

# Knowledge and acceptability of HPV vaccine among HPV-vaccinated and unvaccinated adolescents at Western Amazon

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<http://dx.doi.org/10.1590/1806-9282.66.8.1062>

## SUMMARY

**PURPOSE:** To analyze the level of knowledge about and the acceptability of the HPV vaccine among vaccinated and unvaccinated adolescents in the Western Amazon.

**METHODS:** A cross-sectional study on adolescents aged 10 to 19 years. The instrument used to collect data contains demographic and socioeconomic information and 27 questions that assess the knowledge and acceptability of the HPV vaccine. To compare the prevalence of vaccinated adolescents with the correct answers to questions about HPV and acceptability and vaccination, the robust variance Poisson regression model was used in the Stata 13.0 software.

**FINDINGS:** A total of 190 adolescents participated in the study, 60.5% in the age group of vaccination recommended by the Brazilian government, among them, 53.9% reported not having been vaccinated ( $p < 0.001$ ). A total of 150 (78.9%) adolescents correctly recognized HPV as a virus; 121 (63.7%) recognized HPV as a cause of cervical cancer. Participants who know HPV is a causative factor for cervical cancer are 1.94 times more likely to have been vaccinated than those who do not. Among the interviewees, the main sources of knowledge about the vaccine were schools (51.6%) and health professionals (22.6%).

**CONCLUSION:** Unvaccinated adolescents have knowledge gaps about HPV and its vaccine when compared to those vaccinated. Our results emphasize the need for effective campaigns to deliver adequate information about HPV and its vaccine to adolescents, their parents, and health professionals.

**KEYWORDS:** Perception. Vaccines. Papillomaviridae. Adolescent.

## INTRODUCTION

The human papillomavirus (HPV) infection is considered a frequent viral infection among sexually active individuals. In adolescence, multi-partner behavior without the use of condoms may increase the risk of infection<sup>1,2</sup>.

In 2014, the Ministry of Health introduced in the

National Immunization Program (NIP) the quadrivalent human papillomavirus vaccine for girls aged 9 to 14 and, since 2017, for boys aged 11 to 14. The inclusion of male adolescents strengthens health actions targeted at this group<sup>2</sup>.

DATE OF SUBMISSION: 13-Feb-2020

DATE OF ACCEPTANCE: 26-Feb-2020

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The World Health Organization (WHO) considers vaccine coverage adequate when there are 80% inoculations in the priority population at the second dose<sup>2</sup>. In Brasil and in the Federative Unit of Acre there were 64.48% and 49.84% of inoculations in the second dose, respectively<sup>3</sup>. In Acre in 2017, 17.02% of the female adolescent population and 26.75% of males were vaccinated for HPV<sup>3</sup>.

Adolescent's parents present a barrier due to myths that the vaccine is applied against sexual initiation and regarding its safety<sup>4</sup>. Sousa et al.<sup>5</sup> demonstrated a low level of knowledge about the vaccine safety and efficacy among adolescents.

The population for vaccination is in a period considered ideal for primary prevention because it has safe and effective immunological results to reduce the incidence of HPV-related diseases<sup>2</sup>. Sorpreso and Kelly<sup>6</sup> argue that encouraging information, counseling, and continuing education is an important way to increase the acceptability of the vaccine and ensure that new cases of cervical cancer are reduced in the future.

Elucidating the panorama of the adolescent population and target of the HPV vaccine in the Western Amazon is important to women's and public health because of the low HPV vaccine coverage, low socioeconomic income, high prevalence of HPV infections, as well as its repercussions, such as cervical cancer. Thus, the objective of this study is to analyze the level of knowledge about and acceptability of the HPV vaccine among vaccinated and unvaccinated adolescents in the Western Amazon.

## METHODS

### Study design

This is a cross-sectional study presented according to STROBE guidelines<sup>7</sup> performed in the municipality of Cruzeiro do Sul, in the state of Acre, between May and August 2017.

The research project was approved by the Research Ethics Committee of the União Educacional do Norte - UNINORTE (2.158.359) and authorized by the Municipal Health Department of Cruzeiro do Sul (AC).

