Cost-Effectiveness of Establishing a Community-Based Friend Centre versus Implementing a Training Course for MSM

Sittikorn Rongsumlee[1], Chantal Herberholz[2], Kyaw Min Soe[1], Sukhontha Kongsin[1]

ABSTRACT

This cross-sectional study aimed to determine the cost–effectiveness of two HIV prevention interventions: 1. a community-based friend centre (P1) versus 2. a training course (P2) for men who have sex with men (MSM) in Ubon Ratchathani province, Thailand. The interventions were implemented for two rounds (R1 and R2) during 2008-2010. The study involved 224 MSM who were enrolled in the two interventions between 2008 and 2010. Participants were interviewed using questionnaires to assess their knowledge and attitude towards HIV/AIDS. Cost-effectiveness analysis was carried out to compare the two interventions. There were 37 (51.4%) participants in R1 and 47 (65.3%) in R2 with sound knowledge for P1. For P2, 8 (20%) out of 40 in R1 and 17 (42.5%) in R2 were found to have sound knowledge of HIV/AIDS. 57 (79%) participants in R1 and 64 (88.9%) in R2 had preferable attitude for P1. 77.5% of participants in R1 and 85% in R2 had preferable attitude for P2. The costs per MSM with sound knowledge were 869 baht (27 USD) per person in R1 and 682 baht (21 USD) per person in R2 of P1, which were significantly lower compared to those of P2 for the same period (3,820 baht per person for P2R1, 1,899 baht per person for P2R2). The costs per one MSM with preferable attitude of P1, 564 baht (18 USD) per person for R1, 501 baht (16 USD) per person in R2 were significantly higher compared to that of P2 for the same round (1,455 baht per person in R1, 949 baht per person in R2). The results from our study suggest that establishing a community-based friend centre (P1) was more effective and cost-effective than implementing a training course (P2) for achieving desired outcomes with less cost. Therefore, the HIV prevention program for MSM should consider establishing a community-based friend centre in the long run rather than implementing a training course.

Keywords: Cost-effectiveness, HIV/AIDS, Men who have sex with men (MSM)

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Corespondence: Sukhontha Kongsin, Department of Public Health Administration, Faculty of Public Health, Mahidol University, Bangkok, THAILAND 10400. Phone/Fax: +66 2640 9853. Email: sukhontha.kon@mahidol.ac.th, skongsin@gmail.com

[1] Research Centre for Health Economics and Evaluation, Faculty of Public Health, Mahidol University, THAILAND

[2] The Centre for Health Economics, Faculty of Economics, Chulalongkorn University, THAILAND

Introduction

According to the United Nations Program on HIV/AIDS (UNAIDS) and the World Health Organization (WHO), HIV/AIDS has become a major public health problem. It was estimated that about 33.5 million people were living with HIV/AIDS in 2008, which was 20% higher than the number in 2000[1,2]. One systematic review indicated that men who have sex with men (MSM) in Asia and the Pacific were facing a serious and rapidly growing HIV epidemic. MSM were 19 times more likely to be infected with HIV than the general population in Asia[3]. High HIV prevalence among MSM has been reported throughout multiple recent studies in the region[2,4,5].

In Thailand, HIV/AIDS was the first leading cause of DALYs (Disability Adjusted Life Years) for males, and the second for females, based on 2009 data from the Ministry of Public Health, Thailand[6]. A high prevalence of HIV has been reported among Men Who Have Sex with Men (MSM) through many studies in Thailand[7]. Studies conducted by the United Nations Development Programme (UNDP) and the United States Agency for International Development (USAID) in Bangkok showed that there was a significant HIV incidence among 18-22 year old MSM, with continued high rates of infection over time so prevention interventions among MSM were urgently needed[5,8].

Even though the epidemic of HIV had been recognized as a global crisis, the resources allocated for the control of the epidemic were still severely limited and the expenditure for the prevention of HIV/AIDS was insufficient. The data showed that the resource used for the prevention programs for MSM was less than 4% of total expenditure for HIV prevention programs[7]. In Thailand, the spread of HIV infection has been rapidly increasing over the last two decades; however, there has been a shortage of budget for prevention as the focus in Thailand was on treatment. Yet, health resources were needed for MSM prevention in Thailand. The scarcity of resources demonstrated that it was important to identify a cost-effective HIV prevention intervention to improve the efficiency of resource use and the budget allocation. Hence, cost-effectiveness analysis would help facilitate the decision-making process by measuring the effectiveness of the available HIV prevention interventions for MSM. This study was expected to assess value for money or cost effectiveness of the National AIDS program for the MSM prevention intervention.

