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Characteristics of Patients with Positive Cervical Cancer Screening using Visual Inspection with Acetic Acid (VIA) in Bantul District 2023: A Descriptive Study

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Abstract

Background: Cervical cancer is the second leading cause of death in Indonesia and is one of the largest burdens on health costs. This study aims to determine the distribution of characteristics of positive cervical cancer screening patients in the Bantul District. **Methods:** A descriptive study using data from cervical cancer screening reports at Bantul District Health Office in 2023 was conducted to observe treatment outcomes, demographic factors (education, age, working status, marital status, and address), nutritional status, and behavior. Cervical cancer screening was done using Visual Inspection with Acetic Acid (VIA). Univariate analysis was conducted using proportions calculated from available data, excluding missing values. **Results:** There were 1,587 females screened and 40 people (2,5%) were positive. Among those positive cases, only 7.5% received cryotherapy, and 55% were referred to other health centers (either primary centers with cryotherapy facilities or secondary centers for further treatment). Most of positive cases married (25/25; 100%), non-drinker of alcohol (25/25; 100%), non-smoker (25/25; 100%), had high education levels (17/23; 73.9%), overweight (15/22; 68.2%), 20-44 years old (26/40; 65%), were not working (16/25; 64%), did not regularly consume fruits and vegetables (16/25; 64%), and active physical activity (13/25; 52%). There were variables with missing data ranging from 37.5% to 45%, with the variable that had the most missing data being BMI, while the variable with the most complete data was age. The positive cases were distributed across 9 sub-districts (52,9%). **Conclusion:** The majority of positive cases were married, non-drinkers of alcohol, non-smokers, had higher education levels, were overweight, 20-44 years old, were not working, had unhealthy dietary habits, active physical activity, and 37.5% had unknown follow-up. These findings underline the need for targeted interventions to improve follow-up care and conduct follow-up studies regarding risk factors of cervical cancer.

Keywords: Bantul; Characteristics; Cervical Cancer; VIA

Introduction

Cervical cancer (CC) is a malignancy of the cervix, with the primary cause being Human Papillomavirus (HPV) infection. Types 16 and 18 are frequently identified in CC (Novalia, 2023; Parwanto, 2019). HPV contributes to 99.7% of CC worldwide (World Health Organization, 2020). In 2018, CC ranked globally as the fourth most common cancer in incidence, following breast cancer, colorectal cancer, and lung cancer. In 2022, CC remained the fourth most common

cancer in women, with an incidence of 14.1 per 100,000 women-years and a mortality rate of 7.1 per 100,000 women-years (Global Cancer Observatory, 2022a; Novalia, 2023). Finally, CC is a significant health issue for women worldwide.

Based on the Global Cancer Observatory report (2022b), the Asian continent has the third highest incidence and mortality of CC in the world, with an incidence of 13.6 per 100,000 women-year and a mortality rate of 6.9 per 100,000 women-year, higher than the world average. Indonesia has the second-highest incidence and mortality in Asia (Bruni et al., 2023). In Indonesia, CC is the second leading cause of death with a mortality rate of 13.2 per 100.000 women-year and incidence 23.3 per 100.0000 women-year. In addition, CC is one of the biggest burdens in healthcare costs (Kementerian Kesehatan Republik Indonesia, 2023). The number of CC deaths was 23,541, greater than the estimated 7,000 maternal deaths in the 2015-2020 period (Bruni et al., 2023; Global Cancer Observatory, 2022b). Therefore, CC should be the main focus of the current government.