### Setting

The study was conducted in a Basic Health Unit (BHU) located in Cruzeiro do Sul that provides health services to low- and middle-income families. The health unit has a multi-professional approach, with

doctors, nurses, nursing technicians, and community health agents, all of whom were trained to apply the instrument for data collection.

All adolescents and their legal guardians/parents were informed about the voluntary participation in the research and read the informed consent form. In addition, for adolescents under 14 years of age, we required parental consent and assent form. After signing the informed consent form, the adolescents were interviewed.

The interviews were conducted individually with the adolescents, away from their parents, before the adolescent's medical consultation and during the activities of the group of adolescents, without prejudice to their demands.

### Participants

The sample was composed of 190 adolescents aged 10 to 19 years 11 months and 29 days according to the stratification of the World Health Organization<sup>8</sup>.

Inclusion criteria: adolescents of both sexes, attending the reference BHU UBS. The criteria for non-inclusion were: participants who did not respond to all domains of the questionnaires, adolescent or legal guardian refusal, and impossibility to contact the adolescent (Figure 1).

— insert Figure 1 here—

The adolescents were informed on HPV, repercussions of the vaccine by HPV, and vaccine for HPV after the interview. The adolescents had their medical care preserved without any prejudice to the treatment or follow-up in the basic health unit. Still, the confidentiality of the responses was maintained and any uncomfortable situations were avoided.

## VARIABLES AND DATA SOURCE

### Characterization of the sample

The socioeconomic and demographic characteristics were obtained through a socioeconomic and demographic identification form<sup>5</sup>. The form consisted of the following variables: gender, age, partner, children, schooling, family income, and paid work.

### Knowledge and Acceptability of HPV Vaccine

The collection instrument for assessing the knowledge about and acceptability of the HPV vaccine was adapted from a validated instrument with a sample of adolescents, parents or guardians, and health professionals<sup>5</sup>. We used 27 questions addressing the knowledge about HPV, the vaccine, barriers to vaccination,

vaccine acceptability, and personal history related to HPV infection. Each question had three possible answers: “Yes,” “No,” and “Not sure”.

### Data sources and measurement

In order to score the answers, the value (0) was attributed to non-correct answers and the “Not sure” option, and (1) to correct answers in each question. The instrument was adapted from the original since these are specific questions for health professionals<sup>5</sup>.

The questionnaire was tested on similar populations in a previous study<sup>5</sup>. To measure the internal consistency of the instrument, the Cronbach’s alpha equation was used, obtaining an alpha ( $\alpha$ ) value of 0.61, considered a substantial value<sup>9</sup>.

### Bias

To minimize the selection bias, a validated collection instrument was used and applied in a previous study on adolescents. The responses of the adolescents without intervention during the collection and standardization of the collection by an interviewer previously trained were considered. The registration of the data was standardized in an Excel worksheet and the analysis carried out by two researchers.

### Statistical methods

The study was performed with a non-probabilistic sample and for convenience. Considering a power of 80%, a significance level of 5%, and 64% of vaccinated individuals based on the proportion of vaccination by NIP-Acre, 201727, the minimum number of interviewees necessary was 105.

The data were tabulated in a Microsoft Excel spreadsheet and analyzed by the Statistics Data Analysis software for Windows® (Stata®, StataCorp, LLC, 13.0, College Station, TX, USA).

The homogeneity test among the vaccinated and non-vaccinated adolescents, in relation to the socioeconomic variables, was performed by the chi-square test.

For the prevalence of vaccinated adolescents and correct answers, the Poisson regression model with robust variance was used, with a Prevalence Ratio (PR) and Confidence Intervals of 95% (95% CI). All analyses were two-tailed, and  $p < 0.05$  were considered statistically significant.

The proportion and respective 95% confidence intervals of the correct answers were used to describe the proportion of correct answers for each question. Information not answered by the participants were

considered missing, thus were not considered and not analyzed.

