J Hum Ecol, 47(1): 27-33 (2014)
PRINT: ISSN 0970-9274 ONLINE: ISSN 2456-6608 DOI: 10.31901/24566608.2014/47.1.04

Determinants of Knowledge of HIV Status in Cambodia: Results from a Population-based Survey

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KEYWORDS HIV Testing. Population Survey. Men. Women. Knowledge of HIV Status. Stigma. Cambodia

ABSTRACT The aim of this study was to investigate the determinants of knowledge of HIV status in Cambodia using secondary data analysis of the national demographic and health survey, 2010. Of the total sample of 18754 15-49 year-old women and 8239 15-49 year-old men, 23.5% and 24.2%, respectively, reported to have ever had an HIV test and had received their HIV test results (knowledge of HIV status). In multivariate analysis, among women, middle age (30-39 years), higher educational level, having greater wealth, currently not working, residing in an urban area, greater HIV transmission knowledge, lower AIDS stigma attitudes, having been diagnosed with a sexually transmitted disease in the past 12 month, and among men, middle age (30-39 years), higher educational level, having greater wealth, currently working, residing in an urban area, lower AIDS stigma attitudes, and having had extramarital sexual partners in the past 12 months were associated with knowledge of HIV status. Results may inform the HIV testing and Counselling programme in Cambodia.

INTRODUCTION

To reach the goal of zero new HIV infections, individuals should receive a continuum of prevention services, starting with HIV testing, "followed by linkage of HIV-uninfected persons to prevention services, retention in such services, and adherence to prevention interventions with repeated HIV testing to monitor for HIV acquisition." (McNairy and El-Sadr 2014: S12). "Effective national and global HIV responses require a significant expansion of HIV testing and counselling (HTC) to expand access to prevention and care." (Suthar et al. 2013: 1). In order to improve on HIV testing it is important to assess on a population level the uptake of HIV testing and factors associated with it.

Cambodia is a low income country in Southeast Asia with an estimated population of 15.135 million in 2013 (United Nations 2013), and 20% of the population living in urban and 80% in rural areas (WHO 2012). In Cambodia the human immunodeficiency virus HIV prevalence declined from 1.7% in 1998 to 0.7% in 2011 (Sopheab et al. 2009; Vun et al. 2014). Sex work used to be a dominant mode of transmission in 1990's. This has changed over time and the transmissions between spouses and casual partnerships now account for around a half of the total new infections (Vun et al. 2014; Yang et al. 2013). During the second phase of the country's HIV response, Voluntary Counselling and Testing (VCT) has been rapidly expanding to cover all operational districts and even health centre level (Vun et al. 2014). Provider Initiated Testing and Counselling (PITC) has been introduced in most health centres as well as referral hospitals and recently outreach HIV testing has been introduced for Most-at-risk Populations (MARPs) (Vun et al. 2014). Knowledge of HIV status helps HIV-negative individuals make specific decisions to reduce risk and increase safer sex practices so they can remain disease free. For those who are HIV infected, knowledge of their status allows them to take action to protect their sexual partners and to access treatment (Peltzer et al. 2009).

In the most recent Demographic and Health Survey (National Institute of Statistics, Direc-

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torate General for Health, and ICF Macro 2011) 24% of the general population (15-49 years) had been tested for HIV and received their test results. In surveys in the region similar prevalence rates of HIV testing were found, for example, in a rural demographic surveillance site in Vietnam, 7.6% (Pharris et al. 2011), in a cross-sectional computer-assisted telephone interview survey of a representative sample of multiracial Malaysians aged 18 years and above, 20.6% (Wong 2013) and in a population-based sample from Guntur district in Andhra Pradesh in India, 21.1% (Dandona et al. 2009).

Various factors have been identified for the low uptake of HIV Counselling and Testing (HCT): (1) socio-economic factors such as age (Ma et al. 2007; Pharris et al. 2011; Wringe et al. 2008), lower educational level (Dandona et al. 2009; Gage and Ali 2005; Peltzer et al. 2009; Yao et al. 2014), lower household wealth (Agha 2012; Gage and Ali 2005; Pharris et al. 2011), and rural residence (Dandona et al. 2009; Pharris et al. 2011; Peltzer et al. 2009; Wringe et al. 2008); (2) lack of HIV knowledge and greater HIV risk behaviour (Gage and Ali 2005; Kakimoto et al. 2007; Ma et al. 2007; Peltzer and Matseke 2013; Sasaki et al. 2010; Wringe et al. 2008), and 3) social factors such as fear of stigma and discrimination (Corno and de Walque 2013; Ma et al. 2007; Obermeyer and Osborn 2007; Wong 2013).

