

A review of the epidemiology of HIV infection and prevention responses among MSM in Asia

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Objective: To review the epidemiology of HIV infection and prevention responses among men who have sex with men (MSM) in Asia.

Methods: A review of the existing scientific literature and governmental and non-governmental reports regarding the epidemiology of HIV infection and prevention responses among MSM in Asia.

Results: Data show that HIV infection is now widespread among MSM throughout Asia. With the exception of the Philippines and Timor Leste, all countries for which information is available show epidemics of HIV infection among MSM, particularly in urban areas. Double-digit HIV prevalence among MSM is found in cities in China, Taiwan, India, Myanmar and Thailand. Incidence data, although scarce, confirm the ongoing transmission of HIV among MSM. Reports of new HIV diagnoses in MSM have been increasing in recent years, particularly in the developed economies of East Asia. HIV prevention responses have started in most Asian countries, but while the exact coverage and investment of such responses remain unclear, coverage seems to be far from the 60-80% level needed to have an effect on the HIV epidemic. Both Government and donor investment in prevention programs for MSM remain inadequate, especially when compared with the contribution of male-to-male transmission to the overall burden of the HIV epidemic.

Conclusion: Enlarged HIV prevention coverage and increased financial investment are necessary to reduce the spread of HIV infection among MSM in Asia.

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Introduction

In the past few years, there has been increased concern about new, newly identified and resurging epidemics of HIV infection among men who have sex with men (MSM) on a global level [1,2]. Against the background of low and declining adult HIV prevalence in most countries, MSM continue to be disproportionately affected by HIV infection [2]. In Asia, MSM have 18.7 times the odds of being HIV infected compared with someone in the general adult population [2]. In recent years, scattered epidemiological research has identified

high HIV prevalence among MSM in several Asian countries, but a comprehensive picture of the HIV epidemic among MSM in Asia is lacking. In addition, little information is available regarding preventive and policy responses toward the HIV epidemic in MSM. In this article, we review the epidemiology of HIV and the status of HIV prevention responses among MSM in Asia and make some recommendations for future directions. Unless indicated otherwise, data presented in this review are limited to general MSM and do not include specific MSM subpopulations, such as transgenders and male sex workers.

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Epidemiology of HIV infection among MSM in Asia

HIV surveillance and case reports

Most countries in Asia have very low (<0.5) or low (0.5%–1.0%) adult HIV prevalence, except Thailand, which has medium-level prevalence (1.4%) [3]. In Asia, HIV/AIDS case report data are available for some countries, but most nations rely on epidemiologic studies and sentinel surveillance for information about the HIV epidemic in MSM.

In Hong Kong, the reported annual number of newly diagnosed HIV infections in MSM increased from 68 to 174 during 2004–2007, an increase of more than 250%. In 2008, this number declined slightly to 156 (Fig. 1) [4]. In 2008, MSM constituted 35.9% of all reported HIV cases (435), more than any other group at risk [4]. Statistics provided by the Taiwan Centers for Disease Control show that the number of newly diagnosed HIV infections reported in MSM increased from 503 to 1075 during 2004–2007, an increase of more than 100% (Fig. 1) [5]. In 2008, the number declined slightly to 1035 [5]. Of all new HIV infections reported in 2008 (1609), 64.3% were in MSM [5]. In 2008 in Singapore, 185 MSM were newly reported with HIV infection; almost five times the number in 2002 when 38 cases were reported (Fig. 1) [6]. In 2008, MSM accounted for 40.6% of the total number of new HIV infections reported (456) [6]. In Japan, the number of newly reported HIV cases in MSM more than doubled from 305 in 2002 to 743 in 2008 (Fig. 1) [7]. Of all 1126 new HIV cases reported in 2007, 66.0% were in MSM [7].

Epidemiologic studies

In east and south-east Asia, recent HIV prevalence in MSM ranged from 0.8% (provinces) to 14.4% (Phnom Penh) in Cambodia [8,9], from 0% (province) to 9.4% (Hanoi) in Vietnam [10–12], 5.4% in Vientiane, Lao

PDR, in 2007 [13] and 3.9% in Kuala Lumpur, Malaysia, in 2009 (Table 1) [14]. Increasing HIV prevalence has been reported among MSM in Bangkok, Thailand, from 17.3% in 2003 to 30.8% in 2007 [15–18]. Sentinel surveillance in Myanmar found 23.5% of MSM in Yangon and 35.0% of MSM in Mandalay were HIV-infected in 2007 [19]. In mainland China, several recent cross-sectional studies among MSM showed HIV prevalence ranging from 0.0% (Jiangsu) to 10.8% (Chongqing) (Table 1) [20–38]. Mostly nonsignificant upward trends in HIV prevalence among MSM in China have been observed in Harbin, from 1.3 to 2.2% during 2002–2006 [21], in Beijing, from 0.4 to 5.8% during 2004–2006 [24], in Shenzhen, from 1.7 to 3.8% during 2005–2007 [30], in Jiangsu, from 0 to 5.8% during 2003–2007 [22], in Chongqing, from 10.4 to 12.5% during 2006–2007 [35], and in Jinan, from 0.05 to 3.1% during 2007–2008 [37,38]. In cross-sectional studies among MSM in Taiwan, the HIV prevalence was 14.1% in 2000–2001, 6.9% in 2003 and 8.5% in 2004 [39–41]. In Singapore, it was 4.2% in 2007 and 3.2% in 2008–2009 [42,43], in Hong Kong 4.1% in 2006–2007 and 4.3% in 2008–2009 [44,45], and in Tokyo, Japan, it was 2.9% in 2000 [46].

In the Philippines, no HIV infections were found among over 500 MSM sampled from the cities of Manila and Baguio in 2006 [47]. A study in Jakarta, Indonesia, in 2002, found 2.5% of MSM to be HIV-positive [48]. More recent data from Indonesia showed that 2.0, 5.6 and 8.1% of MSM were HIV-positive in 2007 in the cities of Bandung, Surabaya and Jakarta, respectively [49]. A study conducted in Dili, Timor Leste in 2003 found 0.9% of MSM to be HIV-positive [50].

In south Asia, recent surveillance among MSM in Dhaka, Bangladesh and Katmandu, Nepal, found 0.2 and 3.3% to be HIV infected, respectively [51,57,58]. Sentinel surveillance in 40 districts in India showed the HIV prevalence among MSM to be greater than 5% in 21 districts and greater than 15% in nine districts [59]. Several cross-sectional and clinic-based studies conducted during 2006–2007 found HIV prevalence among MSM in India to range from 9.3 to 4.7% in Andhra Pradesh, from 10.2 to 17.4% in Maharashtra, from 4.2 to 22.3% in Tamil Nadu, and a prevalence of 19.5% in Karnataka and 8% in Chennai [51–53]. A recent systematic review of five studies estimated the HIV prevalence among MSM in India to be 16.5% [54].

No epidemiologic data were available regarding the HIV prevalence among MSM in Afghanistan, Bhutan, Brunei, Maldives, Mongolia, North Korea, South Korea, Pakistan, Papua New Guinea, and Sri Lanka.

