

Brazilians alone are the third largest minority group (267, 500; 12.23%) after Chinese (680, 500; 31.13%) and Koreans (578, 500; 26.46%), but the occupational structure of Latin Americans differs from these groups. Latin Americans are overwhelmingly manual laborers in the manufacturing industry. In contrast, the occupations of other immigrant groups are more evenly spread between manual production workers, professional and technical, and personal services [15,16]. While in the early years of immigration Latin Americans were mostly temporary guest workers who intended to return home in a few years, more immigrants are settling in with their families [14].

Few prior studies have addressed the problems of healthcare access and uninsurance among foreign immigrants in Japan [17,18]. Findings from these studies are inconclusive because of the non-probabilistic nature of their sampling methods and the low response rates. Some authors speculate that uninsurance may be due in part to a reasoned decision by the immigrants themselves and also to a failure by many companies, especially labor contract companies, to provide insurance [14]. Our study was designed to assess the pattern of health insurance coverage and predictors of uninsurance among documented Latin Americans in Japan in a probability population sample.

## Methods

### Study setting

The study area, Nagahama City, lies on the eastern shore of Lake Biwa, the largest lake located close to the center of the Japan Peninsula. It extends 164.40 km<sup>2</sup>, divided into 298 townships with nearly 126,000 inhabitants [19]. This city hosts the largest number of Latin American immigrants in the west half of Japan because it is a major industrial center, where a number of automobile related companies employ foreign workers. In Nagahama City, nearly 2% of the population is Latin American [20], while they account for 0.3% of the total population in Japan [12].

### Survey instrument

We conducted a preliminary qualitative study in September of 2009. This initial step served several aims. It informed the development of an appropriate instrument for the quantitative survey and provided insight into recruitment issues [21,22]. Twenty Latin American immigrants (not included in the main survey) were recruited purposively in Nagahama and surrounding areas. After explaining the purpose of the study and obtaining individual consent we conducted semi-structured interviews, which lasted between 60 to 90 minutes, and upon completion provided a pre-paid monetary incentive (approximately 25.60 USD). Extensive notes were taken, as recording was not possible. Interviews focused on a range of topics including: current and past health insurance

coverage; barriers for enrollment and payment; health status and access to medical care; work and accidents or problems related to the workplace. We also explored opinions, reasons and circumstances in known cases of uninsurance or personal cases of uninsurance. These findings were used to draft our survey instrument. We developed new questions, modified others found in the literature review [17], and also created response choices for domains related to work, health insurance, and health background and access to healthcare. The instrument was then assessed for its reliability in a test retest design with one week interval in 15 respondents, who were living in Nagahama but were not included in the final survey. All continuous variables showed a high test-retest reproducibility with Pearson correlation coefficient ranging 0.68 - 1.00. In general, categorical variables showed good agreement [23], except for some variables with kappa coefficients less than 0.60 that were excluded from the questionnaire.

The final survey instrument consisted of five domains: sociodemographic characteristics (12 items), work related (9 items), health insurance (19 items), health background and access to healthcare (14 items), and knowledge and opinion towards HIV/AIDS and HIV testing (14 items). The questions of the last domain were taken from the widely used guidelines for Behavioral Surveillance Surveys (BSS) [24]. Results from this domain, however, were not included in this paper. The instrument was translated into Spanish and Brazilian Portuguese by a bilingual researcher (SPS) and pilot tested for face validity.

### Sampling frame and sample selection

The target population was documented residents of Nagahama City from any Spanish or Portuguese speaking country in Latin America, aged 18 or over. Tourists and those who had overstayed their visa were excluded. Since all foreigners legally staying in Japan are registered in the township where they live and these statistics are readily available by township, we decided to use this information to create clusters. First we selected townships with more than 5 registered foreigners as of August 2010 [25] and when necessary we grouped neighboring townships to create 28 clusters having at least 30 immigrants. Then, 400 samples were selected according to a two-stage cluster sampling procedure. In the first stage, 25 clusters were selected with probability proportional to estimated size (PPES) with replacement [26], while in the second stage, 16 participants were randomly selected from each selected cluster without replacement. No information about age or nationality of registered foreigners in each township was available, but we assumed that it highly correlated with that of adult Latin Americans and used it as an estimated cluster size because nearly 80% of the foreign population in Nagahama was either Brazilian or

Peruvian [27]. After mapping, this assumption was proven to be true because the correlation between the number of registered foreigners used as an estimated size of the clusters and the number of eligible Latin Americans identified in our field mapping in each township was very high ( $r = 0.98, P < 0.001$ ).

Since an accurate address was not available for the foreign residents, we had to map the selected clusters to create the sampling frame. To get an idea of their residence distribution, we first collected information through neighborhood associations, private day care centers with foreign children, Japanese language class groups, a Brazilian school, religious associations and several key informants, and then started household visits. During November 2010 through March 2011, we visited initial contacts, labor contract companies' housings, public housings, and interviewed local inhabitants to confirm the presence of Latin American immigrants and collected basic information (gender, nationality, adult/minor and address). When necessary we visited the same dwellings several times, until we reached information saturation. During the mapping we collected information, directly or indirectly, on 1502 foreigners including nationalities other than Latin American such as Chinese, Korean, Philippine, Vietnamese, American, and Australian. Of these, 1052 Latin Americans were identified to be eligible and coded to generate an anonymous list as a frame for random sampling (Figure 1).

#### Data Collection

The survey was conducted from March through May 2011. Data were collected through face-to-face interviews using a structured questionnaire. The interview was carried out by the lead author (SPS) and the fieldwork team in either Spanish or Brazilian Portuguese and took an average of 15 to 20 minutes to complete. Respondents who were not at home were visited up to 5 times on different hours and days of the week. All interviewers were trained on how to conduct the structured interview, informed of the study purpose, and closely supervised in the field. Interviews were conducted at a place designated by the participants. Before each interview the interviewer explained the purpose of the study, content of the questionnaire, and assured anonymity as well as confidentiality to each participant.

We considered Latin Americans to be those who were born and/or self identified as foreigners coming from Mexico, Central America (except Belize), Cuba, Dominican Republic, and South America (except Suriname, Guyana and French Guiana). Immigration status was addressed by asking the respondents what type of visa they had and if their visa was currently valid. Respondents were classified as uninsured if they reported not having any health insurance at the time of the interview, irrespective if they were the primary holder or dependant. Also, we asked if they knew about the mandatory nature of health insurance in Japan as it may not be the case in their countries of origin

#### Analysis

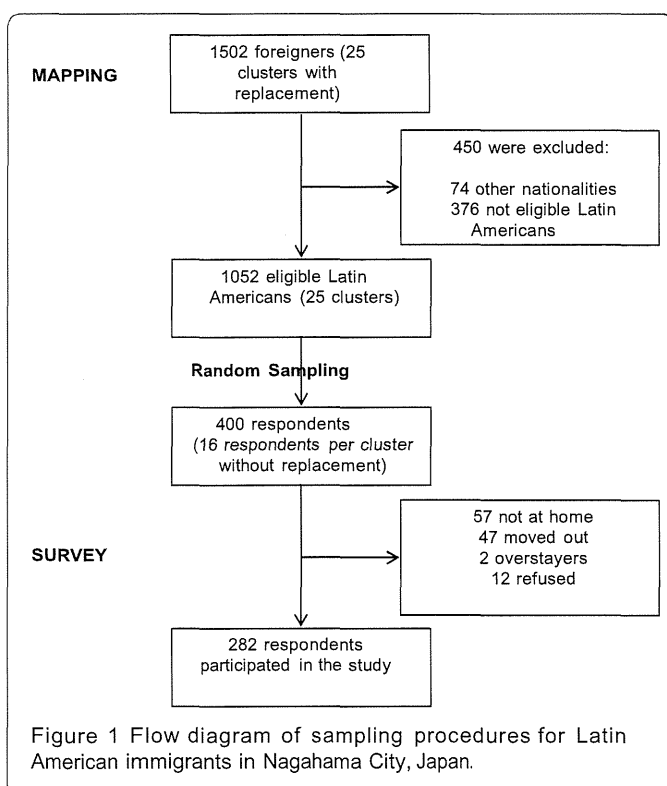
Statistical analyses were performed using the Complex Samples module of SPSS version 17.0, a statistical analysis program that accounts for clustering and multiple stages of sampling [28]. All analyses incorporated appropriate standardized sample weights to adjust for nonresponse. Univariate analysis was used to describe the population and bivariate analysis to determine associations between uninsurance and other variables. Finally, factors significantly associated ( $p < 0.05$ ) with being uninsured in the bivariate analyses were compulsorily entered into a multivariate logistic regression model to calculate adjusted odds ratios (AORs) to assess the magnitude of independent association of these predictors with uninsurance.