Based on data from Dr Sardjito Central General Hospital in Yogyakarta Province (2024) related to hospital-based cancer registration reports in the period 2008-2021, 3,552 cases of CC were reported, ranking third in both sexes, and ranking the second most common cancer in women. Most patients were diagnosed at stage 2 (45.00%) and stage 3 (36.00%), while just 11.50% were identified at stage 1. Appropriate control programs are needed to ensure early identification of cervical cancer (CC) patients, thereby reducing incidence and mortality rates. Cervical cancer is a preventable disease. The World Health Organization (2020) has launched a CC elimination program by 2030 with a limit of 4 per 100,000 women-years for elimination as a public health problem. CC elimination is achieved through 90-70-90 targets, including 90% of girls fully vaccinated with HPV vaccine by age 15 years, 70% of women screened with a high-performance test by 35 years and again by 45 years of age and 90% of women identified with CC receiving treatment (90% of women with pre-cancer treated, and 90% of women with invasive cancer managed).

In line with the global target, the Government of Indonesia has launched a single visite approach program with the Visual Inspection with Acetic Acid (VIA) method to implement the target of 70% of women screened for secondary prevention of CC, although not followed by HPV testing (Kementerian Kesehatan Republik Indonesia, 2013; World Health Organization, 2018). Bantul District conducted CC screening via VIA at 27 Public Health Centers (PHCs) across 17 sub-districts (Bantul District Health Office, 2024). However, the results of the screening implementation have not been processed optimally. Data processing is limited only to the achievements of women who have been screened, both at the district and PHC levels. No previous study had identified the characteristics of patients with positive VIA results at the district level in Bantul, and no analysis had been conducted; therefore, this study aimed to describe the distribution of characteristics among patients who tested positive in cervical cancer screening in Bantul District.

Methods

A descriptive study with secondary data from CC screening reports at the Bantul District Health Office in 2023. The population in this study was all women who screened for CC at all PHCs in the Bantul District in 2023. 1,587 women were screened and had individual data in 2023. The sample was taken using total sampling, where the entire population was included for analysis. The dependent variable was the result of CC screening using VIA. There were 3 categories of results: Positive, Negative, and Suspected Cancer. Positive results are indicated by a cervix with white patches (*acetowhite epithelium* very clearly visible) with firm and raised, non-glossy borders that are connected to, or

extend from, the *squamocolumnar junction*. Negative results if the cervix is smooth, pink, uniform, featureless, *ectropion, cervicitis, nabothy* cysts, and *acetowhite* lesions are not significant. Suspected cancer, classified if there is a cauliflower-like growth mass that bleeds easily or a purulent wound/*ulcer* (Kementerian Kesehatan Republik Indonesia, 2013).

The independent variables consist of demographic factors (education level, age, working status, marital status, and address), the level of education is categorized into low education if the education is junior high school, elementary school, or no school, while high education if the education at least high school and university. Age was categorized into 3 groups: adolescents (10-19), adults (20-44), and pre-elderly and elderly (45+). Working status was categorized into 2 groups: working if the woman had an income-generating activity. Marital status was categorized as married if was married for the first time, second time, third time, or was married but currently divorced (widowed). While unmarried, if the patient has not ever been married. Addresses are presented in a case distribution map based on sub-district level and will be divided into 3 categories: 0 cases, 1-5 cases, and more than 3 cases. Nutritional status was presented by body mass index (BMI), categorized into 3 groups: underweight if BMI<18.5, normal weight if BMI 18.5-22.99, and overweight if BMI ≥ 23. Behavioral factors consisted of smoking, categorized into smokers and non-smokers, drinking alcohol, categorized into drinker and non-drinker, physical activity, categorized into active and inactive, and fruit and vegetable consumption, categorized into regularly and not regularly.

All screening data were collected in Microsoft Excel and data were analyzed using STATA version 17 to calculate proportions. Proportions were calculated with available denominators, missing data were excluded. There were 37.50%-45.00% missing data in the positive screening results, the amount of missing data was written in the table with the percentage calculation obtained from the total missing data divided by the total data in the positive category. All variables are presented in the table, except address, which is presented as a distribution map. Maps were created using the Health Mapper application from WHO version 4.3.2. The map is displayed at the sub-district level with the PHC location for each area.