Ubon Rachathani has been among the provinces affected by the HIV epidemic since it started in the early 1980s. According to the National AIDS Program, there were 5,409

accumulated HIV cases and 1,019 HIV related deaths from 1990 to 2012. There were 182 newly registered HIV cases in 2012[9]. In 2008, two prevention interventions for MSM were implemented by non-government organizations (NGOs) with funding from the Health Systems Research Institute (HSRI) of Thailand for HIV prevention among MSM, which included establishing a community-based friend centre (P1) and implementing a training course (P2). Community-based friend centres, also known as drop-in-centres, are led by peer MSM, are very attractive to youth and are widely adopted by NGOs to conduct different HIV-related activities and services[10,11]. On the other hand, P2 focuses on organizing a formal training course with curriculum for MSM to acquire knowledge, attitude and skills. Previously, there were limited reports or empirical data comparing cost and effectiveness of these types of interventions. Therefore, this cross-sectional study was conducted to find out which intervention among the two would be more cost-effective.

Materials and Methods

This study was a cross-sectional study aimed at evaluating cost and cost-effectiveness of two HIV prevention interventions: 1. a community-based friend centre (P1) versus 2. a training course (P2) for men who have sex with men (MSM), in Ubon Ratchathani province, Thailand. Each intervention was implemented for two rounds. The first round (R1) took place between 2008-2009 and lasted for 1 year, while the second round (R2) was for six months between 2009-2010. Both interventions were funded by the Health Systems Research Institute (HSRI) of Thailand and brief descriptions of the interventions are shown in Table 1.

An MSM population which was reached by interventions through different activities was used as the study population. The project manager provided a list of MSM (those who were enrolled in interventions, lived nearby the site of this study, and were available and willing to participate in this study). Those who met the inclusion criteria (being 15 years of age or above and able to communicate with the researcher) were recruited into the study. Those who preferred to withdraw from the study were excluded.

Table 1 Brief descriptions of Project 1 and Project 2

Characteristics	Community-based friend center (P1)	Training course (P2)
Site	Rural area	Urban area
Participants	MSM who lived in the community	MSM from different communities
1st round (R1)	The 1st round of P1 implementation took place during 2008-2009 and lasted for 1 year	The 1st round of P2 implementation took place during 2008-2009 and lasted for 1 year
2nd round (R2)	The 2nd round of the P1 implementation took place during 2009-2010 and lasted for six months	The 2nd round of the P2 implementation took place during 2009-2010 and lasted for six months
No. of activities	4 times per month	Once per month
Venue	Beauty salons located in the community	NGO office located in the city
Lead organizers	MSM peer leaders in the community	NGO staff
General content	Specific to local community	Not specific to any community
Activities	MSM from the local community were given training to be peer educators or leaders. The leaders then worked proactively in educating peer MSM (one on one or in a group) as well as teenagers (in a group) about HIV/AIDS at the community-based center (beauty salon) with the aim of improving their knowledge and attitude which would finally lead to behavior change and prevent HIV transmission. The leaders shared their experiences with participants and scheduled HIV/AIDS related activities. Outreach activities and awareness campaigns were organized. Commodities such as condoms, lubricants and information, education and communication materials were distributed through intervention activities.	NGO staff recruited those who volunteered to be trained as the project participants. The training topics such as prevention of HIV/AIDS and STI with the aim of improving their knowledge and attitude which would finally lead to behavior change and prevent HIV transmission. This curriculum was called Life Skill Defeating AIDS Camp. Outreach activities and awareness campaigns were organized. Volunteers were not involved in organizing these activities apart from their participation. Commodities such as condoms, lubricants and information education and communication materials were distributed through intervention activities.

