



## Knowledge, Attitudes and Acceptability of Cervical Cancer Screening among Public School Teachers in Benin Metropolis

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**Abstract.** This study was designed to investigate knowledge, attitudes and acceptability of cervical cancer screening among public school teachers in Benin Metropolis. Five research questions were raised to guide the study, while two hypotheses were formulated and tested at 0.05 level of significance. The descriptive survey research design was adopted for the study. The population for this study consisted of all the 2,120 public school teachers in Benin Metropolis. The sample size for the study was 381 respondents and was selected through multi-stage sampling technique. A self-structured questionnaire designed by the researchers and validated by three experts in HSE department was used for the study. Two research assistants who were briefed of the purpose of the study assisted the researchers to administer the questionnaire to the respondent, only 361 copies were retrieved successfully after completion. Data collected was analyzed using frequency counts and percentages for the research questions while the inferential statistics of Chi-square was used to test the hypotheses at 0.05 level of significance. The findings from the study showed that most (63.9%) of the public-school teachers in Benin Metropolis had moderate knowledge of cervical cancer screening. Majority (70.9%) of respondents have positive attitudes towards cervical cancer screening and their level of acceptability is also high (60.11%). The study further revealed that knowledge significantly influenced acceptability of cervical cancer screening among public school teachers in Benin metropolis but attitudes did not. Based on the findings of the study, it was recommended among others that government should carryout educational campaigns and increase efforts to enhance knowledge about cervical cancer screening.

**Keywords:** Knowledge, attitudes, acceptability, cervical cancer screening, Benin Metropolis

### 1. Introduction

#### 1.1 Background to the study

One of the public health issues affecting women globally is cervical cancer. It is a form of cancer that develops in the cells of the cervix. The cervix is the lower, narrow end of the uterus that connects the uterus to the vagina. Cervical cancer is the most common cancer of the female genital tract and is the most prevalent cause of cancer-related deaths in women. One of the major ways of surviving cervical cancer is through early detection. If cervical cancer is undiagnosed and untreated, it will slowly spread out of the cervix and into the surrounding tissue and organs. The cancer can spread down to the vagina and the surrounding muscles that support the bones of the pelvis. One can have emotional and social effects after a cancer diagnosis which may include dealing with a variety of emotions such as sadness, anxiety, fear, or anger, or managing your stress level. Sometimes people find it difficult to express how they feel to their loved ones.

Cervical cancer is one of the most typical cancers worldwide, with an estimated 604,000 new cases and 342,000 deaths in 2020 (World Health Organization, WHO, 2024). It is a public health problem responsible for increased morbidity and mortality in women. Cervical cancer arises following a human papillomavirus (HPV) persistent infection with oncogenic or high-risk types. According to Nindl and Stockfleth (2020), HPV spreads through sexual contact between mucous membranes of people with the infection. In persistent “high-risk” HPV infections, the virus can damage the deoxyribonucleic acid (DNA) and cause cells to divide and continue growing out of control leading to cancer. The development of cervical cancer is linked to various risk factors, including multiple sexual partners, unprotected sex, and coitus with uncircumcised sexual partners. A study carried

out by the National Centre for Biotechnology in 2001, revealed that uncircumcised men have an increased risk of HPV infection, including oncogenic HPV because of its proximity to the foreskin, which may be particularly vulnerable to infection. The study suggested that the increased risk of multiple HPV infections among uncircumcised men may simply reflect “an enhanced vulnerability of the foreskin to multiple episodes of infection by different HPV types over time.” Out of the 379 men that participated in the study, the prevalence of any HPV infection in the glans/corona was significantly higher in uncircumcised men 46% than in circumcised men 29% (Castellsague, et al, 2002). Also, among uncircumcised men, HPV prevalence in the foreskin was considerably higher than was found in circumcised men. The human papillomavirus infection is the principal cause of cervical cancer and is often contracted through sexual contact. Other factors include smoking, prolonged use of combined oral contraceptives, and engaging in early sexual practices which could include both vaginal, anal, and oral sex.

Cervical cancer can be prevented through screening and testing. Cervical cancer screening is a medical screening test designed to identify risk of cervical cancer. It is used to find changes in the cells of the cervix that could lead to cancer. Three types of tests are currently available and are widely used for the screening of cervical cancer. These include tests for HPV, cytology-based Papinocolaou test (Pap test), and unaided Visual Inspection with Acetic acid (VIA) (WHO, 2013).

