

Adaptation of Venue-Day-Time Sampling in Southeast Asia to Access Men Who Have Sex with Men for HIV Assessment in Bangkok

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This article describes adaptation and implementation of venue-day-time (VDT) sampling to enroll Thai men who have sex with men (MSM) through bars, saunas, and parks in Bangkok for the first community-based assessment of HIV prevalence and risk behavior. VDT sampling had four phases: (1) identification and geographic mapping of venues, (2) enumerating foot traffic at a subset of venues, (3) determination of eligibility and willingness to participate at a further subset of venues, and (4) enrollment of participants at a final set of venues. Field staff included peer staff, information technologists, and lab specialists. Survey data were collected with hand-held computers; oral fluid specimens were collected for HIV testing. Local stakeholders were included in the process. The VDT sampling process took 6 months to complete, with 1,121 MSM enrolled. The successful implementation of VDT sampling provides a model for adapting the method to access and assess hard-to-reach populations in other non-Western settings.

Keywords: *sampling; methodology; Bangkok; Southeast Asia; HIV; men who have sex with men (MSM); gay; bisexual*

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The HIV/AIDS epidemic in Thailand has, in large part, been attributed to heterosexual transmission and, to a lesser degree, injection drug use and perinatal transmission (Weniger et al. 1991; Vanichseni et al. 2002; Royal Thai Ministry of Public Health, AIDS Division 2003). Of the 236,099 AIDS cases reported to the Thailand Ministry of Public Health as of March 2004, 1% (2,200) were categorized as having had a male-to-male sexual mode of transmission (Royal Thai Ministry of Public Health, AIDS Division). It is unclear whether this low percentage is accurate or due to underreporting.

No studies have investigated HIV prevalence or sexual risk behavior among community-based samples of men who have sex with men (MSM) in Thailand. Some data are available from sentinel surveillance among male sex workers (Royal Thai Ministry of Public Health, AIDS Division 2004), but there is a lack of knowledge about risk behavior and HIV infection among community samples of MSM in Thailand. This information is necessary to better understand the situation among MSM, in general, and to develop informed prevention interventions. Consequently, we wanted to conduct an assessment of HIV prevalence and associated risk factors, but we faced a number of barriers.

Homosexuality in Thailand has been characterized as tolerated but not accepted (Jackson and Sullivan 1999; van Griensven et al. 2004), although there is an increasing number of public venues for MSM to meet socially and to seek sexual partners (Jackson and Sullivan 1999). Therefore, it is possible to identify venues where MSM congregate, although these are often away from well-trafficked areas. Unlike many Western cities, homosexual men do not tend to live in particular residential districts, so venues for meeting partners tend to be widely dispersed across the metropolitan area. Another consideration is the social norms that inhibit public discussion of sexuality, particularly sexual behavior, such as that between men, which is socially proscribed in some way (Van Landingham et al. 1994; Jackson and Sullivan 1999).

Given the need to estimate HIV prevalence among MSM in Thailand, we wanted to undertake a population-based epidemiological investigation. Accessing this hard-to-reach population posed a challenge. The limited amount of available data and the absence of conventional sampling frames

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(e.g., censuses or other representative listings of community members) led us to a focus on venues. This led us to use venue-day-time (VDT) sampling, a form of time-space sampling that has been successfully used to reach MSM populations in the United States, including young and ethnic/racial minority MSM (MacKellar et al. 1996; Muhib et al. 2001; Stueve et al. 2001). In this article, we provide a descriptive case example of how this methodology can be implemented. As such, we focus on practical issues in implementation such as determination of eligibility and participation rates and discuss the value and limitations of our obtained sample. We also compare our implementation and outcomes with those of other VDT applications with MSM that have occurred in the United States. The HIV prevalence findings are reported elsewhere (van Griensven et al. 2005) and so are not the main focus here.

METHODS AND RESULTS

Assessment Staff and Materials

Project staff consisted of two Thai male project coordinators who oversaw all phases of the project; twenty trained peer staff for type I and II enumeration (fifteen peer staff for assessment), of whom four served as field supervisors; eight information technology staff; and four lab specialists. The staff received classroom and field-based training immediately prior to each phase of the sampling procedure. A van transported staff to and from venues and served as the project base for materials and storage at the venues.