#### Ethical issues

The study protocol was reviewed and approved by the Kyoto University Graduate School and Faculty of Medicine Ethics Committee. Verbal informed consent was obtained from all participants.

#### Results

Of the 400 Latin American immigrants who were selected for the study, 57 (14.3%) were not at home, 47 (11.8%) had moved out, 2 (0.5%) were excluded from our study



because they overstayed their visas and 12 refused to participate. Overall, 282 participants were included in our study (response rate 70.5%). All results that follow reflect weighted data. Table 1 displays the detailed characteristics of respondents. They consisted of slightly more women (51.5%), mostly from Brazil (69.9%), under 40 years of age (64.5%), married (70.4%), with children (75.4%), and reported 11.68 (SE 0.17; median, 12.00) years of formal education. Despite living 9.45 (SE 0.44; median, 8.00) years in Japan and 6.08 (SE 0.47; median, 5.00) years in Nagahama, only 29.2% reported having intentions to stay permanently in Japan (for more information see Additional file 1: Table S1.pdf)

The prevalence of health uninsurance was 19.8%. Those uninsured were more likely to be men ( $P = 0.006$ ), have no children ( $P = 0.045$ ), have less years of formal education ( $P = 0.013$ ), do not know that health insurance was mandatory in Japan ( $P < 0.001$ ), not have visited a doctor in the last 12 months ( $P < 0.001$ ), not have a chronic disease for which they need to visit the doctor's office regularly ( $P = 0.016$ ), have less years employed by the current employer ( $P = 0.001$ ) and ever had a serious accident at work that forced them to see a doctor ( $P = 0.020$ ).

The majority of respondents (73.3%) were employed through a labor contract company, but it was not associated with the insurance status. Those employed full time worked 9.86 (SE 0.18; median, 10.00) hours per day and 5.37 (SE 0.04; median, 5.00) days per week. On average, immigrants had been working for their current employers for much longer periods of time compared to the term of their contracts. Those working full time reported a term contract of 5.97 (SE 0.45; median, 6.00) months, but 3.23 (SE 0.35; median, 2.00) years working for the same employer. Shortest term of contract was 1-2 months and only observed among full time workers (data not shown in the tables). Sources of health insurance coverage were diverse but mostly from the National Health Insurance (NHI), irrespective of whether they were employed or not (Table 2). We also found that 6.0% of the insured had a health insurance provided by their labor contract company.

Most uninsured respondents (68.3%) reported having ever had health insurance at some point in Japan, 64.6% had NHI and 47.4% had Employees' Health Insurance (EHI). However, only 37.1% think they will enroll in a health insurance plan in the next 6 months (data not shown in the tables). The reasons reported as the most important for lacking health insurance coverage are displayed in Table 3. Most respondents cited financial trade-offs as reasons for uninsurance. Many considered the health insurance too expensive (24.0%). In 12.2% of the cases, the respondents stated that the back payments for the time spent without being enrolled is too expensive

and in 10.9% respondents said they would be leaving Japan soon. Employer's refusal of EHI was reported by only 2.0%.

Regarding the correlates of uninsurance (Table 4), multiple logistic regression analysis showed that not having a chronic disease was the strongest predictor of uninsurance (AOR = 12.10). Also, those who do not know that health insurance is mandatory in Japan (AOR = 6.36), have one or no children (AOR = 2.58, 5.23), or have less education (AOR = 3.72) were significantly more likely to be uninsured.

## Discussion

To our knowledge, this is the first study using rigorous methodology that demonstrates the pattern of health insurance coverage and the predictors of uninsurance among documented Latin American immigrants in Japan. We found that documented Latin American immigrants in Japan are uninsured at rates that are much higher than has been estimated in the general population (1.3%) [1], we found that almost 20% of the documented Latin American immigrants over 18 years of age lacked health insurance.

Among the immigrants themselves, the most common reason for uninsurance was considering the premiums too expensive. For workers who had not paid into the NHI for many years, back payments of premiums for the time they had lived in Japan without enrolling (up to a maximum of 2 years) to join/rejoin the NHI was also considered to be prohibitively expensive by many of the respondents. Low perceived medical needs and the expectation of a short-term stay in Japan were also among major reasons; these may reflect financial trade-offs. Some of the correlates of uninsurance from multivariate analysis are supportive in this respect since factors related to lower perceived medical needs such as not having or having fewer children, and not having a chronic disease were all strong predictors of uninsurance. Unwillingness of some immigrants to enroll in medical insurance is clearly represented by the fact that only one third of uninsured reported that they will enroll in a health insurance plan in the next 6 months.

In addition, we found that the majority of insured full time employees are covered by the National Health Insurance (NHI) rather than the Employees' Health Insurance (EHI). According to Japan's Health Insurance Act, employers are obligated to enroll their employees and their dependants in the EHI (except those employed 2 months or less, who work less than three quarters of the hours that full time employees work, and those aged 75 years or older) [29]. All those not eligible for EHI such as the self employed, unemployed, and retired younger than 75 years are covered by the NHI; and people aged 75 years and above are covered by the Late Elders' Health Insurance [30,31]. Health insurance coverage patterns

Table 1 Sociodemographic, medical background and work related characteristics of documented Latin American immigrants in Nagahama City, Japan by health insurance status

	Total (n = 282)		Uninsured (n = 56)		Insured (n = 226)		P value
	n	% <sup>a</sup>	n	% <sup>a</sup>	n	% <sup>a</sup>	
<b>Sociodemographic</b>							
<b>Gender</b>							
Men	137	48.5	37	66.1	100	44.1	0.006
Women	145	51.5	19	33.9	126	55.9	
<b>Country of origin</b>							
Brazil	197	69.9	41	73.1	156	69.2	0.073
Peru	46	16.4	4	6.5	43	18.8	
Bolivia	25	8.9	10	18.2	15	6.6	
Others	14	4.8	1	2.2	12	5.4	
<b>Age</b>							
18 - 29	91	32.1	22	39.2	69	30.3	0.102
30 - 39	91	32.4	15	26.2	77	34.0	
40 - 49	55	19.4	16	28.1	39	17.3	
50 or more	45	16.0	4	6.5	42	18.4	
<b>Marriage and live-in partnerships</b>							
Married (living with spouse)	178	63.1	27	49.2	150	66.5	0.132
Married (not living with spouse or other partner)	20	7.3	3	6.0	17	7.6	
Not married (living with partner)	23	8.0	6	10.7	17	7.3	
Not married (not living with partner)	61	21.7	19	34.0	42	18.7	
<b>Number of children</b>							
0	69	24.6	26	45.8	44	19.3	0.045
1	80	28.5	16	28.0	65	28.6	
2	87	30.9	10	17.5	77	34.2	
3 or more	45	16.0	5	8.7	40	17.8	
<b>Years of education</b>							
1 - 8	41	14.5	16	29.1	25	10.9	0.013
9 -12	157	55.6	31	56.2	125	55.4	
13 -16	84	29.9	8	14.7	76	33.7	
<b>Knowledge about mandatory nature of health insurance in Japan</b>							
No	55	19.6	24	43.2	31	13.8	< 0.001
Yes	227	80.4	32	56.8	195	86.2	
<b>Medical background</b>							
<b>Visited a doctor in the last 12 months in Japan<sup>b</sup></b>							
No/Have never visited a doctor in Japan	86	30.9	34	60.5	53	23.5	< 0.001
Yes	194	69.1	22	39.5	172	76.5	
<b>Chronic disease<sup>b</sup></b>							
No	238	84.9	54	96.6	184	82.0	0.016
Yes	42	15.1	2	3.4	40	18.0	
<b>Work related</b>							
<b>Working condition</b>							
Full time	209	74.1	43	76.5	166	73.4	0.447
Part time	16	5.7	1	1.8	15	6.7	
Self employed	3	1.1	0	0.0	3	1.4	
Unemployed	53	18.6	12	21.6	40	17.9	
Retired	1	0.5	0	0.0	1	0.6	
<b>Employed through labor contract company<sup>c</sup></b>							
No	58	25.7	11	24.8	47	27.1	0.852
Yes	167	74.3	33	75.2	134	72.9	



Table 1 Sociodemographic, medical background and work related characteristics of documented Latin American immigrants in Nagahama City, Japan by health insurance status (Continued)

Years employed by the current employer <sup>c</sup>							
0 - 2	131	58.1	34	77.2	97	53.5	0.001
3 or more	94	41.9	10	22.8	84	46.5	
Term of contract with employer (months) <sup>b, c</sup>							
1 - 2	25	11.1	8	18.5	17	9.3	0.393
3 - 6	73	32.7	12	28.4	61	33.8	
7 - 24	28	12.3	4	9.5	23	13.0	
Indefinite	44	19.4	6	13.1	38	21.0	
No written contract	55	24.4	13	30.5	41	23.0	
Ever had a serious accident at work that forced you to see a doctor <sup>b</sup>							
No	247	88.2	44	78.7	203	90.6	0.020
Yes	33	11.8	12	21.3	21	9.4	

Note 1: Totals may differ from the sum of categories due to rounding, unless specified

Note 2: Percentages are calculated based on the exact estimated standardized weighted counts n, rounded estimated standardized weighted count

<sup>a</sup>, total percentage may differ from 100% due to rounding

<sup>b</sup>, total for the category may be less than the total n due to nonresponse

<sup>c</sup>, among the total full time and part time working population (n = 225)

revealed in our participants clearly deviate from the pattern required by the law. This could be discussed from two point of views.

