

RESEARCH ARTICLE

Editorial Process: Submission:23/12/2025 Acceptance:19/08/2026 Published:21/08/2026

Predictors of Cervical Cancer Screening Uptake Among Women of Reproductive Age in Indonesia: A Nationwide Cross-Sectional Study Based on the 2023 Indonesian Health Survey

Suci Muchtariza^{1*}, Yeffi Masnarivan¹, Radian Ilmaskal²

Abstract

Background: Cervical cancer is a major public health issue in Indonesia due to limited screening reach. Identifying the factors influencing screening uptake is critical for enhancing screening uptake strategies. **Methods:** This cross-sectional study utilised data from the 2023 Indonesian Health Survey (IHS) to explore the predictors of cervical cancer screening uptake among women aged 15–49 years. Bivariate and multivariate logistic regression analyses were performed to assess associations. **Results:** This study included 163,433 women, with only 8.7% (n = 14,184) reporting participation in cervical cancer screening. Age, education, occupation, health insurance ownership, information exposure, and parity were significantly associated with cervical cancer screening. Among these, exposure to cervical cancer information showed the strongest effect, with informed women having more than twice the odds of screening (OR = 2.252, 95% CI: 1.992–2.545). **Conclusions:** Cervical cancer screening uptake is low in Indonesia and is predicted by age, education, health insurance coverage, and exposure to cervical cancer information. Targeted interventions to improve these factors are essential for enhancing screening uptake and reducing the burden of cervical cancer. Future research should explore longitudinal studies to establish causal relationships between the identified factors and cervical cancer screening uptake.

Keywords: Cervical cancer, Screening, Women of reproductive age, Cross-sectional, National survey

Asian Pac J Cancer Prev, 27 (8), 3013–3020

Introduction

Cervical cancer continues to be a predominant cause of oncological mortality and morbidity among women in low- and middle-income countries (LMICs), including Indonesia. Despite its high preventability and treatability, it accounts for over 85% of disease-related fatalities globally [1–3]. To address this disparity, the World Health Organization (WHO) established the “90-70-90” elimination strategy, targeting 70% screening coverage with high-performance testing for women aged 35 again by the age of 45 [4, 5]. Indonesia, as a signatory to this global commitment, formally adopted these targets in its national action plan for cervical cancer elimination 2023–2030, marking a critical policy shift toward accelerated prevention [6]. Despite these national commitments, the burden of cervical cancer in Indonesia remains acute, with cervical cancer being the second leading cause of cancer-related death among women, and approximately 32,469 new diagnoses reported annually by the ministry of health [7]. Although the Indonesian government has implemented a screening uptake program using the visual inspection with acetic acid (VIA) method integrated into

the national health insurance (JKN), national screening coverage has historically been very low, stagnating below 10% over the past decade [8, 9]. Broader national data indicate that screening coverage between 2014 and 2018 reached 7.34%, with a slightly higher rate of 10.3% in Badung District, Bali [10]. A review of Asian screening programmes highlights major gaps in coverage and implementation: an affordable government-led screening program was present in only 8 of 34 provinces, and Indonesia faces combined problems of low awareness and socioeconomic disparities that constrain screening expansion [11]. This persistent low uptake directly contributes to a grim reality where approximately 70% of cancer patients present at an advanced stage, leading to higher mortality rates and placing an enormous economic burden on the social security fund, with costs reaching approximately Rp 3.5 trillion for 2.5 million cases [12].

Despite this significant burden, the effectiveness of interventions is hampered by limited understanding of screening predictors. Research conducted in various low- and middle-income regions has consistently demonstrated that sociodemographic characteristics, including age, educational attainment, and socioeconomic status, along

¹Department of Public Health, Faculty of Public Health, Universitas Andalas, Padang, Indonesia. ²Department of Public Health, Faculty of Health Science and Information Technology, Universitas Alifiah, Padang, Indonesia. *For Correspondence: sucimuchtariza@ph.unand.ac.id

with access to healthcare services and health literacy, are critical factors that influence of cervical cancer screening [13–16]. However, the existing literature on these predictors in Indonesia often suffers from several limitations. Most studies rely on small, localized samples or focus on specific geographical areas [17–20], severely limiting their generalizability and ability to inform national policy. Furthermore, prior national analyses have relied on outdated datasets, such as the 2015 Indonesian Family Life Survey [21], which do not reflect recent shifts in health-seeking behavior or the disruptions to preventative services caused by the COVID-19 pandemic [22]. Failing to capture the dynamic shifts in health behaviors and healthcare access that have occurred in recent years.

To address these critical gaps and provide current, nationally representative insights, this study utilized data from the 2023 Indonesian Health Survey (SKI). The SKI 2023 data offers strategic advantages through its strong national representation and ability to capture the current post-pandemic situation regarding screening participation among women of reproductive age in Indonesia. Specifically, this study aimed to identify the sociodemographic, informational, and health insurance-related predictors of cervical cancer screening uptake. A deep understanding of these contemporary predictors is crucial for informing evidence-based policies and designing precise, targeted intervention strategies essential for accelerating progress towards the WHO's cervical cancer elimination targets in Indonesia.

