Web-based Recruiting for a Survey on Knowledge and Awareness of Cervical Cancer Prevention Among Young Women Living in Kanagawa Prefecture, Japan

Etsuko Miyagi, MD, PhD,* Yoko Motoki, MD,* Mikiko Asai-Sato, MD, PhD,* Masataka Taguri, PhD,† Satoshi Morita, PhD,† Fumiki Hirahara, MD,* John D. Wark, MD, PhD,‡§ and Suzanne M. Garland, MD||¶**

Objectives: Cervical cancer (CC) incidence and mortality among young women have been increasing in Japan. To develop effective measures to combat this, we assessed the feasibility of using a social networking site (SNS) to recruit a representative sample of young women to conduct a knowledge and attitude study about CC prevention via an internet-based questionnaire.

Methods: From July 2012 to March 2013, advertising banners targeting women aged 16 to 35 years in Kanagawa Prefecture were placed on Facebook in a similar manner as an Australian (AUS) study conducted in 16- to 25-year-olds in 2010 and on a homepage to advertise our CC advocacy activities. Eligible participants were emailed instructions for accessing our secure Web site where they completed an online survey including demographics, awareness, and knowledge of human papillomavirus (HPV) and CC. Data for the study population were compared with the general Japanese population and the AUS study.

Results: Among 394 women who expressed interest, 243 (62%) completed the survey, with 52% completing it via Facebook. Women aged 26 to 35 years, living in Yokohama City, with an education beyond high school, were overrepresented. Participants had high awareness and knowledge of HPV and CC, comparable with the AUS study participants. However, the self-reported HPV vaccination rate (22% among participants aged 16–25 years) and the recognition rate of the link between smoking and CC (31%) were significantly lower than in the AUS study (58% and 43%, respectively) (P < 0.05). Significant predictors of high knowledge scores about HPV included awareness of HPV vaccine (P < 0.001) and self-reported HPV vaccination (P < 0.05).

Conclusions: The SNS and homepage are efficient methods to recruit young women into health surveys, which can effectively be performed online. A nationwide survey using SNSs would be an appropriate next step to better understand the current lack of uptake of the national HPV vaccine program by young women in Japan.

Key Words: Cervical cancer, HPV, Young female, Social networking sites, Advocacy

Received May 7, 2014, and in revised form June 18, 2014. Accepted for publication June 19, 2014.

(Int J Gynecol Cancer 2014;24: 1347–1355)
The increasing incidence and mortality rates of cervical cancer (CC) among young Japanese (JPN) women are a serious health problem. This situation is thought to be a result of low uptake of the CC cytology screening program. With a population of approximately 65,600,000 women, Japan reported in 2007 that 8867 women were newly diagnosed with invasive CC, whereas 2737 women died from the disease in 2011. To establish effective prevention strategies in Japan, we require a broader understanding of reproductive and sexual health behaviors among young people, because the risk for CC begins at the first intercourse. The recruitment of representative samples of young people is challenging as this population is increasingly mobile and, in general, indifferent to medical issues. Moreover, traditional strategies, such as random digit dialing and media advertising campaigns, have limitations, including low participation rates due to reduced landlines and high costs.

Recently, a study conducted by us in Australia showed that using the social networking site (SNS), Facebook (FB), was an effective strategy to identify a representative sample of young women. This Australian (AUS) study demonstrated the potential of using SNSs in a cost-effective way to engage young women in health research and to penetrate nonurban communities. In Japan, SNSs, including FB, are rapidly being embraced among younger generations with 72% in their teens and 64% in their 20s being reported as regular users. Furthermore, around 42% of JPN women aged 10 to 39 years have their own FB account with 50% of them being daily users.

In this study, our objectives were to measure (1) the feasibility of recruiting a representative sample of young women aged 16 to 35 years living in Kanagawa Prefecture (population of 9,084,000) using an SNS for a health study and (2) the knowledge and attitudes of that representative sample of young women toward CC prevention. The data were compared with the AUS study, where very comprehensive CC screening and human papillomavirus (HPV) vaccine programs are established.

MATERIALS AND METHODS

Recruitment

Inclusion criteria were being female; having an age of 16 to 35 years; living in Kanagawa Prefecture, Japan; and a written consent for completing an online survey. As minors are legally defined as 19 years and younger in Japan, girls aged 16 to 19 years required written parental consent for participation in the study.