Some information on the rate of new infections is available from Thailand, where the HIV incidence density was 5.7 per 100 person-years in a cohort of high-risk MSM in Bangkok during 2006–2008 [18] and

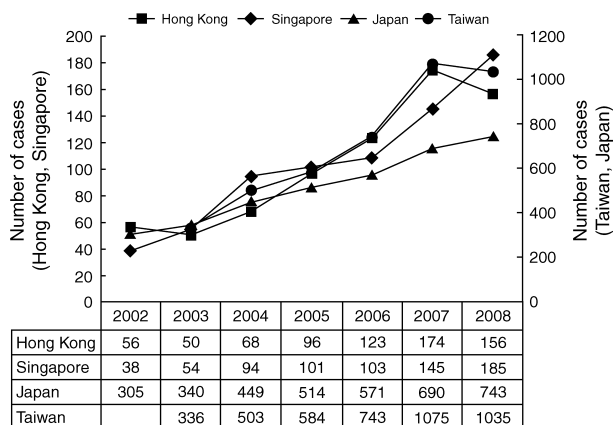


Fig. 1. Number of newly diagnosed HIV infections among MSM, Hong Kong SAR, Singapore, Taiwan and Japan, 2002–2008. Data from [4–7].

Table 1. HIV prevalence estimates from cross-sectional studies among MSM in Asia.

Country/province/city	Year	HIV prevalence (%)	Number of MSM enrolled	References
Cambodia				
Phnom Penh	2000 ^a	14.4	206	[8]
	2005 ^b	8.7	299	[9]
Battambang and Siem Reap		0.8	249	[9]
Vietnam				
Hanoi	2006	9.4	397	[10]
Khanh Hoa	2005	0.0	295	[11]
Ho Chi Minh	2000	5.8	208	[11]
	2004	7.8	600	[12]
	2006	5.3	397	[10]
Lao PDR				
Vientiane	2007	5.4	540	[13]
Malaysia				
Kuala Lumpur	2009	3.9	517	[14]
Thailand				
Bangkok	2003	17.3	1121	[15]
	2005	28.3	399	[16]
	2007	30.8	401	[17]
	2006–2008	22.4	1292	[18]
Chiang Mai	2005	15.3	222	[16]
Phuket	2005	5.5	200	[16]
Myanmar				
Yangon	2007	23.5	200	[19]
Mandalay	2007	35.0	200	[19]
China				
Heilongjiang	2001	1.3	215	[20]
	2002	1.4	140	[20]
	2004	1.4	148	[20]
Harbin	2002	1.3	154	[21]
	2004	0.9	320	[21]
	2006	2.2	674	[21]
Jiangsu	2003	0.0	144	[22]
	2006–2007	5.8	433	[22]
Beijing	2001–2002	3.1	481	[23]
	2004	0.4	325	[24]
	2005	4.6	427	[24]
	2006	5.8	540	[24]
	2005	3.2	500	[25]
	2006	4.8	515	[26]
	2005	3.2	526	[27]
	2005–2006	2.1	753	[28]
Shanghai	2004–2005	1.5	477	[29]
Shenzhen	2005	1.7	242	[30]
	2006	2.6	458	[30]
	2007	3.8	676	[30]
Guangzhou	2004	0.0	200	[31]
	2006	1.3	423	[32]
Urumqi/Beijing	2007	4.6	429	[33]
Chongqing	2006–2007	10.8	1692	[34]
	2006	10.4	1000	[35]
	2007	12.5	1044	[35]
Chengdu	2007	9.1	538	[36]
Jinan	2007	0.05	428	[37]
	2008	3.1	500	[38]
Taiwan	2000–2001	14.1	284	[39]
	2003	6.9	549	[40]
	2004	8.5	451	[41]
Singapore	2007	4.2	967	[42]
	2008–2009	3.2	960	[43]
Hong Kong SAR	2006–2007	4.1	859	[44]
	2008–2009	4.3	843	[45]
Japan				
Tokyo	2000	2.9	1232	[46]
Philippines				
Manila	2006	0.0	261	[47]
Baguio		0.0	261	[47]
Indonesia				
Jakarta	2002	2.5	279	[48]
	2007	8.1	248	[49]
Bandung	2007	2.1	249	[49]
Surabaya	2007	5.6	250	[49]

Table 1 (continued)

Country/province/city	Year	HIV prevalence (%)	Number of MSM enrolled	References
Timor Leste				
Dili	2003	0.9	109	[50]
Bangladesh				
Dhaka	2006	0.2	401	[51]
Nepal				
Kathmandu	2007	3.3	265	[52]
India				
21 out of 40 districts	2006–2007	>5.0		[53]
9 out of 40 districts		>15.0		[53]
Andhra Pradesh	2006–2007 ^a	9.3–24.7	4597	[54,55]
Maharashtra		10.2–17.4		[55]
Karnataka		19.5	210	[55]
Tamil Nadu		4.8–22.3		[55]
Chennai	2007	8.0		[56]

^aSample includes transgenders and male sex workers.

^bSample includes transgenders.

2.7 per 100 person-years using nucleic acid testing among MSM attending an HIV testing clinic during 2006–2007 [55]. In China, a study using detuned serologic testing among MSM attending sexually transmitted disease (STD) clinics in Beijing found an estimated HIV incidence of 2.9% in 2005 and 3.6% in 2006 [56]. During 1-year follow-up in a cohort of MSM in Beijing in 2007–2008, the HIV incidence density was 2.6 per 100 person-years [60].

HIV prevention responses

HIV prevention interventions

Increased knowledge about the elevated HIV prevalence among MSM compared with the low HIV prevalence in the general population in Asia has led to advocacy for more targeted use of resources to address male-to-male sex as one of the core drivers of the epidemic, away from 'general population' programming [61–63]. Unprotected anal intercourse is the main route of HIV transmission in MSM, and global meta-analyses conducted in 2003 and 2007 found that behavioral interventions can decrease the number of sexual partners, decrease the frequency of unprotected anal sex and increase condom use in MSM [64,65]. The authors concluded that behavioral interventions to reduce unprotected anal sex among MSM can work and should be supported [65].

Few systematic behavioral interventions for MSM have been implemented and evaluated in Asia. A recent exception confirmed the benefit of interventions for behavior change 'in some MSM' in India [66], whereas an Internet-based intervention in Hong Kong, China, found no effect [67].

For interventions to have any impact on the HIV epidemic – meaning for them to facilitate a significant change in sexual behavior at the population level, in terms

of partner reduction and increased use of condoms during anal intercourse – they need to cover a significant proportion of the population. Based on trends observed among Thai and Cambodian female sex workers in the 1990s, the Asian Epidemic Model (AEM) demonstrated that a level of 60% consistency in condom use is needed for HIV epidemics to stabilize, and higher levels for a decline [68]. Based on this, and assuming a high level of intervention effectiveness and quality, the Commission for AIDS in Asia has argued that interventions should cover at least 60%–80% of most at risk populations with a comprehensive array of services in order to stabilize and start to reverse the HIV epidemic [63].

Modeled on successful interventions referred to above [64,65] – which occurred mostly in western countries – small-scale community projects that focused on HIV prevention for MSM started in several Asian cities in the early and mid-1990s. Although some projects emerged locally, most were initiated in the late 1990s and early 2000s and were supported by foreign donors, primarily the US Agency for International Development (USAID) [69,70]. Since 2008, funding has been increasingly provided via the Global Fund for AIDS, Tuberculosis and Malaria (GFATM) [71]. Because GFATM funds are disbursed via Country Coordinating Mechanisms, which are usually led by Government partners, countries where homosexuality is illegal may not access funds for HIV prevention among MSM via this mechanism. The GFATM has recently developed a specific strategy addressing this issue [72].