Palm personal digital assistants (PDAs), Model Palm 500 (Palm Inc., Milpitas, CA), were used for both screening and interviewing in Thai language using ThaiHack Software (PDA ThaiPalm Co. Ltd., Bangkok, Thailand). A data collection program was developed with Satellite Forms software (Pumatach Inc., San Jose, CA), and after completion of interviews, data were downloaded into a Microsoft Access (Microsoft Corp., Redmond, WA) database via HotSync (Palm Inc., Milpitas, CA).

Institutional Review of the Study

The study protocol was reviewed and approved by the Scientific Research in Human Subjects Committee of the Thailand Ministry of Public Health. It was reviewed by the U.S. Centers for Disease Control and Prevention and determined to be a surveillance activity that did not require institutional review board review.

VDT Sampling Procedure

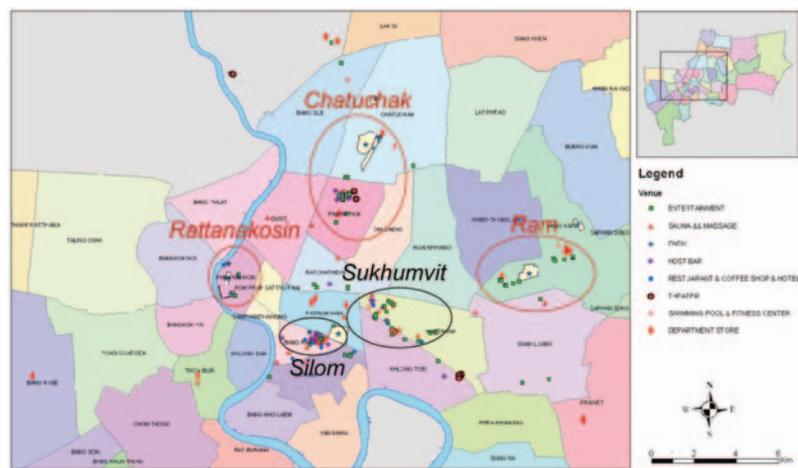
The VDT sampling method systematically identifies and selects venues and associated days and times of the week during which hard-to-reach populations congregate and may be accessed for recruitment and assessment (MacKellar et al. 1996; Muhib et al. 2001; Stueve et al. 2001). We used VDT sampling to establish a set of venues and times during which MSM could be screened for eligibility and, if willing, be interviewed and have an oral fluid specimen collected on site for HIV testing.

Our application of VDT sampling included four distinct and consecutive phases: (1) venue identification and mapping; (2) enumeration of foot traffic in and around venues (type I enumeration); (3) determination of eligibility and willingness to participate of MSM who met eligibility criteria, by venue (type II enumeration); and (4) recruitment of MSM for an assessment of HIV prevalence and risk behavior. These procedures were conducted by staff from a local MSM-oriented community-based organization (CBO) with short periods of time required for each phase (4 to 6 weeks). The sampling process was supplemented by meetings with venue proprietors and security personnel, local police, other CBOs, community leaders, and other HIV researchers working in Thailand to inform them about the project and our presence at the venues, gain their input and support, and enhance cooperative working relationships.

Venue Identification and Mapping

MSM venue identification and mapping took place within the geographic boundaries of the Bangkok metropolitan area. The urban core and primary suburban areas of Bangkok have a population of approximately 10 million (Bangkok Metropolitan Administration 2003). Venues were systematically identified and mapped through (1) gathering and reviewing informational materials on MSM venues (e.g., local magazines, Internet sites, papers, and guidebooks) and (2) speaking with local key informants (e.g., Rainbow Sky Organization members and other MSM). Venues were either parks or single business establishments (typically bars or saunas), although in one case, a *soi* ("lane" or "small street") that contained several nearby establishments was treated as a single venue. Venues were mapped using ArcView 8.2 mapping software (ESRI Inc., Redlands, CA). Staff physically verified the locations of venues and recorded this information using global information system (GIS) mapping by using a global positioning software (GPS) device to record each venue's location. GPS devices position venues on a world map and allow for assessment of the proximity and any geographic clustering of venues.

