

## Effect of Educational Program on Knowledge, Practice and Attitude of Women Regarding Cervical Cancer

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### Abstract

**Background:** Decrease level of women's knowledge and practice regarding cervix for cancer and their attitudes to prevent susceptibility to more complications; need to increase awareness through knowledge, practice and women's attitudes by educational program **Aim:** to evaluate the impact of educational program on knowledge, practice and attitude of women regarding cervical cancer. **Design:** Quasi-experimental design. **Setting:** outpatient clinics at Suez Canal University, Ismailia city **Sample:** purposive sample; 185 women participated in this study. **Tools:** three tools were utilized 1<sup>st</sup> tool was a structured Interviewing Questionnaire divided into 3 parts; Socio-demographic data, Obstetric and gynecologic history and Assessment of women's Knowledge, 2<sup>nd</sup> tool: Modified Likert Scale for women's attitude. The 3<sup>rd</sup> Tool: Self-reported practice. **Results:** Knowledge and Practice: The intervention led to statistically significant improvements in knowledge and practice across all phases. Attitude: A significant improvement in positive attitudes was observed in both the post-intervention and follow-up phases, indicating a lasting effect of the educational program p-values (<0.001) .**Conclusion:** Women's knowledge, practice and attitude were improved significantly following the adoption of the educational program. **Recommendation:** Enhance Professional Training, Provide Targeted Patient Education.

**Key Words:** Cervical Cancer, Knowledge, Practice, Attitude.

## Introduction

Cervical cancer is characterized by the abnormal growth of cells in the cervix and is primarily caused by the human papillomavirus (HPV). HPV types 16 and 18 are responsible for approximately 70% of cervical cancer cases worldwide. The virus is predominantly transmitted through sexual contact. Globally, cervical cancer ranks as the fourth most common cancer among women, with an estimated 660,000 new cases and around 350,000 deaths in 2022. Notably, about 94% of these deaths occur in low- and middle-income countries. In Egypt, cervical cancer is the 13th most frequent cancer among women and the 9th most frequent among women aged 15 to 44. Annually, approximately 1,320 women are diagnosed with cervical cancer, and 744 succumb to the disease (**ICO/IARC Information Centre on HPV& Cancer, 2023; World Health Organization, 2024**). Initiation of sexual activity at a younger age, several sexual partners, either because of several wives becoming married or because divorce and remarriage are becoming more common in the community as a whole, over-aged pregnancy risk, lack of genital hygiene, nulliparity and multiparity, alcohol and tobacco use, poor dietary habits, obesity, immune suppression, prolonged use of contraceptives, and positive family history for cervical cancer all of these are risk factors to the HPV infection that may progress to cancer (**Mengesha, Messele, & Beletew, 2020; Cancer Research UK, 2023**).

Exposure to cancer in the cervix usually has no indicators. There are no symptoms until a precancerous lesion becomes a true invasive cancer and metastasizes into close tissues. When this occurs, the most common symptoms of cervical cancer are abnormal bleeding that occurs after sexual vaginal intercourse or menopause. Other symptoms during the menstrual interval are spotting, after douching, or having longer or heavier menstrual periods than usual, pain during sex, and abnormal vaginal discharge. More advanced cervical cancer can cause pelvic pain, hunger loss, weight loss, and reduction in red blood cells (**Butler, 2025**).

The risk of cervical cancer is six times higher for women with HIV than for those without the infection. Cost-effective cervical cancer prevention measures include HPV vaccination, early-stage cancer lesion screening, and therapy. Cancer screening for women has been repeatedly demonstrated to be effective in lowering the rate of incidence, or the occurrence of new cervical cancer cases, and mortality from cervical cancer. Women frequently do not experience symptoms until the disease has progressed, so early detection is crucial for the cure and rapid treatment of cervical cancer (**Tsegay, Araya, Amare, Tsadik, (2021); WHO, 2022**).

