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Diagnostic accuracy of urine-based HPV DNA testing for cervical cancer screening: A systematic literature review

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Abstract

Background: Cervical cancer remains a major global health challenge, particularly in low- and middle-income countries where screening uptake is limited. Clinician-collected cervical HPV testing is the current reference standard, yet conventional sampling procedures are often invasive, uncomfortable, and stigmatized, reducing acceptability among under-screened women. Urine-based HPV DNA testing has therefore emerged as a promising non-invasive alternative.

Purpose: To critically synthesize and appraise existing evidence on the diagnostic accuracy of urine-based HPV DNA testing—specifically its sensitivity, specificity, and concordance—as well as the methodological factors influencing these metrics, in comparison with clinician-collected cervical HPV DNA samples for cervical cancer screening.

Method: This systematic review, conducted in accordance with PRISMA 2020 guidelines, synthesized evidence from PubMed, Scopus, and ScienceDirect published between 2016 and 2026. Thirty eligible studies were included from 455 identified records, all evaluating the diagnostic accuracy of urine-based HPV DNA testing compared with clinician-collected cervical samples.

Results: Findings revealed moderate-to-high concordance, with sensitivity ranging from 44% to over 95% and consistently high specificity. Superior diagnostic performance was observed in studies employing first-void urine collection and validated PCR-based assays, while methodological heterogeneity in collection procedures, preservation methods, and assay platforms remained evident.

Conclusion: Urine-based HPV DNA testing offers a feasible, non-invasive approach to expand cervical cancer screening, particularly for under-screened populations. However, methodological standardization and large-scale validation are essential before adoption as a primary screening strategy.

Keywords: Cervical Cancer, Diagnostic Accuracy, HPV DNA Testing, Urine-Based Screening.

INTRODUCTION

Cervical cancer remains one of the leading causes of cancer-related morbidity and mortality among women worldwide, particularly in low- and middle-income countries, despite being largely preventable through HPV vaccination and early screening strategies (Aimagambetova et al., 2024; El-Zein et al., 2025). Persistent infection with high-risk Human

Papillomavirus (hrHPV) is recognized as the primary etiological factor for cervical carcinogenesis, and HPV DNA testing has demonstrated higher sensitivity than cytology for detecting high-grade cervical precancerous lesions and early cervical cancer (Aimagambetova et al., 2024; Van Keer et al., 2025; Tranberg et al., 2025). Although clinician-collected

cervical HPV testing is currently considered the reference standard for molecular cervical cancer screening, conventional cervical sampling procedures remain associated with multiple barriers, including invasiveness, embarrassment, discomfort, cultural stigma, limited healthcare access, and low screening participation among under-screened women (Aimagambetova et al., 2024; El-Zein et al., 2025; Shin et al., 2019).

To overcome these barriers, self-sampling approaches have increasingly been introduced as alternative screening strategies capable of improving accessibility, convenience, and participation in cervical cancer prevention programs (Davies et al., 2024; Aimagambetova et al., 2024; Bose et al., 2026). Among available self-sampling methods, urine-based HPV DNA testing has emerged as a particularly promising non-invasive approach because urine collection is simple, painless, culturally acceptable, and feasible for home-based screening (Tranberg et al., 2025; van den Borst et al., 2025; Bose et al., 2026). Recent advances in first-void urine collection devices, DNA stabilization media, urine concentration techniques, and highly sensitive molecular HPV assays such as Cobas 4800/6800, Abbott RealTime HPV, GeneXpert, and BD Onclarity have substantially improved the analytical performance of urine-based HPV detection (Van Keer et al., 2025; Davies et al., 2024; Manjeshwar et al., 2026; Nilyanimit et al., 2024).

Several recent studies have demonstrated moderate-to-high concordance, sensitivity, and specificity between urine-based HPV testing and clinician-collected cervical samples, particularly when first-void urine and validated molecular assays are used; however, other studies continue to report lower sensitivity and inconsistent agreement (Van Keer et al., 2025; Tranberg et al., 2025; Latsuzbaia et al., 2024; Shih et al., 2023; Neita et al., 2026). Current evidence regarding urine-based HPV DNA testing remains heterogeneous due to substantial variations in urine collection protocols, urine sample types, preservation methods, HPV genotyping assays, reference standards, and reported diagnostic outcomes, resulting in ongoing uncertainty regarding its clinical applicability as a primary cervical cancer screening (Aimagambetova et al., 2024; Téblick et al.,

2021; Sharipova et al., 2024; Mizuno et al., 2025). Therefore, this systematic literature review aims to critically synthesize and evaluate current evidence regarding the diagnostic accuracy of urine-based HPV DNA testing, particularly its sensitivity, specificity, concordance, and methodological determinants compared with clinician-collected cervical HPV DNA samples for cervical cancer screening. A comprehensive and evidence-based evaluation of urine-based HPV DNA testing is urgently needed to support the development of effective non-invasive cervical cancer screening strategies, strengthen molecular screening implementation, and improve screening coverage among underserved populations and low-resource healthcare settings (El-Zein et al., 2025; Bose et al., 2026; Intan et al., 2025).

RESEARCH METHOD

This study was conducted as a systematic literature review to evaluate the diagnostic accuracy of Human Papillomavirus (HPV) DNA testing using urine samples for cervical cancer screening. The review was developed following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines for diagnostic accuracy studies to ensure methodological rigor, transparency, and reproducibility. The primary objective was to compare the diagnostic performance of urine-based HPV DNA testing with clinician-collected cervical HPV DNA samples. The main diagnostic outcomes analyzed included sensitivity, specificity, and concordance or kappa agreement between both sampling methods.

A comprehensive literature search was performed using PubMed, Scopus, and ScienceDirect databases to identify relevant studies published between January 2016 and December 2026. The search strategy combined Medical Subject Headings (MeSH) terms and free-text keywords using Boolean operators. The primary search string consisted of ("urine" OR "urinary") AND ("HPV DNA" OR "HPV test") AND ("accuracy" OR "sensitivity" OR "specificity" OR "concordance").

