

## RESEARCH ARTICLE

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# Exploring Indonesian Primary Schoolgirls' Experiences of School-based HPV Vaccination, Knowledge of HPV Risks and Prevention, and Preferences for Cervical Cancer Education

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## Abstract

**Objective:** In 2016, Indonesia introduced its Human Papillomavirus (HPV) vaccination demonstration program for girls in grades 5 and 6 of primary school, to reduce cervical cancer (CC) burden in selected provinces and test the viability of nationwide vaccination. This study explored schoolgirls' experience of school-based HPV vaccination, their knowledge of HPV and HPV vaccination, and their preferences for cervical cancer (CC) education. **Methods:** An online survey was conducted with schoolgirls who experienced HPV vaccination between 2019 and 2021 through the demonstration program. Using purposive sampling, respondents were recruited through partnerships with primary public health centres and primary schools in Jakarta and Yogyakarta. Data analysis was conducted using Chi-square test, Independent-samples t-test, and one-way ANOVA. **Results:** One hundred and forty primary schoolgirls with a mean age of 12.2 years (SD = 0.70) completed the survey. Schools and mothers were identified as key actors in socialising children about important health information and as girls' preferred sources of information. The average summed score for girls' knowledge of HPV, the HPV vaccine, and CC after being vaccinated was 5.07 out of 10 (SD 0.23). Significant differences in the mean knowledge scores among participants with different preferences regarding CC education in school were observed. **Conclusion:** While schoolgirls' experiences of HPV vaccination were largely positive, their knowledge of critical health information regarding HPV vaccination and CC prevention needs improving. Thus, it is necessary to provide parents, and school-based educators with culturally appropriate strategies and comprehensive evidence-based information about HPV vaccination and CC prevention more effectively to children.

**Keywords:** Adolescent girls-cervical cancer education-school-based-human papillomavirus vaccination-Indonesia

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## Introduction

Annually, around 36,600 Indonesian women are diagnosed with CC, however, it is estimated that 103 million females aged 15 and older are at risk of acquiring it [1]. The Quadrivalent HPV (Human Papillomavirus) vaccine is known to be efficacious in preventing CC and a subset of other cancers [2] and is recommended by The Centre for Disease Control and Prevention (CDC) for all children for routine vaccination starting at age 9 [3]. In 2016, Indonesia introduced HPV vaccination using a quadrivalent HPV vaccine through a demonstration program targeting primary schoolgirls in grades 5 and 6 in the provinces of Jakarta, Yogyakarta, East Java, Bali, South Sulawesi, and North Sulawesi. The program is part of Indonesia's prevention strategy to reduce CC burden by providing primary prevention via school-based HPV vaccination and secondary prevention via screening for pre-cancer with visual inspection with acetic acid (VIA)

or pap-smears. In 2022, Indonesia announced the intention to upscale HPV vaccination for girls in grades 5 and 6, by adding HPV vaccination to the National Childhood Immunisation Program that is implemented through primary schools, with a goal of vaccinating around 2 million adolescent girls by 2024.

The success of the demonstration program was affirmed by more than 90% of eligible girls participating and high vaccination completion rate (>90%), yet the program's evaluation report also highlighted challenges for future implementation [4]. The absence of a policy for vaccinating out-of-school girls indicates possible inequality in access to the vaccine. Misinformation and myths regarding the HPV vaccine also remain among some community members and health professionals. According to the evaluation report [4], a small number of parents refused the vaccination due to rumors that the vaccine is haram (forbidden by Islamic law) and some

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health workers incorrectly believed that only girls who had reached menarche could be vaccinated. Moreover, other studies found that despite high parental acceptance of the HPV vaccine, knowledge of CC, HPV, and HPV vaccination is generally poor among those acceptors [5-7]. Many mothers, whose daughters have not been vaccinated, had never heard of HPV vaccination and understood very little about the benefits of the HPV vaccine [5].