In developed countries, organized and population-based screening programs have significantly increased coverage rates, especially among hard-to-reach populations. However, in developing countries, the average screening coverage remains low, with rates as

low as 1% in some regions. In Egypt, data on HPV prevalence is limited. However, in the Northern Africa region, which includes Egypt, approximately 3.0% of women in the general population are estimated to harbor cervical HPV-16/18 infection at any given time (**Human Papilloma Virus (HPV) information center, 2023**).

Effective primary and secondary prevention measures, including HPV vaccination and routine screening, can significantly reduce the risk of cervical cancer. Infections with the HPV strains that most frequently result in cervical cancer can be avoided with the use of the HPV vaccine. Even for those who have received vaccinations, routine cervical screening is still necessary. With the right follow-up, routine Pap test screening every three to five years can cut the incidence of cervical cancer by as much as 80% (**Arbyn, Weiderpass, Bruni, de Sanjosé, Saraiya, Ferlay, & Bray, 2020; National Cancer Institute 2021**).

Cervical Cancer has a long pre-invasive period. Thus, it can be effectively treated at an early stage. There are number of factors affecting the stage of the disease, thus its treatment measures. Factors as the woman's age and general health, and desire for the next pregnancy in the future. The different measures for its treatment are radiation, chemotherapy, surgery, targeted therapy, and immunotherapy.

Since they are an essential part of the healthcare delivery system, nurses are a vital component in the fight against cervical cancer. Thankfully, nurses

are essential to health promotion and education. Additionally, it is the nurse's responsibility to educate women about risk factors, identify early indicators of cervical cancer, and encourage regular screenings. The three main components of comprehensive cervical cancer control are HPV vaccination as first-line prevention, pre-cancerous lesion screening and treatment as secondary preventive measures, and tertiary prevention, which includes palliative care and the diagnosis and treatment of invasive cervical cancer (**Lemma, Aboma, Girma, Dechesa, 2022**).

### **Significant of the study**

The most recent data from 2023 indicates that cervical cancer in Egypt accounts for approximately 1,302 new cases annually, with an age-standardized incidence rate of 2.8 per 100,000 women. In the same year, an estimated 820 women died from the disease, resulting in an age-standardized mortality rate of 1.8 per 100,000 women. Regarding HPV prevalence, data specific to Egypt is limited. However, in the Northern Africa region, which includes Egypt, about 3.0% of women in the general population are estimated to harbor cervical HPV-16/18 infection at a given time (**ICO/IARC Information Centre on HPV& Cancer, 2023; World Health Organization, 2024**).

A high rate of mortality may be due to insufficient or shortage of knowledge, practice, or attitude of Egyptian women regarding cervical cancer and screening that considered one of the prevention methods and to early detection of cervical cancer. This study will assess the educational

program's impact on women's knowledge, practice, and attitudes towards cervical cancer among female at Suez Canal University hospitals in Ismailia city.

### **Aim of the study**

This study aimed to evaluate the impact of educational program on knowledge, practice and attitude of women regarding cervical cancer.

### **Objectives**

- Design the educational program regarding cervical cancer knowledge, attitude and practice.
- Assessing of women's knowledge, practice, and attitude regarding cervical cancer.
- Implement the educational program on women's Knowledge, practice and attitude regarding cervical cancer.
- Evaluate the educational program on women's Knowledge, practice and attitude regarding cervical cancer.
- Describe the relation pre/post-test between women's Knowledge, attitude and practice regarding cervical cancer.
- Describe the relation pre/post-test between women's Knowledge and demographic characteristics (pre-post- follow up).

### **Research Hypothesis**

There will be an improvement in women's Knowledge, practice and attitude after the implementation of the educational program on women regarding cervical cancer.

### **Subject and Method**

**Research design:** Quasi-experimental study design.

**Setting:** This study was conducted at Suez Canal University hospitals, Ismailia City.

**Target population:** women dealt with outpatient clinics in Suez Canal University hospitals, Ismailia City.

**Sample technique:** purposive sample.

### **Inclusion criteria**

All women aged from 20-60 years, married, single, widowed, or divorced, can read and write, with no history of cervical cancer.