All participants were interviewed by using questionnaires, to collect personal data and assess knowledge and attitude about HIV/AIDS during the data collection period of March to May 2011. There were 5 indicators (questions) for knowledge assessment based on the guideline of 'Core Indicators' for National AIDS Programmes by UNGASS and 6 indicators (questions) for attitude. Each indicator or question was counted as one score. Participants who correctly answered all questions and scored 5 for knowledge assessment were regarded as MSM with sound knowledge of HIV/AIDS. Participants who failed to score 5 points were considered to have poor knowledge. Similarly, participants who correctly answered at least five out of six questions and scored 5 or 6 were regarded as MSM with preferable attitude towards HIV/AIDS. MSM with sound knowledge or preferable attitude were defined as effectiveness (E) of the interventions.

Cost data were extracted from secondary records. The cost of interventions was extracted from secondary records of implementing agencies. It consisted of both capital cost and recurrent cost for R1 and R2 of both interventions. Capital cost included items which had useful lifetimes more than one year, such as buildings or space rental, equipment with a cost of 5,000 baht (156 USD) or more and vehicles, etc. Recurrent cost included personnel salary, telephone, utility, materials (office supplies, condoms and lubricants, and media), staff training, outreach activity, awareness campaigns, community-based friend centre activities and training courses for MSM. Effectiveness (E), unit cost per MSM, cost of study samples (C), cost-effectiveness (CE) and incremental cost-effectiveness ratio analysis (ICER) were defined or calculated as follows:

- Effectiveness (E) = Number of MSM with sound knowledge or preferable attitude
- Unit cost per MSM = Total cost / total number of MSM reached
- Cost of study samples = Unit cost per MSM × number of MSM recruited for the study
- CE = Cost of study samples / number of MSM with sound knowledge or preferable attitude
- ICER = (Cost of R2–cost of R1) / (effectiveness of R2 – effectiveness of R1)

This research was approved by the Ethical Review Committee for Human Research, Faculty of Public Health, Mahidol University (COA no: MUPH 2010-078). Special permission to conduct the study was obtained from corresponding local authorities, in which the projects operated.

Results

224 MSM participated in this study. 142 were enrolled in P1 and 80 in P2. The general characteristics of participants are shown in Table 2. For P1, 121 (84%) participants were between 15-25 years of age, 17 (11.8%) between 26-35 years, 4 (2.8%) between 46-55 years, and 2 (1.4%) between 36-45 years. The mean age for P1 was 22.5 years (SD = 5.96), minimum 15 years and maximum 46 years. For P2, 65 (81.3%) participants were between 15-25 years of age, 13 (16.3%) between 26-35 years and 2 (2.5%) between 46-55 years. The mean age for P2 was 21.7 years (SD = 6.00), minimum 15 years and maximum 49 years. In terms of educational attainment, 51.4% of P1 participants and 92.5% of P2 participants had completed senior high school or higher education. Most of the participants were students, who accounted for 59.7% of participants in P1 and 53.8% in P2.

Table 2 Characteristics of MSM who participated in P1 and P2 of both rounds

Characteristics	Community-based friend center (P1) n = 142		Training course (P2) n = 80	
	n	%	n	%
Age, years				
15-25	121	84.0	65	81.3
26-35	17	11.8	13	16.3
36-45	2	1.4	2	2.5
46-55	4	2.8	0	0.0
Mean	22.50		21.75	
SD	5.96		6.00	
Min-Max	15-46		15-49	
Education level				
No education	5	3.5	0	0
Primary education	8	5.6	1	1.3
Junior high school	57	39.6	5	6.3
Senior high school	35	24.3	36	45.0
Vocational education/diploma	14	9.7	14	17.5
Bachelor's degree or higher	25	17.4	24	30.0

Table 2 Characteristics of MSM who participated in P1 and P2 of both rounds (cont.)

Characteristics	Community-based friend center (P1) n = 142		Training course (P2) n = 80	
	n	%	n	%
Occupation				
Student	86	59.7	43	53.8
Housekeeper	9	6.3	13	16.3
Farmer/agriculturist	5	3.5	0	0.0
Temporary worker	15	10.4	7	8.8
Trader	15	10.4	11	13.8
Officer	10	6.9	4	5.0
Other	4	2.8	2	2.5

Table 3 shows the results of the knowledge assessment scores of participants for P1 and P2 in two rounds of the project implementation period. For P1, 37 (51.4%) participants out of 72 in R1 and 47 (65.3%) out of 72 in R2 had sound knowledge. For P2, 8 (20%) out of 40 in R1 and 17 (42.5%) in R2 were found to have sound knowledge of HIV/AIDS.