While HPV-related studies in Indonesia are emerging, most have been clinically focused [8-11]. These studies primarily focused on identifying the most prevalent HPV types in Indonesia and investigating HPV vaccine safety for adolescent girls. Additional studies have explored the affordability of HPV testing, and the cost-utility of HPV vaccination in Indonesia and confirmed the long-term fiscal and clinical benefits of primary prevention for alleviating the CC burden in Indonesia [12, 13]. Meanwhile, HPV-related studies involving HPV-vaccinated schoolgirls in Indonesia have thus far been limited to understanding the determinants of HPV vaccination uptake and their level of knowledge regarding HPV vaccination and CC risk factors [14, 15]. Prayudi et al. [14] found that HPV vaccination is strongly associated with sufficient knowledge regarding HPV infection and HPV vaccination, although the study did not elaborate on what aspects of the vaccination experience helped improve knowledge. Additionally, Wahidin & Febrianti [15] suggested that parental support was key in HPV vaccination uptake in the school-based HPV vaccination program in Jakarta. Furthermore, two qualitative studies regarding adults and young women's perceptions of HPV and acceptance of HPV vaccines found high acceptance among these populations, but also suggested that knowledge regarding HPV infections and prevention needs improving, for example through community education programs [5-7].

Currently, the HPV vaccination program follows a standardised childhood immunisation protocol that requires primary health centres to provide information sessions to parents, schools, and students regarding the benefit of the vaccination. However, in practice, implementation of such sessions may vary across districts and provinces due to limited resources and capacity at primary health centre level. Additionally, there is a notable gap in identifying key aspects of school-based HPV vaccination that can be improved to meet adolescent girls' priorities and needs regarding CC prevention. This study aimed to fill the research gap in Indonesia through understanding primary schoolgirls' experience of HPV vaccination, and their related need for HPV and CC education. This was achieved by exploring schoolgirls' experiences and perceptions of the vaccination process, their knowledge of HPV, HPV vaccine, and CC prevention after HPV vaccination, and their preferences regarding CC education. The objectives of this article are to report on findings related specifically to girls' experiences, to distil lessons from these findings for the national up-scaling of HPV vaccination, and to identify any areas where improvements can potentially be made as the program expands to maximise its benefits for girls as a health asset [16] both during and beyond adolescence.

## Materials and Methods

### *Study design*

An exploratory cross-sectional study was conducted with schoolgirls in grades 5 and 6 of public and private primary schools participating in the school-based HPV vaccination demonstration program.

### *Recruitment*

Respondents were recruited through partnerships with primary health centres as well as schools participating in the HPV vaccination program in Jakarta and Yogyakarta. Respondents' criteria included having received at least 1 dose of HPV vaccine between 2019-2021 through the school-based immunisation program and obtained approval from mothers to participate in the research. An electronic flyer was advertised to schoolgirls and their mothers through parent-teacher WhatsApp groups between December 2021 – March 2022. Of 208 expressions of interest, 202 schoolgirls subsequently received their mothers' consent to participate. From these, 180 survey responses were recorded; 140 (77.8%) were mostly or fully complete, and 40 (22.2%) were incomplete, hence not included in the analysis.

### *Research instrument*

In addition to the respondents' socio-demographic data, there were four thematic sections in the survey which covered:

#### *Theme 1: Girls' experiences immediately before vaccination*

Eighteen questions were presented in this section to explore primary schoolgirls' experiences before HPV vaccination. The issues that were explored included: familiarity with CC; provision of information regarding CC, the quadrivalent HPV vaccine, and its side effects; girls' satisfaction levels with the information provided; girls' assent before vaccination.

#### *Theme 2: Girls' experiences following vaccination*

This section explored girls' experiences of side effects; their sharing of vaccination experiences with mothers; and lastly girls' willingness to recommend HPV vaccination to their female peers. The questions in this section were presented in "yes", "no", or "don't know" format.

#### *Theme 3: Girls' knowledge of HPV, HPV vaccine, and cervical cancer*

Girls' knowledge following vaccination, including knowledge of HPV infection, HPV vaccination, and CC prevention was measured using ten true-or-false questions. A correct answer scored 1 point and an incorrect answer scored 0 points. The highest summed knowledge scale score possible was 10 and the lowest possible was 0. Summed knowledge scores were grouped into three classifications: high (8-10 correct responses), moderate (5-7 correct responses), and low knowledge (0-4 correct responses).

#### Theme 4: Girls' preferences regarding cervical cancer education at primary school

Five questions explored participants' preferences related to CC education in primary school using a 5-point Likert scale. The responses were classified into three categories: positive (5 - Strongly agree and 4 - Agree), negative (1 - Strongly disagree and 2 - Disagree), and unsure (3 - Unsure). Positive preference means respondents preferred or strongly preferred cervical cancer education at school. Negative preference means respondents opposed or strongly opposed cervical cancer education at school, while unsure preference means respondents were ambivalent about cervical cancer education at school.