**Exclusion Criteria:** Those women who had disabilities (as blindness or deafness) or disagree to share in the study.

### **Sample size calculation**

$n = \frac{(Z_{\alpha/2})^2 * P(1-P)}{d^2}$  (Dawson,2004)., Where

- $n$  = sample size
- $Z_{\alpha/2}$  =  $Z$  is the statistic corresponding to level of confidence (1.96)
- $d$  = is precision (corresponding to effect size) (0.05)
- $P$  is the expected prevalence (14%) (Elazab, Ali, Ramadan, Hassan, Aljedaani, Gardner, 2021)
- $N$  = 185 (Dawson & Trapp, 2004)

### **Tools of data collection**

A structured questionnaire was developed by researchers using clear and straightforward Arabic language, based on an extensive review of the literature. Data was collected through face-to-face interviews using the questionnaire. It included four instrumental tools:

**1<sup>st</sup> Tool: Structured interview:** used only for pre-intervention. It was conducted by an interviewer who asks a predefined set of questions in a

specific order. It is divided in to two parts:

**I part: Socio-demographic data:** it included basic demographic information, such as age, marital status, educational level, religion, residence, social status, occupation, family income, and the number of family members...etc.

**II part: Obstetric and gynecologic history**

**a) Gynecologic data:** age during first sexual intercourse, age at menarche, any abnormal vaginal discharge/bleeding, and source of information about cervical cancer and cervical cancer screening as Pap smear test...etc.

**b) Obstetric data:** gravidity, parity, stillbirth, abortion...etc.

**2<sup>nd</sup> Tool: Knowledge Assessment Questionnaires:**

Self-administered by respondents, who read and answer the questions without an interviewer present pre/post intervention. It was developed by the reasearcher depending on different resources regarding cervical cancer. The researcher used it to assess women's knowledge about disease both before and after the intervention. The questions include the content of the educational program presented, as definition, etiology, risk factors, signs & symptoms, diagnosis, and treatment of cervical cancer were among the topics covered that prepared from different resources and revised by 5 Obstetrician and gynaecologist experts in nursing .

**Scoring system**

Women's responses were scored as follows: yes = 2, no = 1, do not know = 0. Correct answers received a score

of 1, while wrong answers scored zero. Using Modified Bloom's cut-off points, knowledge was categorized as good (80-100%), satisfactory (50-79%), and poor (below 50%). The mean score determined the overall knowledge of cervical cancer screening among respondents, classified as poor or good for description and comparison (Tekle et al., 2020).

**3<sup>rd</sup> Tool: Modified Likert Scale:**

The Likert scale is a widely used psychometric tool designed to measure respondents' attitudes, opinions, or perceptions by presenting a series of statements with a range of response options, typically indicating levels of agreement or disagreement. This scale was modified to assess women's attitude for prevention of Cervical Cancer Questionnaires. It included nine statements that were developed by the researcher like: I believe that screening helps in prevention of carcinoma of the cervix. I am feeling shy to have cervical screening/ I think that cultural belief prevented me from having cervical cancer screening/ I believe that screening causes no harm to the client.....etc. Which was answered and scored as the following: strongly agree =5, agree=4, neutral= 3, disagree=2, strongly disagree=1.

**4<sup>th</sup> Tool: Self-Reported Practice:**

Self-reported practice refers to the process by which women provide information about their own behaviors, actions, through surveys, questionnaires, or interviews. It was used during pre/ posttest to assess women's practice regarding prevention of Cervical Cancer as

doing gynecological examination, getting Pap smear, and screening methods for cervical cancer. It considered who doing which of this practice even one time had a good practice.