## RESULTS

We interviewed 190 adolescents living in Cruzeiro do Sul-AC, Northern region of Brasil, with a mean age of 14.1 years (SD  $\pm 2.80$  years), of which 115 (60.5%) were in the age group for HPV vaccination recommended by the Health Immunization Program, 98 (51.6%) were female and 92 (48.4%) were males. A total of 179 (94.2%) adolescents reported having no partner, 24 (12.6%) had one child or more, 29 (15.3%) had paid work, and 127 (66.8%) reported lower income than two minimum wages, as seen in Table 1.

**TABLE 1.** SOCIOECONOMIC CHARACTERISTICS OF ADOLESCENTS ACCORDING TO THE ACCOMPLISHMENT OF VACCINATION AGAINST HPV OF ADOLESCENTS OF THE WESTERN AMAZON, 2017.

Variable	Total population n (%)	Vaccinated against HPV		p*
		NOT n (%)	YES n (%)	
Target Population**				
Not	75 (39.5)	62 (82.7)	13 (17.3)	<0.001
Yes	115 (60.5)	62 (53.9)	53 (46.1)	
Sex				
Female	98 (51.6)	45 (45.9)	53 (54.1)	<0.001
Male	92 (48.4)	79 (85.9)	13 (14.1)	
Partner				
Not	179 (94.2)	115 (64.2)	64 (35.7)	0.235
Yes	11 (5.8)	9 (81.8)	2 (18.2)	
Work				
Not	161 (84.5)	102 (63.4)	59 (36.6)	0.193
Yes	29 (15.3)	22 (75.9)	7 (24.1)	
Have children				
Not	166 (87.4)	105 (63.3)	61 (36.7)	0.126
Yes	24 (12.6)	19 (79.2)	5 (20.8)	
Schooling***				
Suitable	18 (9.5)	16 (88.9)	2 (11.1)	0.027
Inappropriate	172 (90.5)	108 (62.8)	64 (37.2)	
Income				
Up to 2 Min. Wages	127 (66.8)	82 (64.6)	45 (35.4)	0.111
2-4 Min. Wages	22 (11.6)	11 (50)	11 (50)	
4-10 Min. Wages	1 (0.5)	0	1 (100)	
> 10 Min. Wages	2 (1.0)	1 (50)	1 (50)	
Do not know	38 (20)	30 (78.9)	8 (21.1)	
	Mean (SD)	Mean (SD)	Mean (SD)	p*
Age (in years)	14.1 ( $\pm 2.80$ )	14.50 ( $\pm 3.01$ )	13.71 ( $\pm 2.39$ )	0.013

\* chi-square test in the comparison between vaccinated and non-vaccinated.\*\* Adolescents in the age group for HPV vaccination recommended by the Health Immunization Program..\*\*\* School age according to guidelines at the Brazilian Ministry of Education. SD – Standard Deviation

Table 1 also shows that 53 (54.1%) of the female adolescents reported having been vaccinated, and 62 (53.9%) of the adolescents interviewed in the vaccination target group reported not having been vaccinated ( $p < 0.001$ ). There was no statistical relevance among the vaccinated ones regarding the marital status, employment status, number of children, schooling, and income. The group of unvaccinated adolescents included 79 (85.9%) males, and 62 (82.7%) were outside the age range of free vaccination ( $p < 0.001$ ). The vaccinated group had a lower

mean age (13.71 years old  $\pm 2.39$ ) than the unvaccinated (14.50 years old  $\pm 3.01$ ) adolescents ( $p = 0.013$ ).

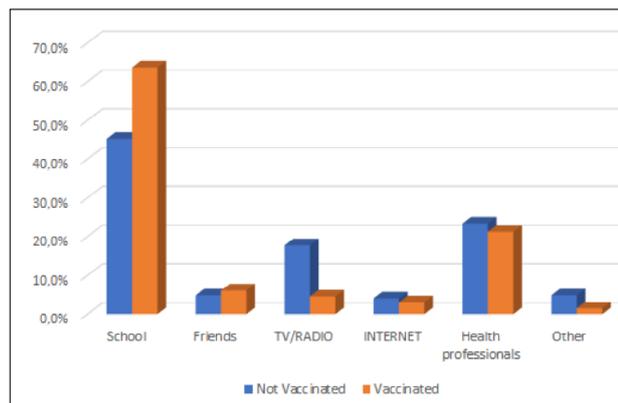
Table 2 shows the proportion of correct answers (knowledge) among adolescents interviewed. Of a total of 190 respondents, 150 (78.9%) recognized HPV as a virus; 121 (63.7%) described HPV as a cause of cervical cancer; 148 (77.9%) knew that the HPV vaccine is part of the immunization program for female adolescents; 115 (60.5%) knew someone who had already received a vaccine.

