

HIV testing and attitudes among the working-age population of Japan: annual health checkups may offer an effective way forwards

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Abstract: In Japan, Voluntary Counselling and Testing (VCT) for HIV has been recommended for people concerned about their infection risk, especially those in high-risk groups. Although HIV awareness has declined in this country somewhat during recent years, the number of newly-infected cases has been increasing. The purpose of the current study therefore, was to determine the prevalence of HIV testing, individuals' reasons for being tested, and the overall acceptance of HIV testing among working-age Japanese. We utilized an anonymous, nationwide survey which was administered to a total of 3,055 participants aged 20–69 yr. The lifetime prevalence of HIV testing was 14% (2% within the past year). A gap was observed between a prior history of HIV testing and willingness to be tested in future (32%) or willingness to be tested during health checkups in the workplace (41%). HIV testing appears to have only been conducted among a limited number of working-age Japanese adults, even though some reported a willingness to be tested. Opportunities for VCT during workplace health checkups might offer an immediate and positive way forwards in the fight against HIV; however, privacy protection for test results and the acceptance of HIV-positive employees should be carefully considered in the workplace.

Key words: AIDS, HIV, Japan, Voluntary Counselling and Testing (VCT), Working-age population

Introduction

Declining awareness of the importance of Human Immunodeficiency Virus (HIV) infection has led to a marked decrease in the number of Voluntary Counselling and Testing (VCT) services being undertaken at Japanese public health centers in recent years. The number of HIV VCT

conducted nationwide in Japan peaked at 177, 156 in 2008 for example, and then declined to 136,400 in 2013¹⁾. Although Japan has historically had one of the lowest community HIV rates of developed countries (less than 0.1% in 2013)¹⁾, the number of new cases of HIV infection and Acquired Immune Deficiency Syndrome (AIDS) has been increasing elsewhere since 2001, especially among males of working-age²⁾.

National strategies for VCT of HIV status differ between Japan and other countries, such as the United States (US). In Japan, HIV testing has been recommended for people who are concerned about their infection risk,

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especially those in high-risk groups such as adolescents, foreigners, men who have sex with men, commercial sex workers and their customers, and drug abusers; according to the Japanese AIDS Prevention guidelines, which were established in 1999 by the *Law Concerning the Prevention of Infectious and Medical Care for Patients of Infections*³⁾. In addition, HIV testing is regularly offered at pregnancy health checkups and prior to surgery to prevent vertical and horizontal transmission in Japan. In the US, however, routine HIV testing has been recommended for all people aged 13–64 yr and patients in all health care settings according to the US Centers for Disease Control and Prevention (CDC), since 2006⁴⁾. HIV testing is clearly the first step for the prevention of infection and the provision of appropriate care and treatment⁵⁾.

The Joint United Nations Programme on HIV/AIDS (UNAIDS) has recommended measuring the incidence of HIV testing in the general population as a core indicator to evaluate the national response⁶⁾. However, the percentage of people who voluntarily undertook HIV testing or even have a desire to do so is not well known in Japan. VCT behavior is usually not random, however. Some research has identified for example, social barriers that reduce accessibility to HIV testing, even though study participants were willing to have such tests^{7, 8)}. Given these facts, we hypothesized that anonymous HIV testing at the time of regular health checkups in Japan might promote greater accessibility for people who actually desire HIV testing, but have not yet done so. The purpose of this study therefore, was to determine the current prevalence of HIV testing, individuals' reasons for being tested, as well as their actual willingness to undergo HIV testing among the working-age population of Japan. Given the often sensitive nature of the topic, we conducted the study by means of an anonymous, nationwide cross-sectional internet survey.

