JOURNAL OF INTERDISCIPLINARY PERSPECTIVES

ISSN Print: 2984-8288, ISSN Online: 2984-8385
Vol. 4 No. 4, pp. 292-303, April 2026

Original Article

Underutilization of the Human Papillomavirus Vaccine: Implications for Health Education and Awareness

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Article History:

Date received: January 12, 2026
Date revised: March 24, 2026
Date accepted: April 1, 2026

Recommended citation:

Olaes, C.G., Pandiño, K.C., Quintana, M.L., Corcolon, K., Tokiwa, S., & Cipriano, S.M. (2026). Underutilization of the Human Papillomavirus vaccine: Implications for health education and awareness. *Journal of Interdisciplinary Perspectives*, 4(4), 292-303. https://doi.org/10.69569/jip.2026.055

Abstract. The underutilization of the Human Papillomavirus (HPV) vaccine in San Pablo City poses a significant public health concern. This study aimed to examine the factors contributing to the underutilization of the HPV vaccine among parents residing in Barangay Del Remedio, San Francisco, and San Jose in San Pablo City, Laguna, and to provide a basis for developing appropriate health education and awareness strategies. A descriptive cross-sectional research design was utilized, involving 368 parents of children aged 9 to 18 years. Data were gathered through a validated questionnaire and analyzed using descriptive and inferential statistics. Findings revealed that most respondents were aged 35–44 years, married, junior high school graduates, and self-employed, with children aged 9-10 years. Results indicated low HPV vaccination rates among the respondents. The primary barriers to vaccination included limited awareness and knowledge about the HPV vaccine, high vaccination costs, and fear of possible side effects. The study was limited to respondents from only three barangays in San Pablo City, which may affect the generalizability of the findings. Respondents identified community-based and school-based health education programs as the most preferred methods for receiving information about HPV vaccination. Statistical analysis further showed that age, marital status, and educational attainment did not significantly influence respondents' awareness of or knowledge about the HPV vaccine. However, occupation and vaccination status were associated with higher levels of awareness, while only vaccination status significantly influenced knowledge levels. Overall, the findings highlight the need to strengthen targeted health education initiatives to improve awareness, address misconceptions, and promote HPV vaccination uptake within the community.

Keywords: *Awareness; Barriers; Education; HPV; Vaccination.*

Cervical cancer remains a significant public health concern worldwide. It is the fourth most common cancer among women globally, with an estimated 660,000 new cases reported in 2022 (World Health Organization, 2023). In the Philippines, cervical cancer is the second leading cause of cancer-related deaths among women, with approximately 7,897 new cases and 4,052 deaths recorded annually (PhilHealth, 2023). Most affected individuals belong to the reproductive age group of 15 to 45 years. However, the true burden may be higher due to undiagnosed or unreported cases, particularly at the local level. In San Pablo City, Laguna, records from the City Health Office reported a cervical cancer rate of 3.95 percent among women aged 15 to 45 years, equivalent to

about 2,964 women as of September 2024.

Scientific evidence identifies the human papillomavirus (HPV) as the primary cause of cervical cancer, particularly high-risk types 16 and 18 (Szymonowicz et al., 2020). Because cervical cancer is largely preventable, the World Health Organization launched a global initiative to eliminate the disease by 2030, emphasizing HPV vaccination as a key preventive strategy. In response, the Philippines incorporated HPV vaccination into national health policy through the Responsible Parenthood and Reproductive Health Act of 2012. Under the Department of Health National Immunization Program, free HPV vaccines are provided to girls aged 9 to 10 years (DOH, 2025).

Despite the availability of a free HPV vaccine, HPV vaccine uptake in the Philippines remains low compared to other low- and middle-income countries (Lintao et al., 2022). This concern is also evident in San Pablo City, where vaccination coverage remains limited despite the availability of healthcare services. Records from the City Health Office showed that 97.16 percent of women were unvaccinated in 2023, increasing to 99.08 percent in 2024. These findings suggest that factors beyond access, such as individual perceptions, knowledge, self-care capacity, and social influences, may affect vaccination behavior.

This study is guided by nursing and behavioral theories to better understand HPV vaccine underutilization. Pender's Health Promotion Model explains how health behaviors are influenced by personal characteristics, perceived benefits and barriers, and interpersonal influences. Orem's Self-Care Deficit Theory suggests that low vaccination uptake may reflect a lack of knowledge or support needed to meet preventive health needs. The Health Belief Model highlights how perceived susceptibility, severity, benefits, and barriers influence health decisions, while Bandura's Social Cognitive Theory emphasizes the role of social influence and observational learning in shaping health behaviors.

Despite the seriousness of the issue, limited local research in San Pablo City examines the factors contributing to HPV vaccine underutilization. Addressing this gap is essential for understanding the barriers, beliefs, and experiences that influence vaccination behavior in the community. Guided by these theoretical frameworks, this study aims to analyze the factors contributing to the underutilization of the HPV vaccine among women of reproductive age in San Pablo City, Laguna. The findings will serve as a basis for developing health education and awareness strategies to promote informed health decisions and increase HPV vaccination uptake in the community.