### **Scoring system**

Women responded as follows: yes = 2 and no = 1. Poor Practice: Respondents who never underwent gynecological examination, getting Pap smear, screening for cervical cancer. Good Practice: Respondents who had been done gynecological examination, get Pap smear, or screened for cervical cancer at least once (Tekle et al., 2020).

### **Operational design**

#### **Field of work**

#### **Preparation**

The researcher explored both local and international literature pertinent to various aspects of the research problem through books, articles, internet sources, periodicals, and magazines. Following this, the researcher developed the necessary data collection instruments and educational programs. To ensure these tools' validity, they were reviewed by five experts in maternity, obstetrics, and gynecology.

#### **Booklet preparation**

A booklet was created using clear and concise Arabic language. It contains a definition of cervical cancer, its prevalence, risk factors, signs and symptoms, the significance of early detection measures, and various screening methods. Select suitable teaching methods and appropriate media including lectures, discussions, and demonstrations. The media included a booklet, videos to illustrate

some cervical cancer and screening methods. The booklet was approved officially Filing No.: 2023/21090 AD ISBN: nine

The study is conducted within the Suez Canal University Hospitals setting. The primary field of work is the outpatient clinics, where participants can be recruited. These clinics are where women who have regular visits or medical check-ups for gynecologic or obstetric issues can be found.

### **Phase I: Assessment**

The researchers interviewed with each woman. Introduced and discussed the aim and purposes of the study. The structured questionnaires (1<sup>st</sup> tool) were given pre program only and distributed to not more than twenty women in waiting rooms and during non-emergency appointments. Then the 2<sup>nd</sup> tool used to assess the women's knowledge about cervical cancer. This took about 10-15 minutes.

The next step is to measure the women's attitudes using a modified Likert scale (3<sup>rd</sup> tool). The Likert scale questions gauge how women feel about cervical cancer screening, its prevention, cultural influences, and personal beliefs. It is useful for understanding the psychological and emotional barriers that might affect cervical cancer screening behaviors, such as feelings of discomfort, shyness, or cultural stigma.

Practice assessment comes in by asking women whether they have undergone practices like gynecological examinations, Pap smears, or other cervical cancer screenings. This step helps track whether the women put their

knowledge into action after the intervention. The 4<sup>th</sup> tool (Self-Reported Practices) was used and took about 5 to 10 minutes.

### **Phase II: Implementation**

- a) The program implemented, over two separate sessions, two hours for each session.
  - The first session will include theoretical knowledge about cervical cancer. Ask open-ended questions to encourage discussion. Provide real-life examples or moving stories to increase attention.
  - The second session will include different screening methods (early detection measures, and steps of prevention) for cervical cancer. Practical activities show an explanatory video on how to perform the examination. Distribute an explanatory model of the preventive steps.
- b) Closing the session by summarized the main points, Answer the participants' questions clearly. Then brochures a copy of the booklet was given to the studied participants at the end of the educational program.

### **Phase III: Evaluation**

The Participants were evaluated immediately after receiving the program and after three months (as a follow-up program) through communicated by telephone for knowledge, attitude and practice by using the same pre-test format (2<sup>nd</sup> tool, 3<sup>rd</sup> and 4<sup>th</sup> tools). This phase took about 20-30 minutes.

### **Validity and reliability of the study tools**

It will be ascertained by a jury consisting of five experts in academic nursing. The reliability of the measurement scales was evaluated using Cronbach's alpha. The Knowledge scale showed an acceptable reliability with a Cronbach's alpha of 0.773, indicating that the items consistently measure women's knowledge about cervical cancer screening. Similarly, the attitude scale demonstrated excellent reliability with Cronbach's alpha of 0.946, reflecting a prominent level of internal consistency in assessing women's attitude towards cervical cancer screening. These reliability coefficients not only confirm the scales' consistency but also indirectly support their validity, making them reliable tools for evaluating women's Knowledge, practice and attitude in this critical health area.

### **Administrative design**

The Dean of the Faculty of Nursing at Suez Canal University issued an official permission letter to the managers of Suez Canal University hospitals and outpatient clinics to approve the study. Approval was then obtained from the research ethics committee.

