

Behavioral differences in early detection of cervical cancer through self-assessment using KarS-A (Aim score card)

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Abstract

Purpose: This study aims to find cases of cervical cancer as early as possible by using self-assessment through KarS-A (Aim Score Card). **Methods:** The research design used a quasi-experimental approach with a pre-post test control group design. The number of samples at this stage was 230 WUS. The treatment group in the Sepulu subdistrict consisted of 115 WUS, while the control group in the Burneh subdistrict consisted of 115 WUS. The variables studied were self-assessment and WUS behavior. The statistical tests employed in the third stage are the chi-square test and logistic regression. **Results:** This research showed differences in the behavior of WUS with self-assessment and WUS without self-assessment, with a P value <0.05. In the behavioral variable, a p-value of 0.010 was obtained, which meant that there was an influence between self-assessment and the positive behavior of women of childbearing age for early detection of cervical cancer, with an OR of 7.200. Women who had conducted self-assessments and received a high-risk score had up to 7.2 times the chance of carrying out early detection compared to women who received a low-risk score, with a 95% CI value of 1.595-32.504. **Conclusion:** Self-assessment affects WUS behavior. Women with a high-risk score were 7.2 times more likely to undergo early detection as compared to women who got low scores.

Keywords: cervical cancer; KarS-A (aim scorecard); self-assessment

INTRODUCTION

Cervical cancer remains a major global health challenge, ranking third among the most common cancers in women, with an estimated 569,847 new cases and 311,365 deaths annually, of which 85–90% occur in low-resource and developing countries [1]. In Indonesia, the burden is particularly high, with 32,469 new cases and 18,279 deaths each year—equivalent to 50 women dying daily and one new diagnosis every hour [2,3]. Despite the availability of affordable early detection methods such as Pap smear and VIA (visual inspection with acetic acid), screening coverage in Indonesia remains very low, with national coverage at

only 11% and even lower in several rural districts, including Bangkalan [4, 5–8].

The problem is compounded by sociocultural factors, stigma, lack of awareness, and limited support systems, especially from husbands [9–13]. Previous research has highlighted multiple barriers to the successful implementation of cervical cancer screening programs. Studies show that women often feel embarrassed, lack knowledge, or perceive screening as unnecessary [9,10,14,15]. Government programs promoting Pap smear and VIA have not achieved their targets, particularly in rural areas, where awareness and participation remain inadequate [6–9].

Furthermore, obstacles extend beyond individual awareness to include systemic challenges, such as

procedural difficulties, lack of follow-up, limited infrastructure, and social stigma [4, 9–13]. The state of the art in this field shows that while the obstacles to cervical cancer screening are well-documented, little has been done to create innovative approaches that empower women to overcome these barriers. What is already known is that in Indonesia, cervical cancer deaths remain high and early detection coverage is still low, with significant gaps in districts such as Bangkalan. Barriers include a lack of knowledge, inadequate infrastructure, and insufficient support from spouses. What this study adds is the development of a self-assessment score for cervical cancer risk factors, which addresses one of the most persistent obstacles—procedural barriers—by encouraging women to self-evaluate their risk and become motivated to undergo early screening. This approach also challenges stigma by shifting responsibility from a solely medical setting to an accessible, individual-level tool.

To achieve this objective, this study employs a behavioral analysis framework to examine how self-assessment using the KarS-A (Aim Score Card) influences women’s awareness, motivation, and actions toward cervical cancer early detection. The framework links risk factor identification with health-seeking behavior, providing a novel pathway to address low screening uptake. By integrating self-assessment into existing prevention strategies, this study aims to bridge the gap between knowledge and action, offering an innovative approach to enhancing the early detection of cervical cancer in low-resource settings.

