

## Original Article

# Knowledge and attitude toward cervical cancer and its prevention among female workers in the Vientiane Capital, Lao PDR

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### Purpose:

This study aimed to provide the data to establish the national cervical cancer prevention program by studying the knowledge and attitude regarding cervical cancer and its prevention among Lao female workers in Vientiane, capital city of Laos.

### Methods:

This cross-sectional study was conducted among 356 female workers in Vientiane, the capital of Laos. They were interviewed by means of a structured questionnaire. The data were analyzed and compared between the medical worker (MW) group, office worker (OW) group, and factory worker and cleaner (FWC) group.

### Results:

Participants who had heard of cervical cancer, human papillomavirus (HPV), and HPV vaccine comprised 89.9%, 34.0%, and 27.8%, respectively. The average knowledge score of FWC was lower than that of the MW or OW group. Only 3.4% of the participants knew that HPV infection was the

cause of cervical cancer. Among the 175 women who felt at a risk of cervical cancer, 84 had never undergone a Pap smear. The main reasons for not undergoing a Pap smear were the absence of symptoms (28.8%) and the feeling of shame or embarrassment (24.6%).

### Conclusions:

Female workers, especially in the FWC group, had little knowledge regarding cervical cancer and its prevention. Thus, cervical cancer education for female workers and the cultivation of health professionals are most efficient steps to overcome this situation.

**Key words:** Cervical cancer, Prevention, Pap smear, Health education, Laos.

## Introduction

Cervical cancer develops from precancerous lesions due to persistent human papillomavirus (HPV) infection<sup>1</sup>. HPV can be detected in more than 99% of the patients with cervical cancer, and high-risk HPV types 16 and 18 contribute to more than 70% of cervical cancer cases<sup>2, 3</sup>. Cervical cancer is the second most common cancer in developing countries. In 2012, there were 528,000 new cases of and 266,000 deaths from cervical cancer

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worldwide. Of the new cases and deaths, approximately 84% of new cases and 87% of deaths occurred in developing countries<sup>6</sup>. The World Health Organization (WHO) reported that cervical cancer ranks as the third leading cause of female cancer and its deaths: hepatocellular carcinoma and breast cancer rank first and second in Laos. It is the leading health hazard of women in Laos\*. Cervical cancer is among the preventable diseases that can be detected early through Pap smear screening and treated during the early stage<sup>4, 5</sup>. But Pap smear test and cervical biopsy are not available in Laos except for the Vientiane Capital, because of the small number of medical laboratories, pathologists, and cytotechnologists in Laos. Furthermore, no national cancer registration system exists in Laos, which provides detailed statistical and epidemiological data regarding cervical cancer. Therefore, the incidence and mortality rate of Laos reported by the WHO were extrapolated from that of the neighboring country, Thailand\*.

Previous studies on Lao healthy women reported that 3% showed abnormal cervical cells on Pap smear test<sup>7</sup>, approximately 5.7% were diagnosed with atypical squamous cells of undetermined significance<sup>8</sup>, and high-risk HPV infection was detected in 11%<sup>9</sup>. The prevalences of HPV infection in the neighboring countries were reported to be 11% in Ho Chi Minh, Vietnam<sup>10</sup>, 10% in southeastern China<sup>11</sup>, and 10% in northeastern Thailand<sup>12</sup>; these prevalences were almost the same as that in Laos.

A comprehensive three-step approach of cervical cancer prevention and control is recommended by the WHO guidelines<sup>\*\*</sup>. The primary prevention entails the reduction of HPV infection through HPV vaccination, secondary prevention involves screening with Pap smear and treatment in the early stage of cancer, and tertiary prevention includes treatment of invasive cervical cancer with palliative care. Furthermore, health education is necessary to improve the knowledge of Lao women about cervical cancer. Rates of Pap smear screening in developed countries are high: 80.4% in Germany, 75.4% in France, 66.7% in Korea (2014), 83.3% in the United States, 79% in Italy, 77.2% in the United Kingdom (2015), and 42.1% in Japan (2013) <sup>\*\*\*</sup>. In these countries, Pap smear screening program has succeeded in reducing the incidence and mortality rate of cervical cancer for the past 40 years<sup>13,14</sup>.

In addition, HPV vaccine had been introduced into the national immunization programs in more than 40 countries from 2007 to 2012<sup>14</sup>, and evaluation on the efficacy of HPV vaccination programs has been started<sup>15</sup>. However, no national cervical cancer prevention program is

implemented in Laos. For cervical cancer prevention programs to succeed, the target population of these programs need enough knowledge about cervical cancer and its prevention and the motivation to undergo screening.

Little is known about the knowledge, attitude, and awareness of Lao women regarding cervical cancer. Previous studies showed that Lao women in rural areas have limited knowledge about cervical cancer<sup>16</sup>. As the HIV-infected women in Lao have many chances to receive health education, their knowledge level of cervical cancer was higher than that of healthy Lao women<sup>17</sup>. Thus, health education programs are necessary to improve the knowledge of Lao women about cervical cancer and realize its risk.

This study aimed to provide the data to establish the national cervical cancer prevention program by studying the knowledge and attitude regarding cervical cancer and its prevention among Lao female workers in Vientiane, capital city of Laos.

## Methods

### 1. Study design and participants

The cross-sectional study was conducted by the interview of Lao women in Vientiane of Laos, from September to October 2016. The interview was done one time for each participant. The target population was healthy female workers who live and work in Vientiane.

Our counterpart, National University of Health Sciences, sent the request letters for research cooperation to five target institutes; the Ministry of Health, National Friendship Hospital, National Mahosott Hospital, Lao Brewery Company, and Electric du Laos in Vientiane. Then the responsible persons of the target institutes informed their female workers of our research. Female workers working in the National University of Health Sciences, National Friendship Hospital, and National Mahosott Hospital had received information about this study beforehand, and then voluntary participated in this study. The selected female workers in Lao Brewery Company and Electric du Laos were invited for the interview after a simple random sampling from the list of staffs.

