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Socioeconomic Impact of HIV/AIDS on Households under Free Antiretroviral Therapy in Preah Sihanouk Province, Cambodia

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Objectives: The aim of this study was to compare the economic status of HIV-affected households with non-affected households and explore the economic impact of HIV/AIDS on HIV-affected households under high coverage of free antiretroviral therapies (ART).

Design and methods: We conducted a cross-sectional study in Preah Sihanouk Province, Cambodia in February and March 2008. We recruited HIV-positive participants (n=285) from a referral hospital and five health centers, and other 285 HIV-negative participants. We interviewed them using a questionnaire and compared the differences of economic status such as household income, expenditure, assets as well as medical cost, education cost, transportation cost for health services and funeral cost between the households of HIV-positive participants (HIV-positive households) and the households of HIV-negative participants (HIV-negative households).

Results: Compared to the negative households, the HIV-positive households were more likely to have lower household income ($p<0.001$), household expenditure ($p<0.001$), assets ($p<0.001$), education cost ($p=0.001$) and medical cost ($p<0.001$). Among the HIV-positive households, the proportion of medical cost to the household expenditure was 1.3%, which was lower than that of the HIV-negative households. On the contrary, the economic burden for transportations for medical service and funeral cost was much higher among the HIV-positive households compared to the HIV-negative households.

Conclusions: The HIV-positive households had worse economic status compared to the negative households. Though medical cost was lower than that of the negative households under high coverage of free ART, the HIV-positives were still suffering from high economic burden in non health related living cost. From the results of our study, we suggest that the government and global agencies should support their living beyond health.

Keywords: HIV/AIDS; Antiretroviral therapies; Household survey; Socioeconomic factor; Health economics; Cambodia

Introduction

HIV/AIDS debilitates infected individuals or households both physically and economically [1]. In Africa and Asia, households affected by HIV were found poorer than unaffected households [2]. For example, the average household income of the HIV-affected households was 40% [2] or 35% [3] lower than that of the unaffected households in South Africa, and 27% lower in Nigeria [4]. In Asia, two similar studies were conducted to examine the economic status of HIV-affected households. A Thai study identified that the average household income of households with family deaths due to HIV/AIDS was 46% lower than that of non HIV-affected households with no family deaths [5]. Deaths due to HIV/AIDS resulted in a permanent loss of income from less labor or from specific expenditures including funeral and mourning costs [5]. In Cambodia, the average household income of HIV-affected households was 48% lower than that of unaffected households in 2003-2004 under low coverage of free antiretroviral therapies (ART) [6].

Cambodia has been one of the countries with high prevalence of HIV in Asia; the peak of the HIV prevalence was 3.3% during 1997-1998. However, Cambodia carried out 100% condom use campaign for sex workers and successfully reduced the prevalence of HIV to 0.8% in 2007 [7,8]. Since then, number of HIV-positive people receiving ART has been increasing year by year. For example, 5,000 people received ART in 2004, and covered 14% of all HIV infected people. The number increased to 27,000 people in 2007, and covered 67% [7,9-11]. In Cambodia, high coverage of free ART has dramatically reduced the mortality due to HIV/AIDS and HIV-related morbidity, and

improved the quality of life of the HIV-positives [12-14]. The economic burden for HIV-affected households has been mitigated owing to the introduction of ART. However few studies explored the economic impact of HIV under high coverage of ART except Batteh's study [6]. In this study, we aimed to explore the socioeconomic impact of HIV/AIDS on households by comparing household economics between the HIV-positive and negative households under the high coverage of free ART.

Methods**Study design and settings**

We conducted a cross-sectional study in both urban and rural areas of Preah Sihanouk Province (previous name was Sihanouk Ville in 2008), Cambodia in February and March 2008. Preah Sihanouk Province is located in the southwest coastal area in Cambodia and is one of the provinces with the highest prevalence of HIV/AIDS in Cambodia

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[15]. Preah Sihanouk Province has three districts, 22 communes and 94 villages with 167,376 population in 31,742 households [16]. Ten health centers and a referral hospital cover the whole population.