First, immigrants' financial trade-offs may be responsible for the disproportionately low EHI coverage among employed immigrants as workers may select the NHI rather than the EHI; the latter mandatorily includes a pension premium, a preference that has been reported by other authors [14,32,33]. To receive a Japanese pension it is necessary to have paid into the system for 25 years and those who contributed fewer years than the stipulated, receive a maximum refund of only up to 3 years. Considering the fact that the majority of immigrants do not have intentions to stay permanently in Japan (in spite of the fact that most stay for many years), they may not have a strong incentive to enroll in the EHI.

Second, companies may be in part responsible for this inadequate and unusual coverage pattern. While the total

employment period was about 3 years, the average contract period of full time workers was only 6 months. Furthermore, a high percentage of immigrants were working without a written contract. These mechanisms may allow the employer to avoid the obligation of providing EHI, and thus sparing half of the premium for the health insurance and the pension that is coupled with the EHI. Not providing EHI to full time employees who work longer than 2 months is illegal. This situation should be explored in further studies.

The high uninsurance rate among Latin American legal immigrants in Japan is troubling because it could have serious economic and health implications not only for workers themselves but also for their families. Immigrant workers have higher risks of occupational accidents and disability than native workers [34]. In our study uninsured respondents were even more likely to have had a serious accident at work than those insured. Occupational

Table 2 Sources of health insurance by working condition among employed documented Latin American immigrants in Nagahama City, Japan

	National Health Insurance (NHI) (n = 139) %	Employee's Health Insurance (EHI) (n = 70) %	Labor contract company health insurance (n = 14) %	Other public source (n = 3) %	P value
Employed full time	55.5	35.9	8.1	0.5	0.007
Employed part time	72.7	27.3	0.0	0.0	
Unemployed	85.3	11.2	0.0	3.5	
Self employed/ Retired	44.3	33.3	0.0	22.4	
Total	61.7	30.8	6.0	1.4	

n, rounded estimated standardized weighted count

Table 3 Most important reason for lack of health insurance among uninsured documented Latin Americans in Nagahama City, Japan

Reason	(n = 56)	%
It's too expensive		24.0
I have too many years without insurance, it's too expensive to enroll now		12.2
I will be leaving Japan soon		10.9
I don't get sick so frequently		9.8
I have to save/send money		8.8
I don't have enough money to pay the health insurance		6.9
I or my spouse lost the job		6.1
Don't understand the Japanese insurance system		6.0
I changed employer		4.6
It's cheaper if I pay the medical expenses		4.0
In transition from another city		2.2
My employer refuses to enroll me in the Employees' Health Insurance (EHI)		2.0
Never thought about health insurance		1.3
If I get seriously sick/injured, I will return to my country		1.2

n, rounded estimated standardized weighted count

Table 4 Correlates of uninsurance by multiple logistic regression analysis among documented Latin American immigrants in Nagahama City, Japan

	%	AOR	95% CI	P value
Sociodemographic				
Gender				
Men	55.6	2.63	(0.68 - 10.12)	0.147
Women	44.4	1.00		
Country of origin				
Bolivia	6.3	2.75	(0.47 - 16.16)	0.214
Others	19.9	0.25	(0.03 - 1.80)	
Brazil	73.8	1.00		
Number of children				
0	26.9	5.23	(2.132 - 12.89)	0.001
1	29.6	2.58	(0.50 - 13.21)	
2 or more	43.5	1.00		
Years of education				
1 - 8	14.1	3.72	(1.14 - 12.15)	0.032
9 or more	85.9	1.00		
Knowledge about mandatory nature of health insurance in Japan				
No	19.8	6.36	(1.34 - 30.25)	0.023
Yes	80.2	1.00		
Medical background				
Visit a doctor in Japan in the last 12 months				
No/Have never visited a doctor in Japan	31.3	2.72	(0.98 - 7.59)	0.055
Yes	68.7	1.00		
Chronic disease				
No	86.0	12.10	(1.56 - 94.09)	0.020
Yes	14.0	1.00		
Work related				
Years employed by current employer				
0 - 2	58.1	1.58	(0.43 - 5.85)	0.464

Table 4 Correlates of uninsurance by multiple logistic regression analysis among documented Latin American immigrants in Nagahama City, Japan (Continued)

3 or more	41.9	1.00		
Ever had a serious accident at work that forced to see a doctor				
Yes	10.7	1.93	(0.68 - 5.47)	0.196
No	89.3	1.00		

AOR, Adjusted odds ratio

CI, Confidence interval

accidents may have resulted in financial burden which in turn lead to the choice of uninsurance, or employers may have been responsible for both, not providing working safety and health insurance. Whichever the case, outreach programs to persuade the immigrant workers about the importance of health insurance could be promoted through multiple partnerships among peer workers, Japanese care providers, researchers, and community leaders to help them adapt to a new health culture, and increase awareness about health. Such outreach has been used successfully to increase access to healthcare and health information in a culturally sensitive way in other countries [35-37]. Also, audit and legal enforcement on employers should be enhanced so that their employees are adequately insured.

To encourage immigrant employees to enroll in the EHI, policymakers in Japan should consider decoupling the pension premium from the health insurance premium. This would allow them to enroll in health insurance with a lower premium than the NHI. Alternatively, consideration could be given to promote a bilateral social security agreement between Japan and the country of origin of the immigrants to make the pension contributions effective in either country. Brazil is currently the only Latin American country to have recently signed an international social security agreement with Japan, though it is still awaiting implementation [38]. Of course, strict enforcement of the law is necessary to not allow the companies, especially labor contract companies through which the majority of immigrant workers are employed, escape the responsibility to cover their employees by the EHI. Foreign immigrant workers are placed into an unfair situation where the companies that indirectly employ immigrant workers through labor contract companies place responsibility on the labor contract companies, while labor contract companies may try to evade their responsibility to provide health insurance for their employees.

Finally, it should be noted that we found that some labor contract companies provided to their employees private health insurance plans. These programs should be closely monitored as they may allow companies to avoid their share of the premiums for the EHI and pension. Furthermore, health insurance provided by

labor contract companies are not connected to the public health insurance system, thus immigrants may face back payments of premiums when they change employer and wish to join public health insurance programs.

Our findings should be interpreted in the context of their limitations. First, we need to consider the non coverage error [39] that may have arisen from the failure to include some immigrants from the selected clusters into the sampling framework during the mapping stage. Thus, the prevalence of uninsurance we found could in fact underestimate or overestimate the real value. Second, our findings may not be generalizable to other immigrant groups in Japan. However, we believe that our results shed light on the important fact that even in developed countries with universal health coverage, certain minority groups might be left out. Countries trying to achieve universal health coverage need to consider the vulnerability of these populations when planning and implementing reforms. Finally, as with any self reported data, the potential for reporting bias should be considered, as we were unable to verify their health insurance coverage or their legal status through other sources.

## Conclusions

We found that among our sample of legal Latin American immigrants in Japan, the proportion of people without health insurance was disproportionately high compared to the estimated national proportion. In addition, the coverage of employees by the EHI was disproportionately low. Appropriate measures should be taken to facilitate access to health insurance for this vulnerable population.

## Additional material

Additional file 1: Table S1. Additional information of documented Latin American immigrants in Nagahama City, Japan by health insurance status.