There is a lack of information about factors contributing to HIV testing in the Cambodian general population (Kakimoto et al. 2007; Sasaki et al. 2010). Therefore, this study investigates the determinants of knowledge of HIV status in Cambodia using secondary data analysis from the National Demographic and Health Survey 2010. Specifically, the objectives of the study are: 1) to estimate the knowledge of HIV status in national population-based survey in Cambodia, and 2) to assess factors (socio-demographics, HIV transmission knowledge, HIV risk history, AIDS stigma) associated with the knowledge of HIV status.

METHODS

Sample and Procedure

Participants for this study were drawn from the 2010 Cambodia Demographic and Health Survey (CDHS), a nationally representative sample of 18754 women and 8239 men aged 15 to 49 years. The 2010 CDHS employed a two-stage stratified sample, where systematic sampling with probability proportional to size was applied (National Institute of Statistics, Directorate General for Health, and ICF Macro 2011).

Measures

The questionnaire included demographic variables such as age, sex, formal education, work status, residence and wealth status, a composite index based on the household's ownership of consumer items such as television, car, drinking water, toilet facilities, etc. (National Institute of Statistics, Directorate General for Health, and ICF Macro 2011).

HIV Testing History*:* The survey included questions concerning the history of HIV antibody testing. These measures were used to classify participants into groups based on whether they had been tested for HIV and knew their results. Participants who reported having been tested for HIV indicated their HIV awareness status of their most recent test, or that they did not know the results.

HIV Risk History: To assess HIV risk history, participants indicated the number of sex partners they had in the previous 12 months and lifetime and if they had been diagnosed with a sexually transmitted disease (STD) in the past 12 months. All responses were dichotomised indicating the occurrence or non-occurrence of each risk factor.

HIV Transmission Knowledge was assessed with four items, for example, "Can people reduce their chance of getting the AIDS virus by using a condom every time they have sex?" Response options were yes, no, does not know. Responses were scored for the number of correct responses; with don't know responses scored incorrect, range 0-4. Scores were coded into two levels low= 0-3 correct responses and high=4 correct responses.

AIDS Stigma Attitudes were assessed with three items, for example "If a member of your family became sick with AIDS, would you be willing to care for her or him in your own household?"Response options were, "yes", "no" or "do not know/not sure/depends". A total score was calculated, (range 0-3), and coded into two levels 0= scores low AIDS stigma and 1-3 scores high AIDS stigma.

Data Analysis

Data analysis was performed using STATA software version 11.0 (Stata Corporation, College Station, Texas, USA). The analysis in STATA took into account the multilevel stratified cluster sample design of the study. We obtained frequencies as estimation of prevalence of knowledge of HIV status. Logistic regression analysis was conducted to estimate the association between relevant predictor variables and knowledge of HIV status. The predictor variables were identified from the literature as possible factors that may be associated with knowledge of HIV status (Agha 2012; Corno and de Walque 2013; Dandoma et al. 2005; Gage and Ali 2005; Kakimoto et al. 2007; Ma et al. 2007; Obermeyer and Osborn 2007; Pharris et al. 2011; Sasaki et al. 2010; Wong 2013; Wringe et al. 2008). Unadjusted odds ratios for selected predictor variables (sex, age, formal education, residence, wealth status, working status, HIV knowledge, HIV risk behaviour, AIDS stigma attitudes, history of STD, number of sexual partners) are reported, while considering knowledge of HIV status as a dependent variable, separately for women and men. The results of adjusted odds ratios are reported, having controlled for factors as significant in the bivariate analysis. The dependent variable was knowledge of HIV status, and the independent variables were factors which significantly increased knowledge of HIV status in the bivariate analysis. In the analysis, weighted percentages are reported. The reported sample size refers to the sample that was asked the target question. The two-sided 95% confidence intervals are reported. The p-value less or equal to 5% is used to indicate statistical significance. Both the reported 95% confidence intervals and the p-value are adjusted for the multistage stratified cluster sample design of the study.