**TABLE 2.** COMPARISON OF CORRECT ANSWERS ON HPV KNOWLEDGE AND ITS VACCINE AND ACCEPTABILITY AMONG ADOLESCENTS VACCINATED AND UNVACCINATED IN THE WESTERN AMAZON, 2017.

Question	Total population n (%)	Vaccinated		Gross model RP (CI95%)*	p
		Not n (%)	Yes n (%)		
Do you know what HPV is?	79 (41.6)	50 (63.3)	29 (36.7)	1.10 (0.74 to 1.63)	0.630
Is HPV a virus?	150 (78.9)	103 (68.7)	47 (31.3)	0.66 (0.44 to 0.99)	0.043
Is HPV a sexually transmitted disease?	130 (68.4)	88 (67.7)	42 (32.3)	0.81 (0.54 to 1.20)	0.293
Can HPV cause cervical cancer?	121 (63.7)	70 (57.9)	51 (42.1)	1.94 (1.18 to 3.18)	0.009
Can HPV cause changes in the Papanicolaou?	93 (49)	65 (69.9)	28 (30.1)	0.77 (0.52 to 1.14)	0.195
Is cervical cancer a major cause of cancer in women?	149 (78.4)	93 (62.4)	56 (37.6)	1.54 (0.86 to 2.75)	0.143
Can smoking increase the risk of cervical cancer?	101 (53.2)	70 (69.3)	31 (30.7)	0.78 (0.53 to 1.15)	0.215
Does the HPV vaccine prevent cervical cancer?	141 (74.2)	93 (66)	48 (34)	0.93 (0.60 to 1.43)	0.731
Should the HPV vaccine be given before the first sexual intercourse?	116 (61)	74 (63.8)	42 (36.2)	1.12 (0.74 to 1.68)	0.598
Can the HPV vaccine be given to people who have had sex?	86 (45.3)	57 (66.3)	29 (33.7)	0.95 (0.64 to 1.40)	0.790
Can the HPV vaccine be harmful to health?	121 (63.7)	75 (62)	46 (38)	1.31 (0.85 to 2.03)	0.222
Can the HPV vaccine cause HPV infection?	75 (39.5)	51 (68)	24 (32)	0.88 (0.58 to 1.32)	0.527
Is the HPV vaccine provided by the Government?	155 (81.6)	101 (65.2)	54 (34.8)	1.02 (0.61 to 1.69)	0.951
Is the HPV vaccine part of the girls' immunization record?	148 (77.9)	88 (59.5)	60 (40.5)	2.84 (1.32 to 6.12)	0.008
Are 3 doses required for complete vaccination?	109 (57.4)	66 (60.6)	43 (39.4)	1.39 (0.91 to 2.11)	0.123
Does the HPV vaccine lessen the chance of having genital warts?	89 (46.8)	61 (68.5)	28 (31.5)	0.84 (0.56 to 1.24)	0.378
Does the HPV vaccine decrease the chance of having Pap test changes?	85 (44.7)	59 (69.4)	26 (30.6)	0.80 (0.54 to 1.20)	0.286
<b>Acceptability</b>					
Do you think that the HPV vaccine would stimulate the onset of sexual life earlier?					
Yes	89(46.8)	64 (71.9)	25 (28.1)		
No	101 (53.2)	60 (59.4)	41 (40.6)	1.44 (0.96 to 2.17)	0.077
Do you think that after the HPV vaccine you still need to use a condom?					
No	32 (16.8)	21 (65.6)	11 (34.4)		
Yes	158 (83.2)	103 (65.2)	55 (34.8)	1.01 (0.60 to 1.71)	0.963
Do you think that after the HPV vaccine you still need to have the Pap test?					
No	38 (20)	24 (63.2)	14 (36.8)		
Yes	152 (80)	100 (65.8)	52 (34.2)	0.93 (0.58 to 1.49)	0.758
Do you know anyone who has already had the HPV vaccine?					
No	75 (39.5)	62 (82.7)	13 (17.3)		
Yes	115 (60.5)	62 (53.9)	53 (46.1)	2.66 (1.56 to 4.53)	<0.001
Would you recommend the HPV vaccine for a child, friend or relative to take?					
No	20 (10.5)	16 (80)	4 (20)		
Yes	170 (89.5)	108 (63.5)	62 (36.5)	1.82 (0.74 to 4.49)	0.191