#### Statistical analyses

Descriptive statistics were generated for all variables and the results included frequencies, percentages, mean scores (M), and standard deviations (SD). Relationships between categorical variables and the city where girls' schools were located were assessed using Chi-square tests. Independent samples T-tests were conducted to compare knowledge scores between grade levels, the city where girls' schools were located, and having ever discussed HPV vaccination with their mothers. One-way ANOVA test was conducted to evaluate differences in the mean knowledge scores among schoolgirls with positive, negative, and unsure preferences regarding cervical cancer education in school. The level of significance was set at 0.05. Statistical analyses were conducted using SPSS Version 28.

## Results

#### Socio-demographic characteristics

A total of 140 public and private primary schoolgirls completed the survey with a mean age of 12.2 years (SD 0.70). Of these, 55% attended schools in Jakarta and 45% attended schools in Yogyakarta. A considerable number of girls had only received 1 dose of the HPV vaccine because at the time of the study around 40% of the respondents were in 5<sup>th</sup> grade. Through the school-based program, eligible girls will receive a total of 2 doses of HPV vaccine, the first will be given in 5<sup>th</sup> grade and the last one in 6<sup>th</sup> grade. All respondents who received HPV vaccination did so through the school-based HPV vaccination demonstration program between 2019–2021 in Jakarta and Yogyakarta. See Table 1 for a summary of relevant socio-demographic data for the sample.

#### Schoolgirls' experiences related to HPV vaccination

##### Experience prior to HPV vaccination

This subset of questions focused on girls' exposure to HPV- and CC-related knowledge before receiving any vaccinations. These questions were asked because of the importance of providing comprehensive, age-appropriate, and easily understood information for medical procedures to meet the requirements of informed consent.

Sixty-three percent of respondents indicated that they had heard of CC before receiving the HPV vaccination – primarily through health education sessions at school,

from mothers, and via social media. Chi-square tests revealed significant associations between city of residence and prior knowledge of CC before HPV vaccination, as well as between city of residence and having discussed the benefits of HPV vaccine with mothers before vaccination (Table 2). Schoolgirls from Jakarta were more likely than those from Yogyakarta to know about CC before their HPV vaccination. Additionally, mothers in Jakarta were more likely to discuss the benefits of the HPV vaccine with their daughters before vaccination than mothers in Yogyakarta. However, there was no association between city of residence and having received information about HPV and CC from school or a health worker.

While 64.9% of respondents received key health information from schools or health workers regarding HPV vaccination, 27.6% reported that they did not receive information about the HPV vaccine side effects. Of the 48 schoolgirls (35.1%) who reported not being given information, 83.3% would have liked to receive information about HPV vaccination and CC. The findings also revealed that most schoolgirls who were given information were satisfied with the information they received. In regard to being asked for permission before getting vaccinated, 77.9% out of 140 respondents reported giving assent to their HPV vaccination.

Additionally, 100 out of 138 schoolgirls (72.5%) indicated receiving information regarding HPV vaccination and CC from mothers, and of these 88% indicated satisfaction with that information. Of the 38

Table 1. Respondents' Socio-Demographics Data

Demographics	Count (%)
Age range in years (11-14)	
11	17 (12.1%)
12	77 (55.0%)
13	39 (27.9%)
14	4 (2.90%)
Unknown	3 (2.10%)
Grade level	
5 <sup>th</sup> grade	59 (42.1%)
6 <sup>th</sup> grade	80 (57.1%)
Unknown	1 (0.70%)
School location	
Jakarta	77 (55.0%)
Yogyakarta	56 (40.0%)
Unknown	7 (5.00%)
Vaccination Status	
Number of HPV vaccines received	
1 dose	54 (38.5%)
2 doses	67 (47.9%)
Don't remember	19 (13.6%)
Last year of HPV vaccination	
2019	2 (1.40%)
2020	15 (10.7%)
2021	119 (85.0%)
Unknown	4 (2.90%)

