KNOWLEDGE, ATTITUDES AND PRACTICES REGARDING CERVICAL CANCER AND ITS SCREENING AMONG WOMEN FROM LOW-SOCIO-ECONOMIC AREAS OF MANILA, THE PHILIPPINES

Atsuko Imoto[1,2], Sumihisa Honda[2] and Erlidia F Llamas-Clark[3]

[1]School of Tropical Medicine and Global Health, [2]Department of Community-based Rehabilitation Sciences, Graduate School of Biomedical Sciences, Nagasaki University, Nagasaki, Japan; [3]Department of Obstetrics and Gynecology, University of Philippines Manila - Philippine General Hospital, the Philippines

Abstract. Cervical cancer is common in the Philippines. In this study, we aimed to determine the knowledge, attitudes and practices regarding cervical cancer and its screening among women from low-socio-economic areas of Manila, the Philippines to guide cervical cancer control programs in the study population. Inclusion criteria for study subjects were women aged 20-50 years with children aged <5 years who were registered at one of four public health centers in low-socio-economic areas of Manila. Exclusion criteria were having had a hysterectomy, those who had a history of cervical cancer and declined to participate in the study. Study subjects were selected by convenience sampling. The study was conducted during April 2018. Each subject was asked to complete a standardized questionnaire. Results were quantified using scores for subject knowledge, attitudes and practices. Arbitrary cutoff levels were used to categorize subjects by knowledge and attitude levels. Two hundred-fifty subjects were included in the study. The mean (±standard deviation (SD)) subject age (range) was 31.3 (±7.4) (20-49) years. Forty-five percent of subjects were married, 84.0% had a secondary education. The average parity was 2.98; 64.4% of subjects used contraception. Ninety-seven point nine percent had heard of cervical cancer screening. Fifty-four point eight percent had a low, 40.4% a moderate and 4.8% a high knowledge level about cervical cancer. Thirty-five point six percent of subjects perceived they had a low, 35.2% a moderate and 29.2% a high risk for getting cervical cancer. Twenty-three point two percent of subjects perceived the severity of cervical cancer was low, 48.8% moderate and 28.0% high. Only 27.6% of subjects stated they had ever received cervical cancer screening. The common reasons given by subjects for not being screened for cervical cancer were fear of the screening procedure and lack of screening promotion. The most common reason given by subjects for having cervical cancer screening was being recommended by the health care provider. Factors significantly associated with cervical cancer screening were being aged ≥40 years ($p = 0.001$), being married ($p = 0.011$) and using contraceptives ($p = 0.027$). Our study subjects had a low knowledge level, a moderate attitude level and a low practices level regarding cervical cancer and its screening. Health care providers influenced subject decisions to have screening, but there was fear and lack of knowledge about cervical cancer and its screening. Cervical cancer screening promotion programs need to take this into consideration when developing

methods to overcome these problems. Further studies are needed to test these new methods to determine if they can improve screening rates. Providers also need to be educated to encourage their patients to be screened. Further studies among providers are needed to determine their knowledge, attitudes and practices regarding cervical cancer screening.

Keywords: cervical cancer, screening, knowledge, attitude, practice, urban, the Philippines

INTRODUCTION

Cervical cancer is a common cancer among women; an estimated 570,000 new cervical cancer cases and 311,000 deaths due to cervical cancer occurred world-wide in 2018; more than 85% of these deaths occurred in low- and middle-income countries (WHO, 2019; Bray *et al*, 2018). In the Philippines, cervical cancer is the second most common type of cancer among women after breast cancer (Bruni *et al*, 2019). An estimated 7,190 women were diagnosed with having cervical cancer and 4,088 died from cervical cancer in the Philippines in 2018 (Bruni *et al*, 2019). In 2018, the age-standardized incidence and mortality rates per 100,000 population due to cervical cancer in Southeast Asia were 17.2 and 10.0, respectively, and in the Philippines were 14.9 and 8.8, respectively (Bruni *et al*, 2019).