This study was guided by selected nursing and behavioral theories to explain factors influencing HPV vaccine underutilization. The Health Belief Model highlighted how parents' perceptions, such as susceptibility to HPV, severity of cervical cancer, perceived benefits, and barriers, including cost or fear, affect vaccination decisions. Pender's Health Promotion Model emphasized that sociodemographic characteristics, individual experiences, and beliefs can shape engagement in preventive behaviors. Orem's Self-Care Deficit Theory frames low vaccination uptake as a self-care limitation, where awareness and knowledge are essential for proactive health decisions. Finally, Bandura's Social Cognitive Theory underscored the influence of social and environmental factors, including support networks and observational learning, on health behavior. Together, these theories guided the selection of study variables related to awareness, knowledge, perceived barriers, and vaccination status.

Methodology

Research Design

A quantitative research design was employed to collect and analyze numerical data to describe patterns, identify differences across groups, and examine relationships among variables (Bhandari, 2020). Specifically, a descriptive cross-sectional approach was used to evaluate HPV vaccine awareness, knowledge, perceived barriers, and underutilization among parents in selected barangays of San Pablo City (Singh, 2024). This design allowed assessment of variables at a single point in time without inferring cause-and-effect relationships.

Participants and Sampling Technique

The study population comprised parents aged 24 to 45 years residing in San Pablo City who had children aged 9 to 18 years, as parents are primarily responsible for vaccination decisions (WHO, 2024). Inclusion criteria included parents within the specified age range, residing in San Pablo City, having children aged 9–18 years, and providing informed consent. Exclusion criteria were non-residents of the selected barangays, parents without children in the specified age range, and those unwilling to participate. A total of 368 respondents were selected using purposive

sampling, a non-probability technique that targets individuals with characteristics relevant to the research objectives (Bisht, 2024). Respondents were drawn from three barangays: Barangay Del Remedio (147 respondents: 22 men, 125 women), Barangay San Francisco (125 respondents: 20 men, 105 women), and Barangay San Jose (96 respondents: 13 men, 83 women).

Research Instruments

The study used a structured questionnaire adapted from Nabirye et al. (2020) on factors influencing HPV vaccine uptake among adolescent girls in Uganda. The instrument included 13 items from the original tool and 14 researcher-developed items to align with the study objectives and local context. The questionnaire covered seven areas: sociodemographic profile, HPV vaccine awareness and knowledge, perceived barriers, health education strategies, influence on vaccination, and recommendations. Likert and nominal scales were used, and the tool was translated into Tagalog for better comprehension. Content validity was ensured through expert review by the research adviser, a language expert, and three community health nurses. A pilot test with 30 parents (ages 24–45) showed good to excellent reliability, with an overall Cronbach's alpha of .815, indicating that the instrument is reliable for measuring the study variables.

Data Gathering Procedure

Data were collected through a face-to-face survey using a paper-and-pen questionnaire. Before data collection, official HPV vaccination records from the City Health Office (CHO) of San Pablo City were reviewed, showing that 97.16% of residents were unvaccinated in 2023 and 99.08% as of September 2024, with no available data from 2016 to 2022. These records helped the researchers understand local vaccination trends and identify barangays with the highest population of parents aged 24 to 45 years with children aged 9 to 18 years. Based on this information, Barangay Del Remedio, Barangay San Francisco, and Barangay San Jose were selected as study sites. Approval to conduct the study was obtained from the Dean of the College of Nursing at Canossa College and the barangay captains. On-site data collection was conducted after obtaining informed consent from participants, using the approved questionnaire to assess awareness, knowledge, and perceived barriers related to HPV vaccination. No interventions, pre-tests, or post-tests were included. Completed questionnaires were organized and submitted to a statistician for analysis. By using CHO records to guide site selection, the study ensured that the sample reflected areas most affected by low HPV vaccine uptake, supporting meaningful interpretation of the results.

Data Analysis Procedure

Data were analyzed using both descriptive and inferential statistical methods. Descriptive statistics, including frequencies and percentages, were used to summarize respondents' sociodemographic characteristics and distributions (Shwetha, 2023; Turney, 2022), while means and standard deviations were used to describe levels of awareness, knowledge, and perceived barriers, with standard deviations indicating variability in the data (Hargrave, 2024). For inferential analysis, nonparametric tests were applied due to non-normal data distribution. The Kruskal–Wallis H test assessed differences in awareness and knowledge across sociodemographic groups, and the Mann–Whitney U test compared knowledge levels between vaccinated and unvaccinated respondents (LAERD Statistics, n.d.). Data collection was conducted over three months, from December to February 2025, ensuring sufficient time to gather data from all selected barangays. All data were compiled and submitted to a statistician for analysis and interpretation.

Ethical Considerations

Ethical considerations were strictly observed throughout the study to protect the rights, safety, and well-being of the respondents. Participation in the study was entirely voluntary, and informed consent was obtained prior to data collection. Respondents were clearly informed about the purpose, procedures, and extent of their involvement, and they were given the right to withdraw at any time without any consequences. Confidentiality and anonymity were ensured by excluding personal identifiers from the questionnaires and restricting access to collected data to the researchers only. All data were handled in compliance with the Data Privacy Act of 2012 (Republic Act No. 10173), ensuring proper acquisition, storage, and processing of information. The study posed no physical, psychological, or social harm to the respondents, and ethical research practices, including proper citation and avoidance of plagiarism, were strictly followed. These measures ensured the integrity of the research process while upholding the dignity and rights of all participants.

