

ORIGINAL ARTICLE

CERVICAL CANCER SCREENING BEHAVIOR AND FACTORS ASSOCIATED WITH SCREENING BEHAVIOR

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Abstract Objective: This study is aimed at examining Japanese women's screening behavior with a focus on differences in screening behavior between age groups and on factors associated with the behavior. **Method:** The survey period was from August 2010 to January 2012. An anonymous questionnaire form was distributed to Woman 20 years or older who participated in cervical cancer screening at medical institutions or examination centers in Aomori Prefecture, Japan and consented to participate in this survey. The survey was designed to investigate respondents' background, screening behavior, and perceived health status. **Results:** Of 1,287 women who provided consent, data from 1,207 respondents who answered all the survey items were included in analysis (response rate: 93.4%). Their age ranged from 20 to 76 (mean: 37.2) years. Of these women, 75% regularly received screening provided by public health services. Demographically, the proportion of women who underwent regular screening was significantly higher in employed workers ($p < 0.05$). The proportion of women who underwent regular screening increased with age. The percentage of women who were participating in cervical cancer screening for the first time was significantly higher in those in their 20s than that in the other age groups ($p < 0.05$). Respondents strongly felt that they were healthy and had a high internal health locus of control. Respondents' age, background, and previous screening experience were associated with their current screening behavior. **Discussion:** The findings indicate that motivational and other assistance individualized to people's background and age may be effective in motivating women with no previous screening experience to participate in screening and others to continue screening.

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Key words: Cervical cancer screening; screening behavior; perceived health status; Health Locus of Control (HLC); screening program.

原 著

子宮頸がん検診における受診行動の実態と影響要因

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抄録 目的: 受診行動の実態や年代による特徴, および受診行動に影響を与える要因を明らかにする. **方法:** 2010年8月~2012年1月に青森県内の医療機関・健診センターで子宮頸がん検診を受診した20歳以上の女性で同意の得られた対象者に無記名式調査用紙を配布し, 対象者の背景・受診実態・健康感を調査した. **結果:** 回収した1,287名のうち, すべての項目に回答した1,207名(有効回答率93.4%)を分析した. 年齢は20~76(平均37.2), 75%が検診制度を利用し定期的に受診していた. 定期受診者の背景は, 就業者が有意に多かった($p < 0.05$). 年齢が高くなるほど定期受診者の割合が多かった. 20代は初回受診者が有意に多かった($p < 0.05$). 対象者の主観的健康感および内的健康統制感は高かった. 受診行動には年代や背景これまでの受診経験が影響していた. **考察:** 受診者の背景や年代に応じた支援は, 初回受診を促し継続的受診を可能にすると推察された.

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I. Introduction

Cervical cancer often affects and kills women who are planning to have or raising a child and is regarded as a “mother killer.” The cause of cervical cancer is persistent infection with high-risk human papilloma virus (HPV) in the cervical epithelial cells. Cervical intraepithelial neoplasia (CIN) develops into cervical cancer after more than 10 years.^{1,2)} The estimated global prevalence of cervical cancer is 12.4 persons per 100,000 population. Approximately 800,000 women develop or die from the disease annually. The prevalence of cervical cancer in Japan is 14.1 persons, which is higher than that in the United States (7.8), Britain (9.3), and the global average.^{3,4)} The prevalence of the disease in Japan has increased from 0.2 to 1.2 persons in women in their early 20s and from 2.0 to 6.3 persons in women in their late 20s since the 1980s. Cervical cancer is the most common form of cancer in women in their 20s. While mortality due to cervical cancer has not increased in recent years, the proportion of young women who die from the disease is increasing. Women in their 30s and 40s now account for 40% of deaths due to cervical cancer.⁵⁾

Cervical cancer may be prevented by early detection of CIN through cytological screening and HPV DNA testing.⁶⁻⁸⁾ Some European and Asian countries have introduced population-based screening schemes designed to motivate screening and raise the screening rates, and they have successfully decreased the prevalence of cervical cancer.⁹⁾ The most effective approach for prevention of cervical cancer is uterine cancer screening. In Japan, common uterine cancer screening involves an interview, internal examination, and cytological screening. The associations between the rate of screening with this type of program and mortality have been demonstrated.^{10,11)} In Japan, the main cause of death is cancer. A number of

anticancer programs have been developed and implemented since the 1960s. Current programs are based on the Basic Plan to Promote Cancer Control Programs (Article 9-1 of Cancer Control Act). Population-based screening (at municipalities) implemented for different types of cancer including cervical, lung, stomach, and breast cancers is part of the programs.¹²⁾ The target screening rate at municipalities is 50%, which is considered the lowest required for screening to reduce mortality. The mean screening rate across Japan is only 23.8%, the lowest among OECD countries and extremely low compared to the rate in Britain (79%), the Netherlands (70%), and South Korea (65%).¹³⁾ When analyzed by age group, the screening rate across Japan among women in their early 20s is a mere 5.6%, which is approximately one-sixth of the screening rate among women in their late 40s and early 50s (32%). According to the Comprehensive Survey of Living Conditions 2010, the reason why adult women do not undergo screening is “No time” in 22.9% of the entire age group and in 25.8% of women in their 20s, and the proportion was higher in women in their 20s. Women who answered “I do not know the presence of screening” accounted for 4.5% of the entire age group and 13.0% of women in their 20s; those who answered “Worried about fees” accounted for 19.6% of the entire age group and 29.1% of women in their 20s; and those who answered “I feel no need because I am confident of my health” accounted for 9.4% of the entire age group and 15.1% of women in their 20s. Based on the results, it is assumed that women in their 20s were confident about their health and did not understand the purpose of cancer screening and that people should spend time and money on screening for their health.

