



Comparison of Willingness to Pay for Human Papillomavirus Vaccine Between Low-/Middle- and High-Income Countries: A Systematic Review

Imania Afidatus Syaifabila^{1*}, Dwi Endarti², and Tuangrat Podha^{3,4}

¹Master Program in Pharmacy Management, Faculty of Pharmacy, Universitas Gadjah Mada, Yogyakarta, Indonesia

²Department of Pharmaceutics, Faculty of Pharmacy, Universitas Gadjah Mada, Yogyakarta, Indonesia

³Drug Information and Consumer Protection Center, Faculty of Pharmacy, Thammasat University, Rangsit Campus, Pathum Thani, Thailand

⁴Center of Excellence in Pharmacy Practice and Management Research Unit, Faculty of Pharmacy, Thammasat University, Rangsit Campus, Pathum Thani, Thailand
imaniaafid99@mail.ugm.ac.id

Abstract. Human Papillomavirus (HPV) vaccination is a proven preventive strategy against cervical cancer, yet affordability and acceptance remain challenges, particularly in low- and middle-income countries (LMICs). This systematic review compares willingness to pay (WTP) for HPV vaccines between LMICs and high-income countries (HICs), and explores determinants influencing factors. We conducted a systematic review of four databases (PubMed, Scopus, SpringerLink, and Science Direct) from 2015 to 2024. Inclusion criteria were full-text, peer-reviewed studies measuring WTP for HPV vaccination. Extracted data included WTP per dose (USD), market price, WTP as a percentage of market price, GDP per capita, and associated determinants. Fifteen studies were included, 7 from LMICs and 8 from HICs. In LMICs, average WTP per dose ranged from 1.43 USD – 82.5 USD, covering only 6.7 % – 85.3 % of the market price. In HICs, WTP ranged from 65.45 USD – 262.28 USD and could exceed market value. Key determinants included income, education, vaccine knowledge, and parental demographics. WTP is significantly lower in LMICs, both in absolute value and relative to affordability. Policy efforts should focus on vaccine subsidization, awareness campaigns, and inclusive financing models to close the HPV prevention gap across global income settings.

Keywords: Vaccine Affordability, Cervical Cancer Prevention, Health Economics, Willingness to Pay, Vaccine.

1 Introduction

The most common virus is the human papillomavirus (HPV) [1]. Even though vaccinations can prevent the disease, almost everyone who engages in sexual activity will contract HIV at some point in their lives [2]. While most infections show no symptoms,

HPV can affect individuals of any age, including healthy young children [2, 3]. Globally, HPV is most common in women in sub-Saharan Africa, accounting for 24 % of the global burden, and associated with 5 % of all malignancies worldwide [4].

The World Health Organization (WHO) recently outlined key principles for a comprehensive approach to preventing and managing cervical cancer [5]. Their recommendation emphasizes implementing effective interventions throughout a person's life, aligned with the natural progression of the disease. The WHO (2016) recommends vaccinating girls and young women between the ages of 9 and 26. Cervarix, Gardasil, and Gardasil 9 are the three HPV vaccinations currently on the market. They are all safe and very efficient at preventing illnesses brought on by HPV types 16 and 18. The HPV vaccine was available in 45 countries globally by the end of 2012 [6].

Disparities in access and uptake persist despite the availability of HPV vaccines, especially between high-income countries (HICs) and low- and middle-income countries (LMICs). While HICs have made substantial progress in HPV vaccination coverage through government-funded programs and insurance systems. While LMICs face challenges such as financial constraints, limited healthcare infrastructure, and insufficient awareness, resulting in lower vaccination rates [7, 8].

A popular economic metric for evaluating people's financial preparedness to embrace preventive health interventions and the perceived value of vaccinations is Willingness to Pay (WTP). WTP studies help identify population affordability thresholds, influencing vaccine pricing, subsidy programs, and policy decisions. In LMICs, where healthcare costs are often paid out-of-pocket, WTP for the HPV vaccine is particularly critical to understand as it reflects economic barriers and cultural perceptions toward vaccination. By contrast, WTP in HICs is generally higher due to better affordability, higher income levels, and greater awareness of HPV-related health risks [9, 10].