Well established methods have been developed to screen for abnormalities that precede potential cervical cancer (WHO, 2014). Cervical cancer screening programs help reduce the incidence and mortality of cervical cancer (Arbyn *et al,* 2009). Many developing countries do not have screening programs due to resource constraints (Sankaranarayanan *et al,* 2001). The Philippines, like some other developing countries, perform opportunistic cervical cancer screening (Domingo and Dy-Echo, 2009). The current cervical cancer screening guideline for women in the Philippines (DOH Philippines, 2005) state: 1) all women aged 25-55 years should have visual inspection of their cervix treated with acetic acid (VIA) at five to seven year intervals in areas with no pap smear capability; 2) acetic acid wash (3-5%) should be used as the primary screening method at local health units (rural health units; health centers), district hospitals and provincial hospitals with no pap smear capability; 3) VIA should be used as a triage method before pap smear at a district, provincial or regional hospital with pap smear capability; 4) colposcopy with biopsy as needed is the diagnostic test of choice after encountering positive or suspicious screening results at an appropriate tertiary level health facility; 5) pap smear is the monitoring diagnostic test of choice in patients with stage 1 cervical intraepithelial neoplasia and no available colposcopy facilities; 6) positive or suspicious lesions noted on screening should be referred immediately to a referral facility; 7) and referral centers for cervical cancer diagnostic tests and treatment should be established at tertiary care facilities. The Department of Health's Advisory on Uterine cervix cancer (DOH Philippines, 2015) states: a woman's first

Correspondence: Erlidia F Llamas-Clark, University of Philippines Manila - Philippine General Hospital, Taft Avenue, Manila 1000, the Philippines.
Tel: +63 92 2867 9648
E-mail: erlidia.clark@yahoo.com

pap smear should be done 3 years after her first vaginal intercourse. After that, it should be done yearly for 3 years. If the pap smear test is negative for 3 consecutive years, then it can be performed every two or three years. In unmarried women who have never had sexual intercourse, a pap smear should be done at age 35. In areas where a pap smear is available it should be used to screen all women beginning at age 21 years and performed every 1-2 years depending on if it is the traditional method or Thin Prep.

Barriers to cervical cancer screening reported among women from low- to lower-middle-income countries include: lack of awareness and lack of knowledge about cervical cancer and its prevention; demographic factors, such as younger age and being single; psychological factors, such as fear and anxiety; structural barriers, such as lower education level, cost of screening and distance to the service; sociocultural and religious barriers and perceived barriers (Al-Naggar *et al,* 2010; Singh *et al,* 2014; Islam *et al,* 2017).

Human papillomavirus (HPV) infection is the main cause of cervical cancer and the most common sexually transmitted infection in most populations (Castellsagué, 2008). A study from the Philippines reported several factors associated with an increased likelihood of HPV infection and subsequent development of cervical cancer: young age at first intercourse, low socioeconomic status, high parity, smoking, use of hormonal contraception and risky sexual behavior (Ngelangel *et al,* 1998; Domingo and Dy-Echo, 2009). Women from a low socioeconomic level are more likely to engage in risky sexual behavior, such as early sexual initiation, early marriage, early pregnancy, high parity and poor sexual knowledge (Singh, 1998; Wyatt *et al,* 1999; Fako *et al,* 2010). This puts these women at greater risk for cervical cancer and they may have less access to health care services and information.

Studies addressing prevention of cervical cancer in this population in the Philippines are few. It is important to know the knowledge levels, attitudes and practices regarding cervical cancer and its screening in order to inform cervical cancer screening promotion programs how to improve utilization. In this study we aimed to determine knowledge levels, attitudes and practices regarding cervical cancer and its screening among urban women living in low-socio-economic areas of Manila and determine the factors influencing screening practices in order to inform cervical cancer control programs for the study population.

MATERIALS AND METHODS

This cross-sectional study was conducted during April 2018 at four public health centers (Tondo Foreshore, Parola, Corazon Aquino, and Baseco) in Manila. A total of 250 women (60 from each health center and 10 extra women) were recruited using convenience selection. Inclusion criteria were women aged 20-50 years with a child aged <5 years registered at the studied health centers. Exclusion criteria for study subjects were women who had a hysterectomy, who had been diagnosed with cervical cancer or who declined to participate in the study. Each subject was interviewed through a face-to-face interview at the health center or at their home by request. The interviews followed a set questionnaire.

The questionnaire asked about age, education level, religion, marital status, employment status, household

monthly income, parity, knowing a family member or friend with cervical cancer, travel time to nearest facility providing cervical screening, and use of a contraceptive. Knowledge, perceptions about susceptibility and severity of HPV infection and cervical cancer were assessed using a standardized questionnaire adapted from a validated tool (Ingledue *et al*, 2004) developed based on the Health Belief Model which has been successfully used to study preventive health behavior, such as cancer prevention (Rosenstock, 1974). According to the Health Belief Model, perceived susceptibility (believing one is susceptible to HPV infection or cervical cancer) and perceived severity (believing HPV infection or cervical cancer have serious consequences) influence decisions about preventive behavior.