Materials and Methods

Study Design and Data Sources

A cross-sectional study design was employed to leverage comprehensive and nationally representative data from the 2023 Indonesian Health Survey (IHS). This study was conducted in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines to ensure transparent and comprehensive reporting [23]. The survey data were collected from January to December 2023. The 2023 IHS is an integrated survey combining the Basic Health Research (Riskesdas), the Survey of Nutritional Status of Children Under Five (SSGI), and Biomedical and Dental and Oral Examinations conducted every five years by the Health Development Policy Agency (BKPK), Ministry of Health of the Republic of Indonesia, designed to monitor key health indicators, health service utilization, and health behaviors across the Indonesian population.

Participation and Sample Criteria

The population of the 2023 IHS is all households in Indonesia, while the sample includes 34,500 Census Blocks (BS) representing the national level to districts/cities, with a target of approximately 315,646 ordinary households (routes) and 284,177 toddler routes. A total of 190,318 women aged 15–49 years were initially identified from the SKI 2023 database. The inclusion criteria were women aged 15–49 years who were registered as respondents in the SKI 2023 database and who had completed the reproductive health module. The exclusion

criteria were applied to respondents with incomplete data and women who had never given birth (nulliparous women), resulting in a final analytical sample of 163,433 women. Figure 1 presents a flowchart that details the process of selecting the population for the analysis.

The IHS 2023 applied a stratified multistage cluster random sampling method to ensure sample representation at the national, provincial, and district/city levels. The sample frame consisted of census blocks obtained from the Central Statistics Agency (BPS) in Indonesia. In the first stage, primary sampling units (PSUs), typically census blocks, were selected using probability proportional sampling (PPS). In the second stage, households were systematically sampled from the selected PSUs. Finally, eligible women from the selected households were invited to participate in the study. Data were collected through direct interviews using a validated, structured, self-administered questionnaire. Detailed explanations of survey methodologies, sampling procedures, and instrument validity are available in the IHS 2023 technical report [24].

Research Variables

Variable Dependent (Outcome)

The dependent variable in this study was cervical cancer screening among women aged 15–49 years, operationalized as a binary outcome (Yes or No). Cervical cancer screening is defined as the proportion of women within the 15–49 age range who have undergone screening for cervical cancer.

Variable Independents (Exposure)

The independence variables include sociodemographic characteristics and reproductive history that are suspected to be determinant factors, namely: age (low risk; < 35 years and high risk; > 35 years), education level (low: elementary to junior high school and high: secondary high school to college), Occupational (employed and non-employed), health insurance ownership (owning BPJS/ Private Insurance and not owning), parity: the number of children ever born alive, information exposure: assessed based on whether respondents had ever heard or received information about cervical cancer and screening uptake

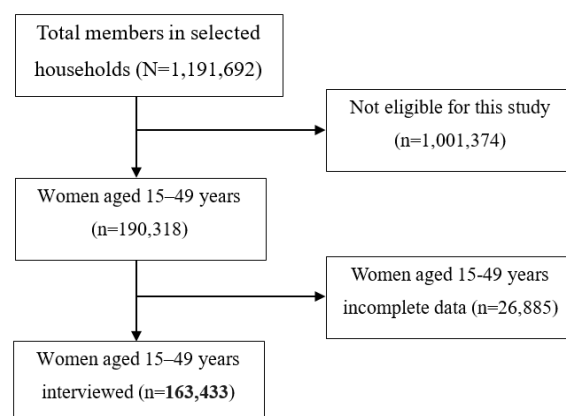


Figure 1. The Sample Selection Process from the 2023 IHS

Table 1. Socio-Demographic Characteristic of Respondent's Predictors Of Cervical Cancer Screening Uptake Among Indonesian Women

Variables	Frequency (n)	Percentage (%)
Age		
Low Risk (<35 years)	71,361	43.7
High Risk (≥35 years)	92,072	56.3
Education Level		
High (College)	79,571	48.7
Low (Elementary-Senior High)	83,862	51.3
Occupation		
Employed	69,460	42.5
Not Employed	93,973	57.5
Health Insurance Ownership		
Owning	123,080	75.3
Not Owning	40,353	24.7
Information Exposure		
Ever	5,282	3.2
Never	158,151	96.8
Parity		
1-3 children	148,558	90.9
>3 children	14,875	9.1
Cervical Cancer Screening Uptake		
Ever screened	14,184	8.7
Never screened	149,249	91.3
Total	163,433	100

methods from health workers or the media (ever/never).