This study primarily focuses on compares willingness to pay (WTP) for HPV vaccines between LMICs and HICs, and explores determinants influencing factors. Countries' income categories were defined based on the 2025 World Bank classification [11]. Although the main emphasis is on WTP for vaccines in LMICs, studies from HICs are also included for comparison.

2 Methods

A systematic and consistent approach was ensured by the research's adherence to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) criteria.

2.1 Data Source and Search Strategy

Several databases, including PubMed, Scopus, Springer Link, and Science Direct, were thoroughly searched. The period from 2015 to 2024 was chosen as the search window

for the articles. To guarantee comprehensive coverage, our search combined specific fields (Title, abstract, and all fields) with Boolean operators (AND, OR). The following search terms were used: “HPV vaccine” AND “willingness to pay OR WTP,” and all articles were found between January 5 and January 20, 2025.

2.2 Eligibility Criteria

The criteria for inclusion in this systematic review were: (1) English-language studies, (2) studies examining willingness to pay for HPV vaccination, (3) use of validated instruments to measure willingness to pay, (4) availability of full-text publications, and (5) peer-reviewed status. On the other hand, exclusion criteria encompassed studies published prior to 2015, those not written in English, topics or subjects unrelated to the review, and publications with data that could not be extracted or analyzed further.

2.3 Study Quality Assessment

The quality assessment was conducted independently by the authors. An adapted version of the Newcastle-Ottawa Scale (NOS-CS) was utilized for cross-sectional studies [12]. A maximum of one star may be awarded to each question, with the exception of the comparison domain question, which is eligible for two stars. Consequently, a research can receive a maximum score of 10 and a minimum score of 0. Very good studies receive scores of 9–10, good studies receive 7–8, satisfactory studies receive 5–6, and bad studies receive 0–4.

2.4 Data Extraction

Two different forms of data extraction were created. While the second was devoted to extracting the studies' findings about WTP, the first was centered on obtaining general information about the included research. Details like author, publication year, country, sample size, target population for vaccination, kind of HPV vaccination, elicitation techniques, and percentage of positive WTP were among the general parameters gathered. WTP currency, WTP in 2025, market price in 2025, WTP as a percentage of market price, WTP as a percentage of GDP per capita, and factors influencing WTP are among the important facts that were taken from the study's findings.

2.5 Data Analysis Method

Excel was used to evaluate the extracted data. Both the original currency and USD were used to display the monetary values provided in the included research [13]. In certain instances, participants' willingness to pay (WTP) was shown as a percentage. The US Inflation Calculator, a free online tool, was used to convert the provided WTP amounts in USD to 2025 values to calculate the percentage of WTP concerning GDP per capita. The greatest WTP amount, if several measurements were available, was then used to

divide these values by the GDP per capita for the research year (2025) [14]. When calculating GDP per capita and categorizing nations according to their economic standing, the World Bank statistics was used as a guide [15].

3 Results

3.1 Data Source and Search Strategy

The systematic search yielded 227 papers in total, with 63 publications coming from Scopus, 40 from SpringerLink, 59 from PubMed, and 65 from Science Direct. Due to database duplication, a total of 71 were eliminated. After screening titles and abstracts, 115 articles were eliminated since they had nothing to do with the research issue. Lastly, as seen in Fig. 1, our study contained 15 articles. Every article that was featured was released within the last ten years, from 2015 to 2024. A summary of their characteristics is presented in Table 1.