### **Ethical consideration**

The scientific Research Ethics committee held its session No. 58 on 27/12/2022 has approved the research (code182/11-2022). Written consent for participation in the study was received from each participant. Informed consent was provided by the women after being briefed on the study's aim and process. The confidentiality of their personal information was assured. The

participants were informed of their right to withdraw from the study at any time.

### **Pilot study**

A pilot study, involving 10% (18 women) of the sample, was conducted to evaluate the tool's applicability, clarity, and feasibility before data collection. This study also helped estimate the time needed for data collection. Modifications were made based on the analysis, and the final sample excluded the pilot participants.

### **Limitation of the study**

- Conducting the study solely at Suez Canal University Hospitals in Ismailia City may limit the applicability of findings to other regions or healthcare settings with different demographics or resources.
- Relying on participants' self-reports for practices (e.g., whether they have undergone Pap smears) may lead to over- or under-reporting due to memory inaccuracies or a desire to give socially acceptable answers.

### **Statistical Analysis**

Data was entered into and analyzed using the SPSS database program version 20. Descriptive Statistics were used from questionnaires (socio-demographic information, knowledge, attitudes, and practices), analyzed by (e.g., percentages, means, standard deviations) to summarize the characteristics of the sample. The Friedman test was used to analyze repeated measures data in attitude. Comparative Analysis: Pre- and post-intervention data was compared using Cochran's Q test; and chi-square test, P value is significant  $<.05$  to see if

significant changes in knowledge, attitudes, and practices occurred after the educational intervention. Correlation Analysis was applied between socio-demographic factors (e.g., age, education level) and knowledge/attitude changes by Pearson correlation & P value is significant (two tailed significance)  $\leq 0.5$ .

### **Results**

**Table (1):** describe the demographic characteristics of women. More than half of the studied women aged from 20 to 30 years' old who were married and reside in rural area. Majority of them had a prominent level of education. More than half of the women's families studied had 3 to 5 members. Less than half of the studied women had not enough money.

**Table (2):** show distribution of the studied women based on gynecological history were menarche occurred between age 12 to 15 years old for more than half of the studied women with regular cycle and had three times of pregnancy and about half of them had birth more than three times. More than three fourth of the studied women had not miscarriage before. Less than half of studied women had first sex between age 23 to 26 but more than half of them experienced vaginal bleeding during intercourse. Two third of women use intrauterine device from those who used other contraceptives.

**Table (3):** describe distribution of the studied women about cervical cancer history which more than half of the studied women receive their knowledge from social media or television. Most of the studied women



had not first or second-degree relatives with cervical cancer.

**Figure (1):** illustrates more than half of the studied women receive their knowledge from social media or TV then from reading.

**Table (4):** show an improvement of the level of knowledge about cervical cancer and vaccination according to their correct answers with a highly statistically significant difference between Pre, post and follow up ( $p=0.001$ ,  $0.038$  to  $0.045$ ) respectively.

**Table (5):** revealed knowledge immediately after the intervention improved significantly and slightly declined during the follow-up period but remained higher than pre-intervention levels with a statistically significant improvement in knowledge across all time points, with notable differences between pre, post, and follow-up assessments ( $P_{1,2,3} < 0.001$ ).

**Table (6):** reveal that women's beliefs about the importance and benefits of cervical cancer screening improve significantly after intervention (post and follow-up scores) compared to pre-intervention, particularly on items such as the belief that screening helps prevent cervical cancer ( $p < 0.001$ ), the importance of HPV vaccination ( $p < 0.001$ ), and the belief that screening causes no harm ( $p < 0.001$ ).

Furthermore, cultural beliefs that previously prevented screening (item 3) also show a marked improvement, with a substantial increase in mean scores post-intervention. Interestingly, although there is an improvement in perceptions about the affordability of cervical cancer

screening (item 5), this is the only item that has a  $p$  value greater than  $0.001$  but still statistically significant at  $p = 0.002$ .