Statistical Analysis

The sociodemographic characteristics of the women were described with frequency and percentage. A bivariate analysis was conducted using simple logistic regression to explore the association between socioeconomic factors and the prevalence of early cervical cancer detection in Indonesia. Furthermore, a multivariable binary logistic regression model was constructed to identify independent predictors after adjusting for potential confounding factors. The findings were expressed as odds ratios (ORs) and 95% confidence intervals (CIs), with statistical significance set at $p < 0.05$. All fully adjusted models accounted for potential confounding variables, including age, occupation, education level, health insurance status, and exposure to cervical cancer information. Statistical analyses were conducted using STATA 14.0 (Stata Corporation, College Station, TEXAS, USA). All tests were two-tailed, with a P-value of less than 0.05 considered statistically significant.

Research Ethics

This study used anonymised secondary data (without the respondents' personal identity). Ethical clearance for implementing the 2023 IHS survey was obtained from the Health Development Policy Agency. Therefore, this study was exempt from the full ethics review, but permission to use the data was officially obtained from the BKPK Data Management Laboratory of the Ministry of Health of the Republic of Indonesia. This research was also approved

Table 2. Association of Sociodemographic Characteristics with Cervical Cancer Screening Uptake among Indonesian Women

Variables	Cervical Cancer Screening Uptake		Total (N = 163,433)	OR (95% CI)	P-value
	Ever Screened n (%)	Never Screened n (%)			
Age					
Low Risk (<35)	5,485 (7.7)	65,876 (92.3)	71,361 (43.7)	0.798 (0.754–0.845)	<0.001
High Risk (≥35)	8,699 (9.4)	83,373 (90.6)	92,072 (56.3)	Ref.	
Education Level					
High	9,034 (11.4)	70,538 (88.6)	79,571 (48.7)	1.958 (1.843–2.079)	<0.001
Low	5,150 (6.1)	78,712 (93.9)	83,862 (51.3)	Ref.	
Occupation					
Employed	7,079 (10.2)	62,381 (89.8)	69,460 (42.5)	1.387 (1.310–1.469)	<0.001
Not Employed	7,105 (7.6)	86,868 (92.4)	93,973 (57.5)	Ref.	
Health Insurance					
Owning	11,791 (9.6)	111,289 (90.4)	123,080 (75.3)	1.681 (1.553–1.819)	<0.001
Not Owning	2,392 (5.9)	37,960 (94.1)	40,353 (24.7)	Ref.	
Information Exposure					
Ever	1,067 (20.2)	4,214 (79.8)	5,282 (3.2)	2.800 (2.481–3.161)	<0.001
Never	13,116 (8.3)	145,035 (91.7)	158,151 (96.8)	Ref.	
Parity					
1-3 children	13,027 (8.8)	135,530 (91.2)	148,558 (90.9)	1.141 (1.046–1.244)	0.003
>3 children	1,156 (7.8)	13,719 (92.2)	14,875 (9.1)	Ref.	

Table 3. Predictor Factors of Cervical Cancer Screening Uptake among Indonesian Women (Multivariable Logistic Regression)

Variable	OR	95% CI	p-value
Age (<35 vs ≥35 years)	0.735	0.692–0.781	<0.001
Education (high vs low)	1.795	1.687–1.909	<0.001
Health insurance ownership (yes vs no)	1.467	1.356–1.588	<0.001
Cervical cancer information exposure (ever vs never)	2.252	1.992–2.545	<0.001
Employment status (employed vs not employed)	1.248	1.178–1.323	<0.001
Parity (1–3 vs >3 children)	1.156	1.057–1.265	0.002

by the Research Ethics Commission of the Faculty of Public Health, Andalas University (Approval Number: B/115/UN16.12.D/PP/2025).

Results

Characteristic of respondents

In this study, the majority of respondents were classified within the higher-risk age category, with 56.3% ($n = 92,072$) being aged ≥ 35 years. Regarding educational attainment, 51.3% ($n = 83,862$) of respondents had achieved a low level of education (elementary to junior high school). In terms of employment status, 57.5% ($n = 93,973$) of the women were not employed. A substantial proportion of respondents (75.3%, $n = 123,080$) had health insurance (BPJS or private). Notably, exposure to information regarding cervical cancer was limited, with 96.8% ($n = 158,151$) indicating they had never received such information. In terms of reproductive history (parity), 90.9% ($n = 148,558$) had one to three children. Finally, regarding cervical cancer screening behaviour, only 8.7% ($n = 14,184$) of women reported having ever been screened, while the vast majority (91.3%, $n = 149,249$) had never been screened. The characteristics of the respondents are summarised in Table 1.

