



need of rebuilding habits of safe sex. This preliminary study applied HIV-infected cases in Taipei Region whose information of contact tracing were completed in the Chronic Communicable Disease Management-AIDS and Hansen's Diseases Subsystem (CCDMS-AIDS) of the Taiwan Centers for Disease Control (Taiwan CDC) in analyzing their contact patterns, places they encountered with casual sex partners (CSPs, only ASCs were included) and had unprotected sex (high risk niches) prior to their diagnosis of HIV-infection to facilitate health education toward safer sex and achieve prevention and control within high risk niches.

### **Materials and Methods**

A. Study period and subjects: native cases that were diagnosed and reported as human immunodeficiency virus (HIV)-infected cases during September 1, 2012 and March 31, 2013 and were managed in Taipei Region (i.e. HIV-infected cases living or managed in Taipei City, New Taipei City, Keelung City, Yilan County, Kinmen County and Lienchiang County) were included.

B. Data source: This preliminary study applied HIV-infected cases in Taipei Region according to "The Program for HIV-infected Case Management" under "The Fifth Five Year AIDS Prevention and Control Program" [2, 3] whose information of contact tracing were fulfilled in the CCDMS-AIDS of the Taiwan CDC in analyzing their contact patterns, time and places they encountered with CSPs (only ASC were included) and had unprotected sex (high risk niches) prior to their diagnosis of HIV-infection.

This information of contact patterns, time and places they encountered with Casual ASCs and where they had unprotected sex were obtained through interview or during accompanying HIV-infected cases applying National Medical Service Cards [4] and follow-up interview of HIV case managers. The aforementioned information were dictated by HIV-infected cases' recall and recorded into corresponding fields within CCDMS-AIDS by HIV case managers.

C. Data management and analysis:

The aforementioned contact tracing and case management information of contact patterns, time and places they encountered with ASCs and where they had unprotected sex were downloaded from CCDMS-AIDS. The downloaded contact tracing and case management information were anonymous, without any identifiable information and link of personal specificity, i.e. name, identity number, telephone and address, and coding with unique HIV number. Even though the downloaded information do not contain any identifiable information, the downloaded data files were encrypted immediately and were managed and analyzed by assigned analyzers on designated computer. The downloaded data files were managed and pivot analyzed through Microsoft Excel®, and output results of only secondary data. For HIV-infected cases that provided differentiable nicknames, cross-over comparisons to reallocate same nickname ASCs were performed to analyze their contact patterns and places.

#### D. Definition

##### 1. Definition of human immunodeficiency virus infected case (HIV-infected case):

The Taiwan CDC, Ministry of Health and Welfare (MOHW) defined adults, adolescents, or children aged greater than or equal to 18 months whose test results fulfilled at least one of the following criteria as HIV-infected cases and are mandatory to be reported to the health authorities according to the Communicable Disease Control Act.

- (1). Positive result of a HIV antibody screening test (EIA or PA) or a HIV antibody and antigen combination assay confirmed by Western blot test,
- (2). Twice positive results of HIV nucleic acid, and at least one of the positive results were reported by the Research and Diagnostic Center, Taiwan CDC,
- (3). Positive result of a HIV p24 antigen test including neutralization assay.

To study the contact patterns and high risk niches of unprotected sex among HIV-infected cases with their ASCs, only cases who met the above definition of HIV-infected case and completed the contact tracing information of ASCs were included into this preliminary study.

2. Casual sex partners (CSPs): According to the Mass Improvement Program for HIV-infected Case Management, 2012 and Evaluation Criteria of Communicable Diseases Prevention for local Health Bureaus, 2013 of Taiwan CDC, MOHW, the CSPs were defined as: (1) sex partners other than spouses of married HIV-infected cases whose marriage status continued, (2) unmarried HIV-infected cases who have sex with other sex partners without solid contact information and names through sex workers, sex consumptions, sex industries, prostitutes, call gays, compensated dating, one night stands, home parties and material mediated transactions.
3. Anonymous sexual contacts (ASCs): the ASCs were defined as those aforementioned CSPs whose information of contact tracing are completed including nicknames, gender, time and places they encountered with CSPs and had unprotected sex (high risk niches).
4. Sexual behaviors / sexual contacts: sexual behavior or sex contacts in this study including hetero-, homo- and bi-sexual behaviors, e.g., oral sex, anal sex and vaginal intercourse.
5. Duration of unprotected sex might occur: the duration of unprotected sex might occur is defined as the days of the end date of unprotected sex minus the start date of unprotected sex with any one of CSPs prior to the diagnosis of HIV infection.
6. Re-categorize the “party places” inside the places HIV-infected cases encountered with CSPs and had unprotected sex: As the category of “party places” inside the interview questionnaire implied that a place for more than one person gathered for a specific purpose and having activities or entertainment together. Since this category did not represent any specific area, in this preliminary study, we re-categorized each place they encountered with CSPs and had unprotected sex into category of their places of true occurrence to study the contact patterns and high risk niches of HIV-infected cases and their ASCs.

## E. Ethics

This preliminary study was exempted from review of Institutional Review Board (IRB) because none of the study subjects were of juveniles, inmates, aboriginals, pregnant women, disabled, mental illness and those who were judged by the IRB as under improper coercion or unable to make decision on their free will. In addition, this preliminary study fulfilled the Article 5 of Human Research Act and the third category for “public authorities to perform statutory duties, assessment of the effectiveness of public policy commissioned by the public authority or professional organizations” of the Notice of "Exempt Review Categories for Human Research" of Department of Health, Executive Yuan (promulgation becomes effective from 5<sup>th</sup>, July 2012).