FIGURE 1
Men Who Have Sex with Men Venue Clusters in Bangkok, 2003



NOTE: The three northernmost zones (Rattankosin, Chatuchak, and Ram) were included in the assessment.

A total of 225 MSM venues were identified and mapped (Figure 1). Venues attended by substantial numbers of tourists and expatriate foreigners (those in the Silom and Sukhumvit clusters) were excluded to recruit a sample of native Thai MSM and allow a focus on local populations. Male commercial sex venues were excluded in all clusters because they attracted Thai men of extreme wealth or foreigners (expatriates, tourists). Most of the sex workers in these venues report that they do not have noncommercial male partners (Kunawararak et al. 1995); hence, their sexual behavior may differ substantially from the much larger population of Thai MSM. Venues that advanced to the next assessment phase were selected based on (1) feasibility of delimiting an established area (i.e., being able to clearly tell whether potential participants had “entered” the identified venue area), (2) ease of accessing venue users, (3) proprietor and security support, (4) safety concerns about venue locations, and (5) establishment of relatively equivalent numbers of venues across geographic clusters to provide representation of all areas and facilitate the logistics of assessment data collection.

Type I Enumeration

This phase assessed pedestrian traffic at venues. A line or geometric area was designated on the ground at each venue to measure attendance levels.

Two or three peer enumerators dispersed and positioned themselves in view of the area to make independent counts, using a mechanical clicker. They counted the number of men who crossed the designated line or area and appeared to be at least 18 years old and of Asian descent. Counting continued for a 1-hour period for each session; the average counts across staff members was used as the official count for that VDT unit (i.e., venue sample at a specific date and time). Enumeration always took place during the evening hours of 6:00 p.m. to midnight. Different venues were enumerated on different days, and we chose to enumerate during times when venues were expected to be most busy (based on reports from key informants during identification of venues and observations made during the verification of locations). Each staff person completed a summary form and made an overall recommendation of whether the venue should be accepted for type II enumeration. The summary form assessed population access, logistics and lighting, venue proprietor and security personnel support, safety concerns, and any problems that arose during the enumeration session. Each venue was scheduled for enumeration on two different occasions (one weekday evening and one weekend evening) for two 1-hour VDT units per venue. Several venue enumerations were rescheduled due to weather; however, a few venues could not be enumerated more than once due to limited staff time and resources.

Table 1 summarizes the results of our type I enumeration in terms of the number of venues, the number of VDT units (this exceeds the number of venues because some venues needed to be assessed more than once), the number of men who appeared to be eligible (total and the mean number per venue), and staff opinions regarding inclusion of the VDT unit for further assessment in type II enumeration (i.e., was this a suitable venue and a suitable day and time for this venue to be considered for the next stage of the assessment in which actual eligibility and willingness to participate would be assessed). Consensus among staff was used to make these choices. This was based on the type I enumeration data as well as qualitative information reported on VDT unit summary forms. As with the venue identification phase, venues were eliminated in this phase if they (1) were perceived to have a very small proportion of clientele that was MSM, (2) had very low levels of pedestrian traffic, (3) appeared unsafe, or (4) were logistically difficult to access while (5) attempting to achieve representation across venue clusters.

Type I enumeration (see Table 1) was completed in 4 weeks and included sixteen saunas (thirty VDT units), sixteen bars (twenty-seven VDT units), and ten parks (twenty-three VDT units). Eligible MSM totaled 574 at saunas, 1,321 at bars, and 1,319 in parks. Saunas had relatively low traffic, with a mean of nineteen eligible men per VDT unit. Bars had a wide range of attendance and an overall mean of forty-nine eligible men per VDT unit; parks

TABLE I
Type I Enumeration Results for 1-Hour Count of Perceived Eligible Men at Venues by Venue Type and Time Period, Including Venue-Day-Time (VDT) Unit Means and Staff Recommendation for VDT Unit Acceptance for Type II Enumeration: Bangkok, 2003