Results and Discussion

Demographic Profile

Table 1 presents the sociodemographic profile of respondents by age. Most respondents were aged 35–44 years (196; 53.26%), followed by those aged 24–30 years (81; 22.01%) and 31–34 years (77; 20.92%), while respondents 45 years and above (14; 3.80%) comprised the smallest group. The predominance of individuals aged 35–44 indicates that most respondents are within the middle-adulthood stage, a period commonly associated with increased parental responsibility and involvement in health-related decision-making for children. Similar age distributions among caregivers have been reported in previous studies, highlighting the important role of middle-aged parents in influencing child health practices (American Medical Association, 2022).

Table 2 presents the sociodemographic profile of the respondents' youngest children according to age. The majority were 9–10 years old (164; 44.57%), followed by 13–14 years (57; 15.49%) and 11–12 years (56; 15.20%). Children aged 15–16 years (48; 13.04%) and 17–18 years (43; 11.68%) comprised smaller proportions of the sample. The predominance of children aged 9–10 years aligns with the recommended age for initiating HPV vaccination, underscoring the importance of parental awareness and decision-making at this stage of child development (WHO, 2022).

Table 1. *Sociodemographic profile of the respondents when grouped according to age*

Age Bracket	Frequency	Percentage (%)
24-30	81	22.01%
30-34	77	20.92%
35-44	196	53.26%
45	14	3.80%

Table 2. *Sociodemographic profile of the youngest child of the respondents*

Age Bracket	Frequency	Percentage (%)
9-10	164	44.57%
11-12	56	15.22%
13-14	57	15.49%
15-16	48	13.04%
17-18	43	11.68%

Table 3. *Sociodemographic profile of the respondents when grouped according to marital status*

Marital Status	Frequency	Percentage (%)
Single	20	5.43%
Married	182	49.46%
Widowed	22	5.98%
Separated	14	3.80%
Domestic Partnership	130	35.33%

Table 4. *Demographic profile of the respondents when grouped according to the educational attainment*

Educational Attainment	Frequency	Percentage (%)
Primary Level	99	26.90%
Junior High School	187	50.82%
Senior High School	5	1.36%
College Undergraduate	31	8.42%
College Graduate	46	12.50%

Table 3 presents the respondents' marital status. Nearly half of the respondents were married (182; 49.46%), followed by those in live-in relationships (130; 35.33%). Smaller proportions were widowed (22; 5.98%), single (20; 5.43%), and separated (14; 3.80%). The predominance of married respondents suggests that many participants belong to family structures where healthcare decisions for children may be shared between parents. Marital status has been identified as a factor influencing parental decision-making regarding child health practices, including vaccination (Tatsuya Matsumura et al., 2022).

Table 4 presents the respondents' educational attainment. The majority completed Junior High School (187; 50.82%), followed by those who reached the primary level (99; 26.90%). Smaller proportions were college graduates (46; 12.50%) and college undergraduates (31; 8.42%), while Senior High School graduates (5; 1.36%) comprised the smallest group. This distribution indicates that most respondents completed basic secondary education, which may influence their health literacy and understanding of health-related information. Previous

studies have shown that lower educational attainment may affect individuals' ability to interpret health information and make informed health decisions (Javier, Tiongco, & Jabar, 2019).

Table 5. *Sociodemographic profile of the respondents when grouped according to the occupation*

Occupation	Frequency	Percentage (%)
Employed	83	22.55%
Unemployed	166	45.11%
Self-employed	118	32.07%
Others (Volunteer)	1	0.27%

Table 6. *Sociodemographic profile of the respondents based on their vaccination status*

Vaccinated Respondents	Frequency	Percentage (%)
Yes	15	4.08%
No	353	95.92%

Table 7. *Sociodemographic profile of the respondents based on their children's vaccination status*

Vaccinated Children	Frequency	Percentage (%)
Yes	29	7.88%
No	339	92.12%

Table 8. *Participants' willingness to have their child vaccinated*

Willingness	Frequency	Percentage (%)
Willing	130	35.326%
Not Willing	209	56.793%
Already Vaccinated	29	7.880%

Table 5 presents the respondents' occupational status. The largest proportion was unemployed (166; 45.11%), followed by self-employed individuals (118; 32.07%) and employed respondents (83; 22.55%). Only one respondent (0.27%) was classified under Others (Volunteer). This distribution indicates that a considerable portion of the respondents may have limited or irregular sources of income, which may influence their access to healthcare services and vaccination decisions. Previous studies have shown that employment status can affect access to healthcare and health outcomes across various populations (Health Foundation, 2022).