Additional eligible studies were identified through manual screening of the reference lists of included articles. Only articles published in English were included in this review. Eligibility criteria were

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determined using the Population, Index Test, Comparator, and Outcome (PICO) framework. Studies were included if they involved women eligible for cervical cancer screening, evaluated HPV DNA testing using urine samples, compared urine-based results with clinician-collected cervical HPV DNA samples, and reported diagnostic accuracy outcomes such as sensitivity, specificity, concordance, or kappa agreement values. Original diagnostic accuracy studies were considered eligible regardless of urine sample type, including first-void, random, or midstream urine samples. Review articles, editorials, conference abstracts, case reports, animal studies, and studies lacking sufficient diagnostic accuracy data were excluded.

The study selection process consisted of identification, screening, eligibility assessment, and final inclusion stages. Duplicate records retrieved from multiple databases were removed before title and abstract screening. Potentially relevant studies subsequently underwent full-text assessment according to predefined inclusion and exclusion

criteria. Any disagreements during the selection process were resolved through discussion among reviewers to minimize selection bias. The overall selection process was documented using a PRISMA flow diagram.

Data extraction was conducted systematically using a standardized extraction form. Extracted information included author names, publication year, country of study, study design, participant characteristics, sample size, urine sample type, HPV detection assay, comparator methods, and diagnostic accuracy outcomes. Due to methodological heterogeneity among studies, particularly regarding urine collection techniques, HPV assays, and outcome reporting, findings were synthesized narratively rather than quantitatively.

This study analyzed previously published literature and did not involve direct interaction with human participants or identifiable patient data. Therefore, ethical approval and informed consent were not required.

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RESEARCH RESULTS

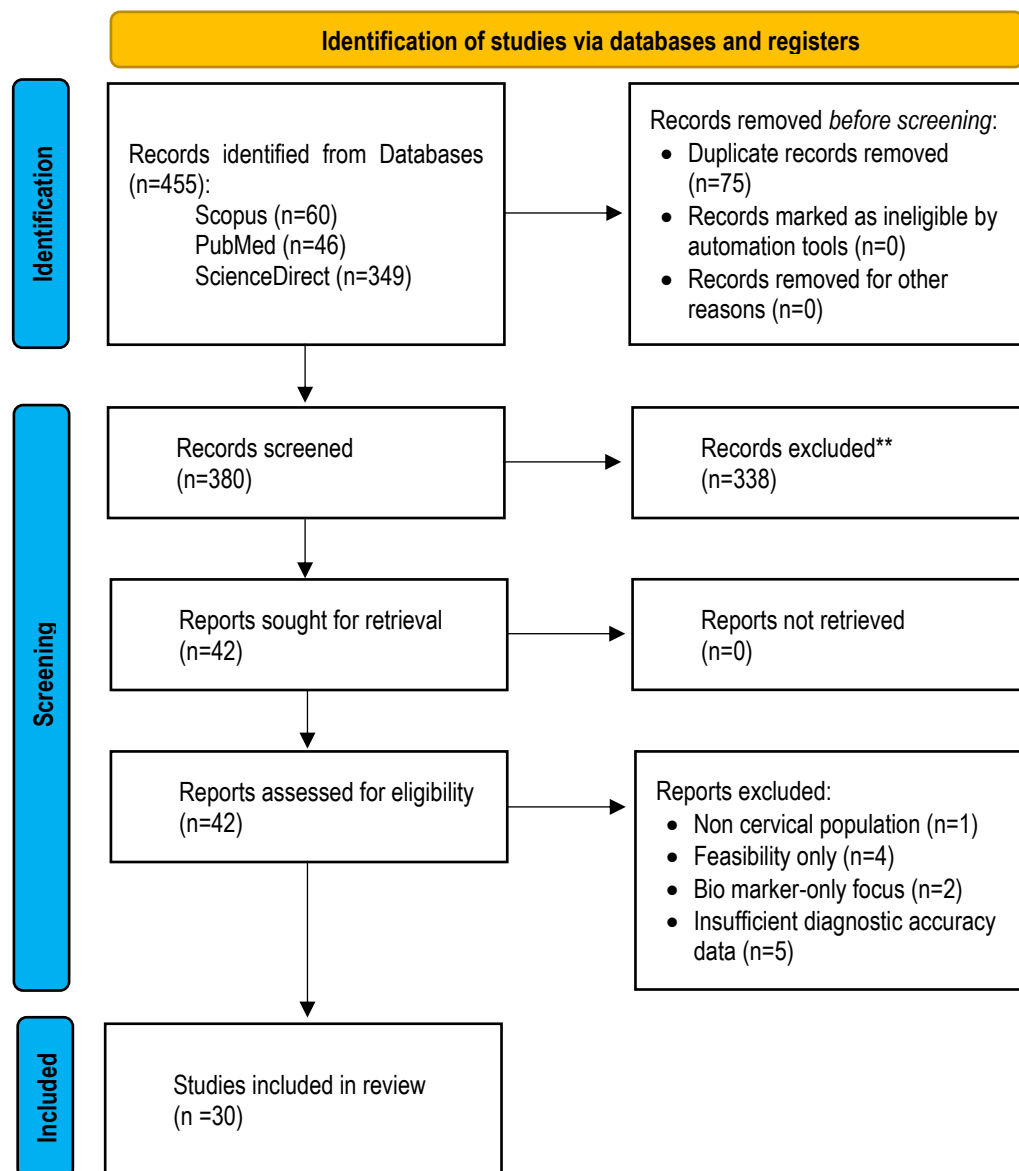


Figure 1. PRISMA 2020 flow diagram

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The literature search identified 455 records from PubMed, Scopus, and ScienceDirect. After removing 75 duplicate articles, 380 studies underwent title and abstract screening. A total of 338 articles were excluded because they were unrelated to urine-based HPV DNA testing, did not report diagnostic accuracy outcomes, or lacked comparison with clinician-collected cervical samples. Subsequently, 42 full-text articles were assessed for eligibility, and 12 studies were excluded due to insufficient diagnostic accuracy data, non-cervical populations, or focus on feasibility and acceptability outcomes only. Finally, 30 studies met all inclusion criteria and were included in the final narrative synthesis. The study selection process is presented in the PRISMA 2020 flow diagram.