Results

Characteristics of Respondents

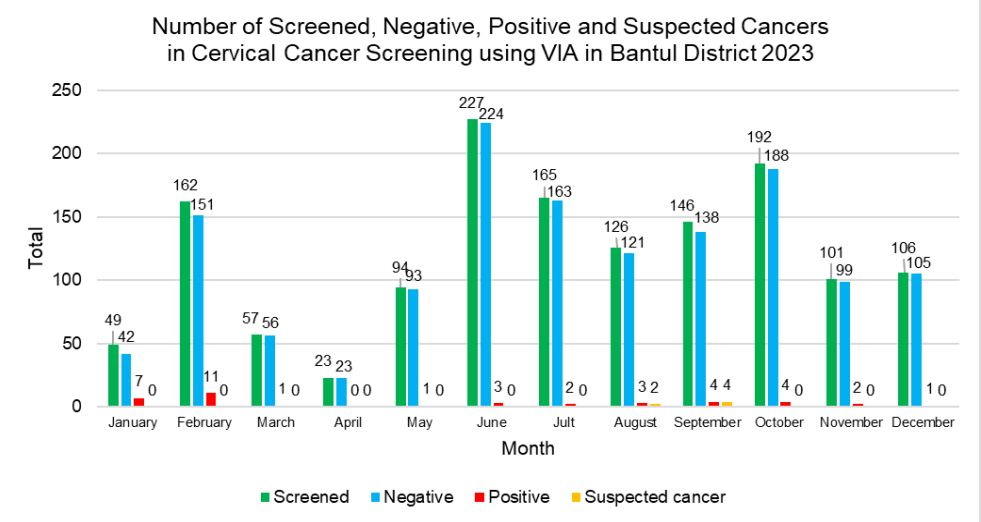

Figure 1. Number of Screened, Negative, Positive, and Suspected Cancers in CC Screening using VIA in Bantul District 2023

We included 1,587 women who were identified as having been screened for CC using VIA, 40 (2.52%) women showed positive, 6 (0.48%) suspected cancer, 1,540 (97.04%) negative, and 1 (0.06%) with unknown results/ missing data. Based on Figure 1, the highest number of screenings was conducted in June, with 227 (14.30%) women. In June, negative results were also most frequently found, with 224 women (14.55%). Meanwhile, the highest number of positive results was found in January, with 7 women (17.50%), and suspected cancer cases were most frequently found in September, with 4 women (66.67%).