Table 2. Respondents' Experiences before and after HPV Vaccination

Before HPV Vaccination	Jakarta Count (%)	Yogyakarta Count (%)	p-value
Prior knowledge of CC			
Had heard of CC or HPV infection before HPV vaccination (n = 138)			
Yes	59 (42.8)	28 (20.3)	0.016 <sup>a</sup>
No	24 (17.3)	27 (19.6)	
Access to information regarding HPV, HPV vaccine, and CC			
Received information about HPV infection, HPV vaccine, CC from school or health worker (n = 137)			
Yes	54 (65.8)	35 (63.6)	0.790 <sup>a</sup>
No	28 (34.2)	20 (36.4)	
(IF YES) Satisfaction with the information provided (n = 87)			
Yes	51 (96.2)	31 (91.2)	*
No	2 (3.80)	2 (5.80)	
Don't know	0 (0.00)	1 (2.00)	
(IF NO) Interest in receiving written information? (n = 48)			
Yes	23 (82.1)	17 (85.0)	*
No	2 (7.10)	1 (5.00)	
Don't know	3 (10.8)	2 (10.0)	
(IF YES) Received information regarding the HPV vaccine side effects (n = 87)			
Yes	38 (71.7)	25 (73.5)	0.852 <sup>a</sup>
No	15 (28.3)	9 (26.5)	
(IF YES) Satisfaction with the information provided (n = 61)			
Yes	36 (97.3)	22 (91.6)	*
No	1 (2.70)	0 (0.00)	
Don't know	0 (0.00)	2 (8.40)	
(IF NO) Interest in receiving written information? (n = 24)			
Yes	11 (73.3)	8 (88.8)	*
No	1 (6.40)	0 (0.00)	
Don't know	3 (20.0)	1 (11.2)	
Discussed the benefits of HPV vaccination with female caregivers (n = 138)			
Yes	66 (80.5)	34 (60.8)	0.011 <sup>a</sup>
No	16 (19.5)	22 (39.2)	
(IF YES) Satisfaction with the information provided (n = 100)			
Yes	58 (87.9)	30 (88.2)	*
No	7 (10.6)	2 (5.90)	
Don't know	1 (1.50)	2 (5.90)	
(IF NO) Interest in discussing the benefits of HPV vaccination with female caregivers (n = 38)			
Yes	10 (62.5)	14 (63.6)	*
No	3 (18.7)	6 (27.3)	
Don't know	3 (18.7)	2 (9.10)	
Assent before HPV vaccination			
Assent before receiving HPV vaccination (n = 140)			
Yes	66 (79.5)	43 (75.5)	0.838 <sup>a</sup>
No	8 (9.60)	7 (12.3)	
Don't remember	9 (10.9)	7 (12.3)	
Experience After HPV Vaccination			
Experience of the HPV vaccine side effects			
Experience of side effects after HPV vaccination (n = 138)			
Yes	8 (9.60)	4 (7.30)	*
No	75 (90.4)	51 (92.7)	

Table 2. Continued

Before HPV Vaccination	Jakarta Count (%)	Yogyakarta Count (%)	p-value
(IF YES) Received care in a health facility (n = 12)			
No	8 (100)	4 (100)	*
Sharing HPV vaccination experience with other females			
Discussed HPV vaccination experience with female caregivers (140)			
Yes	68 (82.0)	41 (72.0)	0.046 <sup>a</sup>
No	7 (8.40)	13 (22.8)	
Don't remember	8 (9.60)	3 (5.20)	
Discussed HPV vaccination experience with friends (139)			
Yes	52 (62.7)	38 (67.8)	0.797 <sup>a</sup>
No	25 (30.1)	14 (25.0)	
Don't remember	6 (7.20)	4 (7.20)	
Recommending HPV vaccination to other females			
Willingness to recommend HPV vaccines to other female friends/relatives (n =138)			
Yes	67 (80.8)	35 (63.6)	0.082 <sup>a</sup>
No	8 (9.60)	10 (18.2)	
Don't know	8 (9.60)	10 (18.2)	

\*, Chi-square analysis not suitable due to small cell counts; <sup>a</sup>, Pearson's Chi-square.

who did not receive information, 63.2% indicated they would have liked to discuss the vaccination with mothers.

#### Experience after HPV vaccination

Experiences of side effects were measured primarily to determine girls' input on the safety of the HPV vaccination being used. Most respondents (91.3%) did not experience any HPV vaccine side effects, while 8.70% reported mild side effects. Among the most common reactions reported were joint/muscle pain, redness around the injection site, headache, and fever.