The included studies were published between 2016 and 2026 and originated from multiple geographical regions, including Europe, Asia, Africa, North America, and South America. Most studies employed diagnostic accuracy, comparative, cross-sectional, or prospective study designs. Sample sizes ranged from 40 to more than 2,500 participants. Most studies evaluated first-void urine as the index sample and compared it with clinician-collected cervical HPV DNA samples as the reference standard. Frequently used HPV assays included Cobas 4800/6800, Abbott RealTime HPV, GeneXpert HPV, BD Onclarity, and Allplex HPV assays (Van Keer et al., 2025; Tranberg et al., 2025; Nilyanimit et al., 2024).

Overall, urine-based HPV DNA testing demonstrated moderate-to-high diagnostic agreement with clinician-collected cervical HPV DNA samples. Sensitivity values ranged from approximately 44% to over 95%, whereas specificity values were generally high and frequently exceeded 90%. Studies using standardized first-void urine collection and clinically validated PCR-based assays consistently reported higher concordance and diagnostic performance than studies using random

urine or non-standardized protocols (Van Keer et al., 2025; Davies et al., 2024; Latsuzbaia et al., 2024).

Several studies demonstrated diagnostic performance approaching equivalence with clinician-collected cervical samples for detecting high-risk HPV infection and CIN2+/CIN3+ lesions (Tranberg et al., 2025; van den Borst et al., 2025; Intan et al., 2025). In contrast, lower sensitivity and weaker agreement were observed in studies using random urine collection or heterogeneous laboratory workflows. (Shih et al., 2023; Mizuno et al., 2025)

A consistent finding across studies was the superior performance of first-void urine compared with random or midstream urine specimens. First-void urine collection devices combined with DNA preservation technologies improved HPV DNA stability and analytical sensitivity (Davies et al., 2024; Manjeshwar et al., 2026). Similarly, studies using clinically validated PCR-based assays such as Cobas 4800/6800, Abbott RealTime HPV, and GeneXpert generally reported higher concordance and sensitivity than studies using non-standardized assays (Van Keer et al., 2025; Kaoma et al., 2023; Andrijono et al., 2023).

Overall, the synthesized evidence indicates that urine-based HPV DNA testing represents a promising non-invasive approach for cervical cancer screening, particularly when first-void urine collection and validated molecular assays are applied. However, substantial heterogeneity in urine collection protocols, sample preservation methods, and assay platforms remains an important limitation affecting the consistency of diagnostic performance across studies. These findings suggest that further methodological standardization and large-scale validation studies are required before widespread implementation of urine-based HPV DNA testing as a primary cervical cancer screening strategy.

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Table 1. Diagnostic accuracy characteristics of urine-based HPV DNA testing for cervical cancer screening (2016–2026).

Authors, (Year), Country	Study Design	Sample (N)/ Age (Years)	Intervention Description	HPV Genotyping/ Assay Used	Reference Standard	Concordance /Agreement	Sensitivity	Specificity	Conclusion
Van Keer et al. (2025), Belgium	Diagnostic accuracy study	n=499, Adult women	First-void urine vs clinician-collected cervical sample	Cobas 4800 and Cobas 6800 HPV systems	Histology/CIN2+ and cervical sample	$\kappa = 0.68\text{--}0.87$	Sensitivity ratio 0.98 (Cobas 4800); 0.96 (Cobas 6800)	Specificity ratio 1.00–1.01	First-void urine demonstrated clinical accuracy equivalent to cervical samples when standardized protocols were used.
Tranberg et al. (2025), Denmark	Diagnostic accuracy study	n=325, 23–64	First-void urine vs cervical sample	Allplex HR HPV assay	Histology CIN2+/CIN3 +	$\kappa = 0.44\text{--}0.88$	CIN2+ ratio 0.97; CIN3+ ratio 0.95	Specificity ratio 0.67	First-void urine showed similar sensitivity to cervical samples, although specificity was lower.
Van den Borst et al. (2025), Belgium	Multicenter validation study	n=494, Adult women	First-void urine self-sample vs clinician-collected cervical sample	EUROArray HPV test	Clinician-collected cervical sample and CIN2+	Moderate to excellent agreement	Relative sensitivity 0.96	Relative specificity 0.94	First-void urine showed clinical accuracy comparable to clinician-collected samples.
Young et al. (2025), United States	Cross-sectional diagnostic accuracy study	n=188, 30–65	Self-collected first-void urine vs clinician-collected cervical sample	HPV genotyping/clinical HPV assay	CIN2+ and cervical sample	PABAK for HPV16 = 0.95	Comparable for HPV16; sensitivity ratio 1.00	Most specificity ratios anchored at 1.0	Urine HPV testing showed strong agreement with cervical sampling and potential as an alternative for women unable to tolerate clinician collection.

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Authors, (Year), Country	Study Design	Sample (N)/ Age (Years)	Intervention Description	HPV Genotyping/ Assay Used	Reference Standard	Concordance /Agreement	Sensitivity	Specificity	Conclusion
Uyar et al. (2025), Türkiye	Comparative study	n=126, Adult women	Concentrated first-void urine vs cervical smear	RT-PCR	Cervical smear	Fleiss' $\kappa = 0.796$	Detection increased by 17% after concentration	Not fully reported	Concentrated urine improved HPV detection and may support large-scale screening.
Du et al. (2025), China	Comparative performance study	n=1280, Adult women	Self-sampled urine HPV test with DNA purification/concentration vs provider-collected cervical sample	Experimental urine test; Cobas 4800 control	CIN2+/CIN3 + and cervical sample	$\kappa = 0.73$ HPV16; $\kappa = 0.66$ HPV18; $\kappa = 0.53$ pooled HR-HPV	Comparable/non-inferior for CIN2+/CIN3+	Lower than control	Urine testing was non-inferior for detecting high-risk HPV and high-grade cervical lesions.
Intan et al. (2025), Indonesia	Diagnostic study	n=876, Adult women	Urine vs paired cervical swab	hrHPV ReadyMix qPCR Kit; Roche Cobas 6800	Cervical swab	Diagnostic accuracy 98.48%	80.88%	100%	Urine-based qPCR showed strong potential for screening in developing-country settings.
Mizuno et al. (2025), Japan	Comparative study	n=121, Women with abnormal cytology	Spot urine, vaginal self-sample, and clinician-collected cervical sample	BD Onclarity HPV assay	Clinician-collected cervical sample	Cervical–urine concordance 63.9%; $\kappa = 0.34$	46.4% for urine	Not clearly reported	Spot urine showed lower sensitivity than cervical and vaginal samples, indicating need for method optimization.

