

Knowledge and Uptake of VIA Screening: A Case-Control Study among Women of Reproductive Age in Kendari City

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ABSTRACT

Background: Cervical cancer remains one of the leading causes of mortality among women in Indonesia, largely due to low uptake of early detection methods such as Visual Inspection with Acetic Acid (VIA) screening. Knowledge among women of reproductive age (WRA) has been identified as an important factor associated with participation in screening. This study aimed to examine the association between knowledge level of WRA and VIA screening uptake at the BLUD UPTD Wua-Wua Public Health Center in Kendari City. **Methods:** A case-control design was applied involving 64 respondents, comprising 32 cases (women who had undergone VIA screening) and 32 controls (women who had not). Cases and controls were determined based on service records from the health center. Data were collected from June to August 2024 using a structured and validated questionnaire. The Chi-Square test was used for statistical analysis with a significance level of 0.05. **Results:** More than half of respondents (54.7%) demonstrated low knowledge. A significant association was found between knowledge level and VIA screening uptake ($p < 0.001$). **Conclusion:** Knowledge level was significantly associated with VIA screening behavior among WRA. These findings suggest that strengthening awareness and educational efforts may contribute to improving participation in cervical cancer early detection programs.



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INTRODUCTION

Cervical cancer remains one of the most burdensome cancers in terms of morbidity and mortality among women worldwide, particularly in developing countries with limited health service systems. Globally, more than 600,000 new cervical cancer cases and 342,000 deaths were reported in 2020, with 90% of these occurring in low- and middle-income countries (Singh et al., 2023). This disease is generally caused by persistent high-risk Human Papillomavirus (HPV) infection that is not properly managed in a timely manner (Wolf et al., 2024). Although HPV vaccination and screening technologies are available, delayed diagnosis continues to pose a major barrier to cervical cancer control efforts (Soheili et al., 2021).

In Indonesia, cervical cancer is a pressing public health issue, ranking as the second most common cancer after breast cancer. According to GLOBOCAN data (2020), there were 36,633 new cases and 21,003 deaths due to cervical cancer, equivalent to 57 female deaths every day (WHO, 2021). These figures indicate that early detection efforts remain far from optimal. The Indonesian Demographic and

Health Survey (IDHS, 2019) reported that most women of reproductive age still have low levels of knowledge about cervical cancer and early detection, particularly in the eastern regions of Indonesia (Kemenkes, 2019).

One screening approach recommended by the WHO for developing countries is Visual Inspection with Acetic Acid (VIA), a simple, low-cost method that does not require complex laboratory equipment (Sankaranarayanan et al., 2012). This method has been proven to have adequate sensitivity and specificity for use in primary healthcare facilities (Wang et al., 2024). However, the success of VIA screening is strongly influenced by the active participation of women of reproductive age, which many studies have shown to be closely associated with individual knowledge levels (Adyani & Realita, 2020).

National VIA coverage remains low. Data from the Ministry of Health (2023) show that of the targeted 50% of women aged 30–50 years, only 5.2% had ever undergone VIA screening (Kementrian Kesehatan, 2023). This situation is even more concerning in Southeast Sulawesi Province. Data from the Wua-Wua Health Center (2023) reported that only 6.2% of women of reproductive age had undergone VIA screening despite the availability of services. This low coverage reflects persistent structural and behavioral health barriers (Dinkes Kesehatan Provinsi Sulawesi Tenggara, 2023).

Knowledge has been proven to be a key factor in encouraging cervical cancer screening behavior. Women with higher knowledge levels are two to three times more likely to undergo VIA screening (Taneja et al., 2021). This is consistent with the Health Belief Model and the Theory of Planned Behavior, which position knowledge as a primary determinant in disease prevention behavior (Akinlotan et al., 2017; Nyaaba & Akurugu, 2023; Ruddies et al., 2020).

Most existing evidence comes from foreign contexts or western regions of Indonesia, which have different social, cultural, and healthcare access characteristics. Studies conducted in eastern Indonesia, particularly in Southeast Sulawesi, remain very limited and are rarely published in indexed journals. This scarcity of evidence hinders the development of locally relevant interventions.

Therefore, this study seeks to address this gap by analyzing the association between knowledge level and VIA screening uptake among women of reproductive age at the BLUD UPTD Wua-Wua Public Health Center in Kendari City. In doing so, the study provides contextualized evidence that may inform targeted educational interventions and evidence-based policymaking to enhance screening coverage in eastern Indonesia.