We interviewed 356 female workers, aged 21 to 69 years, who voluntarily participated in this study. The participants comprised two women from the Ministry of Health, 23 from the National University of Health Sciences, 71 from the National Friendship Hospital, 47 from the National Mahosott Hospital, 80 from Lao Brewery Company, and 133 from Electricite du Laos.

The professions of the participants were as follows: 37 medical doctors, 41 nurses, 8 laboratory technicians, 9 pharmacists, 209 office workers including participants who work at both companies and hospitals, 40 factory workers, and 12 cleaners. The participants were divided into three groups: medical worker (MW) group, office worker (OW) group, and factory worker and cleaner (FWC) group. Approximately 70% of Lao women in workable ages have any kind of jobs, and 21% are students. The remaining 6% are housewives and 3% have no jobs mainly due to diseases, retirement or others\*\*\*\*. The education level was divided to three categories; low education from no school to upper secondary school; middle education of 2-year or 3-year college; and high education from 4-year university to graduate school.

## 2. Questionnaire and data collection

We used a structured questionnaire written in Lao and modified from that of Sichanh's<sup>17</sup>. The questionnaire consisted of four sections: 1) demographic characteristics such as age, ethnic, religion, final educational background, and monthly income; 2) risk behaviors with regard to reproductive status, contraception, and smoking; 3) knowledge of cervical cancer and its prevention and sources of information on cervical cancer, HPV, and HPV vaccination; and 4) attitudes and behaviors toward cervical cancer prevention and Pap smear screening. Contraceptive methods include use of condom, contraceptive injection, and contraceptive pill. The contraceptive injection meant the intramuscular injection of a synthetic progestogen hormone with an interval of 12 weeks. It protects a woman from getting pregnant for 12 weeks. With regard to the current use of contraception in section 2 of the questionnaire, 260 women aged 45 years or less were evaluated. The level of knowledge was assessed through 6 open questions (Q6, 7, 8, 9, 10, 12) and 6 closed questions (Q1, 2, 3, 4, 5, 11), with possible answers being "yes/no/I do not know." Multiple answers were allowed in open questions. For each participant, the knowledge score was defined as the total number of "yes" responses in case of closed questions. The knowledge score in case of open questions was defined as the total number of "yes" responses with correct answers. If the answer was incorrect, the score was zero. The maximum score is 12 points. The participants were interviewed anonymously and confidentially by the Lao medical doctors in a private room of each facility. Each participant was interviewed for 15 minutes.

## 3. Statistical analysis

The data were analyzed using the JMP® Pro 12 (SAS Institute Inc., Cary, NC, USA). Fisher's exact test was used to assess the qualitative variables, and Kruskal-Wallis test was used for the quantitative variables to compare three occupational groups in Table 1. The *P* values were calculated using the Steel-Dwass test in order to evaluate knowledge score. The *P* values were also calculated for the qualitative variables among each group using Fisher's exact test with Bonferroni correction (*P* values multiplied by three) in Table 2. If the *P* values exceeded 1, they were considered to be 1. Fisher's exact test was used to assess the qualitative variables to compare three occupational groups in Table 4. The *P* values less than 0.05 were considered statistically significant.

## 4. Ethical consideration

This study was approved by the National Ethics Committee on Health Research, Ministry of Health, Laos (No.061/16). The written informed consent was obtained from all the participants after the Lao medical doctors explained the purpose and outline of this study to the participants.

## Results

### 1. Demographic characteristics

The mean age of the participants was  $38.2 \pm 9.8$  years (range 21-69) (Table 1). The ethnic groups involved in this study were Lao (354 women), Nui (1 woman), and Hmong (1 woman), and the religious groups were Buddhist (353 women), Christian (1 woman), and Animist (2 women). All participants in the MW group attained middle or high education, whereas 73% of the OW group achieved high education. However, 90.4% of the FWCs attained low education, and 3.8% of FWCs went no school. The median monthly income of OWs (2,500,000 Lao kip = 304.3 United States dollar) was higher than those of the other two groups (1,500,000 Lao kip, both = 182.6 United States dollar).

### 2. Risk behaviors

#### 2.1. Reproductive status

Almost all participants (92.6%) were married, divorced, or widowed. The number of single women was the highest in the OW group (11.5%). Overall, 294 participants (82.6%) had given birth to at least one baby, with the average gravidity being  $2.2 \pm 1.7$ . First pregnancy between 21 and 30 years of age showed the highest rate (81.6%) among 293 women who answered this question, and 22

Table 1. Demographic characteristics, reproductive status, risk factors, and behaviors of the participants