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Latsuzbaia et al. (2024), Italy/Ireland/Scotland/Belgium	VALHUDES diagnostic validation study	n=490, Women referred to colposcopy	First-void urine and vaginal self-samples vs cervical sample	OncoPredict HPV Quantitative Typing assay	CIN2+ and cervical sample	High agreement	Urine/cervical sensitivity ratio 0.99	Urine/cervical specificity ratio 0.91	After cut-off optimization, urine self-sampling achieved accuracy similar to cervical sampling.
Nilyanimit et al. (2024), Thailand	Prospective comparative study	n=240, 22–70	Concentrated first-stream urine collected with Colli-Pee vs cervical swab	Cobas 4800	Clinician-collected cervical swab	Concordance 96.7%; $\kappa = 0.87$	Not separately reported	Not separately reported	Colli-Pee urine collection produced HPV detection comparable to cervical swabs.
Kaoma et al. (2023), Zambia	Comparative cross-sectional study	n=100, Adult HIV-positive women	First-void urine vs cervical sample	GeneXpert HPV	Cervical sample	Agreement 89.80%; $\kappa = 0.77$	84.8%	92.3%	First-void urine had substantial agreement with cervical samples and high acceptability.
Andrijono et al. (2023), Indonesia	Diagnostic accuracy study	n=876, 20–50	Urine-based HPV DNA test vs cervical swab	CerviScan; Cobas 6800	Cervical swab	$\kappa = 0.662$ vs Cobas; $\kappa = 0.828$ after sequencing	73.1%	97.3%	CerviScan urine testing was reliable for detecting high-risk HPV and expanding screening coverage.
Yang et al. (2023), China	Cross-sectional study	n=250, Clinical patients	Urine vs genital samples	GenoArray assay	Clinician-collected genital sample	Female agreement 77.1%; $\kappa = 0.523$	Reduced sensitivity noted	Not fully reported	Urine reflected HPV infection trends in women but was less reliable in men.

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Purwar et al. (2023), India	Hospital-based cross-sectional study	n=295, 54 lesions analyzed, Adult women	Self-collected first-void urine vs healthcare worker-collected cervical sample	Multiplex real-time PCR and genotyping	Cervical sample and histopathology	Agreement 85.96%; $\kappa = 0.6988$	Not separately reported	Not separately reported	First-void urine showed substantial concordance in women with precancerous and cancerous cervical lesions.
Shih et al. (2023), Taiwan	Comparative diagnostic study	n=167, Adult women	Random urine vs vaginal self-sample and clinician-collected cervical sample	HC II and Cervista	Clinician-collected cervical sample and CIN2+	Moderate/limited agreement	44.44%–49.07%; after cut-off 58.33%–63.89%; CIN2+ ~50%	Not fully reported	Random urine had insufficient sensitivity and should not replace optimized sampling.
Sharipova et al. (2024), Uzbekistan	Cross-sectional study	n=218, ≥ 18	Urine vs cervical sample	PCR with genotyping	Cervical sample	$\kappa = 60.1$	57.7%	98.6%	Urine testing showed high specificity but moderate sensitivity; further optimization is needed.
Davies et al. (2024), United Kingdom	Randomized diagnostic accuracy trial	n=480, 24–70	First-void urine device vs standard pot and cervical sample	Roche Cobas 8800	CIN2+	High comparative performance	90.3% with FVU device; 73.4% standard pot	Not fully reported	First-void collection device substantially improved urine HPV sensitivity for CIN2+.
Yamazaki et al. (2021), Japan	Prospective observational study	n=338, Women with ASC-US	First-void urine vs cervical sample	Cobas 4800	Cervical hrHPV test	Overall concordance 90.8%; $\kappa = 0.765$	Not separately reported	Not separately reported	Urine hrHPV testing could substitute cervical testing in women with ASC-US.

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						HPV16/18 κ = 0.840			
Marcus et al. (2021), United States	Pilot study	n=40, Adult women	Urine HPV testing using NAAT	Xpert HPV on GeneXpert	Cervical genotyping reference	Repeat urine testing κ = 0.89–0.90	64.3%–66.7%	86.7%–100%	Xpert HPV urine testing was reproducible but requires optimization for sensitivity.
Ertik et al. (2021), Germany	Prospective multicenter phase II trial	n=65, 24–76	First-void urine and vaginal self-sampling devices vs clinician sample	Abbott RealTime High Risk HPV Test	CIN2+/CIN3 + histology	κ for Colli-Pee = 0.34	77.6% for Colli-Pee in CIN2+ context	57.1%	Urine self-sampling showed good lesion detection but lower agreement than vaginal devices.
Tranberg et al. (2020), Denmark	Comparative diagnostic study	n=150, 30–59	Home-collected first-void urine vs vaginal self-sample and GP-collected cervical sample	Cobas 4800 and CLART HPV4S	Cervical sample	Cobas κ = 0.66; CLART κ = 0.47	63.9% with Cobas; 51.6% with CLART	96.5% with Cobas; 92.4% with CLART	Cobas outperformed CLART for urinary HPV detection.
Sabeena et al. (2019), India	Cross-sectional study	n=114, Cervical cancer cases	Urine vs cervical sample	PCR HPV DNA	Cervical sample	Agreement 66.7%; κ = 0.35	59.6%	92%	Urine sampling was inexpensive and acceptable but insufficient as a standalone screening tool.