Participants

Participants of this study were HIV-positive and negative married men and women residing in Preah Sihanouk Province, Cambodia. All the participants were aged between 18 and 59 years, household heads or their spouses, and were willing to participate in the study. We defined the HIV-positive participants as HIV-positives, and the HIV-negative participants as HIV-negatives.

Selection criteria and data collection

The inclusion criteria of the HIV-positives were; 1) they had to register in the Preah Sihanouk Province Referral Hospital or in the health centers, 2) they had attended their medical facilities for ART or consultations. Based on these criteria, we recruited 285 HIV-positive participants including 204 from the Referral Hospital and other 81 from five local health centers. These five local health centers had the highest registry numbers of HIV-positives in each district. When the number of participants reached 285, we stopped recruiting. We selected HIV-negative participants from the same villages where the HIV-positives resided. The inclusion criteria of the HIV-negatives were; 1) none of the family members were HIV-positive, 2) none of them have ever experienced AIDS deaths of any family members. To recruit the HIV-negative participants, we visited our target 13 villages and conducted interview with all households. We included household heads or their spouses who were at home on the visiting day. When the number reached 285, we stopped recruiting. We excluded HIV-positives and negatives who were too ill to participate in this study, and who did not approve to participate in the study. We trained 6 health workers who conducted face-to-face interviews in Khmer.

Measurements

We developed our questionnaire based on the standardized ones: WHOQOL-100 [17], WHOQOL-HIV [18], HIV/AIDS Prevention Indicator Survey [19], and Behavioral Surveillance Survey [20]. The questionnaire including 67 items was classified into five domains; 1) socio-demographic characteristics (27 items), 2) education status (7 items), 3) health status (9 items), 4) working status (7 items), and 5) economics status (17 items). Socio-demographic characteristics included the widow/non-widow-headed households, family size, number of children, and number of working family members. Education status included years of school attendance, and the final school level. Health status included HIV-status, years of HIV-infection, health condition, and worrying about health. Working status included working ability and working days per week. Economics status of the households included household income, expenditure, assets, debts, medical cost, education cost, transportation cost for medical service and funeral cost for family deaths due to AIDS in the previous year. Questionnaire was drafted in English, and then translated into Khmer with back translation. Before the main survey, we conducted a pre-test.

Analysis

To compare the economic data between the HIV-positive and negative households, we conducted the *t*-test and Mann-Whitney U test with *t*-value and *p*-value and used the median value and Inter Quartile Range (IQR) instead of the mean. To compare the differences

between HIV-positive households and negative households, we conducted binary logistic regression analysis using a univariate logistic regression model and a multivariate logistic regression model adjusted for age and sex. We calculated crude odds ratio (COR) and adjusted odds ratio (AOR) with their 95% confidence intervals (95% CI). Statistical analyses were conducted using SPSS software version 12.0J for Windows (SPSS Inc., Chicago, IL).

Ethical issues

We received the ethical approval from both the Ethical Committee of the University of Tokyo, Tokyo, Japan and the National Ethics Committee for Health Research, Phnom Penh, Cambodia. When we conducted the survey, we explained purposes and procedures of this research to participants that this survey would be conducted confidentially and that participation would be voluntary. After the participants consented our survey, we asked them to sign informed consent form and to respond the questionnaire.

Results

Socio-demographic characteristics

Table 1 presents the characteristics of socio-demography and education of the HIV-positive and the negative participants and households. Of the 285 HIV-positive and 285 negative participants, the mean age was 37.7 (SD=7.8) years and 39.7 (SD=10.2) years, percent of female was 57.5% and 45.6%, percent of widow or widower households was 35.1% and 4.9%, the mean family size was 4.3 (SD=1.7) persons and 5.3 (SD=1.9) persons, the mean number of children was 2.4 (SD=1.5) children and 3.1 (SD=1.8) children, and the mean number of working family members was 1.7 (SD=0.8) persons and 2.4 (SD=1.3) persons, respectively. Compared to the HIV-negative households, the positive households had less family size ($t=-6.239$; $p<0.001$), less number of children ($t=-5.327$; $p<0.001$), and less number of working family members ($t=-7.414$; $p<0.001$).