METHODS

This study employed an observational analytic design with a case–control approach to examine the association between the knowledge level of women of reproductive age (WRA) and the uptake of Visual Inspection with Acetic Acid (VIA) screening. The case–control design was considered appropriate because it enables efficient comparison of characteristics between screened (cases) and unscreened (controls) groups within a limited timeframe. The study population comprised all WRA registered at the BLUD UPTD Wua-Wua Public Health Center, Kendari City, in 2023.

Inclusion criteria were WRA aged 30–50 years, permanent residents within the health center's catchment area, and those who provided informed consent. Exclusion criteria were women with a history of total hysterectomy or medical conditions that could compromise participation (e.g., cognitive impairment or terminal illness). A total of 64 respondents were enrolled, consisting of 32 cases (women who had undergone VIA screening) and 32 controls (women who had not). Sampling was conducted

purposively based on 2023 VIA records. Cases were randomly selected from available service records, while controls were selected from the same database to ensure comparability. This procedure, however, may introduce selection bias and limits external validity. Data collection was carried out from June to August 2024.

The independent variable was knowledge of cervical cancer and VIA screening, assessed using a structured questionnaire. Knowledge was categorized as good (76–100%), fair (56–75%), or poor (<56%), although reliance on arbitrary cut-off points may limit interpretability. The dependent variable was VIA screening behavior, categorized as “screened” or “not screened.” Potential confounders included age, educational level, occupation, and parity. The questionnaire had been previously validated; all items demonstrated adequate content validity (r count > r table = 0.294, $n=30$). Reliability testing produced a Cronbach’s Alpha of 0.669, which is below the conventional threshold of 0.70, and thus acknowledged as a study limitation.

Data processing involved editing, coding, scoring, tabulation, and double entry. Univariate analysis was performed to describe respondent characteristics. Bivariate analysis employed the Chi-square (χ^2) test at a 95% confidence level ($\alpha = 0.05$). Given the presence of potential confounders, logistic regression would have provided a stronger analytical approach, but was not applied in this study. All statistical analyses were performed using SPSS.

This study was approved by the Health Research Ethics Committee, Faculty of Health Sciences, Jenderal Soedirman University (Approval No. 291/EC/KEPK/2024). Written informed consent was obtained from all respondents. Ethical principles of anonymity, confidentiality, and autonomy were maintained throughout the research process.

RESULTS

The distribution of respondent characteristics is a critical element in data analysis, as it provides a deeper context for the findings and assists in interpreting relevant outcomes. The following is the distribution of respondent characteristics in this study:

Table 1. Sociodemographic Characteristics of Respondents (n = 64)

Variables	Category	n	%
Age	>20 years	2	3.1
	20–35 years	44	68.8
	≥35 years	18	28.1
Parity	I	7	11.0
	II	26	40.6
	III	16	25.0
	≥IV	15	23.4
Education	Junior High School	2	3.1
	Senior High School	42	65.6
	Diploma/Bachelor's	20	31.3
Occupation	Housewife	22	34.4
	Civil Servant	9	14.1
	Entrepreneur	33	51.6

Table 1 presents the sociodemographic characteristics of the 64 respondents in this study. In terms of age, the majority of respondents were in the 20–35 year age group, accounting for 44 individuals (68.8%), followed by those aged ≥35 years with 18 individuals (28.1%), and only 2 respondents (3.1%) were under 20 years old. Regarding parity, most respondents had parity II (40.6%), followed by parity III (25.0%), parity ≥IV (23.4%), and parity I (11.0%). In terms of educational background, the

majority had completed senior high school (65.6%), while 31.3% held a diploma or bachelor's degree, and only 3.1% had a junior high school education. In terms of occupation, most respondents were entrepreneurs (51.6%), followed by housewives (34.4%) and civil servants (14.1%). These findings provide an important initial overview of the respondents' sociodemographic profile, which may influence their knowledge, attitudes, and practices regarding cervical cancer early detection.

Table 2. Frequency Distribution of Respondents Based on VIA Examination

VIA Examination	Frequency (f)	Percentage (%)
Underwent VIA Examination	32	50.0
Did Not Undergo VIA Examination	32	50.0

Table 2 presents the frequency distribution of respondents based on their Visual Inspection with Acetic Acid (VIA) screening status at BLUD UPTD Wua-Wua Public Health Center, Kendari City, in 2024. Out of a total of 64 respondents, 32 individuals (50.0%) had undergone VIA screening, while the remaining 32 (50.0%) had never undergone the procedure. This balanced proportion reflects an equal division between those with awareness or access to early cervical cancer detection services and those who have not engaged in screening efforts. These findings highlight the need to identify determining factors influencing VIA screening behavior to increase early detection coverage at the primary healthcare level.

