

HIV Prevalence, Risk Behavior, Hormone Use and Surgical History Among Transgender Persons in Thailand

Thomas E. Guadamuz · Wipas Wimonsate · Anchalee Varangrat ·
Prapphan Phanuphak · Rapeepun Jommaroeng · Janet M. McNicholl ·
Philip A. Mock · Jordan W. Tappero · Frits van Griensven

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Abstract While Male-to-female transgender persons (TG) are believed to often engage in sex work and have high HIV infection risk, little is known about demographics, surgical and hormone use history, risk behaviors and HIV prevalence. Between March and October 2005, 474 TG from Bangkok, Chiangmai, and Phuket were surveyed using venue-day-time sampling. Of 474 participants, overall HIV prevalence was 13.5%. Most participants had completed at least secondary or vocational education (79.2%), gender self-identified as female (89.0%), had received money, gifts or valuables for sex (60.8%), and reported hormone use (88.6%). Surgical history was taken

from 325 participants. Of these, 68.6% reported some form of surgery and 11.1% had undergone penile-vaginal reconstructive surgery. In multivariate analysis, being recruited from a park/street; older age, anal sex role identification as “versatile” and anal sex debut before age 13 were independently associated with HIV prevalence. The development, implementation and evaluation of culturally appropriate sexual health interventions for Thai TG is urgently needed.

Keywords Men who have sex with men · Transgender · HIV/AIDS · Hormone use · Silicone injection · Thailand

T. E. Guadamuz · W. Wimonsate · A. Varangrat ·
J. M. McNicholl · P. A. Mock · J. W. Tappero ·
F. van Griensven (✉)
Thailand Ministry of Public Health, U.S. Centers for Disease
Control and Prevention Collaboration, Ministry of Public Health,
DDC 7 Building, 11000 Nonthaburi, Thailand
e-mail: fav1@cdc.gov

T. E. Guadamuz
Department of Epidemiology, Johns Hopkins Bloomberg School
of Public Health, Baltimore, MD, USA

P. Phanuphak · R. Jommaroeng
AIDS Research Center, Thai Red Cross Society,
Bangkok, Thailand

R. Jommaroeng
Rainbow Sky Association of Thailand, Bangkok, Thailand

J. M. McNicholl · F. van Griensven
Division of HIV/AIDS Prevention, Centers for Disease
Control and Prevention, Atlanta, GA, USA

J. W. Tappero
Global AIDS Program, Centers for Disease Control
and Prevention, Atlanta, GA, USA

Introduction

Transgender persons (TG) are often defined as people whose gender identity and gender expression differ from their biological sex at birth [1]. It is important to recognize that this term does not describe sexuality, sexual behavior or sexual orientation. TG may be male-to-female or female-to-male and may engage in heterosexual or homosexual activities. While the American Psychiatric Association classifies TG as having gender identity disorder [2], there has been a shift away from gender pathology towards a more social understanding of transgenderism [3]. In the past few decades, TG have attained increased social and cultural acceptance [3], as well as legal rights [4]; however, discrimination, harassment, and abuse still occur [5]. Often, TG are denied medical care, mental health services, and other health-related services because of their gender identity [6, 7]. The latter social contexts may contribute to higher rates of suicide, sexual coercion, violence, drug and alcohol use, stress and lack of social support among TG, as compared to the general population [6, 8, 9]. These health

disparities among TG oftentimes exist in the context of poor social and environmental conditions [5, 6].

Transgender health problems also include consequences or complications from body augmentations, surgical procedures, or hormone and silicone use [10–12]. These include discolorization of surrounding tissues, inflammation, and silicone-induced pulmonary embolism. Further, because liquid silicone and hormones are often expensive or not approved for body augmentation, TG may participate in “back alley” procedures whereby these substances are injected without medical supervision [9]. In these settings, needle-sharing activities may potentially lead to the acquisition of HIV infection, hepatitis B and C, and other infectious diseases (in addition to acquisition risks by sexual and injecting drug use behaviors).

In the past two decades, epidemiologic studies among TG have shown HIV prevalence to range from 8 to 68% [10, 13–15] and HIV incidence from 3.4 to 7.8 per 100 person-years [16, 17]. Correlates for HIV infection included lower education [13, 16], unprotected anal sex [18], sex work [10], multiple sex partners [13], and (injecting) drug use [9, 13, 18].