The main goal of cervical cancer screening programmes is to reduce the mortality rate from an incidence of the disease by identifying females with precancerous lesions and early invasive cancer and treating them appropriately. Precancerous lesions are lesions that have a capacity to progress potentially to invasive cancer if left untreated (International Agency for Research on Cancer IARC, 2005).

Regular screening at different ages is recommended in some countries as a secondary prevention strategy for cervical cancer. From 21years to 29years, it is recommended that women have a Pap smear every 3 years and those within the ages of 30 to 65 years should have Pap smear every 5 years in combination with HPV testing. However, after 65 years, it is recommended that women who have had regular screening can stop screening (Campos et al., 2017).

For cervical cancer screening methods and services to be utilized, women must be aware of their availability and have a basic understanding of the disease. This will increase screening acceptability

and as a result, reduce cancer related morbidity and mortality.

Another preventive measure of cervical cancer is vaccination which is one of the most commonly used public health strategies to reduce the risk of infection and minimize the prevalence of the disease-causing agent (HPV) in the environment. Although cervical cancer early screening and treatment can decrease morbidity and mortality, most women including female public-school teachers report to the hospital late and this could partly be explained by a lack of knowledge and poor attitude of women towards cervical cancer screening.

Cervical cancer can be cured if detected early, and if the early warning signs and symptoms are understood which is necessary for early diagnosis. Cervical cancer screening is effective in identifying those that are at risk and if an anomaly has been discovered, a follow-up screening and treatment is delivered to women with the least amount of discomfort. Cervical cancer preventive programs offer services to help women avoid or reduce the risk of developing cervical cancer. For a health program to be implemented at the grass root, state or national levels, it must be feasible or accessible.

Despite the availability of preventive measures of cervical cancer such as cervical cancer screening services, a lot of women do not utilize them and one of the prevalent causes is inadequate knowledge. The knowledge women have about cervical cancer differs from country to country and the devastating impact of cervical cancer on individuals, families, nations and mankind is reduced by increasing literacy among the general public, especially women. Being aware of the disease makes many to develop interest in utilizing screening services and it takes knowledge of cervical cancer, its risk factors and the consequence of not getting screened to promote a favourable attitude towards cervical cancer screening. Knowledge of cervical cancer will empower women to accept appropriate vaccination and screening as means of preventing and controlling the disease.

The attitudes towards cervical cancer screening is also very important in eliminating or reducing cervical cancer. A lot of women may feel it is not important to participate in cervical cancer screening because of the belief that they are not at risk of developing cervical cancer. The poor attitude of some women towards cervical cancer screening including public school teachers may limit their involvement in the screening programme. A number of factors that hindered acceptability of cervical cancer screening include fear of humiliation, pain or the detection of cervical cancer; anxiety as a result

of a negative or abnormal cervical smear result; embarrassment of being screened by male screeners, etc. A previous history of trauma, such as childhood sexual abuse, intimate partner violence, and trauma related to medical procedures, which was reported in a previous study, appeared to induce negative attitudes and function as barriers to cervical cancer screening (Ackerson, 2010). In addition, research has indicated that a favorable attitude towards cervical cancer screening is linked to a woman's degree of education. In a study, Kahesa, et al, (2012), reported that women who had attended at least primary school were more likely to attend screening than women who had never attended school.

The acceptability of cervical cancer screening will be based on the knowledge women have about cervical cancer and their attitude towards screening services after gaining knowledge. The acceptability of cervical cancer screening is poor in many developing countries including Nigeria (Uchendu, Hewitt-Taylor, Turner Wilson & Nwakasi, 2021). Some of the factors that may hinder acceptability of cervical screening include a lack of knowledge about the disease, lack of familiarity with the concept of prevention, the geographical and economic inaccessibility of care, the poor quality of services and lack of support from husbands and families (Uchendu, et al, 2021).