METHODS

The research method used a quasi-experimental design with a pretest-posttest control group design. The population was women of childbearing age who lived in Bangkalan. The treatment group was conducted in the Sepulu sub-districts of West Tanagurah, including the villages of Banyior, Prancak, and Maneron. In contrast, the control group was conducted in the Burneh sub-district, comprising the villages of Banangkah, Tonjung, Burneh, and Langkap, in 2018. The sample size is calculated using sample estimates, as described by Lemeshow et al. [16].

$$n = \frac{2 \sigma^2 (Z1- \alpha/2 + Z1-\beta)2}{(\mu1-\mu2)2}$$

A study obtained the following values: $\mu1 = 46.15$, $\mu2 = 64$, $\sigma1 = 4.5$, $\sigma2 = 6.8$. Based on the calculation of the formula, a sample size of 229 women was obtained, rounded up to 230 women [17]. Thus, the minimum sample in the treatment group was 115 women in the

Sepulu District, Bangkalan Regency (West Tanagurah, Banyior, Prancak, and Maneron villages). The minimum sample size in the untreated group was 115 women from the Burneh District, Bangkalan Regency (comprising Banangkah, Tonjung, Burneh, and Langkap Villages). In this research, sampling was conducted using simple random sampling, where the selection of samples was based on random chance.

RESULTS

Bangkalan Regency is on Madura Island, East Java Province, Indonesia. It has an area of 126,181 hectares. Geographically, its position is between 1120 40'06"–1130 08'04" BT and 60 51'39"–70 11'39" LS. It is located at the westernmost tip of Madura Island, bordered by the Java Sea to the north, Sampang Regency to the east, and Madura Strait to the south and west.

Bangkalan Regency comprises 18 sub-districts, which are divided into 273 villages and eight districts. This research was conducted in Bangkalan District, specifically in the Sepulu District (treatment group), where participants received counseling and self-assessment using the KarS-A. In contrast, in the Burneh District (control group), only counseling was provided without the use of self-assessment. In this research, the researchers selected Burneh and Sepulu sub-districts because these two sub-districts had the first and second lowest coverage rates for cervical cancer screening programs through VIA examination. The variables studied in the third stage are knowledge, attitudes, actions, behavior, and self-assessment.

Table 1. KarS-A (Aim score card)

Cervical Cancer Risk Factor Score Card			
Name :			
Age : ... Years Number (NIK) :			
Date :			
Address :			
No	Risk Factor	Score	Result
1.	Age women ≥35 years	7	
2.	Family income < Minimum Regional Wage (UMK)	6	
3.	History of childbirth ≥5	3	
4.	Never had a Pap smear	4	
5.	Partner not circumcised	3	
6.	Active smoker	6	
7.	Not using IUD contraception	1	
8.	Using oral contraceptive pill	5	
9.	Early sexual activity	5	
10.	Early sexual activity (≤17 years)	4	
11.	Number of sexual partners >1	9	
TOTAL SCORE			
Risk Categories	Low Risk = if total score <11		
	High Risk = if total Score ≥11		
Recommendations	= Continue regular cervical cancer screening according to age and schedule.		
	= Immediately undergo a Pap smear and other supporting examinations to confirm the diagnosis.		

Table 1 is the cervical cancer risk factor score card/ KarS-A (aim score card). Guidelines for using the score:

1. Women conducting self-assessment should evaluate their own condition based on the indicators in the “Risk Factor” column.
2. The score is filled in the “Result” column with the following rules: (a) If the condition matches the risk factor indicator, assign the corresponding score. (b) If the condition does not match, assign a score of 0 (zero). (c) Write the obtained score (based on 2a and/or 2b) in the “Result” column.
3. After filling all results, sum the scores and write the total in the “Total Score” row.
4. Interpret the self-assessment result based on the total score and match with the risk category (low or high risk), then follow the recommended management for each risk level.
5. Write the obtained score in the “Result” column, with the following provisions: (a) If the condition

- corresponds to the risk factor indicator, assign the score listed in the “Score” column. (b) If the condition does not correspond, assign a score of 0 “zero”. (c) Enter the score obtained (according to 5a and/or 5b) in the “Result” column.
6. After completing all entries in the “Result” column, add up the scores obtained and record the total in the “Total Score” row.
 7. Interpret the self-assessment result based on the total score. Classify the woman into the appropriate risk category (low risk or high risk), then follow the corresponding management recommendations provided for each risk level.