## Abbreviations

NHI: National Health Insurance; EHI: Employees' Health Insurance.

#### Acknowledgements

The authors are grateful to all the study participants and key informants who helped throughout the study. We also thank the officials in Nagahama City Hall for their cooperation. We gratefully acknowledge Giancarlo Flores, Satoshi Nakase, Haruka Iwamura, Etsuko Imamura, and Carlos Nomura for their valuable collaboration during the fieldwork. This research was supported by the Department of Global Health and Socio epidemiology at the Kyoto University School of Public Health, Japan. Dr. Feldman was supported in part by a Fulbright Research Fellowship.

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#### Authors' contributions

All authors conceived and contributed to the study design. SPS conducted the fieldwork and MK supervised the data collection. SPS and MK carried out data analyses. SPS, MDF, and MK interpreted the data. SPS, MDF and MK drafted and revised the manuscript. MOK participated in the revision of the manuscript. All authors read and approved the final manuscript.

#### Competing interests

The authors declare that they have no competing interests.

Received: 25 November 2011 Accepted: 25 March 2012

Published: 25 March 2012

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#### Pre-publication history

The pre-publication history for this paper can be accessed here:  
http://www.biomedcentral.com/1471-2458/12/238/prepub

doi:10.1186/1471-2458-12-238

Cite this article as: Suguimoto et al.: Latin American immigrants have limited access to health insurance in Japan: a cross sectional study. *BMC Public Health* 2012 12:238.

**Table A1. Additional information of documented Latin American immigrants in Nagahama City, Japan by health insurance status.**

	Total (n=282)		Uninsured (n=56)		Insured (n=226)		P value
	n	% <sup>a</sup>	n	% <sup>a</sup>	n	% <sup>a</sup>	
<b>Sociodemographic</b>							
Type of visa <sup>b</sup>							
Long term resident	156	55.6	38	68.4	118	52.5	0.416
Permanent resident	94	33.4	15	26.3	79	35.1	
Other	31	11.0	3	5.3	28	12.4	
Years living in:							
Japan <sup>b</sup>							
Under 5	51	18.2	12	21.7	39	17.4	0.478
5 - 9	104	37.2	25	44.5	80	35.4	
10 or more	125	44.6	19	33.8	106	47.3	
Nagahama City							
Under 5	128	45.3	34	61.1	93	41.4	0.169
5 - 9	85	30.3	13	23.2	72	32.0	
10 or more	69	24.4	9	15.7	60	26.6	
<b>Intention to stay permanently in Japan?</b>							
No / don't know	199	70.8	39	69.4	161	71.1	0.846
Yes	82	29.2	17	30.6	65	28.9	
<b>Medical background</b>							
Health insurance in the home country							
No	132	46.8	28	49.9	104	46.0	0.623
Yes	150	53.2	28	50.1	122	54.0	
Ever been hospitalized in Japan <sup>b</sup>							
No	190	67.7	45	79.9	145	64.7	0.116
Yes	90	32.3	11	20.1	79	35.3	
Ever felt so sick that needed to take days off from work <sup>b</sup>							
No	147	52.3	28	49.3	119	53.1	0.693
Yes	134	47.7	28	50.7	105	46.9	
Family or friends ever been hospitalized in Japan <sup>b</sup>							
No	138	49.2	28	49.5	110	49.1	0.966
Yes	142	50.8	28	50.5	114	50.9	

Note 1: Totals may differ from the sum of categories due to rounding, unless specified

Note 2: Percentages are calculated based on the exact estimated standardized weighted counts  
n, rounded estimated standardized weighted count

<sup>a</sup>, total percentage may differ from 100% due to rounding

<sup>b</sup>, total for the category may be less than the total n due to nonresponse



## Changing Patterns of HIV Epidemic in 30 Years in East Asia

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Published online: 25 March 2014

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**Abstract** The HIV epidemic in East Asia started relatively late compared to the rest of the world. All countries or areas, except for North Korea, had reported HIV and AIDS cases, with China being the major contributor to the epidemic. Though initially driven by injecting drug use in China, East Asia did not experience an explosive spread. Strong commitment in China and early harm reduction programs in Taiwan managed to reduce transmission substantially among injecting drug users. In contrast to China and Taiwan, injection drug use has accounted just a little, if not at all, for the spread of HIV in other East Asian countries. However, following a global trend, sexual contact has become a major route of infection across the region. While much progress has been achieved in this region, with the epidemic among other key populations relatively stable, the emerging epidemic through sex between men is a growing concern. Recent estimates suggest that HIV prevalence among men who have sex with men (MSM) has reached 6.3 % in China, 7.5 % in Mongolia, and ranges

between 8.1 %-10.7 % in Taiwan and between 2.7 %- 6.5 % in South Korea. In Japan, 74 % of male HIV cases were among MSM in 2012, while Hong Kong has witnessed a sharp increase of HIV cases among MSM since 2004. There is urgent need to address issues of discrimination and stigma toward homosexuality, and to strengthen the strategies to reach and care for this population.

**Keywords** East Asia · Japan · China · Taiwan · Hong Kong · South Korea · Mongolia · HIV · AIDS · HIV testing · MSM · Epidemiology · Global epidemic

### Introduction

Despite the tremendous progress in the global response to the HIV epidemic, we have not yet been able to fully control the spread of HIV infection [1]. Since the start of the epidemic over 30 years ago, around 75 million have become infected with HIV and nearly 36 million have died of AIDS. The HIV epidemic has become one of the greatest pandemics in modern times with disastrous socioeconomic and demographic consequences [2]. The unprecedented scale of multisectoral approach and coordinated global efforts to respond to this epidemic can serve as a model of response to other global health threats such as chronic diseases [2].

HIV was introduced much later in East Asia than in the rest of the world, but the pattern of spread differed from that described in other regions [3]. According to the latest UNAIDS estimates, there were 35.3 million people worldwide living with HIV infection in 2012, of whom 880,000 resided in East Asia [1]. Unlike the global downward trend, the number of estimated newly infections among all ages and among children increased 19 % and 50 %, respectively, in East Asia since 2001. Similarly, the estimated number of AIDS-related deaths increased from 18,000 in 2001 to 41,000 in

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2012. The estimated HIV prevalence in East Asia is still low (0.1 %) compared to other regions, notably sub-Saharan Africa (4.7 %), North America (0.5 %), or neighboring countries in South and Southeast Asia (0.3 %) [1]. However, given the large population in China (1.3 billion, 2012) [4], even low prevalence translates into large numbers of people affected. Since China is the hardest hit in this region, not surprisingly the HIV epidemic of other countries or areas in East Asia is usually overlooked when referring to Asia at large. Therefore, we would like to describe the trends or patterns of the HIV epidemics over the last 30 years in People's Republic of China (China), Taiwan, Japan, Republic of Korea (South Korea), Hong Kong, and Mongolia.

## China

China is by far the largest country in East Asia and most populous in the world [4]. Although the national estimated prevalence of HIV infection remains low at 0.058 % [5], China alone accounts for 89 % of the estimated people living with HIV (PLHIV) in East Asia [1]. It was estimated that by the end of 2011 there were 780,000 PLHIV, of whom 154,000 were living with AIDS. Although, the annual incidence of HIV infection has remained stable at a low level in recent years, the patterns of transmission have evolved over time [5, 6••]. HIV prevalence varies greatly among different sub-populations and shows clear regional disparities [6••]; six out of 31 provinces reported 75.8 % of the cumulative national total of HIV/AIDS cases [5].

China's HIV epidemic began in rural areas and then spread to urban areas. The first case of AIDS was reported in 1985 in a tourist from the United States [7]. The following years other isolated cases were reported in foreigners and Chinese traveling overseas and hemophiliac patients infected through imported contaminated blood products [8]. The first outbreak of HIV infection, however, was reported in 1989 among injecting drug users (IDUs) in Yunnan Province close to the so-called "Golden Triangle", an opium producing area of South East Asia. From there, HIV spread steadily along major drug trafficking routes and from IDUs into the general population through sexual contact [9]. As it rapidly spread among injecting drug users (IDUs), HIV also spread among female sex workers (FSWs). Subsequent sexual transmission to their male clients and other sexual partners led to further spread of HIV.