**Table (7)** was evident that studied women had improved practice significantly after implementation of the educational program immediately and 3 months after. The one third of the studied women found that the limitations for screening test were lack of screening service and long waiting time. Also, this result increases immediately and after following up of educational program.

**Table (8)** demonstrates a strong positive correlation between total knowledge and total attitude, indicating that women with higher baseline knowledge exhibited better attitudes even before the intervention. Postintervention significantly increased, the associated attitude changes were not as strongly correlated. Then the correlation remained moderate and stable ( $r = 0.373$ ).

**Table (9):** found a high statistically significant difference in the examined women's knowledge levels during the post- and follow-up periods. Additionally, there was a large statistically significant difference in the positive attitude that improved during the post and follow-up periods.

**Table (10):** clearly demonstrate that the educational program had a positive impact on women's knowledge, attitudes, and practices related to cervical cancer prevention, particularly regarding gynecological examinations, Pap smear tests, and cervical cancer screening. The significant improvements observed

immediately post-intervention and the relatively stable outcomes at follow-up underscore the effectiveness of the program. However, some decline in knowledge retention over time (e.g., Pap smear knowledge).

**Table (11):** highlights those demographic factors, especially age, education level, and marital status, play an essential role in shaping the level of knowledge before, after, and at follow-up stages of an intervention. The study reveals significant improvements in knowledge post-intervention, with a noticeable effect on certain groups, particularly those with lower education or residing in rural areas.

**Table (1): Distribution of Demographic Features among the Women in the Study (n=185)**

Items	No.	%
Age (Years)		
- 20-	57	30.8
- 30-	57	30.8
- 40-	43	23.2
- 50-	13	7.0
- 60-	15	8.1
Mean±SD	37.50±11.60	
Educational level		
- Read and write	23	12.4
- Middle education	71	38.4
- High education	91	49.2
Marital status		
- Married.	117	63.2
- Widowed or divorced	51	27.6
- Single	17	9.2
Place of residence		
- rural	116	62.7
- urban	69	37.3
Number of family members		
- 1-	7	3.8
- 3-	102	55.1
- 5-	76	41.1
Family income		
- Not enough.	83	44.9
- Enough.	79	42.7
- Enough and save it	23	12.4