Coverage of prevention responses among Asian MSM remains limited. In a survey conducted in 2005, coverage of MSM with one type of intervention – outreach – was estimated to be on average 8% in China and 2% in 11 other Asian countries for which data were available [73]. A recent global review analyzed four MSM-related coverage indicators that were part of reports submitted by UN member states to assess their progress toward

achieving the objectives set at the United Nations General Assembly Special Session (UNGASS) on HIV/AIDS: HIV testing uptake, HIV prevention service exposure, HIV knowledge and condom use at last sex [74]. The review found that south and south-east Asia scored worst on all four indicators compared with other regions for which sufficient data were available. China, however, scored higher than the global average [75]. These findings are summarized in Table 2. Note that several countries failed to report any data, or reported data that were incomplete. Only Bangladesh, China, Indonesia, Nepal and the Philippines reported data on all four indicators.

Combination package of prevention services

Analogous to highly effective antiretroviral combination treatment, combination prevention consists of multiple interventions that have been proven effective individually and are theorized to work synergistically when implemented simultaneously, increasing their effect [76]. Interventions found to be effective among MSM are behavioral change programs, access to condoms and lubricants and HIV voluntary counseling and testing [64,65]. Unfortunately, there is little evidence that STD control will have a significant effect on the HIV epidemic in MSM [77]. Also, no evidence has been found regarding the impact of structural level interventions, such as decriminalization of homosexuality or programs to decrease homophobia and stigma. In 2005, a number

of agencies agreed on a 'Minimum Package of Services' (sometimes also called the 'Combination Package') to which MSM should have access in the Greater Mekong Region and China [78,79]. The package consisted of five components [78,79], as follows:

- (1) exposure to HIV prevention outreach;
- (2) exposure to targeted media;
- (3) access to condoms and lubricants;
- (4) access to HIV voluntary counseling and testing;
- (5) access to sexually transmitted infection (STI) services.

Exposure data collected by the Thailand Ministry of Public Health and the US Centers for Disease Control and Prevention Collaboration found that 11% of MSM in Bangkok and Chiang Mai were reached by this minimum package in 2007; in Bangkok, 27% of MSM (including transgenders and male sex workers) had been reached by at least three of the five components in 2007, up from 22% in 2005; in Chiang Mai, coverage of the entire package among MSM went up from 1% in 2005 to 18% in 2007, with 32% having been exposed to at least three components [80].

In 2009, the United Nations Development Programme (UNDP) – having become the lead UN agency working on HIV and MSM – together with USAID and the United Nations Educational, Scientific and Cultural Organization brought together a wider range of countries

Table 2. Estimated percentages coverage of testing and prevention interventions for MSM in Asian countries and levels of HIV knowledge and condom use.

Country	Outreach ^a [%]	HIV testing ^b [% (range)]	Prevention programs ^c [% (range)]	HIV knowledge ^d [% (range)]	Condom use ^e [% (range)]
Bangladesh	–	6.4 (4.7–8.1)	12.7 (10.5–14.9)	27.3 (24.3–30.3)	24.3 (21.2–27.4)
Cambodia	17	58.1 (54.5–61.6)	NA	NA	86.5 (84.0–88.9)
China	8	32.7 (31.4–34.0)	37.8 (36.5–39.1)	55.1 (53.7–56.5)	64.4 (63.1–65.7)
India	4	NE	NE	NE	NE
Indonesia	10	31.9 (29.0–34.8)	40.1 (37.0–43.1)	41.6 (38.5–44.6)	39.3 (36.3–42.3)
Lao PDR	1	4.8 (3.0–6.6)	NA	NE	NE
Malaysia	10	NE	NE	NE	NE
Mongolia	–	NE	NE	NE	NE
Myanmar	30	NE	NE	NE	NE
Nepal	36	30.0 (25.5–34.5)	46.8 (41.9–51.6)	44.5 (39.6–49.4)	73.5 (69.2–77.8)
Pakistan	15	NE	NE	NE	24.2 (22.4–25.9)
Papua New Guinea	–	41.7 (36.1–47.2)	10.3 (6.9–13.8)	70.7 (65.5–75.8)	NE
Philippines	2	16.0 (13.8–18.2)	18.5 (16.2–20.8)	10.0 (8.2–11.8)	31.9 (29.1–34.7)
Sri Lanka	10	13.6 (9.7–17.5)	NA	19.9 (15.4–24.4)	60.9 (56.1–65.7)
Thailand	1	34.9 (31.8–38.0)	NA	25.3 (23.1–27.5)	88.2 (84.1–92.3)
Vietnam	–	16.3 (13.8–18.9)	25.6 (22.5–28.6)	NE	61.3 (51.5–58.4)

Data from USAID (column^a) and UNGASS (columns^{b–e}) [73,75]. NA, not available; NE, not eligible, for example, data not reported in the required format.

^aDefined as 'percentage of MSM having been contacted by an HIV outreach worker'.

^bDefined as 'percentage of MSM having received an HIV test in the past 12 months'.

^cDefined as 'percentage of MSM replying "yes" to "Do you know where you can go if you wish to have an HIV test" and "In the last 12 months, have you been given condoms?" (e.g. through an outreach service, drop-in centre or sexual health clinic)'.

^dDefined as 'percentage of respondents giving correct answers to all of the following five questions: "Can having sex with one faithful, uninfected partner reduce the risk of HIV transmission?" "Can using condoms reduce the risk of HIV transmission?" "Can a healthy-looking person have HIV?" "Can a person get HIV from mosquito bites?" "Can a person get HIV by sharing a meal with someone who is infected?" (The last two questions can be replaced by the most common misconceptions in the country.)'

^eDefined as 'percentage of MSM reporting the use of a condom the last time they had sex, among men who reported having had male partner(s) in the previous 6 months'.

and partners, including the Association of South East Asian Nations, World Health Organization and the Asia-Pacific Coalition on Male Sexual Health to review and agree on a wider package of prevention services for MSM on the country level. This package had four components [81], as follows:

- (1) prevention (with peer outreach, promotion of access to means of prevention, STI prevention and treatment and HIV testing and counseling as subcomponents);
- (2) health sector response (involvement of the government);
- (3) enabling environment (decriminalization and human rights improvement);
- (4) strategic information (epidemiology, surveillance and other data).

No data are currently available regarding the coverage of this package and its subcomponents for MSM in Asian countries.

Policy environment and human rights

UNAIDS and other organizations have long suggested a link between the human rights situation and the HIV vulnerability of MSM. In this regard, countries where homosexuality is illegal would face difficulties in responding to HIV among this group [82,83]. However, illegal status of homosexuality does not necessarily prevent the initiation of HIV prevention work with MSM, as Bangladesh, India, Myanmar, Nepal and Pakistan may exemplify. Table 3 summarizes the state of the legal and policy responses to the epidemic among MSM. The table shows that male-to-male sex is legal in 10 out of 17 countries for which UNAIDS collected data in 2009; 13 out of 17 included MSM in their National Strategic Plan; in 14 out of 17 countries, MSM were prioritized for prevention; and in eight out of 11 countries, MSM were

included in the HIV surveillance system. However, only one country (Cambodia) had a specific policy and strategic plan focusing on HIV prevention for MSM [84].