<i>Venue Type by Time Period</i>	<i>Venues</i>	<i>VDT Units</i>	<i>Perceived Eligible Men</i>		<i>Staff Recommend VDT Unit for Type II Phase</i>		
			<i>Total</i>	<i>Mean per VDT Unit</i>	<i>Yes</i>	<i>No</i>	<i>Mixed</i>
Saunas							
6-8 p.m.	10	16	316	20	7	7	2
8-10 p.m.	7	10	154	15	4	4	2
10 p.m.-midnight	3	4	104	26	3	1	0
Overall	16	30	574	19	14	12	4
Bars							
6-8 p.m.	2	3	12	4	0	3	0
8-10 p.m.	9	12	311	26	3	8	1
10 p.m.-midnight	9	12	998	83	8	4	0
Overall	16	27	1,321	49	11	15	1
Parks							
6-8 p.m.	3	5	448	90	4	1	0
8-10 p.m.	8	12	590	49	8	3	1
10 p.m.-midnight	3	6	281	47	6	0	0
Overall	10	23	1,319	57	18	4	1

NOTE: VDT units for type I enumeration were a 1-hour block within the time period noted. Perceived eligible men were those who appeared to be of Asian or Indian descent and at least 18 years old; number of perceived eligible men presented was a mean of enumerations by individual staff for each VDT unit. Staff recommendation of VDT unit for type II enumeration was based on several factors, including access, safety, lighting, and logistics; individual recommendations of each staff member were presented in combination for the VDT unit (yes, no, mixed [both yes and no]).

had a mean of fifty-seven eligible men per VDT unit and higher traffic flow during early evening hours. The study staff used consensus to accept venues into the type II enumeration phase, in which actual eligibility and willingness to participate would be assessed. Consensus was based on quantitative type I enumeration data as well as qualitative information reported on VDT unit summary forms. As with the venue identification phase, venues were eliminated in this phase if they (1) were perceived to have a very small proportion of clientele that was MSM, (2) had very low levels of pedestrian traffic, (3) appeared unsafe, or (4) were logistically difficult to access while (5) attempting to achieve representation across venue clusters. A total of fourteen of thirty sauna VDT units, eleven of twenty-seven bar VDT units, and eighteen of twenty-three park VDT units were accepted into the next phase. This meant that in some cases, venues were chosen for type II enumeration but were to be assessed for fewer time periods than had been assessed in the type I enumeration phase because of variations in traffic flow, safety, and so forth.

Type II Enumeration

A project coordinator, a supervisor, two to four peer enumerators, and one or two information technology (IT) staff members conducted type II enumeration in a series of 2-hour sessions. Each interviewer received a Palm handheld PDA with programmed screening questions to administer to respondents. At the end of a session, the handheld PDAs were returned to IT staff, checked for quality control purposes (e.g., identification number verification against paper-and-pencil documentation), and data were downloaded to a common database.

All men who crossed the designated line or geometric area were approached for screening unless staff were already engaged with another participant. If multiple men were entering the designated area, staff would address the person physically closest to them. Staff were scattered evenly throughout the venue recruitment area to encounter men approaching from all directions. Staff displayed their project identification badges, gave a brief (three-sentence) description of the assessment, and inquired if they could ask the respondent a few questions, which were used to assess eligibility for the future assessment phase. Eligibility criteria included Thai citizenship, 18 years of age or older, and oral or anal sex with a man during the past 6 months. The men were also asked about where they met sex partners, their willingness to participate in the planned assessment (described as a 15- to 20-minute survey and oral fluid collection), and whether they had been screened previously. The interviews took place away from the locations where the men were approached to provide privacy. These varied by venue type and

typically included lobby areas of saunas, adjacent streets, or parking areas near bars and well-lit areas to the side of main pathways in parks.