Table 3. Frequency Distribution of Respondents Based on Knowledge

Knowledge Level	n	%
Good	29	45.3
Poor	35	54.7

Table 3 shows that among the 64 respondents, 35 individuals (54.7%) were categorized as having poor knowledge, while 29 individuals (45.3%) demonstrated good knowledge. These results indicate a persisting gap in community understanding regarding the importance of early cervical cancer detection through VIA screening, emphasizing the need for enhanced health education initiatives.

Table 4. Knowledge Question Items about VIA Examination among Women

No	Knowledge Statement	Yes n (%)	No n (%)
1	Cervical cancer is one of the malignancies occurring in the uterine area.	50 (78.1)	14 (21.9)
2	A symptom of cervical cancer is persistent vaginal discharge.	42 (65.6)	22 (34.4)
3	VIA test is an examination to detect symptoms of cervical cancer.	47 (73.4)	17 (26.6)
4	To prevent cervical cancer, one should avoid having multiple partners.	53 (82.8)	11 (17.2)
5	Pap smear is an examination to detect symptoms of cervical cancer.	45 (70.3)	19 (29.7)
6	Using vaginal cleansers containing antiseptics can prevent cervical cancer.	28 (43.8)	36 (56.2)
7	Genital hygiene is important to prevent cervical cancer.	55 (85.9)	9 (14.1)
8	VIA examination is an early detection method for cervical cancer.	48 (75.0)	16 (25.0)
9	VIA examination can prevent cervical cancer.	39 (60.9)	25 (39.1)

Table 4 presents the distribution of responses to nine knowledge items concerning cervical cancer and Visual Inspection with Acetic Acid (VIA) examination among women at BLUD UPTD Wua-Wua Public Health Center, Kendari City, in 2024. The majority of respondents demonstrated awareness that cervical cancer is a malignancy occurring in the uterine area (78.1%), while a smaller proportion (21.9%) did not recognize this fact. Knowledge regarding specific symptoms was more varied, as only 65.6% identified persistent vaginal discharge as a symptom of cervical cancer, leaving a considerable proportion (34.4%) unaware of this important clinical sign. With respect to early detection methods, most respondents understood that VIA is a procedure to detect cervical cancer symptoms (73.4%) and that Pap smear serves a similar purpose (70.3%). Furthermore, 75.0% correctly identified VIA as an early detection method for cervical cancer, yet fewer (60.9%) acknowledged its preventive potential, suggesting partial misconceptions regarding its role in reducing cancer incidence. Preventive behavior-related knowledge appeared stronger, as 82.8% of respondents agreed that avoiding multiple sexual partners can reduce cervical cancer risk, and 85.9% recognized the importance of genital hygiene. Conversely, misconceptions were noted: 43.8% believed that using vaginal cleansers containing antiseptics can prevent cervical cancer, while the majority (56.2%) correctly disagreed with this statement.

Table 5. Association Between VIA Examination and Knowledge among Women

Knowledge Level	VIA Screening	%	No VIA Screening	%	Total	%	p Value	OR	95% CI
Good	22	75.9	7	24.1	29	45.3	<0.001	7.8	2.5-24.1
Poor	10	28.6	25	71.4	35	54.7			

Table 5 shows that among the 29 respondents with good knowledge, 22 individuals (75.9%) underwent VIA screening, while 7 (24.1%) did not. Conversely, among the 35 respondents with poor knowledge, only 10 (28.6%) had undergone VIA screening, whereas 25 (71.4%) had not. Statistical testing reveals a significant relationship between knowledge and VIA screening behavior, with a p-value < 0.001. The calculated Odds Ratio (OR) indicates that respondents with good knowledge are 7.857 times more likely to undergo VIA screening compared to those with poor knowledge, with a 95% confidence interval ranging from 2.556 to 24.154. Since the OR > 1 and the CI does not include 1, good knowledge can be considered a significant factor in increasing the likelihood of undergoing VIA screening. Therefore, knowledge is a crucial determinant in promoting early cervical cancer detection behavior through VIA examination.