Other human rights that are linked to improving HIV prevention and sexual health services for MSM include [61–63]:

- (1) the right to the enjoyment of the highest attainable standard of health;
- (2) the right to access appropriate information and tools for HIV prevention;
- (3) the right to anonymity and privacy when testing for HIV;
- (4) the right to access antiretroviral treatment when HIV-positive;
- (5) the right to be free from sexual and other forms of exploitation.

The Yogyakarta principles provide a comprehensive overview of all areas and aspects of human rights in relation to sexual diversity and (indirectly) to HIV prevention, care and support [82].

Country investment and donor contributions to the response

Government investment in prevention among MSM remains small: a review covering the Greater Mekong Subregion (GMS) (consisting of Cambodia, two provinces of China, Lao PDR, Myanmar, Thailand and Vietnam) found that as of 2004, the share of the government HIV prevention budget allocated to MSM ranged from 0 to 3.8% of the total [69]. A more recent report estimates that the GMS subregion needs to invest US\$ 291 million on HIV programs for MSM over 5 years to reach 80% coverage in 2014; it estimates that only 16%

Table 3. Legal and policy environment for HIV responses among MSM in selected Asian countries.

Country	Male-to-male sex legal?	MSM part of national HIV strategic plan?	MSM prioritized for HIV prevention?	Separate HIV plan/policy for MSM in place?	MSM part of HIV surveillance/case reporting?
Bangladesh	No	Yes	Yes	No	Yes
Cambodia	Yes	Yes	Yes	Yes	Yes
China	Yes	No	Yes	No	Yes
India	Yes	Yes	Yes	No	Yes
Indonesia	Yes	Yes	Yes	No	Yes
Lao PDR	Yes	Yes	Yes	No	N/A
Malaysia	No	No	No	No	No
Mongolia	Yes	Yes	Yes	No	Yes
Myanmar	No	Yes	Yes	No	Yes
Nepal	No	Yes	Yes	No	Yes
Pakistan	No	Yes	Yes	No	Yes
Philippines	Yes	Yes	Yes	No	Yes
Papua New Guinea	No	No	No	No	No
Singapore	No	Yes	Yes	No	Yes
Sri Lanka	Yes	Yes	Yes	No	Planned
Thailand	Yes	Yes	Yes	No	Yes
Vietnam	Yes	No	No	No	No

Data from UNAIDS [84]. MSM, men who have sex with men; N/A, not available; PDR, People's Democratic Republic.

of the resources needed are currently pledged or available [70]. According to the GFATM, 75% of countries in Asia and the Pacific do not have any funding for MSM in their country plans on HIV [71]. However, the GFATM recently reported increased country demand for interventions focusing on most-at-risk populations, including MSM, and 58.7% of funding disbursed in round 8 was allocated for these groups, compared with 24.3% in round 6. The budget allocated for interventions focusing specifically on MSM increased from an average of 2% over rounds 1–7 to 7% of the total budget allocated in round 8. Although this is promising, it should be placed in perspective: in 2007, an estimated US\$ 5.1 billion was needed for HIV programs among MSM in the Asia-Pacific region, of which only US\$ 1.6 billion was available [71].

MSM 'community responses'

In western countries, 'the gay community' responded to the HIV epidemic with a strong volunteerism and activist focus [85,86]; 'interventions' started without much outside support, and many of the models currently promoted worldwide (including home-based care, community-based social support for people living with HIV, peer education) emerged in cities as far apart as San Francisco, Sydney and Amsterdam [87]. In most Asian countries – perhaps with the exception of certain Chinese and Japanese cities – the absence of an MSM community-led response has been remarkable, especially when considering the great potential benefit MSM could gain from increased access to antiretroviral treatment. The lack of community initiatives in response to HIV may be explained by what constitutes community and identity in relation to male-to-male sex (and related disease and death), placing these questions in the context of family relations and career options in Asian societies. These questions are also important to assess the appropriateness of current prevention intervention models, which often are based on concepts of gay identity and community, which may be less relevant in Asian settings [88].

Discussion

Available data show that HIV infection is now widespread among MSM throughout Asia. With the exception of the Philippines and Timor Leste, all countries for which information was available show that HIV infection among MSM has reached epidemic levels, particularly in urban areas. Double-digit HIV prevalence among MSM has been found in cities in China, Taiwan, India, Myanmar and Thailand. Incidence data, although scarce, confirmed the ongoing epidemic spread of HIV among MSM in Thailand and China. Where HIV case reporting was present, trends in newly diagnosed HIV infections among MSM have been increasing in recent years, particularly in the developed economies of east Asia. On a positive note,

in 2008, the number of newly diagnosed HIV infections reported among MSM in Hong Kong and Taiwan did not increase further.

As in most epidemiological studies in marginalized and hidden populations at risk for HIV infection, the prevalence data reviewed in this article were collected from selected populations of MSM, with varying sampling strategies and research methodologies. It is, therefore, difficult to say to what extent the current data are representative for the HIV prevalence among the population of MSM at large and to what level data can be compared between countries. However, with HIV prevalence being consistently high in most countries and, if data were available, increasing over time, it is clear that a considerable epidemic of HIV infection is occurring in MSM in Asia, even though precise numbers are not available. Similarly, despite the fact that HIV case-report data may be biased by a higher uptake of HIV testing, or more high-risk people coming forward because of more promising new drugs (or other factors), sustained increasing trends in reported cases of HIV infection among MSM can be indicative of a growing epidemic in this population.

Some countries – Afghanistan, Bhutan, Brunei, Maldives, Mongolia, North Korea, South Korea, Pakistan, Papua New Guinea, and Sri Lanka – still lacked the basic epidemiological data needed to assess the prevalence of HIV infection among MSM to inform policy and programming of HIV prevention interventions for this population.

Due to the high reported levels of unprotected anal intercourse [8,10,11,13,17,18,24,26,28,32,33,36,39,41,43,44,46,47,49,52,53,55], the sexual behavior with the highest risk for HIV transmission, it is safe to conclude that sexual behavior is driving the HIV epidemic among MSM in the region. Although in some countries and situations, there may have been some overlap between populations of MSM and injection drug users, the overall impact of injecting drug use on the spread of HIV among MSM is thought to be limited. Nevertheless, the importance of non-injection drug use as a risk factor for HIV infection among MSM in Asia seems to be on the rise. Reports of use of methamphetamine ('ice' or 'crystal') as a sexual stimulant drug among MSM have been increasing throughout the Asian region [17,89]. The use of methamphetamine has been well established as a risk factor for HIV infection among MSM in the western world [90].

Concerns have been raised about the relatively large proportion of MSM in Asia who are married or bisexually active and the risk of HIV transmission to their female sexual partners. Whereas substantial spread of HIV infection has been documented from heterosexual men to their female sexual partners in the early days of the HIV

epidemic in Asia [91], the scenario between homosexual men and their female sexual counterparts is a different one. First, the percentage of married or bisexual homosexual men is small and their HIV prevalence appears to be substantially lower than among homosexual men who are not married and do not have female sexual partners [38,92]. In addition, we may assume that most married homosexual men entertain low sexual activity profiles with their wives, making HIV transmission unlikely. On the contrary, in the early days of the HIV epidemic in Asia, a substantial proportion of heterosexual men visited female sex workers, acquired HIV infection and continued to have high sexual activity profiles with both sex workers and their female sexual partners and wives. Such a scenario does not apply to MSM and currently there are no epidemiologic data indicating any substantial transmission of HIV infection from homosexual men to their wives or to the population at large.