In Europe and North America, education programs aimed at preventing cervical cancer are established and provided to young women at

schools and workplaces. These programs raise women's knowledge of the disease and high-risk HPV and help them learn about disease prevention and available screening. The number of women who undergo HPV DNA testing and HPV vaccination are also high in those countries. However, these factors that motivate women to participate in cervical cancer screening are lacking in Japan. Therefore, developing effective programs to raise the cervical cancer screening rate among women in their 20s and 30s at high risk is a major health challenge in Japan.^{8, 10, 14)}

In addition, cervical cancer screening in such countries with a high screening rate is available in medical institutions that women usually visit and is conducted by nurses and midwives as well as physicians.^{7, 15)} Since 2007, the Ministry of Health, Labour and Welfare (MHLW) in Japan has made efforts to improve the primary care programs for promoting healthcare to reassure people throughout their lifetime. MHLW also recommends that people should have a local primary care physician. However, the role of primary care physicians is not completely understood and many outpatients present to large-scale hospitals. Furthermore, the shortage and uneven distribution of obstetricians and gynecologists have become a problem. In these situations, designing an assistance mechanism to motivate cervical cancer screening is necessary. This is because, in comparison to general healthcare-seeking behavior that is usually triggered by occurrence of symptoms, cancer screening is aimed at people who have no symptoms.

Hence, individual background and perceived health status influence screening behavior.^{16, 17)} Among the measures of subjective health, perceived health status (subjective definition of health or self-assessed health status) is one of the most important concepts in recent years and is reportedly associated with objective health and healthcare seeking behavior. Health

Locus of Control (HLC), one of the scales designed to measure perceived health status and developed in the United States in the 1960s, has been used for predicting health behavior and assessing the effectiveness of guidance.¹⁸⁻²⁰⁾ HLC evaluates whether an individual has an internal or external health locus of control.²¹⁾

In Japan, cervical cancer screening was made available to all women in their 20s only a few years ago. Because of this, most research in this field is focused on studying screening rates and the validity of screening techniques. In comparison, few studies have investigated participants' perceived health or screening behavior. Factors associated with screening behavior have not been identified.

The present survey was conducted to investigate cervical cancer screening behavior, differences in the behavior among age groups, and factors associated with their behavior in women who underwent cervical cancer screening in the Tsugaru Region of Aomori Prefecture, Japan.

II. Method

1. Subjects

1) The outline of the survey region

The survey region was Hirosaki-shi, Aomori Prefecture. Its population is approximately 180 thousand, and it is the third most populated city in Aomori Prefecture. In the city, there are four universities and several institutions of higher education. There are large and small medical institutions, including highly functional hospitals such as a university hospital and a national hospital, and the per-capita number of medical institutions is the highest in Aomori Prefecture.

According to the survey in fiscal 2006, employment rates in the working-age population were 66.6% in total, 74.6% in men, and 59.4% in women. The rate in women is increasing ever year. The marriage rate in people in their 20s

is low, and the birth rate in women aged 20 to 24 years is the lowest in Aomori Prefecture. The young population rate of Hirosaki-shi was 10% (8.6% in Aomori Prefecture and 7.2% nationwide) and the total fertility rate was 1.19 (1.34 in Aomori Prefecture and 1.31 nationwide), according to the Health Statistics of Aomori Prefecture in fiscal 2008.

Health promotion measures for women in Hirosaki-shi are designed not only as health measures based on the Health Promotion Act but also as part of the municipal programs for the development of the next generation based on the national measures against the declining birth rate and for the development of children and youth. Since 2010, longitudinal work has been conducted with the cooperation system of the divisions for health promotion, children support, and health and physical education, the education institute, and other related units.

2) Summary of cervical cancer screening in Hirosaki-shi

The most common cause of death in Hirosaki-shi was cancer (31.6%), followed by heart disease (15.0%) and cerebrovascular disorder (11.2%), according to the Health Statistics of Aomori Prefecture in fiscal 2010. As cancer measures based on the Health Promotion Act, screenings for cancers in the stomach, lung, large intestine, prostate, and breast are conducted. Cervical cancer screening is conducted under the name of "uterine cancer screening."

Cervical cancer screening includes medical interview, visual inspection, cervical cytology, and internal examination. Colposcopic examination is also performed as necessary. In cervical cytology, samples are collected by scraping the whole areas of the cervix and vaginal surface, and after rapid fixation, they are microscopically examined with Papanicolaou staining. The examinees are informed of the diagnosis approximately 2 weeks after

screening.

Screening is conducted at approximately 10 designated hospitals and clinics in Hirosaki-shi, including the city medical association examination centers. The qualifying age is ≥ 20 years, and there is no upper limit. Women aged ≥ 40 years can undergo screening also at local meeting places (circuit screening with a bus). The expense for screening is subsidized when a woman's age is an even number, and the actual expense is 700 yen for general women (350 yen for national health insurance subscribers and 630 yen for the members of National Health Insurance Association).

The health examination center (the Health Promotion Division) of Hirosaki-shi sends cancer screening notifications by mail to eligible women, and the information on screening is found in bulletins, the Health Calendar, and homepage of the city.