Around the mid-1990s a second major outbreak of HIV infection occurred among commercial blood/plasma donors in rural communities in the east-central provinces due to unhygienic practices [10, 11]. As soon as the problem became apparent in the early 2000s, the Chinese government took strong action to prevent further spread closing blood collection stations, issuing new regulations, conducting mass HIV screenings, and providing free treatment (National Free Antiretroviral Treatment Program) [12]. There are no accurate data

reported on the number of people infected, but in 2005 the Ministry of Health and UNAIDS/WHO estimated it to be 55,000 [13, 14]. Former commercial blood/plasma donors were primarily poor farmers with almost no IDU or commercial sex work in their communities. A recent study revealed that the HIV epidemic in former plasma donors was not widespread but rather centered in Henan Province and surrounded provinces [11]. By 2004, 43 % of the cumulative reported HIV cases were IDUs and 26.8 % former commercial plasma donors [15].

As the HIV epidemic among IDUs has fallen (less so in China's southwest region), HIV incidence has stabilized since 2005 [6••] probably because of significant progress toward implementing and enhancing harm-reduction programs countrywide [6••, 16]. The proportion of newly reported HIV cases who acquired the infection through IDU has decreased from 34.1 % in 2006 to 16.9 % in 2011 (Table 2) [17]. In contrast, the proportion of new HIV cases resulting from sexual transmission increased from 33.1 % in 2006 to 76.3 % in 2011, during which time cases of MSM increased from 2.5 % to 13.7 % [17]. The HIV epidemic is rapidly expanding among MSM (Fig. 1). A national epidemiological survey including over 47,000 MSM was conducted between 2008 and 2009 in 61 major cities of China [18••]. This survey reported an overall HIV prevalence of 4.9 %, with the highest HIV prevalence of 13.2 % in the southwest region. More recent estimates suggest that HIV prevalence among MSM has reached 6.3 % in 2012, up from 5.7 % in 2010 and 2 % in 2007 [17, 19]. HIV incidence among MSM has tripled from 0.39 in 2000 to 0.98 per 100 person-years in 2010 nationwide, especially rapidly in large cities such as Shanghai, Beijing, Tianjin, Chongqing, and Chengdu [6••]. In addition, previous studies have reported high prevalence of syphilis among MSM, ranging from 9.5 % to 17.5 % [18••, 20, 21], inconsistent condom use with male partners, multiple sexual partnerships including bisexual behaviors, low testing rates, and prevalent stigma and discrimination [18••, 20, 22, 23, 24•]. These data suggest the increasing potential of HIV infection spreading into the broader population [6••].

Despite increasing heterosexual HIV transmission in China, the national HIV prevalence among FSWs has decreased from 0.46 % in 2000 to 0.26 % in 2011 [6••, 19], remaining low except for southwest China where it was 1.57 % in 2010 [6••]. Similarly, HIV prevalence among sexually transmitted infection (STI) clinic attendees and pregnant women have been maintained at a low level [5]. Recent studies suggest that non-commercial heterosexual contact in the general population may play an important role [25, 26]. The prevalence of multiple sexual partnerships among adult women increased from 8.1 % in 2000 to 29.6 % in 2006 [26]. Other factors that may contribute to further expansion are the high prevalence of syphilis among different populations, characteristics of commercial sex work (e.g., migrants, highly mobile, engaged for



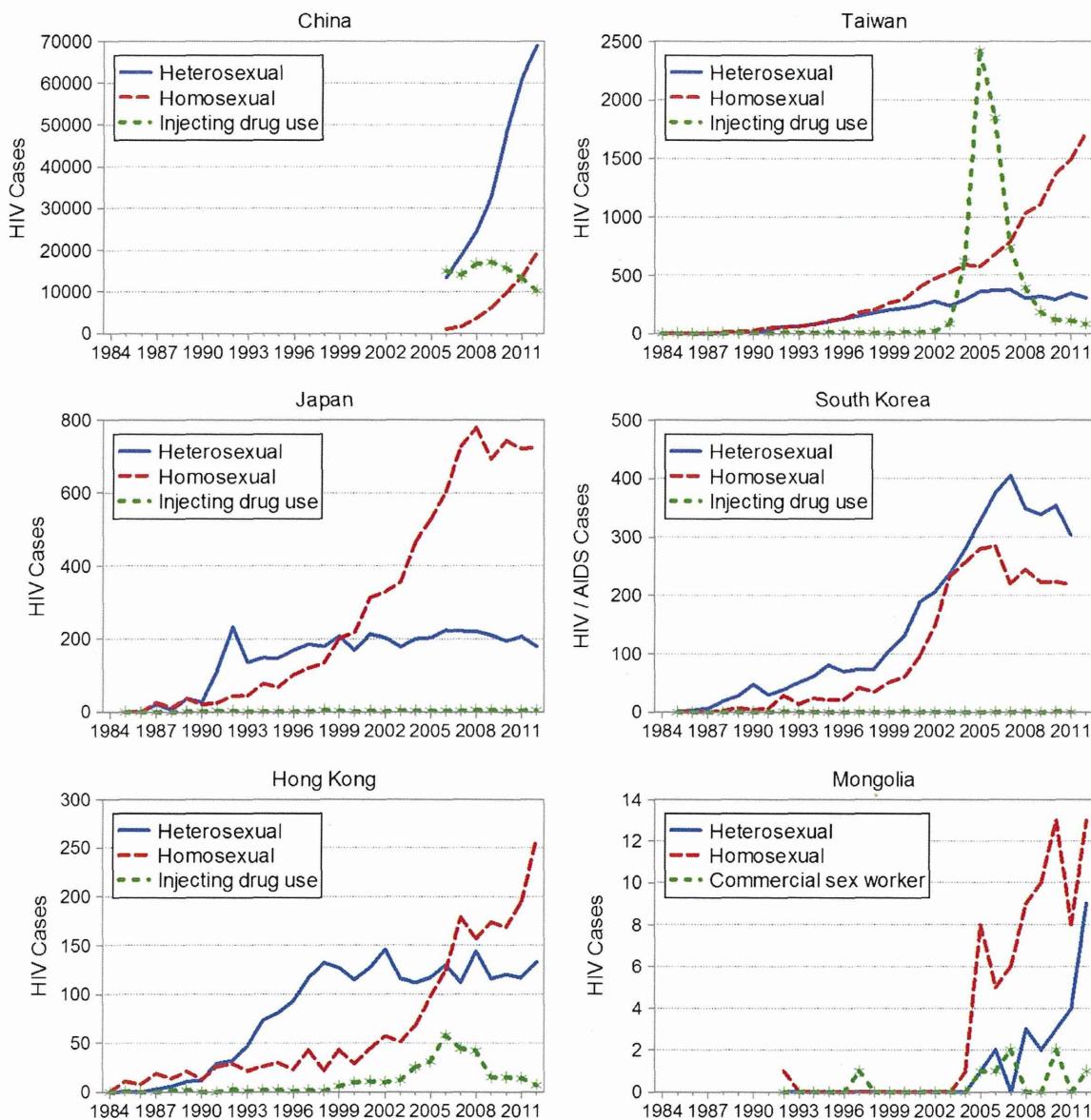


Fig. 1 Changing trend of the annual number of HIV cases by main routes of transmission in China<sup>1</sup>, Taiwan, Japan, South Korea<sup>2</sup>, Hong Kong and Mongolia (1984–2012) <sup>1</sup>Annual number of HIV cases for 1984 to 2005 were not available <sup>2</sup>Data for 2012 could not be included

short time), and low condom use [27, 28]. Moreover, in provinces with high HIV prevalence among IDUs HIV prevalence is also high among FSWs and MSM, suggesting interactions between these groups [6••].

Since the beginning of the twenty-first century China has taken bold steps to control the HIV epidemic and has made great progress [29]. However, many challenges still remain particularly addressing the needs of Chinese MSM [6••, 29, 30].

#### Taiwan

The first AIDS case in Taiwan was identified in 1984 in an American in transit [31]. In the 1980s, similar to what happened in Japan and Hong Kong but on a smaller scale, at least

53 Taiwanese hemophiliacs were infected with HIV through contaminated blood products from the United States, 37 of them had died [31–34]. The government banned the use of unheated blood products in 1985 and no more HIV cases among hemophiliacs have been reported since 1997 [35]. By 2012, a total of 25,081 people had been reported as infected with HIV (24,239 Taiwanese and 842 foreigners), of whom 9828 had developed AIDS (9725 Taiwanese and 103 foreigners) (Table 1) [36]. Of Taiwanese nationals infected with HIV in 2012, the male-to-female ratio was 30:1 [37]. Despite international growing advocacy to remove “HIV-related restrictions on entry, stay and residency” for PLHIV, Taiwan still keeps its policy to deport foreigners on the grounds of HIV status [38].