Type II enumeration (see Table 2) was completed at nine saunas (seventeen VDT units), six bars (twelve VDT units), and nine parks (fourteen VDT units) in 4 weeks. The VDT units yielded 500 eligible men, of whom 271 were willing to participate in the planned assessment: 87 of 209 (42%) eligible men from saunas, 101 of 171 (59%) from bars, and 83 of 120 (69%) from parks. Overall yield (number of men eligible and willing to participate out of number of men screened) based on all screened men was 28% for saunas, 34% for bars, and 35% for parks. The highest yields per staff hour occurred during late evening hours at bars, while parks and saunas had fairly consistent yields across time periods. Again, selection of venues for the next phase was based on consensus and used the quantitative enumerations as well as qualitative feedback from staff.

HIV Prevalence and Risk Behavior Assessment

The actual assessment of HIV prevalence and risk behavior involved interviews and HIV oral fluid specimens collected at six saunas, four bars, and four parks over a six-week period. Staff present at each 4-hour enrollment and assessment session included a project coordinator, a supervisor, three to six interviewers, and one or two IT staff members, based on the traffic levels that had been observed during type I and type II enumerations. Laboratory staff were present, periodically, to ensure proper procedures for oral fluid collection and storage.

Interviewers approached and screened potential participants in the same manner that had been done during the type II enumeration. If the respondent was eligible, the interviewer gave a more thorough description of the project, followed by an oral informed consent procedure. The interviewer then administered the survey and recorded the responses using a handheld PDA. The 15- to 20-minute survey included demographic and behavioral (i.e., sex, drug use) items and items dealing with HIV-related knowledge, attitudes, and beliefs. Personal identifying information (e.g., name, address) was not gathered.

Following the survey, an oral fluid specimen (Orasure Salivary Collection Device; Epitope Inc., Beaverton, OR) was collected for HIV-testing purposes. Participants were given a voucher (which contained a bar code identification number linked to their oral fluid specimen) and directions to the Thai Red Cross Anonymous Clinic and reimbursed 350 baht (approximately US\$8) for their time and costs of travel to the Anonymous Clinic for test results. The men were also given a written copy of the oral informed consent

TABLE 2
Type II Enumeration Results for Number and Percentage of Men Eligible, Ineligible, Willing, and Unwilling to Participate in the Enrollment and Assessment Phase and Potential Yield by Venue Type and Time Period: Bangkok, 2003

Venue Type by Time Period (Number of Venues)	Staff Hours	Eligible		Ineligible		Willing		Unwilling		Yield		Per Staff Hour	
		n/n	%	n/n	%	n/n	%	n/n	%	n/n	%	n/n	Rate
Saunas													
6-8 p.m. (7)	40	98/154	64	56/154	36	39/98	40	19/98	19	39/154	25	39/40	0.98
8-10 p.m. (8)	45	83/123	67	40/123	33	34/83	41	27/83	33	34/123	28	34/45	0.76
10 p.m.-midnight (2)	9	28/35	80	7/35	20	14/28	50	7/28	25	14/35	40	14/9	1.56
Overall (9)	94	209/312	67	103/312	33	87/209	42	53/209	25	87/312	28	87/94	0.93
Bars													
6-8 p.m. (0)	0	—	—	—	—	—	—	—	—	—	—	—	—
8-10 p.m. (6)	31	31/86	36	55/86	64	16/31	52	5/31	16	16/86	19	16/31	0.52
10 p.m.-midnight (6)	33	140/214	65	74/214	35	85/140	61	16/140	11	85/214	40	85/33	2.58
Overall (6)	64	171/300	57	129/300	43	101/171	59	21/171	12	101/300	34	101/64	1.58
Parks													
6-8 p.m. (6)	27	33/93	35	60/93	65	27/33	81	3/33	9	27/93	29	27/27	1.00
8-10 p.m. (5)	27	55/94	59	39/94	41	36/55	65	9/55	16	36/94	38	36/27	1.33
10 p.m.-midnight (3)	15	32/50	64	18/50	36	20/32	63	3/32	9	20/50	40	20/15	1.33
Overall (9)	69	120/237	51	117/237	49	83/120	69	15/120	13	83/237	35	83/69	1.20

NOTE: Men were eligible if they were Thai citizens, aged 18 years or older, and had oral or anal sex with a man in the previous 3 months. Eligible men were asked their degree of willingness to participate in the study, described as a 15-minute survey of their behavior and an HIV oral fluid test. On a scale ranging from 1 (100% sure they would) to 5 (100% sure they would not), with 3 (unsure) as the midpoint, responses of 1 and 2 were considered "willing" and responses of 4 and 5 were considered "unwilling."

script, a boxed juice beverage (to remove the aftertaste from the oral fluid collection), a condom, a lubricant, and written HIV prevention materials, and they were asked if they had questions.