In fiscal 2009, 6,842 of 47,939 eligible women (4,267 at designated medical institutions and 2,575 with circuit screening) underwent cervical cancer screening, and the screening rate was 14.9% (18.8% nationwide and 26.5% in Aomori Prefecture). Among them, the number of women with a finding that required further testing, such as precancerous lesions and suspected cancer, based on the screening result (class III and above) was 99 (1.4%). In Aomori Prefecture, including the survey region, the number of women who require further testing is increasing, and they receive explanation on the importance of close examination and are encouraged to visit medical institutions.^{22, 23)}

Employees and their dependent family members can undergo screening paid by their employers. Similar to population-based screening, they can undergo screening at the examination centers and designated medical institutions. Voluntary screening is conducted at the examination centers and medical institutions, and women can concurrently receive cervical

HPV DNA testing and screening for cancer of the uterine body and ovary. In addition, women can undergo screening when they visit a medical institution for treatment or prenatal checkup. Those who undergo voluntary screening pay the full expenses, starting from approximately 2,500 yen.

3) Target of the survey

The subjects were women 20 years or older living in Hirosaki-shi or regions around Hirosaki-shi who underwent cervical cancer screening (voluntary or population-based) at medical institutions or examination centers in Hirosaki-shi.

2. Survey method

A total of 1,449 women were invited to the survey in person and in writing. The anonymous questionnaire form was distributed to 1,287 women (88.8%) who consented to the survey. Participants filled out the questionnaire, sealed the form in an envelope, and dropped it at a designated place. Researchers later collected the forms.

3. Survey items

The questionnaire form was distributed to each consented woman and was collected later.

1) Subject background

Data regarding the following was collected: age; family structure (marital status, have/do not have children, live alone or with family); and employment status (full-time employed, part-time employed, full-time homemaker, student, or unemployed).

2) Screening behavior

The following information was collected:

1. Screening they were participating in: a) screening designated by employers, b) screening for residents of which Hirosaki-shi notified them, c) voluntary screening whose expense was out-of-pocket, and d) screening with treatment or prenatal checkup.

2. Previous screening experience: regular, irregular, or no previous experience

3. Institutions where they were receiving screening: medical institutions or examination centers

4. Time from the decision to undergo screening to the date of the screening: a) immediately, b) within 1 week, c) within 1 month, d) within 3 months, e) longer than 3 months.

5. Any screening (other than cervical cancer screening) received in the past year and the type(s) of the screening

6. What motivated screening: a) because I have received screening before, b) free ticket to screening, c) recommendation by a healthcare professional, d) recommendation by family or a friend, e) because I am concerned about cancer, and f) because I obtained information on cancer.

3) Attitude towards screening

Data regarding the following were obtained.

1. Reasons for avoiding screening: a) have no family doctor, b) too much of a bother, c) do not know how to undergo screening, d) no time, e) afraid of finding abnormality, f) worried about fees, g) forget undergoing screening after receiving the notice, h) screening is unnecessary when there are no symptoms, and i) other reasons.

2. Barriers to screening: a) because doctors are often men, b) screening facilities are far away from my home or workplace/school, c) do not want to be asked about my sexual activities during screening, d) internal examination is embarrassing, e) anxious about screening procedures, f) cervical cancer screening is much different from other types of examinations, g) worried about a long waiting time, h) screening is not conducted in later hours or on Saturdays or Sundays, and i) other reasons.

3. A preferred screening procedure or setting: a) routine checkup at my workplace (by health insurance) or school, b) voluntary checkup at my own expense (at a clinic or in complete medical checkup), c) population-based general checkup by Hirosaki-shi, d) cancer

screening by Hirosaki-shi, e) screening during a gynecological visit for pregnancy or treatment, f) health checkup necessary for taking a job or examination.

4) Perceived health

Participants in the survey were asked to rate their perceived health status on a 4-point scale from “Very healthy” to “Unhealthy.” To measure their health locus of control, the Japanese version of the Health Locus of Control (JHLC) was used. JHLC was developed by Horike *et al.*, who integrated Japanese views of health and cultural attributes into HLC.²⁴⁾ Adding 1 dimension to MHLC, JHLC consists of 5 subscales: a subscale measuring the internal locus of control (IHLC) and 4 subscales measuring the external loci of control [Professional (PrHLC), Family (FHLC), Chance (CHLC), and Supernatural (SHLC)]. The stable 5-factor structure and Cronbach’s alpha coefficients for the subscales IHLC, PrHLC, FHLC, CHLC, and SHLC (0.82, 0.68, 0.87, 0.77, and 0.86, respectively) have demonstrated the reliability of JHLC.²⁵⁾ Subjects chose 1 answer ranging from “Yes” to “No” for each of 5 questions (each assigned a score of 1–6) in each subscale. The highest score is 30 in each subscale.

4. Survey period

From August 2010 through January 2012.