Table 4 shows the results of attitude assessment scores of participants for P1 and P2. About 57 (79%) participants in R1 and 64 (88.9%) in R2 had a preferable attitude towards HIV/AIDS after their involvement in P1. Similarly, among participants in P2, 77.5% and 85% showed a preferable attitude towards HIV/AIDS in R1 and R2, respectively.

Table 3 Knowledge assessment of participants in community-based friend centre (P1) versus training course (P2)

Intervention	Round	n	Knowledge assessment scores[1]					
			0	1	2	3	4	5
Community-based friend centre (P1)	R1	72 (100.0%)	0 (0.0%)	1 (1.4%)	2 (2.8%)	14 (19.4%)	18 (25.0%)	37 (51.4%)
	R2	72 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	10 (13.9%)	15 (20.8%)	47 (65.3%)
Training course (P2)	R1	40 (100.0%)	1 (2.5%)	4 (10.0%)	1 (2.5%)	6 (15.0%)	20 (50.0%)	8 (20.0%)
	R2	40 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	4 (10.0%)	19 (47.5%)	17 (42.5%)

[1] Participants who correctly answered all questions and scored 5 were regarded as participants with sound knowledge of HIV/AIDS.

Table 4 Attitude assessment of participants in community-based friend centre (P1) vs. training course (P2)

Intervention	Round	Participants n	Attitude assessment scores[1]		
			0-2	3-4	5-6
Community-based friend centre (P1)	R1	72 (100.0%)	9 (12.5%)	6 (8.3%)	57 (79.2%)
	R2	72 (100.0%)	1 (1.4%)	7 (9.7%)	64 (88.9%)
Training course (P2)	R1	40 (100.0%)	3 (7.5%)	6 (15.0%)	31 (77.5%)
	R2	40 (100.0%)	1 (2.5%)	5 (12.5%)	34 (85.0%)

[1] 0-2 scores = no attitude, 3-4 scores = moderate attitude, 5-6 scores = preferable attitude. Participants who correctly answered five out of six questions and scored 5/6 were regarded as participants with a preferable attitude towards HIV/AIDS.

The community-based friend centre (P1) reached out to a total of 2,255 of the targeted population of MSM through two rounds of project implementation (P1R1 = 1,500 and P1R2 = 755). In contrast, the training course (P2) reached out to 920 MSM (P2 R1 = 560 and P2 R2 = 360), as shown in Table 5. The total cost of P1 was 669,560 baht in R1 and 336,168 baht in R2. Unit cost per person was 447 baht per person for P1R1 and 445 baht per person for P1R2. The total cost of P1 study samples was 32,140 baht for P1R1 and 32,040 baht for P1R2. For P2, the total cost was 427,751 baht in R1 and 290,349 baht in R2. Unit cost per person for P2R1 was 764 baht per person and P2R2 807 baht per person. Cost-effectiveness (C/E) analysis shows P1 spent 868.65 baht in R1 and 682 baht in R2 for one MSM with sound knowledge. In terms of attitude, P1 spent 569 baht in R1 and 501 baht in R2 for one MSM with a preferable attitude. For P2, the cost for one MSM with sound knowledge was 3,820 baht in R1 and 1,899 baht in R2. The cost for one MSM with a preferable attitude was 1,455 baht in R1 and 949 baht in R2.

ICER for MSM with sound knowledge (R2 versus R1) was -10 baht and MSM with preferable attitude (R2 versus R1) was -14 baht for a community-based friend centre (P1), as shown in Table 5. This means that P1 spent 10 baht less for every additional case of MSM with sound knowledge in R2 when compared with R1 and 14 baht less for each additional case of MSM with a preferable attitude in R2 than in R1. For P2, ICER for sound knowledge (R2 versus R1) was 191 baht and a preferable attitude (R2 versus R1) was 132 baht. This means that P2 spent 191 baht more for each additional case of MSM with sound knowledge in R2 compared to that of R1 and 132 baht more for each additional case of MSM with a preferable attitude.