Subjects and Methods

Participants and data collection

This study used an internet research company for data collection, with which a total of 1.6 million members had voluntarily registered. The company first sent invitation letters to 7,937 registered individuals using a simple random sampling method, thus creating a list of potential participants. Recruitment ceased after we acquired data for around 3,000 participants using a stratified sampling method, to ensure an equal ratio of gender and age per group. The age groups were stratified as follows: 20–29, 30–39, 40–49, 50–59, and 60–69 yr. We excluded health-

care providers (physicians, nurses and pharmacists). The survey company conducted data collection in September 2011, by contacting the randomly-selected individuals and then asking them to respond to the survey. Recruitment was ceased when the target number was reached for each stratum of participants. Informed consent was required to join the study and to access the website questions, with participation being voluntary. Participants had a financial incentive of a few hundred Japanese yen for voluntarily responding (at the time, 100 yen equaled approximately 1.3 US dollars). The study was approved by the institutional ethics committee of Kitasato University School of Medicine (B-12-70). It utilized the same dataset which has been examined for different research questions and the results published elsewhere^{9, 10)}.

Questionnaire

Our questionnaire included items on demographics, history of HIV testing, willingness to undergo HIV testing and reasons for HIV testing. Participants' demographic information consisted of sex, age, education level, occupation and knowledge of HIV testing. Knowledge of HIV testing was ascertained with the following two questions, both included yes and no response options: "Do you know if a blood test is useful to identify HIV infection status?" and "Do you know if health centers provide HIV testing free of charge?" The second set of questions asked respondents about their history of HIV testing. The answer options were: "yes," "no," "unknown," and "refuse to answer". For respondents who reported having prior HIV testing then selected the time of their last HIV test from the options of: "within one year," "one to three years," "three years and more," and "unknown." The following questions regarding their willingness to test were also included: "Do you want to have HIV screening if it is free of charge?" and "Do you want to have a blood test for HIV screening as part of a health checkup in the workplace, if it is free of charge?" The options for these questions were: "Yes, definitely," "Probably," "Probably not," "Definitely not," and "Unknown".

Respondents who had previously received HIV testing were asked about their reasons for being tested and were required to choose at least one of the following 15 answers: 1) HIV testing was free of charge at a health center; 2) HIV testing was an additional option as part of a complete health checkup or health screening for local residents; 3) HIV testing was included in pregnancy health checkups or medical examinations at the time of surgery in a hospital; 4) HIV testing was required in the workplace

Table 1. Participant characteristics

	N=3,055 (%)
Sex	
Male	1,532 (50)
Female	1,523 (50)
Age	
20–29	607 (20)
30–39	611 (20)
40–49	612 (20)
50–59	616 (20)
60–69	609 (20)
Educational attainment	
Secondary school or high school	878 (29)
Vocational school or Junior college	767 (25)
Bachelor degree or above	1,368 (45)
Others	42 (1)
Occupation	
Manager	244 (8)
Full-time employee	873 (29)
Part-time employee	522 (17)
Self-employed	213 (7)
Student (Bachelor degree or above)	201 (7)
Unemployed	1,002 (33)
Did you know that blood tests are useful to identify HIV infection status?	
Yes, I know	2,246 (74)
No, I didn't know	809 (26)
Did you know health centers provide HIV testing free of charge?	
Yes, I know	2,336 (77)
No, I didn't know	719 (23)

(including before or after employment); 5) I am/was engaged in the handling of blood products (for example, for experiments, research and development, nursing care); 6) I had suggestive symptoms; 7) I thought I had unsafe sex with partners; 8) One of the sex partners around me was diagnosed with a positive HIV infection status; 9) My doctor recommended it; 10) My family or an associate recommended it; 11) There was a possibility that I was given a blood transfusion or blood product in the past; 12) Publicity by the Ministry of Health, Labour and Welfare or a news report motivated me to be tested; 13) I donated blood; 14) Others; and 15) Unknown.

Results

The questionnaire was sent to 7,937 individuals and ceased when the total number of participants reached the target number. Table 1 shows their demographic characteristics. A total of 3,055 participants responded, of whom 1,532 were male. Each age group contained approximately

20% of the total participants. Regarding knowledge about HIV testing, 25% of the respondents did not know that a blood test is useful to determine HIV infection status and 23% of respondents did not know that public health centers provide HIV testing free of charge.

The overall lifetime prevalence of HIV testing among the Japanese working-age population was 14% (2% within the past year) (Table 2), of whom young female adults (18%) were the most likely to have been tested; and young male adults (7%), the least likely. A gap was observed between a prior history of HIV testing and willingness to be tested in future (32%) or willingness to be tested during health checkups in the workplace (41%). There was a higher desire to undergo HIV testing among the young working-age group (47% of males and 49% of females).