## Results

During September 1, 2012 and March 31, 2013, there were 552 HIV-infected cases confirmed and reported in Taipei Region. After contact tracing, 142 among them have CSPs, and of which, 132 have completed information on ASCs, time, places and patterns of unprotected sex and were included into our study. There were no significant differences between age of diagnosis as HIV-infected cases, risk factors for contracting HIV and occupations for HIV-infected cases included versus excluded as study subjects (Table 1).

**Table 1. Analysis of HIV-infected cases included or excluded as study subjects, Taipei Region.**

	Included as study subject (%)	Excluded as study subject (%)	p-value
<b>Gender</b>			
Female	0 (0)	11 (2.6)	0.05
Male	132 (100)	409 (97.4)	
Total	132	420	
<b>Age of diagnosed as HIV-infected case</b>			
15-24	44 (33.3)	103 (24.5)	0.22
25-29	30 (22.7)	102 (24.3)	
30-39	41 (31.1)	140 (33.3)	
40-49	15 (11.4)	57 (13.6)	
50-79	2 (1.5)	18 (4.3)	
Total	132	420	
<b>Risk factors for contracting HIV</b>			
Sexual behavior	129 (97.7)	388 (92.4)	0.08
Injection drug user	0 (0)	6 (1.4)	
Unknown	3 (2.3)	26 (6.2)	
Total	132	420	
<b>Occupation</b>			
Government employees	2 (1.5)	14 (3.3)	0.18
Others	9 (6.8)	26 (6.2)	
Business	6 (4.5)	37 (8.8)	
Students	24 (18.2)	57 (13.6)	
Housekeepers	1 (0.8)	2 (0.5)	
Specialists	7 (5.3)	22 (5.2)	
Labors	5 (3.8)	17 (4.0)	
Services (Sex workers not included)	59 (44.7)	147 (35.0)	
Unemployed	13 (9.8)	50 (11.9)	
Military	2 (1.5)	10 (2.4)	
Unknown	3 (2.3)	37 (8.8)	
Total	132	420	

Among 132 HIV-infected cases, 92 (69.7%) cases had single ASCs, 35 (26.5%) cases had two to five ASCs, five (3.8%) cases had more than six ASCs, and the maximum had 23 ASCs (Table 2).

These 132 HIV-infected cases had totally 227 ASCs. Among 227 ASCs, 31 (13.7%) did not reveal their ASCs' nicknames and were not able to be compared, the rest 196 ASCs' nicknames were provided and after cross-over comparisons, 168 ASCs having unique nicknames were reallocated. For tracing sex contacts of these 168 differentiable anonymous sexual contacts (DASCs), 140 (83.3%) had sex with only one HIV-infected cases, 14 (8.3%) had sex with two HIV-infected cases, seven (4.2%) had sex with three HIV-infected cases, four (2.4%) had sex with four HIV-infected cases, and three (1.8%) had sex with as many as six HIV-infected cases (Table 3).

For the analysis of duration where unprotected sex might occur between HIV-infected cases with their ASCs, there were 75 person-times (33.0%) had unprotected sex for one day, 32 person-times (14.1%) for 2 to 90 days, 34 person-times (15.0%) for 91 to 180 days, 42 person-times (18.5%) for 181 to 365 days, and 44 person-times (19.4%) for more than 366 days (Table 4), respectively.

**Table 2. Numbers of anonymous sexual contacts of HIV-infected cases with casual sex partners, Taipei Region.**

No. of anonymous sexual contacts	Persons	Percentage
1	92	69.7
2-5	35	26.5
6-10	4	3.0
11-20	0	0
>20	1	0.8
Total	132	100

**Table 3. Analysis of numbers of sexual contacts of HIV-infected cases' anonymous sexual contacts with identical nicknames, Taipei Region.**

No. of sexual contacts	Persons	Percentage
1	140	83.3
2	14	8.3
3	7	4.2
4	4	2.4
5	0	0.0
6	3	1.8
Total	168	100

**Table 4. Analysis of duration of unprotected sex might occur for HIV-infected cases with their anonymous sex contacts, Taipei Region.**

	Person-times	Percentage
Duration for unprotected sex might occur (duration, days)		
1	75	33.0
2-90	32	14.1
91-180	34	15.0
181-365	42	18.5
>366	44	19.4
Total	227	100

For the analysis of places where 227 ASCs encountered with 132 HIV-infected cases and had unprotected sex, 169 person-times (74.5%) among 227 ASCs encountered with HIV-infected cases on the internet e-dating ranked the highest, followed by 17 person-times (7.5%) at sauna (baths) and 11 person-times (4.6%) at Pub, and 17 person-times (7.5%) of others could not be categorized in Taipei Region. The places where ASC encountered with HIV-infected cases demonstrated consistent patterns in each city and county in Taipei Region (Figure 1).

For the analysis of places of 227 ASCs had unprotected sex with 132 HIV-infected cases, 170 person-times (74.9%) was at home ranked the highest, followed by 21 person-times (9.3%) at sauna (baths) and 16 person-times (7.0%) at hotel, and 13 person-times (5.7%) of others could not be categorized in Taipei Region. The places where unprotected sex occurred demonstrated consistent patterns in each city and county in Taipei Region (Figure 2).