### **1.2 Statement of the Problem**

The importance of cervical cancer screening as a preventive measure of cervical cancer cannot be overemphasized. One will expect every woman who has attained the child bearing age to make full use of cervical cancer screening services in order to live healthily but this is not always the case as reported by Uchendu, et al, (2021), in their study which revealed that the uptake of screening was poor among the general population in Nigeria. Although screening is a known cost-effective strategy used in reducing the burden of cervical cancer worldwide, its uptake particularly in developing countries is still abysmal (Jeronimo, et al, 2014). According to Hawkins, Benard and Greek (2013), if a large number of women participate in cervical cancer screening, cervical cancer mortality will be greatly reduced. Government has made efforts to increase awareness on cervical cancer screening through jingles on television and radio, various print media, and social media handles. The government have also provided free cervical cancer screening services at primary health care centers to curb cervical cancer; but despite the various efforts made by government to increase awareness and to improve the acceptability of cervical cancer screening, cervical cancer screening remains very low. Could the reason for this low uptake be inadequate/low knowledge of

cervical cancer and its screening services, or negative or poor attitudes towards screening services? From the researcher's personal observation, there seems to be no empirical work done in this area among public school teachers in Benin Metropolis that is best known to the researcher; therefore, the study seeks to investigate the knowledge, attitudes and acceptability of cervical cancer screening among public school teachers in Benin Metropolis with particular interest in the influence of knowledge and attitudes towards acceptability of cervical cancer screening among public school teachers in Benin Metropolis.

### **1.3 Research Questions**

The following research questions were raised to guide the study:

- What is the level of knowledge of cervical cancer screening among public school teachers in Benin Metropolis?
- What are the attitudes of public-school teachers in Benin Metropolis towards cervical cancer screening?
- What is the level of acceptability of cervical cancer screening among public school teachers in Benin Metropolis?
- Does level of knowledge influence acceptability of cervical cancer screening among public school teachers?
- Does attitude influence the acceptability of cervical cancer screening among public school teachers?

### **1.4 Hypotheses**

The following hypotheses were formulated and tested at 0.05 level of significance:

- Knowledge of cervical cancer screening will not significantly influence its acceptability among public school teachers.
- Attitude towards cervical cancer screening will not significantly influence its acceptability among public school teachers.

### **1.5 Purpose of the Study**

The purpose of this study was to investigate the knowledge, attitudes and acceptability of cervical cancer screening among public school teachers in Benin Metropolis, Edo State.

Specifically, the objectives of the study were to:

- Investigate the knowledge of cervical cancer screening among public school teachers in Benin Metropolis.
- Determine the attitudes of public-school teachers in Benin Metropolis towards cervical cancer screening.
- Determine the level of acceptability of cervical cancer screening among public school teachers.
- Determine if knowledge influences the acceptability of cervical cancer screening among public school teachers.
- Determine if attitude influences the level of acceptability of cervical cancer screening among public school teachers.

## 2. Research Methodology

The descriptive survey research design was adopted for this study. The design was considered appropriate for this study because it is primarily concerned with the collection of data for the purpose of describing and interpreting existing conditions and prevailing practices using a representative sample of the population. Furthermore, it accurately and systematically describes, observes and validates aspects of groups collected through quantifiable information without manipulation of the variables (Sledlecki, 2020). The design enabled the researcher to investigate the knowledge, attitude and acceptability of cervical cancer screening among public school teachers in Benin Metropolis.

The population of the study consisted of all the 2,120 female public-school teachers in Benin Metropolis (Edo State Ministry of Education, 2023). Benin Metropolis is made up of three Local Government Areas which are; Oredo, Egor and Ikpoba-Okha.

The sample size for this study consisted of 381 respondents who were selected through the multi-stage sampling technique. The stages are:

**Stage 1:** The stratified random sampling technique was used to stratify the public schools into three clusters that make up the area of study. This includes Oredo, Egor and Ikpoba-Okha public schools.

**Stage 2:** Simple random sampling technique was used to select 50% from the three strata through balloting with replacement to get a total of 68 public schools out of the 134 public schools in Benin Metropolis.

**Stage 3:** In this stage, 11 from 22 schools, 14 from 27 schools and 43 from 85 schools were selected from Oredo, Egor and Ikpoba-Okha L.G.A respectively to make up a total of 68 public schools for sampling.

**Stage 4:** Finally, the systematic sampling technique was used to select 35% of the total number of teachers from each of the previously selected schools to give a total of 381 sampled respondents.