Table 3 indicates the reasons why participants who had a history of HIV testing decided to undergo testing for HIV infection. The most frequent reason for having such tests was "HIV testing was included in pregnancy health

Table 2. History of HIV testing and willingness to be tested among Japanese people of working-age

	Total N ^a =3,055 (%)	Male Age 20–39 n ^a =613 (%)	Male Age 40–69 n ^a =919 (%)	Female Age 20–39 n ^a =605 (%)	Female Age 40–69 n ^a =918 (%)
History of HIV testing					
Yes	417 (14)	43 (7)	137 (15)	107 (18)	130 (14)
<1 yr	62 (2)	12 (2)	17 (2)	21 (3)	12 (1)
1–3 yr	77 (3)	7 (1)	20 (2)	35 (6)	15 (2)
>3 yr	265 (9)	23 (4)	95 (10)	50 (8)	97 (11)
Unknown	13 (0)	1 (0)	5 (1)	1 (0)	6 (1)
No	2,493 (82)	543 (89)	723 (79)	477 (79)	750 (82)
Unknown	128 (4)	20 (3)	53 (6)	21 (3)	34 (4)
Willingness to undergo HIV testing					
Yes, definitely	318 (10)	98 (17)	67 (8)	104 (18)	49 (6)
Probably	669 (22)	175 (30)	192 (22)	179 (31)	123 (14)
Probably not	956 (31)	172 (30)	330 (38)	169 (29)	285 (33)
Definitely not	956 (31)	136 (23)	278 (32)	128 (22)	414 (48)
Unknown	156 (5)	32 (6)	52 (6)	25 (4)	47 (5)
Willingness to undergo HIV testing during health checkups in the workplace					
Yes, definitely	439 (14)	107 (19)	109 (13)	121 (21)	102 (12)
Probably	835 (27)	178 (31)	214 (25)	210 (37)	233 (28)
Probably not	810 (27)	161 (28)	293 (34)	128 (22)	228 (28)
Definitely not	723 (24)	120 (21)	235 (28)	110 (19)	258 (31)
Unknown	248 (8)	47 (8)	68 (8)	36 (6)	97 (12)

^a Numbers may not always add up to the total number due to missing data in individual cells

Table 3. Reasons for undergoing HIV testing among Japanese people of working-age (multiple selections allowed)

	Total	Male		Female	
	(%)	20–39 yr (%)	40–69 yr (%)	20–39 yr (%)	40–69 yr (%)
HIV testing was included in pregnancy health checkups or medical examinations at the time of surgery in a hospital	183 (37)	5 (9)	23 (14)	81 (69)	74 (49)
I donated blood	90 (18)	8 (14)	44 (26)	12 (10)	26 (17)
HIV testing was an additional option as part of a complete health checkup or health screening for local residents	55 (11)	4 (7)	29 (17)	3 (3)	19 (13)
HIV testing was free of charge at a health center	40 (8)	8 (14)	16 (10)	9 (8)	7 (5)
I thought I had unsafe sex with partners	38 (8)	14 (25)	16 (10)	6 (5)	2 (1)
There was a possibility that I was given a blood transfusion or blood product in the past	15 (3)	2 (4)	7 (4)	1 (1)	5 (3)
My doctor recommended it	7 (1)	1 (2)	4 (2)	1 (1)	1 (1)
Publicity by the Ministry of Health, Labour and Welfare or a news report motivated me to be tested	7 (1)	0	4 (2)	0	3 (2)
My family or an associate recommended it	6 (1)	2 (4)	2 (1)	2 (2)	0
HIV testing was required in the workplace (including before or after employment)	4 (1)	1 (2)	1 (1)	1 (1)	1 (1)
I am/was engaged in the handling of blood products (for example, for experiments, research and development, nursing care)	3 (1)	0	2 (1)	0	1 (1)
I had suggestive symptoms	2 (0)	2 (4)	0	0	0
One of the sex partners around me was diagnosed with a positive HIV infection status	2 (0)	2 (4)	0	0	0
Others	32 (7)	5 (9)	16 (10)	2 (2)	9 (6)
Unknown	8 (2)	3 (5)	3 (2)	0	2 (1)

checkups or medical examinations at the time of surgery in a hospital" (37%), followed by "I donated blood" (18%), and "HIV testing was an additional option as part of a complete health checkup or health screening for local residents" (11%). Alternatively, "I thought I had unsafe sex with partners" was the top reason among young male adults (25%).