HIV prevention responses among MSM have started in most Asian countries, but although the exact coverage and investment in such responses remain unclear, coverage seems to be far from the levels needed to have an impact on the HIV epidemic. Both government and donor investment in prevention programs for MSM are insufficient, especially when compared with the contribution of male-to-male transmission to the overall burden of the HIV epidemic in Asia [2]. Although criminalization of homosexuality does not necessarily hamper the establishment of HIV prevention and treatment services for MSM, the heightened stigmatization and discrimination surrounding homosexuality in such countries hinders free access of MSM to HIV-prevention services and may also complicate the allocation of funds toward HIV prevention and services. At the intervention level, with the growing importance of the GFATM and the leading role of governments in the process of application for funds, HIV prevention services for MSM in countries that criminalize homosexuality may soon have fewer options to access donor support, an issue which the GFATM is currently trying to address [72].

In terms of coverage, at first sight, there appears to be no clear relationship between the severity of the HIV epidemic among MSM and the extent to which HIV interventions have been initiated or expanded. Some countries with low-level epidemics among MSM (such as Nepal) appear to have reached higher coverage than countries with the most severe epidemics (Thailand, Myanmar). Some countries might underestimate the number of MSM in need of interventions, artificially inflating current levels of coverage and downplaying the need for increased investment in prevention for this group [70]. The failure of countries reporting on HIV-prevention coverage for UNGASS is worrisome in this regard; only seven out of 13 Asian countries for which data were available reported on their coverage [75].

The recent agreement on a standardized combination HIV prevention package for MSM in Asia is significant, although it is important to realize that the types of intervention in this package remain largely based on theoretical assumptions. None of its components have been scientifically evaluated in Asian settings. In addition, methods to assess the coverage and impact of the standardized combination HIV prevention package remain unclear. Finally, data on the (cost-)effectiveness of a combination package of interventions in the differing sociocultural settings of Asian countries is lacking. The availability of such data may help to increase investment in a rapid scale-up of implementation.

In conclusion, this review found severe HIV epidemics among MSM across Asia. Although recent moves to agree on a standardized combination HIV prevention package and increases in donor support are encouraging, knowledge about the effectiveness of interventions in the Asian settings is not available. Current coverage levels of prevention services for MSM are not sufficient to stabilize or reverse the HIV epidemic, and unless scaled-up rapidly, HIV will continue to spread among MSM in the Asian region.

Conflicts of Interest: None.

References

1. van Griensven F, de Lind van Wijngaarden JW, Baral S, Grulich A. **The global epidemic of HIV infection among men who have sex with men.** *Curr Opin HIV AIDS* 2009; **4**:300–307.
2. Baral S, Sifakis F, Cleghorn F, Beyrer C. **Elevated risk for HIV infection among men who have sex with men in low and middle income countries 2000–2006: a systematic review.** *PLoS Med* 2007; **4**:e339.
3. United Nations Joint Programme on HIV/AIDS. *UNAIDS 2008 Report on the global AIDS epidemic. Annex 1. HIV and AIDS estimates and data* [Internet]. Geneva: Switzerland; 2008. http://data.unaids.org/pub/GlobalReport/2008/jc1510_2008_global_report_pp211_234_en.pdf. [Accessed 25 February 2009]
4. Center for Health Protection, Department of Health [Internet]. *Hong Kong: AIDS Office. Hong Kong STD/HIV update. Quarterly Surveillance Report.* Vol. 15, No. 2, Quarter 2; 2009. <http://www.info.gov.hk/aids/archives/backissuestd/std08q4.pdf>. [Accessed 23 October 2009]
5. Centers for Disease Control [Internet]. Taipei: Ministry of Health, R.O.C.; 2009. <http://www.cdc.gov.tw/lp.asp?ct=Node=2237&CtUnit=1263&BaseDSD=7&mp=5>. [Accessed 26 October 2009]
6. Ministry of Health [Internet]. Singapore: Republic of Singapore. <http://www.moh.gov.sg/mohcorp/pressreleases.aspx?id=22038>. [Accessed 3 June 2009]
7. National Institute of Infectious Diseases. **Infectious Agents Surveillance Report. Tokyo: Ministry of Health, Labour and Welfare (Japan).** *IASR* 2009; **30**:229–230. <http://idsc.nih.gov.jp/iasr/30/355/tpc355.html>. [Accessed 2 September 2010].
8. Girault P, Sidel T, Song N, de Lind van Wijngaarden JW, Dallabetta G, Stuer F, et al. **HIV, STIs, and sexual behaviors among men who have sex with men in Phnom Penh, Cambodia.** *AIDS Educ Prev* 2004; **16**:31–44.
9. Sopheab H, Morineau G, Neal JJ, Chhorvann C. *2005 Cambodia STI Prevalence Survey. Integrated Biological and Behavioral Survey.* Phnom Penh: National Center for HIV/AIDS, Dermatology, and STDs; 2008. www.nchads.org/Publication/dissemination/SSS%202005%20Eng.pdf. [Accessed 2 September 2010].