The Instrument that was used in collecting data for this study was a self-structured questionnaire titled: Knowledge, Attitude and Acceptability of Cervical Cancer Screening. The questionnaire consists of four sections, Section A consisted of demographic data of respondents, Section B consisted of 15 multiple choice questions on the knowledge of cervical cancer screening among female public-school teachers in Benin Metropolis, the correctly answered items was scored 1 while incorrect options was scored 0. Section C consisted of 10 items on the attitudes of female public-school teachers in Benin Metropolis towards cervical cancer screening which was structured on a four-point modified Likert rating scale ranging from Strongly Agree (SA) 4, Agree (A) 3, Disagree (D) 2, Strongly Disagree (SD) 1. Section D consisted of 5 items on the acceptability of cervical cancer screening among female public-school teachers in Benin Metropolis and it was structured on a four-point modified Likert rating scale ranging from Strongly Agree (SA) 4, Agree (A) 3, Disagree (D) 2, Strongly Disagree (SD) 1.

The instrument was validated by three experts in the Department of Health, Safety and Environmental Education. They examined the items in terms of relevance, clarity and appropriateness of language. Their corrections, opinions and suggestions were taken into consideration while preparing the final instrument for this study.

The reliability of the instrument was determined by test-retest method of reliability. The instrument was administered twice to twenty (20) public school teachers who were not part of the study within two weeks interval. The scores obtained from both administrations were computed using the Pearson's Product Moment Correlation Coefficient, and a coefficient score of 0.73 was obtained.

The instrument was personally administered by the researchers with the help of two research assistants who helped in the distribution and the retrieval of the questionnaire. The research assistants were properly briefed on the method of data collection to ensure 100% retrieval of the questionnaires. Data collected were analyzed using descriptive statistics of frequency counts and percentages for the research questions raised, while inferential statistics of chi-square was used to test the formulated hypotheses at 0.05 level of significance.

### 3. Presentation of Results and Discussion of Findings

This section of the research focuses on presentation of results and discussion of findings. The results are presented in tables and statistical reports with the aim to validate the stated objectives and hypotheses. Thus, the research provides an evaluation on knowledge, attitudes and acceptability of cervical

cancer screening among public school teachers in Benin Metropolis, Edo State. In the study 381 questionnaires were administered to the respondents but only 361 were returned successfully. Hence, return rate of 94.70%.

Therefore, the discussion of this work was done based on the research questions as follows:

**Research Question One:** What is the level of knowledge of cervical cancer screening among public school teachers in Benin Metropolis?

**Table 1:** Level of knowledge of cervical cancer screening among public school teachers in Benin Metropolis

Knowledge	Frequency	Percent
low	91	25.2
moderate	230	63.7
high	40	11.1
Total	361	100.0

Bench mark: score of 1-7=low knowledge, score of 8-11=moderate knowledge, score of 12-15= High knowledge  
The result on the level of knowledge of cervical cancer screening among public school teachers in table one, revealed that 25.2% of the respondent public school teachers have low knowledge of cervical cancer screening, 63.7% of them have moderate knowledge of cervical cancer screening, while 11.1% of them have high knowledge of cervical cancer screening. From the result, it can be clearly seen that the larger proportion of the respondent public school teachers had moderate knowledge of cervical cancer screening while a few of them had high knowledge of cervical cancer screening in Benin Metropolis.

**Research Question 2:** Attitudes of public-school teachers towards cervical cancer screening in Benin Metropolis

**Table 2:** Frequency and percentage of public-school teachers towards cervical cancer screening

Attitude	Frequency	Percent
Negative	105	29.1
Positive	256	70.9
Total	361	100.0

Score of 0-5: negative attitude; score of 6-10: positive attitude

In research question 2, the table on attitude of public-school teachers towards cervical cancer screening shows that 70.9% of the respondents have positive attitude towards cervical cancer screening and also 29.1% of the respondent public school teachers were observed to have negative attitude towards cervical cancer screening. This suggests the fact that the respondents have a positive attitude towards cervical cancer screening.