	Total N (%)	Medical workers N (%)	Office workers N (%)	Factory workers + cleaners N (%)	P value
<b>Number of participants</b>	<b>356</b>	<b>95</b>	<b>209</b>	<b>52</b>	
<b>Demographic characteristics</b>					
<b>Mean age<math>\pm</math>SD (year)</b>	38.2 $\pm$ 9.8	41.0 $\pm$ 10.5	37.4 $\pm$ 9.7	36.6 $\pm$ 7.8	<b>0.006</b>
Range	21-69	23-69	23-61	21-54	
<b>Education</b>					<b>&lt; 0.001</b>
Low education (no school – upper secondary school)	60 (16.9)	0 (0.0)	13 (6.2)	47 (90.4)	
Middle education (2-year- or 3-year college)	88 (24.7)	41 (43.2)	42 (20.1)	5 (9.6)	
High education (university – graduate school)	208 (58.4)	54 (56.8)	154 (73.7)	0 (0.0)	
<b>Income/month (LAK) (n = 352)</b>					
25th percentile	1,500,000	1,300,000	1,900,000	1,500,000	
50th percentile (median)	2,000,000	1,500,000	2,500,000	1,500,000	<b>&lt; 0.001</b>
75th percentile	2,800,000	1,946,000	3,500,000	1,800,000	
<b>Median income/month (USD) (n = 352)</b>	243.4	182.6	304.3	182.6	<b>&lt; 0.001</b>
<b>Reproductive status</b>					
<b>Marital status</b>					<b>0.01</b>
Married	322 (90.4)	93 (97.9)	178 (85.2)	51 (98.1)	
Divorced/widowed	8 (2.2)	0 (0.0)	7 (3.3)	1 (1.9)	
Single	26 (7.3)	2 (2.1)	24 (11.5)	0 (0.0)	
<b>Parity</b>					<b>0.01</b>
More than and equal to one time	294 (82.6)	87 (91.6)	159 (76.1)	48 (92.3)	
None	62 (17.4)	6 (6.3)	50 (23.9)	4 (7.7)	
<b>Mean gravidity<math>\pm</math>SD (n = 294)</b>	2.2 $\pm$ 1.7	2.6 $\pm$ 1.6	2.1 $\pm$ 1.7	2.3 $\pm$ 1.3	0.06
<b>Age of the first pregnancy</b>	n = 293	n = 86	n = 159	n = 48	
$\leq$ 20 years	22 (7.5)	4 (4.7)	8 (5.0)	10 (20.8)	
21-30 years	239 (81.6)	73 (84.9)	130 (81.8)	36 (69.2)	
31 $\leq$ years	32 (10.9)	9 (10.5)	21 (13.2)	2 (3.8)	
<b>Risk factors and behaviors</b>					
<b>Current method of contraception (age <math>\leq</math> 45)</b>	n = 260	n = 56	n = 159	n = 45	
Condom					0.07
Always	16 (6.2)	7 (12.5)	9 (5.7)	0 (0.0)	
Sometimes, often, or usually	81 (31.2)	20 (35.7)	50 (31.4)	11 (24.4)	
Never	154 (59.2)	28 (50.0)	96 (60.4)	30 (66.7)	
Contraceptive injection					0.56
Yes	5 (1.9)	2 (3.6)	3 (1.9)	0 (0.0)	
No or past	251 (96.5)	54 (96.4)	153 (96.2)	44 (97.8)	
Contraceptive pill					<b>0.01</b>
Yes	21 (8.1)	3 (5.4)	7 (4.4)	11 (24.4)	
No or past	235 (90.4)	53 (94.6)	149 (93.7)	33 (73.3)	
<b>Smoking among the participants</b>	n = 354	n = 94	n = 208	n = 52	1.0
Yes	2 (0.6)	0 (0.0)	2 (1.0)	0 (0.0)	
No	352 (99.4)	94 (100.0)	206 (99.0)	52 (100.0)	
<b>Smoking among family members</b>	n = 353	n = 94	n = 207	n = 52	0.07
Yes	101 (28.6)	24 (25.5)	55 (26.6)	22 (42.3)	
No	252 (71.4)	70 (74.5)	152 (73.4)	30 (57.7)	
<b>Experience of Pap smear screening (n=356)</b>					<b>&lt; 0.001</b>
More than and equal to one time	165 (46.3)	53 (55.8)	100 (47.8)	12 (23.1)	
Never	191 (53.7)	42 (44.2)	109 (52.2)	40 (76.9)	

Fisher's exact test was used to assess the qualitative variables, and Kruskal-Wallis test was used for the quantitative variables to compare three occupational groups. The *P* values less than 0.05 were considered statistically significant. LAK: Lao kip (currency). USD: United States dollar.

young women experienced pregnancy at less than 20 years of age (Table 1).

## 2.2. Contraception and smoking

Condom use was most common among three contraceptive methods; however, 139 women (53.5% of 260 participants) did not use any contraceptive method. Only two women (0.6%) among the 354 participants smoked cigarettes (Table 1).

## 2.3. History of Pap smear screening

Half of the participants (53.7%) had never undergone a Pap smear screening; the FWC group had the least frequency of Pap screening among the three groups ( $P<0.01$ ) (Table 1).

## 3. Knowledge and attitudes of cervical cancer and its prevention

### 3.1. Average knowledge score

As shown in Table 2, the average knowledge score was  $4.9 \pm 2.6$ . It was significantly higher in the MW

group than those in the OW and FWC groups ( $P<0.001$ ). The highest score was recorded in five married women: two office workers with high educational level and three medical workers with middle or high educational level. The average score of middle and high educational level groups was significantly higher than that in the low educational level group (5.3 points vs. 3.2 points;  $P<0.001$ ). The average score of women who had undergone Pap smear screening was significantly higher than that of women who had never undergone a Pap smear screening (5.8 points vs. 4.1 points;  $P<0.001$ ).

### 3.2. Knowledge of cervical cancer and its prevention

Participants who had heard of cervical cancer, HPV, and HPV vaccine comprised 89.9%, 34.0%, and 27.8%, respectively. Notably, the rate of the correct answer "yes" was the lowest in the FWC group among the three groups (Q1-3). Only 12 (3.4%) of the participants correctly answered that the cause of cervical cancer was HPV (Q6). As regards the knowledge of risk

Table 2. Knowledge and attitudes of the participants about cervical cancer and its prevention