RESULTS

Of the total sample of 18754 15-49 year-old women and 8239 15-49 year-old men, 23.5% and 24.2%, respectively, reported to have ever had an HIV test and had received their HIV test results (knowledge of HIV status). In multivariate analysis, among women, middle age (30-39 years), higher educational level, having greater wealth, currently not working, residing in an urban area, greater HIV transmission knowledge, lower AIDS stigma attitudes, having been diagnosed with a sexually transmitted disease in the past 12 months and having had extramarital sexual partners in the past 12 months were associated with knowledge of HIV status (see Table 1).

In multivariate analysis among men, middle age (30-39 years), higher educational level, having greater wealth, currently working, residing in an urban area, lower AIDS stigma attitudes, and having had extramarital sexual partners in the past 12 months were associated with knowledge of HIV status (see Table 2).

Of those who had tested for HIV more than one-third of the women (34.6%) had their test within the past year, while almost two-thirds of the men who had tested for HIV (65.1%) had their test two ore more years ago. By far most women and men had their last HIV test in a public health facility, namely a hospital (national, provincial or district), 40.0% for women and 37.1% for men, followed by the health centre, 36.9% for women and 21.3% for men. Among the different types of private health facilities, the most utilized for HIV testing was the private clinic, 6.7% for women and 12.4% for men (see Table 3).

DISCUSSION

The study found from a large, nationally representative population-based survey that 23.5 of women and 24.2% had knowledge of their HIV status, similar prevalence rates of ever HIV testing were found in the region, India, Malaysia and Vietnam (Dandona et al. 2009; Pharris et al. 2011; Wong 2013).

This study found in multivariate analysis, among both men and women that middle age (30-39 years), higher educational level, having greater wealth, and residing in an urban area, were associated with knowledge of HIV status. Other studies also found that socio-economic factors such as age (Ma et al. 2007; Pharris et al. 2011; Wringe et al. 2008), higher educational level (Dandona et al. 2009; Gage and Ali 2005; Peltzer et al. 2009; Yao et al. 2014), greater household wealth (Agha 2012; Gage and Ali 2005; Pharris et al. 2011), and urban residence (Dandona et al. 2009; Pharris et al. 2011; Peltzer et al. 2009; Wringe et al. 2008) were associated with knowledge of HIV status. Similar to the knowledge of HIV status, Sopheab et al. (2009) found that the HIV

Table 1: Bivariate and multivariate analyses of factors associated with knowledge of HIV status among women (n=18754)

Variables	*Know HIV test result (%)*	*Does not know the HIV test result (%)*	*Crude OR (95% CI)*	*Adjusted OR (95% CI)*
Demogrphics				
Age in years				
All	4513 (23.5)	14241 (76.5)		
15-29	2541 (24.9)	7755 (75.1)	1.00	1.00
30-39	1257 (28.5)	2916 (71.5)	1.20 (1.09-1.33)[c]	1.38(1.23-1.25)[c]
40-49	715 (15.6)	3570 (84.4)	0.56 (0.50-0.62)[c]	0.63 (0.55-0.72)[c]
Education				
None	462 (15.4)	2741 (84.6)	1.00	1.00
Primary	2062 (22.8)	6734 (77.2)	1.63 (1.40-1.89)[c]	1.30 (1.08-1.56)[b]
Secondary or higher	1989 (28.3)	4766 (71.7)	2.17 (1.85-2.55)[c]	1.80 (1.45-2.23)[c]
Wealth Quintile				
Lowest	458 (16.0)	2802 (84.0)	1.00	1.00
Second	521 (17.5)	2638 (82.5)	1.15 (0.95-1.30)	1.31 (1.03-1.67)[a]
Middle	635 (20.1)	2607 (79.9)	1.32 (1.12-1.56)[c]	1.37 (1.08-1.72)[b]
Fourth	948 (24.1)	2787 (75.9)	1.67 (1.42-1.96)[c]	1.79 (1.42-2.27)[c]
Highest	1951 (36.2)	3407 (63.8)	2.98 (2.50-3.54)[c]	2.80 (2.16-3.63)[c]
Working Status				
Not working	1365 (25.5)	4155 (75.5)	1.00	1.00
Currently working	3145 (22.7)	10074 (78.3)	0.85 (0.77-0.95)[b]	0.66 (0.57-0.77)[c]
Geolocality				
Rural	2315 (19.9)	10362 (80.1)	1.00	1.00
Urban	2198 (37.3)	3879 (62.7)	2.40 (2.11-2.73)[c]	2.12 (1.78-2.52)[c]
HIV Knowledge, Attitudes and Risk				
HIV Knowledge				
Not knowing any 4 items	1092 (22.3)	3776 (77.7)	1.00	1.00
Knowing all 4 items	2622 (29.3)	6080 (70.7)	1.45 (1.30-1.61)[c]	1.26 (1.10-1.44)[c]
AIDS stigma attitudes				
None	3477 (27.7)	8674 (72.3)	1.00	1.00
Yes (any of 3 items)	885 (16.6)	4312 (83.4)	0.52 (0.45-0.58)[c]	0.70 (0.61-0.80)[c]
History of STD in the Past 12 Months				
No	4265 (23.1)	13847 (76.9)	1.00	1.00
Yes	238 (37.4)	378 (62.6)	1.19 (1.63-2.44)[c]	2.08 (1.64-2.63)[c]
Number of Sexual Partners in Lifetime				
One	3847(31.4)	7988 (68.6)	1.00	--
Two or more	355 (33.6)	645 (66.4)	1.11 (0.93-1.33)	--
Sexual Partner Other Than Husband in Past 12 Months				
No	4481 (23.5)	13847 (76.5)	1.00	1.00
Yes	32 (51.7)	378 (48.3)	3.50 (1.53-7.98)[b]	4.65 (1.74-12.45)[b]