Table 5 Cost-effectiveness of a community-based friend centre versus training course

Key Findings	Community-based friend centre (P1)		Training course (P2)	
	1st round (P1R1)	2nd round (P1R2)	1st round (P2R1)	2nd round (P2R2)
Study population and sample				
- Population reached by intervention[1]	1,500	755	560	360
- Sample n[2]	72	72	40	40
Effectiveness (E)				
- MSM with sound knowledge on HIV/AIDS	37	47	8	17
- MSM with preferable attitudes on HIV/AIDS	57	64	21	34
Cost (C)				
- Capital cost (baht[3])	61,704	3,108	32,370	2,486
- Recurrent cost (baht)	607,856	333,060	395,381	287,863
- Total cost (baht)	669,560	336,168	427,751	290,349
- Average unit cost per person reached in each round (baht per person)	446	445	764	807
- Total cost for study samples in each round (baht)	32,140 (72 × 446.37)	32,040 (72 × 445.26)	30,560 (40 × 763.84)	32,280 (40 × 806.53)
Cost-Effectiveness (C/E)				
- C/E ratio of knowledge (baht per person)	869 (32,140/37)	682 (32,040/47)	3820 (30,560/8)	1899 (32,280/17)
- C/E ratio of attitudes (baht per person)	564 (32,140/57)	501 (32,040/64)	1455 (30,560/21)	949 (32,280/34)
Incremental cost-effectiveness ratio analysis (ICER)[4]				
- ICER for MSM with sound knowledge of R2 vs. R1 (baht)		-10		191
- ICER for MSM with preferable attitude of R2 vs. R1 (baht)		-14		132

[1] MSM population reached by interventions through different activities from each round of implementation period was used as the study population. [2] MSM, who enrolled in the intervention, met the inclusion criteria and expressed willingness to participate in this study were selected as the study sample. [3] 1 Thai baht = 0.033 USD. [4] ICER was calculated by the difference in cost between R2 and R1 of the intervention, divided by the difference in effectiveness of R2 and R1 of the same intervention.

Discussion

The study found that the total targeted population reached for P1 was much higher when compared with P2 for each round and in total. It was also found that P1 achieved a higher percentage of MSM with sound knowledge (37% in R1, 47% in R2) compared to P2 (20% in R1, 42.5% in R2) and a slightly higher percentage of MSM with a preferable attitude (79.2% in R1, 88.9% in R2) compared to P2 (77.5% in R1, 85% R2). According to UNGASS, sound knowledge or attitude about HIV/AIDS is an essential prerequisite, although often an insufficient condition for adoption of behaviors that reduce the risk of HIV transmission[12].

Although the total cost of P1 in each round (669,560 baht in R1 and 336,168 baht in R2) was higher than the total cost of P2 (427,751 baht in R1 and 290,349 baht in R2), the average unit cost per person reached in P1 (447 baht per person for R1, 445 baht per person for R2) was lower than that of P2 (764 baht per person in R1 and 807 baht per person in R2) because of a higher population reached. According to the cost-effectiveness analysis shown in Table 5, the costs per one MSM with sound knowledge in two rounds of P1 (869 baht per person for P1R1, 682 baht per person for P1R2) were significantly lower compared to that of P2 for the same period (3,820 baht per person for P2R1, 1,899 baht per person for P2R2). Similarly, the costs per one MSM with a preferable attitude of P1 (564 baht per person for P1R1, 501 baht per person for P1R2) were significantly higher compared to that of P2 in the same round (1,455 baht per person for P2R1, 949 baht per person for P2R2). ICER for MSM with sound knowledge was -10 baht and MSM with a preferable attitude was -14 baht for Centre P1. This could be related to the fact that peer educators/ leaders were more experienced in R2 and they were then able to work with the MSM population more effectively which led to a higher number of MSM with sound knowledge and a preferable attitude, all in less time and for lower cost in the second round of project implementation.

ICER for sound knowledge was 191 baht and a preferable attitude was 132 baht for the training course (P2), thereby indicating that P2 spent more in the second project implementation to produce the desired outcome. This could be due to the failure of P2 to reach out to a higher number of the target MSM population, which resulted in a higher unit cost per MSM spent.

The results from our study show that a community-based friend centre (P1) is both more effective and cost-effective than a training course (P2) in terms of producing the desired outcomes with less cost. Similar

findings were found by Jommaroeng et al and indicated that peer-led health education programs were effective among MSM in Thailand[13]. It is likely that joining activities at a community-based friend center in the local beauty salon was more convenient and interesting than attending a training course at an NGO office. However, other contributing factors (i.e. quality of services, nature of activities etc.) that are associated with high and low cost-effectiveness of the intervention should also be discussed in further research, in order to optimize intervention outcomes.