Table 2 shows that the age and occupation characteristics had a p-value of greater than 0.05, indicating no significant difference in these variables between the two groups. The education variable obtained a value of <0.05, meaning there were differences in the characteristics of educational variables in the two groups.

Table 2. Frequency distribution and homogeneity test of WUS characteristics according to the Bangkalan District treatment group, November 2021

Characteristic	Category	Control (n=115)		Behavior (n=115)		p-value
		n	%	n	%	
Age (years old)	<20	6	5.2	2	1.7	0.484
	21-34	38	33.0	52	45.2	
	>35	71	61.7	61	53.0	
Education	Basic (elementary school & junior high school)	40	34.8	81	70.4	0.000*
	Middle (senior high school)	43	37.4	20	17.4	
	High (diploma, undergraduate)	32	27.8	14	12.2	
Work	Unemployed (housewife)	80	69.6	91	79.1	0.131
	Work	35	30.4	24	20.9	

Homogeneity test using Chi-Square * non-homogeneous

Table 3 shows that self-assessment was ineffective in improving knowledge across all educational strata. In contrast, the variable of self-assessment attitude was only effective in the lower strata of education. In terms of the variables of action and behavior related to providing effective self-assessment, both low, secondary, and higher education strata have a value of $p < 0.05$. Based on the results of the behavioral comparison tests in both groups, differences were observed in behavioral variables between the two groups ($p\text{-value} < 0.05$).

The provision of risk factor scorecards aimed to increase women’s awareness of the early detection of cervical cancer by informing them of their risk score. It was hoped that there could be a follow-up by conducting early detection of cervical cancer at the

nearest health service. Self-assessment was only administered to the treatment group, women of childbearing age, in the Sepulu Health Center area; therefore, the following analysis test was conducted only in the Sepulu area.

Table 4 shows that, by identifying high risk through self-assessment, the positive behavior of WUS changed from 20.9% to 28.6%. A p-value of <0.05 was 0.010, which meant that there was an influence between self-assessment and the behavior of women of childbearing age to carry out early detection of cervical cancer. Table 3 also obtained the value of $OR = 7.200$, especially for women who had done self-assessment and then categorized as high risk; the chances of these women to do early detection of cervical cancer 7.200 times with a CI value of 95% = 1.595 – 3.504.

Table 3. Test of differences in WUS knowledge, attitudes, actions, and behavior based on education strata in Bangkalan Regency, November 2021

Education	Indicator	Control		Treatment		p-value
		n	%	n	%	
Lower education (Elementary school and junior high school)	Knowledge					
	Less	25	62.5	43	53.1	0.339
	Good	15	37.5	38	46.9	
	Attitude					
	Negative	29	72.5	37	45.7	0.007
	Positive	11	27.5	44	54.3	
	Action					
	No	40	100	42	51.9	0.000
	Yes	0	0	39	48.1	
	Behavior					
Secondary education (Senior high school)	Negative	40	100	68	84	0.004
	Positive	0	0	13	16	
	Knowledge					
	Less	14	32.6	10	50	0.265
	Good	29	67.4	10	50	
	Attitude					
	Negative	19	44.2	8	40	0.791
	Positive	24	55.8	12	60	
	Action					
	No	43	100	6	30	0.000
Higher education (Diploma, undergraduate, and postgraduate)	Yes	0	0	14	70	
	Behavior					
	Negative	43	100	14	70	0.001
	Positive	0	0	6	30	
	Knowledge					
	Less	8	25	4	28.6	1.000
	Good	24	75	10	71.4	
	Attitude					
	Negative	13	40.6	7	50	0.748
	Positive	19	59.4	7	50	
	Action					
	No	32	100	1	7.1	0.000
	Yes	0	0	13	92.9	
	Behavior					
	Negative	32	100	9	64.3	0.001
	Positive	0	0	5	35.7	