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Marhash et al. (2018), Iraq	Cross-sectional study	n=100 Child-bearing age	First-void urine vs cervical swab	Nested PCR and sequencing	Cervical swab	$\kappa = 0.853$	96.7%	100%	Urine samples showed excellent performance for HPV DNA detection in this clinical population.
Hernandez et al. (2018), Micronesia	Randomized controlled trial	n=217, 21–65	Self-collected urine vs clinician-collected liquid cytology	Roche Linear Array	Cervical sample and cytology	$\kappa = 0.54$ overall; $\kappa = 0.65$ in women >40	51.0% for cervical hrHPV detection	96.2%	Urine was less sensitive but highly specific and may be useful in low-resource settings.
Buchegger et al. (2018), Chile	Cohort/comparative study	n=190, Women referred for gynecological exam	First-stream urine vs cervical sample	PCR reverse blot	Histology CIN2/3	Overall agreement 73.7%; $\kappa = 0.42$	90.2% for CIN2/3	Good but not fully specified	Urine-based sampling demonstrated good clinical performance for CIN2/3 detection.
Hwang et al. (2018), South Korea	Prospective pilot study	n=700, Screening-age women	Urine and vaginal self-sampling	Roche Cobas 4800	Vaginal self-sample and Pap program context	HPV16/18 urine-vaginal agreement 99.1%	Not estimable for CIN2+ due to low lesion count	Not reported	Urine sampling was feasible, but larger studies were needed to assess CIN2+ sensitivity.
Asciutto et al. (2017), Sweden	Comparative study	n=218, 19–71	Urine and vaginal self-sampling vs clinician-taken cervical sample	Cobas 4800	HSIL/AIS histology	Urine sensitivity relative to cervical HPV	76.3% for HSIL/AIS	Not fully reported	Urine detected high-grade lesions but was less sensitive than vaginal and cervical sampling.

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						detection 83.9%			
Combita et al. (2016), Colombia	Comparative study	n=535, 19–25	Optimized first-void urine vs cervical sample	Multiplex genotyping assay/ Luminex	Cervical sample	Substantial concordance for vaccine HPV types	Similar HPV prevalence to cervical samples	Not fully reported	Optimized urine testing was suitable for HPV monitoring and vaccine surveillance.
Khunamornpong et al. (2016), Thailand	Comparative study	n=168, Women in HPV follow-up	Urine vs cervical sample	Cobas 4800; Linear Array in selected cases	Cervical sample and HSIL+ histology	Agreement 86.2%; $\kappa = 0.65$	68.6% for HPV; 80.0% for HSIL+	93.2% for HPV; 78.0% for HSIL+	Urine testing was feasible but required improved sensitivity and standardization.
Neita et al. (2026), Colombia	Cross-sectional study	n=161, 20–65	First-void urine vs cervicovaginal sample	INNO-LiPA HPV Genotyping Extra II	Cervicovaginal sample	$\kappa = 0.39$	61.70%	78.94%	Urine showed limited diagnostic performance, highlighting need for optimization.

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DISCUSSION

The findings of this systematic literature review demonstrate that urine-based HPV DNA testing exhibits moderate-to-high diagnostic performance compared with clinician-collected cervical HPV testing, particularly when first-void urine collection and clinically validated molecular assays are employed. These findings reinforce previous evidence supporting the potential of urine self-sampling as a promising non-invasive strategy for cervical cancer screening (Aimagambetova et al., 2024; Van Keer et al., 2025; Tranberg et al., 2025; van den Borst et al., 2025).

The present findings suggest that urine-based HPV DNA testing may serve as a complementary or alternative screening approach to improve participation in cervical cancer screening programs, particularly among under-screened women who experience barriers to clinician-collected cervical sampling due to procedural invasiveness, discomfort, cultural stigma, or limited access to healthcare services (Bose et al., 2026; Young et al., 2025; Hernandez et al., 2018). One of the most consistent findings identified in this review was the superior diagnostic performance of first-void urine compared with random or midstream urine specimens. This superiority is likely attributable to the higher concentration of exfoliated cervicovaginal cells, cell-free HPV DNA, and viral particles accumulated in the initial urine stream, thereby increasing the probability of molecular HPV detection compared with non-standardized urine collection methods (Davies et al., 2024; Nilyanimit et al., 2024; Uyar et al., 2025; Combata et al., 2016). This review also demonstrated that clinically validated PCR-based assays, including Cobas 4800/6800, Abbott RealTime HPV, GeneXpert HPV, BD Onclarity, and Allplex HPV assays, consistently produced higher concordance and sensitivity compared with non-standardized assays. These findings indicate that molecular assay validation and laboratory workflow standardization are critical determinants of the clinical reliability of urine-based HPV testing (Van Keer et al., 2025; Tranberg et al., 2025; Kaoma et al., 2023; Andrijono et al., 2023; Tranberg et al., 2020).

Although several studies reported diagnostic performance approaching equivalence with clinician-collected cervical samples, other studies still demonstrated lower sensitivity and weaker

concordance, particularly those using random urine collection, non-standardized preservation protocols, or assays with limited clinical validation. These findings suggest that variability in diagnostic performance is more likely attributable to methodological heterogeneity rather than intrinsic biological limitations of urine as a diagnostic specimen (Shih et al., 2023; Neita et al., 2026; Mizuno et al., 2025).

The findings of this review have important translational implications because urine-based HPV DNA testing may support the transition toward more accessible, patient-centered, and scalable molecular cervical cancer screening strategies, particularly in low- and middle-income countries where screening coverage and healthcare infrastructure remain limited (El-Zein et al., 2025; Intan et al., 2025; Kaoma et al., 2023). Furthermore, urine self-sampling approaches may contribute to the World Health Organization (WHO) target of achieving 70% cervical cancer screening coverage as part of the global cervical cancer elimination strategy.