Participants were recruited for 9 months, from July 2, 2012, to March 20, 2013, using FB advertisements targeted by age and place of residence, in addition to a banner on the homepage (HP) (http://kanagawacc.jp/) to advertise our CC prevention project, which started in 2011 as the Yokohama-Kanagawa CC Prevention Project (YKCCPP). The YKCCPP was announced via public lectures, television, and brochures, whereas FB advertisements were displayed only for FB users whose profiles met the inclusion criteria. We chose the “cost-per-click” option for FB advertisements, which charged each time the advertisement was clicked on. When someone clicked on the advertisement, they were redirected to our secure study Web site that contains detailed study information. Potential participants expressed their interest by giving their name, residential and email addresses, age, and telephone number on a form on the study Web site. After receiving information from potential participants, a consent form was sent to their residential address by mail. All potential participants who furnished signed consent forms had their final eligibility confirmed by telephone or email; those who did not respond to a second notification by email within 2 months were considered to have withdrawn their expression of interest (EoI). Eligible participants were then emailed instructions for accessing the online survey. The online survey tool SurveyMonkey with the enhanced security option of Secure Socket Layers encryption was used to administer the survey to participants. For further protection of privacy, research assistants, who were not qualified to access the questionnaire data, provided each participant with a unique study ID to access the survey, so that the researchers could not connect a participant’s name with the unique ID. As compensation for participants’ time in the online survey, a gift card worth JPY 1,000 (US $1 = JPY 80 in June 2012) was sent to those completing it.

Questionnaire

The survey contained questions on demographic variables (date of birth, marital status, country of birth, educational background, and residential address); self-reported height and weight; how participants found the study; sexual history; and experience and knowledge of chlamydia, HPV, HPV vaccine, and CC. With the exception of several questions about CC, these questionnaires were almost identical to the study in Australia conducted in 2010 (AUS study).

HPV and CC Knowledge Scores

The HPV and CC knowledge were evaluated using the same method as the AUS study. The HPV knowledge was defined by a “yes” response to the question “Do you know what HPV is?” The HPV knowledge was evaluated only among participants who responded “yes” to the question “Do you know what HPV is?”, using 6 subsequent “true/false/don’t know” questions. One point was given for each correct answer, and a knowledge scale (0–6, from no to high) was constructed. Participants who did not know what HPV was were automatically given a score of 0. The HPV knowledge scale was divided into 3 groups according to the participants’ scores: low (0–2), moderate (3–4), and high (5–6). The CC knowledge was also assessed using 7 “yes/no/don’t know” questions about the factors that reduce a person’s risk for CC. One point was given for each correct answer, and a knowledge scale (0–7) was constructed. The CC knowledge scale (0–7) was divided into 3 groups: low (0–2), moderate (3–4), and high (5–7).

Statistical Analysis

Statistical analysis was performed using SPSS version 20 (IBM Corporation, Armonk, NY). We used Japanese Bureau of Statistics 2010 census data to compare our study group with the distribution of the general population. Regarding women’s educational background and body mass index (BMI), data from the Employment Status Survey 2012 from the Japanese Bureau of Statistics and National Health.
and the Nutrition Survey 2010 from Ministry of Health, Labour and Welfare\textsuperscript{17} were cited, respectively. We compared demographic characteristics in our samples with those of the general population using Fisher exact test. Odds ratios, adjusted odds ratios, 95\% confidence intervals (CIs), and two-sided \( P \) values were estimated using binomial logistic regression analysis. In all analyses, we defined a two-sided \( P < 0.05 \) as statistically significant. Data were treated as missing if no response was given or "don’t know" was selected. Binomial logistic regression analysis was used to identify independent predictors of HPV and CC knowledge.

**Ethical Considerations**

After users were directed to our secure study Web site, all subsequent study procedures took place outside the SNSs. This study protocol was approved by the institutional ethics committee of Yokohama City University School of Medicine.