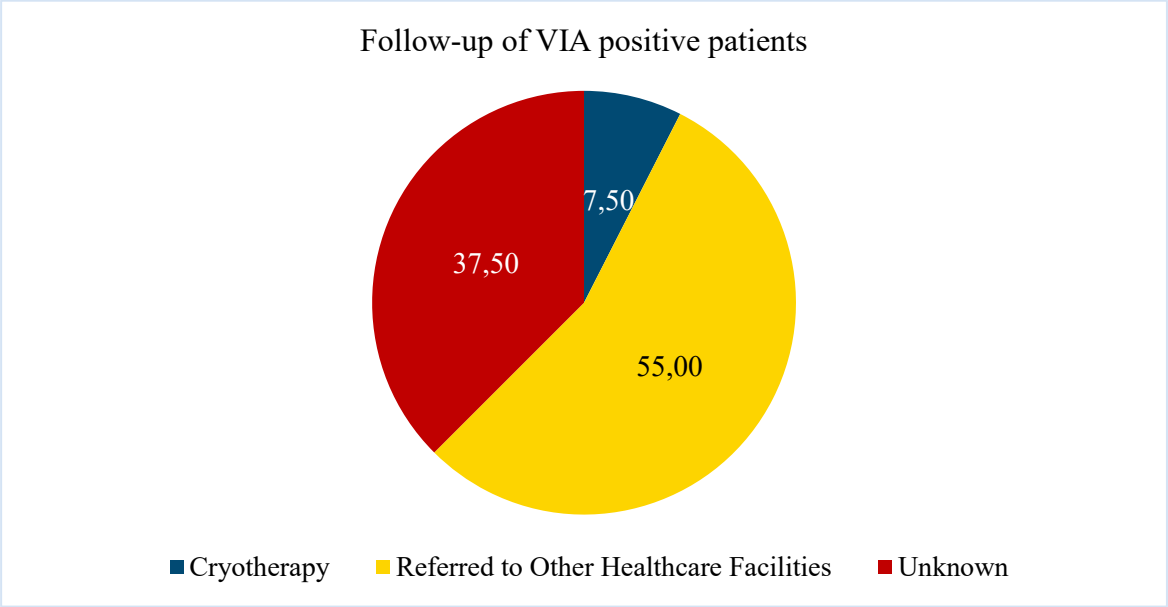

Figure 2. Follow-up of VIA-positive patients

Based on Figure 2, among those positive cases, only 7.5% received cryotherapy, and 55% were referred to other health centers (either primary centers with cryotherapy facilities or secondary centers for further treatment). The other 37.5% were not followed up. The following are the characteristics of the women who were screened:

Table 1. Characteristics of Respondents

Characteristics	Number Tested (N=1,587)	Number VIA Positive (%) (N=40)	Number VIA Negative (%) (N=1,540)	Number Suspicious of Cancer (%) (N=6)
Age				
10-19	3 (0.19)	0 (0.00)	3 (0.20)	0 (0.00)
20-44	1,125 (72.16)	26 (65.00)	1,094 (72.31)	5 (83.33)
45+	431 (27.65)	14 (35.00)	416 (27.50)	1 (16.67)
missing	28 (1.76)	-	27 (1.75)	-
Education Level				
Low	216 (23.97)	6 (26.09)	209 (23.97)	1 (16.67)
High	685 (76.03)	17 (73.91)	663 (76.03)	5 (83.33)
missing	685 (43.16)	17 (42.50)	668 (43.38)	-
Marital Status				
Married	1,133 (99.82)	25 (100.00)	1,102 (99.82)	6 (100.00)
Unmarried	2 (0.18)	0 (0.00)	2 (0.18)	0 (.0.00)
missing	451 (28.42)	15 (37.50)	436 (28.31)	-

Characteristics	Number Tested (N=1,587)	Number VIA Positive (%) (N=40)	Number VIA Negative (%) (N=1,540)	Number Suspicious of Cancer (%) (N=6)
Working status				
Working	275 (30.15)	9 (36.00)	264 (29.97)	2 (33.33)
Not Working	638 (69.85)	16 (64.00)	617 (70.03)	4 (66.67)
missing	674 (42.47)	15 (37.50)	659 (42.79)	-
BMI				
Underweight	44 (4.61)	1 (4.55)	43 (4.63)	0 (0.00)
Normal	347 (36.34)	6 (27.27)	340 (36.64)	1 (20.00)
Overweight	564 (59.06)	15 (68.18)	545 (58.73)	4 (80.00)
missing	632 (39.82)	18 (45.00)	612 (39.74)	1 (16.67)
Cigarette Smoking				
Smoker	1 (0.10)	0 (0.00)	1 (0.10)	0 (0.00)
Non-Smoker	1,045 (99.90)	25 (100.00)	1.014 (99.90)	6 (100.00)
missing	541 (34.09)	15 (37.50)	525 (34.09)	-
Physical Activity				
Active	184 (17.57)	13 (52.00)	171 (16.83)	0 (.0.00)
Inactive	863 (82.43)	12 (48.00)	845 (83.17)	6 (100.00)
missing	540 (34.03)	15 (37.50)	524 (34.03)	-
Consuming fruits and vegetables				
Regularly	144 (13.75)	9 (36.00)	135 (13.29)	0 (.0.00)
Not Regularly	903 (86.25)	16 (64.00)	881 (86.71)	6 (100.00)
missing	540 (34.03)	15 (37.50)	524 (34.03)	-
Alcohol consumption				
Drinker	3 (0.29)	0 (0.00)	3 (0.30)	0 (.0.00)
Non-Drinker	1,043 (99.71)	25 (100.00)	1,012 (99.70)	6 (100.00)
missing	541 (34.09)	15 (37.50)	525 (34.09)	-