\* Poisson regression with robust variance

GRAPH 1



Participants who knew HPV was a causative factor in cervical cancer were 1.94 (CI 1.18 a 3.18;  $p=0.009$ ) times more likely to have been vaccinated than those who did not. Moreover, participants who knew that the HPV vaccine is part of the immunization program for female adolescents were 2.84 (CI 1.32 – 6.12;  $p=0.008$ ) times more likely to have been vaccinated than those who did not.

Graph 1 shows the main sources of information for adolescents in Acre. Schools (51,6%) and health professionals (22,6%) are the main sources of information on HPV vaccination in both populations.

## DISCUSSION

The assessment of acceptability and knowledge about HPV and its vaccine among adolescents is an important outcome for the health of this population and public health since they are in a period of experimentation and initiation of sexual activity, thus vulnerable to Sexually Transmitted Infections (STI)<sup>5,10,11</sup>. In the State of Acre, vaccination rates for HPV have not yet reached the goals of the National Immunization Program or the goals expected by WHO<sup>2,3</sup>.

The results show that non-vaccinated adolescents present knowledge gaps compared to those vaccinated. In addition, they reported barriers to vaccine acceptability, such as the belief that this stimulates the onset of sexual activity.

The prevalence of high-risk HPV cervical cancer in the territory of Acre is 71%, which reinforces the importance of identifying knowledge gaps and acceptance barriers for the HPV vaccine<sup>12</sup>. In our study, we describe the knowledge of adolescents from Acre about HPV being a virus and its relation to cervical cancer. A convergent study<sup>13</sup> conducted with adolescents in Santa Catarina, Brasil, with the fourth-highest

income<sup>14</sup>, showed the respondents presented basic notions about the subject.

Gualano et al.<sup>15</sup> corroborate that adolescents vaccinated for HPV have a better level of knowledge about the virus and its relation to cancer than those not vaccinated. Studies have shown divergent results with adolescents in Greece<sup>16</sup> and the US<sup>17</sup>, pointing out that the HPV vaccine is present in the vaccination program for adolescents in Greece; however, in the US, the vaccine for HPV is not provided without cost by the Government.

Knowledge gaps among the unvaccinated include: HPV being a virus and not being related to cervical cancer; no knowledge about the HPV vaccine being part of the girls' official immunization calendar, and not knowing individuals who have already been vaccinated for HPV. Studies conducted in England, where the vaccine is available for adolescents aged 12 to 18 years, corroborate our findings and state that vaccinated girls were more likely to have heard of HPV than unvaccinated ones<sup>18</sup>.