**RESULTS**

**Recruitment**

The FB advertisements were displayed 5,698,440 times from July 2012 until April 2013, resulting in 1,588,711 viewers and 2171 clicks on the advertisement that directed respondents to the study Web page. There were 2853 visitors to the YKCCPP HP, with 1141 visitors being directed to the study Web page. Of the total 3312 unique visitors to the study Web page, 394 (204 via FB, 190 via HP) showed an EoI in sending individual information from the Web page. We collected signed consents from 264 of those 394 women (67\% of EoIs), and 243 (62\% of EoIs) women completed the survey. Overall, 52\% (127/243) were recruited through FB, and the remainder was recruited through the HP: the demographics were not different between the 2 groups except that the number of virgins was greater and the proportion of age of first sexual intercourse being 16 to 18 years was lower in the HP (data not shown). The detailed recruitment steps are shown in Figure 1.

![FIGURE 1. Summary of recruitment steps. Sampling and response steps are shown. Percentages are calculated using the number of EoIs (\( n = 394 \)). The EoI was defined to give their name, residential address, age, email address, and telephone number on a form on the study Web site.](image)

**Participants’ General Demographic Characteristics**

The participants’ general demographic characteristics are shown in Table 1. Compared with the general target population,\textsuperscript{12} participants aged 16 to 21 years were underrepresented, whereas those aged 22 to 25 years were representative, and those aged 26 to 35 years were overrepresented (\( P < 0.05 \)). Residents in the capital (Yokohama City) were overrepresented compared with the other cities and towns (\( P < 0.05 \)). Most participants were born in Japan (97.1\%), which was similar to the target population (\( P = 0.46 \)). As for educational background, 5 (2.1\%) participants were high school students, 47 (19.3\%) were high school graduates, and 190 (78.2\%) had an educational level higher than high school graduate (\( P < 0.05 \)). Another parameter of significant difference was that 23\% of the study participants were underweight.
(BMI < 18.5 kg/m²), compared with 16.7% of the women in the target population, according to the National Health and Nutrition survey\(^\text{17}\) \((P < 0.05)\). However, for the participants aged 16 to 25 years, the BMI distribution was comparable with the target population \((P = 0.85)\).

### Critical Characteristics of Participants Related to CC Compared With the AUS Study

The analyses of critical characteristics of participants related to CC in the JPN study in comparison with data from the AUS study are shown in Table 2. The significant differences among participants aged 16 to 25 years were the age of first intercourse in 12 to 15 years old \((\text{JPN}, 7.7\% \text{ vs AUS, 20.5\%; } P < 0.001)\), chlamydia awareness \((\text{JPN}, 89.7\% \text{ vs AUS, 77.7\%; } P < 0.005)\), and self-reported HPV vaccination status \((\text{JPN}, 21.8\% \text{ vs AUS, 58.3\%; } P < 0.001)\). The rates of HPV awareness \((\text{JPN}, 67.9\% \text{ vs AUS, 62.2\%; } P = 0.895)\) and awareness of HPV vaccines \((\text{JPN}, 79.8\% \text{ vs AUS, 75.5\%; } P = 0.303)\) were comparable in the 2 studies. Self-reported CC screening status was asked only in the JPN study: 65.0% (158/236) among participants aged 16 to 25 years old, compared with 16.7% of the women in the target population, according to the National Health and Nutrition survey\(^\text{17}\) \((P < 0.001)\). However, for the participants aged 16 to 25 years, the BMI distribution was comparable with the target population \((P = 0.85)\).