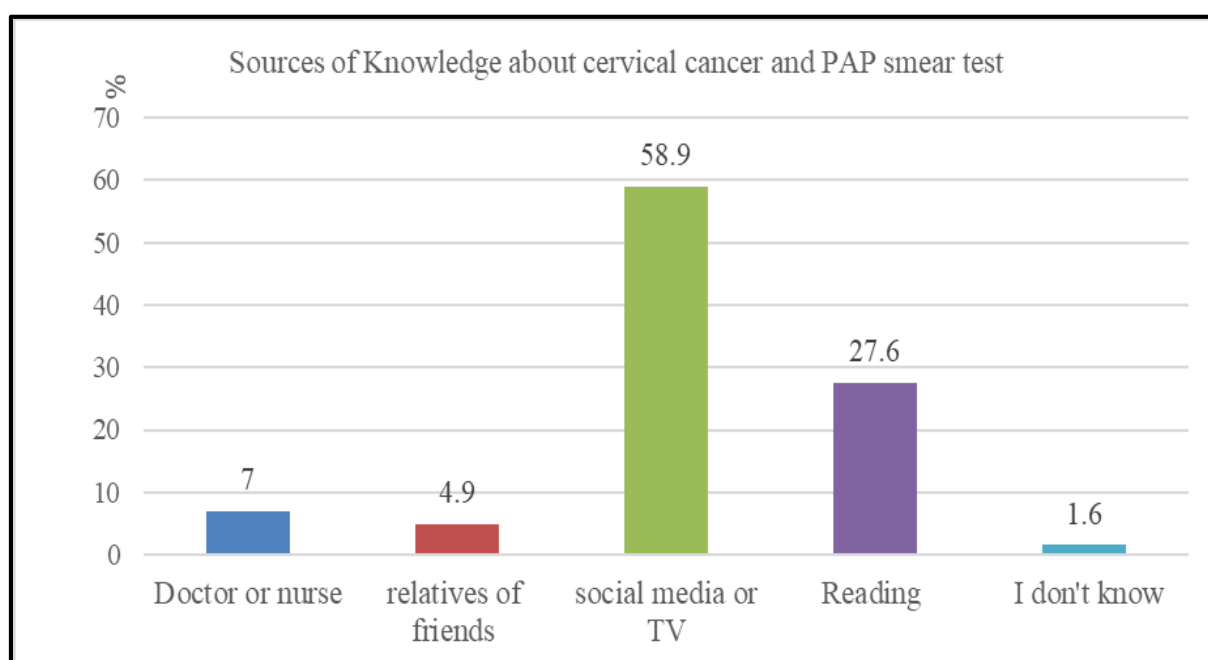
**Table 12** revealed that no significant difference in attitudes based on **age groups** across pre-, post-, and follow-up measurements (p-values: 0.166, 0.124, 0.124). **Educational Level:** Significant positive relationship between higher education and more positive attitudes at all stages (p < 0.001). **Marital Status:** No significant difference pre-test (p = 0.546), but significant after the intervention (p = 0.020) indicating marital status influences attitudes post-intervention. **Place of Residence:** No significant difference in pre-test attitudes (p = 0.353), but significant changes post-intervention (p = 0.014) suggesting place of residence

**Table (2): Distribution of the Studied Women Based on Gynecological History (n=185)**

Items	No.	%
<b>What is the age of the first menstrual period?</b>		
- 9 < 12 years old	62	33.5
- 12 < 15	101	54.6
- More than 15 years old	22	11.9
<b>How old were you when you first had sex?</b>		
- 15-17 years old	40	21.6
- 18-22 years old	48	25.9
- 23-26 years old.	80	43.2
- I have never had sex before	17	9.2
<b>Have you ever experienced bleeding during intercourse (intimacy)? (n=168)</b>		
- Yes	70	37.8
- No	98	53.3
<b>Have you used contraceptives before? (n=168)</b>		
- Yes	111	60.0
- No	57	40
<b>If the answer is yes: What method did you use? (n=111)</b>		
- Single hormone pills (breastfeeding pills)	9	8.1
- Two-hormonal pills	14	12.6
- contraceptive injection	12	10.8
- contraceptive capsule	19	17.1
- IUD (tape or device)	49	44.1
- Condom.	8	7.2
<b>What is the nature of your menstrual cycle?</b>		
- Regular	112	60.5
- Irregular	46	24.9
- No period (menopause).	27	14.6
<b>How many pregnancies have you had?</b>		
- I have never been pregnant.	25	13.5
- 1-3	54	29.2
- More than 3 times.	106	57.3
<b>What is the number of births?</b>		
- I have not given birth before.	25	13.5
- 1-3	68	36.8
- More than 3 times	92	49.7
<b>What is the number of abortions?</b>		
- I have never had a miscarriage before.	160	86.5
- 1-3	20	10.8
- More than 3 times	5	2.7

**Table (3): Cervical cancer history of studied women (n=185)**

Items	No.	%
<b>What is the source of your knowledge about cervical cancer and PAP sample test?</b>		
- Doctor or nurse	13	7.0
- Relatives of friends	9	4.9
- Social media or TV	109	58.9
- Reading	51	27.6
- I don't know	3	1.6
<b>Have any of your first-degree relatives had cervical cancer?</b>		
- Yes	1	0.5
- No	184	99.5
<b>Have any of your second-degree relatives had cervical cancer?</b>		
- Yes	2	1.08
- No	182	98.9