Table 6 presents the vaccination status of the respondents. Only 15 respondents (4.08%) reported having received the HPV vaccine, while the vast majority, 353 (95.92%), had not been vaccinated. This finding indicates a notably low uptake of the HPV vaccine among parents from the three selected barangays. The result suggests the presence of perceived barriers that may contribute to vaccine underutilization. Previous studies support this finding. According to Rositch et al. (2022), many parents who choose not to vaccinate their children against HPV report hesitancy due to limited information, lack of healthcare provider recommendations, and concerns about vaccine safety. These factors highlight the importance of improving health education and strengthening provider communication to increase HPV vaccination uptake.

Table 7 shows the vaccination status of respondents' children. The results reveal that only twenty-nine (29) of their children have received the HPV vaccine, and a concerning ninety-two point twelve percent (92.12) of children remained unvaccinated with the HPV vaccine. This shows that among the three barangays with the highest child population aged 9-18, vaccine uptake is markedly low. This suggests that certain factors may be hindering parents' decision-making regarding the HPV vaccination, which contributes to the underutilization of the vaccine.

This finding indicates consistently low vaccination coverage among children aged 9–18. Comparable trends have been observed in other rural and semi-urban communities, where limited knowledge and misconceptions hinder vaccine uptake. Thus, the results may apply to similar populations facing comparable informational and cultural barriers. The main reason why people in the small rural community under investigation did not get the HPV vaccine was a lack of knowledge (Rodrigues, Mendez, & Nucci, 2023). This might be the case elsewhere as well. According to their research, since girls are recommended to receive the HPV vaccine earlier than boys, there is a need for more targeted communication to dispel the myth that the initiation of sexual activity is associated with the requirements for vaccination. To address this issue, both genders must recognize the risks associated with HPV. To increase parental motivation for vaccination and improve the effectiveness of public health efforts, the study highlights the need to train healthcare providers to serve as reliable sources of HPV information.

Table 8 presents participants' willingness to have their child vaccinated against HPV. The majority of respondents were not willing (209; 56.79%), followed by those who were willing (130; 35.33%), while 29 respondents (7.88%) were undecided. The findings indicate that more than half of the participants are reluctant to vaccinate their child, suggesting the presence of potential barriers such as limited knowledge, misconceptions about vaccine safety, or fear of possible side effects. Previous studies have reported similar findings. According to Wahab et al. (2025), parents' attitudes and level of knowledge significantly influence their willingness to vaccinate their children against HPV. Lack of awareness and misinformation about the vaccine have been identified as common reasons for parental hesitancy. These results highlight the importance of strengthening health education and awareness campaigns to improve understanding of HPV, its associated health risks, and the benefits and safety of vaccination. Implementing school-based and community-based health education programs that provide accurate information about HPV and its prevention may help address misconceptions and increase parental acceptance of the HPV vaccine.

Level of Awareness on HPV Vaccine

Table 9 presents the respondents' level of awareness regarding the HPV vaccine. Overall, the respondents demonstrated a very low level of awareness (Mean = 1.41, SD = 0.86), with most indicating that they had never heard of the vaccine, its purpose, or related campaigns. The lowest awareness was observed regarding familiarity with the HPV vaccine itself, while slightly higher scores were noted for awareness that the vaccine is available for free. These results suggest that limited exposure to HPV information, misconceptions, and gender-specific assumptions hinder parental awareness and contribute to the underutilization of the vaccine.

Table 9. *Level of awareness of the respondents on the HPV vaccine*

Indicators	Mean	SD	Interpretation
1. How familiar are you with the HPV vaccine?	1.04	0.27	Never Heard of It
2. How familiar are you with the campaigns and recommendations about the HPV vaccine?	1.35	0.87	Never Heard of It
3. How familiar are you with the HPV vaccine, which is recommended for both men and women?	1.52	0.98	Never Heard of It
4. How familiar are you with the purpose of the HPV vaccine?	1.42	0.92	Never Heard of It
5. How familiar are you with the fact that the HPV vaccine is given for free?	1.73	1.27	Never Heard of It
Overall	**1.41**	**0.86**	

Note: *1-1.79 – Never Heard of It; 1.80- 2.59 – Heard of It but I Don't Know the Details; 2.60- 3.39 – Somewhat Familiar; 3.40- 4.19 – Familiar; 4.20-5.00 – Very Familiar*

Similar trends have been reported in other studies. For instance, Sackey et al. (2022) and Thompson et al. (2020) found that low parental awareness is associated with limited provider engagement and misinformation, while Wijayanti et al. (2021) emphasized the importance of a gender-neutral approach in HPV vaccination campaigns. These findings underscore the need for targeted health education and community-based programs to increase awareness of the HPV vaccine, its benefits, and its recommendation for both males and females. The results can also be understood through Bandura's Social Cognitive Theory, which highlights the influence of observational learning, social interactions, and self-efficacy on behavior. Low awareness among respondents reflects limited exposure to reliable health information and guidance from healthcare providers, suggesting that strengthening community-based educational initiatives may enhance parental knowledge and uptake of the HPV vaccine.

Level of Knowledge on HPV Vaccine

Table 10 presents the respondents' level of knowledge regarding the HPV vaccine. Overall, respondents demonstrated a very low level of knowledge (Mean = 1.38, SD = 0.90), particularly regarding the recommended dose, the meaning of HPV, and the ideal age for vaccination. The highest scores were observed for awareness of the vaccine's availability and its role in disease prevention, yet these scores still indicate insufficient knowledge. These findings suggest that knowledge gaps are widespread, which may hinder informed decision-making and contribute to low HPV vaccination uptake in San Pablo City, Laguna.