### Table 1. General demographic characteristics of study participants

| Characteristic                        | No. | Rate, % | 95% CI | Target Population | Rate, % | \(P\) |
|--------------------------------------|-----|---------|--------|-------------------|---------|------|
| **Age group, y\(^\ast\)**           |     |         |        |                   |         |      |
| 16–17                                | 4   | 1.6     | 0.0–3.2| 77,499            | 7.4     | <0.001|
| 18–21                                | 29  | 11.9    | 7.9–16.0| 176,271           | 16.8    |      |
| 22–25                                | 45  | 18.5    | 13.6–23.4| 193,250           | 18.4    |      |
| 26–30                                | 75  | 30.9    | 25.1–36.7| 274,747           | 26.2    |      |
| 31–35                                | 90  | 37.0    | 31.0–43.1| 324,620           | 31.0    |      |
| **Geographic region\(^\ast\)**      |     |         |        |                   |         |      |
| Yokohama city                        | 143 | 58.8    | 52.7–65.0| 422,238           | 40.4    | <0.001|
| Kawasaki and Sagamihara city        | 44  | 18.1    | 13.3–22.9| 275,998           | 26.4    |      |
| The other cities and towns           | 56  | 23.0    | 17.8–28.3| 348,051           | 33.3    |      |
| **Country of birth\(^\ast\)**       |     |         |        |                   |         |      |
| Japan                                | 236 | 97.1    | 95.0–99.2| 1,013,379         | 96.8    | 0.459 |
| Others                               | 5   | 2.1     | 0.3–3.8 | 33,008            | 3.2     |      |
| No answer                            | 2   | 0.8     | 0.0–2.0 |                   |         |      |
| **Educational level\(^\dagger\)**   |     |         |        |                   |         |      |
| <High school graduate                | 5   | 2.1     | 0.3–3.8 | 16,500           | 16.9    | <0.001|
| High school graduate                 | 47  | 19.3    | 14.4–24.3| 338,000           | 34.5    |      |
| >High school graduate                | 190 | 78.2    | 73.0–83.4| 463,100           | 47.3    |      |
| No answer                            | 1   | 0.4     | 0.0–1.2 | 12,800           | 1.3     |      |
| **BMI, kg/m\(^2\): 16–35 years old\(^\dagger\)** |     |         |        |                   |         |      |
| <18.5 (underweight)                 | 56  | 23.0    | 17.8–28.3| 137              | 16.7    | 0.030 |
| 18.5–25 (normal)                    | 166 | 68.3    | 62.5–74.2| 598              | 72.7    |      |
| 25–30 (overweight)                  | 15  | 6.2     | 3.1–9.2 | 87               | 10.6    |      |
| >30 (obese)                         | 2   | 0.8     | 0.0–2.0 |                   |         |      |
| No answer                            | 4   | 1.6     | 0.0–3.2 |                   |         |      |
| **BMI, kg/m\(^2\): 16–25 years old\(^\dagger\)** |     |         |        |                   |         |      |
| <18.5 (underweight)                 | 17  | 21.8    | 12.6–31.0| 80               | 20.2    | 0.853 |
| 18.5–25 (normal)                    | 55  | 70.5    | 60.4–80.6| 284              | 71.7    |      |
| 25–30 (overweight)                  | 4   | 5.1     | 0.2–10.0| 32               | 8.1     |      |
| >30 (obese)                         | 1   | 1.3     | 0.0–3.8 |                   |         |      |
| No answer                            | 1   | 1.3     | 0.0–3.8 |                   |         |      |

Data for the study population were compared with the target population.

\(^\ast\)Target population data of Kanagawa Prefecture from the Ministry of Internal Affairs and Communications Statistics Bureau Census 2010.\(^{12}\)

\(^\dagger\)Target population data range 15 to 34 years old from distribution of educational background in Kanagawa Prefecture.\(^{16}\)

\(^\ddagger\)Target population data range 15 to 39 years old from the National Health and Nutrition Survey 2011.\(^{17}\)