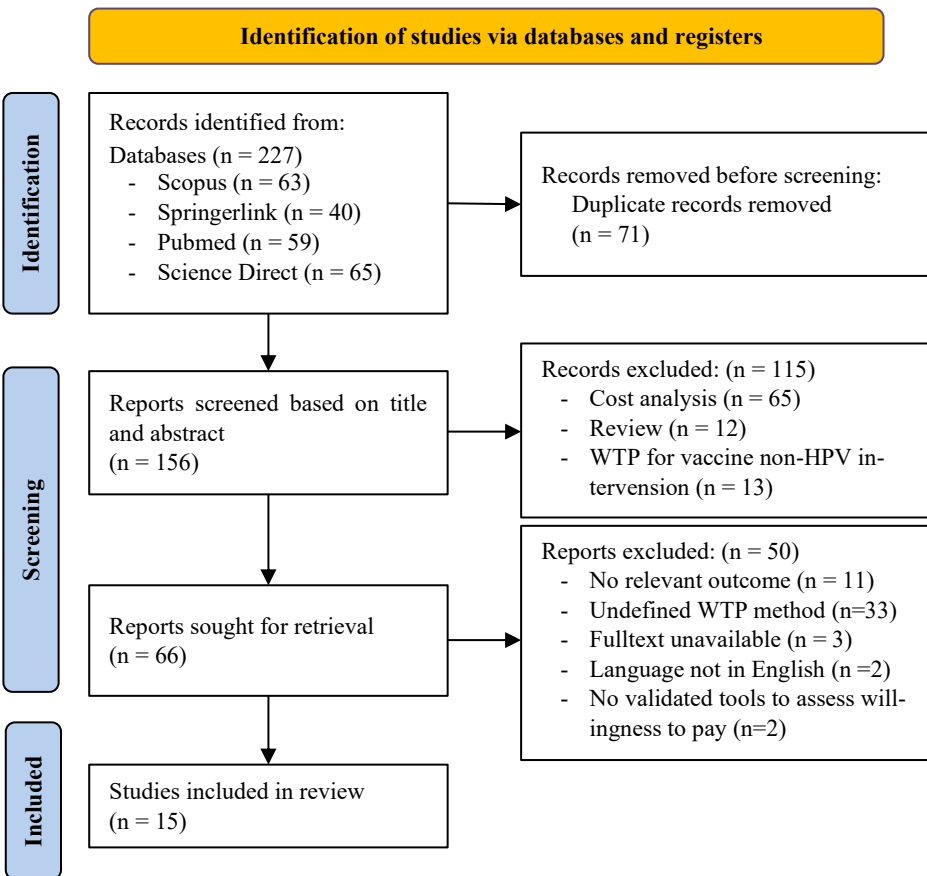


Fig.1. PRISMA Flowchart

Table 1. Summary Characteristics of the 15 Studies

Description	Numerous studies and Sources	
	Low- and middle-income countries	High- or upper-middle-income countries
	n=7 (%)	n=8 (%)
Study design		
Cross-sectional	7 (100)	8 (100)
Study setting*		
School setting	3 (43)	2 (25)
College setting	1 (14)	2 (25)
Healthcare setting	2 (29)	3 (38)
General population setting	1 (14)	1 (13)
Data collection method		
Self-administered survey	3 (43)	1 (13)
Face-to-face interview	4 (57)	2 (25)
Online survey	0 (0)	5 (63)
Sample		
Adult women (teachers, workers)	2 (29)	1 (13)
Outpatients of hospital/clinic	1 (14)	0 (0)
Mothers	2 (29)	2 (25)
Parents (Mothers and fathers)	1 (14)	3 (38)
Students	1 (14)	2 (25)
Sample size		
<100	0 (0)	0 (0)
100 – 500	4 (57)	3 (38)
501 – 1000	2 (29)	1 (13)
>1000	1 (14)	4 (50)
Methods for eliciting WTP		
CVM	7 (100)	5 (63)
DCE	0 (0)	3 (38)

Abbreviations: WTP = Willingness to Pay, CVM = Contingent valuation method, DCE = Discrete choice experiment

3.2 Data Source and Search Strategy

Eight of the 15 studies were carried out in high- or upper-middle-income countries (HICs), including China, Thailand, Hong Kong, and Malaysia, and seven were carried out in low- and middle-income countries (LMICs), particularly Nigeria and Vietnam.

A cross-sectional study design was used in all included investigations, and data were gathered by online questionnaires (5 studies), self-administered surveys (4 studies), and in-person interviews (6 studies). Twelve studies employed the Contingent Valuation Method (CVM), whereas three studies employed the Discrete Choice Experiment (DCE) as their primary elicitation technique. Targeting demographics including mothers, parents, teachers, students, and healthcare professionals, which sample sizes ranged from 240 to 15,969 people.