Discussion

This study determined the prevalence of HIV testing, individuals' reasons for testing, and their willingness to undergo future HIV testing among the general working-age population of Japan, for what we believe is one of the first times. Encouragingly, our investigation found that approximately one-third of adults aged between 20 and 69 yr are willing to be tested for HIV. However, a far smaller proportion of respondents had actually undergone a HIV test in the past year (2%). This was likely because the major reason for having HIV tests was not related to their perceived risk of HIV infection, but rather, as a part of routine pregnancy health checkups or surgery (37%) or blood donation (18%).

Perhaps the most important finding from the current study is that HIV testing has only been conducted amongst a relatively limited number of Japanese individuals of working age. The prevalence of HIV testing within the past year in Japan was clearly suboptimal when compared to that seen in other developed countries with low levels of endemic HIV/AIDS; but was similar to the situation of some other Asian countries such as Vietnam (2.0% of females and 2.6% of males) and India (1.2% of females and 1.4% of males)²). This suggests that many existing HIV infections in the community go unreported during surveillance efforts¹¹). One main reason for the current lack of HIV testing revealed by our study centered on the fact that more than 20% of respondents did not know about HIV VCT services at public health centers. This finding indicates that not only encouraging willingness to be tested but also information dissemination about VCT services should be considered to help promote the accessibility for the VCT service¹²).

Our study revealed that a moderate proportion of Japanese adults reported a willingness to undergo HIV testing although many simply had not accessed VCT in the past. This finding is consistent with some previous research from other countries^{7, 13, 14}). For example, the proportions of willingness to be tested and actual HIV testing were, respectively, 43.5% and 3.7% in China⁷) and 37.0% and

3.6% in Zambia¹⁴). Many factors in the current study were shown to be associated with accessibility to HIV testing. Again, this finding is similar to that reported in some previous research. Perceived risk of HIV infection (for example, sex with commercial sex workers) has been shown elsewhere to be the major predictor of being tested for HIV^{15, 16}), whereas fear and stigma of HIV have been reported as major barriers^{17, 18}). HIV/AIDS education for the general population therefore remains critical for tackling the social stigma and discrimination which currently exists¹⁰), and is evidently limiting accessibility to VCT in Japan. HIV VCT program managers should raise public awareness of VCT services through assessing personal risk for HIV infection and educating individuals about HIV infection. A widespread and targeted educational campaign in the workplace might also help reduce social stigma and facilitate HIV testing of people who desire testing^{19, 20}).

Voluntary, anonymous HIV testing at the time of health checkups represents a key way forwards in promoting accessibility for people who would like to undergo HIV testing. In Japan, all workers are entitled to receive an annual health checkup in the workplace based on the *Industrial Safety and Health Act*²¹). Community health services also provide local residents opportunities for health checkups, although tests for HIV in this situation are comparatively rare. In the current study, around 10% of adults had received an additional HIV test as part of a complete health checkup or health screening. In Japan, health checkups are widely accepted opportunities to conduct various screening including for infectious diseases. For example, hepatitis B and C viral screening have been introduced as additional tests during regular health checkups in recent years²²).

Voluntary HIV screening during workplace health checkups is not necessarily a panacea however, as it may increase the potential for an individual's HIV infection status to be disclosed because if there are insufficient privacy protections. Social acceptance of HIV/AIDS remains suboptimal in many areas, and AIDS patients can still suffer from stigma and discrimination⁹). The International Labour Organization Code of Practice states that: "Voluntary testing should normally be carried out by the community health services and not at the workplace. Where adequate medical services exist, voluntary testing may be undertaken at the request and with the informed consent of a worker, with advice from the workers' representative. It should be performed by suitably qualified personnel with adherence to strict confidentiality and to disclosure requirements."²³)

With regard to blood donations, to avoid contamination individuals should be encouraged not to donate their blood simply for the purposes of HIV testing. The Japanese Red Cross has declared that it does not officially inform blood donors of their HIV infection status to deter blood donations for the purpose of HIV testing²⁴). However, around one-fifth of respondents who received HIV testing answered that blood donation was their reason for HIV testing. A previous study in the US revealed that around half of all individuals who donated blood failed to read the deferral materials and some of them (15%) desired HIV testing²¹). As such, health practitioners should aim to more comprehensively educate people regarding the HIV testing process associated with blood donation.