\(^\S\)Target population data range 15 to 29 years old from the National Health and Nutrition Survey 2011.\(^{17}\)
| Characteristic                              | Japan (16–35 Years Old), n = 243 | Japan (16–25 Years Old), n = 78 | Australia (16–25 Years Old), n = 278 | P*       |
|-------------------------------------------|----------------------------------|----------------------------------|--------------------------------------|----------|
| **Age at first vaginal intercourse, y**   |                                  |                                  |                                      |          |
| Never                                     | 31                               | 24                               | 62                                   | 0.001    |
| Age not specified                         | 21                               | 6                                | 21                                   | 0.001    |
| 12–15                                     | 14                               | 6                                | 57                                   | 0.001    |
| 16–18                                     | 71                               | 13                               | 99                                   | 0.001    |
| 19–24                                     | 98                               | 29                               | 39                                   | <0.001   |
| 25–30                                     | 8                                | NA                               | NA                                   | <0.001   |
| 31–35                                     | 0                                | NA                               | NA                                   | <0.001   |
| **Chlamydia awareness**                   |                                  |                                  |                                      |          |
| No                                        | 17                               | 8                                | 61                                   | <0.001   |
| Yes                                       | 226                              | 70                               | 213                                  | <0.001   |
| **Awareness of HPV vaccines**             |                                  |                                  |                                      |          |
| No                                        | 47                               | 14                               | 65                                   | <0.001   |
| Yes                                       | 194                              | 62                               | 210                                  | <0.001   |
| **Self-reported HPV vaccination status**  |                                  |                                  |                                      |          |
| No                                        | 206                              | 59                               | 62                                   | <0.001   |
| Yes                                       | 30                               | 17                               | 162                                  | <0.001   |
| Don’t know                                 | 6                                | 2                                | 54                                   | <0.001   |
| No answer                                 | 1                                | 0                                | 0                                    | <0.001   |
| **Self-reported CC screening status**     |                                  |                                  |                                      |          |
| No                                        | 51                               | 35                               | NA                                   | <0.001   |
| Yes                                       | 158                              | 25                               | NA                                   | <0.001   |
| Don’t know                                 | 1                                | 0                                | NA                                   | <0.001   |
| No answer                                 | 33                               | 18                               | NA                                   | <0.001   |

*Compared with the data of 16 to 25 years old between Japan and Australia. NA, not applicable.
Comparison of HPV and CC Knowledge Between the JPN Study and the AUS Study

In the JPN study, HPV knowledge was assessed in the 164 participants who reported knowing what HPV was, whereas the questions about factors to reduce CC risks (CC knowledge) were asked to all participants. Percentages of correct answers to each item for HPV and CC knowledge were compared with data from the AUS study (Table 3). In both studies, almost all participants answered correctly “false” to the question that no factors reduce CC risks. Compared with the participants in the AUS study, those from Japan aged 16 to 25 years demonstrated better knowledge for HPV being a common virus and being sexually transmitted ($P < 0.05$). Among all JPN participants, 73.3% (95% CI, 66.5–80.1) recognized HPV as a common virus compared with 47.9% (95% CI, 44.1–51.7) for the AUS study. On the other hand, the correct answer of “no” regarding HPV as an inherited virus was obtained significantly less often in the JPN study (37.6%; 95% CI, 44.1–51.7) for the AUS study (69.9%; 95% CI, 66.4–73.4). For the questions regarding reduction of CC risk, the correct answer rates of “true” for the Papanicolaou test were more than 90% in both studies; however, the answer rate of “true” regarding the HPV vaccine was significantly higher in the AUS study (94.2; 95% CI, 91.5–96.9) than in the JPN study (80.7%; 95% CI, 75.7–85.7). The correct answer rate of “true” for refraining from smoking was very low (31.3%; 95% CI, 25.5–37.1) in the JPN study and was significantly lower than the rate (42.8%; 95% CI, 37.0–48.6) in the AUS study.

Although the mean (SD) HPV knowledge score among the JPN study participants aged 16 to 35 years at 3.1 (2.5) (95% CI, 2.8–3.5) was slightly higher than that among the AUS study participants aged 16 to 25 years (2.8 [2.4]; 95% CI, 2.5–3.1) ($P = 0.03$), it is noteworthy that there was no significant difference in the mean HPV knowledge scores for participants aged 16 to 25 years in both studies. The CC knowledge scores were comparable between the studies (JPN, 4.9 [1.0] and 95% CI, 4.8–5.0 vs AUS, 5.0 [1.0] and 95% CI, 4.9–5.1).

Predictors of High Knowledge Scores of HPV and CC Among Participants in the JPN Study

Table 4 shows predictors of high HPV knowledge. Awareness of HPV vaccine (adjusted odds ratio [OR], 10.31; 95% CI, 3.46–30.76; $P < 0.001$) and self-reported administration of HPV vaccination (adjusted OR, 3.11; 95% CI, 1.09–8.87; $P = 0.034$) were significant predictors of high HPV knowledge, with scores of 5 to 6 points. Whereas awareness of chlamydia was a significant predictor of a high HPV score (adjusted OR, 2.57; 95% CI, 1.11–5.94) in the