Statistical test using Chi-Square

Table 4. Influence test self-assessment WUS behavior in the treatment group of Bangkalan in November 2021

The result of self-assessment	Behavior				Total	
	Negative		Positive			
	n	%	n	%	n	%
Low risk	36	94.7	2	5.3	38	100
High risk	55	71.5	22	28.6	77	100
Sum	91	79.1	24	20.9	115	100
p-value = 0.010	OR = 7.200		CI 95% = 1.595 – 32.504			

Statistical test using Logistic Regression

DISCUSSION

The research was designed to identify the efficacy of a measuring tool by conducting a self-assessment of cervical cancer risk factors in two groups. To date, the government has implemented programs and policies aimed at early detection of cervical cancer. However, it has not increased the scope of early detection of cervical cancer. Self-assessment using KarSA is an innovation that can expand the scope of early cervical

cancer detection, addressing the obstacles identified in previous research. By carrying out a self-assessment, it is hoped that women will be able to carry out early detection of cervical cancer at the nearest health service.

This research examined several variables in both groups: knowledge, attitudes, and actions. A cervical cancer risk factor scorecard was provided in the WUS treatment group to assess itself (self-assessment) and determine whether it fell into the low-risk or high-risk category. This research was conducted in Bangkalan

Regency, specifically in two sub-districts: Burneh and Supulu. These two sub-districts are located far from each other. The reason for choosing the region was that its early detection coverage in 2016 was among the lowest.

Table 1, the homogeneity test of WUS characteristics according to groups was carried out; age and work characteristics were homogeneous, while educational characteristics received a p-value of <0.05 , which meant that educational characteristics were not homogeneous. The education characteristics in this research were not among the primary variables to be studied; however, further tests were conducted to determine whether education is a confounding variable. The subjects were from communities with varying levels of education, which could affect their WUS behavior.

Behavior is an action performed by a person that can be observed, measured, or repeated [18]. The behavioral domain encompasses knowledge, attitudes, and behaviors. The action in this research was in the form of the activities of a woman of childbearing age to carry out early detection examinations of cervical cancer, both in midwives, Community Health Centers, and private laboratories. At the same time, the behavior in question was assessed using several indicators, such as knowledge, attitudes, and actions of women [19]. This research was conducted in two sub-districts in Bangkalan, where one of the areas, Burneh sub-district (control group), 100% of participating WUS became respondents during the implementation of the research. However, after 1-3 months of research evaluation, no early detection of cervical cancer was achieved.

There were differences in behavior in the two groups, where the WUS group with self-assessment knew whether the risk score included high or low risk. The woman followed up the results of the score obtained by conducting an early detection examination of cervical cancer by conducting a VIA examination. In the WUS group, without self-assessment (control) and only given counseling about cervical cancer, 100% of no one in the group achieved early detection of cervical cancer. Providing counseling about cervical cancer was one way to increase public knowledge and awareness. The results showed that the control group was different from previous studies, where providing information and interventions about the importance of early detection of cervical cancer can positively change women's attitudes and behaviors toward early detection [17,20,21]. Health counseling in this research only changed knowledge, and WUS attitudes in both groups had not yet led to changes in attitudes and behaviors. Other factors, such as motivation, also influence a person's behavior. Motivation can come

from either internal or external sources. External motivation can come from the support of people such as husbands, community leaders, and peers. Based on the assessment of external motivation in both groups, it was found that more than 70% of husbands and close relatives in the treatment group received support from community leaders, compared to approximately 60% in the control group. Both groups were motivated to do early detection if the distance to do the examination was affordable and cost-free. The results showed that the differences from the research conducted in Central Java are that factors influencing women's behavior in early detection are support from husbands and social support, such as friends and health workers [22].