Knowledge and attitudes about cervical cancer (CC) and its prevention	Total N (%)	Medical workers (a) N (%)	Office workers (b) N (%)	Factory workers + cleaners (c) N (%)	a vs b	P value a vs c	b vs c
<b>Number of participants</b>	<b>356</b>	<b>95</b>	<b>209</b>	<b>52</b>			
<b>Knowledge</b>							
<b>Knowledge score (0 to 12) mean±S.D.</b>	<b>4.9 ± 2.6</b>	<b>6.8 ± 2.7</b>	<b>4.5 ± 2.2</b>	<b>3.2 ± 2.0</b>	<b>&lt; 0.001</b>	<b>&lt; 0.001</b>	<b>0.01</b>
<b>Q1. Have you heard about CC?</b>	320 (89.9)	91 (95.8)	193 (92.3)	36 (69.2)	0.98	< 0.001	< 0.001
<b>Q2. Have you heard about HPV?</b>	121 (34.0)	54 (56.8)	59 (28.2)	8 (15.4)	< 0.001	< 0.001	0.23
<b>Q3. Have you heard about HPV vaccination?</b>	99 (27.8)	40 (42.1)	48 (23.0)	11 (21.2)	0.01	0.04	1.0
<b>Q4. Is CC the serious illness?</b>	305 (85.7)	91 (95.8)	179 (85.6)	35 (67.3)	0.03	< 0.001	0.01
<b>Q5. Do you know someone with CC?</b>	86 (24.2)	39 (41.1)	42 (20.1)	5 (9.6)	< 0.001	< 0.001	0.32
<b>Q6. Do you know the cause of CC?</b>	18 (5.1)	13 (13.7)	5 (2.4)	0 (0.0)	< 0.001	0.01	1.0
HPV infection	12 (3.4)	9 (9.5)	3 (1.4)	0 (0.0)			
Sexually transmitted infections	3 (0.8)	3 (3.2)	0 (0.0)	0 (0.0)			
Others	3 (0.8)	1 (1.1)	2 (1.0)	0 (0.0)			
<b>Q7. Do you know risk factors for CC?</b>	81 (22.8)	36 (37.9)	38 (18.2)	7 (13.5)	< 0.001	0.01	1.0
Sexual intercourse	52 (14.6)	28 (29.5)	18 (8.6)	6 (11.5)			
Multiple sexual partners	22 (6.2)	6 (6.3)	15 (7.2)	1 (1.9)			
Unsafe sexual intercourse	3 (0.8)	1 (1.1)	2 (1.0)	0 (0.0)			
Sexually transmitted infections	2 (0.6)	0 (0.0)	2 (1.0)	0 (0.0)			
Risky sexual behavior	2 (0.6)	0 (0.0)	2 (1.0)	0 (0.0)			
HPV infection	1 (0.3)	0 (0.0)	1 (0.5)	0 (0.0)			
Using contraceptive pills	1 (0.3)	1 (1.1)	0 (0.0)	0 (0.0)			
Pathogen infection regarding cancer	1 (0.3)	1 (1.1)	0 (0.0)	0 (0.0)			
<b>Q8. Do you know how to get tested for CC screening?</b>	134 (37.6)	58 (61.1)	72 (34.4)	4 (7.7)	< 0.001	< 0.001	< 0.001
<b>Q9. Do you know any methods to prevent CC?</b>	79 (22.2)	36 (37.9)	40 (19.1)	3 (5.8)	0.01	< 0.001	0.06
Medical check	34 (9.6)	17 (17.9)	16 (7.7)	1 (1.9)			
HPV vaccination	6 (1.7)	3 (3.2)	2 (1.0)	1 (1.9)			
Pap smear	5 (1.4)	4 (4.2)	1 (0.5)	0 (0.0)			
Using condom	19 (5.3)	9 (9.5)	9 (4.3)	1 (1.9)			
No multiple sexual partner	13 (3.7)	7 (7.4)	6 (2.9)	0 (0.0)			
Protected sexual intercourse	10 (2.8)	5 (5.3)	5 (2.4)	0 (0.0)			
Avoid risky sexual behavior	1 (0.3)	0 (0.0)	1 (0.5)	0 (0.0)			

Table 2. Knowledge and attitudes of the participants about cervical cancer and its prevention (continued)

Knowledge and attitudes about cervical cancer (CC) and its prevention	Total N (%)	Medical workers (a) N (%)	Office workers (b) N (%)	Factory workers + cleaners (c) N (%)	a vs b	P value a vs c	b vs c
<b>Q10. Do you know the symptom of CC?</b>	80 (22.5)	39 (41.1)	38 (18.2)	3 (5.8)	<b>&lt; 0.001</b>	<b>&lt; 0.001</b>	0.10
Back pain, pelvic pain, or pain on urination	37 (10.4)	13 (13.7)	21 (10.0)	3 (5.8)			
Irregular bleeding, intermenstrual bleeding, or abnormal vaginal bleeding after sexual intercourse	36 (10.1)	22 (23.2)	14 (6.7)	0 (0.0)			
Odorous discharge	26 (7.3)	13 (13.7)	13 (6.2)	0 (0.0)			
Vaginal discomfort	4 (1.1)	1 (1.1)	3 (1.4)	0 (0.0)			
No symptom	3 (0.8)	3 (3.2)	0 (0.0)	0 (0.0)			
Fatigue or depression	3 (0.8)	1 (1.1)	2 (1.0)	0 (0.0)			
<b>Q11. Are the women who have had many sexual partners at an increased risk of CC?</b>	316 (88.8)	92 (96.8)	181 (86.6)	43 (82.7)	<b>0.02</b>	<b>0.01</b>	1.0
<b>Q12. Do you know the mode of transmission of HPV?</b>	114 (32.0)	53 (55.8)	52 (24.9)	9 (17.3)	<b>&lt; 0.001</b>	<b>&lt; 0.001</b>	0.83
Sexual intercourse	104 (29.2)	51 (53.7)	44 (21.1)	9 (17.3)			
Unprotected sexual intercourse	7 (2.0)	1 (1.1)	6 (2.9)	0 (0.0)			
Unsafe sexual intercourse	3 (0.8)	1 (1.1)	2 (1.0)	0 (0.0)			
<b>Attitude about CC and its prevention</b>							
<b>Believing:</b>							
<b>Q13. Do you think that CC is a common disease in Laos?</b>	245 (68.8)	80 (84.2)	138 (66.0)	27 (51.9)	<b>0.01</b>	<b>&lt; 0.001</b>	0.23
<b>Q14. Do you feel at a risk of developing CC?</b>	175 (49.2)	49 (51.6)	102 (48.8)	24 (46.2)	1.0	1.0	1.0
<b>Risk factors:</b>							
<b>Q15. Do you think that unprotected sex is a risk factor for developing CC?</b>	288 (80.9)	87 (91.6)	165 (78.9)	36 (69.2)	<b>0.02</b>	<b>0.01</b>	0.43
<b>Q16. Do you think that having multiple sexual partners is a risk factor for developing CC?</b>	324 (91.0)	93 (97.9)	187 (89.5)	44 (84.6)	0.05	<b>0.03</b>	1.0
<b>Q17. Do you think that smoking is a risk factor for developing CC?</b>	164 (46.1)	54 (56.8)	80 (38.3)	30 (57.7)	<b>0.01</b>	1.0	<b>0.04</b>
<b>Wishing:</b>							
<b>Q18. Do you think the government should make recommendation for vaccination against HPV?</b>	346 (97.2)	95 (100.0)	202 (96.7)	49 (94.2)	0.31	0.13	1.0
<b>Q19. Will it need to continue to consult the gynecologist for CC screening, even after HPV vaccination?</b>	343 (96.3)	94 (98.9)	204 (97.6)	45 (86.5)	1.0	<b>0.01</b>	<b>0.01</b>
<b>Q20. If there were a cheap vaccine against HPV in Laos, would you get vaccinated?</b>	328 (92.1)	88 (92.6)	197 (94.3)	43 (82.7)	1.0	0.28	<b>0.05</b>
<b>Q21. Do you think the HPV vaccine may be given to adolescent girls before the onset of sexual activity?</b>	322 (90.4)	90 (94.7)	188 (90.0)	44 (84.6)	0.57	0.19	0.97