**Research Question 3:** Acceptability of cervical cancer screening among public school teachers in Benin Metropolis

**Table 3a:** frequency and percentage on the level of acceptability of cervical cancer screening among public school teachers in Benin Metropolis

S/N	Items	Agree	Disagree
1	I have been screened for cervical cancer	180(49.9%)	181(50.1%)
2	I am willing to be screened for cervical cancer.	356(98.7%)	5(1.3%)
3	I will go for cervical cancer screening often as recommended by WHO	355(98.4%)	6(1.6%)
4	I have been screened for cervical cancer more than once	96(26.8%)	265(73.2%)
5	I will go for cervical cancer screening if a health professional performs the procedure.	304(84.3%)	57(15.7%)

Analysis on level of acceptability of cervical cancer screening among public school teachers in Benin Metropolis shows that 49.9% of the respondents agreed that they have been screened for cervical cancer, while 50.1% have never been screened for cervical cancer. Also, 98.7% are willing to be screened for cervical cancer while 1.3% are not willing to be screened for cervical cancer. Furthermore, 98.4% agreed to go for cervical cancer screening often as recommended by the World Health Organization, while 1.6% disagreed to this. More so, 26.8% have been screened for cervical cancer more than once, while 73.2% have not been screened more than once. Lastly, 84.3% agreed to go for cervical cancer screening if a health professional performs the procedure, while 15.7% do

not agree to this. In conclusion from the result above, the level of acceptability of cervical cancer screening among public school teachers in Benin Metropolis is very high.

**Table 3b:** frequency and percentage level of acceptability of cervical cancer screening among public school teachers in Benin Metropolis

Level of acceptability	Frequency	Percentage
High acceptability	209	60.11
Low acceptability	152	39.89
Total	361	100

Score of 0-2: low acceptability, score of 3-5: high acceptability

The table above on the level of acceptability of cervical cancer screening among public school teachers in Benin Metropolis reveals that 94.8% of the respondents have high acceptability of cervical cancer screening, while 5.2% of the respondents have low acceptability of cervical cancer screening. This implies that the level of acceptability of cervical cancer screening among public school teachers in Benin Metropolis is high.

**Hypothesis 1:** Knowledge does not significantly influence acceptability of cervical cancer screening among public school teachers in Benin Metropolis

**Table 4:** Influence of knowledge on acceptability of cervical cancer screening among public school teachers in Benin Metropolis

		Acceptance		Chi-square	df	Sig.
		High	Low			
Knowledge	Low	170	60	68.97	2	0.00
	Moderate	31	60			
	High	8	32			
Total		209	152			

The chi-square test statistics in Table 4 shows that knowledge of cervical cancer screening has a significant influence on the acceptability of cervical cancer screening among public school teachers in Benin Metropolis. From the report of the analysis, since the calculated P-value is less than the adopted significance level of 0.05, ( $\chi^2(df=2, N=361, P\text{-value}=0.00)$ ), then, the stated null hypothesis is rejected. This implies that knowledge of cervical cancer screening has significant influence on acceptability of cervical cancer screening among public school teachers in Benin Metropolis.

**Hypothesis 2:** attitudes does not significantly influence acceptability of cervical cancer screening among public school teachers in Benin Metropolis

**Table 5:** Influence of attitudes on acceptability of cervical cancer screening among public school teachers in Benin Metropolis

		Acceptability		Chi-square	df	Sig.
		High	Low			
Attitude	Negative	65	40	0.97	1	0.39
	Positive	144	112			
Total		209	152			

The Table 5 above shows the chi-square test analysis which states that attitude does not influence acceptability of cervical cancer screening among public school teachers in Benin Metropolis. It was discovered that the P-value is greater than the adopted significance level of 0.05 ( $\chi^2(df=1, N=361, P\text{-value}=0.39)$ ). This implies that the null hypothesis that attitude does not significantly influence acceptability of cervical cancer screening among public school teachers in Benin Metropolis is accepted.

#### 4. Discussion of Findings

The findings of this study reveal that a significant proportion of public-school teachers in Benin

Metropolis possess only a moderate level of knowledge about cervical cancer screening. Specifically, 63.7% of the respondents have moderate knowledge, while 25.2% have low knowledge, and only 11.1% have high knowledge. This pattern suggests that while most teachers are somewhat informed about cervical cancer screening, there is a considerable gap in comprehensive understanding, which could hinder the effectiveness of public health campaigns aimed at increasing screening uptake. This result aligns with previous studies in similar settings. For instance, Ebu et al. (2015) found that healthcare workers in Ghana also exhibited moderate levels of knowledge regarding cervical cancer screening, indicating a widespread issue across the West

African region. The moderate level of knowledge observed in this study might be attributable to limited access to continuous professional development opportunities and educational resources tailored to cervical cancer prevention (Akinyemiju et al., 2015). Moreover, Olaniyan et al. (2010) noted that inadequate health education programs in schools could contribute to the observed gaps in knowledge.