10. National Institute of Epidemiology and Family Health International. *Results from HIV/STI integrated behavioral and biological surveillance (IBBS) in Vietnam, 2005–2006*. Hanoi, Vietnam: Ministry of Health, Government of Vietnam; 2007. www.unaids.org.vn/sitee/upload/publications/ibbs_en.pdf.
11. Colby D, Minh TT, Toan TT. **Down on the farm: homosexual behaviour, HIV risk and HIV prevalence in rural communities in Khanh Hoa province, Vietnam**. *Sex Transm Infect* 2008; **84**:439–443.
12. Nguyen TA, Nguyen HT, Le GT, Detels R. **Prevalence and risk factors associated with HIV infection among men having sex with men in Ho Chi Minh City, Vietnam**. *AIDS Behav* 2008; **12**:476–482.
13. Sheridan S, Phimphachanh C, Chanlivong N, Manivong S, Khamsyvolsvong S, Lattanavong P, et al. **HIV prevalence and risk behaviour among men who have sex with men in Vientiane Capital, Lao People's Democratic Republic, 2007**. *AIDS* 2009; **23**:409.
14. Kanter J, Koh C, Kiew R, Tai R, Izenberg J, Razali K, et al. **Risk behaviour and HIV prevalence among MSM in a predominantly muslim and multiethnic society: a venue-based study in Kuala Lumpur, Malaysia** [abstract]. Presented at the 17th Conference on Retroviruses and Opportunistic Infections; San Francisco; 16–19 February 2010.
15. van Griensven F, Thanprasertsuk S, Jommaroeng R, Mansergh G, Naorat S, Jenkins RA, et al. **Evidence of a previously undocumented epidemic of HIV infection among men who have sex with men in Bangkok, Thailand**. *AIDS* 2005; **19**:521–526.
16. van Griensven F, Varangrat A, Wimonasate W. **HIV prevalence among populations of men who have sex with men in Thailand, 2003 and 2005**. *MMWR Morb Mortal Wkly Rep* 2006; **55**:844–848.
17. van Griensven F, Varangrat A, Wimonasate W, Tanpradech S, Kladsawad K, Chemnasiri T, et al. **Trends in HIV prevalence, estimated HIV incidence and risk behavior among men who have sex with men in Bangkok, Thailand, 2003 to 2007**. *J Acquir Immune Defic Syndr* 2010; **53**:234–239.
18. van Griensven F, Wimonasate W, McNicholl J, Chaikummao S, Thienkrua W, Kittinunvorakoon C, et al. **Continuing high HIV incidence in a cohort of men who have sex with men in Bangkok, Thailand** [abstract]. Presented at the 16th Conference on Retroviruses and Opportunistic Infections; Montreal; 8–11 February 2009 [abstract #1037b].
19. World Health Organization. *Strengthening HIV Second Generation Surveillance (SGS) in Myanmar*. WHO: Yangon, Myanmar; 2008.
20. Zhang BC, Chu QS. **MSM and HIV/AIDS in China**. *Cell Res* 2005; **15**:858–864.
21. Zhang D, Bi P, Lv F, Zhang J, Hiller JE. **Changes in HIV prevalence and sexual behavior among men who have sex with men in a northern Chinese city: 2002–2006**. *J Infect* 2007; **55**:456–463.
22. Guo H, Wei JF, Yang H, Huan X, Tsui SK, Zhang C. **Rapidly increasing prevalence of HIV and syphilis and HIV-1 subtype characterization among men who have sex with men in Jiangsu, China**. *Sex Transm Dis* 2008; **36**:120–125.
23. Choi KH, Liu H, Guo Y, Han L, Mandel J, Rutherford G. **Emerging HIV-1 epidemic in China in men who have sex with men**. *Lancet* 2003; **361**:2125–2126.
24. Ma X, Zhang Q, He X, Sun W, Yue H, Chen S, et al. **Trends in prevalence of HIV, Syphilis, Hepatitis C, Hepatitis B, and sexual risk behavior among men who have sex with men: Results of 3 consecutive respondent-driven sampling surveys in Beijing, 2004 through 2006**. *J Acquir Immune Defic Syndr* 2007; **45**:581–587.
25. Ruan Y, Shi W, Li D, Luo F, Wang W, Jiang S, et al. **Changes of HIV and syphilis infection among men who have sex with men in Beijing China** [abstract]. Presented at the XVII International AIDS Conference; Mexico City, Mexico; 3–8 August 2008 [abstract #CDC0153].
26. Ruan Y, Luo F, Jia Y, Li X, Li Q, Liang H, et al. **Risk factors for syphilis and prevalence of HIV, hepatitis B and C among men who have sex with men in Beijing, China. Implications for HIV prevention**. *AIDS Behav* 2009; **13**:663–670.
27. Ruan Y, Li D, Li X, Qian H, Shi W, Zhang X, et al. **Relationship between syphilis and HIV infections among men who have sex with men in Beijing, China**. *Sex Transm Dis* 2007; **34**:592–597.
28. Zhang X, Wang C, Hengwei W, Li X, Li D, Ruan Y, et al. **Risk factors of HIV infection and prevalence of co-infections among men who have sex with men in Beijing, China**. *AIDS* 2007; **21** (Suppl 8):S53–S57.
29. Choi KH, Ning Z, Gregoric SE, Pan QC. **The influence of social and sexual networks in the spread of HIV and syphilis among men who have sex with men in Shang Hai, China**. *J Acquir Immune Defic Syndr* 2007; **45**:77–84.
30. Feng TJ, Lui XL, Cai YM, Pan P, Hong FC, Jiang WN, et al. **Prevalence of syphilis and human immunodeficiency virus infections among men who have sex with men in Shenzhen, China: 2005 to 2007**. *Sex Transm Dis* 2008; **35**:1022–1024.
31. He Q, Wang Y, Lin P, Liu Y, Yang F, Fu X, et al. **Potential bridges for HIV infection to men who have sex with men in Guangzhou, China**. *AIDS Behav* 2006; **10** (Suppl 1):S17–S23.
32. He Q, Wang Y, Lin P, Raymond HF, Li Y, Yang F, et al. **High prevalence of risk behavior concurrent with links to other high-risk populations: a potentially explosive HIV epidemic among men who have sex with men in Guangzhou, China**. *Sex Transm Infect* 2009; **85**:383–390.
33. Zou H, Yu J, Li M, Ablimit M, Li F, Pang L, et al. **Sexual risk behaviors and HIV infection among men who have sex with men who use the internet** [abstract]. Presented at the XVII International AIDS Conference; Mexico City, Mexico; 3–8 August 2008 [abstract #CDC0101].
34. Xiao Y, Ding X, Li C, Liu J, Sun J, Jia Y. **Prevalence and correlates of HIV and syphilis infections among men who have sex with men in Chongqing municipality, China**. *Sex Transm Dis* 2009; **36**:647–656.
35. Feng L, Ding X, Lu R, Liu J, Sy A, Ouyang L, et al. **High HIV prevalence detected in 2006 and 2007 among men who have sex with men in China's largest municipality: an alarming epidemic in Chongqing, China**. *J Acquir Immune Defic Syndr* 2009; **52**:79–85.
36. Feng Y, Wu Z, Detels R. **HIV/STD prevalence among MSM in Chengdu, China and associated risk factors for HIV infection** [abstract]. Presented at the XVII International AIDS Conference; Mexico City, Mexico; 3–8 August 2008 [abstract #CDC088].
37. Ruan S, Yang H, Zhu Y, Ma Y, Li J, Zhao J, et al. **HIV prevalence and correlates of unprotected anal intercourse among men who have sex with men, Jinan, China**. *AIDS Behav* 2008; **12**:469–475.
38. Ruan S, Yang H, Zhu Y, Wang M, Ma Y, Zhao J, et al. **Rising HIV prevalence among married and unmarried men who have sex with men: Jinan, China**. *AIDS Behav* 2009; **13**:671–676.
39. Chen, YMA, Chung CLJ, Jen I, Lan YC, Wu SI, Hsu H. **Surveys on the sexual behaviours, HIV-1 infection and its related risk factors among men attending gay saunas in Taiwan** [abstract]. Presented at the 6th International Congress on AIDS in Asia and the Pacific; Melbourne, Australia; 5–10 October 2001 [abstract Mo0660].
40. Lai SF, Hong CP, Lan YC, Chen KT, Wong WW, Hu BS, et al. **Molecular epidemiology of HIV-1 in men who have sex with men from gay saunas in Taiwan from 2000 to 2003** [abstract]. Presented at the XVth International AIDS Conference; Bangkok, Thailand; 11–16 July 2004 [abstract WePeC6097].
41. Ko NY, Lee HC, Chang JL, Lee NY, Chang CM, Lee MP, et al. **Prevalence of human immunodeficiency virus and sexually transmitted infections and risky sexual behaviors among men visiting gay bathhouses in Taiwan**. *Sex Transm Dis* 2006; **33**:467–473.
42. Toh P, Lim S, Chio M, Chan R. **Men having sex with men HIV sero-prevalence study in Singapore, a community based project to protect the MSM community** [abstract]. Presented at the XVII International AIDS Conference; Mexico City, Mexico; 3–8 August 2008 [abstract #THPE0354].
43. Toh P. **Country report Singapore**. Presented at the *Insular Southeast Asia consultation on male to male transmission of HIV infection*; Denpasar, Bali, Indonesia; 4–6 August 2009. http://msmasia.org/tl_files/2010%20resources/10-04_resources/Country_update_Singapore_010809_latest.pdf. [Accessed 2 September 2010].
44. Mak D, Ho K, Mak K. **The first integrated seroprevalence and behavioral survey for men who have sex with men (MSM) in Hong Kong – prism** [abstract]. Presented at the XVII International AIDS Conference; Mexico City, Mexico; 3–8 August 2008 [abstract #MOPE0407].