3.3 Quality Assessment

Based on Table 2, the Newcastle-Ottawa Scale for cross-sectional studies, 3 studies were rated as very good, 7 as good, and 5 as satisfactory. No studies were excluded due to poor quality. All studies demonstrated acceptable levels of methodological rigor in sample representativeness, WTP measurement tools, and statistical analyses.

3.4 WTP Vaccine Measure in Low- and Middle- Income Countries

As presented in Table 3, WTP values in LMICs showed substantial variation, reflecting both economic conditions and contextual factors. The average WTP per dose ranged from US\$ 1.43–82.50, depending on the country and population group. WTP in Nigeria was consistently low (US\$ 1.43–19.32), while Vietnam showed a broader range (US\$ 10.30 – 82.50). Regarding WTP as a percentage of market price, values in LMICs ranged from 6.7 % to 85.3 %, as well as a proportion of GDP per capita, from 0.05 % to 3.37 %. These figures highlight the limited affordability of HPV vaccines in LMICs, even when willingness to pay is expressed.

3.5 Comparison with Relation to WTP Calculations in High- or Upper-Middle Income Countries

In contrast, as presented in Table 4, WTP in HICs was significantly higher, with values ranging from 65.45 – 262.28 USD per dose, and total vaccination WTP reaching up to 786.85 USD in Thailand. Participants in China, Thailand, and Hong Kong reported WTP values that often covered more than 50 % of the market price, and in some cases, such as for the quadrivalent vaccine in Thailand, exceeded the actual price. As a percentage of GDP per capita, WTP in HICs ranged from 1.4 % to 10.09 %, indicating a lower relative economic burden compared to LMICs. These findings underscore substantial disparities in both absolute and relative WTP across income levels.

3.6 Determinants Influencing WTP

The review identified several recurring determinants of WTP across settings:

- Socioeconomic factors: Higher income, tertiary education, and urban residence were positively associated with higher WTP.

- Knowledge and awareness: Understanding of HPV and cervical cancer risks, vaccine efficacy, and prevention strongly influenced WTP.
- Demographic factors: Younger age, being female (especially mothers), and having fewer children were linked to greater willingness to pay.
- Psychological and behavioural factors: Belief in the importance of early detection, perceived severity of cervical cancer, positive attitudes toward vaccination, and prior screening behaviour were significant drivers.
- Healthcare access: Employment in tertiary hospitals, media exposure, and regional development levels (GDP/HDI) also contributed to WTP differences.

These factors suggest that enhancing public knowledge, addressing affordability through subsidies, and tailoring outreach strategies based on local socio-demographic contexts are critical to increasing HPV vaccine uptake.

Table 2. Quality Assessment of included studies using New Castle Ottawa Scale

Study name	Representative- ness of the cases(★)	Sample size(★)	Non- Response rate(★)	Ascertainment of the screening/surveillance tool (max★★★)	The potential confounders were investigated by subgroup analysis or multivariable analysis(★★★)	Assessment of the outcome (max★★★)	Statistical test (★)	Quality level
Nguyen et al., [9] 2022	★	★	★	★	★★	★★	★	Very good (9)
Tran et al., [16] 2018	★	★	★	★	★	★	★	Good (7)
Thu et al., [17] 2017	★	★	-	★	★★	★	★	Good (7)
Akande et al., [18] 2024	★	★	-	-	★★	★	★	Satisfactory (6)
Akinsolu et al., [19] 2023	★	★	-	★	★★	★★	★	Good (8)
Umeh et al., [20] 2016	★	★	★	★	★	★	★	Good (7)
Enebe et al., [21] 2021	★	★	★	★★	★	★	★	Good (8)
Lu et al., [22] 2022	★	★	★	★	★★	★★	★	Very good (9)
Ngorsuraches et al., [23] 2015	★	★	-	★	★	★	★	Satisfactory (6)
Zhou et al., [24] 2024 (a)	★	★	-	★	★	★	★	Satisfactory (6)
Zhou et al., [25] 2024 (b)	★	★	★★	-	★	★★	★	Good (8)
Zhou et al., [26] 2022 (c)	★	★	-	★★	★	-	★	Satisfactory (6)
Wong et al., [27] 2018	★	★	-	★	★	-	★	Satisfactory (5)
Maharajan et al., [28] 2015	★	★	★	★	★★	★★	★	Very good (9)
Lin et al., [29] 2020	★	★	★	-	★	★★	★	Good (7)