Subject knowledge was evaluated by 15 multiple-choice questions about cause, risk factors, and preventive measures for HPV infection and cervical cancer. To calculate total score, each correct response was given 1 point and each incorrect or unknown response was given 0 points. The possible score ranged from 0 to 15 points. Higher scores indicated greater knowledge. Perceived susceptibility and severity were measured using 15 questions: 6 questions related to perceived susceptibility and 9 questions related to severity. Responses consisted of a 5-point Likert scale ranging from strongly disagree (1) to strongly agree (5). Higher scores indicated greater perceived susceptibility (range: 6 to 30 points) and greater severity (range: 9 to 45 points). Knowledge and perceived susceptibility and severity scores were classified into three levels: a high knowledge level (≥12 points), a high perceived susceptibility (≥26 points), and a high perceived severity (≥39 points); a moderate knowledge level (9-11 points), a moderate perceived susceptibly (21-25 points) and a moderate perceived severity (31-38 points); and a low knowledge level (≤8 points), a low perceived susceptibility (≤20 points) and a low perceived severity (≤30 points) (Narayana *et al*, 2017). Subjects were asked if they had heard of cervical cancer screening (pap smear or VIA) and if so, the source of their information; whether they had been screened previously, the number of screenings and the reasons for being or not being screened. The questionnaire was pilot tested on 20 women not included in the actual study and minor modifications made. The Cronbach's alpha results were 0.65 for knowledge, 0.85 for perceived susceptibility and 0.78 for severity.

Stata/IC version 14.0 (StataCorp LP, College Station, TX) was used for statistical analyses. Descriptive statistics were calculated and data were analyzed using the Cochran-Armitage test and Pearson's chi-square test. Variables with a p-value <0.25 on univariate analysis for knowledge and attitudes were included on multivariate logistic regression analysis. A p-value <0.05 was considered statistically significant.

Ethical approval for the study was obtained from the University of the Philippines Manila Review Ethics Board (approval no. 2017-370-01) and from Nagasaki University, Japan (approval no.17091493). Written informed consent was obtained from each subject prior to inclusion in the study.

RESULTS

A total of 250 subjects were included in the study. The mean (±standard deviation (SD)) age (range) of study subjects was 31.3 (±7.4) (20-49) years (Table 1). Forty-five percent of subjects were married

Table 1
Study subject demographic characteristics (n = 250).

Characteristic	Number	Percent
Age in years (Mean ± SD = 31.3 ± 7.4)		
20–29	124	50.0
30–39	84	34.0
≥40	42	17.0
Education		
No formal education or primary	40	16.0
Secondary or higher	210	84.0
Religion		
Roman Catholic	220	88.0
Non-Catholic	30	12.0
Marital status		
Married	111	45.0
Living with partner	98	39.0
Never married	35	14.0
Widowed/divorced/separated	6	2.0
Employment status		
Currently employed	39	16.0
Unemployed	211	84.0
Monthly household income in PHP (Mean ± SD = 8,442 ± 4,460)		
≤8,000.00	111	44.4
≥8,001.00	139	55.6
Parity (Mean ± SD = 2.98 ± 1.7)		
≤2	117	46.8
≥3	133	53.2
Friend or family diagnosed with cervical cancer		
Yes	20	8.0
No	230	92.0
Travel time to health facility for screening in minutes (Mean ± SD = 11.3 ± 7.9)		
≤10	177	70.8
≥11	73	29.2
Uses contraceptives		
Yes	161	64.4
No	89	35.6

SD: standard deviation; PHP: Philippine Pesos

and 84.0% had completed a secondary education. The average household income was PHP8,442 (approximately USD160) per month and most subjects lived within 10 (range: 2-45) minutes from a health facility providing a screening service. The average parity of study subjects was 2.98; 64.4% used contraceptives.

Fifty-four point eight percent of subjects had a low, 40.4% had a moderate and 4.8% had a high knowledge score about HPV infection and cervical cancer. Ninety-seven percent of subjects had heard of a pap smear or a VIA and 69.0% had heard about these from a health facility, 47.9% from a friend, family member or neighbor, 24.0% from a television program, 15.7% from a poster, newspaper or magazine, 5.4% from a learning institution or school and 5.0% from a radio program. Thirty-five point six percent had a low, 35.2% had a moderate and 29.2% had a high perceived susceptibility to HPV infection or cervical cancer. Twenty-three point two percent of subjects believed HPV infection and cervical cancer were of low severity, 48.8% believed they were of moderate severity and 28.0% believed they were of a high level of severity. Twenty-seven point six percent of subjects had previously

Table 2
Study subject knowledge, attitudes and practices regarding cervical cancer and its screening (n = 250).