Educational status of the participants

The number of the HIV-positives and negatives who responded that they had ever attended school was 205 (72%) and 236 (83%), respectively (Table 1). The mean year of the total school attendance of the HIV-positives and negatives was 4.1 (SD=3.5) years and 4.9 (SD=3.6) years, respectively. Compared to the HIV-negatives, the HIV-positives were less likely to go to school ever (COR=0.5; 95% CI=0.4<0.8; $p=0.003$).

Health status of the participants

Table 2 presents the characteristics of health and the working status of the HIV-positive and negative participants and households. The number of the HIV-positives and negatives who responded that their health condition was poor ('poor' or 'very poor') was 68/285 (24%) and 37/285 (13%), respectively (COR=2.1, 95% CI=1.4<3.3; AOR=2.4, 95% CI=1.5<3.7). The number of the HIV-positives and negatives who responded that they worried about their health more ('very much' or 'extremely') was 85/285 (30%) and 38/207 (18%), respectively (COR=1.9; 95% CI=1.2<2.9; AOR=1.8, 95% CI=1.2<2.8). According to the results of multivariate logistic regression adjusted for age and sex, the HIV-positives had significantly poorer health condition and worried about health more compared to the HIV-negatives.

Working status of the participants

Of total, 242/284 (85%) of the HIV-positives and 172/263 (65%) of

	HIV-positives (n=285)	HIV-negatives (n=285)
Mean age (years) (SD)	37.7 (7.8)	39.7 (10.2)
Sex: Female (%)	164 (57.5)	130 (45.6)
Widow or widower (%)	100 (35.1)	14 (4.9)
Mean family size (persons) (SD)	4.3 (1.7)	5.3 (1.9)
Mean no. of children (SD)	2.4 (1.5)	3.1 (1.8)
Mean no. of working family members (SD)	1.7 (0.8)	2.4 (1.3)
Category of working family members		
Household heads (%)	122 (42.8)	73 (25.6)
Household heads and their spouses (%)	74 (26.0)	105 (36.8)
Household heads and their children (%)	48 (16.8)	38 (13.3)
Household heads, their spouses and their children (%)	21 (7.4)	68 (23.9)
Children (%)	14 (4.9)	1 (0.4)
No working family members (%)	6 (2.1)	0 (0)
School children		
Yes (%)	198 (69.5)	190 (66.7)
No (%)	87 (30.5)	95 (33.3)
Ever experienced family deaths due to AIDS		
Yes (%)	104 (36.5)	0 (0)
No (%)	181 (63.5)	285 (100.0)
Ever been to school		
Yes (%)	205 (71.9)	236 (82.8)
No (%)	80 (28.1)	49 (17.2)
Mean years of school (years) (SD)	4.1 (3.5)	4.9 (3.6)

Notes: SD=Standard Deviation

Table 1: Characteristics of socio-demography and education of the HIV-positive and the negative participants and households.

the negatives responded that their working ability was lower ('a little' or 'less') (COR=3.0; 95% CI=2.0<4.6; AOR=3.4, 95% CI=2.2<5.1). The number of the HIV-positives and negatives who responded that they worked less than 5 days per week was 146/284 (51%) and 106/278 (38%), respectively (COR=1.7; 95% CI=1.2<2.4; AOR=1.8, 95% CI=1.3<2.5). According to the results of multivariate logistic regression adjusted for age and sex, the HIV-positives had significantly lower working ability and fewer working days per week compared to the HIV-negatives.