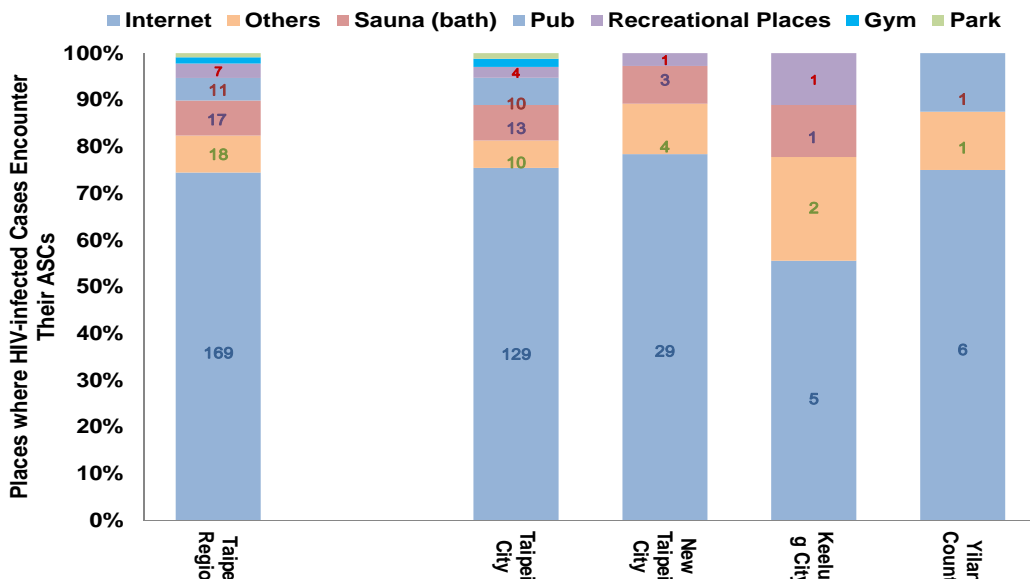


Figure 1. Analysis of places where HIV-infected cases encounter their anonymous sex contacts (ASCs).

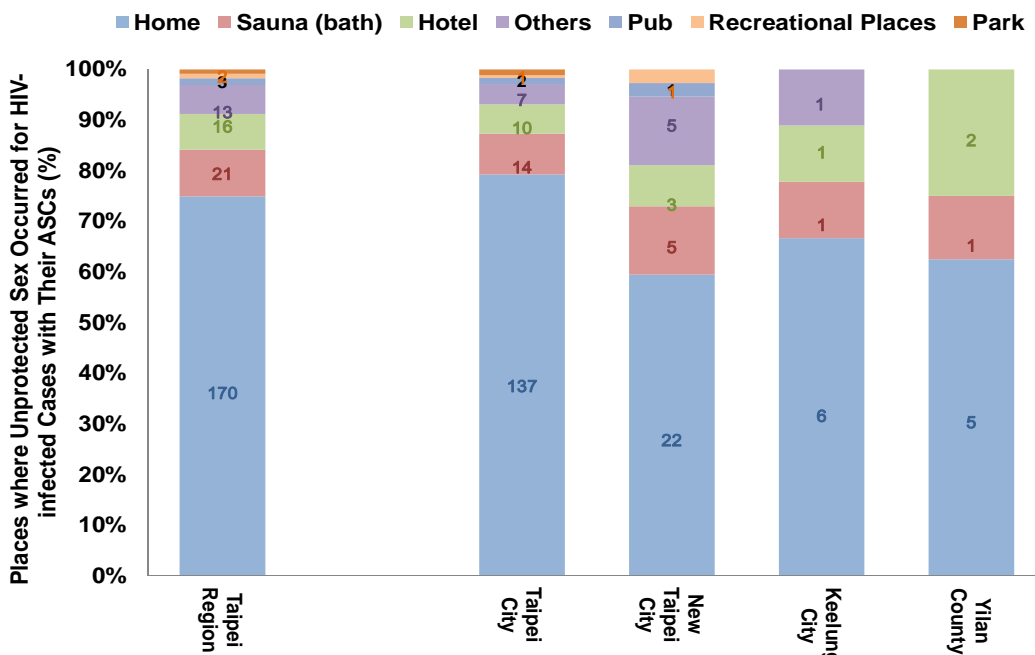


Figure 2. Analysis of places where unprotected sexual behavior (USB) occurred for HIV-infected cases with their anonymous sex contacts (ASCs).

## Discussion

Our preliminary study demonstrated that 69.7% HIV-infected cases had only 1 ASCs, the rest 30.3% HIV-infected cases had more than 2 ASCs, and could have as many as 23; whereas 83.3% differentiable anonymous sex contacts (DASCs) had sexual contact with only 1 HIV-infected case, the rest 16.7% DASCs had sexual contact with more than 2 HIV-infected cases, and could have as many as 6 in Taipei Region. This finding was lower than the finding of 74% HIV-infected case had more than 10 sexual contacts prior to be confirmed diagnosis in a research performed by a medical center [5]. We analyzed the two HIV-infected case cohorts in the above medical center study with our study in Taipei Region and found that cases younger than 24 years old was 16.1% in the above medical center study cohort from August, 2006 to July, 2008, which was less than the percentage of the same age group in our study (27.1%). This phenomenon showed our cohort was younger than the above medical center study and might lead to less compatibility of lifetime accumulated number of causal sexual partners, in the meanwhile, we could not exclude the existence of measurement error which might cause by HIV-infected cases had higher trust in medical doctors to HIV case managers, and the existence of selection bias of differential population representing where the medical center cohort and ours might come from. As to the duration of unprotected sex might occur, only 33.0% had unprotected sex for 1 day, and the rest 67.0% had more than one days, and might be as long as four years and six months (1705 days).