Compared with previous reviews that primarily focused on the feasibility or acceptability of self-sampling, this systematic literature review provides a more updated and methodologically focused synthesis regarding the relationship between urine collection methodology, assay standardization, and diagnostic accuracy. Consequently, this review expands current understanding of the methodological factors that determine the clinical performance of urine-based HPV DNA testing (Aimagambetova et al., 2024; Van Keer et al., 2025; Tranberg et al., 2025).

Based on the findings of this review, future research should prioritize the harmonization of urine collection protocols, standardization of DNA preservation systems, multicenter validation of clinically validated HPV assays, and prospective large-scale implementation studies to determine the effectiveness of urine HPV testing within real-world cervical cancer screening programs. In addition, economic evaluation studies and implementation research are needed to assess the cost-effectiveness and feasibility of integrating urine self-sampling into WHO-based cervical cancer elimination programs.

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Although this systematic literature review remains influenced by methodological heterogeneity across studies, particularly regarding variations in urine collection protocols, preservation methods, and molecular assay platforms, the review nevertheless possesses important strengths. These include the inclusion of up-to-date evidence from multiple countries, the evaluation of various clinically validated molecular platforms, and the comprehensive assessment of different urine self-sampling approaches, thereby providing a broad overview of the current diagnostic landscape of urine-based HPV DNA testing for cervical cancer screening.

CONCLUSION

Conclusions are briefly explained and cover the aspects studied, make suggestions if any. This systematic literature review demonstrates that urine-based HPV DNA testing is a promising non-invasive approach for cervical cancer screening, particularly when first-void urine collection and clinically validated PCR-based assays are utilized. The synthesized evidence showed moderate-to-high concordance, sensitivity, and specificity compared with clinician-collected cervical HPV testing, although substantial methodological heterogeneity related to urine collection procedures, preservation systems, and assay platforms remains evident across studies. These findings suggest that urine-based HPV testing has significant potential to improve screening accessibility and participation, especially among under-screened populations and in low-resource settings. However, further methodological standardization, multicenter validation, and large-scale implementation studies are still required before widespread adoption as a primary cervical cancer screening strategy.

REFERENCES

- Aimagambetova, G., Atageldiyeva, K., Marat, A., Suleimenova, A., Issa, T., Raman, S., Huang, T., Ashimkhanova, A., Aron, S., Dongo, A., Iztleuov, Y., Shamkeeva, S., & Azizan, A. (2024). Comparison of diagnostic accuracy and acceptability of self-sampling devices for human Papillomavirus detection: A systematic review. *Preventive Medicine Reports*, 38, 102590. <https://doi.org/https://doi.org/10.1016/j.pmedr.2024.102590>
- Andrijono, A., Wulandari, D., Widyahening, I. S., Mahardhika, D., Nurainy, N., Sari, R. M., Soetomo, I., & Utama, R. (2023). Diagnostic performance of urine-based HPV-DNA test (CerviScan, Bio Farma) as Cervical Cancer screening tool in adult women. *Indonesian Journal of Obstetrics and Gynecology*, 161-165. <https://doi.org/10.32771/inajog.v11i3.1968>
- Asciutto, K. C., Henningsson, A. J., Borgfeldt, H., Darlin, L., & Borgfeldt, C. (2017). Vaginal and urine self-sampling compared to cervical sampling for HPV-testing with the cobas 4800 HPV test. *Anticancer Research*, 37(8), 4183–4187. <https://doi.org/10.21873/anticancer.11807>
- Bose, S., Mandal, R., Sengupta, S., Dutta, S., Abraham, P., Muwonge, R., Lucas, E., Panda, C. K., Palaniraja, S., Rol, M., Chakrabarti, J., & Basu, P. (2026). Comparative efficacy, feasibility and acceptability of HPV DNA testing on first-void urine versus self-collected vaginal samples: a real-world study in a resource-limited setting. *BMJ Global Health*, 11(1). <https://doi.org/10.1136/bmjgh-2025-021707>
- Buchegger, K., Viscarra, T., Andana, A., Ili, C., López, J., Zanella, L., Carmona-López, M. I., Fernández, J. J., Espinel, I. C., Sánchez, R., Roa, J. C., & Brebi, P. (2018). Detection and genotyping of human papillomavirus virus (HPV): a comparative analysis of clinical performance in cervical and urine samples in Chilean women. *International Journal of Clinical and Experimental Pathology*, 11(11), 5413–5421.
- Combata, A. L., Gheit, T., Gonzalez, P., Puerto, D., Murillo, R. H., Montoya, L., Vorsters, A., Van Keer, S., Van Dammea, P., Tommasino, M., Hernandez-Suarez, G., Sanchez, L., Herrero, R., & Wiesner, C. (2016). Comparison between Urine and Cervical Samples for HPV DNA detection and typing in young women in Colombia. *Cancer*
- Aimagambetova, G., Atageldiyeva, K., Marat, A., Suleimenova, A., Issa, T., Raman, S., Huang, T., Ashimkhanova, A., Aron, S., Dongo, A., Iztleuov, Y., Shamkeeva, S., & Azizan, A. (2024). Comparison of diagnostic accuracy and acceptability of self-sampling devices for human Papillomavirus detection: A systematic review.