Measures	Number	Percent
Knowledge score (Mean $\pm$ SD = 7.7 $\pm$ 2.9)		
Low	137	54.8
Moderate	101	40.4
High	12	4.8
Attitudes score (Mean $\pm$ SD = 22.0 $\pm$ 5.5)		
Low	89	35.6
Moderate	88	35.2
High	73	29.2
Perceived severity score (Mean $\pm$ SD = 34.7 $\pm$ 6.1)		
Low	58	23.2
Moderate	122	48.8
High	70	28.0
Practices		
Has had pap smear or VIA		
Yes	69	27.6
No	181	73.3
Number of times had pap smears or VIA (n = 69)		
1	54	78.2
≥2	15	23.8

SD: standard deviation; VIA: visual inspection with acetic acid.

undergone cervical cancer screening; of these 78.2% had only undergone it once (Table 2).

The main reasons given by subjects for being screened for cervical cancer were being recommended by a health professional (74.0%), being advised by a teacher or neighbor (13.1%) and making their own decision (7.2%). The main reasons given by subjects for not being screened were fear of pain, discomfort or embarrassment during the procedure (35.4%), lack of screening promotion (17.1%), fear of what the results showed (11.6%), not having time to be screened (9.9%) and not having enough money to be screened (8.3%) (Table 3).

On univariate analysis factors significantly ($p<0.25$) associated with screening for cervical cancer were: being ≥40 years of age, being Roman Catholic, being married, having a parity of ≥3 times, travel time to health facility of ≤10 minutes and using contraceptives. On multivariate analysis, factors significantly associated with screening were: being ≥40 years of age (odds ratio (OR): 5.38; 95% confidence interval (CI): 2.25-12.90; $p = 0.001$), being married (OR: 4.68; 95% CI: 1.42-15.41; $p = 0.011$), and using contraceptives (OR: 2.20; 95% CI: 1.09-4.41; $p = 0.027$) (Tables 4, 5).

DISCUSSION

Cervical cancer is a common cancer in the Philippines (Bruni *et al*, 2019). It can be prevented by screening and early

Table 3
Reasons given by study subjects for having/not having cervical cancer screening.

Reasons given by study subjects	Number	Percent
Study subjects having cervical cancer screening ($n = 69$)		
Being recommended by health professional	51	74.0
Being advised by others (teacher, neighbor)	9	13.1
Own decision	5	7.2
Being worried about vaginal/abdominal symptoms	2	2.9
Free screening	1	1.4
Having diabetes	1	1.4
Study subjects not having cervical cancer screening ($n = 181$)		
Fear of pain, discomfort or embarrassment during the procedure	64	35.4
Lack of screening promotion	31	17.1
Fear of what the results showed	21	11.6
Lack of having time to be screened	18	9.9
Not having enough money	15	8.3
Never heard of screening	10	5.5
No signs or symptoms	9	5.0
Do not know where service is available	7	3.9
Missing	6	3.3

Table 4
Comparison of study subjects who did and did not have cervical cancer screening (n = 250).

Characteristics	Total number	Had cervical cancer screening, n (%) or mean (SD)		p-value
		Yes (n = 69)	No (n = 181)	
Age in years				<0.001[a]
Mean (SD)		35 (7.2)	30 (6.9)	
20-29	124	20 (29.0)	104 (57.5)	
30-39	84	27 (39.1)	57 (31.5)	
≥40	42	22 (31.9)	20 (11.0)	
Education				0.988[b]
No formal education or primary	40	11 (15.9)	29 (16.0)	
Secondary or higher	210	58 (84.1)	152 (84.0)	
Religion				0.040[b]
Roman Catholic	220	56 (81.2)	164 (90.6)	
Non-Catholic	30	13 (18.8)	17 (9.4)	
Marital status				<0.001[b]
Married	111	44 (63.8)	67 (37.0)	
Living with partner	98	21 (30.4)	77 (42.6)	
Never married/widowed/divorced/separated	41	4 (5.8)	37 (20.4)	
Employment status				0.927[b]
Employed	39	11 (15.9)	28 (15.5)	
Unemployed	211	58 (84.1)	153 (84.5)	
Monthly household income in PHP				0.300[b]
Mean (SD)		8,752 (4,091)	8,324 (4,598)	
≤8,000.00	111	27 (39.1)	84 (46.4)	
≥8,001.00	139	42 (60.9)	97 (53.6)	
Parity				0.001[b]
≤2	117	21 (30.4)	96 (53.0)	
≥3	133	48 (69.6)	85 (47.0)	
Knowing friend or family diagnosed with cervical cancer				0.509[b]
Yes	20	5 (7.2)	15 (8.3)	
No	230	64 (92.8)	166 (91.7)	
Travel time to health facility for screening in minutes				0.232[b]
≤10	177	45 (65.2)	132 (72.9)	
≥11	73	24 (34.8)	49 (37.1)	