Economic characteristics of the households

Table 3 presents the economic characteristics. The median income of the HIV-positive and negative households was US\$ 900 (IQR=600<1,440) and US\$ 1,530 (IQR=900<2,400), respectively. The median household expenditure of the HIV-positive and negative households was US\$ 900 (IQR=600<1,440) and US\$ 1,344 (IQR=900<1,800), respectively. The median assets of the HIV-positive and negative households was US\$ 50 (IQR=0<1,415) and US\$ 1,550 (IQR=10<7,300), respectively. The median debts of the HIV-positive and negative households was US\$ 15 (IQR=0<125) and US\$ 25 (IQR=0<150), respectively. The median medical cost of the HIV-positive and negative households was US\$ 12 (IQR=0<60) and US\$ 50 (IQR=10<147), respectively. The median transportation cost for medical service of the HIV-positive and negative households was US\$ 30 (IQR=13<60) and US\$ 0 (IQR=0<20), respectively. Of

total, 70% (n=198) HIV-positive households and 67% (n=190) HIV-negative households had school children and expended their education costs. The median education cost of the HIV-positive (n=198) and negative households (n=190) was US\$ 150 (IQR=90<300) and US\$ 257 (IQR=100<450), respectively. Of total HIV-positive households, 37% (n=104) experienced family deaths due to AIDS and expended an additional expenditure for funeral cost. The median funeral cost of the HIV-positive households (n=104) was US\$ 300. From the results of the comparison, we identified that compared to the negative households, the HIV-positive households had lower household income ($p<0.001$), household expenditure ($p<0.001$), assets ($p<0.001$), education cost ($p=0.001$) and medical cost ($p<0.001$). On the other hand, the HIV-positive households had higher transportation cost for medical service than the negative households ($p<0.001$).

Discussion

This study demonstrated the following two findings. First, the HIV-positives had lower health and working status, and their households had worse economic status compared to the negatives and their households. With regard to the economic characteristics, the annual median household income of the HIV-positive households was 41% lower than that of the HIV-negative households under high coverage of free ART. Second, compared to the previous study conducted in 2003/4 when the coverage of free ART was 13%, the medical cost of the HIV-positive households was greatly reduced to 1.3% of the total household expenditure, which is lower than that of the negative households. Compared to the HIV-negatives, HIV-positives had poorer health condition and more worried about their health, which could result in lower working ability and fewer working days per week. These lower health status and lower working force might have affected their incomes. In fact the annual median HIV-positive household income and expenditure were lower than those of the HIV-negative households by 41% and 33%, respectively.

Of the items of household expenditure, we compared medical cost, education cost and transportation cost for medical service between the HIV-positive and negative households. It was surprising that the annual median medical cost of the HIV-positive households was 76% lower than that of the negative households. Meanwhile, in the study of Alkenbrack Batteh et al. [6] in 2003/4, when the coverage of free ART was 13%, and the proportion of the medical cost was 17.3% of their total household expenditure. In this study, it has reduced to 1.3% in the HIV-positive households. Though the medical cost has reduced, the transportation cost of the HIV-positive households was high; it was 40% higher than that of the negative households. This is partly because the majority of the HIV patients in three districts received treatment at the Referral Hospital located in the town and they might have to use taxi or motorbikes to access there. In some countries like Lao PDR, NGOs and the international organizations support transportation costs for HIV-positive people [21]. Similar support should be given in Cambodia in order to reduce the economic burden of the transportation cost for medical service.

In this study, annual median education cost of the HIV-positive households with school children was 42% lower than that of the negative households. In relatively poor households, the family responds to economic crises by decreasing expenditures on other household members including education costs, spending less on food, medical care, and leisure activities in Cambodia [6,22]. Lower education cost of the HIV-positive households can suggest that the HIV-positive households would reduce the opportunities for child education.