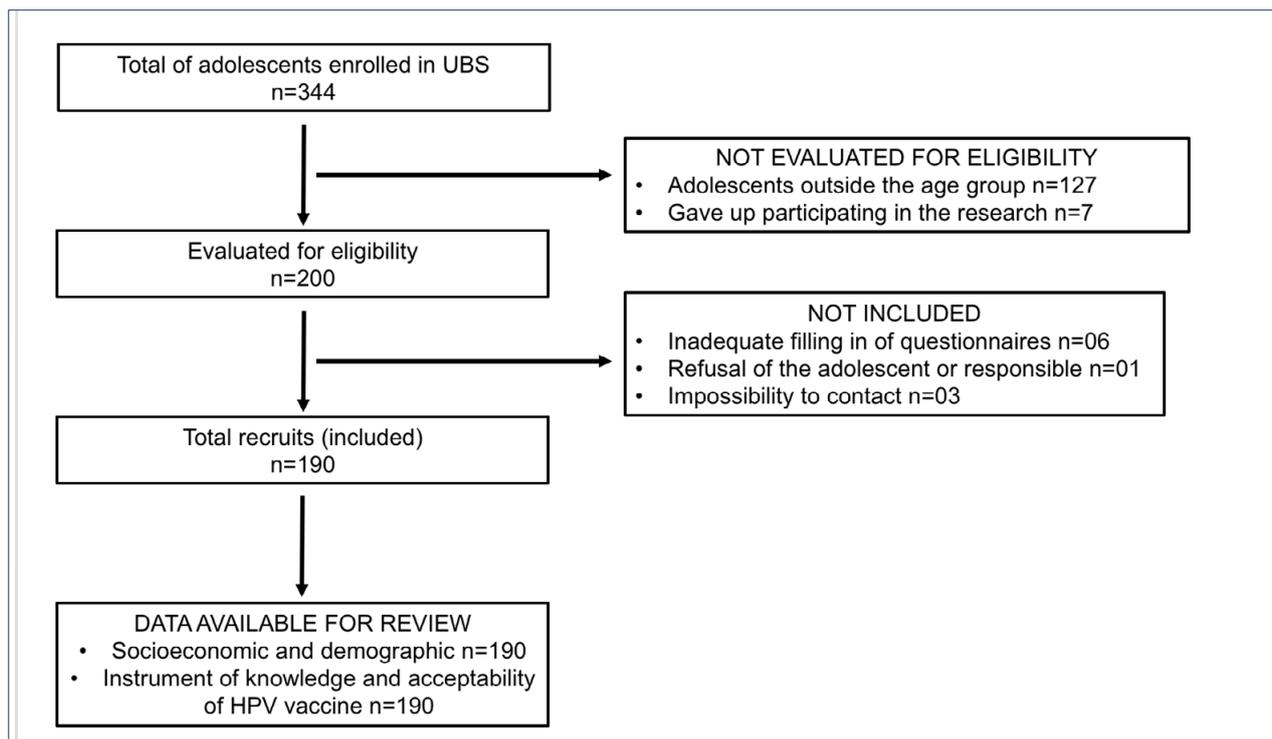
Respondents showed they did not know that the HPV vaccine can be applied to those who have had sex. It is important to emphasize that vaccination will be more effective if applied early, especially before the first sexual contact. However, even if they are already sexually active, they will benefit because they will be protected against other types of HPV contained in the vaccine. And the vaccinated population will present an effective and timely immune response<sup>2</sup>.

In addition, adolescents may be reinfected with different types of HPV viruses during their lifetime if there is no double protection (association with a condom). In this study, the adolescents demonstrated knowledge about preventive measures, the use of condoms, and cervical cancer screening exams after vaccination<sup>2</sup>. Chiang et al.<sup>19</sup> found in their results that adolescents of both sexes are interested in being vaccinated or recommending the vaccine to relatives.

The main sources of information for HPV vaccination among adolescents in Acre were schools and health professionals. It is worth mentioning the importance of the school environment in the sexual, reproductive, and preventive education of adolescents. Investments in sex education and the development of educational campaigns on Papanicolaou with an appropriate approach and appropriate language applied in the prevention of cervical cancer are necessary<sup>15,20</sup>.

Our results reinforce the importance of inter-sectionality between health and education, with

FIGURE 1.



joint informative campaigns expanded and making it possible to demystify the concepts for better knowledge and acceptability of the HPV vaccine. The first HPV vaccination campaign in Brasil took place in partnership with public and private schools<sup>21</sup>, which may have contributed to the school environment being the source of information most cited among adolescents.

The literature shows that health professionals advise on Pap smears and cervical cancer, but have gaps in knowledge about the effects of HPV on adolescent health and the benefits of the vaccine for men<sup>5,22,23</sup>. In the study by Lorenzi et al.<sup>24</sup>, they analyzed whether age is a barrier against the acceptability of cervicovaginal self-sampling in screening for cervical cancer, and they concluded that younger women indicated more fear and discomfort in self-sampling, which points to the need for attraction strategies that are more appealing to the younger generations. Moreover, the self-collection method is well-accepted and may, therefore, encourage greater participation in cervical cancer screening programs<sup>25</sup>.