### TABLE 3. Comparison between participants in Japan study and Australia study concerning their knowledge of HPV and CC

| Correct Answer Rates to Each Question | Japan (16–35 Years Old), % (95% CI) | Japan (16–25 Years Old), % (95% CI) | Australia (16–25 Years Old), % (95% CI) |
|--------------------------------------|-------------------------------------|-------------------------------------|----------------------------------------|
| About HPV                            |                                     |                                     |                                        |
| Sexually transmitted infection (T)   | 87.9 (82.9–92.9)*                    | 93.8 (87.0–100.0)*                  | 73.4 (70.0–76.8)                       |
| Common virus (T)                     | 73.3 (66.5–80.1)*                    | 77.1 (65.2–89.0)*                   | 47.9 (44.1–51.7)                       |
| Inherited virus (F)                  | 37.6 (30.2–45.0)*                    | 39.6 (25.8–53.4)*                   | 69.9 (66.4–73.4)                       |
| Rare virus that infects only people with many sex partners (F) | 84.8 (79.3–90.3)* | 81.2 (70.1–92.3) | 75.7 (72.4–79.0) |
| Affects only the elderly (F)         | 92.1 (88.0–96.2)                     | 95.8 (90.1–100.0)                   | 94.2 (92.4–96.0)                       |
| Related to CC (T)                    | 87.3 (82.2–92.4)                     | 81.2 (70.3–92.3)*                   | 92.4 (90.4–94.4)                       |
| About factors to reduce CC risks     |                                     |                                     |                                        |
| Papanicolaou test (T)                | 97.5 (95.5–99.5)*                    | 98.7 (96.2–100.0)*                  | 91.4 (88.1–94.7)                       |
| HPV vaccine (T)                      | 80.7 (75.7–85.7)*                    | 82.1 (73.6–90.6)*                   | 94.2 (91.5–96.9)                       |
| Safe sex (T)                         | 68.3 (62.4–74.2)                     | 74.4 (64.7–84.1)                    | 71.9 (66.6–77.2)                       |
| Refrain from smoking (T)             | 31.3 (25.5–37.1)*                    | 26.9 (17.1–36.7)*                   | 42.8 (37.0–48.6)                       |
| Exercise (F)                         | 63.0 (56.9–69.1)*                    | 64.1 (53.5–74.7)                    | 54.0 (48.1–59.9)                       |
| Healthy food (F)                     | 51.4 (45.1–57.7)                     | 55.1 (44.1–66.1)                    | 47.8 (41.9–53.7)                       |
| Nothing (F)                          | 99.6 (98.1–100.0)                    | 100.0                               | 99.6 (98.9–100.0)                      |

* $P < 0.05$ compared with the data in Australia.

T, true; F, false.
AUS study,\(^9\) it was not significant in the JPN study (adjusted OR, 1.72; 95% CI, 0.40–4.46). There was no significant predictor related to high CC knowledge scores of 5 to 7 points found (Table 1, Supplemental Digital Content 1, http://links.lww.com/IGC/A226).

### DISCUSSION

In Australia and Japan, the recent age-adjusted CC incidences are 4.9 and 9.8, respectively, and the mortality rates of CC are 1.4 and 2.6, respectively, per 100,000 women.\(^{18}\) Australia has established a well-organized cervical screening program by conventional Papanicolaou test screening. The uptake is approximately 60% of the target population, and the program has succeeded in decreasing both the incidence and mortality rates of CC.\(^{18,19}\) In contrast, in Japan, the seriously low acceptance rate of the Papanicolaou test is thought to be the main reason for the increase in number of CC patients in Japan. The recommended CC screening guideline for JPN women is twice yearly for those 20 years and older.\(^{20}\) The self-reported coverage rate of the Papanicolaou test in the targeted women was only 32% in the survey of 2010.\(^{15}\) This is one of the lowest rates among developed