Table 4 (Continued)

Characteristics	Total number	Had cervical cancer screening, *n* (%) or mean (SD)		*p*-value
		Yes (*n* = 69)	No (*n* = 181)	
Uses contraceptives				0.022[b]
Yes	172	55 (79.7)	117 (64.6)	
No	78	14 (30.3)	64 (35.4)	
Knowledge score				0.107[b]
Low	137	32 (46.4)	105 (58.0)	
Average	101	35 (50.7)	66 (36.5)	
High	12	2 (2.9)	10 (5.5)	
Susceptibility score				0.236[b]
Low	89	21 (30.4)	68 (37.6)	
Average	88	30 (43.5)	58 (32.0)	
High	73	18 (26.1)	55 (30.4)	
Severity score				0.262[b]
Low	58	12 (17.4)	46 (25.4)	
Average	122	39 (56.5)	83 (45.9)	
High	70	18 (26.1)	52 (28.7)	

SD: standard deviation; PHP: Philippine Pesos; [a]Cochran-Armitage test; [b]Pearson's chi-square test.

Table 5
Evaluation of factors potentially associated with cervical cancer screening practices by multiple logistic regression analysis.

Variables	Adjusted OR (95% CI)	*p*-value
Age in years		
20-29	1	
30-39	1.68 (0.82–3.49)	0.162
≥40	5.38 (2.25–12.90)	0.001
Marital status		
Never married/widowed/divorced/separated	1	
Living with partner	2.50 (0.73–8.52)	0.143
Married	4.68 (1.42–15.41)	0.011
Uses contraceptives		
No	1	
Yes	2.20 (1.09–4.41)	0.027

OR: odds ratio; CI: confidence interval.

treatment of abnormalities. Understanding the knowledge levels, attitudes and practices regarding cervical cancer and its screening will be useful for effective cervical cancer promotion programs.

In our study, more than half of subjects had a low knowledge level about HPV infection and cervical cancer. Most of our subjects had heard of cervical cancer screening but few had any specific knowledge about the disease, similar to previous studies (Dzuba *et al,* 2005; Rosser *et al,* 2015). Many of our subjects had heard about cervical cancer screening at a health facility. Health care providers were the main sources of information about cervical cancer and screening, similar to previous studies (Gichangi *et al*, 2003). Health care providers should be trained in how to educate the study population about HPV infection, cervical cancer and screening practices.

More than one-third of our subjects had perceived they had a low susceptibility to HPV infection and cervical cancer, similar to other studies from developing countries (Wong *et al*, 2009; Gu *et al*, 2012). This may be due to lack of knowledge about the disease and its risk factors. Marlow *et al* (2009) stated it is necessary for an individual to understand the relevant risk factors for the disease in order to accurately assess their risks for contracting it. Another study found an educational intervention significantly increased perceived susceptibility to a disease (Shojaeizadeh *et al,* 2011). Health education is needed to educate the study population about the disease and its risk factors in order to create a better understanding of their perceived susceptibility.

Most of our study subjects perceived the severity of HPV infection and cervical cancer to be moderate or high, similar to the findings of a previous study (Austin *et al*, 2002). However, perceived severity does not always reflect knowledge. A study from Malaysia found their women subjects believed cervical cancer to be deadly without treatment, even when diagnosed early (Wong *et al*, 2009). Many of our study subjects had a low knowledge level about cervical cancer. Perceived severity may be exaggerated by insufficient knowledge about the effectiveness of early detection and treatment (Wilcher *et al*, 1999).

In our study, just over a quarter of our subjects (27.6%) had ever been screened for cervical cancer, much lower than a study from the US (91.6%) (Coughlin *et al*, 1999). Our findings are similar to other studies from the Philippines (23%, 37%) (UP-DOH Cervical Cancer Screening Study Group, 2001; Ngelangel *et al*, 1993). These minor differences in studies from the Philippines may be due to differences in study protocols, definitions and study populations. Our results are similar to those from a study from China (21%) (Wang *et al*, 2015) and higher than a study from Nepal (5%) (Ranjit *et al*, 2016).

In our study, subjects who had not screened reported fear of pain, discomfort and embarrassment as reasons for not being screened, similar to the results of another study from the Philippines (Estrada-Marcelo, 2015) and Asia in general (Aswathy *et al,* 2012). Cervical cancer screening programs need to address these psychological barriers and make efforts to overcome them. Members of the study population should be educated about the screening procedure and provided a comfortable screening environment to overcome this barrier.