Table 10. *Level of knowledge of the respondents regarding the HPV vaccine*

Indicators	Mean	SD	Interpretation
1. How familiar are you with the meaning of HPV?	1.24	0.72	Not Knowledgeable at All
2. How familiar are you with the fact that there is a vaccination for HPV?	1.63	1.17	Not Knowledgeable at All
3. How familiar are you with the number of doses given in the HPV vaccination?	1.23	0.75	Not Knowledgeable at All
4. How familiar are you with the recommended age for HPV vaccination?	1.30	0.83	Not Knowledgeable at All
5. How familiar are you with the fact that the HPV vaccine prevents cervical cancer and genital warts?	1.53	1.05	Not Knowledgeable at All
Overall	**1.38**	**0.90**	

Similar gaps have been reported globally. For example, Su (2022) noted that HPV infections cause over 90% of cervical cancer cases worldwide, yet awareness of the vaccine remains low. Studies by Rančić et al. (2020) and Thanasan et al. (2022) similarly reported that knowledge deficits, particularly in mixed urban–rural populations, are a major barrier to vaccine acceptance. These findings indicate a clear need for targeted educational campaigns and community-based interventions to improve awareness and understanding of HPV vaccination. The results can be interpreted through Pender's Health Promotion Model, which emphasizes that adequate knowledge is essential for individuals to make informed health decisions. Applying this model, healthcare professionals can design structured, culturally sensitive education initiatives to enhance parental understanding of HPV, the benefits of vaccination, and the recommended vaccination schedule. Strengthening such interventions is likely to improve vaccine acceptance and reduce HPV-related disease incidence in the community.

Perceived Barriers

Table 11 presents the perceived barriers to HPV vaccine utilization among respondents. Overall, the primary barriers were insufficient information and awareness campaigns (Mean = 4.51, SD = 0.86), financial constraints (Mean = 4.31, SD = 1.19), and fear of potential side effects (Mean = 4.18, SD = 1.19). Other barriers, including low perceived susceptibility to HPV-related diseases, accessibility and availability issues, and time constraints, were less significant, while distance to healthcare facilities was the least of a concern. These results indicate that informational and perceptual factors, rather than geographic or logistical issues, are the main obstacles to HPV vaccination in the study community.

Table 11. *Perceived barriers of the respondents to the HPV utilization*

	Indicators	Mean	SD
1.	There is not enough information and awareness campaigns about the HPV vaccine in my community.	4.51	0.86
2.	I don't have enough budget to receive the HPV vaccination.	4.31	1.01
3.	I am afraid of the possible side effects of the HPV vaccine.	4.18	1.19
4.	I don't need the HPV vaccine because I am not at risk of getting cervical cancer and genital warts.	3.46	1.37
5.	The HPV vaccine is not readily available at the health facilities.	3.21	1.13
6.	I don't have enough time to go to the nearest healthcare facility to receive the HPV vaccination.	3.02	1.30
7.	The nearest healthcare facility is far from my home.	1.95	1.01

Some respondents believed they were not at risk for HPV-related diseases, reflecting misconceptions that may reduce vaccination motivation, consistent with findings from Chen et al. (2024). Accessibility and availability were moderate concerns, suggesting that logistical factors may affect some individuals, particularly for specific vaccines such as Gardasil®9 (Krishna & Polonijo, 2024; Llave et al., 2022). Time constraints were minor barriers, highlighting the importance of flexible vaccination schedules to accommodate parents' work and academic responsibilities (Muthukrishnan et al., 2022). Geographic distance was not a significant barrier, likely due to the presence of multiple Rural Health Units providing accessible vaccination services, although other studies report distance as a challenge in rural and urban settings (Lee, Gerend, & Boakye, 2021).

The findings align with the Health Belief Model, which posits that perceived susceptibility, severity, benefits, and barriers influence health behavior. Low awareness and misconceptions reflect reduced perceived susceptibility and severity, while fear of side effects and financial concerns represent strong perceived barriers. Strengthening community-based education, healthcare provider engagement, and awareness campaigns is essential to address these informational and perceptual barriers, improve vaccine confidence, and increase HPV vaccination uptake.

Difference in Awareness and Knowledge by Sociodemographic Profile

Table 12 presents the relationship between the selected demographic variables and respondents' HPV awareness and knowledge using the Kruskal–Wallis H and Mann–Whitney U tests. The combined analysis of awareness and knowledge indicates that basic sociodemographic factors such as age, marital status, and education did not significantly affect respondents' awareness or knowledge of HPV and its vaccine. This suggests that these demographic characteristics alone may not meaningfully explain variations in health understanding (Huang, Ruan, & Sun, 2025; Elenwo et al., 2023; Li et al., 2024). Although education approached significance for knowledge, it did not meet the threshold, supporting prior studies indicating that contextual, experiential, and psychological factors often influence health knowledge more than basic demographics (Tabachnick & Fidell, 2019; Wasserstein et al., 2019).