5. Analysis

Summary statistics were calculated from collected answers. With respect to the subject background, screening behavior, and perceived health status, χ^2 test and residual analysis were used to compare differences between the variables across age groups. An adjusted standardized residual of 2 or higher was defined as “significantly more frequent” and that of -2 or lower as “significantly lower in frequency.” One-way analysis of variance was performed using the mean subscale scores of the JHLC. Multiple comparison test (Tukey’s HSD) was performed

on the items with a significant difference. The reliability of the items was evaluated before analysis. Cronbach’s alpha coefficients for the subscales IHLC, PrHLC, FHLC, CHLC, and SHLC were 0.82, 0.74, 0.86, 0.79, and 0.83, respectively. Multivariate analysis was also performed to investigate factors associated with screening behavior. A logistic regression analysis was performed using respondents’ previous screening experience as the dependent variable and background and outcome of screening behavior as independent variables. Subsequently, Pearson’s correlation coefficient was calculated to investigate the relationships between the internal locus of control and each identified factor. Statistical calculations were performed using IBM SPSS Statistic 20.0. The significance level in each test was $p < 0.05$.

6. Ethical considerations

This survey was conducted after obtaining approval from the Ethics Committee of Hirosaki University Graduate School of Medicine. The consent for participation was obtained from the representatives of the participating medical institutions and examination centers after explanation about the survey had been given in person or in writing. Thorough information about the survey was also given to prospective participants in writing or in person before consent was obtained.

III. Results

1. Subject background

Of collected data from 1,287 respondents, data from 1,207 respondents who answered all the survey items were included in analysis (response rate: 93.4%). The subject background information is shown in Table 1. The age of respondents ranged from 20 to 76 (mean: 37.2) years. Approximately half the respondents were married or had a child(ren), but the percentages were significantly lower in women

Table 1 The subject background information

		All cases n =1207	20~29 n=321	30~39 n=421	40~49 n=295	50or over n=170	<i>p</i>
Item	Average age (SD)	37.2 (10.4)	24.7 (2.9)	34.6 (3.3)	44.3 (2.8)	54.7 (4.8)	
Family structure	Marital status married	675 (55.9)	66 (20.6) ‡	243 (57.7)	219 (74.2)	147 (86.5)	*
	Single	532 (44.1)	255 (79.4) †	178 (42.3)	76 (25.8)	23 (13.5)	
	Have children do not have a child	586 (48.6)	46 (14.3) ‡	206 (48.9)	196 (66.4)	138 (81.2)	
	Do not have children Do not have a child housemate	621 (51.4)	275 (85.7) †	215 (51.1)	99 (33.6)	32 (18.8)	*
	Live with family	481 (39.9)	126 (39.3)	164 (39.0)	113 (38.3)	78 (45.9)	
	Live alone	726 (60.1)	195 (60.7)	257 (61.0)	182 (61.7)	92 (54.1)	ns
Employment status	Full-time employed	691 (57.2)	190 (59.2)	264 (62.7) †	166 (56.3)	71 (41.8) ‡	
	Part-time employed	235 (19.5)	44 (13.7)	74 (17.6)	79 (26.8) †	38 (22.4)	
	Full-time homemaker	172 (14.3)	18 (5.6) ‡	61 (14.5)	40 (13.6)	53 (31.2) †	*
	Student	61 (5.1)	55 (17.1) †	5 (1.2)	1 (0.3)	0 (0.0)	
	Unemployed	48 (4.0)	14 (4.4)	17 (4.0)	9 (3.1)	8 (4.7)	

Mean ±SD or n(%).

The comparison according to the generation: χ^2 test *: $p < 0.05$.

Adjusted standardization residual error †: Significantly thing with much frequency ‡: Significantly thing with a little frequency.

Table 2 The respondents' screening behavior

		All cases n =1207	20~29 n=321	30~39 n=421	40~49 n=295	50 or over n=170	<i>p</i>
Participating	Workplace	420 (34.8)	88 (27.4) ‡	137 (32.5)	121 (41.5)	74 (43.5)	
	Provided by municipalities	413 (34.2)	123 (38.3)	178 (42.3)	71 (24.1)	41 (24.1)	*
	Voluntary	245 (20.3)	53 (16.5)	71 (16.9)	74 (25.1)	47 (27.6)	
	Association with therapy	129 (10.7)	57 (17.8)	5 (8.3)	29 (9.8)	8 (4.7)	
Previous experience	Regular	856 (70.9)	142 (44.2)	307 (72.9)	245 (83.1)	162 (95.3)	
	Irregular	133 (11.0)	31 (9.7)	65 (15.4) †	31 (10.5)	6 (3.5)	*
	Previous experience	218 (18.1)	148 (46.1) †	49 (11.6)	19 (6.4)	2 (1.2)	
Institution	Examination center	685 (56.8)	139 (43.3)	269 (63.9)	172 (58.3)	105 (61.8)	
	Medical institutions	522 (43.2)	182 (56.7) †	152 (36.1)	123 (41.7)	65 (38.2)	*
Time from the decision to undergo screening to the date of the screening	Immediately	261 (21.6)	89 (27.7) †	86 (20.4)	53 (18.0)	33 (19.4)	
	A week	91 (7.5)	34 (10.6) †	30 (7.1)	19 (6.4)	8 (4.7)	
	A month	338 (28.0)	85 (26.5)	120 (28.5)	75 (25.4)	58 (34.1)	*
	Three months	195 (16.2)	47 (14.6)	64 (15.2)	59 (20.0) †	25 (14.7)	
	Longer than three months	322 (26.7)	66 (20.6) ‡	121 (28.7)	89 (30.2)	46 (27.1)	
Any screening	Prior experience	745 (61.6)	174 (54.2)	257 (61.0)	191 (64.7)	123 (72.3)	
	No prior experience	462 (38.3)	147 (45.8) †	164 (39.0)	104 (35.3)	47 (27.6) ‡	*

n(%).