The *P* values were calculated using the Steel-Dwass test in order to evaluate knowledge score. The *P* values were calculated for the qualitative variables among each group using Fisher's exact test with Bonferroni correction. The *P* values less than 0.05 were considered statistically significant. CC, cervical cancer; HPV, human papillomavirus.

Table 3. Sources of information on cervical cancer, HPV, and HPV vaccination

Sources	Total N (%)	Medical workers N (%)	Office workers N (%)	Factory workers + cleaners N (%)
<b>Cervical cancer</b>	n = 320	n = 91	n = 193	n = 36
Health professionals	164 (51.3)	60 (65.9)	86 (44.6)	18 (50.0)
Media	140 (43.8)	33 (36.3)	95 (49.2)	12 (33.3)
Family, relatives, friends, or acquaintances	48 (15.0)	4 (4.4)	39 (20.2)	5 (13.9)
<b>HPV</b>	n = 121	n = 54	n = 59	n = 8
Health professionals	64 (52.9)	32 (59.3)	26 (44.1)	5 (62.5)
Media	48 (39.7)	16 (29.6)	30 (50.8)	2 (25.0)
Family, relatives, friends, or acquaintances	6 (5.0)	2 (3.7)	3 (5.1)	1 (12.5)
<b>HPV vaccination</b>	n = 99	n = 40	n = 48	n = 11
Health professionals	52 (52.5)	22 (55.0)	27 (56.3)	3 (27.3)
Media	34 (34.3)	16 (40.0)	15 (31.3)	3 (27.3)
Family, relatives, friends, or acquaintances	9 (9.1)	0 (0.0)	6 (12.5)	3 (27.3)

HPV, human papillomavirus.

Table 4. Reasons for not undergoing a Pap smear screening in the past

Reasons	Total N (%)	Medical workers N (%)	Office workers N (%)	Factory workers + cleaners N (%)	<i>P</i> value
<b>Number of participants</b>	<b>191</b>	<b>42</b>	<b>109</b>	<b>40</b>	
No symptoms	55 (28.8)	9 (21.4)	37 (33.9)	9 (22.5)	0.22
Shame or embarrassment	47 (24.6)	14 (33.3)	21 (19.3)	12 (30.0)	0.13
No time	31 (16.2)	11 (26.2)	15 (13.8)	5 (12.5)	0.16
I believe that I do not have cervical cancer	30 (15.7)	2 (4.8)	16 (14.7)	12 (30.0)	<b>0.01</b>
Never heard of screening	17 (8.9)	3 (7.1)	13 (11.9)	1 (2.5)	0.21
Fear of pain	10 (5.2)	3 (7.1)	6 (5.5)	1 (2.5)	0.61
No risk factor	6 (3.1)	1 (2.4)	4 (3.7)	1 (2.5)	1.0
Absence of sexual activities	4 (2.1)	0 (0.0)	4 (3.7)	0 (0.0)	0.50
I do not have a child	2 (1.0)	1 (2.4)	1 (0.9)	0 (0.0)	0.68
Too expensive	2 (1.0)	0 (0.0)	1 (0.9)	0 (0.0)	0.42
Not prescribed by the doctor	1 (0.5)	0 (0.0)	1 (0.9)	0 (0.0)	1.0
Others	6 (3.1)	3 (7.1)	2 (1.0)	1 (1.9)	

Fisher's exact test was used to assess the qualitative variables to compare three occupational groups. The *P* values less than 0.05 were considered statistically significant.

behavior, sexual intercourse (14.6%) was the most common answer among three groups (Q7). The most common answer of the participants when asked about the symptoms of cervical cancer were back pain/pelvic pain/pain on urination (10.4%), irregular vaginal bleeding/intermenstrual bleeding/abnormal vaginal bleeding after sexual intercourse (10.1%), and odorous discharge (7.3%) (Q10). Only three medical workers (3.2%) knew that it was symptomless. More than 80% of each group answered that having multiple sexual partners was a risk of cervical cancer (Q11). Sexual intercourse was the most common answer to the question on the transmission of HPV (29.2%) (Q12).