Table 12. *Difference in the level of awareness and knowledge of the respondents across socio-demographic profile*

Profile	Test Statistic (DF) / U	*p*-value	Significance	Post Hoc	Statistics
Awareness					
Age	H = 1.87 (df = 3)	.623	Not Significant		Kruskal-Wallis H Test
Marital Status	H = 4.83 (df = 4)	.089	Not Significant		Kruskal-Wallis H Test
Education	H = 5.10 (df = 4)	.084	Not Significant		Kruskal-Wallis H Test
Occupation	H = 7.22 (df = 3)	.027	Significant	Self-employed > Unemployed	Kruskal-Wallis H Test
Vaccination Status	U = 549.50	<.001	Significant	Vaccinated > Unvaccinated	Mann-Whitney U Test
Knowledge					
Age	H = 1.82 (df = 3)	.401	Not Significant		Kruskal-Wallis H Test
Marital Status	H = 4.24 (df = 4)	.105	Not Significant		Kruskal-Wallis H Test
Education	H = 5.72 (df = 4)	.060	Not Significant		Kruskal-Wallis H Test
Occupation	H = 5.08 (df = 3)	0.61	Not Significant		Kruskal-Wallis H Test
Vaccination Status	U = 1006.00	<.001	Significant	Vaccinated > Unvaccinated	Mann-Whitney U Test

**Significant at <.05 level*

In contrast, occupation and vaccination status were significant predictors of awareness. Post hoc analysis for occupation revealed that self-employed respondents had significantly higher HPV awareness than unemployed respondents (p = 0.021), while differences between self-employed and employed respondents were not statistically significant (p = 0.104). These findings indicate that occupational engagement may provide greater access to health information or encourage proactive health behaviors. Vaccinated respondents also showed significantly higher awareness and knowledge compared to unvaccinated individuals, demonstrating that vaccination itself serves as an educational experience through exposure to healthcare providers and educational materials (Nutbeam, 2020; Ozdemir et al., 2025).

The results are consistent with Pender's Health Promotion Model, which emphasizes the role of personal experiences, perceived benefits, self-efficacy, and interpersonal influences in shaping health behavior. Higher awareness and knowledge among vaccinated and occupationally engaged respondents likely reflect increased self-efficacy and proactive engagement in preventive practices. At the same time, these findings align with Orem's Self-Care Deficit Theory, highlighting that low HPV vaccine uptake represents a self-care deficit caused by limited knowledge, lack of access to reliable health information, and insufficient support. These deficits reinforce the need for targeted nursing interventions and health education strategies to empower individuals to make informed health decisions.

Overall, the study demonstrates that targeted, community- and workplace-based health education initiatives, school programs, and vaccination campaigns are likely more effective than strategies solely based on demographic characteristics. By addressing barriers, enhancing knowledge, and fostering supportive social and environmental conditions, such interventions can reduce self-care deficits and promote proactive participation in preventive health behavior, ultimately increasing HPV vaccination uptake in San Pablo City.

HPV Awareness Recommendations

Table 13 presents participants' recommended strategies to raise awareness about HPV vaccination. Community-based programs received the highest endorsement (Mean = 4.62, SD = 0.74), followed by school-based programs (Mean = 4.56, SD = 0.82). Traditional television campaigns ranked third (Mean = 4.45, SD = 0.91), while social media initiatives ranked lowest (Mean = 4.18, SD = 1.12), suggesting caution regarding the reliability of online health information. These results indicate a clear preference for interactive, face-to-face education over media-driven strategies. Community programs allow participants to ask questions, receive accurate information, and build trust in healthcare professionals. School-based programs engage students early and involve parents, enhancing vaccine uptake and awareness. While traditional media remains influential, social media is perceived as less reliable, highlighting the importance of credible sources and fact-checking to prevent misinformation. Existing research supports these preferences. For example, relocating vaccination services to accessible community sites improved acceptance (Yahia et al., 2024), and school-based HPV immunization programs in the Philippines effectively increased coverage among girls aged 9–14 (BMPlus, 2023; INQUIRER.net BrandRoom, 2024). When used responsibly, social media can supplement outreach and support informed decision-making (Jiang, Ng & Ngien, 2022).

Table 13. *Respondents' recommended ways to raise awareness on HPV*

	Recommendations	Mean	SD
1.	Community Outreach Programs	4.62	0.74
2.	School-Based Education Programs	4.56	0.82
3.	Public Health Campaigns on Television	4.45	0.91
4.	Social Media Campaigns	4.18	1.12

The findings align with Bandura's Social Cognitive Theory, which emphasizes learning through observation, social influence, and reinforcement. Community and school programs provide direct social interaction that positively shapes health behavior. They also support Pender's Health Promotion Model, highlighting that perceived benefits, self-efficacy, and environmental factors influence preventive health actions. Accessible and interactive interventions are therefore likely to improve HPV vaccine awareness and acceptance among the target population.