Table 3. Willingness to pay (WTP) valuation method and WTP values for vaccine in low-middle income countries (USD 2025)

Author, Year, Country	Sample	Sample size	Target Population for Vaccination	HPV Vaccination Type	Methods for eliciting WTP	% of Positive WTP	WTP (Currency)	WTP in 2025	Market Price in 2025	WTP as % of market price	WTP as % of GDP per Capita	Determinants Influencing WTP
Nguyen et al., 2022, Vietnam	Parents (Mother and Father)	785	Boys	Two doses of Gardasil vaccine	CVM (Bidding game)	49.2% of parents agreed to have their sons vaccinated against HPV	3,053,005 VND ~ 137.5 USD	165.0 USD (full dose) or 82.5 USD (per dose)	96.7 USD per dose	85.3%	3.37%	Knowledge
Tran et al., 2018, Vietnam	Outpatients of the hospital/clinic	492	Adult	Bivalent vaccine (e.g., Cervarix)	CVM (Double-bounded dichotomous-choice and Open question)	86.6% of respondents were willing to pay for the HPV vaccine	1,119,900 VND ~ 49.3 USD	67.25 USD	110.48 USD	60.9%	1.37%	Age, income, having children, and married
Thu et al., 2017, Vietnam	Mothers	606	Adult	Cervarix or Gardasil (3 doses, not specified per respondent)	CVM (Open question)	53.1% of mothers expressed their willingness to pay (WTP) for their daughters' HPV vaccine	23–46 USD	30.8–61.6 USD (full dose) 10.3–20.5 USD (per dose)	53.6–87.1 USD	21.9%	1.26%	Affordability perception, condom use, HPV knowledge, screening experience, and employment outside agriculture

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Author, Year, Country	Sample	Sample size	Target Population for Vaccination	HPV Vaccination Type	Methods for eliciting WTP	% of Positive WTP	WTP (Currency)	WTP in 2025	Market Price in 2025	WTP as % of market price	WTP as % of GDP per Capita	Determinants Influencing WTP
Akinsolu et al., 2023, Nigeria	Adult women	1371	Adult	Bivalent (Cervarix TM) and Quadrivalent (Gardasil TM) that 2–3 doses (standard multi-dose regimen)	CVM (Payment card)	31.7% of women living with HIV (WLWH) were willing to pay (WTP) for the HPV vaccine for themselves	₦ 3,221.15 ~ 7.00 USD	4.40 USD	66 USD	6.7%	0.17%	Education, income, knowledge, and positive beliefs about prevention and early detection
Umeh et al., 2016, Nigeria	Mothers	438	Girls aged 9-12 years	Bivalent (Cervarix) and Quadrivalent (Gardasil)	CVM	91.6% stated a positive WTP amount	5.84 USD	9.22 USD	55.55–57.27 USD	16.3%	0.35%	HPV history, urban setting, and awareness
Enebe et al., 2021, Nigeria	Teachers	377	Adult	Bivalent (Cervarix) – 3 doses	CVM (Bidding game)	74.3 % of them accepted to pay out of pocket for the cervical cancer vaccine	₦ 5,568 ~ 15 USD (full dose) 5 USD (per dose)	23.04 USD (full dose) 7.68 USD (per dose)	53.97–55.73 USD	14.0%	0.87%	Income, non-food expenses, household size

Author, Year, Country	Sample	Sample size	Target Population for Vaccination	HPV Vaccination Type	Methods for eliciting WTP	% of Positive WTP	WTP (Currency)	WTP in 2025	Market Price in 2025	WTP as % of market price	WTP as % of GDP per Capita	Determinants Influencing WTP
Akande et al., 2024, Nigeria	Students	240	Students between 18-21 years	Single-dose HPV vaccine	CVM	35% of respondents were willing to pay for the HPV vaccine	₦ 1000 ~ 3 USD	1.43 USD	10.00 USD	14.3%	0.054%	Marital & parental status