The study further explored the attitudes of public-school teachers towards cervical cancer screening. The data shows that 70.9% of the respondents possess a positive attitude, while 29.1% have a negative attitude. The prevalence of positive attitudes is encouraging as it suggests a general willingness among teachers to engage in screening activities, which is crucial for early detection and treatment of cervical cancer. These findings are consistent with the work of Udigwe (2006), who reported that a positive attitude towards cervical cancer screening was prevalent among Nigerian women. The positive attitude observed in this study could be influenced by the teachers' educational background, as education has been linked to more favorable health behaviors (Nwobodo & Malami, 2005). However, the existence of a significant minority with negative attitudes warrants attention, as these individuals may represent a group at risk of non-participation in screening programs. The influence of cultural beliefs and fear of diagnosis, as noted by Gharoro and Ikeanyi (2006), might explain these negative attitudes and should be addressed in future interventions.

The level of acceptability of cervical cancer screening among public school teachers in Benin Metropolis is notably high, with 60.11% of respondents displaying high acceptability. Despite this, the data reveals a disparity between willingness and actual screening behavior. For instance, while 98.7% expressed willingness to be screened, only 49.9% had ever been screened, and a mere 26.8% had undergone multiple screenings. This gap between intention and action is reflective of barriers such as accessibility, cost, and fear, which have been highlighted in previous studies (Okunowo et al., 2018). According to Ifemelumma et al. (2019), factors such as inadequate screening facilities and the lack of a national screening program in Nigeria contribute significantly to low screening rates despite high willingness. The findings here suggest that while public health education has been effective in creating awareness and positive attitudes, practical challenges continue to impede actual screening uptake.

The chi-square analysis shows a significant influence of knowledge on the acceptability of cervical cancer screening among public school

teachers in Benin Metropolis ( $p < 0.05$ ). This finding suggests that increasing knowledge about cervical cancer screening can potentially enhance its acceptability. This is consistent with the Health Belief Model, which posits that individuals who are more informed about a health issue are more likely to engage in preventive behaviors (Champion & Skinner, 2008). Conversely, the study found no significant influence of attitudes on the acceptability of cervical cancer screening ( $p > 0.05$ ). This could be because attitudes, while important, may be overshadowed by other factors such as accessibility, convenience, and personal experiences with healthcare services. This aligns with the findings of Makwe et al. (2012), who reported that positive attitudes alone were insufficient to drive screening behavior in the absence of enabling conditions.

The study highlights the importance of enhancing knowledge about cervical cancer screening among public school teachers to increase the overall acceptability and participation in screening programs. While attitudes are generally positive, their influence on screening behavior appears limited without addressing practical barriers. Therefore, public health interventions should focus on both educational campaigns and improving access to screening facilities to close the gap between intention and action in cervical cancer prevention.

## 5. Conclusion

In conclusion, the outcome of the research findings revealed that majority of the respondents are knowledgeable and possess high level of positive attitude towards cervical cancer screening. However, it was observed that knowledge has a significant influence on acceptability of cervical cancer screening while attitude does not significantly influence the acceptability of cervical cancer screening among public school teachers in Benin Metropolis. In view of these findings, the following recommendations were made.

## 6. Recommendations

In view of the challenges resulting from the associations between knowledge, attitude and acceptability of cervical cancer screening, the following recommendations were made:

- The government should carry out educational campaigns and increase efforts to enhance knowledge about cervical cancer screening procedures, focusing on the benefits and addressing misconceptions.
- There should be accessibility improvements by ensuring that screening services are easily accessible to teachers,

possibly through school-based health programs.

- There should be continuous promotion of positive attitudes among teachers while addressing the concerns of those with negative attitudes through tailored interventions.
- Trusted health professionals should be utilized to encourage screening participation, possibly through regular health talks and on-site screening events.
- Emphasis should be laid on regular follow-up screenings to those who have been screened once, ensuring sustained health monitoring.

By addressing these areas, it is likely that both the knowledge level and participation rates in cervical cancer screening among public school teachers in Benin Metropolis can be significantly improved

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