TG populations in Southeast Asia have predominantly been studied in the context of sex work [19]. A recent study in Indonesia found HIV prevalence among TG sex workers to be 22% and unprotected anal intercourse reported by 59% of TG surveyed [19]. In October 2005, an opportunistic, non-systematic assessment of TG in Pattaya, Thailand, found consistent condom use to be reported by 39% and correct use of water-based lubricants by 31% of respondents [20]. However, HIV prevalence and other transgender-specific factors such as surgical implants, silicone or hormone use were not assessed. In Thailand, no systematically collected epidemiologic or behavioral data on TG are currently available. In spite of this, there is an abundance of research that describes the historical, linguistic, cultural, and social contexts of the transgender community in Thailand [21–24].

It is important to note that the term transgender in itself is a Western, biomedical one and that Thailand has a different understanding of gender identity that is deep-rooted in Thai history and culture. The Thai word to designate biologic men who express themselves as women is *Katoey* (a noun). *Katoey* has Khmer origins and means “different kind of person” [22]. *Katoeys* take on traditional female gender roles in both the private (e.g., sexual) and public contexts [21]. Thus, understanding HIV risks among TG in Thailand involves recognizing not only the biological pathways of HIV infection, but also the psycho-sexual and social determinants specific for this population. Most studies on transgender health have been limited to small needs assessments by community-based organizations [7, 9]. Therefore, having reliable data on HIV prevalence and social and behavioral correlates like social support,

number of sexual partners, unprotected anal intercourse, sex work, drug use, surgical implants, hormone and silicone use may be important to inform public health programs for TG. In this paper, we report HIV prevalence and correlates, hormone and silicone use, and surgical history among TG in Thailand.

Methods

Sampling and Assessment

Detailed methods for this assessment of HIV prevalence and risk factors have been described previously [25]. Briefly, venue-day-time sampling (VDTS) was used to enroll 474 TG from venues around Bangkok, Chiangmai, and Phuket during March–October 2005 (enrollment rate 88.3%). VDTS is a systematic method of identification and mapping of venues, followed by enumeration of venue attendees, determination of attendees’ eligibility and willingness to participate, and finally, selection of venues to be included in the assessment. All identified venues were visited, verified for existence, and characterized by owner-gatekeeper support, safety, and opening times. Venues where TG congregate for professional reasons (e.g., cabaret show, sex work, etc.) or to socialize were selected from each city and categorized into entertainment/bars, public parks/streets, and elsewhere (e.g., beauty salons, barber shops, etc.). At these venues, attendees were classified as TG if they met at least three out of four outward characteristics: (1) dressed in women’s clothes, (2) appeared to have breast implants or breast surrogates (foam), (3) had long female hair style and (4) used facial make-up. Participant eligibility further included male sex at birth; at least 15 years old; Thai national; resident of the study area; and reporting anal, oral or neovaginal sex with a man in the past 6 months. Participation was voluntary and anonymous. Once eligibility and verbal informed consent were attained, hand-held computers were used to self-collect demographic and behavioral data, including information on female hormone use and surgical implant history (in Bangkok and Phuket only). An oral fluid specimen was self-collected using the OraSure device (OraSure Salivary Collection Device, OraSure Technologies Inc., Beaverton, Oregon, USA) and later tested with an enzyme immunoassay (Oral Fluid Vironostika HIV Microelisa System, Organon Teknika Corporation, Durham, North Carolina, USA) to assess the presence of HIV infection. Members from a local community-based organization, Rainbow Sky Association of Thailand (RSAT), aided research staff in venue mapping and recruitment of TG at these venues, through a community-based participatory research method. The assessment protocol was reviewed and approved by the

Ethical Review Committee of the Thailand Ministry of Public Health and determined to be a surveillance activity by the U.S. Centers for Disease Control and Prevention, which consequently did not require an IRB review. The data analysis portion of this assessment was determined a non-human subjects research activity by the Johns Hopkins Bloomberg School of Public Health.