Immediately after completing each assessment, the supervisor checked the data for quality assurance and verified identification numbers in the PDA and on the oral swab specimen against pencil-and-paper and preprinted computer lists. The staff then placed the identification number-labeled oral fluid specimen in a storage cooler and received materials for the next assessment. Both the interviewer and supervisor completed a summary form for each completed record, which included the date and time, venue identification code, interviewer code, participant identification number, and status of each component of the assessment process (e.g., eligible, consented, completed PDA survey and oral swab specimen). A reimbursement receipt was filed for each stipend distributed. This system allowed for quality assurance and verification of protocol implementation.

A total of 1,121 MSM completed the prevalence and risk behavior assessment (Table 3). As intended, the sample was split fairly evenly across the three types of recruitment venues: 35% from saunas, 34% from bars, and 31% from parks. The men were relatively young (43% were aged 18 to 24; 29% were aged 25 to 29) and educated (only 3% reported primary education or less; 42% reported university or higher). Nearly half (48%) lived with family, 25% lived alone, and the remainder lived with a roommate (19%) or a steady partner (7%); 22% reported having had oral or anal sex with both women and men in the previous 6 months and identified as bisexual. The results of HIV testing in this sample, unweighted for venue type or other variables, provided our prevalence estimate, which was 17.3% HIV positive (van Griensven et al. 2005).

It is important to examine potential demographic differences across venue type with a sampling procedure such as this because demographic factors may be associated with HIV prevalence (see van Griensven et al. 2005). Furthermore, in and of itself, it is important to characterize our sample by venue type, given that the three venue types are central to the sampling method. Bivariate comparisons of demographic differences by venue are summarized in Table 3. Men recruited at bars were younger than men recruited in parks, and men recruited in parks were younger than men recruited at saunas ($p < .05$ for each chi-square comparison). Men recruited at saunas reported significantly higher levels of education compared to each of the other venue types ($p < .05$); a smaller proportion of participants recruited at saunas (18%) indicated that they were currently a student compared to men who had been recruited at bars (25%, $p < .05$) or parks (31%, $p < .05$). Men from saunas (53%) more often reported living with parents or relatives than did men in

TABLE 3
 Characteristics of the Assessment Sample Overall and by Venue Type: Bangkok, 2003

	% Overall Sample (N = 1,121)	% Participants by Venue Type		
		Saunas (n = 396)	Bars (n = 376)	Parks (n = 347)
Age (years)				
18–24	43	34 _a	53 _b	42 _c
25–29	29	27	31	28
30+	28	39	16	30
Education level completed				
Primary or less	3	2 _a	3 _b	5 _b
Secondary	36	30	43	36
Technical school	19	18	16	21
University or higher	42	50	38	38
Current student	24	17 _a	25 _b	31 _b
Living situation				
Parent or relative	48	53 _a	47 _{a,b}	45 _b
Alone	25	24	25	24
Friend or roommate	19	16	18	23
Steady partner	7	7	9	7
Other	1	0	1	1
Sexual contact in past 6 months				
Male only	78	75 _a	77 _{a,b}	82 _b
Male and female	22	25	23	18
Sexual orientation self-identification				
Homosexual/gay	76	75 _a	74 _a	80 _a
Bisexual	22	24	24	18
Other	2	1	2	2

NOTE: By venue type, columns with different subscript letters represent a significant difference ($p < .05$) for that variable based on a chi-square test; common subscript letters represent no statistical difference ($p > .05$) as do no subscripts.

parks (45%, $p < .05$). By definition, all participants reported having sexual contact with a man in the previous 6 months; however, a greater percentage of men at saunas reported recent sexual contact with women than did men recruited in parks (26% and 18%, respectively, $p < .05$). There were no differences in sexual orientation identification by venue ($p > .05$).