One of the strengths of this study is that it shows the real-world data in a real setting and reflects real situations. However, there were some limitations. The study only focused on knowledge and attitude as essential prerequisites to behavior change for prevention of HIV transmission among MSM. It did not investigate its linkages with other HIV services, such as HIV counselling and testing for those who were referred for testing, and referral for treatment for those who test positive after their participation of the interventions etc. In addition, this study did not investigate details regarding the quality of services, barriers to access HIV services for MSM and delivery model of the interventions etc., which could be associated with high or low cost and effectiveness of the interventions. Therefore, further studies should be conducted to investigate which factors determine cost-effectiveness of these interventions in order to produce desired outcomes to prevent HIV/AIDS.

Conclusion

The results from our study suggests that establishing a community-based friend centre (P1) is more effective and cost-effective than implementing a training course (P2) for achieving lower costs per MSM with sound knowledge about HIV/AIDS or MSM with a preferable attitude towards HIV/AIDS. Therefore, the HIV prevention program for MSM should consider establishing a community-based friend centre in the long run rather than implementing training courses.

Author Contributions

SR designed the study and formulated the content of the intervention tools and knowledge with guidance from CH and SK. SR conducted the study and carried out reliability testing under the supervision of CH and SK. SR and KMS contributed to initial statistical analysis and interpretation of data and wrote the manuscript. KMS helped in re-analysis of data, interpretation and revision of the manuscript. All authors read and approved the manuscript prior to submission for publication.

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Conflicts of Interest

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References

1. United Nations Program on HIV/AIDS UNAIDS and World Health Organization (WHO). AIDS Epidemic Update. Geneva; UNAIDS and WHO: 2009.
2. Van Griensven F, Thanprasertsuk S, Jommaroeng R, Mansergh G, Naorat S, Jenkins R, et al. Evidence of a previously undocumented epidemic of HIV infection among men who have sex with men in Bangkok, Thailand. AIDS 2005; 19(5): 521-526.
3. Baral S, Sifakis F, Cleghorn F, Beyrer C. Elevated risk for HIV infection among men who have sex with men in low- and middle-income countries 2000-2006: A systematic review. PLoS Med 2007; 4(12): e339.
4. Seekaew P, Pengnonyang S, Jantarapakde J, Sungsing T, Rodbumrung P, Trachunthong D, et al. Characteristics and HIV epidemiologic profiles of men who have sex with men and transgender women in key population-led test and treat cohorts in Thailand. PLoS ONE 2018; 13(8): e0203294.
5. Van Griensven F, Varangrat A, Wimonsate W, Tanpradech S, Kladsawad K, Chemnasiri T, et al. Trends in HIV prevalence, estimated HIV incidence, and risk behavior among men who have sex with men in Bangkok, Thailand, 2003-2007. J Aquir Immue Defic Syndr 2010; 53(2): 234-9.
6. Bureau of Epidemiology, Ministry of Public Health Thailand. HIV/AIDS surveillance report in Thailand. Nonthaburi; BOE MOPH: 2011.

7. United Nations Development Programme and United States Agency for International Development. Asia Regional Consultation on MSM HIV Care and Support. Bangkok: UNDP and USAID; 2009.
8. World Health Organization, Regional Office for South-East Asia. HIV/AIDS among men who have sex with men and transgender populations in South-East Asia: the current situation and national responses. New Delhi: WHO SEARO; 2010.
9. National AIDS Programme, Thailand. A report of HIV/AIDS situation of Ubonratchathani Province in 2012. Nonthaburi; NAP: 2012.
10. National AIDS Committee, Thailand. AIDS Response Progress Report 2018. Nonthaburi; BATS: 2018.
11. Asia Pacific Coalition on Male Sexual Health: The MSM Thailand Snapshots 2012. Bangkok; APCOM: 2012.
12. National AIDS Programme, Thailand. UNGASS Country Progress Report Thailand. Nonthaburi; NAP: 2010.
13. Jommaroeng R, Richter KA, Chamra-trithirong A, Soonthorndhada A. The effectiveness of national HIV prevention education program on behavioral changes for men who have sex with men and transgender women in Thailand. J Health Res 2019; 34(1): 2-12.