For the analysis of places of ASCs encountered with HIV-infected cases and had unprotected sex, internet e-dating (74.5%), sauna (baths) (7.5%) and pub (4.6%) had become the first three choices of place ASC getting acquainted with HIV-infected cases, and after they met each other, they went home (74.9%), sauna (baths) (9.3%) and hotel (5.8%) for unprotected sex. Our preliminary study showed the occurrence of HIV-infected cases e-dating for sex in Taipei Region lies between international studies of gay e-dating for sex through internet (33~50% in United Kingdom and 88% in Netherlands) [6,7], and closer to Netherlands of similar status of higher internet and smartphone coverage [7]. To sum up, the contact patterns of HIV-infected cases with their ASCs showed characteristics of “multiple exposure, continuously accumulating risk exposures, and surging e-dating for sex”. In conclusion, our study showed the places of abovementioned HIV-infected cases encountered with their ASCs and where unprotected sex occurred were mainly encountered on the internet e-dating and went to each other’s home for unprotected sex, which might lead to our health education focused on high risk niches, i.e. Certificate for Friendly, Health and Safe Store for men who have sex with men (MSM) to use condoms in special settings like sauna (baths) [8], had less and less penetration toward HIV-infected case and ASCs.



However, our preliminary study was confined by the difficulties of contact tracing and management, recalling memories and trust building between HIV-infected cases with case managers during our study period. Thus, our study method, process and team might subject to the following limitations: (1) only 25 % of native HIV-infected cases in Taipei Region completed contact tracing information. Although there were no significant difference in the demographic characteristics and risk factors of contracting HIV of these study subjects included versus excluded (Figure 1), the HIV-infected cases dominated the definition of CSPs and ASPs and might lead to selection bias; (2) since the contact tracing information was obtained from the supporting, consultation, counseling and interviewing of case managers, the experiences, skills, standardization, degrees of mutual trust, deliberate concealment, e-dating nicknames can be added or deleted any time, and difficulties of tracing back might lead to recall bias and measurement error. Even so, our preliminary study showed more than 70% contact patterns and places of HIV-infected cases encountered with their ASCs and had unprotected sex in a consistent manner in Taipei Region.

To overcome the contact characteristics of “multiple exposures, continuously accumulating risk exposures, and surging e-dating for sex” of HIV-infected cases with their ASCs, it is necessary for us to build up inter-ministerial and cross-departmental integrated multidiscipline penetration health promotion. By improving general public’s cognition toward HIV transmission and safe sex, and by let everyone know even only once of risk exposure have certain risk of infection to encourage them accepting wear on condom throughout sexual intercourse and wear a new condom while each time change partners. The Taiwan CDC, MOHW was vigorously setting up Taskforce for AIDS Prevention in order to: (1) cooperate with Ministry of Education for mobilizing each campus in performing AIDS prevention education and interact with gay club to build up concept of safe sex; (2) integrate with Ministry of National Defense for continuously promoting HIV prevention and safe sex through weekly educational television program, recruit training and warm remind for safe sex prior to holiday; (3) run virtue broadcasting stations with Voice of Han Broadcasting Networking (VHBN), National Education Radio (NER) and Taipei Broadcasting Station (TBS), through the HIV-infected case acting as an example to others and interaction with clinical and disease prevention sectors for advocating protected sex. In the future, we will strengthen our cooperation with: (1) National Communication Commission to send push notification or add notice on e-dating websites and APPs to remind safe sex; (2) opinion leaders on the internet to establish solid interaction between clinical and disease prevention authorities for e-dating surveillance and counselling to avoid unprotected sex; (3) give impetus to cooperation of nongovernment organization with Parent-Teacher Association to reform family education and supporting system for implanting treasure self’s health since their childhood.



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## Performance Analysis of a Facebook event for HIV/AIDS Prevention – The 2012 “Creature Detector” example

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### Abstract

According to statistics from Taiwan Centers for Disease Control (Taiwan CDC), 15-24 year olds have shown an increase of new HIV infections in the recent years. Due to the fact that the main risk factor of the infected persons is sexual behavior, this shows that “unsafe sex” is the main reason behind the increase in infected persons and the drop in infected age; this group is also the main social network user. Therefore, the Taiwan CDC set the young age group as the targeted audience, and set up the “1922 Epidemic Prevention Experts” Facebook page, and promoted the “Creature Detector” **HIV/AIDS** prevention event during the summer vacation of 2012 from June 22 to August 28. A total of 14,153 users participated in this event with an average of 2 logins per person, most on Wednesdays and after office/class hours. This event increased 18,670 fans of “1922 Epidemic Prevention Experts” Facebook page. Of the newly-joined fans, male (63.0%) exceeded female, with the most from the 13-24 year age group (52.1%). Cross-analyzing age and gender, male fans growth from all age groups also exceed those of females, with the highest growth rate being male fans between 13-17 years of age (1,582.9%). During the event, “Talking about this” on the page increased from 180 persons every day to 900, showing an eightfold increase. The results of the event show, aiming at target groups in designing suitable web events can contact with high risk subjects and change the formation of the fan page; in addition, this event also allows us to understand how to manage a Facebook fan page. In the future, the best timing for posts and event promotion will be used for the spreading of information and shares to enhance the effectiveness of the promotion.