Table 4. Willingness to Pay (WTP) valuation method and WTP values for vaccine in high or upper- and middle-income countries (USD 2025)

Author, Year, Country	Sample	Sample size	Target Population for Vaccination	HPV Vaccination Type	Methods for eliciting WTP	% of Positive WTP	Estimated mean or median WTP (Currency)	WTP in 2025	Market Price in 2025 per dose	WTP as % of market price	WTP as % of GDP per Capita	Determinants Influence WTP
Lu et al., 2022, China	Adult women	15,969	Adult	Bivalent (2v), Quadrivalent (4v), 9-valent	CVM (Closed and open-ended question)	1.1 % of respondents remained willing to pay for more expensive HPV vaccines	Median general WTP = 2,000 CNY (3 doses) or 666.67 CNY per dose (103.45 USD)	670.91 USD (3 doses) or 223.64 USD per dose	223.64 USD	51.3 %	2.44 %	Age, unmarried, income, small family, vaccine-positive, tertiary staff, developed urban area
Ngor-suraches et al., 2015, Thailand	Parents (Mother and Father)	314	Girls	Bivalent (Cervarix) and Quadrivalent (Gardasil) requires a 3 dose schedule	DCE	93 % of observations showed positive WTP	Bivalent vaccine (3 doses) is 10,479.9 Baht and Quadrivalent Vaccine (3 doses) is 21,189.9 Baht	Bivalent vaccine (3 doses) is 129.66 USD per dose and Quadrivalent Vaccine (3 doses) is 27,123 Baht (786.85 USD) or 262.28 USD per dose	148.33 USD	Bivalent is 87.4 % and quadrivalent is 176.8 %	Bivalent (full dose) is 4.99 % and quadrivalent (full dose) is 10.09 %	Risk perception, awareness, gender, experience

Author, Year, Country	Sample	Sample size	Target Population for Vaccination	HPV Vaccination Type	Methods for eliciting WTP	% of Positive WTP	Estimated mean or median WTP (Currency)	WTP in 2025	Market Price in 2025 per dose	WTP as % of market price	WTP as % of GDP per Capita	Determinants Influencing WTP
Zhou et al., 2024, China	Parents (Mother and Father)	3904	Girls	2-valent (2vHPV), 4-valent (4vHPV), 9-valent (9vHPV)	CVM	93.6 % of respondents were willing to pay for HPV vaccination for their daughters.	2,169 CNY ~ 321.33 USD (3 doses) or 723 CNY ~ 107.11 USD (per dose)	2,375 CNY ~ 334.51 USD (3 doses) or 792 CNY ~ 111.55 USD (per dose)	200 USD per dose	55.7 %	2.36 %	Education, income, younger age, mother's role, vaccine awareness/ intent
Zhou et al., 2024, China	Parents (Mother and Father)	2493	Boys	2-valent, 4-valent, 9-valent	DCE	90.99 % of mothers and 85.04 % fathers were willing to accept HPV vaccine for their son	2,122.75 CNY ~ 298.98 USD (full dose) or 707.58 CNY ~ 99.65 USD (per dose)	2,324 CNY ~ 327.61 USD (full dose) and 774.67 CNY ~ 109.23 USD (per dose)	1,423 CNY ~ 200.52 USD per dose	54.5 %	2.32 %	Father, age >45, income >20k CNY, knowledge, awareness, WTA
Zhou et al., 2022, China	Students	850	Adults	Bivalent, Quadrivalent, and 9-valent vaccines	CVM (Bidding game)	92.54 % of the participants were willing to pay for HPV vaccines	Imported Bivalent, quadrivalent, and 9-valent are 1689.80 RMB (250.63 USD), 2216.61 RMB (328.76 USD), and 3252.43 RMB (482.68 USD)	Imported Bivalent, quadrivalent, and 9-valent are 234.70 USD, 307.59 USD, and 451.73 USD	Imported Bivalent, quadrivalent, and 9-valent are 241.67 USD, 342.92 USD, and 555.56 USD	Bivalent (97.11 %), Quadrivalent (89.78 %), and 9-valent (81.31 %)	Bivalent (1.74 %), Quadrivalent (2.28 %), and 9-valent (3.35 %)	HPV knowledge, female gender (9%), urban residence, exercise frequency