Association between demographic characteristic and cervical cancer screening uptake

Table 2 presents the bivariate associations between sociodemographic characteristics and cervical cancer screening uptake among Indonesian women. All variables examined demonstrated statistically significant associations with screening status ($p < 0.001$ for all, except for parity, $p = 0.003$). Women aged ≥ 35 years were significantly more likely to have undergone screening than those aged < 35 years (9.4% vs. 7.7%; OR = 0.798, 95% CI: 0.754–0.845). This indicates that younger women had approximately 20% lower odds of being screened than older women did. A strong positive association was observed with educational attainment: women with higher education (college) were substantially more likely to be screened (11.4%) than those with lower education (elementary to junior high school; 6.1%). The Crude OR of screening among highly educated women were nearly twice as high (OR = 1.958, 95% CI: 1.843–2.079) compared with their less-educated counterparts. Employed women had a higher screening rate (10.2%) than non-employed women (7.6%), corresponding to

crude OR of 1.387 (95% CI: 1.310–1.469), indicating about 39% higher odds of screening among employed women. Women with insurance (BPJS or private) had a screening rate of 9.6%, compared to only 5.9% among uninsured women. Insured women had 68% higher odds of being screened (OR = 1.681, 95% CI: 1.553–1.819) than those without coverage. The strongest association was found with exposure to information about cervical cancer. Among women who had ever received information, 20.2% reported being screened, compared to only 8.3% among those who had never received information. Women with prior exposure had nearly three times higher odds of undergoing screening uptake (OR = 2.800, 95% CI: 2.481–3.161). Finally, parity showed a modest but statistically significant association ($p = 0.003$). Women with 1–3 children had a slightly higher screening rate (8.8%) compared to those with > 3 children (7.8%), yielding a crude OR of 1.141 (95% CI: 1.046–1.244). This suggests a small but significant tendency for women with fewer children to be more likely to undergo screening.

Multivariate Analysis

Multivariable logistic regression was conducted to identify the independent predictors of early cervical cancer screening (Table 3). After mutual adjustment for all sociodemographic factors, all variables remained significantly associated with screening uptake. Women aged < 35 years had significantly lower odds of undergoing screening uptake compared to those aged ≥ 35 years (OR = 0.735, 95% CI: 0.692–0.781; $p < 0.001$). Higher educational attainment was strongly associated with screening: women with high education had 1.8 times higher odds of being screened than those with low education (OR = 1.795, 95% CI: 1.687–1.909; $p < 0.001$). Health insurance ownership remained a significant enabling factor. Women who had BPJS or private insurance had 47% higher odds of undergoing screening compared to uninsured women (OR = 1.467, 95% CI: 1.356–1.588; $p < 0.001$). Exposure to cervical cancer information showed the strongest association in the adjusted model. Women who had ever received information about cervical cancer had more than twice the odds of being screened compared to those who had never received such information (OR = 2.252, 95% CI: 1.992–2.545; $p < 0.001$). Employment status also had associated with, employed women had 25% higher odds of screening than non-employed women (OR = 1.248, 95% CI: 1.178–1.323; $p < 0.001$). Finally, parity was

modestly but significantly associated with screening behavior. Women with 1–3 children had 16% higher odds of undergoing screening compared to those with >3 children (aOR = 1.156, 95% CI: 1.057–1.265; $p = 0.002$).

Discussion

This study, leveraging the most recent and nationally representative 2023 Indonesian Health Survey data, confirms the critically low cervical cancer screening uptake of 8.7% among Indonesian women. Our analysis identified individual factors (age, education, information exposure), social-economic (health insurance ownership, employment status) as independent and significant predictors of screening uptake. These findings provide contemporary, high-resolution insights into the complex barriers to cervical cancer screening in Indonesia, building upon and updating previous research, which is often localized or outdated. This finding aligns with national statistics, which show that cervical cancer screening coverage in Indonesia remains below 10%, falling short of both national and WHO targets [11, 25, 26]. Similar low coverage has been documented in other low- and middle-income countries (LMICs), where screening rates of approximately 7–10% have been reported, including in Tanzania and other African settings, despite the high disease burden [27, 28]. These data underscore the urgency of scaling up systematic screening as part of cervical cancer elimination efforts.

To address this alarmingly low prevalence, identifying key predictors is crucial. Among these, education has emerged as a significant factor. Women with higher levels of educational attainment were nearly twice as likely to undergo screening compared to those with lower educational levels. This trend aligns with findings from studies conducted in Ghana, Ethiopia, Jordan, and multi-country analyses in low- and middle-income countries (LMICs), which consistently demonstrate that higher education is associated with enhanced knowledge, more favorable attitudes, and increased utilization of cervical cancer screening services [28–31]. In Indonesia, previous research has highlighted that low health literacy and limited understanding of screening recommendations are key barriers to uptake [6]. This suggests that interventions targeting educational attainment, or at least health literacy, are fundamental for long-term improvements in screening coverage. Other studies utilizing both qualitative and quantitative approaches, has demonstrated that limited awareness, low risk perception, and insufficient counseling by healthcare professionals significantly impede screening participation [28–30]. International studies similarly report that knowledge and provider recommendation are among the most consistent predictors of screening behaviour [27, 32, 33]. Studies in Ethiopia, Nepal, and other low-resource contexts also identify insufficient public education and knowledge gaps as primary constraints on participation [34, 35]. Strengthening community-level health promotion, leveraging mass media and digital platforms, and integrating cervical cancer education into routine primary health care may be essential to increasing screening uptake.