In this study, the most common reason given by subjects for being screened for cervical cancer was being recommended

by a health professional, similar to a previous study (Ackerson *et al*, 2008). Health care provider recommendation positively affects women's decisions about not only initial screening, but also continued regular screening (Bessler *et al*, 2007). Health care providers should be aware of their influential role in promoting cervical cancer screening, especially in the current situation which relies on opportunistic screening.

In our study, being aged ≥40 years, being married and using a contraceptive were associated with screening for cervical cancer, similar to the findings of previous studies (Yi, 1994; Simou *et al*, 2010). Cervical cancer screening promotion programs need to especially target women aged <40 years, those who are not married and those who do not use contraceptives. These women are less likely to have been to health care providers and less likely to have been exposed to cervical cancer screening promotion materials. A previous study found women with no contact with a primary care provider were unlikely to have a pap smear test (Hewitt *et al*, 2004). Health care providers need to take advantages of each healthcare visit to promote routine health services, such as cervical cancer screening.

Knowledge and attitudes have been reported to be important factors affecting cervical cancer screening practices (Nwankwo *et al*, 2011; Khani *et al*, 2015; Chaowawanit *et al*, 2016; Parsa *et al*, 2017). However, in our study, we found no significant association between knowledge and attitudes and screening practices, similar to previous studies (McFarland, 2003; Srisuwan *et al*, 2015). These differences in findings may reflect different study populations and study methods. Our study may not have adequately assessed other influencing factors, such as perceived barriers (McFarland *et al*, 2016), awareness of screening benefits, self-efficacy (Rosenstock, 1974), and community/social support (Williams-Brennan *et al*, 2012), which may influence a woman's knowledge, attitudes and practices. Further studies are needed to explore these other factors.

Our study had several limitations; we used convenience sampling to select subjects, which introduces selection bias. The results cannot be generalizable to other populations. We did not assess the risk factors for HPV infection and cervical cancer among the study subjects, which could influence their behavior. Our results were based on self-reports, which can be affected to social desirability and recall bias. Our subjects may also not have been able to differentiate a cervical cancer screening test from a pelvic examination or vaginal swab test for infection (Gichangi *et al*, 2003). This might have resulted in overestimation of the proportion of subjects screened.

Our study subjects had a low knowledge level, a moderate attitude level and a low practices level regarding cervical cancer and its screening. Factors significantly associated with cervical cancer screening were being aged ≥40 years, being married and using contraceptives. Health care providers influenced subject decisions to have screening. Factors significantly influencing subjects to avoid screening were fear during the screening procedure and lack of screening promotion.

In conclusion, cervical cancer screening promotion programs need to take our results into consideration when developing methods to promote cervical cancer screening. Further studies are needed to test these new methods to

determine if they can improve screening rates. Health care providers need to be educated to encourage their clients to be screened. Further studies among providers are needed to determine their knowledge, attitudes and practices regarding cervical cancer screening.

ACKNOWLEDGMENTS

We acknowledge the research assistance given by Ms Cristina Jhoanne Sanchez, Ms Hannah Mae Laderas, and Ms Janel A Sabellano in data collection. We would like to extend our thanks to the Manila City Health Department and staff led by Dr Benjamin Yson, Dr Gina F Pardilla, and Dr Rosalina Tan in providing necessary permissions for the study sites, administrative support, and feedback in the conduct of the study. We would like to extend our appreciation to the staff of Manila City Local Health Centers and volunteer health workers for their support and to the women who participated in this study. We thank Edanz Group (www.edanzediting.com/ac) for editing a draft of this manuscript. This study was supported by a JSPS KAKENHI Grant (Number 17K12568).

REFERENCES

Ackerson K, Pohl J, Low LK. Personal influencing factors associated with pap smear testing and cervical cancer. *Policy Polit Nurs Pract* 2008; 9: 50-60.

Al-Naggar RA, Low WY, Isa ZM. Knowledge and barriers towards cervical cancer screening among young women in Malaysia. *Asian Pac J Cancer Prev* 2010;11:867-73.

Arbyn M, Rebolj M, De Kok IMCM, *et al.* The challenges of organising cervical screening programmes in the 15 old member states of the European Union. *Eur J Cancer* 2009; 45: 2671-8.

Aswathy S, Quereshi MA, Kurian B, Leelamoni K. Cervical cancer screening: current knowledge & practice among women in a rural population of Kerala, India. *Indian J Med Res* 2012; 136: 205-10.

Austin LT, Ahmad F, McNally MJ, Stewart DE. Breast and cervical cancer screening in Hispanic women: a literature review using the health belief model. *Womens Health Issues* 2002; 12: 122-8.