**Keywords:** Facebook, HIV/AIDS, Facebook event

### Introduction

According to Taiwan Centers for Disease Control (Taiwan CDC) statistics data, as of September 2013, the cumulative number of reported HIV infections totaled 25,954; those between 15 to 24 years of age totaled to 5,178, taking up approximately 20% of the whole infected number. Analyzing those HIV infected persons during 2010 to September 2013, a total of 2,109 persons were 15-24 year olds, taking up 27.4% of the total infected numbers (7,704 persons), showing a gradual increase of infected persons in the recent years. Sexual behavior is the main risk factor for those infected (72.3%) which show that unsafe sex is the main reason of HIV transmission which has lead to the increase in infected numbers and decrease in infected age [1].

Analyzing the “unsafe sex” risk factor among HIV infections, the highest ratio is same-sex sexual behavior (44.1%) [1]. Foreign studies indicated that who seek sexual partners through the internet are mostly male, sexual behavior of homosexual, has contracted with sexual transmitted diseases (STDS), have multiple sexual partners, partners have infected HIV, or not using condoms[2, 3]. Approximately 35% to 40% of homosexual men have sought out sexual partners through the internet[4, 5]. In addition, many issues unable to be discussed publicly, or information about dating or drug-using sex parties, can draw attention and discussion due to the amenity and private nature of the internet; therefore, domestic scholars have pointed out that to focus on teen HIV/AIDS prevention education, teen education websites, online game sites or homosexual group sites should interconnect with one another to let the younger age group of internet users to easily receive and search for correct HIV/AIDS prevention information [6].

Facebook is a social network site which has risen up in the recent years. Due to its customary, contact, sharing, and chat functions, more and more corporations are using fan pages to connect with users and deliver and share information. According to the Check Facebook website statistic data, as of October 30, 2013, Taiwan Facebook accounts reached 15 million, among this, users aged between 13 and 24 exceeded 5.2 million (approximately 34.7%), placing second in all age groups [7]. Male and female ratio is balanced (both at 50.0%), showing Facebook’s significant influence on social networking communication between young people and daily life. Additionally, domestic broadband network usage report shows that most network users are below 44 years of age, among which users between 20-24 years of age stand with the highest ratio; the main usage reason is “my friends use it, so I do, too”, showing peer influence. Users below 34 years of age are the main online game users with those between 12-19 years of age as the largest group, with more males than females [8].

Through a social network medium, information can be shared and posted extensively within a social network to elevate public contact with organizational messages; Taiwan emergency departments even use the power of social networks to elevate emergency policy awareness [9]. It is also proven that within homosexual social networks, conduction of HIV/AIDS and STD prevention and intervention measures is possible and is considered a suitable domain [10]. Furthermore, studies show that health education through the media can lead to effective change in health behavior and reduce the risk of disease contraction or even death; Internet media have gradually become an important promotion approach [11].

During the H1N1 epidemic period in 2009, the Taiwan CDC established the “1922 Epidemic Prevention Experts” Facebook page and formally entered internet social networking promotion, which is a new approach to epidemic prevention. Currently, apart from providing HIV/AIDS prevention promotion information, non-scheduled events are also held to draw attention of younger age groups to epidemic prevention issues. This report uses the “Creature Detector” Facebook HIV/AIDS prevention web event held in 2012 to provide operational experience and effects and to bring forward opinions and advice towards health propagation through social network media.

## Materials and Methods

### A. “Creature Detector” Facebook event for HIV/AIDS Prevention

Using the fact that younger age groups like internet social networks and online games, as of June 22 to August 28, 2012 during the summer vacation, Taiwan CDC held this event on the “1922 Epidemic Prevention Experts” Facebook page, assisted by a company in designing a web application in testing internet users and their friends what kind of “Creature” they are. Safe sex propaganda information was also implemented into the application. To attend the event, a user must first become a “1922 Epidemic Prevention Experts” Facebook page fan. The event uses the fun aspect of games, lucky drawings, and the fact that internet users like to share, in addition with the advertisement effect, through the power of internet broadcasting, to draw the attention and participation of internet users. In the meantime, correct HIV/AIDS prevention information is conveyed. Six stages of Facebook advertisements were promoted from July 2, 2012.

### B. Data collection and analysis

Data came mainly from two sources, the online game application secondary data and “1922 Epidemic Prevention Experts” Facebook page management statistics. When obtaining online game application data, personal information of the participants such as names and usernames, birth dates, and phone numbers were eliminated; statistics collected from Facebook management sever were all secondary data. The data collected were input into Excel database and analyzed using Epi info software.

## Results

### A. Participant data analysis

Analysis of online game application data showed a total of 14,153 online participants with 26,917 event web page login times. Analyzing the login times, most participants joined in August (51.2%) and on Wednesdays (20.2%), followed by Tuesdays (15.6%) and Saturdays (15.4%); participation time was mostly during the night between 9-11 p.m. (21.6%), followed by evening hours between 6-8 p.m. (Table 1).