### TABLE 4. HPV knowledge of participants in Japan and ORs of high HPV knowledge compared with low/moderate HPV knowledge using univariate and multivariate analyses

| Characteristic                              | Low (0–1) | Moderate (2–4) | High (5–6) | OR (95% CI)   | P     | Adjusted OR (95% CI) | P     |
|---------------------------------------------|-----------|----------------|------------|---------------|-------|----------------------|-------|
| **Age group, y**                            |           |                |            |               |       |                      |       |
| 16–17                                       | 3         | 1              | 0          | NA            | NA    |                      |       |
| 18–21                                       | 13        | 5              | 11         | 1.00          | 1.00  |                      |       |
| 22–25                                       | 17        | 7              | 21         | 1.80 (0.68–4.80) | 0.841 | 1.36 (0.41–4.46) | 0.984 |
| 26–30                                       | 24        | 18             | 33         | 1.52 (0.62–3.75) | 1.15  | 1.36 (0.36–3.68) | 0.984 |
| 31–35                                       | 30        | 19             | 41         | 1.53 (0.64–3.70) | 1.07  | 1.36 (0.35–3.30) | 0.984 |
| **Educational level**                       |           |                |            |               |       |                      |       |
| <High school graduate                      | 3         | 1              | 1          | 0.43 (0.04–1.44) | NA    |                      |       |
| High school graduate                       | 23        | 7              | 17         | 1.00          | 0.261 | 1.00                 | 0.491 |
| >High school graduate                      | 61        | 42             | 87         | 1.53 (0.79–2.98) | 1.65  | 1.65 (0.72–3.77) | 0.984 |
| **Country of birth**                        |           |                |            |               |       |                      |       |
| Japan                                       | 86        | 49             | 101        | 1.00          | 0.169 | 1.00                 | 0.125 |
| Others                                      | 1         | 1              | 5          | 3.21 (0.61–16.88) | 6.22  | 0.60 (0.60–16.88) | 0.295 |
| **Age at first vaginal intercourse, y**     |           |                |            |               |       |                      |       |
| Never/age not specified                     | 20        | 14             | 18         | 1.00          | 0.373 | 1.00                 | 0.295 |
| 12–15                                       | 5         | 1              | 8          | 2.49 (0.69–8.99) | 2.56  | 1.56 (0.69–8.99) | 0.295 |
| 16–18                                       | 26        | 14             | 31         | 1.45 (0.69–3.06) | 1.95  | 1.95 (0.69–3.06) | 0.295 |
| 19–24                                       | 35        | 16             | 47         | 1.70 (0.84–3.45) | 2.17  | 2.17 (0.84–3.45) | 0.295 |
| 25–30                                       | 1         | 5              | 2          | 0.59 (0.11–3.25) | 0.51  | 0.51 (0.11–3.25) | 0.295 |
| **Chlamydia awareness**                     |           |                |            |               |       |                      |       |
| No                                          | 7         | 5              | 5          | 1.00          | 0.367 | 1.00                 | 0.465 |
| Yes                                         | 80        | 45             | 101        | 1.66 (0.55–5.03) | 1.72  | 1.72 (0.40–7.41) | 0.295 |
| **Awareness of HPV vaccines**                |           |                |            |               |       |                      |       |
| No                                          | 33        | 10             | 4          | 1.00          | <0.001| 1.00                 | <0.001|
| Yes                                         | 53        | 39             | 102        | 10.83 (3.73–31.51) | 10.31 | 10.31 (3.46–30.76) | 0.034 |
| **Self-reported HPV vaccination status**     |           |                |            |               |       |                      |       |
| No                                          | 77        | 42             | 87         | 1.00          | 0.074 | 1.00                 | 0.034 |
| Yes                                         | 5         | 7              | 18         | 2.04 (0.93–4.46) | 3.11  | 3.11 (1.09–8.87) | 0.034 |

NA, not applicable.
countries. We recently reported that only 59.5% of young female workers or students in the Yokohama City University Hospital-based community who received catch-up HPV vaccinations (mean, 28; range, 21–48 years) had undergone CC screening in their lifetime. In the present study, Pap-nicolau test uptake in the participants’ lifetime was 65%, which suggests that the participants of the present study had higher CC screening rates.