Health insurance ownership was also positively associated with screening behaviour. Women with BPJS or private insurance had higher odds of undergoing screening than uninsured women, reinforcing the role of financial access and insurance benefits in facilitating preventive care. Although VIA and Pap smear are offered in primary care, indirect costs and perceptions of affordability may still deter participation among uninsured women. This is in line with national policy documents and economic evaluations that highlight the need to improve reimbursement, expand benefits for HPV-DNA testing, and reduce out-of-pocket barriers to screening in Indonesia [6, 36]. Health insurance and access to private care are associated with higher screening in several national analyses [37, 38].

Employment status showed a moderate but significant association with screening, with employed women more likely to undergo screening. Employment may be linked to greater financial autonomy, broader access to health information, and more frequent opportunities to participate in workplace-based or organized health programs. Similar associations have been observed in other LMICs, where women in formal employment report higher screening rates than those outside the labour force [27, 28].

Parity (number of live births) was also independently associated with screening, although the effect size was smaller. Our findings show that women with 1–3 children had higher odds of screening compared to those with >3 children, which is consistent with some literature suggesting lower screening uptake among multiparous women. While high parity (≥ 4 children) is consistently associated with an increased risk of cervical cancer [39]. However, cervical cancer screening uptake is lower among multiparous women (those with multiple children) than among primiparous women. A study in Sub-Saharan Africa found that women with ≥ 4 children were less likely to be screened (OR=0.70; CI 0.55–0.89) [40]. Nulliparous women (never given birth) also tended to be screened less frequently than women with a parity greater than two (OR=0.26; CI 0.105–0.642) [41]. High parity increases the risk of cervical cancer; however, screening uptake in this group is lower. Screening efforts should target multiparous and nulliparous women to optimize early cervical cancer detection.

The finding that women under 35 years were significantly less likely to screen (OR 0.735) than those 35 years or older, while consistent with some LMIC contexts where older women are more frequently targeted [26, 27], warrants deeper investigation in Indonesia. While older women may have more opportunities for screening during other health encounters, this inverse association could also reflect a perception among younger Indonesian women that cervical cancer is a disease of older age or a lack of targeted awareness campaigns for this younger cohort within the recommended screening age range. This contrasts with some high-income settings, where early screening initiation among younger age groups is increasingly emphasized. Understanding these specific age-related perceptions and barriers in Indonesia is crucial for tailoring age-appropriate interventions.

The inverse association between younger age and

screening indicates that women aged <35 years were less likely to participate in screening uptake than older women, even though they were within the recommended age range for screening. This finding is consistent with evidence that older women in LMICs are often more frequently targeted for screening or may present to health facilities with other chronic conditions, creating more opportunities for providers to offer screening [27, 32]. Recent studies have also highlighted that older women remain at substantial risk and may benefit from extended screening strategies, especially in areas where historical coverage is low [42, 43].

Although this study offers robust insights owing to its large, nationally representative sample, several limitations warrant consideration. First, the cross-sectional design precludes causal inferences. Second, the analysis did not account for certain contextual confounders available in the IHS 2023, such as the wealth index, urban-rural residence, and regional location. Consequently, the reported associations may be subject to residual confounding, and the effect sizes should be interpreted with caution. These factors likely interact with individual-level determinants to influence overall screening uptake. Future research should employ multilevel modelling to incorporate these geographic and socioeconomic layers to provide a more comprehensive view of screening barriers in Indonesia. Furthermore, reliance on self-reported screening status may introduce recall bias (e.g., difficulty remembering exact dates or types of screening) or social desirability bias, potentially leading to an overestimation of actual screening rates. Crucially, the dataset's scope did not permit the exploration of critical provider-level and system-level predictors (e.g., healthcare provider knowledge, attitudes, facility readiness, availability of HPV-DNA testing, or quality of counselling), which qualitative studies in Indonesia have highlighted as significant barriers [20]. This represents an important gap, as these factors likely interact with individual-level predictors to influence overall uptake.

Despite these limitations, our findings have important policy implications. Efforts to increase cervical cancer screening in Indonesia should prioritise expanding health education and communication strategies tailored to women with low literacy, strengthening insurance-based incentives, and integrating screening promotion into maternal, family planning, and other reproductive health services. These findings align with national strategic documents, including the Indonesian Cervical Cancer Elimination Plan 2023–2030 and recent stakeholder analyses, already emphasise the need for system-wide reforms, including scale-up of HPV-DNA-based screening and self-sampling approaches, improved human resources, and stronger advocacy [6]. Community health workers and primary care providers are likely to play a central role in improving information dissemination, addressing sociocultural barriers and stigma, and facilitating referrals for screening, as also highlighted in recent Indonesian and international literature [27, 44].