**Table 1. Analysis of “Creature Detector” Facebook event login times between June 22, 2012 and August 28, 2012**

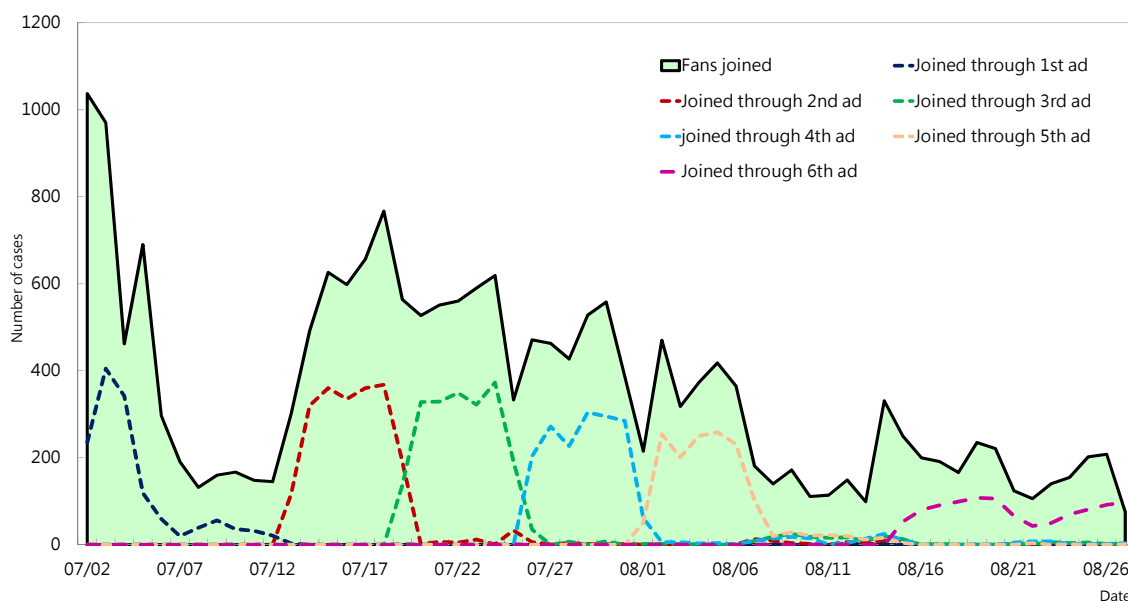
Variables	Logins (%)	Variables	Logins (%)
<b>Total</b>	<b>26,917</b>		
<b>Participant date</b>		<b>Participant time</b>	
Monday	3,347 (12.4)	12-2 a.m.	2,300 (8.5)
Tuesday	4,201 (15.6)	3-5 a.m.	447 (1.7)
Wednesday	5,446 (20.2)	6-8 a.m.	1,244(4.6)
Thursday	3,491 (13.0)	9-11 a.m.	3,699(13.7)
Friday	3,589 (13.3)	12-14 p.m.	3,552(13.2)
Saturday	4,145 (15.4)	15-17 p.m.	4,472(16.6)
Sunday	2,698 (10.0)	18-20 p.m.	5,383(20.2)
		21-23 p.m.	5,820(21.6)

## B. Event effectiveness analysis

“1922 Epidemic Prevention Experts” Facebook management statistics were used for analysis.

### 1. Number of fans

Before the event (shown by the number on June 21, 2012), the number of fans totaled to 17,983. Since July 2, 2012, six stages of online advertisements had been promoted to attract more fans. As of August 31, 2012, the number of fans reached 36,653, showing an increase of 18,670 fans, growth doubling by 103.8%. The highest fan number growth rate on a single day reached its highest on July 2, followed by wave increases which accompanied the advertisements. Data also shows, those fans who joined after clicking on the advertisements took up approximately 45% (Figure 1) of the total increased number. The newly joined fans were mostly made up of males (63.0%). More than half (52.1%) aged between 13 and 24 years of age showed the highest growth rate (205.9%) (Table 2).



**Figure 1. “Creature Detector” Facebook event advertisement stages and fans joined between July-August, 2012.**

### 2. Formation of fan group

By analyzing gender, before the event, female fan members (56.2%) exceeded male fan members (43.2%); after the event, male members (53.3%) exceeded female members (46.3%). Male fan member growth rate reached to 151.3%, this change shows significant difference (Table 2).

Analyzing age, we can see that before the event, the fan members were made up of mostly 25-34 years of age (45.4%) and > 35 years of age (28.3%), followed by the younger age group between 13-24 (26.2%); after the event, 25-34 year age group (36.4%) and > 35 year age group (24.1%) ratio was lower than that before the event, yet the 13-24 year age group ratio increased to 39.5% after the event, showing a growth rate of 205.9%, and is the highest in all age groups. This change shows significant difference (Table 2).

Further analysis of age and gender shows that after the event, male fan members of all age groups had a higher growth rate than those of female members; among which 13-17 year age group male fans had the highest growth rate (1,582.9%), followed by 18-24 year age group (174.2%). Among female fan members, 13-17 year age group show the highest growth rate (935.9%) followed by > 55 year age group (106.1%). Other age groups, 13-17, 18-24, 25-34, and 35-44, all show significant difference before and after the event (Table 2).