(Bantul District Health Office, 2024)

Of the 40 positive cases, 26 (65.00%) were aged 20-44 years, which is considered the productive age group. This finding may be due to the higher screening rate in this group compared to other age groups. There were 14 cases (35.00%) in the over-45 age group, and the percentage of positive cases in this age group was higher compared to the 20-44 age group (3.25% vs 2.31%). In terms of education level, 17 cases (73.91%) were positive for VIA at higher education, while only 6 cases (26.09%) were positive among those with lower education levels. All positive cases (100.00%) were found in married women, non-smokers, and non-drinkers. Most of the women with positive results were not working/ housewives, with 16 women (64.00%). Based on BMI calculations describing nutritional status, positive VIA results were predominantly found in the overweight group, with 15 women (68.18%). There were 13 people (52.00%) with positive VIA results who engaged in active physical activity, while 12 people (48.00%) were physically inactive. Additionally, 16 people (64.00%) with positive VIA results did not consume fruits and vegetables regularly, compared to only 9 people (36.00%) who did.

Distribution of Positive Patients

Below is a map of the distribution of positive patients for CC screening using VIA:

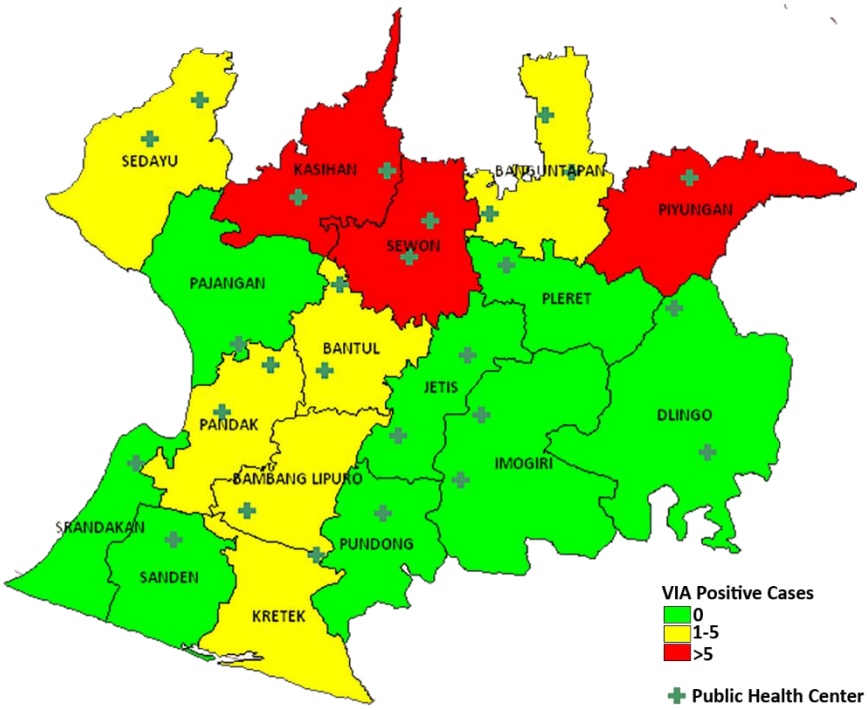

Figure 3. Distribution of Positive VIA patients in Bantul District

Bantul District consists of 17 sub-districts. Each sub-district has at least one PHC, with the number of PHCs adjusted according to the applicable criteria. As a result, some sub-districts have one or two PHCs, and in the case of the Banguntapan sub-district, there are three PHCs. The total number of PHCs in Bantul District were 27 PHCs. Based on the reports of screening, positive cases were distributed in 9 sub-districts (52.9%) out of 17 sub-districts, with the most VIA positive cases were Kasihan sub-districts, with 11 women (27.50%), Piyungan sub-districts were 11 women (27.50%) and Sewon sub-districts were 6 women (15.00%). Apart from these 3 sub-districts, there were 6 sub-districts that had 1-5 positive VIA cases, including Sedayu sub-district were 4 women (10.00%), Kretek sub-district were 2 women (5.00%), Bambanglipuro sub-district were 2 women (5.00%), Banguntapan sub-district was 1 women (2.50%), Pandak sub-district was 1 women (2.50%), and Bantul sub-district was 1 women (2.50%).

Five sub-districts in the north border other districts/cities that have positive VIA cases, including 3 sub-districts with >5 positive VIA cases, including Kasihan, Sewon, and Piyungan, and 2 sub-districts with 1-5 positive VIA cases, including Sedayu and Banguntapan. The screening achievements in the 5 sub-districts were the most screening compared to other sub-districts, with the number screened ranging from 100-254 women. Of the 5 sub-districts, 3 locations could perform cryotherapy, which were Sewon sub-district, Kasihan sub-district and Banguntapan sub-district (Bantul District Health Office, 2024).