Based on further studies of 14 husbands, it was found that most husbands supported early detection of cervical cancer. However, the wife's factor did not do so because the wife felt there were no complaints or, if there were complaints, did not re-control. After all, she felt healed. Local community stores also supported cervical cancer early detection activities by coordinating with local midwives and providing facilities related to these activities. The motivation of local health workers so far has never been collective counseling about cervical cancer. However, the information provided was individual, such as if there were mothers who asked about cervical cancer, it could be explained and facilitated by midwives.

Analysis of behavioral differences in both groups obtained a p-value of <0.05 , meaning there were behavioral differences. Self-assessment in this research was an activity that measured self-assessment using a cervical cancer risk factor scorecard prepared in the first stage. The scorecard contained only risk factors and scores, with no additional information, so it cannot contribute to a person's knowledge or attitude after self-assessment. Self-assessment in this research can be used to enhance internal motivation for WUS to engage in early detection, thereby promoting more positive behavior in the early detection of cervical cancer.

Based on the test of the effect of self-assessment on WUS behavior in the treatment group, it was demonstrated that a positive behavioral change occurred in women who underwent self-assessment using cervical cancer risk factor scorecards. Table 3 also obtained a p-value of <0.010 , with an OR value of 7.200 and a 95% CI of 1.595-32.504, indicating that self-assessment had an influence on the behavior of WUS in conducting early detection of cervical cancer. Women who conducted self-assessment using risk factor scores had the opportunity to detect cervical cancer early by 7.2 times compared to women who did not conduct self-assessment. Researchers also conducted interviews with WUS, which underwent VIA

examinations for several reasons, such as being surprised by their scores and wanting to understand and verify their health. In contrast, WUS did not do the VIA examination partly due to embarrassment, menstruation, and feeling healthy, and there were no complaints. Some argued that the VIA examination was futile because, if abnormal results were obtained, further examination would be carried out using a pap smear procedure that was not significantly different from the one used during the VIA examination.

Self-assessment has not been widely used in health research, particularly in the form of scorecards. The purpose of self-assessment using the risk factor scorecard is to increase self-awareness (internal motivation) in the early detection of cervical cancer. Awareness that arises from within oneself about the importance of early detection of cervical cancer was expected to be actualized into health behavior, in this case by VIA examination and pap smear, as an effort to detect early cervical cancer. However, many women are not aware of the importance of cervical cancer screening [9,10,14,15].

The self-assessment only contained a score for cervical cancer risk factors without providing any additional information related to the definition, causes, signs and symptoms, risk factors, prevention, and treatment of cervical cancer. Table 2 demonstrates that self-assessment is effective in actions and behaviors. Therefore, the use of self-assessment must be accompanied by other activities to provide information related to cervical cancer, such as health education in the form of counseling, followed up with cervical cancer early detection examination to find cases as early as possible (case finding) to reduce the incidence of cervical cancer at an advanced stage.

The findings of this research can inform policymakers that the low coverage of early detection of cervical cancer is partly due to screening procedures. In Madurese, it is still considered taboo if there is an examination procedure that opens the intimate area (reproductive organs), and this follows the coverage of IUD acceptors, which is also low in the Madura region because it has a similar procedure. These findings can inform policymakers that there is an innovation that can be utilized to enhance the coverage of early cervical cancer detection.

CONCLUSION

The study identified significant differences in the behavior of women of reproductive age (WUS) regarding early cervical cancer detection when self-assessment using the KarS-A tool was implemented. Women who utilized the KarS-A scorecard

demonstrated a higher likelihood of engaging in positive behaviors for early detection than those who did not perform self-assessment. The KarS-A tool, designed to assess cervical cancer risk factors, is a simple yet effective method to promote early detection behaviors.

The tool should be coupled with health education, such as counseling, to enhance effectiveness. It should be accompanied by a reminder card prompting women to return for self-assessment and follow-up exams as recommended by their score. Future research should expand to include additional risk factors, supporting and strengthening factors, a broader range of research subjects, and diverse populations.

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