DISCUSSION

This study aimed to analyze the relationship between knowledge level and the implementation of Visual Inspection with Acetic Acid (VIA) screening among women of reproductive age at BLUD UPTD Wua-Wua Public Health Center, Kendari City. The findings revealed that the majority of respondents had low levels of knowledge, and only a small proportion demonstrated good knowledge. Nevertheless, a number of respondents had undergone VIA screening. Bivariate analysis indicated a statistically significant relationship between knowledge level and VIA screening behavior, whereby women with better knowledge were more likely to undergo screening compared to those with limited knowledge.

These findings reinforce the understanding that knowledge plays a crucial role in encouraging women of reproductive age to participate in VIA screening. Adequate

knowledge enhances awareness of cervical cancer risk and strengthens the perception of benefits, thereby motivating screening participation. Conversely, insufficient knowledge continues to be a major barrier to preventive behavior. The odds ratio further highlights that women with higher knowledge were significantly more likely to undergo VIA screening, underscoring knowledge as a critical determinant of early detection behavior.

The results are consistent with previous studies, though cross-country comparisons offer additional insights. For instance, Silva et al. (2023) in Brazil and Derby et al. (2023) in Ethiopia similarly identified knowledge as a key determinant of screening participation, but the contexts differ: while Brazilian women with higher awareness adhered more to screening due to robust health promotion systems, Ethiopian women faced barriers despite service availability. This suggests that in the current study, as in other low-resource contexts, improving knowledge alone may not be sufficient without simultaneous efforts to address structural and cultural barriers. Similarly, evidence from Pakistan (Siddiqi et al., 2023) emphasized the influence of education, occupation, and socioeconomic factors, while Zhang et al. (2023) in China showed that community-based education programs effectively doubled participation rates. These comparisons highlight that while knowledge is consistently important across countries, its role is shaped by broader health system and sociocultural contexts.

The theoretical frameworks further help explain these findings. In this study, women with higher knowledge showed stronger perceived benefits of screening, consistent with Health Belief Model (HBM) assumptions that preventive actions are influenced by perceived susceptibility, severity, benefits, and barriers (Chin & Mansori, 2019; Wati et al., 2021). Higher knowledge reduced perceived barriers and increased awareness of benefits, motivating VIA participation. Likewise, the Theory of Planned Behavior (TPB) is relevant: knowledge helped shape positive attitudes and intentions toward screening, in line with TPB's emphasis on attitudes, subjective norms, and perceived behavioral control (Bosnjak et al., 2020; Liao et al., 2024).

These findings have important implications for primary healthcare practice. Increasing VIA screening coverage can be achieved through knowledge-based interventions, particularly those integrated into maternal and child health services at the community level. Health centers should incorporate VIA education into routine services, supported by community-based counseling and accessible information media, to strengthen sustainable early detection behaviors. Such strategies align with global evidence suggesting that targeted health education is a promising approach to reducing cervical cancer-related morbidity and mortality.

One strength of this study lies in the use of a case-control design, which is efficient for identifying determinants in populations with low screening prevalence. Additionally, the instruments used were tested for validity and reliability, providing confidence in measurement despite some limitations. However, external validity is limited, as the study was conducted in a single health center with a relatively small sample size, restricting the generalizability of the findings. Other determinants such as attitude, healthcare access, and family support were not examined in depth, representing additional limitations.

Future research is recommended to adopt stronger designs, such as cohort or quasi-experimental approaches, with larger and more diverse populations. Incorporating psychosocial and environmental variables would also enrich the understanding of factors influencing cervical cancer early detection behavior, thereby guiding more comprehensive interventions.

CONCLUSION

This study showed that a good level of knowledge is associated with the tendency of women of reproductive age to undergo Visual Inspection with Acetic Acid (VIA) screening as a method for early detection of cervical cancer. Women with higher knowledge are more likely to participate in VIA screening compared to those with lower knowledge. This indicates an association between knowledge level and screening behavior; however, a causal relationship cannot yet be concluded with certainty.

These findings highlight the importance of educational interventions as part of promotive and preventive strategies in primary healthcare services. Efforts to improve public knowledge, particularly among women of reproductive age, can be carried out through systematic counseling, accessible information media, and community-based approaches. Thus, the coverage and acceptance of VIA screening can be improved.

However, more rigorous and comprehensive research is required before these results can be used as a basis for policy-making. Future research is recommended to employ longitudinal or experimental designs, better control for confounding factors through multivariate analysis, and involve larger and more diverse samples to strengthen external validity and generalizability of the findings.

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