[c]P<0.001, [b]P<0.01, [a]P<0.05

prevalence in urban areas was approximately three times higher than in rural settings and among men HIV prevalence increased with household wealth and education. Nevertheless, access to HCT in rural areas and in health centres may need to be increased in order to further improve on HIV testing rates, especially to address rural HIV testing and counselling service utilization gaps (Yawson et al. 2014).

Further, among men and women lower AIDS stigma attitudes and having had extramarital sexual partners in the past 12 months were associated with knowledge of HIV status. These findings that greater HIV risk behaviour (Gage and Ali 2005; Kakimoto et al. 2007; Sasaki et al. 2010), and social factors such as lower AIDS stigma and discrimination (Corno and de Walque 2013; Ma et al. 2007; Obermeyer and Osborn 2007;

Table 2: Bivariate and multivarivate analyses of factors associated with knowledge of HIV status among men (n=8239)

Variables	*Know HIV test result (%)*	*Does not know the HIV test result (%)*	*Crude OR (95% CI)*	*Adjusted OR (95% CI)*
Demographics				
Age in Years				
All	1939 (24.2)	6294 (75.8)		
15-29	894 (20.7)	3762 (79.3)	1.00	1.00
30-39	641 (34.7)	1192 (65.3)	2.04 (1.75-2.37)[c]	2.04 (1.72-2.42)c
40-49	404 (22.4)	1340 (77.6)	1.11 (0.92-1.33)	1.03 (0.85-1.26)
Education				
None	58 (9.6)	616 (90.4)	1.00	1.00
Primary	537 (16.8)	2814 (83.2)	1.88 (1.34-2.66)[c]	1.61 (1.09-2.38)[a]
Secondary or higher	1344 (32.4)	2864 (67.6)	4.49 (3.19-6.33)[c]	2.94 (1.98-4.38)[c]
Wealth Quintile				
Lowest	125 (10.5)	1285 (89.5)	1.00	1.00
Second	198 (15.9)	1221 (84.1)	1.60 (1.18-2.17)[b]	1.37 (0.99-1.89)
Middle	254 (18.9)	1191 (81.1)	1.98 (1.49-2.63)[c]	1.51 (1.12-2.03)[b]
Fourth	425 (26.8)	1236 (73.2)	3.11 (2.29-4.21)[c]	2.08 (1.49-2.89)[c]
Highest	937 (43.5)	1356 (56.5)	6.54 (4.95-8.64)[c]	3.07 (2.20-4.28)[c]
Working Status				
Not working	149 (10.3)	1379 (89.7)	1.00	1.00
Currently working	1790 (27.4)	4915 (82.6)	3.31 (2.68-4.08)[c]	4.41 (3.41-5.70)c
Geolocality				
Rural	946 (19.2)	4682 (80.8)	1.00	1.00
Urban	993 (43.4)	1612 (56.6	3.23 (2.73-3.83)[c]	1.70 (1.39-2.07)[c]
HIV Knowledge, Attitudes and Risk				
HIV Knowledge				
Not knowing any 4 items	1404 (27.7)	3616 (72.3)	1.00	---
Knowing all 4 items	245 (25.1)	886 (74.9)	0.87 (0.69-1.11)	
AIDS Stigma Attitudes				
None	1637 (28.3)	4314 (71.7)	1.00	1.00
Yes (any of 3 items)	271 (14.2)	1596 (85.8)	0.51 (0.44-0.58)[c]	0.68 (0.59-0.78)[c]
History of STD in the Past 12 Months				
No	1927 (24.2)	6216 (75.8)	1.00	---
Yes	7 (31.6)	16 (68.4)	1.44 (0.50-4.13)	
Number of Sexual Partners in Lifetime				
One	1518 (32.1)	3254 (67.9)	1.00	---
Two or more	77 (34.7)	138 (65.3)	1.22 (0.76-1.65)	
Sexual Partner *Other Than Wife in Past 12 Months*				
No	1759 (23.0)	6096 (77.0)	1.00	1.00
Yes	176 (48.7)	195 (51.3)	3.17 (2.40-4.19)[c]	1.98 (1.44-2.72)[c]