To further explore demographic differences by recruitment venue, we conducted multivariate logistic regression analyses. Controlling for the other independent variables, older age was significantly associated with recruitment at saunas or parks compared to bars ($p < .05$ for each). Men recruited at saunas had a significantly higher level of education than did men recruited in

parks ($p < .05$). No other independent variables were associated with recruitment venue in multivariate analysis ($p > .05$).

DISCUSSION

VDT sampling was successfully adapted and implemented in the Bangkok community for an HIV assessment of sexually active MSM at popular Thai venues to identify a relatively high prevalence of HIV infection. A total of 225 venues where MSM met were identified in Bangkok, of which 42 were selected for type I enumeration, 24 for type II enumeration, and 14 for the HIV prevalence and risk behavior assessment in which 1121 MSM were enrolled. The men tended to be young (<30 years) and well educated and often lived with their family. Within the sample, MSM recruited at saunas tended to be somewhat older and better educated. We expected that the three venue types would attract different clientele, with more affluent men visiting saunas (where a cover fee is charged). Bisexual behavior and identification were relatively common. HIV prevalence was relatively high, with one of six men testing positive for HIV infection.

Field implementation was possible because of the high level of cooperation that was achieved among peer staff interviewers and the professional staff (IT and data management staff, lab technicians, project coordinators, behavioral scientists, and counseling and testing personnel). Data collection was performed by peer staff members of the Rainbow Sky Organization CBO. At a broader level, ongoing support and cooperation were established with local authorities such as community leaders, local agencies, business owners, police, and security personnel, as well as local experts in the area of HIV and MSM research.

This assessment was implemented with relatively limited time and resources and yielded a large sample size. In a 6-month period, the four-phase sampling procedure was completed, including time for staff training prior to each phase. Several methodological adaptations to VDT sampling were needed to achieve this outcome.

First, the process was treated as four distinct phases due to its short duration, whereas previous applications in the United States have combined these stages and often conducted them iteratively during much longer assessment time periods, extending over several years (MacKellar et al. 1996; Stueve et al. 2001).

Second, we scheduled each venue to be enumerated twice during both type I and II enumeration phases, including once on a weeknight and once on a weekend night; other studies have randomly assigned venues to specific

days and times (MacKellar et al. 1996; Stueve et al. 2001). In general, we tried to assess venues during relatively busy time periods on days when they had relatively high traffic flows. Studies with more resources have been able to conduct type I enumerations over a much longer time balancing high and low traffic flows.

Third, we purposely selected venues with the greatest amounts of foot traffic, as we needed to maximize our staffing efficiency for the actual assessment study. Studies with more resources could more easily keep less trafficked venues in the mix.

Fourth, we asked about willingness to participate in the assessment during type II enumeration to determine potential effective yields, which aided in selection of the final set of venues used for assessment. Finally, we needed to consider the impact of venues patronized by foreigners or venues whose sole business was commercial sex. We chose to exclude these because they were not consistent with our goal of assessing the general population of sexually active Bangkok MSM. These adaptations were helpful lessons for the U.S.-based researchers because they suggested ways that VDT sampling could be conducted in the United States, as well as international settings with reduced resources.

A limitation of the adapted methodology is sampling popular venues during high traffic periods; this may not reflect the entire range of MSM in Bangkok. The clientele of some venues may be different during slow periods in ways that would be important to a study of HIV prevalence and risk behavior. Future studies should include slower venues and quieter periods at the venues sampled here to assess potential clientele differences. Our evaluation of the methodology is largely based on its operational value and the face validity of its results. However, the prevalence rate (17.3%) found in this study is similar to the HIV prevalence rate (17%) found among MSM tested at the Thai Red Cross Anonymous Clinic in Bangkok during the same year, 2003 (Phanuphak 2004). In the past, the lack of established sampling frames, the stigma associated with male-to-male sexuality, and dispersion of the MSM population and venues in Bangkok all prevented the establishment of benchmarks for this population in terms of the prevalence of HIV infection and common risk behaviors. Our investigation provides a systematic first step toward estimation of prevalence in this population, particularly among those who visit venues where it is common to meet potential sex partners. In considering the limitations of our sample, it is important to understand that we took care to exhaustively map potential venues (using a variety of sources such as Web sites and information from key informants such as local non-governmental organizations) and then began a process of systematically choosing those on the basis of pedestrian traffic, using this as a way to de-

velop a sample that was likely to be normative relative to the overall population of MSM venue users.