The comparison according to the generation: χ^2 test *: $p < 0.05$.

Adjusted standardization residual error †: Significantly thing with much frequency ‡: Significantly thing with a little frequency.

in their 20s ($p < 0.05$). Approximately three-fourths had a full-time or part-time job, and approximately 14% were full-time homemakers. The proportion of students was significantly higher in women in their 20s ($p < 0.05$).

2. Screening behavior

The respondents' screening behavior is

shown in Table 2. Approximately 70% of respondents underwent population-based screening at workplaces or provided by municipalities. Others participated in voluntary screening or received screening in association with therapy or medical examination that they were undergoing. Over 80% of respondents

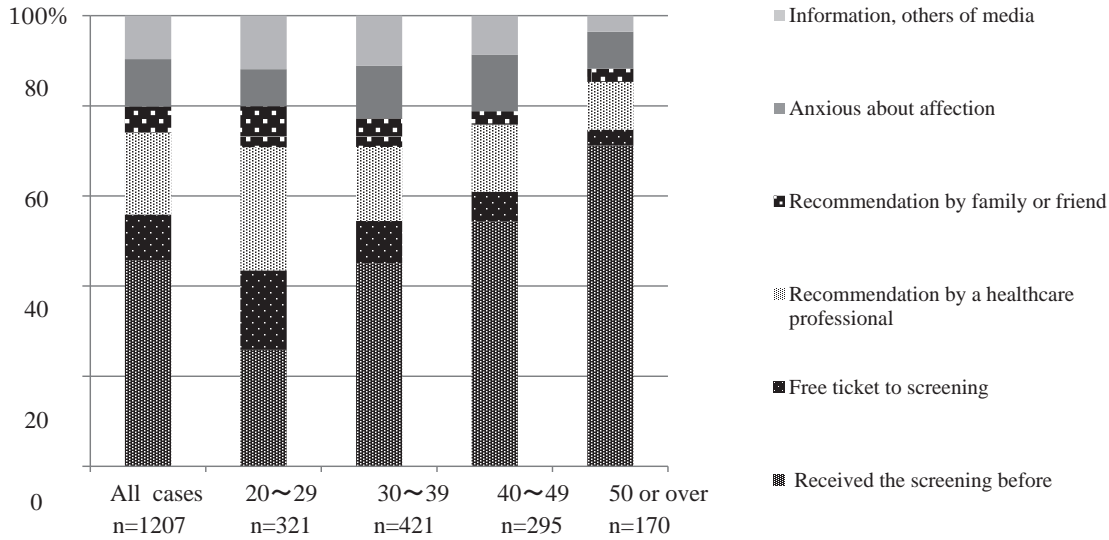


Figure 1 Motivation for screening.

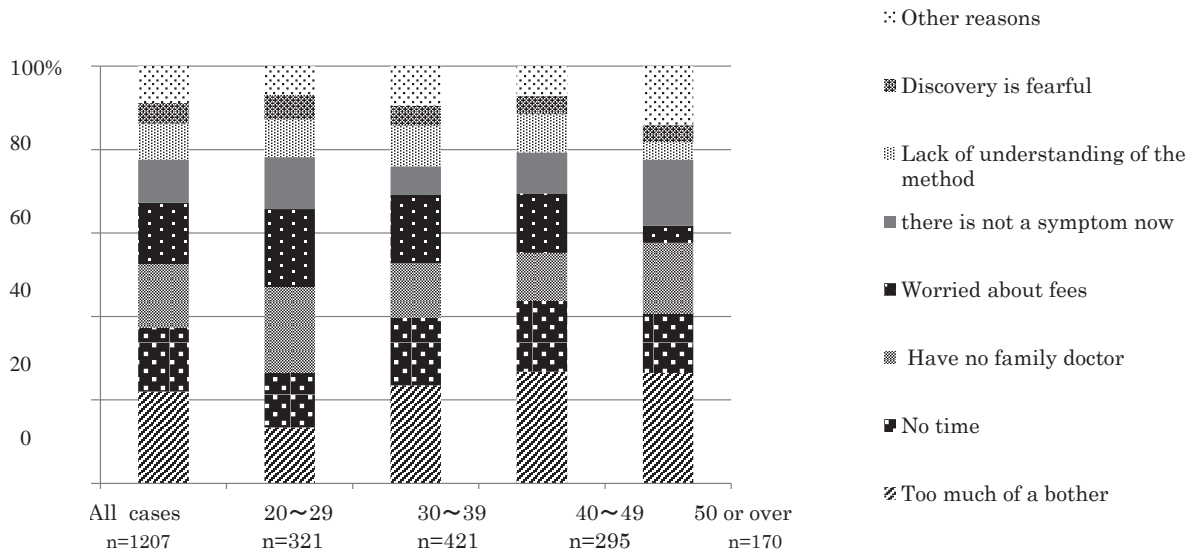


Figure 2 Reasons for avoiding screening.

had previous experience in cervical cancer screening. The proportion of women undergoing regular screening increased with age. Over 70% of women answered that they had been thinking about undergoing the screening for more than a month. When analyzed by age, women in their 20s showed a statistically significant difference in the following items in comparison to other age groups ($p < 0.05$): proportion with no prior

screening, proportion with screening at medical institutions, proportion of those who answered they received the screening “Immediately” after deciding to undergo a screening, and proportion of those with no prior experience in screening other than for cervical cancer. The proportion of women in their 30s who underwent screening irregularly was significantly higher than those in other age groups ($p < 0.05$).