In conclusion, cervical cancer screening uptake remains critically low in Indonesia, with only 8.7% of women of reproductive age participating in screening

programs. This study demonstrates that screening participation is significantly associated with various individual and policy-relevant factors, including age, education, health insurance ownership, employment status, and parity. Notably, exposure to cervical cancer information emerged as the strongest predictor, with informed women being more than twice as likely to have undergone screening. While our analysis focused on modifiable individual and policy-level predictors, we acknowledge that these associations exist within a broader framework of socioeconomic and geographic disparities. Targeted interventions that prioritize information dissemination and integrate screening promotion into routine reproductive health services are essential for achieving the WHO's "90-70-90" elimination targets in Indonesia. Future research should employ longitudinal designs and multilevel modelling to integrate geographic, system-level, and wealth-based data to further address potential residual confounding and refine national prevention strategies.

Author Contribution Statement

Conceptualization, methodology, investigation, data curation, writing original draft: SM. Validation, writing review, project administration: YF. Data curation, investigation, writing review & editing: RI.

Acknowledgements

Funding

This research was financed by the Beginner Lecturer Research Batch II scheme by the Institute for Research and Community Service, Andalas University with the contract number: 529/UN16.19/PT.01.03/PDP/2025.

Data availability statement

The official dataset is accessible for examination and confirmation via the provided link <https://layanandata.kemkes.go.id/katalog-data/ski/ketersediaan-data/ski-2023>

Declaration of competing interest

The authors of this study have declared no conflict of interest.

References

1. Pimple SA, Mishra GA. Global strategies for cervical cancer prevention and screening. *Minerva Ginecol.* 2019;71(4):313-20. <https://doi.org/10.23736/s0026-4784.19.04397-1>.
2. Wilailak S, Kengsakul M, Kehoe S. Worldwide initiatives to eliminate cervical cancer. *Int J Gynaecol Obstet.* 2021;155 Suppl 1(Suppl 1):102-6. <https://doi.org/10.1002/ijgo.13879>.
3. Stelzle D, Tanaka LF, Lee KK, Ibrahim Khalil A, Baussano I, Shah ASV, et al. Estimates of the global burden of cervical cancer associated with hiv. *Lancet Glob Health.* 2021;9(2):e161-e9. [https://doi.org/10.1016/s2214-109x\(20\)30459-9](https://doi.org/10.1016/s2214-109x(20)30459-9).
4. Shrestha AD, Neupane D, Vedsted P, Kallestrup P. Cervical cancer prevalence, incidence and mortality in low and middle income countries: A systematic review. *Asian Pac J Cancer Prev.* 2018;19(2):319-24. <https://doi.org/10.22034/>