HPV Vaccination Decision Factors

Table 14 presents the factors influencing respondents' decisions to receive the HPV vaccine using a 5-point Likert scale (5 = Strongly Agree, 1 = Strongly Disagree). The highest-ranked factor was assurance of safety and effectiveness (Mean = 4.58, SD = 0.79), indicating that confidence in the vaccine's efficacy and safety is the primary driver of uptake. The second-ranked factor was availability of free or affordable vaccines (Mean = 4.40, SD = 1.00), highlighting the crucial role of financial accessibility in vaccination decisions. Social support from family and friends ranked third (Mean = 4.33, SD = 1.04), demonstrating that interpersonal influence strongly affects HPV vaccine acceptance. Healthcare provider recommendation ranked fourth (Mean = 4.08, SD = 1.21), showing that while professional advice is important, it may be less influential than safety, cost, or social factors.

Table 14. *Factors affecting decision regarding HPV vaccination*

Factors	Mean	SD
Assurance of Safety and Effectiveness	4.58	0.79
Free or Reduced-Cost Availability	4.40	1.00
Support from Family and Friends	4.33	1.04
Recommendation from a Healthcare Provider	4.08	1.21

These results suggest that respondents prioritize vaccine safety, affordability, and social influence when deciding to get vaccinated. Mistrust, misinformation, or lack of knowledge about the HPV vaccine may prevent uptake. Social support appears more influential than healthcare provider advice, indicating the importance of community trust and peer/family influence. Public health programs should therefore focus on community-based initiatives to increase confidence and uptake of the HPV vaccine.

Supporting literature confirms these findings. Assurance of safety and effectiveness influences vaccination decisions through knowledge and perception of efficacy, with fear of side effects frequently cited as a barrier to acceptance, while the desire to protect against HPV-related cancers predicts higher uptake (Heyde et al., 2024). Financial accessibility is also critical, as perceived difficulties in accessing HPV vaccines, including cost and logistical challenges, are associated with lower vaccination intention and uptake among young adults (Wang, 2025). Social influence from family and friends shapes individuals' perceptions of necessity and safety (Khalil et al., 2025). Although healthcare providers are key in promoting vaccines, their recommendations alone may not fully drive uptake due to other barriers (Chido et al., 2024).

These factors have consistently been identified in diverse populations, suggesting that the drivers of HPV vaccine acceptance identified here may be applicable beyond the study sample. These results align with Pender's Health Promotion Model, which emphasizes that perceived benefits, barriers, and interpersonal influences affect health behaviors. They also support Bandura's Social Cognitive Theory, illustrating that social modeling and observational learning from family and peers can significantly shape individuals' decisions to accept the HPV vaccine.

Vaccination Attitudes

Table 15 presents the participants' opinions regarding HPV vaccination. Most respondents (331 out of 368) are in favour of initiatives to remove obstacles to HPV vaccination in their local community. This suggests a significant desire to make HPV vaccination more widely available and acceptable. Additionally, the majority of participants

(356 out of 368) indicated that they would like to know more about the HPV vaccine's advantages. This indicates a strong desire to learn more about how the vaccine protects against disease. Lastly, 341 participants said that if they knew more about the advantages of the vaccination, they would promote it to others and get it for themselves and their kids. This finding suggests that vaccination uptake might be positively impacted by raising awareness and knowledge about the HPV vaccine.

Table 15. *Attitudes towards vaccination of the respondents*

	Indicators	Yes	No
1.	Would you support efforts to eliminate perceived barriers to the HPV vaccine in your community?	331	37
2.	Would you like to learn more about the benefits of the HPV vaccine?	356	12
3.	If you learned more about the benefits of the HPV vaccine, would you consider getting it for yourself and your daughter, and recommend it to others?	341	27

According to Sendekie et al. (2025), acceptance of the HPV vaccine is significantly influenced by their views and level of knowledge about HPV infection, cervical cancer, and the vaccine itself. Research findings from countries such as Ethiopia, Jordan, Thailand, Nigeria, and Uganda support this conclusion. Those with a good attitude toward the vaccine had three times the chance of receiving it, while those who knew enough about it had twice the odds of receiving it. These data indicate that when people understand the benefits and significance of the HPV vaccine, they are more inclined to accept it. Higher vaccination rates depend on public awareness and factual information being provided. Similar findings across multiple countries show that improved knowledge and positive attitudes significantly increase vaccine acceptance, suggesting that these results have implications for broader public health interventions. This emphasizes the importance of having efficient educational and communication resources to change people's perceptions and increase their knowledge of the health hazards associated with HPV and the benefits of vaccination.

Conclusion

Based on the findings, it is evident that the underutilization of the Human Papillomavirus (HPV) vaccine in San Pablo City is primarily due to limited awareness and knowledge among parents regarding HPV, its transmission, associated risks, and the preventive benefits of vaccination. Many respondents were unaware that HPV affects both males and females and is linked to cancers beyond cervical cancer, including penile, anal, and oropharyngeal cancers. Sociodemographic factors such as age, marital status, and educational attainment were not significantly associated with awareness or knowledge. In contrast, occupation and vaccination status were significant, with self-employed and vaccinated individuals demonstrating higher awareness. Notably, vaccination status was the only factor significantly correlated with knowledge, suggesting that efforts to increase understanding may directly improve vaccine uptake. Perceived barriers, including cost, misinformation, fear of side effects, and limited access to credible health information, further impede vaccination. These findings highlight the need for comprehensive, culturally sensitive, community-based health education strategies. School programs, parent outreach, and barangay-level initiatives are critical for addressing information gaps, reinforcing accurate knowledge, and promoting informed health decisions. In alignment with Pender's Health Promotion Model and Orem's Self-Care Deficit Theory, the study demonstrates that both individual-level knowledge deficits and systemic gaps in health communication contribute to low vaccine uptake. Improving HPV vaccination coverage requires multi-sectoral collaboration, targeted education, and the removal of structural barriers, ultimately protecting the community from preventable HPV-related diseases.