There are certain limitations which may have impacted on the current study. First, it was cross-sectional in nature, which prevented us from determining cause-effect relationships. Second, we did not ask about high-risk behaviors for HIV. Men who have sex with men, individuals who have sex with commercial sex workers, and people who inject drugs participate in high-risk behaviors that influence their need for HIV testing²⁵). Finally, this study was an internet survey and selection bias may have occurred due to factors related to internet access and use. Respondents may be more aware of HIV testing, for example, through greater access and better knowledge of internet sources, for example²⁶).

Conclusion

In conclusion, our study suggests that HIV testing has only been undertaken by a very limited number of working-age Japanese; despite the fact that a moderate proportion of them actually reported a willingness to undergo HIV testing. Providing increased opportunities for VCT during workplace health checkups might promote accessibility for these individuals; however, privacy protection for test results and the acceptance of HIV-positive employees should be carefully considered in the workplace. HIV/AIDS education clearly remains important for the general population to help eliminate social stigma and discrimination, which will in turn, improve accessibility to voluntary HIV testing.

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References

- 1) National Institute of Infectious Diseases HIV/AIDS in Japan, 2013. <http://www.nih.go.jp/niid/en/basic-science/865-iasr/5000-tpc415.html>. Accessed September 7, 2015.
- 2) Joint United Nations Programme on HIV and AIDS (2013) Global report: UNAIDS report on the global AIDS epidemic 2013, UNAIDS, Geneva.
- 3) International Labour Organization Law Concerning the Prevention of Infections and Medical Care for Patients of Infections. http://www.ilo.org/wcmsp5/groups/public/—ed_protect/—protrav/—ilo_aids/documents/legaldocument/wcms_113225.pdf. Accessed September 7, 2015.
- 4) Rothman RE, Merchant RC, Centers for Disease Control Prevention (2007) Update on emerging infections from the Centers for Disease Control and Prevention. Revised recommendations for HIV testing of adults, adolescents, and pregnant women in health-care settings. *Ann Emerg Med* **49**, 575–9. [[Medline](#)] [[CrossRef](#)]
- 5) Baggaley R (2001) The impact of voluntary counselling and testing: a global review of the benefits and challenges, 7–10, Joint United Nations Programme on HIV/AIDS, Geneva.
- 6) Joint United Nations Programme on HIV/AIDS (2014) Global AIDS Response Progress Reporting 2014: Construction of Core Indicators for Monitoring the 2011 UN Political Declaration on HIV and AIDS, UNAIDS, Geneva.
- 7) Ma W, Detels R, Feng Y, Wu Z, Shen L, Li Y, Li Z, Chen F, Wang A, Liu T (2007) Acceptance of and barriers to voluntary HIV counselling and testing among adults in Guizhou province, China. *AIDS* **21** Suppl 8, S129–35. [[Medline](#)] [[CrossRef](#)]
- 8) Bhoobun S, Jetty A, Koroma MA, Kamara MJ, Kabia M, Coulson R, Ansumana R, Jacobsen KH (2014) Facilitators and barriers related to voluntary counseling and testing for HIV among young adults in Bo, Sierra Leone. *J Community Health* **39**, 514–20. [[Medline](#)] [[CrossRef](#)]
- 9) Wang G, Wada K, Hoshi K, Sasaki N, Ezoe S, Satoh T (2013) Association of knowledge of HIV and other factors with individuals' attitudes toward HIV infection: a national cross-sectional survey among the Japanese non-medical working population. *PLoS ONE* **8**, e68495. [[Medline](#)] [[CrossRef](#)]
- 10) Eguchi H, Wada K, Smith DR (2014) Sociodemographic factors and prejudice toward HIV and hepatitis B/C status in a working-age population: results from a national, cross-sectional study in Japan. *PLoS ONE* **9**, e96645. [[Medline](#)]