**Table 2. “Creature Detector” Facebook event advertisement stages and fans joined between July-August, 2012.**

Variable	Before event (6/21) n(%)	After event (8/31) n(%)	p-value	Increase number n(%)	Growth rate (%)
<b>Total</b>	<b>17,983</b>	<b>36,653</b>		<b>18,670</b>	<b>103.8</b>
<b>Gender</b>			<b>&lt;0.0001</b>		
<b>Female</b>	<b>10,114(56.2)</b>	<b>16,982(46.3)</b>		<b>6,868(36.8)</b>	<b>67.9</b>
<b>Male</b>	<b>7,776(43.2)</b>	<b>19,543(53.3)</b>		<b>11,767(63.0)</b>	<b>151.3</b>
<b>Unknown</b>	<b>93(0.5)</b>	<b>128(0.3)</b>		<b>35(0.2)</b>	<b>37.6</b>
<b>Age/Gender</b>					
<b>13-24 years</b>	<b>4,729(26.2)</b>	<b>14,465(39.5)</b>	<b>&lt;0.0001</b>	<b>9,736(52.1)</b>	<b>205.9</b>
<b>Female</b>	2,490(52.6)	5,706(39.4)		3,216(33.0)	129.1
<b>Male</b>	2,220(46.9)	8,721(60.3)		6,501(66.8)	292.8
13-17 years	385	5,173	<0.0001	4,788	1243.6
Female	195(50.6)	2,020(39.0)		1,825(38.1)	935.9
Male	187(48.6)	3,147(60.8)		2,960(61.8)	1582.9
18-24 years	4,344	9,292	<0.0001	4,948	113.9
Female	2,295(52.8)	3,686(39.7)		1,391(28.1)	60.6
Male	2,033(46.8)	5,574(60.0)		3,541(71.6)	174.2
<b>25-34 years</b>	<b>8,167(45.4)</b>	<b>13,335(36.4)</b>	<b>&lt;0.0001</b>	<b>5,168(27.7)</b>	<b>63.3</b>
<b>Female</b>	4,842(59.3)	6,794(50.9)		1,952(37.8)	40.3
<b>Male</b>	3,274(40.1)	6,483(48.6)		3,209(62.1)	98.0
<b>35-44 years</b>	<b>3,867(21.5)</b>	<b>6,498(17.7)</b>	<b>&lt;0.0001</b>	<b>2,631(14.1)</b>	<b>68.0</b>
<b>Female</b>	2,149(55.6)	3,312(51.0)		1,163(44.2)	54.1
<b>Male</b>	1,703(44.0)	3,163(48.7)		1,460(55.5)	85.7
<b>45-54 years</b>	<b>835(4.6)</b>	<b>1,558(4.3)</b>	<b>0.12</b>	<b>723(3.9)</b>	<b>86.6</b>
<b>Female</b>	437(52.3)	766(49.2)		329(45.5)	75.3
<b>Male</b>	393(47.1)	786(50.4)		393(54.4)	100.0
<b>55+ years</b>	<b>385(2.1)</b>	<b>797(2.2)</b>	<b>0.89</b>	<b>412(2.2)</b>	<b>107.0</b>
<b>Female</b>	196(50.9)	404(50.7)		208(50.5)	106.1
<b>Male</b>	186(48.3)	390(48.9)		204(49.5)	109.7