A Chi-square test showed a significant association between whether girls discussed their HPV vaccination experiences with their mothers and their city of residence. Schoolgirls in Yogyakarta were less likely to discuss their HPV vaccination experience with mothers than those in Jakarta (Table 2). Lastly, 73.9% out of 138 respondents indicated that they would recommend HPV vaccination to their female peers. However, a substantial

percentage (26.1%) remained either unsure or unwilling to recommend HPV vaccination to others. Reasons for this lack of willingness were not captured in the data.

#### Schoolgirls' knowledge of HPV, HPV vaccination and CC prevention, and relationships between knowledge and preferences regarding CC education

The average summed score for knowledge of HPV, the HPV vaccine, and CC at the time of the research and after having had HPV vaccination was 5.07 out of 10 (SD 0.23), which fell within the moderate range. Three out of 10 questions had a high proportion (> 60%) of incorrect answers from respondents (Table 3), these were risk of HPV infection in men and women, the asymptomatic nature of CC, and the need for CC screening after HPV vaccination. Meanwhile, questions with a high number of correct answers were: HPV as the cause of CC, the treatability of early CC, and the effectiveness of HPV vaccines against CC (Table 3).

Table 3. Responses to Questions Regarding HPV, HPV Vaccination, and Cervical Cancer

Questions	Correct n (%)	Incorrect n (%)
Human Papillomavirus can cause cervical cancer.	107 (76.4)	33 (23.6)
Only women can get HPV infections.	23 (16.4)	117 (83.6)
HPV is a sexually transmitted infection (STI).	72 (51.8)	67 (48.2)
Pap smear or visual inspection with acetic acid can detect cervical cancer symptoms.	76 (55.1)	62 (44.9)
Cervical cancer can be cured if detected early.	98 (71)	40 (29)
Only married women can get cervical cancer.	64 (46.7)	73 (53.3)
Women with cervical cancer sometimes have no symptoms.	47 (34.6)	89 (65.4)
All HPV vaccines are effective protection against cervical cancer.	88 (64.2)	49 (35.8)
The best time to get HPV vaccination is before one has sexual contact.	66 (47.8)	72 (52.2)
Regular Pap smear is not needed after one has been fully vaccinated against HPV.	53 (38.4)	85 (61.6)



Table 4. Relationships between Knowledge and Female Caregivers' Involvement, and Mean Differences in Knowledge Scores among Preference Groups

	Knowledge score (M ± SD)	p-value
Relationships between schoolgirls' level of knowledge and engaging with female caregivers to talk about HPV vaccination		
Discussed the benefits of HPV vaccination with female caregivers before the vaccination		
Yes	5.52 ± 2.462	0.002 <sup>b</sup>
No	3.89 ± 2.896	
Differences in mean knowledge scores between the preferences categories		
Positive	5.39 ± 2.683	<0.001 <sup>c</sup>
Negative	6.46 ± 2.106	<0.001 <sup>c</sup>
Unsure	3.30 ± 1.938	<0.001 <sup>c</sup>

<sup>b</sup>, Independent samples t-tests; <sup>c</sup>, One-way ANOVA.

Independent-sample t-tests were conducted to compare knowledge scores between groups on variables including grade level (5<sup>th</sup> or 6<sup>th</sup>), the city where girls' school was located, and having discussed HPV vaccination with mothers before vaccination. No significant differences in knowledge scores were found between grade-level groups or cities. However, the mean knowledge score for girls who discussed HPV vaccination with mothers before getting vaccinated was significantly higher than those who did not (Table 4).

Finally, a one-way ANOVA found significant differences in mean knowledge scores between girls who were positive (n=95), negative (13), or unsure (27) about CC education in school (Table 4). Heterogeneity of variance was observed between groups, therefore Tamhane's T2 was used for post-hoc analyses. These revealed lower mean knowledge scores for respondents who favoured CC education in school compared to those who did not favour such education or those who were unsure.

## Discussion

The study collected survey data from primary schoolgirls in Jakarta and Yogyakarta who participated in the HPV vaccination demonstration program to understand: 1) their experiences of school-based HPV vaccination; 2) their knowledge of HPV, HPV vaccination, and CC prevention; and 3) preferences regarding CC education in school. Primary schoolgirls' experience of the school-based HPV vaccination was largely positive as indicated by an overall high level of exposure and satisfaction towards the provision of key health information as well as minimal experience of side effects. However, many respondents also have limited knowledge about HPV risks and CC prevention, which is consistent with findings from previous studies which found low knowledge regarding HPV and HPV vaccination in adults and older youth populations in Indonesia [5, 7]. While limited knowledge has not been associated with HPV vaccination acceptance in Indonesia [5-7], it is among the key barriers to participating in CC screening [17, 7], which ultimately may impede the country's goal to reduce CC burden. Most girls had knowledge scores in the moderate range, indicating room to improve the quality and retention of knowledge transfer to girls within the vaccination

program and the school-based health education program.