### 3.3. Sources of information about cervical cancer, HPV, and HPV vaccination

Table 3 shows that the health professionals and the media were major sources of information. Family members, relatives, friends, and acquaintances were the least common sources of information.

### 3.4. Attitudes toward cervical cancer prevention

#### 3.4.1 Believing

Approximately two-thirds of the participants (68.8%) believed that cervical cancer was a common disease in Laos. It was higher in MW group (84.2%) than in FWC group (51.9%) ( $P < 0.001$ ) (Q13) (Table 2). Half (49.2%) of the participants in the three groups felt at a risk of developing cervical cancer (Q14).

#### 3.4.2. Risk factor

Most of the participants (80.9%) thought that unprotected sexual intercourse was a risk factor for developing cervical cancer (MW group vs. OW group or

FWC group;  $P < 0.05$ ) (Q15). Furthermore, most participants (91.0%) thought that having multiple sexual partners was a risk factor (MW group vs. FWC group;  $P < 0.05$ ) (Q16), and about half (41.0%) thought that smoking was a risk factor (MW group or FWC group vs. OW group;  $P < 0.05$ ) (Q17).

#### 3.4.3. Wishing

Almost all the participants (97.2%) wished that HPV vaccination would be recommended by the government (Q18) and that consultation with gynecologists should be continued for CC screening after HPV vaccination (Q19). Approximately all participants (92.1%) wished to get vaccinated if the cost of HPV vaccination was affordable (Q20). They also thought adolescent girls could be vaccinated before the onset of sexual activity (Q21).

### 4. Reasons for not undergoing a Pap smear

More than half of the participants (53.7%) had never undergone a Pap smear due to the following reasons: the absence of symptoms (28.8%), feelings of shame or embarrassment (24.6%), no time (16.2%), beliefs of never having cervical cancer (15.7%), and lack of knowledge regarding Pap smear screening (8.9%). The percentage of women believing that they would never suffer from cervical cancer was higher in the FWC group than the other two groups (Table 4). Among the 175 women who felt at a risk of cervical cancer, 84 had never undergone a Pap smear, and the main reason was feelings of shame or embarrassment (29/84; 34.5%).

## Discussion

This study is the first report that assessed the knowledge and attitude toward cervical cancer and its prevention among various female workers in the Vientiane Capital of Laos. The FWC group had most insufficient knowledge about cervical cancer and its prevention among the three groups, but lack of the knowledge was noteworthy in all groups. Approximately 90% of participants had heard of cervical cancer, even though most of them did not know about the details of this disease.

### 1. Average knowledge score

In this study, the average knowledge score was higher in the MW group than those in the OW and FWC groups. The educational level was similar to the level of knowledge on cervical cancer among medical workers in Africa<sup>18, 19</sup>. Another report noted that the knowledge level on cervical cancer and HPV was moderate among nurses in Thailand<sup>20</sup>.

### 2. Knowledge and attitudes of cervical cancer its prevention

#### 2.1. Cervical cancer

The rate of participants (89.9%) who had heard of cervical cancer (Q1) was higher than the reported figures of women attending HIV center (53.8%)<sup>17</sup> and women living in the rural areas (58%)<sup>16</sup> in Laos. Approximately 95.8% of the MW group had heard of cervical cancer; this rate was approximately the same as those revealed in the previous studies among nursing staffs in India (90.4% and 89.8%)<sup>21, 22</sup>.

#### 2.2. HPV and cause of cervical cancer

One-third of the participants in this study had heard of HPV (Q2). Only 3.4% (12 women) answered that HPV infection was the main cause of cervical cancer; nine of the women were in the MW group (Q6). This result was similar to that of the previous study (3.1%) conducted in Laos<sup>17</sup>. In other countries, more women understood that HPV infection was the cause of cervical cancer: 7.0% of inhabitants in Uyghur<sup>23</sup>, 11.6% of HIV-positive women in Nigeria<sup>24</sup>, and 61% of interns and nursing staff in Pakistan<sup>25</sup>.

#### 2.3. Symptom of cervical cancer

The common answers to the question about the symptom of cervical cancer were back pain/pelvic pain/pain on urination (10.4%) and irregular vaginal bleeding/intermenstrual bleeding/abnormal vaginal bleeding after sexual intercourse (10.1%). Although early cervical cancer usually has no symptoms, only 0.8% of the

participants knew (Q10).

In the previous studies, the most common answer of respondents from Pakistan was lower abdominal pain (42%)<sup>25</sup>, whereas intermenstrual bleeding (29.2%) was the common answer among respondents from India<sup>26</sup>; none of them answered "no symptoms."

#### 2.4. Risk factor for cervical cancer and HPV transmission

The most important risk factor for cervical cancer is HPV infection. Other risk factors of cervical cancer include early onset of sexual activity, having multiple sexual partners, a high-risk sexual partner (e.g., a partner with multiple sexual partners or with known HPV infection), history of sexually transmitted infections (e.g., *Chlamydia trachomatis*, genital herpes, et al.), and smoking<sup>27-29</sup>. The most frequent answer to the question about risk factor for cervical cancer was sexual intercourse (14.6%), and only 6.2% of the participants answered multiple sexual partners (Q7). In the previous studies, more than half of the respondents from the rural areas of Laos<sup>16</sup>, Iran<sup>30</sup>, and India<sup>21</sup> answered that having multiple sexual partners was a risk factor. The knowledge levels of the participants of the previous studies regarding the risk factor of cervical cancer were higher than the results of this study (22.8%)<sup>22</sup>.

