT sites and HIV positive rate from 2006 to 2017

The number of men who had HIV testing per quarter was approximately 23,000 in 2006, and increased to 47,661 in the first quarter of 2010, plateaued at 35,000-46,000 in 2010-2012, and decreased gradually to 7,598 in the first quarter of 2015 (Fig 1). Most men who had HIV testing at VCCT sites were 15-49 years old. The HIV positive rate was 8.7% in the first quarter of 2006, decreased to 2.1% in the fourth quarter of 2010, and then increased to 6.2% in the second quarter of 2015. The HIV positive rate of the age group <15 years was higher than those of the other groups (Fig 2). The number of HIV-positive men decreased from 2,001 in the first quarter of 2006 to 528 in the fourth quarter of 2017 (Fig 3).

2. Sociodemographic characteristics and HIV risk history

The CDHS data showed that the major age group was 20-35 years and the major area of residence was rural in 2005-2014 (Table 1). The proportions of men who had no education,

who had no work, who were agriculture workers, who had never married decreased, who had three or more lifetime sexual partner, whose last sexual partner was female entertainment worker (FEW), and who used condoms during their last sexual intercourse were decreased from 2005 to 2014. The prevalence of HIV testing increased from 14.7% in 2005 to 36.4% in 2014.

### 3. Factors associated with HIV testing among Cambodian men in 2005, 2010, and 2014

Multivariable logistic regression analyses using CDHS data showed that men who were the age groups of 20-35 and 36-49 years old, who had high and very high wealth indices, who were ever married, who had a greater number of lifetime sexual partners, and who used condoms during the last sexual intercourse had a significantly higher prevalence of HIV testing among the general male population in 2005, 2010 and 2014 (Table 2). Full-time workers and those in the service or manual industries had a higher prevalence compared to men who were not working in all years. The associations of the last sexual partner, the second-to-last sexual partner, having any sexually transmitted infection (STI), and having genital discharge with the lifetime prevalence of HIV testing were not consistent in all years.

### 4. Factors associated with HIV testing among Cambodian men in 2005-2014

We performed logistic regression analysis using data on 20,160 men who participated in the three CDHS years. Univariate analysis showed that all variables were associated with the lifetime prevalence of HIV testing. However, multivariate analysis showed that the recent CDHS years, age  $\geq 20$  years, urban residence, higher education, higher wealth index, having occupation other than agriculture, ever married status, lifetime sexual partners  $\geq 2$ , and condom use during the last sexual intercourse were significantly associated with a higher prevalence of HIV testing (Table 3). Men whose last or second-to-last sexual partners were spouses, and who had diagnosis of STIs or STI-related symptoms in the last 12 months were more likely to have an HIV test but the difference was not significant in the multivariable analysis.

## **【Discussion】**

The total number of men who had an HIV test at VCCT sites increased from 2006 to 2010 and the lifetime prevalence of HIV testing among men in CDHS increased from 2005 to 2014. The introduction of community-based testing programs might be one of the reasons for this increase in the lifetime prevalence. People can also have HIV testing in private sectors.

To our knowledge, this is the first report of factors associated with HIV testing among the general male population in Cambodia. Of nine factors associated with a higher lifetime

prevalence of HIV testing in 2005-2014, seven were sociodemographic factors, namely CDHS year, age, residence, education, wealth index, occupation, and marital status. The other two factors were HIV risk factors, such as the number of lifetime sexual partners and condom use during the last sexual intercourse. These results are consistent with those of previous studies. The results of this study suggest that Cambodian men who used condoms in the last sexual intercourse might be highly cautious about HIV infection compared to men who were nonusers of condoms. Men who used condoms during the last sexual intercourse with the second-to-last sexual partner were also more likely to have more HIV testing than the others.

Factors related to STIs were not significantly associated with lifetime HIV testing in 2005-2014. The prevalence of HIV infection is higher among STI patients. Genital ulcers increase HIV transmission by bleeding frequently during sexual intercourse, and nonulcerative STIs also increase genital shedding of HIV. This study revealed that the general male population in Cambodia did not worry about having an HIV infection so much when they had genital sore or ulcer. The healthcare provider-initiated testing and counseling approach (HPITC) should be emphasized among STI patients, and education of reproductive health should be provided in primary schools to decrease the rate of STI transmission as well as HIV.

The male HIV positive rate at VCCT sites was high in 2006, but it might not represent the rate in the general population because the clients of HIV testing at VCCT sites might not represent the general population. The HIV positive rate of men <15 years was higher than the others in 2006-2015. It might be due to a high rate of mother-to-child transmission. It was reported that the mortality of HIV-positive children was low during after starting antiretroviral therapy (ART) but high before ART because of delays in ART initiation. The rate of lost to follow-up in HIV-positive children was also high. Improving the coverage of HIV testing and ART among pregnant women contributed to decreasing the HIV positive rate among children.

This study has some limitations. We did not analyze HIV knowledge or AIDS stigma among the sample, although lack of HIV knowledge and fear of stigma and discrimination are reported to be associated with low compliance with HIV testing. Second, the prevalence of HIV testing using the CDHS data was calculated using the lifetime HIV testing rate, yet the rate in the more recent survey might be higher than that of the previous survey because of accumulation over time. The third limitation is the possibility of uncertain findings caused by memory bias and embarrassment to the interviewers.

### **【Conclusion】**

This study showed that the lifetime prevalence of HIV testing increased from 2005 to 2014 among the general male population in Cambodia, although the number of men who

had HIV testing at the VCCT sites increased from 2006 to 2010 and decreased from 2012 to 2015. Factors associated with ever having an HIV test among the general male population in CDHS 2005-2014 were CDHS year, age group, residence, educational level, wealth index, occupation, marital status, number of lifetime sexual partners, and condom use during the last sexual intercourse. These results suggest that HIV prevention programs at primary schools throughout the country could contribute to the overall prevalence of HIV testing in Cambodia.