Misconceptions about the HPV vaccine are barriers to the vaccination of adolescents, especially in the age group that depends on the parents or guardians to get vaccinated. The stimulation of early sexual life should be demystified among the population, and

counseling on the subject should be encouraged by health professionals<sup>5,6,26</sup>.

Papillomavirus infection is a viral STI that most affects the sexually active world population. Knowledge about HPV strengthens the prevention of STIs and the long-term incidence of new cases of cervical cancer<sup>2</sup>.

In a cross-sectional study, a descriptive approach can be considered a limitation, as well as the impossibility of measuring causal relationships between knowledge and acceptability barriers in the interviewed population. Still, there is a bias in the variable of knowledge and perception about the HPV vaccine, since the interviewees were ill with easy access to health, not expressing the reality of other adolescents.

The novelty of the study is considering the perceptions of adolescents of both sexes about HPV, its clinical repercussions, and its vaccine in a territory of low adherence to vaccination and high rates of cervical cancer. Adolescents showed good acceptance and are recommended for HPV vaccination.

Thus, health team counseling for family members and adolescents about the HPV vaccine is necessary, as well as intersectoral health promotion actions to resolve doubts and myths about the vaccine and raise awareness among the population (adolescents and guardians) on the prevention of HPV to extend the recommended vaccination coverage.

## CONCLUSION

Unvaccinated adolescents have gaps in knowledge about HPV and its vaccine compared to those vaccinated. Moreover, unvaccinated adolescents reported barriers to vaccination, such as the belief that this stimulates the onset of sexual activity. School and friends are sources of exchange of knowledge and information among vaccinated adolescents.

Thus, it is noted that training is necessary for health teams, families, and adolescents in order to increase the

population's knowledge about HPV, its clinical repercussions, and its vaccine, as well as to cover the WHO recommended percentage of vaccine coverage.

**Implications and Contribution:** To address the perceptions of adolescents of both sexes about HPV, its clinical repercussions, and its vaccine in a territory of low adherence to vaccination and high rates of cervical cancer. Adolescents showed good acceptance and are recommended for HPV vaccination.

## RESUMO

**OBJETIVO:** Analisar o nível de conhecimento e aceitabilidade da vacina contra o HPV entre adolescentes vacinados e não vacinados na Amazônia Ocidental.

**MÉTODOS:** Estudo transversal com adolescentes de 10 a 19 anos. O instrumento usado para coletar dados contém informações demográficas e socioeconômicas e 27 perguntas que avaliam o conhecimento e a aceitabilidade da vacina contra o HPV. Para comparar a prevalência de adolescentes vacinados com as respostas corretas para perguntas sobre conhecimento, aceitabilidade e vacinação contra o HPV, o modelo de regressão de Poisson de variância robusta foi utilizado no software Stata 13.0. Resultados: Participaram do estudo 190 adolescentes, 60,5% (n=115) na faixa etária de vacinação recomendada pelo governo brasileiro; dentre eles, 53,9% (n=62) relataram não ter sido vacinados (p<0,001). A proporção de resultados corretos entre os adolescentes foi de 78,9% (n=150), que reconheceram o HPV como vírus; 63,7% (n=121) relataram o HPV como causa de câncer do colo do útero. Os participantes que sabem que o HPV é um fator causal no câncer do colo do útero têm 1,94 (IC 1,18-3,18; p=0,009) vez mais chances de terem sido vacinados do que aqueles que não sabem. Entre os entrevistados, as principais fontes de conhecimento sobre a vacina foram escolas (51,6%) e profissionais de saúde (22,6%).

**CONCLUSÃO:** Adolescentes não vacinados apresentam lacunas de conhecimento sobre o HPV e sua vacina quando comparados aos vacinados. Nossos resultados enfatizam a necessidade de campanhas eficazes para fornecer informações adequadas sobre o HPV e sua vacina a adolescentes, pais e profissionais de saúde.

**PALAVRAS-CHAVE:** Percepção. Vacinas. Papillomaviridae. Adolescente.

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