Measures

Survey instruments used in this assessment were adapted from the CDC's Young Men's Survey [26]. All questions were locally tested and adapted to the social and cultural contexts of Thailand and for Thai TG, with the help of the study's community partner RSAT [27]. These questions measured demographics (e.g., education), behavior (e.g., usual anal sex role) and sexuality-related constructs that include gender identity (e.g., male, gay, female) (in the Thai language, gay is denoted as a separate gender: "phet gay" or "gay gender") [21], sexual orientation identity (e.g., heterosexual, bisexual, homosexual and transgender), and self prescribed anal sex role identity (e.g., "top" [insertive sex role identity], "bottom" [receptive sex role identity], "versatile" [both "top" and "bottom"]). Other questions assessed alcohol and drug use (drugs refer to use of marijuana, methamphetamine/speed, ketamine, ecstasy, poppers [nitrates], inhalants [glue, thinners], and sleeping pills), number of male intercourse partners in the past 3 months, sex work and frequency of condom use in the past 3 months. Responses included "always," "sometimes—more than half the time," "sometimes—less than half the time," and "never."

Statistical Analysis

The association between demographic and behavioral characteristics and HIV status was evaluated using Pearson's chi square for categorical variables or Fisher's exact test when expected values for these variables were less than 5. To identify independent risk factors for HIV infection, variables that were theoretically relevant, were not collinear with one another and that had *p* values of 0.25 or lower in bivariate analysis were entered into generalized estimating equation (GEE) backward stepwise selection logistic regression [28]. A variable identifying each venue and calendar date cluster was created which is used to adjust the standard errors and *p*-values in the GEE regression analysis. There were a total of 152 clusters with the number of subjects ranging from 1 to 52, and a median of 11. STATA 9.0 (Version 9.1, 2005; Stata Corp., College Station, Texas, USA) was used for all data analysis.

Results

Socio-Demographics and HIV Prevalence

Of participants, 200 (42.2%) were enrolled in Bangkok, 148 (31.2%) in Chiangmai, and 126 (26.6%) in Phuket. The mean age was 24.1 years (range 15–49 years). Most participants were recruited from entertainment/sex work venues (61.0%), had completed secondary or vocational school education (79.2%), were employed at time of assessment (81.0%), and lived with either their families or roommates (81.2%) (Table 1). The overall HIV prevalence was 13.5% (95% confidence interval [CI]: 10.4–16.6%); prevalences in Bangkok, Chiangmai, and Phuket were 11.5% (CI: 7.0–16.0%), 17.6% (CI: 11.4–23.8%) and 11.9% (CI: 6.2–17.6%). Differences by city were not statistically significant (*p* value = 0.217).

Behavioral Characteristics

Most participants reported having received money, gifts or valuables for sex (61.3%), while 16.7% reported having had more than five male intercourse partners in the past 3 months. About two-thirds reported consistent condom use during anal intercourse with casual male partners in the past 3 months (67.3%), while 39.0% reported consistent condom use with steady male partners. Most participants reported having a close friend to talk about personal problems (90.1%) (Table 1).

Hormone Use, Surgical History and Reported Sexually Transmitted Infections

A history of hormone use (lifetime) was reported by 88.6% of participants. Of these, 25.9% had taken hormones orally, 24.9% had injected hormones, and 49.2% had used both methods. More than half (53.7%) reported using hormones daily (Table 1). The median age at start of hormone use was 15 years (standard deviation: 3.7, range: 5–38) (not shown in Table).

Among the 325 participants who were surveyed on the subject, the prevalence of surgical implants or silicone injection was 68.6%. Of the 223 reporting having had these procedures, the majority of implants/injections were breast or facial. Implants or injection in other body areas, such as upper legs, were also common. Thirty-six participants (11.1%) reported having penile-vaginal reconstructive surgery (Table 1).

Two thirds (68.0%) of TG reported ever having a sexually transmitted infection. Of these, penile and anal ulcers were most common (29.1% and 59.4%, respectively), while penile warts were the least common (2.2%) (Table 1).

Table 1 Demographic characteristics, risk behaviors, hormone and silicone use and HIV prevalence among male-to-female transgender persons, Thailand 2005