- apjcp.2018.19.2.319.
5. Wu ES, Jeronimo J, Feldman S. Barriers and challenges to treatment alternatives for early-stage cervical cancer in lower-resource settings. *J Glob Oncol*. 2017;3(5):572-82. <https://doi.org/10.1200/jgo.2016.007369>.
 6. Kementerian kesehatan republik indonesia. National cervical cancer elimination plan for indonesia 2023-2030. <https://www.iccp-portal.org>. 2023[cited 2025 Aug 19]. https://www.iccp-portal.org/sites/default/files/plans/National%20Cervical%20Cancer%20Elimination%20Plan%20for%20Indonesia%202023-2030_compressed.pdf. Accessed 19 Aug 2025.
 7. Aziz MF. Gynecological cancer in indonesia. *J Gynecol Oncol*. 2009;20(1):8-10. <https://doi.org/10.3802/jgo.2009.20.1.8>.
 8. Nasution SK, Mahendradhata Y, Trisnantoro L. Can a national health insurance policy increase equity in the utilization of skilled birth attendants in indonesia? A secondary analysis of the 2012 to 2016 national socio-economic survey of indonesia. *Asia Pac J Public Health*. 2020;32(1):19-26. <https://doi.org/10.1177/1010539519892394>.
 9. Anindya K, Lee JT, McPake B, Wilopo SA, Millett C, Carvalho N. Impact of indonesia's national health insurance scheme on inequality in access to maternal health services: A propensity score matched analysis. *J Glob Health*. 2020;10(1):010429. <https://doi.org/10.7189/jogh.10.010429>.
 10. Wati P, Januraga PP, Putri W. Utilization of cervical cancer screening program and its predictors in the universal health coverage era in badung district, bali. *Public Health and Preventive Medicine Archive*. 2021;9:59-65. <https://doi.org/10.15562/phpma.v9i1.326>.
 11. Aoki ES, Yin R, Li K, Bhatla N, Singhal S, Ocviyanti D, et al. National screening programs for cervical cancer in asian countries. *J Gynecol Oncol*. 2020;31(3):e55. <https://doi.org/10.3802/jgo.2020.31.e55>.
 12. Indarti J. The role of social obstetrics and gynecology in the coverage of cervical cancer screening in the era of health transformation in indonesia. *Indonesian J Obstet Gynecol*. 2023;198-200. <https://doi.org/10.32771/inajog.v11i4.2181>.
 13. Putri S, Mazarina Devi H, Fransiska R. Associated factors of cervical cancer screening intention among reproductive aged women: A cross-sectional study. *Pedimaternatal Nursing Journal*. 2025;11:90-8. <https://doi.org/10.20473/pmnj.v11i2.70638>.
 14. Amran Y, Fasya TN, Salamah H. Factors associated with premarital screening intention among young adults with higher education in indonesia: A cross sectional study. *J Prev Med Public Health*. 2025;58(3):307-16. <https://doi.org/10.3961/jpmph.24.589>.
 15. Anggraini N, Susanti S, Akhiri R, Amelia S, Cahyani D. The effect of an empowerment program on knowledge and cancer cervical screening participation among reproductive age women in Indonesia: A randomized clinical trial. *Jurnal Keperawatan Padjadjaran*. 2025 Aug 30;13(2):191-202.
 16. Lemp JM, De Neve JW, Bussmann H, Chen S, Manne-Goehler J, Theilmann M, et al. Lifetime prevalence of cervical cancer screening in 55 low- and middle-income countries. *Jama*. 2020;324(15):1532-42. <https://doi.org/10.1001/jama.2020.16244>.
 17. Winarti E, Prasetyanti D, Alimansur M, Mohd Said R. Determining behavioral to uptake and its predictors toward cervical cancer screening among women: A case-control multistage study. *Jurnal Keperawatan Padjadjaran*. 2021;9:206-15. <https://doi.org/10.24198/jkp.v9i3.1691>.
 18. Wibisono p, damay vp, waren k, effendi ik. Cervical cancer screening in sub-urban area of banten and factor associated with uptake of screening. *Ann Oncol*. 2019;30:1x83. <https://doi.org/10.1093/annonc/mdz426.019>.
 19. Sumarmi S, Hsu YY, Cheng YM, Lee SH. Factors associated with the intention to undergo pap smear testing in the rural areas of indonesia: A health belief model. *Reprod Health*. 2021;18(1):138. <https://doi.org/10.1186/s12978-021-01188-7>.
 20. Robbers GML, Bennett LR, Spagnoletti BRM, Wilopo SA. Facilitators and barriers for the delivery and uptake of cervical cancer screening in indonesia: A scoping review. *Glob Health Action*. 2021;14(1):1979280. <https://doi.org/10.1080/16549716.2021.1979280>.
 21. Anwar SL, Tampubolon G, Van Hemelrijck M, Hutajulu SH, Watkins J, Wulaningsih W. Determinants of cancer screening awareness and participation among indonesian women. *BMC Cancer*. 2018;18(1):208. <https://doi.org/10.1186/s12885-018-4125-z>.
 22. Spagnoletti B, Atikasari H, Bennett L, Putri H, Rachellina M, Ramanian A. Hitting the pause button: The impact of covid-19 on cervical cancer prevention, screening and treatment access in indonesia. *Asian Pac J Cancer Care*. 2020;5:255-7. <https://doi.org/10.31557/apjcc.2020.5.S1.255-257>.
 23. Vandembroucke JP, von Elm E, Altman DG, Gøtzsche PC, Mulrow CD, Pocock SJ, et al. Strengthening the reporting of observational studies in epidemiology (STROBE). *Epidemiology*. 2007 Nov;18(6):805-35.
 24. Ministry of health of the republic of indonesia. Indonesian health survey 2023. Indonesian health survey 2023. Jakarta; 2023.
 25. Ferlay J, Colombet M, Soerjomataram I, Parkin DM, Piñeros M, Znaor A, et al. Cancer statistics for the year 2020: An overview. *Int J Cancer*. 2021. <https://doi.org/10.1002/ijc.33588>.
 26. Madiuw D, Nivaan G, Baumase R. SINARA Application to Detect Cervical Cancer Risk: Development and Validity. *Window of Health: Jurnal Kesehatan*. 2025 Oct 22:491-501.
 27. Mahiti GR, Adam J, Luoga P. Prevalence and determinants of cervical cancer screening among women aged 15-49 years in tanzania: Analysis of demographic and health survey 2022. *Arch Public Health*. 2025;83(1):135. <https://doi.org/10.1186/s13690-025-01629-w>.
 28. Ayanto SY, Belachew T, Wordofa MA. Determinants of cervical cancer screening utilization among women in southern ethiopia. *Sci Rep*. 2022;12(1):14830. <https://doi.org/10.1038/s41598-022-18978-z>.
 29. Tawiah A, Konney TO, Dassah ET, Visser LE, Amo-Antwi K, Appiah-Kubi A, et al. Determinants of cervical cancer screening uptake among women with access to free screening: A community-based study in peri-urban ghana. *Int J Gynaecol Obstet*. 2022;159(2):513-21. <https://doi.org/10.1002/ijgo.14158>.
 30. Alie MS, Negesse Y, Ayenew M. Determinants of cervical cancer screening among women aged 30-49 years old in four african countries: A cross-sectional secondary data analysis. *Cancer Control*. 2023;30:10732748231195681. <https://doi.org/10.1177/10732748231195681>.
 31. Kumari S, Ojha N, Bista KD. Knowledge, attitude, and practice of cervical cancer screening among women attending a gynecology clinic at a tertiary level hospital. *Int J Cancer Care Deliv*. 2022;2. <https://doi.org/10.53876/001c.32581>.
 32. Hull R, Mbele M, Makhafola T, Hicks C, Wang SM, Reis RM, et al. Cervical cancer in low and middle-income countries. *Oncol Lett*. 2020;20(3):2058-74. <https://doi.org/10.3892/ol.2020.11754>.
 33. Kontonikou S, Kyrkou G, Bothou A, Nanou C, Vivilaki V, Deltsidou A. Investigation of women's knowledge and beliefs about cervical cancer and cervical smear examination: A survey study in greece. *Cureus*. 2024;16(12):e75486. <https://doi.org/10.7759/cureus.75486>.