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- Prevention Research*, 9(9), 766–771. <https://doi.org/10.1158/1940-6207.CAPR-16-0038>
- Davies, J. C., Sargent, A., Pinggera, E., Carter, S., Gilham, C., Sasieni, P., & Crosbie, E. J. (2024). Urine high-risk human papillomavirus testing as an alternative to routine cervical screening: A comparative diagnostic accuracy study of two urine collection devices using a randomised study design trial. *BJOG: An International Journal of Obstetrics and Gynaecology*, 131(11), 1456–1464. <https://doi.org/10.1111/1471-0528.17831>
- Du, H., Dai, W., Wu, D., Liu, Y., Xiao, A., Hou, J., Huang, B., Zhang, W., Bao, J., Huang, Q., Geng, L., Yang, Q., Li, C., & Wu, R. (2025). Expanding access to cervical cancer screening: The performance of self-sampled urine HPV testing. *International Journal of Infectious Diseases*, 161, 108175. <https://doi.org/https://doi.org/10.1016/j.ijid.2025.108175>
- El-Zein, M., Kassam, P., Alhamlan, F., Zafar, N., Abdelmoula, B., Fadhil, I., Nedjai, B., Selmouni, F., & Basu, P. (2026). Toward cervical cancer prevention and elimination in the Eastern Mediterranean Region: Current landscape and opportunities for evidence-based action. *Preventive Medicine*, 208, 108549. <https://doi.org/10.1016/j.ypmed.2026.108549>
- Ertik, F. C., Kampers, J., Hülse, F., Stolte, C., Böhmer, G., Hillemanns, P., & Jentschke, M. (2021). Cocoss-trial: concurrent comparison of self-sampling devices for HPV-detection. *International Journal of Environmental Research and Public Health*, 18(19), 10388. <https://doi.org/10.3390/ijerph181910388>
- Hernandez, B. Y., Tareg, A. C., Reichhardt, M., Agapito, A., Zhu, X., Sy, A., Yuji, A., Killeen, J., Chan, O., & Buenconsejo-Lum, L. E. (2018). Randomized controlled trial evaluating the utility of urine HPV DNA for cervical cancer screening in a Pacific Island population. *Journal of Global Health Reports*, 2.
- Hwang, S. H., Shin, H. Y., Lee, D. O., Sung, N. Y., Lee, B., Lee, D. H., & Jun, J. K. (2018). A prospective pilot evaluation of vaginal and urine self-sampling for the Roche cobas 4800 HPV test for cervical cancer screening. *Scientific reports*, 8(1), 9015. <https://doi.org/10.1038/s41598-018-27390-5>
- Intan, N. S., Utama, R., Wulandari, D., Wisdharilla, R., Khanza, S. M., Ramadhan, M. R., Widyahening, I. S., Nurainy, N., Sari, R. M., & Andrijono. (2025). Urinary detection of high-risk HPV DNA to enhance cervical cancer screening in developing countries. *Microbiology Spectrum*, 13(9). <https://doi.org/10.1128/spectrum.01938-24>
- Kaoma, M., Olayemi, O., Mwaba, M. H., & Sikwewa, K. (2023). Utilizing first void urine for high-risk HPV testing for cervical cancer screening in HIV-positive women in Katete, Zambia. *BMC Women's Health*, 23(1), 62. <https://doi.org/10.1186/s12905-023-02212-7>
- Khunamornpong, S., Settakorn, J., Sukpan, K., Lekawanvijit, S., Katruang, N., & Siriaunkgul, S. (2016). Comparison of human papillomavirus detection in urine and cervical samples using high-risk HPV DNA testing in northern Thailand. *Obstetrics and Gynecology International*, 2016(1), 6801491. <https://doi.org/10.1155/2016/6801491>
- Latsuzbaia, A., Martinelli, M., Giubbi, C., Cuschieri, K., Elasifer, H., Iacobone, A. D., Bottari, F., Piana, A. F., Pietri, R., Tisi, G., Odicino, F., Cocuzza, C. E., & Arbyn, M. (2024). Clinical accuracy of OncoPredict HPV Quantitative Typing (QT) assay on self-samples. *Journal of Clinical Virology*, 175, 105737. <https://doi.org/https://doi.org/10.1016/j.jcv.2024.105737>
- Manjeshwar, S., Kojima, N., Tsang, E., Pereira, D., Silva, E., Duong, H., Chao, F., Marshak, D. R., Chiu, R. Y. T., & Klausner, J. D. (2026). Performance of a novel, urine-based test for the detection of cervical human papillomavirus infection. *Journal of Clinical Microbiology*, 64(2), e0131825. <https://doi.org/10.1128/jcm.01318-25>