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Author, Year, Country	Sample	Sample size	Target Population for Vaccination	HPV Vaccination Type	Methods for eliciting WTP	% of Positive WTP	Estimated mean or median WTP (Currency)	WTP in 2025	Market Price in 2025 per dose	WTP as % of market price	WTP as % of GDP per Capita	Determinants Influence WTP
Wong et al., 2018, Hong Kong	Mothers	482	Girls aged between 8 - 17 years	General HPV vaccine	DCE	88.4% mothers were willing to pay for HPV vaccines	HK\$1620 ~ 208 USD (full dose) or HK\$540 ~ 69.33 USD (per dose)	230.77 USD (full dose) or 76.92 USD per dose	214 USD per dose	35.9%	0.44%	100% protection, lifetime coverage, fewer side effects, high income, tertiary education
Maharajan et al., 2015, Malaysia	Students	302	Students	Bivalent and Quadrivalent	CVM	Only 12.25% of all participants were willing to pay for HPV vaccines	RM 1,197.68 full dose or RM 399.23 ~ 86.79 USD per dose	110.22 USD per dose	Bivalent 39-54 USD, quadrivalent 109-152 USD, and 9-valent 130-152 USD	112.6%	2.36%	High knowledge, medical background, belief in vaccine efficacy, positive prevention attitude
Lin et al., 2020, China	Mothers	2339	Adult	2vHPV, 4vHPV, 9vHPV	CVM (Closed-ended questions)	81.2% participants were willing to pay for 2vHPV vaccine	2vHPV 65.45 USD, 4vHPV 84.12 USD, 9vHPV 122.06 USD	2vHPV 65.45 USD, 4vHPV 84.12 USD, 9vHPV 122.06 USD	2vHPV 80.56 USD, 4vHPV 110.83 USD, 9vHPV 180.28 USD	2vHPV 81.2%, 4vHPV 75.9%, 9vHPV 67.7%	2vHPV 1.82%, 4vHPV 1.82%, 9vHPV 67.7%	1.41% Income, urban, media, efficacy, partner support, marital status

4 Discussion

This systematic review highlights stark contrasts in the willingness to pay (WTP) for HPV vaccines between low- and middle-income countries (LMICs) and high-income countries (HICs), revealing both economic and perceptual disparities that have significant implications for vaccine accessibility and policy planning.

4.1 Study Characteristics and Representativeness

Based on Table 1, all 15 included studies were cross-sectional and employed quantitative WTP elicitation techniques, with face-to-face interviews more common in LMICs (57 %) and online surveys predominant in HICs (63 %). This reflects infrastructural and technological divides that may affect data quality and sampling [28]. Most studies sampled women, parents, students, and healthcare workers, groups central to vaccine decision-making.

Twelve studies used the Contingent Valuation Method (CVM), while three used Discrete Choice Experiments (DCE) (Table 1). CVM remains the preferred method in LMICs due to simplicity, but DCE allows for preference quantification and trade-offs, as supported by Tanaka et al. (2021) in Japan [30]. Study quality, based on the Newcastle-Ottawa Scale, ranged from satisfactory to very good (Table 2), indicating acceptable methodological rigor.

4.2 Willingness to Pay in LMICs

The review found consistently low absolute WTP values in LMICs, ranging from USD 1.43 to 82.50 per dose, and WTP often covered less than half of the actual market price (Table 3). For instance, in Nigeria [18], WTP was often below USD 10, covering only 6.7 % to 16.3 % of market price, and as little as 0.05 % of GDP per capita. In Vietnam, WTP was relatively higher—up to 85.3 % of market price and 3.37 % of GDP per capita indicating stronger latent demand and vaccine awareness [16].