Characteristic	Total (<i>n</i> = 474) <i>N</i> (%)	HIV positive (<i>n</i> = 64) <i>n/N</i> (%)	Bivariate odds ratios ^a (95% CI)
Recruitment city			
Bangkok	200 (42.2)	23/200 (11.5)	Reference
Chiangmai	148 (31.2)	26/148 (17.6)	1.64 (0.89–3.01)
Phuket	126 (26.6)	15/126 (11.9)	1.04 (0.52–2.08)
Age group (years)			
15–22	227 (47.9)	19/227 (8.4)	Reference
23–28	156 (32.9)	26/156 (16.7)	2.19 (1.16–4.12)
≥29	91 (19.2)	19/91 (20.9)	2.89 (1.45–5.76)
Recruitment venue			
Entertainment/sex work	289 (61.0)	30/289 (10.4)	2.19 (1.17–4.11)
Park or street	81 (17.1)	24/81 (29.6)	2.89 (1.45–5.76)
Elsewhere ^b	104 (21.9)	10/104 (9.6)	Reference
Highest education			
Primary or less	21 (4.4)	5/21 (23.8)	4.56 (1.18–17.64)
Vocational	141 (29.7)	23/141 (16.3)	2.85 (1.04–7.81)
Secondary ^c	234 (49.4)	31/234 (13.2)	2.23 (0.84–5.95)
University or higher	78 (16.5)	5/78 (6.4)	Reference
Currently employed			
Yes	384 (81.0)	60/384 (15.6)	3.98 (1.41–11.27)
No	90 (19.0)	4/90 (4.4)	Reference
Living situation^d			
Roommates	224 (47.4)	23/224 (10.3)	Reference
Family	160 (33.8)	23/160 (14.4)	1.47 (0.79–2.72)
Alone	89 (18.8)	18/89 (20.2)	2.22 (1.13–4.35)
Gender identity			
Female	422 (89.0)	53/422 (12.6)	Reference
Male	30 (6.3)	7/30 (23.3)	2.12 (0.87–5.18)
Gay/other	22 (4.7)	4/22 (18.2)	1.55 (0.50–4.75)
Sexual orientation identity			
Bisexual	10 (2.1)	1/10 (10.0)	Reference
Heterosexual/straight	45 (9.5)	7/45 (15.6)	1.66 (0.18–15.23)
Homosexual/gay	166 (35.0)	28/166 (16.9)	1.83 (0.22–15.00)
Transgender/transvestite	253 (53.4)	28/253 (11.1)	1.12 (0.14–9.17)
Self prescribed anal sex role identity			
Insertive (top)	5 (1.0)	0/5 (0.0)	n/a
Receptive (bottom)	382 (80.6)	43/382 (11.3)	Reference
Insertive and receptive (versatile)	87 (18.4)	21/87 (24.1)	2.51 (1.40–4.50)
Usual anal sex role^{d, m}			
Receptive only	390 (87.9)	47/390 (12.1)	Reference
Insertive only	9 (2.0)	2/9 (22.2)	2.09 (0.42–10.34)
Insertive and receptive	45 (10.1)	10/45 (22.2)	2.09 (0.97–4.49)
Age group at first anal sex (years)^d			
<13	46 (10.4)	13/46 (28.3)	3.00 (1.47–6.11)
≥13	396 (89.6)	46/396 (11.6)	Reference
Ever received money, gifts or valuables for sex^d			
Yes	288 (61.3)	48/288 (16.7)	2.08 (1.14–378)
No	182 (38.7)	16/182 (8.8)	Reference
Ever gave money, gifts or valuables for sex^d			
Yes	141 (30.3)	25/141 (17.7)	1.62 (0.94–2.81)
No	324 (69.7)	38/324 (11.7)	Reference