45. Center for Health Protection, Department of Health [Internet]. PRISM – HIV Prevalence and risk behavioural survey of men who have sex with men in Hong Kong 2008. FACTSHEET; 2009. Hong Kong: AIDS Office. http://www.info.gov.hk/aids/english/surveillance/off_surreport.htm. [Accessed 25 October 2009]
46. Kihara M, Kihara MO, Ichikawa S. **Toward the epidemic: current situation of HIV/AIDS, STDs and risk behaviors in Japan** [abstract]. Presented at the 6th International Congress on AIDS in Asia and the Pacific; Melbourne, Australia; 5–10 October 2001 [abstract Sa1278].
47. Hernandez LI. **Reducing the vulnerabilities of HIV and AIDS among MSM in Olongapo and Davao Cities, Philippines** [abstract]. Presented at the 8th International Congress on AIDS in Asia and the Pacific; Colombo, Sri Lanka; 19–23 August 2007 [abstract WeOPC16-01].
48. Morineau G, Nugrahini N, Riono P, et al. **Sexual risk taking, STI and HIV prevalence among men who have sex with men in six Indonesian cities.** *AIDS Behav* 2009. doi: 10.1007/s10461-009-9590-6. [Epub ahead of print]
49. Pisani E, Girault P, Gultom M, Sukartini N, Kumalawati J, Jazan S, et al. **HIV, syphilis infection, and sexual practices among transgenders, male sex workers, and other men who have sex with men in Jakarta, Indonesia.** *Sex Transm Infect* 2004; **80**:536–540.
50. Pisani E, Purnomo H, Sutrisna A, Asy A, Zaw M, Tilman C, et al. **Basing policy on evidence: low HIV, STIs, and risk behaviour in Dili, East Timor argue for more focused interventions.** *Sex Transm Infect* 2006; **82**:88–93.
51. Ramakrishnan L, Kallam S, Kohli A, Adhikary R, Saidel T, Paranjape R, et al. **High HIV/STI prevalence among self-identified men who have sex with men in South Asia** [Abstract]. Presented at the XVII International AIDS Conference; Mexico City, Mexico; 3–8 August 2008 [abstract # CDC0264].
52. Brahmam GN, Kodavalla V, Rajkumar H, Rachakulla HK, Kallam S, Myakala SP, et al. **Sexual practices, HIV and sexually transmitted infections among self-identified men who have sex with men in four high HIV prevalence states of India.** *AIDS* 2008; **22** (Suppl 5):S45–S57.
53. Thomas B, Mimiaga MJ, Menon S, Chandrasekaran V, Murugesan P, Swaminathan S, et al. **Unseen and unheard: predictors of sexual risk behavior and HIV infection among men who have sex with men in Chennai, India.** *AIDS Educ Prev* 2009; **21**:372–383.
54. Setia M, Brassard P, Jerajani H, Bharat S, Gogate A, Kumta S, et al. **Men who have sex with men in India: a systematic review of the literature.** *J LGBT Health Res* 2008; **4**:51–70.
55. Ananworanich J, Phanuphak N, de Souza M, Paris R, Arroyo M, Trichavaroj R, et al. **Incidence and characterization of acute HIV-1 infection in a high-risk Thai population.** *J Acquir Immune Defic Syndr* 2008; **49**:151–155.
56. Li SW, Zhang XY, Li XX, et al. **Detection of recent HIV-1 infections among men who have sex with men in Beijing during.** *Chin Med J* 2008; **121**:1105–1108.
57. National HIV serological surveillance. 2006 Bangladesh – 7th round technical report. National AIDS/STD Programme. Bangladesh: Ministry of Health and Family Welfare; 2007. <http://centre.icddr.org/activity/index.jsp?activityObjectID=3748>. [Accessed 2 September 2010].
58. National Centre for AIDS and STD Control. Integrated biological and behavioural survey (IBBS) among men who have sex with men (MSM) population in Kathmandu Valley round 2. Kathmandu; 2007. http://202.53.1.70/ncasc/Reports/Integrated%20Bio-Behavioral%20Surveys-%20Nepal/MSM/2007/Full%20Report_IBBS%20MSM%202007%20Final.pdf [Accessed 2 September 2010].
59. National AIDS Control Organization. HIV sentinel surveillance and HIV estimation in India, 2007. A technical brief. New Delhi: Ministry of Health and Family Welfare; 2008. http://www.nacoonline.org/upload/Publication/M&E%20Surveillance,%20Research/HIV%20Sentinel%20Surveillance%20and%20HIV%20Estimation%202007_A%20Technical%20Brief.pdf. [Accessed 2 September 2010].
60. Ruan Y, Jia Y, Zhang X, Liang H, Li Q, Yang Y, et al. **Incidence of HIV-1, syphilis, hepatitis B, and hepatitis C virus infections and predictors associated with retention in a 12-month follow-up study among men who have sex with men in Beijing, China.** *J Acquir Immune Defic Syndr* 2009; **52**:604–610.
61. Hoffmann O, Boler T, Dick B. **Achieving the global goals on HIV among young people most at risk in developing countries: young sex workers, injecting drug users and men who have sex with men.** *World Health Organ Tech Rep Ser* 2006; **938**:287–315; discussion 317–341.
62. De Lind van Wijngaarden JW. *Meeting the HIV prevention needs of young people in Asia: the need for (cost-) effective policies and programmes. Discussion paper prepared for the Commission on AIDS in Asia.* Prepared on behalf of UNICEF, UNESCO, UNFPA, UNICEF. Kathmandu: UNICEF ROSA; 2007. http://www2.unescobkk.org/hivaids/fulltextdb/aspUploadFiles/Aids%20Commision%20in%20Asia_06September_07.pdf. [Accessed 2 September 2010].
63. Commission on AIDS in Asia. *Redefining AIDS in Asia: Crafting an Effective Response.* New Delhi: Oxford University Press; 2008.
64. Herbst JH, Sherba TR, Crepaz JB, DeLuca J, Zohrabyan L, Stall R, et al. **A meta-analytic review of HIV behavioral interventions for reducing sexual risk behavior of men who have sex with men (MSM).** *J Acquir Immune Defic Syndr* 2005; **39**:228–241.
65. Johnson WD, Diaz RM, Flanders WD, Goodman M, Hill A, Holtgrave D, et al. **Behavioral interventions to reduce risk for sexual transmission of HIV among men who have sex with men.** *Cochrane Database Syst Rev* 2008;CD001230.
66. Thomas B, Mimiaga MJ, Mayer KH, Johnson CV, Menon S, Chandrasekaran V, et al. **HIV prevention interventions in Chennai, India: are men who have sex with men being reached?** *AIDS Patient Care STD* 2009; **23**:981–986.
67. Lau JT, Lau M, Cheung A, Tsui HY. **A randomized controlled study to evaluate the efficacy of an Internet-based intervention in reducing HIV risk behaviors among men who have sex with men in Hong Kong.** *AIDS Care* 2008; **20**:820–828.
68. Brown T, Peerapatanapokin W. **The Asian Epidemic Model: a process model for exploring HIV policy and programme alternatives in Asia.** *Sex Transm Infect* 2004; **80** (Suppl 1):i19–i24.
69. United States Agency for International Development – Health Policy Initiative [Internet]. *Mapping donor support for HIV programming for men who have sex with men in the Greater Mekong Subregion.* Report prepared by RTI International; August 2008. http://pdf.usaid.gov/pdf_docs/PNADP002.pdf. [Accessed 13 November 2009]
70. United States Agency for International Development – Health policy initiative and Asia Pacific coalition on male sexual health [Internet]. Investing in HIV prevention for men who have sex with men: averting a ‘Perfect Storm’ – regional policy brief, No. 1; 30 September 2009. http://www.msmsia.org/tl_files/resources/09-06/Investing_in_HIV_prevention_for_men_who_have_sex_with_men_Averting_a_Perfect_Storm.pdf. [Accessed 25 November 2009]
71. Sarkar S. Unfunded response. *Financing MSM program in Asia and the Pacific.* Presented at the Asia Pacific coalition on male sexual health forum: from 200 to 0; Bali, Indonesia; 8 August 2009. <http://www.msmsia.org/200forumdocs.html>. [Accessed 2 September 2010].
72. Global Fund to fight AIDS, Tuberculosis and Malaria [Internet]. The global fund strategy in relation to sexual orientation and gender identities (SOGI). http://msmsia.org/tl_files/resources/GF_SEXUAL_ORIENTATION_GENDER_IDENTITIES_STRATEGY.pdf. [Accessed 13 November 2009]
73. United States Agency for International Development – Health Policy Initiative. HIV expenditure on MSM programming in the Asia Pacific Region. Washington, DC: Constella Futures; 2006. <http://www.healthpolicyinitiative.com/Publications/Documents/MSM%20HIV%20Expenditures%20FINAL%20Formatted%206-11-07.pdf>.
74. Declaration of Commitment on HIV/AIDS. *United Nations General Assembly Special Session on HIV/AIDS.* New York: United Nations; 25–27 June 2001. http://data.unaids.org/publications/irc-pub03/aidsdeclaration_en.pdf.
75. Adam PC, de Wit JB, Toskin I, Mathers BM, Nashkoev M, Zablotska I, et al. **Estimating levels of HIV testing, HIV prevention coverage, HIV knowledge, and condom use among men who have sex with men (MSM) in low-income and middle-income countries.** *J Acquir Immune Defic Syndr* 2009; **52** (Suppl 2):S143–S151.
76. Coates T, Richter L, Caceres C. **Behavioural strategies to reduce HIV transmission: how to make them work better.** *Lancet* 2008; **372**:669–684.