Bessler P, Aung M, Jolly P. Factors affecting uptake of cervical cancer screening among clinic attendees in Trelawny, Jamaica. *Cancer Control* 2007; 14: 396-404.

Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin* 2018; 68: 394-424.

Bruni L, Albero G, Serrano B, *et al*. ICO/IARC Information Centre on HPV and Cancer (HPV Information Centre). Human papillomavirus and related diseases in Philippines, 2019 [cited 2020 May 01]. Available from: URL: https://www.hpvcentre.net/statistics/reports/PHL.pdf?t=1559474177321

Castellsagué X. Natural history and epidemiology of HPV infection and cervical cancer. *Gynecol Oncol* 2008; 110: S4-7.

Chaowawanit W, Tangjitgamol S, Kantathavorn N, *et al*. Knowledge, attitudes and behavior of Bangkok Metropolitan women regarding cervical cancer screening. *Asian Pac J Cancer Prev* 2016; 17: 945-52.

Coughlin SS, Uhler RJ, Blackman DK. Breast and cervical cancer screening practices among American Indian and Alaska Native women in the United States, 1992-1997. *Prev Med* 1999; 29: 287-95.

Department of Health, Republic of Philippines (DOH Philippines). Establishment of a cervical cancer screening program. Administrative Order No. 2005-0006 (Feb 10, 2005).

Department of Health, Republic of Philippines (DOH Philippines). Uterine cervix cancer, 2015. [cited 2020 July 10]. Available from: URL: https://www.doh.gov.ph/Health-Advisory/Uterine-Cervix-Cancer

Domingo EJ, Dy-Echo AVV. Epidemiology, prevention and treatment of cervical cancer in the Philippines. *J Gynecol Oncol* 2009; 20: 11-16.

Dzuba IG, Calderón R, Bliesner S, Luciani S, Amado F, Jacob M. A participatory assessment to identify strategies for improved cervical cancer prevention and treatment in Bolivia. *Rev Panam Salud Publica* 2005; 18: 53-63.

Estrada-Marcelo MLO. Utilization of an opportunistic screening program for cervical cancer in family medicine clinic. *Filipino Fam Physician* 2015; 53: 67-72.

Fako TT, Kangara LW, Forcheh N. Predictors of knowledge about HIV/AIDS among young people: lessons from Botswana. *J AIDS HIV Res* 2010; 2: 116-30.

Gichangi P, Estambale B, Bwayo J, *et al*. Knowledge and practice about cervical cancer and Pap smear testing among patients at Kenyatta National Hospital, Nairobi, Kenya. *Int J Gynecol Cancer* 2003; 13: 827-33.

Gu C, Chan CW, Twinn S, Choi KC. The influence of knowledge and perception of the risk of cervical cancer on screening behavior in mainland Chinese women. *Psychooncology* 2012; 21: 1299-308.

Hewitt M, Devesa SS, Breen N. Cervical cancer screening among U.S. women: analyses of the 2000 National Health Interview Survey. *Prev Med* 2004; 39: 270-8.

Ingledue K, Cottrell R, Bernard A. College women's knowledge, perceptions, and preventive behaviors regarding human papillomavirus infection and cervical cancer. *Am J Health Stud* 2004; 19: 28-34.

Islam RM, Billah B, Hossain MN, Oldroyd J. Barriers to cervical cancer and breast cancer screening uptake in low-income and middle-income countries: a systematic review. *Asian Pac J Cancer Prev* 2017; 18: 1751-63.

Khani Jeihooni A, Kashfi SM, Bahmandost M, Kashfi SH. The survey of factors affecting Pap smears based on health belief model in health centers in Fasa, Fars Province, Iran. *Women Health Bull* 2015; 2: e25565.

Marlow AV, Waller J, Wardle J. The impact of human papillomavirus information on perceived risk of cervical cancer. *Cancer Epidemiol Biomarkers Prev* 2009; 18: 373-76.

McFarland D. Cervical cancer and pap smear screening in Botswana: knowledge and perceptions. *Int Nurs Rev* 2003; 50: 167-75.

McFarland DM, Gueldner SM, Mogobe KD. Integrated review of barriers to cervical cancer screening in sub-Saharan Africa. *J Nurs Scholarsh* 2016; 48: 490-8.

Narayana G, Suchitra MJ, Sunanda G, Ramaiah JD, Kumar BP, Veerabhadrappa K. Knowledge, attitude, and practice toward cervical cancer among women attending Obstetrics and Gynecology Department: a cross-sectional, hospital-based survey in South India. *Indian J Cancer* 2017; 54: 481-7.