Campos et al. (2020) reported similar affordability constraints across Latin America, where despite high perceived value, low-income groups are constrained by out-of-pocket payment systems [32]. Yet, most LMIC participants expressed positive WTP intention, suggesting a financial barrier rather than a behavioral one.

4.3 Willingness to Pay in HICs

In contrast, participants in HICs expressed WTP amounts ranging from USD 65.45 to 262.28, and in some cases (e.g., Thailand, China), WTP exceeded 100 % of the market price. This is supported by evidence from Zhou (2024), who found that the income elasticity of demand for high-value health interventions like HPV vaccines is lower in

high-income settings, meaning that higher-income individuals are more willing to pay extra for perceived quality and protection.

Additionally, studies in HICs frequently used discrete choice experiments (DCEs) to quantify vaccine attribute preferences, such as efficacy, duration of protection, or country of origin (e.g., imported vs. local vaccines). Findings resonate with Tanaka et al. (2021), who showed that 9-valent vaccines are preferred in affluent populations due to broader coverage, despite higher cost.

4.4 Determinants of WTP Across Settings

Across both settings, consistent determinants of higher WTP included higher income, tertiary education, HPV knowledge, and urban residence [22]. Mothers and younger adults were more likely to pay, consistent with findings in Malaysia and Korea [28]. In LMICs, affordability perception, marital status, and parenthood were especially influential, indicating economic prioritization within households [19]. These results align with behavioral frameworks such as the Health Belief Model (HBM) and the Theory of Planned Behavior (TPB). In particular, *perceived susceptibility*, *perceived severity*, and *perceived behavioral control* (i.e., financial ability) were salient across WTP studies [30].

4.5 Comparison of WTP between LMICs and HICs

When considering WTP as a percentage of GDP per capita, LMICs again face a relatively higher economic burden. In Nigeria, for example, the WTP for HPV vaccines represented as little as 0.05 % of GDP per capita, whereas in Vietnam it reached up to 3.37 %. Meanwhile, in HICs, although the absolute WTP was higher, it accounted for only 1.4 % to 10.09 % of GDP per capita, suggesting that HPV vaccination is generally more affordable in wealthier nations.

The type of vaccine also reflects these economic disparities. LMICs most frequently offered and studied the bivalent vaccine, which is less expensive and more widely available through Gavi and government-subsidized programs. HICs, on the other hand, had broader access to quadrivalent and 9-valent vaccines, which offer extended protection and were preferred by more informed and economically empowered populations, despite their higher cost.

Furthermore, the determinants of WTP showed both commonalities and contrasts between LMICs and HICs. In both settings, higher income, greater education, and better knowledge of HPV were consistently associated with greater willingness to pay. However, in LMICs, marital status, parenthood, and affordability perceptions played a more dominant role, reflecting financial constraints and traditional decision-making dynamics. In HICs, vaccine valency, perceived efficacy, and brand preference were more prominent, suggesting a shift toward value-based decision-making over cost alone.

The findings also reveal that urban residents, mothers, and younger individuals were more likely to pay for HPV vaccination in both settings, but these patterns were more pronounced in HICs where access, awareness, and vaccine choices were more diverse.

Importantly, several studies from HICs reported a willingness to pay for premium options (such as imported 9-valent vaccines), indicating demand elasticity based on perceived quality and protection level, something less observable in LMICs due to limited affordability and choice.

These differences underscore the urgent need for context-specific strategies. In LMICs, where WTP remains far below market price, fully subsidized vaccines, Gavi support, and integration into national immunization programs are critical. Education campaigns must also target underserved groups with tailored messages to improve awareness and demand. In contrast, HICs may benefit from tiered pricing, co-payment schemes, and insurance coverage that match high willingness with sustainable financing models, while expanding equitable access across income groups

5 Conclusion

This review highlights substantial disparities in willingness to pay (WTP) for HPV vaccines between LMICs and HICs. While HICs show higher absolute WTP and affordability, individuals in LMICs face greater relative financial burdens. Income, education, and HPV awareness are consistent determinants of WTP across contexts. To improve HPV vaccine uptake, especially in LMICs, tailored strategies such as subsidies, public funding, and targeted health education are urgently needed.

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