	Total	HIV-positives (n=285)	HIV-negatives (n=285)	COR (95% CI)	AOR ^a (95% CI)
Years of HIV-infection (SD)		4.0 (2.6)			
Status of HIV-positive					
Without symptom (%)		208 (73.0)			
With symptom (%)		77 (27.0)			
Health condition					
Poor (%)	105 (18.4)	68 (64.8)	37 (35.2)	2.1 (1.4-3.3)	2.4 (1.5-3.7)
Good (%)	465 (81.6)	217 (46.7)	248 (53.3)	Reference	Reference
Worrying about health ^b					
More (%)	123 (25.0)	85 (69.1)	38 (30.9)	1.9 (1.2-2.9)	1.8 (1.2-2.8)
Less (%)	369 (75.0)	200 (54.2)	169 (45.8)	Reference	Reference
Working ability ^c					
Lower (%)	414 (75.7)	242 (58.5)	172 (41.5)	3.0 (2.0-4.6)	3.4 (2.2-5.1)
Higher (%)	133 (24.3)	42 (31.6)	91 (68.4)	Reference	Reference
Working days per week ^d					
≤ 5 days	252 (44.8)	146 (57.9)	106 (42.1)	1.7 (1.2-2.4)	1.8 (1.3-2.5)
≥ 6 days	310 (55.2)	138 (44.5)	172 (55.5)	Reference	Reference

Notes: COR=Crude Odds Ratio, AOR=Adjusted Odds Ratio, CI=Confidence Interval. ** p<0.01.

^a Adjusted with age and sex.

^b Of HIV-negative households 78 participants did not respond to this question.

^c One participant of HIV-positive and 22 of negative households did not respond to this question.

^d One participant of HIV-positive and 7 of negative households did not respond to this question.

Table 2: Characteristics of health and working status of the HIV-positive and the negative participants.

(US\$)	HIV-Positives (n=285)		HIV-Negatives (n=285)		p-value ^a
	Median	IQR	Median	IQR	
Household income	900	600-1440	1530	900-2400	<0.001
Household expenditure	900	600-1440	1344	900-1800	<0.001
Assets	50	0-1415	1550	10-7300	<0.001
Debts	15	0-125	25	0-150	0.320
Education cost ^b	150 (n=198)	90-300	257 (n=190)	100-450	0.001
Medical cost	12	0-60	50	10-147	<0.001
Transportation cost for medical service	30	13-60	0	0-20	<0.001
Funeral cost ^c	300 (n=104)	125-500			

Notes: All the data were of last year. IQR=Inter-Quartile Range

^a Mann-Whitney U test

^b Of total, 198 HIV-positive households and 190 HIV-negative households had school children and expended their education costs.

^c Funeral cost for family death due to AIDS. Of the HIV-positive households 104 households experienced family death due to AIDS and expended the funeral cost.

Table 3: Economic characteristics of the HIV-positive and the negative households.

Another important expenditure for the HIV-positive households came from funeral cost. Among the HIV-positive households, 36% (n=104) experienced family deaths due to AIDS in the previous year, which was much higher than 20% in the Batteh's study [6]. In this study, the median funeral cost of the HIV-positive households was US\$ 300, which covered 36% of the annual median household expenditure of the HIV-positive households with family deaths due to AIDS. This high cost of funerals was consistent with previous studies [2,23,24]. These findings suggest that supporting only medical treatment cost is not enough to save the living of the HIV-positive households. Though the proportion of medical cost to the total household expenditure was

reduced under high coverage of ART, there still exists a big economic gap between the HIV-positive and the negative households.

This study has some limitations from a methodological perspective. First, to select the HIV-negatives as a comparison group, we selected HIV-negatives with the similar background from the same villages where the HIV-positive households resided instead of a nearest-neighbour approach. Second, to identify HIV-negative status, we adopted the participants' self-reported response instead of blood-testing, which might affect the reliability of HIV-negative status. However, in terms of the status of HIV-positive, we adopted the reliable information from the registry sheets of the hospital and health centers.

Finally, as this is a cross-sectional study, the results do not show any cause-effect relationships. Further studies will be needed to examine such cause-effect relationships over time.

In conclusion, this study showed that the high coverage of free ART contributed to reducing the burden of medical costs of the HIV-positive households, but they are still suffering from the burden of non-medical costs. This might be due to their lower health and working status. These findings suggest that supporting only medical cost is not enough to save the living of the HIV-positive households. The government and global agencies are expected to support their living beyond health.

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