Table 3 The respondents' perceived health status and HLC scores

Item		All cases n =1207	20~29 n=321	30~39 n=421	40~49 n=295	50 or over n=170	F (3,1203)	p	Comparison
Perceived health status	Not so healthy	99 (8.2)	23 (7.2)	34 (8.1)	22 (7.5)	20 (11.8)		ns	
	Healthy	888 (73.6)	211 (65.7) ‡	305 (72.4)	233 (79.0) †	139 (81.8) †		*a	
	Very healthy	220 (18.2)	87 (27.1) †	82 (19.5)	40 (13.6) ‡	11 (6.5) ‡		*a	
Internal HLC		23.2 ± 4.2	23.7 ± 3.9	23.1 ± 4.1	23.1 ± 4.7	22.8 ± 4.2	2.0	ns	
Professional		19.9 ± 4.0	19.7 ± 3.6	19.7 ± 3.9	20.0 ± 4.1	20.5 ± 4.3	2.4	ns	
External HLC	Family	18.3 ± 5.9	16.9 ± 5.6	20.8 ± 5.5	17.9 ± 5.8	15.5 ± 5.3	49.0	*b	5<2,4<3
	Chance	13.9 ± 4.9	13.0 ± 4.6	15.4 ± 5.0	13.7 ± 4.0	12.2 ± 4.7	24.4	*b	2,4,5<3
	Supernatural	19.0 ± 6.7	21.3 ± 6.2	16.1 ± 6.9.	19.4 ± 6.4	21.3 ± 4.8	50.7	*b	3<4<2,5

Mean ±SD or n(%).

The comparison according to the generation

a:The comparison according to the generation: χ^2 test *: $p < 0.05$.

Adjusted standardization residual error †: Significantly thing with much frequency: ‡ Significantly thing with a little frequency

b: One way layout analysis of variance *: $p < 0.05$.

Tukey HSD The multiple comparison method 2 = 20s, 3 = 30, 4 = 40s, 5 = 50s.

The age breakdown of respondents' motivation for screening is shown in Figure 1. Across age groups, the most frequently chosen answer (46.6%) was "Because I have received the screening before." The proportion of women who chose this answer increased with age. The proportion of women in their 20s who answered that "Free ticket to screening," "Recommendation by a healthcare professional," or "Recommendation by family or friend" had motivated them to receive the screening was significantly higher than that in the other age groups ($p < 0.05$). The various reasons, according to age, given for avoiding screening are presented in Figure 2. Across age groups, "Too much of a bother," and "No time" were the most frequent answers. In women in their 20s, the proportion of those who chose "Have no family doctor" (20.6%) or "Worried about fees" (18.7%) was significantly higher than that in other age groups ($p < 0.05$). The proportion of respondents who answered "Too much of a bother" and "Screening is unnecessary when there are no symptoms" was significantly lower in women in their 20s and 30s, respectively ($p < 0.05$).

The highest proportions of respondents answered "Cervical cancer screening is

embarrassing" (22.2%) and "Because doctors are often men" (20.4%) as the barriers to screening. Over 80% of all respondents believed that integrating cervical cancer screening in workplace or school checkups or periodic checkups at municipalities, or making it available at a visit to an obstetrician/gynecologist would motivate them to undergo screening.

3. Perceived health

The respondents' perceived health status and JHLC scores are shown by age group in Table 3. Approximately 90% of respondents answered that they were "Healthy" or "Very healthy." The proportion of women feeling healthy was higher among those in the younger age groups. The proportion of women feeling "Very healthy" was significantly higher among those in their 20s ($p < 0.05$). No one chose "Unhealthy" in any age group. When the JHLC subscale scores were compared, the IHLC score was the highest, followed by the PrHLC and SHLC scores. Analysis of the associations between the IHLC scores representing the internal locus of control and the other subscale scores representing external loci of control revealed that the IHLC score had a positive correlation with the PrHLC, SHLC, and FHLC scores (0.36, 0.27, and 0.16, respectively). The FHLC and CHLC scores were

Table 4 Factors associated with their screening behavior

Item	Adjusted OR	95% confidence interval			<i>p</i>
Age	2.83	2.15	-	3.72	*
Employment status	1.53	1.01	-	2.32	*
Marital status	1.76	1.09	-	2.86	*
Having children	2.48	1.47	-	4.20	*
Previous screening experience	6.77	4.17	-	10.97	*
Undergo other screening	1.93	1.34	-	2.77	*

Logistic-regression analysis.

n=1207 (consultation custom in n=989 less n=218).

86.7% of distinction hitting ratio.

positively correlated (0.46), whereas the FHLC and SHLC scores were negatively correlated (-0.47). No difference was observed in the IHLC or PrHLC scores across age groups. The FHLC, CHLC, and SHLC scores showed a statistically significant difference between age groups ($p < 0.05$). Multiple comparisons revealed that the FHLC and CHLC scores of women in their 30s were higher than those of women in other age groups.