Ngelangel C, Munoz N, Bosch FX, *et al*. Causes of cervical cancer in the Philippines: a case-control study. *J Natl Cancer Inst* 1998; 90: 43-9.

Ngelangel CA, Cordero CP, Lacaya L. Women and child health care knowledge, beliefs, and practices among Filipino women randomly selected from the 1989 telephone directory of Metro Manila. *Philipp J Inern Med* 1993; 31: 89-102.

Nwankwo KC, Aniebue UU, Aguwa EN, Anarado AN, Agunwah E. Knowledge attitudes and practices of cervical cancer screening among urban and rural Nigerian women: A call for education and mass screening. *Eur J Cancer Care* 2011; 20: 362-7.

Parsa P, Sharifi F, Shobeiri F, Karami M. Effects of group counseling based on health belief model on cervical cancer screening beliefs and performance of rural women in Kaboudrahang, Iran. *Asian Pac J Cancer Prev* 2017; 18: 1525-30.

Ranjit A, Gupta S, Shrestha R, Kushner AL, Nwomeh BC, Groen RS. Awareness and prevalence of cervical cancer screening among women in Nepal. *Int J Gynecol Obstet* 2016; 134: 37-40.

Rosenstock IM. The health belief model and preventive health behavior. *Health Educ Monogr* 1974; 2: 354-86.

Rosser JI, Njoroge B, Huchko MJ. Knowledge about cervical cancer screening and perception of risk among women attending outpatient clinics in rural Kenya. *Int J Gynaecol Obstet* 2015; 128: 211-5.

Sankaranarayanan R, Budukh AM, Rajkumar R. Effective screening programmes for cervical cancer in low- and middle-income developing countries. *Bull World Health Organ* 2001; 79: 954-62.

Shojaeizadeh D, Hashemi SZ, Moeini B, Poorolajal J. The effect of educational program on increasing cervical cancer screening behavior among women in Hamadan, Iran: applying health belief model. *J Res Health Sci* 2011; 11: 20-5.

Simou E, Maniadakis N, Pallis A, Foundoulakis E, Kourlaba G. Factors associated with the use of pap smear testing in Greece. *J Womens Health* 2010; 19: 1577-85.

Singh M, Ranjan R, Das B, Gupta K. Knowledge, attitude and practice of cervical cancer screening in women visiting a tertiary care hospital of Delhi. *Indian J Cancer* 2014; 51: 319-23.

Singh S. Adolescent childbearing in developing countries: a global review. *Stud Fam Plann* 1998; 29: 117-36.

Srisuwan S, Puapornpong P, Srisuwan S, Bhamarapravatana K, Suwannarurk K. Knowledge, attitudes and practices regarding cervical cancer screening among village health volunteers. *Asian Pac J Cancer Prev* 2015; 16: 2895-8.

University of the Philippines-Department of Health Cervical Cancer Screening Study Group (UP-DOH Cervical Cancer Screening Study Group). Knowledge, attitudes and practices-behavior study. Manila, Republic of Philippines: University of the Philippines; 2001.

Wang B, He M, Chao A, *et al*. Cervical cancer screening among adult women in China, 2010. *Oncologist* 2015; 20: 627-34.

Wilcher RA, Gilbert LK, Siano CS, Arredondo EM. From focus groups to workshops: developing a culturally appropriate cervical cancer prevention intervention for rural Latinas. *Int Q Community Health Educ* 1999; 19: 83-102.

Williams-Brennan L, Gastaldo D, Cole DC, Paszat L. Social determinants of health associated with cervical cancer screening among women living in developing countries: a scoping review. *Arch Gynecol Obstet* 2012; 286: 1487-505.

Wong LP, Wong YL, Low WY, Khoo EM, Shuib R. Knowledge and awareness of cervical cancer and screening among Malaysian women who have never had a pap smear: a qualitative study. *Singapore Med J* 2009; 50: 49-53.

World Health Organization (WHO). Comprehensive cervical cancer control: a guide to essential practice - Second edition, 2014. [cited 2020 May 01]. Available from: URL: http://apps.who.int/iris/bitstream/10665/144785/1/9789241548953_eng.pdf?ua=1

World Health Organization (WHO). Human papillomavirus (HPV) and cervical cancer, 2019 [cited 2020 May 01]. Available from: URL: http://www.who.int/mediacentre/factsheets/fs380/en/

Wyatt G, Durvasula RS, Guthrie D, Lefranc E, Forge N. Correlates of first intercourse among women in Jamaica. *Arch Sex Behav* 1999; 28: 139-57.

Yi JK. Factors associated with cervical cancer screening behavior among Vietnamese women. *J Community Health* 1994; 19: 189-200.