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- Marcus, J. Z., Abedin, Y., Pierz, A. J., Taveras, Y., Sollecito, C. C., Parmar, H., Burk, R. D., & Castle, P. E. (2021). A Pilot Study of Human Papillomavirus Detection in Urine Using a Novel Nucleic Acid Amplification Test. *Journal of Applied Laboratory Medicine*, 6(2), 474–479. <https://doi.org/10.1093/jalm/jfaa238>
- Marhash, A. D., Al-Mayah, Q. S., & Al-Kazaaly, E. A. A. (2018). Detection and phylogenetic analysis of human papilloma virus in urine from a sample of Iraqi women with vaginal discharge. *Journal of Pure and Applied Microbiology*, 12(4), 2183–2192. <https://doi.org/10.22207/JPAM.12.4.57>
- Mizuno, M., Kamio, M., Sakihama, M., Yanazume, S., Togami, S., Kakizoe, T., & Kobayashi, H. (2025). The Utility of an Human Papillomavirus Genotype Assay for Cancer Screening in Self-Collected Urine and Vaginal Samples from Japanese Women. *Gynecologic and Obstetric Investigation*, 90(2), 143–152. <https://doi.org/10.1159/000541641>
- Neita, L. H. S., Mahecha, E. G., Valero, M. G. H., Suárez, J. M., Rojas, J. P. C., Villalba, G. E. C., & López, L. X. R. (2026). HPV detection in first void urine and cervicovaginal samples: comparative study and analysis of associated factors in women from Tunja, Colombia. *Preventive Medicine Reports*, 62, 103393. <https://doi.org/https://doi.org/10.1016/j.pmedr.2026.103393>
- Nilyanimit, P., Chaithongwongwatthana, S., Oranratanaphan, S., Poudyal, N., Excler, J.-L., Lynch, J., Vongpunsawad, S., & Poovorawan, Y. (2024). Comparable detection of HPV using real-time PCR in paired cervical samples and concentrated first-stream urine collected with Colli-Pee device. *Diagnostic Microbiology and Infectious Disease*, 108(3), 116160. <https://doi.org/https://doi.org/10.1016/j.diagmicrobio.2023.116160>
- Purwar, S., Gupta, S., John, J. H., Gupta, P., & Halder, A. (2023). Study to Determine Concordance between High-Risk Human Papilloma Virus DNA Detection in Self Collected First Voided Urine Samples and Health-Care Worker Collected Cervical Samples in a Subset of Women with Proven Histopathological Precancerous and Cancer. *Journal of Mid-Life Health*, 14(1), 8–14. https://doi.org/10.4103/jmh.jmh_251_22
- Sabeena, S., Kuriakose, S., Binesh, D., Abdulmajeed, J., Dsouza, G., Ramachandran, A., Vijaykumar, B., Aswathyraj, S., Devadiga, S., Ravishankar, N., & Arunkumar, G. (2019). The Utility of Urine-Based Sampling for Cervical Cancer Screening in Low-Resource Settings. *Asian Pacific Journal of Cancer Prevention : APJCP*, 20(8), 2409–2413. <https://doi.org/10.31557/APJCP.2019.20.8.2409>
- Sharipova, I. P., Mirzaev, U. K., Kasimova, R. I., Yoshinaga, Y., Shrapov, S. M., Suyarkulova, D. T., & Musabaev, E. I. (2024). Optimizing Human Papillomavirus (HPV) Screening: Urine Sample Analysis and Associated Factors in Uzbekistan. *Cureus*, 16(9), e69816. <https://doi.org/10.7759/cureus.69816>
- Shih, Y.-H., Sun, L., Hsu, S.-T., Chen, M.-J., & Lu, C.-H. (2023). Can HPV Test on Random Urine Replace Self-HPV Test on Vaginal Self-Samples or Clinician-Collected Cervical Samples? *International Journal of Women's Health*, 15, 1421–1429. <https://doi.org/10.2147/IJWH.S416520>
- Shin, H. Y., Lee, B., Hwang, S. H., Lee, D. O., Sung, N. Y., Park, J. Y., & Jun, J. K. (2019). Evaluation of satisfaction with three different cervical cancer screening modalities: clinician-collected Pap test vs. HPV test by self-sampling vs. HPV test by urine sampling. *Journal of Gynecologic Oncology*, 30(5), e76. <https://doi.org/10.3802/jgo.2019.30.e76>
- Téblick, L., Van Keer, S., De Smet, A., Van Damme, P., Laeremans, M., Rios Cortes, A., Beyers, K., Vankerckhoven, V., Matheeußen, V., Mandersloot, R., Floore, A., Meijer, C. J. L. M., Steenbergen, R. D. M., & Vorsters, A. (2021). Impact of Collection Volume and DNA Extraction

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- Method on the Detection of Biomarkers and HPV DNA in First-Void Urine. *Molecules* (Basel, Switzerland), 26(7).
<https://doi.org/10.3390/molecules26071989>
- Tranberg, M., Jensen, J. S., Bech, B. H., & Andersen, B. (2020). Urine collection in cervical cancer screening – analytical comparison of two HPV DNA assays. *BMC Infectious Diseases*, 20(1).
<https://doi.org/10.1186/s12879-020-05663-7>
- Tranberg, M., Van Keer, S., Jensen, J. S., Nørgaard, P., Gustafson, L. W., Hammer, A., Bor, P., Binderup, K. O., Blach, C., & Vorsters, A. (2025). High-risk human papillomavirus testing in first-void urine as a novel and non-invasive cervical cancer screening modality—a Danish diagnostic test accuracy study. *BMC Medicine*, 23(1).
<https://doi.org/10.1186/s12916-025-04149-0>
- Uyar, N. Y., Bodur, H., Erdem, M. O., Altinisik, I. A. K., Aksoy, E., Polat, T., Demir, F., Acar, O., Aksakal, B., Alizade, G., Nadirova, N., Apa, A., Can, O., & Kocagoz, T. (2025). Concentrated urine as an alternative to cervical smear samples enabling easy screening of HPV in large populations. *Journal of Infection and Public Health*, 18(10), 102857.
<https://doi.org/https://doi.org/10.1016/j.jiph.2025.102857>
- van den Borst, E., Vanden Broeck, D., De Sutter, P., Donders, G., Doyen, J., Tjalma, W., Weyers, S., Arbyn, M., Van Keer, S., & Latsuzbaia, A. (2025). EUROArray HPV test accuracy for cervical precancer in self- vs. clinician-collected samples using the VALHUDES protocol. *Gynecologic Oncology*, 202, 14–23.
<https://doi.org/https://doi.org/10.1016/j.ygyno.2025.08.018>
- Van Keer, S., Latsuzbaia, A., Vanden Broeck, D., De Sutter, P., Donders, G., Doyen, J., Tjalma, W. A. A., Weyers, S., Arbyn, M., & Vorsters, A. (2025). Equivalent Clinical Accuracy of Human Papillomavirus DNA Testing Using Cobas 4800 and 6800 Human Papillomavirus Systems in Paired Urine and Cervical Samples. *The Journal of Molecular Diagnostics*, 27(5), 419–429.
<https://doi.org/https://doi.org/10.1016/j.jmoldx.2025.02.004>
- Yamazaki, H., Wada, T., Asano, H., Fujita, H., Okamoto, K., & Watari, H. (2021). Comparison between urine and cervical high-risk hpv tests for japanese women with asc-us. *Diagnostics*, 11(10).
<https://doi.org/10.3390/diagnostics11101895>
- Yang, H., Luo, Z.-Y., Lin, F., Li, L.-J., Lu, M., Xie, L.-X., & Yang, L.-Y. (2023). Comparison of Urine and Genital Samples for Detecting Human Papillomavirus (HPV) in Clinical Patients. *Obstetrics and Gynecology International*, 2023, 7483783. <https://doi.org/10.1155/2023/7483783>
- Young, A. P., O'Dwyer, M. C., Smith, R., Chen, D., Sen, A., Walline, H. M., & Harper, D. M. (2025). A United States study of self-collected urine vs clinician-collected cervical sample for HPV and cervical intraepithelial neoplasia grade two or worse detection: Cross-sectional agreement and diagnostic accuracy study. *Preventive Medicine Reports*, 58, 103222.
<https://doi.org/https://doi.org/10.1016/j.pmedr.2025.103222>

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