34. Ng'ang'a A, Nyangasi M, Nkonge NG, Gathitu E, Kibachio J, Gichangi P, et al. Predictors of cervical cancer screening among kenyan women: Results of a nested case-control study in a nationally representative survey. *BMC Public Health*. 2018;18(Suppl 3):1221. <https://doi.org/10.1186/s12889-018-6054-9>.
35. R MAK, H HAS, T MAM, Al Mamari K, M AAK, M HA-A. Knowledge of cervical cancer screening among omani women attending a university teaching hospital: A cross-sectional study. *BMC Womens Health*. 2024;24(1):40. <https://doi.org/10.1186/s12905-023-02870-7>.
36. Nuranna L. See and Treat: Cervical cancer prevention strategy in Indonesia with VIA-DoVIA screening and prompt treatment. *The Indonesian Journal of Cancer Control*. 2022;2(1):32-8.
37. Akokuwebe ME, Idemudia ES, Lekulo AM, Motlogeloa OW. Determinants and levels of cervical cancer screening uptake among women of reproductive age in south africa: Evidence from south africa demographic and health survey data, 2016. *BMC Public Health*. 2021;21(1):2013. <https://doi.org/10.1186/s12889-021-12020-z>.
38. Opito R, Ayikobua ET, Akurut H, Alwedo S, Ssentongo SM, Erabu WD, et al. Uptake and acceptability of cervical cancer screening among female sex workers in eastern uganda: A cross-sectional study. *medRxiv*. 2024:2024.10.18.24315734. <https://doi.org/10.1101/2024.10.18.24315734>.
39. Tekalegn Y, Sahiledengle B, Woldeyohannes D, Atlaw D, Degno S, Desta F, et al. High parity is associated with increased risk of cervical cancer: Systematic review and meta-analysis of case-control studies. *Womens Health (Lond)*. 2022;18:17455065221075904. <https://doi.org/10.1177/17455065221075904>.
40. Okyere J, Aboagye RG, Seidu AA, Asare BY, Mwamba B, Ahinkorah BO. Towards a cervical cancer-free future: Women's healthcare decision making and cervical cancer screening uptake in sub-saharan africa. *BMJ Open*. 2022;12(7):e058026. <https://doi.org/10.1136/bmjopen-2021-058026>.
41. Dirirsa DE, Asefa EY, Awol Salo M. Utilization of cervical cancer screening service and associated factors among women of reproductive age group in ilu abba bor zone, southwestern ethiopia, 2019: Cross-sectional study. *SAGE Open Med*. 2022;10:20503121221094904. <https://doi.org/10.1177/20503121221094904>.
42. Castañón A, Landy R, Cuzick J, Sasieni P. Cervical screening at age 50-64 years and the risk of cervical cancer at age 65 years and older: Population-based case control study. *PLoS Med*. 2014;11(1):e1001585. <https://doi.org/10.1371/journal.pmed.1001585>.
43. Song Y, Ran G, Zeng R, Chen C. Global burden and temporal trends of cervical cancer in women aged 60 years and older, 1990-2021: A global burden of disease study. *Int J Gynecol Cancer*. 2026;36(2):102851. <https://doi.org/10.1016/j.ijgc.2025.102851>.
44. Bando E, Mohamed Said MS, Sansuwito T, Suyanto J. Cultural barrier and cervical cancer stigma on screening program in community: A systematic literature review. *Public Health of Indonesia*. 2025;11:129-40. <https://doi.org/10.36685/phi.v11i2.966>.



This work is licensed under a Creative Commons Attribution-Non Commercial 4.0 International License.