#### 2.5. HPV vaccination

The knowledge level about cervical cancer was high in countries where the national HPV vaccination program was implemented, such as The United States<sup>31</sup> and Belgium<sup>32</sup>. In contrast to these countries, it was low in low-income countries where HPV vaccine was not available<sup>17, 18</sup>. The HPV vaccine demonstration project, supported by the WHO and UNICEF, was launched in 2014 with the fifth-grade primary school girls, aged 9 to 11 years, from the Vientiane Capital of Laos as the target population\*\*\*\*. However, only one-third of the participants in this study had heard of HPV vaccine (Q3) and very few participants (1.7%) answered that HPV vaccine prevents the spread of infection (Q9).

### 3. Pap smear screening

The national Pap smear screening program succeeded in decreasing the mortality rate of cervical cancer in developed countries for the past 40 years<sup>13,14</sup>. In this study, less than half of the participants had undergone a Pap smear, although the rate was higher than that of the previous study performed in the rural areas of Laos (4.5%)<sup>16</sup>. Other similar studies reported that 15.7% of the gynecological patients in Nepal<sup>33</sup>; 33% of inhabitants in Uyghur, China<sup>23</sup>; and 3% of the nursing staffs in India<sup>22</sup> had undergone a Pap smear.

#### 4. Recommendation

The national cervical cancer prevention program is mandatory to decrease the incidence and mortality of cervical cancer in Laos. However, Laos has a small number of pathological laboratories, pathologists, and cytotechnologists. In order to extend the pathological services in the rural areas, methods of transportation of collected samples and advanced pathological examination in central laboratories should be established. The development of human resources was required in pathologists, cytotechnologists, and pathological technologists. Our study revealed that 24.6% of the participants had not undergone a Pap smear due to feelings of shame or embarrassment. To address this problem, sampling by female gynecologists should be promoted, and female nurses and laboratory technologists should be allowed to collect samples after a short training on sample collection. Although the main source of medical information in this study was the health professionals, the medical workers still had insufficient knowledge. Therefore, the development of human resources for health education is also critical. Moreover, health education regarding cervical cancer conducted at workplaces seems an effective approach to decrease the incidence and mortality rate of cervical cancer.

In summary, 1) the advancement of histological and cytological diagnostic systems of cervical cancer at pathological laboratories, 2) human resource development for cervical cancer diagnosis and health education, 3) health education provided to women, their family, and acquaintances at workplaces to improve the knowledge level.

#### 5. Limitations

Our target population was healthy female workers in the Vientiane Capital. Their socio-economic backgrounds are clearly different from those women living in the rural areas of Laos<sup>16, 17</sup>. In addition, our participants were health-conscious women who voluntarily participated. Thus, our results might not be generalized to all female population in Laos.

#### 6. Conclusion

We clarified the knowledge and attitude toward cervical cancer among Lao women working in the Vientiane Capital. Considering the limited information on this subject in Laos, our study provided the data that can be utilized for policymakers to design a national cervical cancer prevention program. To advance the prevention program, the cultivation of pathologists and

cytotechnologists is the first step to be performed.

#### Conflict of interest

The authors and their families declared no conflicts of interest.

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#### References

- zur Hausen H. Papillomaviruses and cancer: from basic studies to clinical application. *Nat Rev Cancer*. 2002;2(5):342-50.
- Walboomers JM, Jacobs MV, Manos MM, et al. Human papillomavirus is a necessary cause of invasive cervical cancer worldwide. *J Pathol*. 1999;189(1):12-9.
- Smith JS, Lindsay L, Hoots B, et al. Human papillomavirus type distribution in invasive cervical cancer and high-grade cervical lesions: a meta-analysis update. *Int J Cancer*. 2007;121(3):621-32.
- Johannesson G, Geirsson G, Day N. The effect of mass screening in Iceland, 1965-74, on the incidence and mortality of cervical carcinoma. *Int J Cancer*. 1978;21(4):418-25.
- Vaccarella S, Franceschi S, Engholm G, et al. 50 years of screening in the Nordic countries: quantifying the effects on cervical cancer incidence. *Br J Cancer*. 2014;111(5):965-9.
- Ferlay J, Soerjomataram I, Dikshit R, et al. Cancer incidence and mortality worldwide: sources, methods and major patterns in GLOBOCAN 2012. *Int J Cancer*. 2015;136(5): E359-86.
- Nabandith V, Pholsena V, Mounthisone P, et al. First trial of cervical cytology in healthy women of urban Laos using by self-sampling instrument. *Asian Pac J Cancer Prev*. 2012;13(9):4665-7.
- Kuroshima Y, Ohtake K, Handou K, et al. Investigation using a self-scraping instrument for uterine cervical cancer screening in Laos. *J Jpn Soc Clin Cytol*. 2014;53(1):55-9. (in Japanese with English abstract)
- Phongsavan K, Gustavsson I, Marions L, et al. Detection of human papillomavirus among women in Laos: feasibility of using filter paper card and prevalence of high-risk types. *Int J Gynecol Cancer*. 2012;22(8):1398-406.