The areas in which knowledge scores for girls were lowest also need further attention in the HPV vaccination program. Particularly, it is crucial for girls and boys to understand that everyone is at risk of contracting HPV and possibly transferring it to a future partner once they are sexually active. Poor understanding of the asymptomatic nature of early CC or pre-cancerous cells, and the need for CC screening post-vaccination also needs to be corrected to ensure women seek screening regardless of whether they have symptoms. The school-based HPV program thus holds important potential for promoting secondary prevention as well as upscaling primary prevention of HPV and CC. Additionally, despite limits to girls' knowledge, many were keen to learn more about HPV vaccination and HPV prevention from their mothers and schools. Other studies from the global south have also found that schools and mothers are important sources of information for young people to learn about their sexual and reproductive health [18-20]. However, many parents and teachers often lack confidence and knowledge to discuss sexual and reproductive health issues with young people [21-24]. Moreover, a review on school-based HPV vaccination in the global south affirmed the positive impact of including parents in educational interventions on subsequent willingness to consent to children's HPV vaccination and improved knowledge regarding CC prevention and risk factors [25]. Therefore, upskilling parents and educators with culturally appropriate strategies and evidence-based information is critical to ensure effective and informed communication about sexual and reproductive health issues with young people.

Lastly, 74% of schoolgirls indicated that they would recommend HPV vaccination to their female peers suggesting a highly positive perception of HPV vaccination among the study sample. Such positive perception is an asset that can be leveraged to promote HPV vaccination through a peer-to-peer communication approach. Other studies looking at vaccination behaviour have suggested that peer-to-peer communication can have a positive effect in influencing an individual's intention to get a vaccination and subsequently improve vaccination uptake [26, 27]. However, a meaningful proportion of girls were not willing to recommend HPV vaccination to other females, although the reasons were not explored in this study. Other studies have indicated that lack of information

about HPV and HPV vaccine benefits and safety, as well as lack of parental consent can negatively affect uptake or completion in school-based HPV vaccination programs [25, 28]. Considering the high demand for more knowledge, further integration of more comprehensive CC education in the school-based HPV vaccination programs may help increase positive perception and maintain high HPV vaccination uptake.

While the study results clearly indicate that the school-based HPV vaccination model is a strong asset for Indonesian girls for acquiring immunity to HPV and crucial information about HPV and CC, there are areas for improvement. Firstly, the finding that 27.6% of girls reported not having received information about HPV vaccine side effects should be corrected by greater attention to pre-vaccination information sessions, as this issue relates both to vaccine safety and girls' right to fully informed assent. Furthermore, the issue regarding why 22% of girls did not actively assent requires further investigation. This may relate to factors including differences in primary health centres' interpretations of assent procedures and peer pressure. Regardless of the cause, the protocols used to gain assent from young adolescents should be reviewed to ensure they provide the best possible chances of girls giving well-informed assent.

### Author Contribution Statement

Setiyani Marta Dewi designed the study, analysed data, and revised the paper. Linda Bennett contributed to the conception of the study design, data analysis, and editing of the draft and final versions of the manuscript. Anna Barrett helped with data cleaning, quantitative analysis plans, and interpretation of quantitative analysis.

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#### Ethics approval

The study received ethics approval from Human Research Ethics Committee at the University of Melbourne, Australia (2021-21613-22183-4) and Research Ethics Committee of the Faculty of Medicine, Public Health, and Nursing at Gadjah Mada University, Indonesia (KE/FK/1256/EC/2021)

#### Study limitations

The study used self-reported data, thus the responses will have a high chance of social desirability bias. Moreover, bias in the recruitment method might have attracted participants whose teachers/parents were more engaged or interested in health issues and thus were also more likely to encourage students to participate in the survey. Lastly, due to the small sample size, the findings cannot be generalised to the whole HPV vaccination

demonstration program in Indonesia.

#### Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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