Respondents' screening behavior and factors associated with their screening behavior are shown in Table 4. Logistic regression analysis showed that age, employment status, marital status, and having or not having children were statistically significant factors associated with previous screening experience. Among factors investigated as screening motivators, having a previous screening experience and undergoing other tests/examinations were statistically significant ($p < 0.05$). Comparison of the odds ratios showed that having a previous screening experience (adjusted OR: 6.8, 95% CI: 4.2–11.0) was most strongly related to screening behavior, followed by age (OR: 2.8, 95% CI: 2.1–3.7) and having a child(ren) (OR: 2.5, 95% CI: 1.13–2.8).

IV. Discussion

1) Background and motivators in women who undergo screening

Respondents to the present survey had a mean age of 37.2 years, which was lower than

that of Japanese women. Approximately half of the respondents were either married or had a child(ren). The proportion of employed respondents was above 70%, which was higher than the national average of 60%. Further, 80% of the respondents had a previous cervical cancer screening experience. Of these, the proportion of those undergoing screening regularly was lowest in the youngest age group, with a difference of 10%–30% between neighboring age groups. Approximately 70% of respondents participated in population-based screening or workplace screening (for the person insured and the dependents). The proportion of respondents who underwent screening voluntarily was much lower. The screening rate at workplaces was approximately 10% higher than the previously reported rate of 26% in the Tokyo metropolitan area, and it was similar to a rate estimated from the number of recipients of medical and general checkups (in the 1-year period before the present survey) reported in the Comprehensive Survey of Living Conditions 2010.^{26, 27)} Approximately 70% of respondents answered that they had been considering receiving screening for more than 1 month. The most important motivators were “Because I have received the screening before” and “Recommendation by a healthcare professional.” Previous screening experience was associated with respondents' demographics such as age, employment status, marital status, and having a child(ren). A previous survey in

800 women who were using a daycare center for their children (employed and had a child/children) or female employees at the daycare centers reported that the screening rate was significantly higher in women who had knowledge of cervical cancer, HPV, or HPV vaccination than in those who did not have such knowledge.²⁸⁾ The survey also reported that motivators for screening were publicity campaigns, recommendation by a healthcare professional, and participation in a checkup at workplaces or prenatal checkup. Another survey by the Japan Cancer Society reported that women who underwent regular screening knew more about cervical cancer and how to participate in a screening than those who had never underwent cervical cancer screening. In addition, approximately 90% of the respondents who underwent regular screening replied that they were willing to continue screening regularly. Participants in the survey raised healthcare professionals as an important source of information in terms of their screening behavior.²⁹⁾

Women have opportunities to receive guidance and advice on their health from healthcare professionals as they get older and go through important life events such as entering the workforce, marriage, and childbirth. They seem to increase their interest in and knowledge of cervical cancer screening through these events. More opportunities of receiving guidance on screening are thought to be associated with regular and continuous screening.

2) Support for the promotion of screening in women in their 20s and 30s

In the present survey, >40% of women in their 20s and 30s reported "Free ticket," "Recommendation by a healthcare professional," and "Recommendation by family or a friend" as motivators for screening. The previous survey revealed that the national screening

rate increased after distribution of free tickets for screening. When data were analyzed by age group in the report, the proportion of women who actually used the ticket was 30% in women aged ≥ 30 years, 17.7% in women in their late 20s, and 8.6% in women in their early 20s; the proportion was lower in women in their 20s.³⁰⁾ In the present survey, however, the effectiveness of free tickets in women in their 20s was suggested. Respondents in this survey received the screening notice and free ticket by mail. This may be the reason why free tickets motivated respondents to undergo screening more effectively than general campaigns issuing public notices and recommendations. Nationwide promotional campaigns were also conducted simultaneously with distribution of tickets, and the first HPV vaccine in Japan was approved around the same time. In addition, a vaccination subsidy program was started recently and many other measures against cervical cancer were initiated by municipal governments. The combination of these events may have increased women's knowledge and awareness of cervical cancer in the society in general, particularly in young women and mothers raising children.

As other results in this survey, women in their 20s had fewer experience of screening for cervical and other cancers. Many of them had no family doctor and showed anxiety toward screening. Similar tendency is observed in overseas countries with a high screening rate. In these countries, young women do not have adequate knowledge about cervical cancer or screening, and the anxiety that women experience when they receive a positive result in recently introduced HPV DNA testing or detection of CIN remains an issue.^{31, 32)} This suggests that we should develop assistance programs to be made available to screening recipients along with the efforts to increase screening rate. Previous surveys in Japan have reported that "No time," "I can receive screening

at any time if I want to," "Worried about fees," and "It's a hassle" were common reasons for avoiding cancer screening. In addition, in the present survey, "Too much of a bother" and "No time" were chosen by the largest proportion of respondents as a whole. In women in their 20s, however, the proportion of those who answered "Too much of a bother" was significantly lower than that in other age groups. In contrast, "Have no family doctor" and "Worried about fees" were more frequent answers among the youngest age group. These patterns have been identified for the first time in women in their 20s. They seem to suggest that some young women in their 20s who have never received cervical cancer screening may be willing to undergo screening only if they have a family doctor and the screening procedure is presented to them. A survey conducted by the WACC in 6,000 participants in Germany, Belgium, and Spain reported that approximately 50% of respondents had a family doctor and some started cervical cancer screening in their teens together with their mother when prompted by events such as menarche.³³⁾ In countries, including Britain, gynecological examination is provided by family doctors, midwives, or nurses. The circumstances in these countries are significantly different from those of Japan where women have to see an obstetrician/gynecologist to receive examination.³⁴⁾ These differences in environment, however, do not prevent us from providing adequate education about cervical cancer to girls and young women. Providing guidance on cervical cancer repeatedly at available opportunities is effective and more advisable than waiting for girls to reach an age ready for screening from an obstetrician/gynecologist. For instance, integrating an educational program on cervical cancer into school curricula, educating parents to give information and guidance on the matter, or providing information on the matter to girls at their visits to internal medicine

physicians or pediatricians for HPV vaccination may serve the purpose.