77. Celum C, Wald A, Hughes J, Sanchez J, Reid S, Delany-Mortlwe S, et al. **Effect of aciclovir on HIV-1 acquisition in herpes simplex virus 2 seropositive women and men who have sex with men: a randomised, double-blind, placebo-controlled trial.** *Lancet* 2008; **371**:2109–2119.
78. Centers for Disease Control, United States Agency for International Development, Family Health International. Strategy report: Strategizing interventions among MSM in the Greater Mekong Sub-region (GMR). Based on a workshop held on 28 February to 2 March 2005; Bangkok, Thailand (unpublished).
79. Centers for Disease Control, United States Agency for International Development, Family Health International, Report from HIV Prevention and Care Interventions for MSM in the Greater Mekong Subregion Regional Consultative Forum; Bangkok, Thailand; 15–16 August 2005 (unpublished).
80. Girault P. MSM and drug use in the Asia Pacific region. *Presented at the Consultation on MSM/TC and HIV in Insular Southeast Asia*; Bali, Indonesia; 4–6 August 2009. http://msmasia.org/tl_files/resources/presentations/Philippe_Girault_presentation.pdf.
81. United Nations Development Programme, Association of Southeast Asian Nations, World Health Organization, USAID, United Nations Educational, Scientific and Cultural Organization, Joint UN Programme on HIV/AIDS, Asia-Pacific Coalition on Male Sexual Health. *Developing a Comprehensive Package of Services to Reduce HIV among Men who have Sex with Men (MSM) and Transgender (TG) Populations in Asia and the Pacific. Report of a regional consensus meeting, 29 June – 1 July 2009, Bangkok, Thailand.* Colombo: UNDP; 2009. at: www.msasia.org/tl_files/resources/09-06/Regional_Consensus_Meeting_Report_v2.pdf. [Accessed 2 September 2010].
82. Yogyakarta principles [Internet]. www.yogyakartaprinciples.org/. [Accessed 13 November 2009]
83. United Nations Joint Programme on HIV/AIDS [Internet]. *Men who have sex with men: the missing piece in national responses to AIDS in Asia and the Pacific.* Geneva: UNAIDS; 2007. http://www.unescobkk.org/fileadmin/user_upload/hiv_aids/Images/in_house_doc_covers/Recommended_resources/MSM_the_missing_piece_Aug_2007_.pdf. [Accessed 25 November 2009]
84. Asia Pacific Coalition on Male Sexual Health and UNAIDS, 2009 [Internet]. MSM country snapshots, released: 1 August 2009. http://www.msasia.org/news_article/items/msm_country_snapshots_released_for_15_asia_pacific_countries.html. [Accessed 13 November 2009]
85. Merson MH, O'Malley J, Serwadda D, Apisuk C. **The history and challenge of HIV prevention.** *Lancet* 2008; **372**:475–488.
86. Edwards M. **AIDS policy communities in Australia.** In: Aggleton P, Davies P, Hart G, editors. *AIDS activism and alliances* Melbourne: Taylor & Francis; 1997. pp. 41–58.
87. Dowsett GW. **Reaching men who have sex with men in Australia. An overview of AIDS education: community intervention and community attachment strategies.** *Aust J of Soc Issues* 1990; **25**:186–198.
88. Khan S. **Culture, sexualities and identities: men who have sex with men in south Asia.** In: Sullivan G, Jackson P, editors. *Gay and lesbian Asia: culture, identity, community* New York: The Haworth Press; 2001.
89. United Nations Office on Drugs and Crime (UNODC), Regional Centre for East Asia and the Pacific. *Patterns and trends of amphetamine-type stimulants (ATS) and other drugs of abuse in East Asia and the Pacific 2006.* Publication No. 2/2007. Bangkok: UNODC, 2007. <http://www.unodc.un.or.th/publications/patta.pdf>. [Accessed 17 June 2009]
90. Mansergh G, Purcell DW, Stall R, et al. **CDC consultation on methamphetamine use and sexual risk behavior for HIV/STD infection: summary and suggestions.** *Public Health Rep* 2006; **121**:127–132.
91. Kilmarx P, Supawitkul S, Wankrairoj M, et al. **Explosive spread and effective control of human immunodeficiency virus in northernmost Thailand: the epidemic in Chiang Rai province, 1988–99.** *AIDS* 2000; **14**:2731–2740.
92. Li A, Varangrat A, Wimonasate W, Chemnasiri T, Sinthuwattanawibool C, Phanuphak P, et al. **Sexual behaviors and risk factors for HIV infection among homosexual and bisexual men in Thailand.** *AIDS Behav* 2009; **13**:318–327.