Table 1 Annual reported number of HIV and AIDS cases in China, Taiwan, Japan, South Korea, Hong Kong, and Mongolia (1984 - 2012)

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	
<b>HIV</b>																
China	-	5	1	9	7	171	299	216	261	274	531	1567	2649	3343	3306	
Taiwan	9	14	9	12	21	37	31	78	123	132	160	221	267	341	388	
Japan <sup>3</sup>	-	0	0	55	23	80	66	200	442	277	298	277	376	397	422	
South Korea <sup>4</sup>	-	1	3	9	22	37	52	46	81	69	89	108	104	125	129	
Hong Kong <sup>5</sup>	7	46	20	33	28	38	34	60	71	79	104	122	134	181	189	
Mongolia <sup>6</sup>	-	-	-	-	-	-	-	-	1	0	0	0	0	1	0	
<b>AIDS</b>																
China <sup>1</sup>	-	1	0	2	0	0	2	3	5	23	29	52	38	126	136	
Taiwan <sup>2</sup>	0	0	1	1	2	8	5	13	23	35	64	97	156	136	153	
Japan	-	6	5	14	14	21	31	38	51	86	136	169	234	250	231	
South Korea <sup>4</sup>																
Hong Kong <sup>5</sup>	0	3	0	6	7	17	13	14	14	19	37	44	71	64	63	
Mongolia <sup>6</sup>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	1999	2000	2001	2002	2003		2004	2005	2006	2007	2008	2009	2010	2011	2012	Cumulative
<b>HIV</b>																
China	4677	5201	8219	9732	21,691	47,606	40,711	44,070	48,161	60,081	68,249	82,437	92,940	101,328	647,742	
Taiwan	471	527	652	767	860	1520	3380	2918	1930	1740	1643	1796	1968	2224	24,239	
Japan <sup>3</sup>	530	462	621	614	640	780	832	952	1082	1126	1021	1075	1056	1002	14,706	
South Korea <sup>4</sup>	186	219	327	397	533	610	680	749	740	797	768	773	888	868	9410	
Hong Kong <sup>5</sup>	213	183	213	260	229	268	313	373	414	435	396	389	438	513	5783	
Mongolia <sup>6</sup>	0	0	0	0	0	1	10	8	8	13	12	18	12	23	107	
<b>AIDS</b>																
China <sup>1</sup>	230	233	714	1028	6120	12,652	7550	7909	10,742	14,509	20,056	34,188	39,183	41,929	197,460	
Taiwan <sup>2</sup>	181	180	167	181	235	264	588	787	1070	894	1007	1101	1096	1280	9725	
Japan	301	329	332	308	336	385	367	406	418	431	431	469	473	447	6719	
South Korea <sup>4</sup>																
Hong Kong <sup>5</sup>	61	67	60	53	56	49	64	73	79	96	76	79	82	86	1353	
Mongolia <sup>6</sup>	-	-	1	0	1	0	0	1	3	0	1	3	5	4	19	

<sup>1</sup> The number of AIDS cases includes individuals newly diagnosed with AIDS and individuals previously reported as HIV cases that progressed to AIDS

<sup>2</sup> The number of newly reported AIDS cases may include HIV cases reported in previous years. Taiwanese cases only

<sup>3</sup> Cases of HIV infection through contaminated imported blood products are excluded from official statistics in Japan (1439 people by 2012). All nationalities

<sup>4</sup> Official statistics do not distinguish AIDS cases and HIV cases. South Korean cases only

<sup>5</sup> All nationalities

<sup>6</sup> Mongolian cases only

Sources:

UNAIDS China (personal communication)

Centers for Disease Control Taiwan

National Institute of Infectious Diseases (Japan)

Korea Centers for Disease Control and Prevention

Hong Kong Special Administrative Region Government (GovHK)

UNAIDS Mongolia (personal communication)

The HIV epidemic in Taiwan is concentrated in high-risk populations. HIV prevalence among drug users was estimated to be 6.9 %; much higher among IDUs compared to non-IDUs (25.5 % vs. 0.5 %) [39]. Among MSM, HIV prevalence varies between 8.1-10.7 % [40, 41]. However, the predominant

mode of HIV transmission has changed over time (Fig. 1). Until 2003, sexual transmission accounted for the largest proportion of new infections, predominantly sex between men which accounted for 61.5 % that year [35]. In the following year the epidemic started to increase exponentially

with the major route of infection shifting from unprotected sex to sharing needles and solvents to dilute heroin [42]. In 2005, the number of new HIV infections peaked at 3380, a 122 % increase over the previous year [37]. The total number of HIV cases attributable to IDU grew from 173 (3 % of all cases) until 2003 to 3215 (32 %) by 2005, a 19-fold increase in two years. Molecular epidemiological studies revealed that the HIV strain responsible for this outbreak may have originated in Yunnan Province, China [43, 44]. In response, the government took swift measures in 2005, which included harm-reduction programs such as needle and syringe exchange program (NSEP) and substitution treatment. After the introduction of these programs, all newly reported cases attributable to IDU fell from a high of 72 % in 2005 to only 3.6 % in 2012 [37]. Even though the HIV epidemic among IDUs is largely controlled, a survey in 2008 found that only 21 % of IDUs in methadone maintenance treatment programs were using condoms always/frequently in the last 6 months and almost all (93 %) were infected with hepatitis C virus (HCV) [45]. In Taiwan, co-infection of HIV/HCV among IDUs has received increased attention. The prevalence of HCV infection among HIV-infected IDUs increased from 65.5 % before 2002 to 98.6 % in 2006 [46]. A multicenter cohort study in the Asia Pacific region revealed that patients co-infected with HIV/HBV or HIV/HCV had significantly worse survival rates compared to HIV-infected patients [47]. Thus, the importance of preventing HCV infection among IDU population cannot be underestimated in harm reduction programs.

Since 2008, the epidemic took a turn and the spread of HIV among MSM has re-emerged as a major threat. The proportion of new HIV cases attributed to sex between men increased from 23.3 % in 2006, 59.3 % in 2008 to 77.2 % in 2012 [35]. Bathhouses are reported as the most common venue for unprotected sex [48]. HIV incidence among MSM in gay bathhouses increased from 7.8 % in 2004 to 15 % in 2007 [40]. Over the same period, the prevalence of active syphilis among this population remained high but stable, from 31.8 % to 23.0 %. Of concern is that one fourth of attendees reported unprotected anal sex (UAS) at the last visit to the bathhouse. A recent online survey revealed that 72.4 % of MSM used the Internet as a main way to seek sexual partners, of these, 73.9 % had sex with partners they found online [41]. However, prevention programs targeting MSM are not implemented effectively in Taiwan because homosexuality is highly stigmatized and many MSM do not “come out” [31].

An increasing concern is young people who are becoming infected. Those aged 20–29 represent the highest number of total HIV cases, accounting for 40 % through 2012 [34]. According to a study among college students, only 48.5 % know that HIV can be spread through infected semen [49]. Regarding other risk populations, no updated information was available in English.

## Japan

Japan has East Asia's second largest population after China, with 127 million [4]. The first officially reported case of AIDS was in 1985, a homosexual Japanese man who had been living in New York. However, the first outbreak of the epidemic occurred among approximately 2000 recipients of contaminated blood products from the United States (most of them hemophiliacs) [33]. Until the mid-1990s they accounted for approximately 55 % of HIV and AIDS cases [50]. After the introduction of heat-treated blood products in 1985, the proportion of infections through this route declined amid a gradual increase in cases due to sexual contact. Prostitution is illegal in Japan, but the adult entertainment industry is well-established nonetheless. In the early 1990s many women from other Asian countries arrived in Japan as commercial sex workers (CSWs). A peak in the number of foreign women infected with HIV, most of them infected outside Japan, was observed between 1991 and 1994, but fell markedly thereafter [50]. Currently, the male-to-female ratio is 16:1 and 12:1 for HIV and AIDS cases respectively, with the epidemic among women and non-Japanese contained at a low level.