10. Pham TH, Nguyen TH, Herrero R, et al. Human papillomavirus infection among women in South and North Vietnam. *Int J Cancer*. 2003;104(2):213-20.
11. Ye J, Cheng X, Chen X, et al. Prevalence and risk profile of cervical Human papillomavirus infection in Zhejiang Province, southeast China: a population-based study. *Virol J*. 2010;7:66.
12. Natphopsuk S, Settheetham-Ishida W, Pientong C, et al. Human papillomavirus genotypes and cervical cancer in Northeast Thailand. *Asian Pac J Cancer Prev*. 2013;14(11):6961-4.
13. Arbyn M, Raifu AO, Weiderpass E, et al. Trends of cervical cancer mortality in the member states of the European Union. *Eur J Cancer*. 2009;45(15):2640-8.
14. Markowitz LE, Tsu V, Deeks SL, et al. Human papillomavirus vaccine introduction - the first five years. *Vaccine*. 2012;30 Suppl 5:F139-48.
15. Crowe E, Pandeya N, Brotherton JM, et al. Effectiveness of quadrivalent human papillomavirus vaccine for the prevention of cervical abnormalities: case-control study nested within a population based screening programme in Australia. *BMJ*. 2014;348:g1458.
16. Phongsavan K, Phengsavan A, Wahlstrom R, et al. Women's perception of cervical cancer and its prevention in rural Laos. *Int J Gynecol Cancer*. 2010;20(5):821-6.
17. Sichanh C, Quet F, Chanthavilay P, et al. Knowledge, awareness and attitudes about cervical cancer among women attending or not an HIV treatment center in Lao PDR. *BMC Cancer*. 2014;14:161.
18. Tebeu PM, Major AL, Rapiti E, et al. The attitude and knowledge of cervical cancer by Cameroonian women; a clinical survey conducted in Maroua, the Capital of Far North Province of Cameroon. *Int J Gynecol Cancer*. 2008;18(4):761-5.
19. Getahun F, Mazengia F, Abuhay M, et al. Comprehensive knowledge about cervical cancer is low among women in Northwest Ethiopia. *BMC Cancer*. 2013;13:2.
20. Nganwai P, Truadpon P, Inpa C, et al. Knowledge, attitudes and practices vis-a-vis cervical cancer among registered nurses at the Faculty of Medicine, Khon Kaen University, Thailand. *Asian Pac J Cancer Prev*. 2008;9(1):15-8.
21. Rahman H, Kar S. Knowledge, attitudes and practice toward cervical cancer screening among Sikkimese nursing staff in India. *Indian J Med Paediatr Oncol*. 2015;36(2):105-10.
22. Jain SM, Bagde MN, Bagde ND. Awareness of cervical cancer and Pap smear among nursing staff at a rural tertiary care hospital in Central India. *Indian J Cancer*. 2016;53(1):63-6.
23. Abudukadeer A, Azam S, Mutailipu AZ, et al. Knowledge and attitude of Uyghur women in Xinjiang province of China related to the prevention and early detection of cervical cancer. *World J Surg Oncol*. 2015;13:110.
24. Adibe MO, Aluh DO. Awareness, Knowledge and attitudes towards cervical cancer amongst HIV-positive women receiving care in a tertiary hospital in Nigeria. *J Cancer Educ*.
25. Ali SF, Ayub S, Manzoor NF, et al. Knowledge and awareness about cervical cancer and its prevention amongst interns and nursing staff in tertiary care hospitals in Karachi, Pakistan. *PLoS ONE*. 2010;5(6):e11059.
26. Bansal AB, Pakhare AP, Kapoor N, et al. Knowledge, attitude, and practices related to cervical cancer among adult women: A hospital-based cross-sectional study. *J Nat Sci Biol Med*. 2015;6(2):324-8.
27. International collaboration of epidemiological studies of cervical cancer. Comparison of risk factors for invasive squamous cell carcinoma and adenocarcinoma of the cervix: collaborative reanalysis of individual data on 8,097 women with squamous cell carcinoma and 1,374 women with adenocarcinoma from 12 epidemiological studies. *Int J Cancer*. 2007;120(4):885-91.
28. Anttila T, Saikku P, Koskela P, et al. Serotypes of Chlamydia trachomatis and risk for development of cervical squamous cell carcinoma. *JAMA*. 2001;285(1):47-51.
29. Plummer M, Herrero R, Franceschi S, et al. Smoking and cervical cancer: pooled analysis of the IARC multi-centric case-control study. *Cancer Causes Control*. 2003;14(9):805-14.
30. Asgarlou Z, Tehrani S, Asghari E, et al. Cervical cancer prevention knowledge and attitudes among female university students and hospital staff in Iran. *Asian Pac J Cancer Prev*. 2016;17(11):4921-7.
31. Ragin CC, Edwards RP, Jones J, et al. Knowledge about human papillomavirus and the HPV vaccine--a survey of the general population. *Infect Agent Cancer*. 2009;4 Suppl 1:S10.
32. Deriemaeker H, Michielsens D, Reichman G, et al. Knowledge about human papillomavirus and the human papillomavirus vaccine in Belgian students. *Cent European J Urol*. 2014;67(4):410-7.
33. Ranabhat S, Tiwari M, Dhungana G, et al. Association of knowledge, attitude and demographic variables with cervical Pap smear practice in Nepal. *Asian Pac J Cancer Prev*. 2014;15(20):8905-10.
- \* GLOBOCAN 2012: Estimated Cancer Incidence, Mortality and Prevalence Worldwide in 2012. [http://globocan.iarc.fr/Pages/fact\\_sheets\\_population.aspx](http://globocan.iarc.fr/Pages/fact_sheets_population.aspx). Accessed August 1, 2017
- \*\* Comprehensive Cervical Cancer Control: A guide to essential practice. Second edition. [http://apps.who.int/iris/bitstream/10665/144785/1/9789241548953\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/144785/1/9789241548953_eng.pdf). Accessed August 8, 2017
- \*\*\* Health at a Glance 2015. [http://dx.doi.org/10.1787/health\\_glance-2015-53-en](http://dx.doi.org/10.1787/health_glance-2015-53-en). Accessed August 8, 2017
- \*\*\*\* The 4th Population and Housing Census (PHC). Lao PDR. 2015. [http://lao.unfpa.org/sites/default/files/pub-pdf/PHC-ENG-FNAL-WEB\\_0.pdf](http://lao.unfpa.org/sites/default/files/pub-pdf/PHC-ENG-FNAL-WEB_0.pdf). Accessed November 18, 2017
- \*\*\*\*\* [http://www.who.int/immunization/newsroom/lao\\_introduction\\_pneumococcal\\_vaccine\\_and\\_cervical\\_cancer/en](http://www.who.int/immunization/newsroom/lao_introduction_pneumococcal_vaccine_and_cervical_cancer/en). Accessed August 8, 2017