In an initial investigation such as this one, conventional sampling frames made up of individuals often are not available. Hence, it is important to build alternative frames, such as venues, that are as exhaustive as possible and to assess these in a way that allows investigators to evaluate who has been included or excluded from a sample. VDT sampling is valuable because it provides a way to build an alternative to conventional sampling frames and a means to conceptualize and track inclusion and exclusion of venues, which may serve as proxies for different segments of the population. In addition to low-volume venues, we excluded venues that primarily attracted foreigners or exceptionally wealthy Thai clientele (including commercial sex establishments) and could not exclude certain nonpublic venues (e.g., homes where informal gatherings occur) or the Internet (although we identified Internet sites that facilitated sexual partnerships). We would expect that venues that attract foreigners also may attract some Thais, but these were places with relatively expensive admissions (and unlikely to receive regular attendance from the general MSM population), and the logistics of having staff collect data in numerous foreign languages was impractical. It is difficult to know whether HIV prevalence would be higher or lower in the excluded venues, although we would assume that HIV infection among male sex workers is probably higher than in the general population, based on available data (e.g., comparison of Kunawararak et al. 1995 with surveillance data from other male sex workers and from MSM subsamples of Royal Thai Army conscripts; Nelson et al. 2002) Also, patrons may have relatively high levels of infection if condom use is not enforced.

It is unknown whether MSM sampled in our study differ demographically from MSM in other venues or MSM who used these venues at other times; however, it is possible that men recruited at popular venues at relatively busy times may differ in some way (e.g., younger age). Further study is needed to assess other segments of the Bangkok MSM population such as MSM who may not attend popular local venues in Bangkok (e.g., those who meet partners on the Internet). Consideration of special populations, such as male sex workers, also is needed. Another limitation of our assessment is that we did not examine potential differences between men who refused to participate in the study and men who agreed to participate; future studies should attempt to evaluate this, although it may be difficult to collect adequate proxies for risk behavior or HIV serostatus (or even accurate demographic characteristics) from those unwilling to join a study or be screened.

There is increasing interest in this population from a variety of governmental and nongovernmental agencies in the region, and as data accumulate

using other methods or additional applications of VDT, we may be in a better position to determine how well we were able to achieve valid estimates of HIV infection and risk behavior among sexually active men in Bangkok. A new assessment using similar methods will soon be undertaken with MSM in Bangkok. In the meantime, it is clear that we were able to meet our operational objectives and obtain data that were credible, in terms of the sample we were able to accrue.

This assessment represents an important example of accessing a hard-to-reach population in a Thai setting by using an adapted community-based method originally developed in the West. Both the ecological assessments (identification and mapping of venues, type I and II enumeration) and the rather public querying of MSM about sexual behavior for purposes of screening and assessment appeared feasible. We would expect that local laws, social norms, and cultural practices would affect the success of VDT implementation. In Bangkok, we were able to collect data with levels of accrual comparable to those obtained in the United States (MacKellar et al. 1996), despite being a “first study” of MSM and operating in a climate where norms and practices limit acceptance of MSM and public discussion of sexuality in general (Van Landingham et al. 1994; Jackson and Sullivan 1999; van Griensven et al. 2004). Our efforts suggest that VDT sampling is a viable approach for the assessment of MSM in Thailand and, perhaps, elsewhere in Southeast Asia and that the methodology may be implemented successfully with relatively limited resources. Indeed, these methods may be even more efficiently used where biological data do not need to be collected. The use of handheld PDA technology further adds to the efficiency and versatility of the VDT assessment methods. It eliminates data entry steps, paperwork, and data quality problems. VDT methods can easily be adapted to investigations that collect observational data or use self-administered data collection instruments.

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