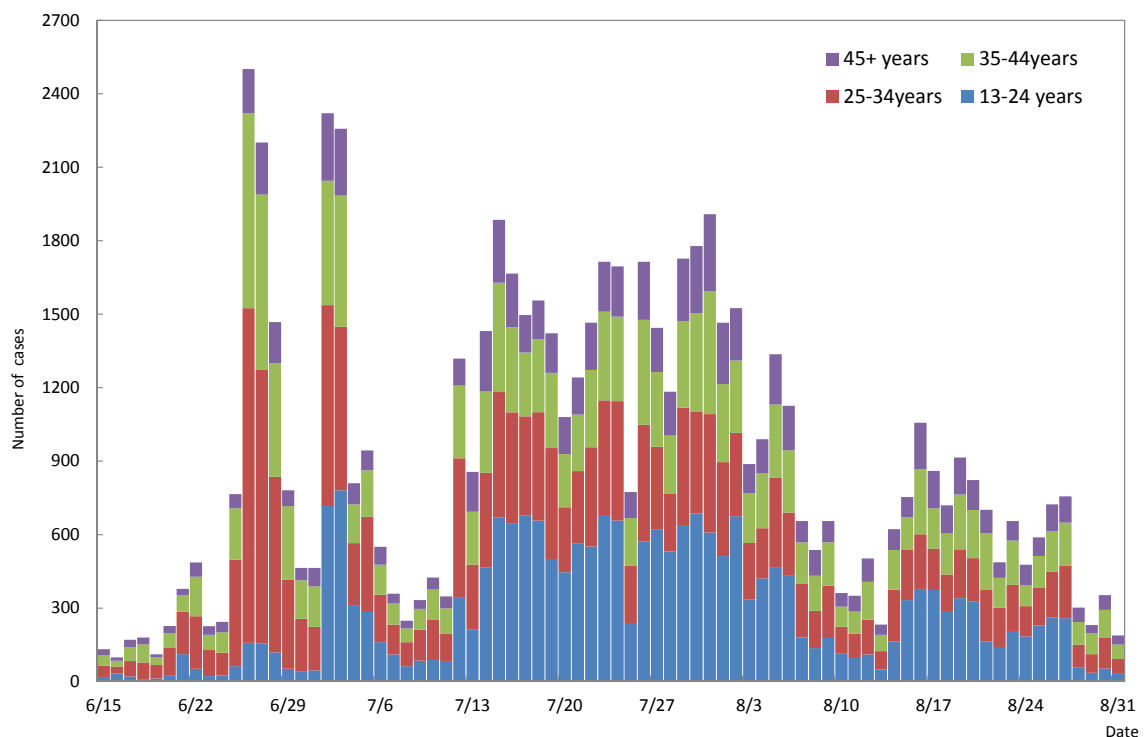


### 3. The Facebook page of “Talking about this”

“Talking about this” indicates the non-cumulative number of visitors “likes”, comments, and shares towards certain posts; these can create discussion topics for the fans forum and contact more Facebook users for further spread effect, which is one of the goals for Facebook promotion operation.

An average of 180 persons was active in “Talking about this” each day before the event; during the event, the average of “Talking about this” each day elevated to 900 persons. In the initial phase of the event from June 26 to 27 and July 2 to 3, two high peaks appeared, followed by another high peak from the middle of July to the end of July. The number of “Talking about this” in August was lower than that of July, however still higher than the average before the event (Figure 2).

Analyzing age distribution, we can see that before the event, 13-24 year age group fans had an average of 30-40 persons of “Talking about this” each day, and showed a significant rise in the middle of July. During the entire event, the average “Talking about this” each day for 13-24 year age group reached 320 persons, showing an eight-fold increase from before the event. Also, among the “Talking about this” numbers, 13-24 and 24-34 year age group fans took up 32% and 31% followed by 35-44 year age group (24%) and > 45 year age group (13%) fans.



**Figure 2. Age distribution of the “1922 Epidemic Prevention Experts” Facebook between Jun-August, 2012.**

## **Discussion**

### **A. Understanding internet user habits can elevate user interaction**

A total of 14,153 users participated in this event, with 26,917 logins, showing an average of 2 logins per person. By analyzing the login number, most of the logins occurred on Wednesdays, followed by Tuesdays and Saturdays, the lowest on Sundays. This may be due to the fact that most people choose to go out on Sundays and spend less time online. The login times were mostly after office/class hours and night time, with the lowest between midnight and 8 a.m.

A digital sales company in USA once analyzed the world top brands and information from over 1,800 Facebook pages. The results show that on Facebook, different professions have different suitable posting times. For advertisements and inquiry type fan pages, weekend posts can reach a 60% interaction rate. Integrating the professions observed the interaction rate of posts between 8 p.m. and 7 a.m. were 14% higher than the rate between 8 a.m. to 7 p.m.; weekend posts also had a higher interaction rate (14.5%) than of weekdays [12]. The results of interaction time from this foreign study and this report have a slight discrepancy; however, after understanding Facebook fan usage habits, using the most suitable time to post messages and promote events can aid in promotion and sharing of information and elevating internet user interaction; this is a common advice.

### **B. Appropriate event design can contact risk subjects and change the form of fan pages and increase promotion scale.**

USA CDC (Centers for Disease Control and Prevention) believes that in the health communication and social marketing process, determining the target audience is one of the key step; one must first understand the behavior, life style, and needs of the targeted subjects and followed by planning the communication message, promotion materials, and approach channels [13]. Due to the ever decreasing HIV infected age group, the plans for this event targeted the young group of 13-24 year olds; through the powerful dissemination of social networks, expectant characteristically and notational web events can be designed. The results show that this event not only reached the targeted promotion subjects set by Taiwan CDC, but also elevated the targeted audience's discussion through comments, shares, and posts; in addition, through the spread effect, more people joined and expanded the topics discussed on the fan page.

### **C. Continuous message posts and events, to enhance fans' memory to elevate their willingness to remain fans of this page**

Domestic researches show, the promoted content and user interactive method for broadcasting in social networks is the main factor in managing fan pages. Enhancing the related topics provided and created can allow users to participate and interact. Enhancing updates of related information such as product promotion, latest news, and event information can effectively elevate most users' memory of a certain product [14]. Due to the facts above, as of September, after the lucky drawing winners were announced, more HIV

prevention and youth-related topics and events were continuously posted to prolong the time the targeted subjects stay in the fans page. The statistics from December 2012 show, 13-24 year age group took up 36% of the fans, with approximately 32% of "Talking about this". The number of fans remained relatively stable with no sign of many fans leaving.

### **Suggestions**

An open domain such as a social network server, with designed events and comment discussion characteristic form a fan forum to bridge the connection with subjects under risk and with a side-sweeping effect can become an effective tool in propagandas. It is advised that social networks can be used to communicate with younger age groups, design attractive web events and implement promotion information; new topics need to be brought up to elevate fans' willingness to remain in the fan page. In addition, this study also found, internet users were most active after 6 p.m. (after office/class hours) on Wednesdays and Saturdays. Information should be posted in accordance with internet user habits for effective promotion and spread of information.

### **Limitations**

Due to the limitation of online game application and Facebook management statistic data, further analysis cannot be conducted.

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