Table 1 continued

Characteristic	Total (<i>n</i> = 474) <i>N</i> (%)	HIV positive (<i>n</i> = 64) <i>n/N</i> (%)	Bivariate odds ratios ^a (95% CI)
Number of male intercourse partners ^c (past 3 months)			
0–1	210 (44.3)	24/210 (11.4)	Reference
2–5	185 (39.0)	22/185 (11.9)	1.05 (0.56–1.94)
More than 5	79 (16.7)	18/79 (22.8)	2.29 (1.16–4.50)
Alcohol use in the past 3 months			
Yes	384 (81.0)	50/384 (13.0)	0.90 (0.65–1.24)
No	90 (19.0)	14/90 (15.6)	Reference
Drug use (past 3 months) ^f			
Yes	202 (42.6)	28/202 (13.9)	1.05 (0.62–1.79)
No	272 (57.4)	36/272 (13.2)	Reference
Sexual coercion (ever) ^{d, g}			
Yes	125 (26.4)	16/125 (12.8)	0.92 (0.50–1.68)
No	348 (73.6)	48/348 (13.8)	Reference
Ever had sex with women ^d			
Yes	27 (5.7)	4/27 (14.8)	0.90 (0.30–2.69)
No	444 (94.3)	60/444 (13.5)	Reference
Condom use during intercourse with male steady partner (past 3 months) ^d			
Always	87 (39.0)	11/87 (12.6)	Reference
Not always	136 (61.0)	23/136 (16.9)	1.41 (0.65–3.06)
Condom use during intercourse with male casual partner (past 3 months) ^d			
Always	171 (67.3)	20/171 (11.7)	Reference
Not always	83 (32.7)	15/83 (18.1)	1.67 (0.80–3.45)
Ever seriously considered suicide			
Yes	115 (24.3)	15/115 (13.0)	Reference
No	359 (75.7)	49/359 (13.6)	1.05 (0.57–1.96)
Have someone in family to talk about personal problems			
Yes	351 (74.0)	48/351 (13.7)	0.94 (0.51–1.73)
No	123 (26.0)	16/123 (13.0)	Reference
Have a close friend to talk about personal problems			
Yes	427 (90.1)	53/427 (12.4)	Reference
No	47 (9.9)	11/47 (23.4)	2.16 (1.03–4.50)
Ever had an HIV test			
Yes	221 (46.6)	37/221 (16.7)	1.68 (0.99–2.87)
No	253 (53.4)	27/253 (10.7)	Reference
Hormone use ^h			
Never	53 (11.4)	11/53 (20.8)	Reference
Ever	413 (88.6)	50/413 (12.1)	0.53 (0.25–1.09)
Oral	107 (25.9)	17/107 (15.9)	1.83 (0.91–3.69)
Injection	103 (24.9)	14/103 (13.6)	1.52 (0.73–3.18)
Both oral and injection	203 (49.2)	19/203 (9.4)	Reference
Frequency of hormone use			
Daily	222 (53.7)	18/222 (8.1)	Reference
Several times a week	55 (13.3)	7/55 (12.7)	1.65 (0.65–4.19)
Weekly	68 (16.5)	12/68 (17.6)	2.43 (1.10–5.35)
Monthly	68 (16.5)	13/68 (19.1)	2.68 (1.24–5.81)
<i>Place of usual hormone purchaseⁱ</i>			
Pharmacy			
Yes	366 (88.6)	43/366 (11.7)	1.31 (0.55–3.12)
No	47 (11.4)	7/47 (14.9)	Reference
Physician/clinic			
Yes	129 (31.2)	12/129 (9.3)	1.51 (0.76–2.99)
No	284 (68.8)	38/284 (13.4)	Reference

Table 1 continued

Characteristic	Total (<i>n</i> = 474) <i>N</i> (%)	HIV positive (<i>n</i> = 64) <i>n/N</i> (%)	Bivariate odds ratios ^a (95% CI)
Hospital			
Yes	20 (4.8)	2/20 (10.0)	1.25 (0.28–5.58)
No	393 (95.2)	48/393 (12.2)	Reference
Friend			
Yes	35 (8.5)	3/35 (8.6)	1.51 (0.45–5.15)
No	378 (91.5)	47/378 (12.4)	Reference
Other persons/not friend			
Yes	10 (2.4)	1/10 (10.0)	1.25 (0.15–10.07)
No	403 (97.6)	49/403 (12.2)	Reference
Implants/injections ^j			
Never	102 (31.4)	10/102 (9.8)	Reference
Ever	223 (68.6)	28/223 (12.6)	1.32 (0.61–2.84)
<i>Locations of implants/injections^k</i>			
Breast			
Yes	113 (34.8)	20/113 (17.7)	2.32 (1.17–4.59)
No	212 (65.2)	18/212 (8.5)	Reference
Bottom/hip			
Yes	25 (7.7)	4/25 (16.0)	1.49 (0.48–4.61)
No	300 (92.3)	34/300 (11.3)	Reference
Facial			
Yes	114 (35.1)	14/114 (12.3)	1.09 (0.54–2.20)
No	211 (64.9)	24/211 (11.4)	Reference
Elsewhere ^l			
Yes	193 (59.4)	27/193 (14.0)	1.79 (0.85–3.75)
No	132 (40.6)	11/132 (8.3)	Reference
<i>Surgery</i>			
Adams apple			
Yes	6 (1.8)	1/6 (16.7)	0.66 (0.07–5.79)
No	319 (98.2)	37/319 (11.6)	Reference
Yes	36 (11.1)	2/36 (5.6)	0.41 (0.10–1.80)
No	289 (88.9)	36/289 (12.5)	Reference
<i>Self-reported sexually transmitted infections (ever)</i>			
Any STI ^d			
Yes	321 (68.0)	42/321 (13.1)	0.93 (0.53–1.64)
No	151 (32.0)	21/151 (13.9)	Reference
Unusual penile fluid ^d			
Yes	50 (10.9)	10/50 (20.0)	1.67 (0.79–3.55)
No	408 (89.1)	53/408 (13.0)	Reference
Penile ulcer ^d			
Yes	136 (29.1)	19/136 (14.0)	1.06 (0.60–1.90)
No	332 (70.9)	44/332 (13.3)	Reference
Anal ulcer ^d			
Yes	281 (59.4)	36/281 (12.8)	0.90 (0.52–1.54)
No	192 (40.6)	27/192 (14.1)	Reference
Penile warts ^d			
Yes	10 (2.2)	4/10 (40.0)	4.71 (1.29–17.25)
No	452 (97.8)	56/452 (12.4)	Reference
Anal warts ^d			
Yes	35 (7.6)	6/35 (17.1)	1.42 (0.56–3.59)
No	425 (92.4)	54/425 (12.7)	Reference