Contributions of Authors

Author 1: conceptualization, research framework design, objectives formulation, data gathering, data analysis, manuscript writing, organization, and finalization
Author 2: research framework refinement, literature review, data gathering, manuscript preparation, and editing
Author 3: academic supervision, manuscript review and revision, research validation, and ethical oversight
Author 4: academic supervision, manuscript review and revision, research validation, and ethical oversight
Author 5: data gathering, data analysis, data interpretation, organization of findings, preparation of tables and figures, contribution to discussion and conclusion
Author 6: data gathering, data analysis, data interpretation, organization of findings, preparation of tables and figures, contribution to discussion and conclusion

Funding

Not Indicated

Conflict of Interests

No conflict of interest.

Acknowledgment

The researchers would like to express their sincerest gratitude and appreciation to the following persons who have extended their wholehearted support and encouragement, which served as enlightenment in the realization of this research paper. To **Sr. Lina L. Amante, FdCC**, Dean of Canossa Colleges, College Department, for the remarkable support and endless effort she provided to all researchers in conducting the research study. To **Sr. Rita D. Nedtran, FdCC**, Dean of the College of Nursing, for her invaluable guidance, unwavering support, and for overseeing the approval and completion of this research study. To **Dr. Marc Lester F. Quintana, Ed.D., M.A.N., R.N. (US-RN)**, Research Professor, for sharing his expertise, insightful suggestions, time, and patience throughout the completion of this research study. To **Mrs. Kathleen B. Corcolon, M.A.N., R.N.**, Research Adviser, for her unwavering support, patience, and dedication in guiding the researchers throughout the study. Her invaluable expertise, meticulous feedback, and commitment to ensuring the quality of this research were instrumental in its completion. It was an opportunity to learn under her mentorship and guidance. To **Mrs. Vivian P. Lajara, M.A.N., R.N.**, clinical instructor and one of the panelists, for her invaluable insights, unwavering support, and dedication. Her patience, expertise, and guidance were essential in developing and completing this study. We also value her role as a validator of research instruments, as her thorough attention to detail and dedication to excellence ensured the accuracy and reliability of our research instrument. Her willingness to share her knowledge and efforts has significantly contributed to the success of this study. To **Ms. Girlie Mannphy A. Lacambra, M.A.N., R.M., R.N.**, clinical instructor and one of the panelists, for her invaluable insights, unwavering support, and dedication. Her patience, expertise, and guidance were essential in developing and completing this study. We also value her role as a validator of research instruments, as her thorough attention to detail and dedication to excellence ensured the accuracy and reliability of our research instrument. Her willingness to share her knowledge and efforts has significantly contributed to the success of this study. To **Mr. Paul Adrian S. Avecilla, RPm**, a statistician and one of the thesis panelists, for sharing his expertise in statistical data analysis and for making suggestions that improved the research paper's outcome. To **Mr. Jaimes Aerolle Tan, RPm**, a statistician, for sharing his knowledge and assisting the group with the statistics of the respondent scores. To **Mrs. Rosalie G. Dizon, LPT, MAEd**, research instrument grammarian, for validating and checking the research instrument's grammar to ensure that the English and Tagalog languages used in the adapted research questionnaire were properly applied, clear, concise, and easy to understand by the respondents. To **Ms. Chelo Michelle Sy, RN, USRN, MPHc**, for sharing her expertise and effort in validating and assessing the accuracy of the research instrument, which was essential to the study's success. To **Hon. Ronaldo D. Reyes**, Barangay Chairman of Del Remedio, Hon. Dandi C. Medina, Barangay Chairman of San Francisco, and Hon. Ariston Amante, San Jose Barangay Chairman, for their approval to conduct the study in their respective barangays in San Pablo City. To the **respondents**, residents of Barangays Del Remedio, San Jose, and San Francisco in San Pablo City, for their cooperation and time in completing all survey questionnaires. This would be impossible without them. To their **family**, especially to Mr/s. Cipriano, Mr/s. Olaes, Mr/s. Pandino and Mr/s. Tokiwa, the researchers' parents, for their thorough understanding of the finances and unwavering support in carrying out the study. To **Canossa College Bachelor of Science in Nursing Batch 2026**, for their unwavering support, encouraging words, and unity, which have inspired and motivated our group throughout this journey. Your kindness and compassion have been invaluable in the successful completion of this study. Above all, to **Almighty God** for providing them with the knowledge, wisdom, guidance, and strength they needed to complete this study. All glory, honor, and praise to God!

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