An HPV vaccine program in Australia began in 2007 and is ongoing for a target age of 12 to 13 years. In addition, a catch-up program was offered for women up to 26 years old through the end of 2009, and this achieved a high level of vaccination coverage. In Japan, only opportunistic HPV vaccination was available until a nationwide HPV vaccination program was widely initiated in 2011, mainly targeting girls aged 13 to 16 years. The nationwide HPV vaccination program was funded equally by the national government and by each regional government for either bivalent or quadrivalent HPV vaccines and finished in March 2013 achieving a high coverage rate (>70%). Subsequently, total coverage by the JPN government was endorsed and started in April 2013. However, its active approval has been suspended indefinitely since July 2013 to investigate mass media reports of a severe chronic pain syndrome. This potential adverse reaction has not been confirmed medically, nor has it been reported at such rates elsewhere in the world. However, in this current study, as most JPN study participants were older the target age for the national HPV vaccine program, the rate of self-reported HPV vaccination was low, at 21.8% in women aged 16 to 25 years, much lower than the rate of 58.3% in the AUS study. Such a difference between the JPN and AUS HPV vaccination programs for young women may enlarge the gap in CC status between Japan and Australia in the future.

Although more than half of the target women aged 16 to 35 years living in Kanagawa Prefecture were estimated to be FB users, we also placed an advertisement banner on the YKCCPPP HP to boost subjects to be recruited. In this study, 52% were recruited by FB, whereas the remainder was recruited by HP, although the 2 groups did not differ significantly, except for sexual experiences. Even with study methods using an SNS, it was more difficult to recruit girls aged 16 to 17 years. In the AUS study, the study population of these ages was 14.0% in contrast to 19.8% of the target population. This tendency was greater in the JPN study with only 4 high school students (1.6%) participating in the study from among the 7.4% of the target population. The low participation rate among this age group in the JPN study was thought to be due to only approximately 30% of girls aged 16 to 17 years in the target population being FB users and due to the need for parental consent for participants younger than 20 years. This is in contrast to Australia in which it allows for professional assessment for mature minor status for those younger than 18 years to participate without parental consent. Another bias in the JPN study not seen in the AUS study was an uneven participation by geographic region. One explanation for the overrepresentation in Yokohama City is that our local CC prevention projects were well advertised by those living in Yokohama City. A limitation of our study, using SNS, is the bias that young participants had more awareness and knowledge about HPV and CC than the target populations as reported in the AUS study, although the latter study was performed 3 years earlier. Our data also showed that significantly more educated women than in the target population participated in the JPN study after adjusting for the age distribution, similar to the AUS study. Ideally, for the precise comparisons among countries, simultaneous study performance is required. However, in the JPN study, the participants were shown to have very high awareness and knowledge about HPV and CC that was comparable with the AUS study. The high profile of the HPV vaccine program by national and local governments in Japan might have influenced these results, in addition to the television commercial for CC screening advocacy broadcasted repeatedly after the Great East Japan Earthquake in 2011. An important point for ongoing education was the lack of knowledge about the link between smoking and CC in the JPN study.

**CONCLUSIONS**

The SNSs are an efficient method to recruit young women into health surveys. A nationwide survey about CC prevention using SNSs would be a next step to better understand young women’s beliefs and potential barriers to better uptake of the JPN national HPV vaccine program.

**ACKNOWLEDGMENTS**

The authors thank Yeshe Fenner, Navera Ahmed, and Bharathy Gunasekaran for providing information and raw data for this study as well as Stefanie Hartley for calculating 95% CI for some of these AUS data to be compared with the Japanese data. They also thank Yukimi Uchiyama, Atsuko Koyama, Hideko Yamauchi, and Athena Costa for secretarial help and Chords Ltd. for the technical support.

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Author/s:
Miyagi, E; Motoki, Y; Asai-Sato, M; Taguri, M; Morita, S; Hirahara, F; Wark, J D; Garland, S M

Title:
Web-based Recruiting for a Survey on Knowledge and Awareness of Cervical Cancer Prevention Among Young Women Living in Kanagawa Prefecture, Japan

Date:
2014-09-01

Citation:
Miyagi, E., Motoki, Y., Asai-Sato, M., Taguri, M., Morita, S., Hirahara, F., Wark, J. D. & Garland, S. M. (2014). Web-based Recruiting for a Survey on Knowledge and Awareness of Cervical Cancer Prevention Among Young Women Living in Kanagawa Prefecture, Japan. INTERNATIONAL JOURNAL OF GYNECOLOGICAL CANCER, 24 (7), pp.1347-1355. https://doi.org/10.1097/IGC.0000000000000220.

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