TG male-to-female transgender persons, CI confidence intervals, *n/a* not applicable

^a Bolded odds ratios and confidence intervals signify significance at alpha < 0.05

^b Elsewhere refers to beauty salons, barbershops, etc

^c Secondary school includes middle and high schools

^d Totals may vary due to missing values

^e Intercourse partners include casual, steady, and client partners

^f Drug use refers to use of any of the following substances: marijuana, methamphetamine/speed, ketamine, ecstasy, inhaled nitrates (poppers), inhalants, and sleeping pills

^g Sexual coercion is defined as being forced to have sex against one's will

^h 466 out of 474 TG responded to hormone questions

ⁱ 413 TG provided hormone purchase information, participants were able to list more than one hormone source

^j Includes silicone and non-silicone implants

^k 223 TG reported having implants; participants were asked to list all implants

^l Elsewhere refers to silicone injections and implants in other body areas

^m This variable asks participants what is their usual sex role (insertive, receptive or both insertive and receptive) when having anal sex. This is different from the variable *self prescribed anal sex role* in that this asks about the *behavior* and not the identity. In Thailand, these two constructs are different

Bivariate and Multivariate Analyses of HIV Prevalence

In bivariate analysis, being 23 years or older (versus under 23 years), being recruited from an entertainment/sex work venue or at a park/street (versus beauty salons, barber shops, etc.), having completed primary or vocational education (versus university), being currently employed, living alone (versus with roommates), anal sex role identification as “versatile” (both “top” [insertive] and “bottom” [receptive] sex roles) (versus bottom only), anal sex debut before age 13 (versus age 13 or older), having ever received money, gifts, or valuables for sex, having had more than five intercourse partners in the past 3 months (versus one or no partner), not having a close friend to talk about personal problems, using hormones weekly and monthly (versus daily), having had a breast implant, and having ever had penile warts were significantly associated with prevalent HIV infection (Table 1).

In multivariate analysis, being 23 years and older (versus under 23 years), being recruited from a street or park, anal sex role identification as versatile, and anal sex debut before age 13 were significantly and independently associated with prevalent HIV infection (Table 2).

Discussion

In our assessment of TG in Thailand, we found a HIV prevalence of 13.5%. While this prevalence is lower than found in other MSM populations in Thailand (male sex workers and general MSM, 15.7% and 19.2%, respectively) [25] and lower than found among TG the United States (estimated at 27.7%) [15], it is still significantly high. Older

age, recruitment from a street or park, self-prescribed anal sex role identity as versatile and earlier anal sex debut were significantly and independently associated with prevalent HIV infection. That age is related to HIV infection is not remarkable since older TG are likely to have a longer exposure to HIV infection, more sexual partners and may have developed a wider sexual risk repertoire. Anecdotal evidence from the field suggests that among many TG who had engaged in the show and entertainment industry in the early years of their careers, several were likely to enter street sex work as they grow older and as cohorts of younger TG enter the industry. And due to economic competition for clients, they may have limited negotiation power for condom use, while HIV prevalence among street clients may be higher [25]. In addition, if identified and disclosed as HIV-infected, TG may no longer be allowed to work at show and entertainment venues, thus inflating the HIV prevalence among TG recruited from streets and parks.