Discussion

Characteristics of Respondents

This study focuses on women with positive VIA results, which indicates early detection of precancerous lesions that can still be treated with cryotherapy at the PHC. However, in women with suspected cancer, late detection results in referral to higher-level health facilities or hospitals. Therefore, we are unable to analyze the characteristics of women who were screened on time. Most of the IVA positive cases were referred to other health facilities, as not all PHCs have cryotherapy and are actively conducting the therapy.

IVA-positive cases were most common among women aged 20-44 years, but the highest proportion of cases was found in the over-45 age group. This finding suggests that sexually active women remain at risk for CC, regardless of age. Similar studies have found that CC screening using VIA is most frequently performed in the productive age group of 20-45 years, with a significant number of positive cases in this group, particularly among women over 35 years old, who are considered a high-risk group (Wahyuningsih & Mulyani, 2014; Angriani, Natosba, & Girsang, 2019; Reza & Friadi, 2022).

At the education level, positive VIA results were most common among individuals with higher education. Those with higher education levels tend to have greater knowledge and awareness about CC screening using VIA, resulting in a higher number of screenings and positive cases in this group (Angriani et al., 2019; Octaliana, Wathan, Aisyah, & Januar, 2022). This finding is supported by research from Wulandari (2023), which indicates that individuals with lower education levels are often associated with negative attitudes toward VIA screening. All positive cases (100.00%) were found in married women, as they have an increased risk of developing precancerous lesions due to higher sexual activity and exposure to risk factors for HPV infection (National Cancer Institute, 2022; World Health Organization, 2024). This finding aligns with research by Utami et al. (2023), which found that 85.8% of married or ever-married women tested positive for VIA.

Women with positive results were mostly found in women who did not work / housewives because women have spare time to do the examination but have less knowledge, this is in line with the research of Anggraini et.al. (2019) it was found that 71.1% of women who were not working performed VIA screening and the majority of them had less knowledge about CC and VIA screening. This may be due to the fact that non-working women do not have the opportunity to exchange ideas and experiences with workmates regarding CC and VIA screening compared to working women. In addition, in line with the results on nutritional status, many non-working women were found to be overweight. The results showed that women with overweight were found to have the most positive VIA results. This happens because overweight women can increase the risk of the pathogenesis of cervical adenocarcinoma. (Lacey et al., 2003; Maruthur, Bolen, Brancati, & Clark, 2009).