- [CrossRef]
- 11) Hashimoto S, Kawado M, Murakami Y, Ichikawa S, Kimura H, Nakamura Y, Kihara M, Fukutomi K (2004) Numbers of people with HIV/AIDS reported and not reported to surveillance in Japan. *J Epidemiol* **14**, 182–6. [Medline] [CrossRef]
 - 12) Li G, Zhang W, Shi W (2009) Current situation analysis on the utilization and demand of VCT service among MSM group. *Mod Prev Med* **36**, 3555–6, 3559.
 - 13) Edelstein ZR, Myers JE, Cutler BH, Blum M, Muzzio D, Tsoi BW (2015) HIV testing experience in New York City: offer of and willingness to test in the context of new legal support of routine testing. *J Acquir Immune Defic Syndr* **68** Suppl 1, S45–53. [Medline] [CrossRef]
 - 14) Fylkesnes K, Haworth A, Rosensvård C, Kwapa PM (1999) HIV counselling and testing: overemphasizing high acceptance rates a threat to confidentiality and the right not to know. *AIDS* **13**, 2469–74. [Medline] [CrossRef]
 - 15) Shin SR, Kang HS, Moneyham L (2007) Characteristics of individuals seeking voluntary counseling and testing for HIV infection in South Korea. *J Assoc Nurses AIDS Care* **18**, 27–33. [Medline] [CrossRef]
 - 16) Fylkesnes K, Siziya S (2004) A randomized trial on acceptability of voluntary HIV counselling and testing. *Trop Med Int Health* **9**, 566–72. [Medline] [CrossRef]
 - 17) Hutchinson AB, Corbie-Smith G, Thomas SB, Mohanan S, del Rio C (2004) Understanding the patient's perspective on rapid and routine HIV testing in an inner-city urgent care center. *AIDS Educ Prev* **16**, 101–14. [Medline] [CrossRef]
 - 18) Kalichman SC, Simbayi LC (2003) HIV testing attitudes, AIDS stigma, and voluntary HIV counselling and testing in a black township in Cape Town, South Africa. *Sex Transm Infect* **79**, 442–7. [Medline] [CrossRef]
 - 19) Mall S, Middelkoop K, Mark D, Wood R, Bekker LG (2013) Changing patterns in HIV/AIDS stigma and uptake of voluntary counselling and testing services: the results of two consecutive community surveys conducted in the Western Cape, South Africa. *AIDS Care* **25**, 194–201. [Medline] [CrossRef]
 - 20) Smith DR, Ning W (2010) Emerging workplace issues for Chinese health care workers in the new millennium: HIV/AIDS. *Work* **37**, 297–300. [Medline]
 - 21) Doll LS, Petersen LR, White CR, Ward JW, The HIV Blood Donor Study Group (1991) Human immunodeficiency virus type 1-infected blood donors: behavioral characteristics and reasons for donation. *Transfusion* **31**, 704–9. [Medline] [CrossRef]
 - 22) Sasaki N, Wada K, Smith DR, Wang G, Ohta H, Shibuya A (2014) Hepatitis screening in Japanese individuals of working age and prejudice against infected persons in the workplace. *J Occup Health* **55**, 392–7. [Medline] [CrossRef]
 - 23) Leipziger D (2010) ILO Code of Practice on HIV/AIDS and the World of Work. The Corporate Responsibility Code Book, 2nd Ed. **237**, 26.
 - 24) Japanese Red Cross Society (2014) Blood service, 35–39, Japanese Red Cross Society, Tokyo.
 - 25) Smith DR, Wei N (2008) Traveling to China for the Beijing Olympic Games: internal migration of the commercial sex workforce may be an important HIV risk factor for travelers. *Travel Med Infect Dis* **6**, 160, author reply 161. [Medline] [CrossRef]
 - 26) Kontos EZ, Emmons KM, Puleo E, Viswanath K (2012) Contribution of communication inequalities to disparities in human papillomavirus vaccine awareness and knowledge. *Am J Public Health* **102**, 1911–20. [Medline] [CrossRef]