We found that versatile anal sex role identity was independently associated with HIV infection. Among TG, who usually self-identified as female and receptive, versatility may be the result of sexual practices required during the course of sex work. Indeed, versatile anal sex role identification appeared to be correlated with having ever received money, gifts or valuables for sex ($p < 0.03$). As we have reported elsewhere, early sexual debuts among TG may be related to coercion or abuse from someone they know during adolescence [29].

In our assessment, we found female hormone use to be common and to have begun during adolescence. Among TG, over 50% reported daily hormone use and first use before age 16 years. TG also tended to obtain hormones from non-prescription sources like pharmacies and friends.

Table 2 Multivariate analysis of HIV prevalence and correlates among male-to-female transgender persons, Thailand 2005

	Adjusted odds ratios ^a	95% Confidence interval
Age group (years)		
15–22	Reference	
23–28	2.24	1.14–4.41
≥29	4.98	2.35–10.57
Recruitment venue		
Entertainment/sex work	0.81	0.35–1.83
Park or street	5.23	2.11–12.97
Elsewhere ^b	Reference	
Self prescribed anal sex role identity		
Insertive (top)	n/a ^c	
Receptive (bottom)	Reference	
Insertive and receptive (versatile)	2.35	1.11–4.98
Age group at first anal sex (years)		
<13	2.57	1.40–4.71
≥13	Reference	

^a Backward stepwise multivariate logistic regression adjusted for clusters by venues and calendar dates, bolded figures indicate significance at alpha <0.05

^b Elsewhere refers to beauty salons, barbershops, etc

^c n/a, not applicable because this category was excluded from the analysis since only 5 transgender persons in the study reported being a top and none of them were positive for HIV

In Thailand, female hormones can be obtained over the counter at an affordable price, without medical prescription. Hormone use is thus not regulated or monitored by clinicians or other healthcare professionals.

Additionally, we found over 50% of TG reported having had surgical implants or silicone injections, while only 36 participants reported having had penile-vaginal reconstructive surgery. Like hormone use, having had these procedures were not associated with HIV prevalence.

There were some limitations in our study. First, our findings are from cross-sectional data, and therefore we do not know if the associations with HIV prevalence found are causal. Second, since the recruitment strategy of our assessment was venue-based, TG who did not attend such venues were not included, and they may have different behavioral characteristics and HIV prevalence. For example, we found that the majority of TG in our study had completed at least vocational/secondary schools and were mostly employed. Whether these findings truly represent TG populations in Thailand is not known and may be biased toward our sampling methodology. Third, only sexually active TG were eligible for enrollment, which may have biased the prevalence of HIV upwards. However, only 2.4% of the 537 TG screened for enrollment in this assessment were ineligible due to sexual inactivity, suggesting that this is an uncommon feature among TG.

Despite these limitations, our assessment is one of the few systematic studies of the prevalence of HIV, hormone use, surgical history, and risk behaviors among TG populations in the region. To our knowledge, other major behavioral assessments among TG populations in the region did not ascertain information on hormone use or surgical history [19, 30, 31]. Our findings have policy implications for TG populations both in Thailand and elsewhere. We found that invasive surgical procedures and hormone use were widespread; but penile-vaginal reconstructive surgery was not. Thus, amidst the increasing HIV epidemic among MSM populations in Thailand [25], there is an urgent need to educate health professionals who may come into contact with TG about HIV transmission risks, hormone and silicone use, and the psychological and health implications of these behaviors. Moreover, continued surveillance among transgender persons is vital. More research is also needed to understand the relationship between female hormone use, surgical history, sexual behavior, and HIV infection.

Additionally, prevention programs need to pay attention to issues related to sexual and gender identities, and the environments in which these identities are formed. Understanding these processes and how they influence HIV risk behaviors will inform public HIV and STI prevention and intervention programs [32]. While Western societies tend to think that TG and MSM are accepted in Thailand, this is not entirely true [33]. Many times, they are

discriminated against and shame is placed in them by multiple sectors of Thai society [33].

The information gathered from this study provides critical insights into a previously poorly documented population at risk for HIV infection in Thailand. Current programs for TG in Thailand are few, not properly evaluated, and not TG specific—often combined with programs for general MSM. What need to follow are the development, implementation and evaluation of culturally appropriate sexual health interventions that are TG specific and relevant to the Thai context. These intervention programs should be community-based in nature and involve Thai TG themselves. Furthermore, formative research on the socio-cultural contexts of TG risks is needed.

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