3) Necessity of the screening system and recommendations according to lifestyles

In the present survey, 10% of respondents answered that they received screening irregularly. No factor significantly interfering with regular screening was identified in the present survey. On reasons for avoiding screening, however, the proportion of women who answered "Screening is unnecessary when there are no symptoms" was significantly lower in respondents in their 30s (the age group with a significantly higher proportion of women receiving screening irregularly than other age groups). This suggests that women do understand the significance of screening, but their screening behavior is influenced by social and/or economic factors.³⁵⁾ In a previous survey that investigated the effects of life events on lifestyle habits in 200 women in their 20s and 30s, who were living in the same areas as those who participated in this survey, worsening lifestyle prompted by childbirth or during childcare was a statistically significant factor associated with irregular or discontinued checkups ($p < 0.01$).³⁶⁾ In another overseas survey in 1,600 respondents, the prevalence of cervical cancer was increased when visits to medical institutions or examination centers became sporadic. The survey also reported that having a child/children, a certain lifestyle, poor economic condition, and lack of adequate knowledge about screening increased women's risk for cervical cancer.³⁷⁾ In Britain, those who do not respond to a first notice for screening receive the second notice to reduce irregular screening. This has reportedly increased the screening rate.^{38, 39)} In Japan, different eligibility criteria for checkup apply and different approaches to encouraging checkup are used in each municipality. Individual encouragement and/or giving repeated notices for checkup/

screening are used only in a small number of municipalities. These should be organized at a nationwide level.

In Europe and North America, the screening rates for uterine cancer are already high. Research in these countries is also focused on developing programs to follow up women whose screening results require further examination and who are positive for HPV DNA testing.⁴⁰⁾ In a survey in the United States, where voluntary checkup is the norm, approximately 60% of individuals whose screening results recommended a further examination underwent further examination, and 40% of these received information about necessary examinations from clinics. The survey report noted the location of examinees' residence, collaboration with local health centers, and age of examinees as factors associated with screening behavior. The authors of the report noted that services that people can use to obtain information about where and how to receive the required care are more important for increasing screening rates than factors associated with individual screening behavior.⁴¹⁾ From the standpoint of health promotion, the World Health Organization (WHO) indicates the importance of environmental improvement to maintain good health habits as well as the importance of voluntary participation in health education.^{42, 43)}

In the present survey, 80% of respondents answered that integrating cervical cancer screening with other checkup opportunities may motivate them to undergo screening. This sheds light on the importance of reconsideration on screening procedures and settings in view of residents' convenience in addition to population-based screening.

On perceived health status, respondents of the present survey generally felt that they were healthy. With respect to the JHLC subscales, women had a high IHLC across age groups. The findings suggest that respondents felt strongly

about protecting their own health and chose to undergo cervical cancer screening although they felt healthy at the moment. At the same time, a positive correlation was observed between their IHLC scores and scores of the FHLC and PrHLC subscales (the external loci of control), indicating women felt that in addition to individual effort, medicine and family also had some control over their own health. On the external loci of control other than PrHLC, CHLC scores showed a negative correlation and SHLC scores showed a positive correlation with IHLC scores. This showed that respondents felt supernatural factors such as gods and karma were more important for health than chance. This may be attributable to the cultural characteristics of the surveyed region.⁴⁴⁾ Because people with a high IHLC and low external loci of control are thought to be more likely to act on their own interpretation, giving guidance on cervical cancer and screening may not prove effective in such women. On the other hand, because women such as the respondents in this survey seem to have high external loci of control, those traits may be utilized to make guidance effective.^{45, 46)} Japanese women have particularly high PrHLC scores among the external loci of control.⁴⁷⁾ Therefore, if healthcare professionals can enhance their own perceived health and be aware of their influence on others to effectively motivate women to receive screening, it will become a support measure based on the viewpoint of health promotion and will thereby increase public interest in cervical cancer screening and the opportunities for women to undergo screening. As a previous study on health behavior reported, people are inclined to look at the negative aspects more than the positive ones while preparing for screening. However, people are more likely to look at the positive aspects than the negative ones after receiving screening.⁴⁸⁻⁵⁰⁾ As being aware of benefits is thought to have a significant

influence on screening behavior, people should be given accurate information to reduce their anxiety about screening. Healthcare professionals should select an approach that can satisfy participants after screening.^{51, 52)}

The present survey sheds light on women's behavior and factors associated with cervical cancer screening. The gathered insights into promoting screening behavior are clinically meaningful. Health education and promotion programs designed for women of different ages and background should prove effective in motivating women with no prior screening experience to participate in screening. Effective dissemination of information about screening procedures is also likely to promote regular screening behavior and increase screening rate.

4) Limitations and issues of the present survey

The surveyed regions were limited in this survey. This makes nationwide generalization of the findings somewhat difficult. In addition, women who had never undergone screening were not included in this survey. Future research should further investigate factors associated with screening behavior and differences in perceived health status between women with and without screening experience.

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