As of the end of 2012, 14,706 HIV and 6719 AIDS cases were reported to the national HIV/AIDS surveillance system (Table 1) [51]. Though the prevalence of HIV in the general population still remains very low (0.018 %) [52], the HIV epidemic has been disproportionately concentrated in a particular subpopulation, men who have sex with men (MSM). In a preliminary study the cumulative number of reported HIV/AIDS cases infected through sex between men through 2008 was estimated to be 8.82 per 1000 of estimated MSM population aged 20 to 59; 68 times greater than non-MSM [53]. However, in large cities such as Tokyo and Nagoya, HIV prevalence among MSM who visited free HIV testing sites has been calculated to be 5.7 % and 4.5 %, respectively [54]. The number of newly reported HIV cases of MSM more than doubled from 314 in 2001 to 724 in 2012 (Fig. 1). In 2012, 74 % (683/920) of Japanese male HIV cases were through this route, of which 67 % (460/683) were aged 20 to 39 [55]. Since the peak in 2008, the number of Japanese MSM HIV cases in this age group has been declining. However, it is of great concern that teenage cases are on the rise since 2005 [55]. Evidence suggests that high proportions of MSM engage in risky behaviors such as UAS, illicit drug use, and sex with multiple partners [56, 57]. Without new interventions it has been projected that HIV prevalence among MSM could reach 10.4 % in 2040 [58••].

The number of AIDS cases reported in Japan is considerably lower than in other industrialized countries. However, newly reported AIDS cases (without prior diagnosis of HIV infection) continue to increase since the beginning of the epidemic, especially the cases of homosexual contact, contrary to other developed countries, where a clear downward



trend has been observed since the introduction of antiretroviral therapy (ART) in the mid-1990s [59]. Despite availability of ART, social awareness and public perception about HIV infection remain extremely low [60] as well as the number of people who use the free HIV testing service at public health centers in Japan [55]. Thus, systematic efforts and strategy to raise awareness and improve access to HIV testing should be strongly encouraged, particularly among MSM population. Regarding other routes of transmission, infection through injecting drug use (IDU) is very limited, representing 0.4 % and 0.7 % of the HIV and AIDS cases through 2012. Finally, transmission from mother to child accounts for only 0.2 % and 0.3 % of the HIV and AIDS cases in the same period [55].

### South Korea

Since the first case in 1985, the number of HIV-infected South Koreans reported through 2012 was 9410, of whom 7788 were currently living with HIV (Table 1) [61]. Available statistics do not distinguish cases of HIV infection from cases with AIDS. As of 2011, the Korean Centers for Disease Control and Prevention estimated the HIV prevalence rate to be 14.1 per 100,000 population [62]. Other studies estimated the HIV prevalence in hospitals to be 1.3 per 10,000 individuals (2008) [63] and in public health centers to be 4.4 per 10,000 individuals (2009) [64]. Although HIV prevalence is very low, the number of newly reported HIV cases increased sharply since 2000, from 219 to 868 in 2012 [62].

The main route of transmission since the beginning of the HIV epidemic has been sexual contact, mostly affecting the male population (93.1 % of cumulative cases) [61]. Even though, the male-to-female ratio of newly reported cases decreased from 17:1 in 2007 to 14:1 in 2012 [61], a recent study projected a widening to 19:1 by 2017 [65]. Heterosexual and homosexual contact accounted for 34.2 % and 24.6 % of newly reported HIV cases among South Koreans in 2011 (Table 2) [66]. However, it is reasonable to speculate that the rate of homosexual transmission may be much higher given the high gender imbalance and low prevalence among women and FSWs [67, 68]. Data from the Korea HIV/AIDS Cohort indicated homosexual contact was a major transmission route of recently identified infected individuals [69]. Latest studies among MSM found the prevalence of HIV ranged between 2.7 % and 6.5 % [70, 71]. In addition, high prevalence of self-reported STIs in the last year (10.7 %) and current syphilis (20.4 %) were found in this population. Over 50 % of MSM reported being drunk while having sex, having bisexual relationships, multiple sexual partners, and inconsistent condom use with male and female partners [71, 72]. Therefore, MSM may serve as a bridge for the transmission of HIV to the population at large.

Transmission through IDU is rare in Korea. Until 2012, there were only four HIV/AIDS cases due to IDU, all among

men. Some authors speculate this could be due to the low prevalence of illicit drug use, and sterile needles and syringes being available over the counter [68]. However, a recent study found high prevalence of hepatitis B, C, and ever-sharing injecting equipment among IDUs [73]. CSWs and migrant workers constitute other vulnerable groups. CSW is illegal and there is no official report on the number of CSWs infected with HIV [68]. However, studies have shown very low prevalence in this population [67, 68]. As of 2012, there had been 1042 foreigners infected with HIV (71 % male), the majority from Asia and Africa [66]. Foreigners account for only 3 % of the total population, but represent 10 % of the cumulative HIV/AIDS cases. Also, among HIV test-takers in public health centers, foreigners showed a higher HIV prevalence than Koreans (6.8 vs 4.2 per 10,000 HIV-tested individuals) [64].

In recent years, greater attention has been placed on the need to promote timely testing [74, 75, 76]. The proportion of late presenters has increased since 1999 after abolition of a government policy of mass mandatory screening [75]. Despite the significant improvement of survival since the introduction of HAART there was a high risk of early mortality in the period 2002–2011 probably due to late diagnosis and late presentation to care [74, 75].

Finally, similar to other countries in Asia, homosexuality is heavily stigmatized in South Korea and many do not “come out” [77]. Also, unsafe sex behaviors even with high risk partners [78], misconceptions about HIV transmission, and negative attitudes toward PLHIV are still prevalent [79]. Thus, it is necessary to monitor and implement appropriate strategies to prevent further spread of the epidemic in South Korea.

### Hong Kong

Hong Kong is a Special Administrative Region of China since 1997. With a population of 7.2 million and the vast majority being ethnic Chinese, Hong Kong is one of the most densely populated areas in the world [4]. In contrast to mainland China, HIV epidemic has remained at a relatively low level, both among the general and high risk populations. HIV prevalence among blood donors, STI clinic attendees, pregnant women, and methadone clinic patients was 0.001 %, 0.172 %, 0.01 %, and 0.489 %, respectively in 2009 [80]. Since the first HIV case was reported in 1984, a total of 5783 HIV cases (3500 Chinese and 1725 foreigners) and 1353 AIDS cases (980 Chinese and 287 foreigners) have been reported through 2012 (Table 1) [81]. The number of new HIV reports hit a record high of 513 cases in 2012, a 17 % increase from the previous year, of which 50.7 % were through homosexual or bisexual contact. The male-to-female ratio increased from 2.6:1 in 2010 to 3.5:1 in 2012, further increasing male predominance. Overall, young male adult Chinese are the group that is most affected [82].

Table 2 Newly reported HIV and AIDS cases by route of transmission in China, Taiwan, Japan, South Korea, Hong Kong, and Mongolia

	China <sup>1</sup> (2011)	Taiwan <sup>2</sup> (2012)	Japan <sup>3</sup> (2012)	South Korea <sup>4</sup> (2011)	Hong Kong <sup>3</sup> (2012)	Mongolia <sup>5</sup> (2012)
<b>HIV</b>						
Heterosexual	62.6 %	13.7 %	28.8 %	34.2 %	24.6 %	39.1 %
Homosexual/Bisexual	13.7 %	77.2 %	55.2 %	24.5 %	49.5 %	56.6 %
Injecting drug use	16.9 %	3.6 %	0.4 %	0.0 %	1.4 %	0.0 %
Transfusion /Blood products	3.3 %	-	2.4% <sup>a</sup>	0.0 %	0.2 %	0.0 %
Mother-to child	1.2 %	0.04 %	0.2 %	0.0 %	0.2 %	0.0 %
Others	-	-	-	-	-	4.3% <sup>b</sup>
Unknown	2.2 %	5.4 %	12.9 %	41.2 %	24.2 %	0.0 %
<b>AIDS</b>						
Heterosexual	-	16.6 %	37.2 %	-	45.3 %	50.0 %
Homosexual/Bisexual	-	60.7 %	36.2 %	-	44.2 %	50.0 %
Injecting drug use	-	19.1 %	0.7 %	-	2.3 %	0.0 %
Transfusion /Blood products	-	0.2 %	3.1 %	-	0.0 %	0.0 %
Mother-to child	-	0.0 %	0.3 %	-	0.0 %	0.0 %
Others	-	-	-	-	-	0.0 %
Unknown	-	3.4 %	22.5 %	-	8.1 %	0.0 %

<sup>1</sup> No information was available regarding routes of transmission for AIDS cases. Chinese cases only

<sup>2</sup> Taiwanese cases only

<sup>3</sup> All nationalities

<sup>4</sup> HIV and AIDS cases. South Korean cases only

<sup>5</sup> Mongolian cases only

<sup>a</sup> Includes infections through blood transfusion, and presumed multiple infection routes

<sup>b</sup> Commercial sex work

Sources:

2012 China AIDS Response Progress Report

Statistics of Communicable Diseases and Surveillance Report, December 2013 (Taiwan)

National Institute of Infectious Diseases (Japan)

Analysis of HIV/AIDS notifications in Korea, 2011 (Korea CDC)

Factsheet: HIV/AIDS Situation in Hong Kong [2012] (Centre for Health Protection)

UNAIDS Mongolia (personal communication)

Sixty four hemophilia patients were the first sub-group to be infected through contaminated blood. They were infected prior to 1985, before a safe heat treated alternative and test for HIV became available [32]. Subsequently, most infections have been from sexual contact, with infections through IDU less common. Over the years, sexual transmission has remained the predominant route of infection. In the 1980s the largest percentage of new infections was through sex between men. In 1987, 57.6 % of the new cases were attributable to homosexual or bisexual contact, whereas only 9.1 % were thought to be from heterosexual contact. Then, in the 1990s until mid-2000s the situation reversed and heterosexual transmission surpassed that of homosexual or bisexual contact. In 2000, 62.8 % of new HIV infections were reported to be through heterosexual contact compared to 15.8 % through

homosexual or bisexual contact. However, the situation has reversed again since 2004 when a sharp increase in the HIV cases of MSM became apparent, while heterosexual transmission remained relatively stable [62] (Fig. 1). It is also plausible that there are surveillance differences over time that may underreport MSM activity if interviewing is less probing, i.e., some men may report heterosexual risk when male-to-male sexual activity is the true risk factor. Similar to other parts of the world, MSM in Hong Kong are seeking sex partners through the Internet [83]. Over half of MSM recently diagnosed with HIV infection found sex partners through the Internet in the year prior to their infection [83]. Another study revealed a high proportion of MSM in Hong Kong seeking cross-border sex and having UAS with multiple types and number of male sex partners in Shenzhen,



China where high prevalence of HIV and syphilis was reported among MSM [84]. In the last six months, 62.1 % of MSM in Hong Kong had had sex with male CSWs, 84.6 % with male non-regular partners, and 31.3 % with male regular partners in Shenzhen [84]. Prevalence of UAS with these types of partners was 29.8 %, 27.9 %, and 78.7 %, respectively. Prior to 2005 there were only two non-governmental organizations which ran condom distribution and outreach testing programs for MSM in saunas and bars [85]. MSM have been identified as the pressing priority for action in the five year AIDS Strategies from the Advisory Council on AIDS.

Unlike the remarkable spread of HIV among IDUs in mainland China and Taiwan, the HIV epidemic among drug users in Hong Kong remained low. Before the start of the HIV epidemic, methadone maintenance treatment (1976) and the STI clinic services of the Department of Health (1970s) were widely accessible in Hong Kong [86]. Both programs provided preventive interventions, free condoms, and treatment for drug users and patients with STIs. It has been argued that they played key roles in protecting people at elevated risk for contracting HIV [86, 87]. Also, the prevalence of HIV among methadone clinic attendees remained at a consistently low level of 0.2–0.5 % from 2004 to 2010 [88]. HIV infection among IDUs has contributed to only 1.4 % (7/513) of all cases in 2012, a marked decrease from 58 cases in 2006. Nevertheless, the potential risk of an upsurge among this population cannot be disregarded as significant proportions engage in unsafe behaviors [89, 90].

HIV prevalence among FSWs was low, 0.2 % between 2005 and 2007 [91]. However, cross-border (from Hong Kong to mainland China) FSW is common [92]. With increasing population mobility and growing HIV epidemics in neighboring countries, sub-populations with elevated risk of infection need to be closely monitored.

## Mongolia

Mongolia is a landlocked country located in Northeast Asia, bordered by the Russian Federation (Russia) to the north and China to the south, two countries with rapidly expanding HIV epidemics. With a small population of 2.8 million, more than 1 million are registered residents of Ulaanbaatar city, the capital and largest city [4]. Mongolia has the smallest HIV epidemic in the region, prevalence in the general population is less than 0.1 % [1, 93] despite high prevalence of other STIs among different population groups [94–96]. Between 1992 and 2004 only five cases of HIV were reported [97], two of whom were AIDS cases (personal communication with UNAIDS Mongolia) (Table 1). However, the number of HIV and AIDS cases has been increasing sharply in recent years. A total of 126 cases were reported by the end of 2012, more than 60 % of them within the last 4 years and 91 % of cases identified in

Ulaanbaatar [97]. According to official statistics 17 died by the end of 2012 [97]. The sharp increase in HIV cases could be a response to an increasing incidence of HIV and improved HIV surveillance system [97–100]. Epidemic estimates (by Spectrum) show that at the end of 2013, the number of PLHIV stood at 655. Of these, 73.3 % were MSM (personal communication with UNAIDS Mongolia).

To date, all cases for which route of transmission is known have been attributed to sexual contact, predominantly MSM (Fig. 1). Until 2011, 80 % of HIV cases were males, 82.5 % of them MSM [93]. This is probably an underestimation given that data on sexual orientation was not collected until 2007. Among the female cases, 52 % were CSWs. There are no reported cases of HIV transmission related to blood or vertical transmission. Unlike the neighboring countries of Russia and China, no cases have been found among IDUs in Mongolia [93, 101].

A series of second generation surveillance surveys (SGSS) have been the main source of information in Mongolia over the past decade. MSM and FSWs are currently the population most at risk. The prevalence among MSM during the 2005, 2007, 2009, and 2011 SGSS was 0.0 %, 0.85 %, 1.80 %, and 7.5 %, respectively [98–100]. The sharp increase in HIV prevalence has been argued to be an artifact possibly due to changes in the cases included for estimations (only new HIV cases vs. new and previously identified cases), sampling strategies (convenience vs. response driven sampling [RDS]), sample sizes (88 in 2005 compared to 200 in 2011), and improvements in surveillance [93, 102•]. However, 7.5 % HIV prevalence rate found in the last round of SGSS may be comparable to 6.3 % self-reported HIV prevalence observed during a survey among MSM in Ulaanbaatar in 2011 using RDS [103•]. There is evidence suggesting risky behaviors among MSM [95, 102•, 103•, 104]. Furthermore, low HIV-related knowledge regarding the risks associated with same-sex practices, low exposure to prevention programs (33.6 %), and high misconception about HIV transmission have been reported [102•, 103•]. It should also be noted that there is very limited research on MSM done to date (no data available from outside the capital city) [105], high levels of discrimination, including violence, and low societal acceptance of MSM [106].

Even though previous SGSS did not find HIV infection among FSWs, overall prevalence of syphilis in this population was consistently high ranging from 17.4 % in 2005 to 27.8 % in 2011. High risk sexual behaviors are still common among FSWs and many have misconceptions about HIV transmission [102•]. The illegal character of sex work coupled with high rates of poverty and unemployment may lead increasing numbers of women into sex work for survival [107]. Little is known about other vulnerable groups such as, IDUs, mobile populations, and clients of FSWs. Low impact behavioral interventions should be considered since they can achieve



considerable reductions of HIV and STI risk in such a low resource setting [108•].

## Conclusion

Although the HIV epidemic reached East Asia relatively late, it expanded region wide driven by the epidemic in China. Because of the timely and effective measures, great progress has been achieved in the control of the HIV epidemic. However, in most of the countries or areas of the region the greatest concern is the growing epidemic among MSM population that has been neglected for many years. Large-scale prevention needs to be tailored to this subpopulation with careful monitoring and evaluation, addressing appropriately the issues of discrimination and stigmatization. Governments need to have strong commitments because the potential consequences of inaction are huge and could have disastrous implications.

**Acknowledgments** This study was supported by a grant from the Ministry of Health, Labour and Welfare in Japan. We greatly appreciate the help of Altanchimeg Deleghoimbol at UNAIDS Mongolia, Sergelen Munkhbaatar at Mongolia Ministry of Health, and Jin Young Ahn at Yonsei University College of Medicine in South Korea for facilitating us with national data and/or country reports. Finally, our appreciation goes to Bishal Gyawali at the University of Southern Denmark for his assistance in the early stages of this review.

## Compliance with Ethics Guidelines

**Conflict of Interest** S. Pilar Sugumoto, Teeranee Techasrivichien, Patou Masika Musumari, Christina El-saaidi, Bhekumusa Wellington Lukhele, Masako Ono-Kihara, and Masahiro Kihara declare that they have no conflict of interest

**Human and Animal Rights and Informed Consent** This article does not contain any studies with human or animal subjects performed by any of the authors.

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- Of major importance

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