Women smokers were not found in positive cases because the proportion of smoking women who were screened was only 1 person, so it cannot represent pre-cancerous lesions in smoking women. It should be highlighted that smoking remains a factor because cigarette smoke contains more than 7,000 chemicals, and 69 of them cause cancer in almost all parts of the body, including the cervix (Centers for Disease Control and Prevention, 2024). Not only smokers, but people exposed to cigarette smoke/passive smoking also increase the incidence of CC 1.7 (95%CI: 1.40-2.07, $P < 0.01$) (Su et al., 2018). Similarly, the factor of drinking alcohol was not found in positive cases in alcohol drinkers. However, alcohol is a risk factor for cancer incidence, where the risk ratio (RR) is 1.12 (95%CI: 1.01-1.25), which means that if a

drinker increases by 112% the risk of developing CC compared to non-drinkers. For someone who drinks alcohol and smokes, the RR increases to 1.66 (95% CI: 1.54-1.79) (Floud, Hermon, Simpson, & Reeves, 2023).

The results showed no significant difference between those who were active and inactive in physical activity. However, physical activity is an important factor, as it reduces the risk of CC by 5% with moderate physical activity (OR=0.95; 95% CI: 0.61-1.48) and by 39% with high physical activity (OR=0.61; 95% CI: 0.38-0.98) compared to individuals with low physical activity (Lee, So, Piyathilake, & Kim, 2013). Research by Xing et.al (2022) also demonstrated that physical activity can serve as a protective factor against HPV infection.

Diet is a significant factor in many aspects of health, including CC. The results indicated that people who did not consume fruits and vegetables regularly had more positive VIA results than those who did. However, cohort studies examining the relationship between fruit and vegetable consumption and CC are limited. A systematic review by Tomita et al. (2021) reported non-significant results, with an Odds Ratio (OR) of 0.61 (95% CI: 0.52-0.73) for vegetable consumption and 0.80 (95% CI: 0.70-0.93) for fruit consumption. In contrast, another study found that individuals with lower fruit and vegetable intake and a high viral load (> 15.5) had a higher risk of cervical intraepithelial neoplasia (CIN) II/III (OR=2.84; 95% CI: 1.26-6.42), compared to those with lower intake and lower viral load (< 15.5). These findings suggest that dietary intake of fruits and vegetables is associated with the development of cervical carcinogenesis (Hwang, Lee, Kim, & Kim, 2010).

Distribution of Positive Patients

All sub-districts with positive VIA cases are strategically located along national roads (Primary Arterial Roads) and district roads that serve as primary collector roads or national strategic roads. Such infrastructure is essential for improving accessibility, including ease of access to health facility services (Damailia & Oktavia, 2015; Sulistiono, Mawardi, & Widjonarko, 2018). Additionally, these sub-districts are well-served by a large number of PHCs, with nearly all having two PHCs in their area. Almost all sub-districts with positive VIA cases offer cryotherapy services. The availability of these services can be a significant incentive for women to undergo screening. With this service in place, patients who receive positive results can quickly access the necessary treatment. This aligns with research by Wahidin et al. (2020), which demonstrated that the effectiveness of cervical cancer screening using VIA is directly proportional to the availability of cryotherapy services. When healthcare facilities lack cryotherapy services, screening rates tend to be low, and vice versa. Incomplete recording of individual reports is a limitation of this study, the proportion obtained is not very accurate due to the large number of missing data. Follow-up research on risk factors is needed to make the characteristics of screened women more meaningful to explain causality.

Conclusion

The majority of positive cases were married, non-drinkers of alcohol, non-smokers, had higher education levels, were overweight, 20-44 years old, not working, had unhealthy dietary habits, active physical activity, and 37.5% had unknown follow-up. The highest positive VIA cases were found in the Kasihan sub-district and the Piyungan sub-district. These findings underline the need for targeted interventions to improve follow-up care and conduct follow-up studies regarding the risk factors of CC.

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Author Contribution and Competing Interest

All authors contributed to every stage of the journal, from collection, analysis, interpretation and preparation of the manuscript. All authors agree to the content of the manuscript and there is no conflict of interest.

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