[c]P<0.001, [b]P<0.01, [a]P<0.05

Wong 2013) have been confirmed in previous studies to be associated with increased HIV testing. Among women, it was found that greater HIV transmission knowledge was associated with knowledge of HIV status. This finding may indicate that HIV awareness campaigns directed at women may improve the uptake of HIV testing in women. In order to improve HIV testing uptake innovative community-based interventions may be needed to reduce HIV and AIDS stigma (Jain et al. 2013). In addition, HIV and AIDS communication programmes can promote HIV testing (Do et al. 2014) and reduce HIV risk behaviour (Peltzer et al. 2012).

Moreover, it was found that women who are not working and men who are working to have greater rates of knowledge of HIV status. It is possible that women who were not working had greater access to HCT due to having been offered HCT during antenatal visits, and that men who are working have financially greater access to HCT in cluding private clinics. Suthar et al.

Table 3: HIV testing history and place of last HIV test

Variables	*Women*		*Men*	
	N	*%*	*N*	*%*
Time of Last HIV Test				
Less than 12 months	1552	34.6	501	25.3
12-23 months ago	777	17.0	207	9.6
2 years or more	2361	48.4	1277	65.1
Place of Last HIV Test				
Public Facility				
National hospital (PP)	833	22.0	344	21.2
Provincial hospital (RH)	684	8.8	415	14.1
District hospital (RH)	330	9.2	203	11.8
Health center	1778	36.9	368	21.3
Health post	27	.4	24	1.3
Outreach	17	.3	13	.5
Military hospital	4	.0	13	.3
VCT center	104	1.5	41	1.4
PMTCT site	11	.3	8	.9
Other public	68	1.7	40	2.1
Private Facility				
Private hospital	133	3.1	109	6.2
Private clinic	292	6.7	241	12.4
Private laboratory	106	2.5	16	.5
Other private medical	113	2.9	63	2.1
Other	190	3.6	81	4.0

(2013) note that countries in their new strategic plans should include programmes that increase the proportion of people with HIV who know their status, by adding to health facility-based testing community-based HIV testing and counselling and outreach HIV testing (Vun et al. 2014).

CONCLUSION

The study identified several predictors, including socio-demographics, HIV knowledge and risk behaviour and AIDS stigma that influence the uptake of knowing the HIV status, which can be utilized in improving HCT programmes and their uptake.

RECOMMENDATIONS

It is recommended that access to HCT in rural areas, in health centres and in community-based or outreach services is promoted. Further, community-based interventions and HIV and AIDS communication programmes can be used promote HIV testing, reduce HIV risk behaviour and HIV and AIDS stigma.

STUDY LIMITATIONS

Caution should be taken when interpreting the results of this study due to certain limitations. Since this was a cross-sectional study, causality between the compared variables cannot be concluded. A further limitation was that some factors known to be contributing to knowledge of HIV status were not assessed, which included attitudes towards and desire for HIV testing and client-counsellor dynamics including lack of confidentiality.

ACKNOWLEDGEMENTS

The authors are grateful to Opinion Research Corporation Macro International, Incorporated, (ORC Macro Inc.), Calverton, USA for the data used in this study.

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