**Figure 1: Source of knowledge about cervical cancer and PAP test among women (n=185)**

**Table (4): Distribution of women's ' knowledge about cervical Cancer and Vaccination according to their correct answers (n=185).**

Items	Pre		Post		Follow up		Cochran Q test
	Correct		Correct		Correct		
	N	%	N	%	N	%	
- Cervical cancer is an abnormal growth of the cells that make up this part that	75	40.5	150	81.1	122	65.9	<.001*
- The risk factors for cervical cancer	66	35.7	155	83.8	126	68.1	<.001*
- The symptoms of cervical cancer	73	39.5	160	86.5	130	70.3	<.001*
- The ways to prevent cervical cancer	49	26.5	156	84.3	125	67.6	<.001*
- The different treatment methods for cervical cancer	56	30.3	163	88.1	136	73.5	<.001*
- The different tests for cervical cancer	56	30.3	163	88.1	134	72.4	<.001*
- The women who are required to undergo early screening for cervical cancer	12	6.5	115	62.2	96	51.9	<.001*
- Duration of a re-examination required for cervical cancer	66	35.7	164	88.6	145	78.4	<.001*
- A vaccine against cervical cancer	59	31.9	162	87.6	132	71.4	<.001*
- Is this type of vaccination available in health units in your governorate	39	21.1	147	79.5	118	63.8	.045*
- The vaccination provide protection against one of several types of cervical cancer virus	37	20.0	145	78.4	116	62.7	.045*
- Doses of vaccination do I need to take	35	18.9	143	77.3	112	60.5	.045*
- The appropriate age to get vaccinated	36	19.5	145	78.4	114	61.6	.038*
- A vaccine against cervical cancer	59	31.9	162	87.6	132	71.4	<.001*

Cochran Q test was used to analyze repeated measures data. P value is significant <.05

**Table (5): Distribution of women's total knowledge about cervical Cancer (n=185).**

Items	Pre	Post	Follow up	P <sup>#</sup>	P1 <sup>#</sup>	P2 <sup>#</sup>	P3 <sup>#</sup>
	Median (IQR)	Median (IQR)	Median (IQR)				
Total knowledge	3 (5)	12 (4.75)	9.5 (4)	<.001*	<.001*	<.001*	<.001*

<sup>#</sup> Friedman test was used to analyzing repeated measures data. P value is significant <.05

P<sup>#</sup> Pre/Post/ Follow up, P1<sup>#</sup> Pre/Post, P2<sup>#</sup> Pre/ Follow Up, P3<sup>#</sup> Post/ Fllow up

**Table (6): Attitude of the Studied Women Toward Cervical Cancer: Distribution Analysis (n=185).**

Items	Pre	Post	Follow up	Friedman test ( P value)
	Mean±SD	Mean±SD	Mean±SD	
- I believe that screening helps in prevention of carcinoma of the cervix.	2.20±1.44	4.03±1.17	4.03±1.17	<.001*
- I Feel shy to have cervical screening.	2.24±1.47	3.28±1.27	3.26±1.25	<.001*
- I think that cultural belief prevented me from having cervical cancer screening.	1.47±1.11	3.27±1.31	3.29±1.31	<.001*
- I believe that screening causes no harm to the client.	2.61±1.83	3.64±1.43	3.62±1.40	<.001*
- I believe that cervical cancer screening is not expensive.	2.61±1.84	3.64±1.44	3.50±1.40	.002*
- Think that having a smear test is important to detect cervical cancer.	2.36±1.53	3.40±1.24	3.40±1.24	<.001*
- It is important to take vaccine against human papilloma virus if available.	2.35±1.52	3.38±1.24	3.33±1.25	<.001*
- I am healthy and I do not need cervical cancer screening.	1.66±.94	2.70±1.25	2.64±1.23	<.001*
- It is important to consult a medical doctor regularly for screening of cervical cancer.	2.35±1.49	3.38±1.20	3.43±1.22	<.001*
<b>Total score</b>	<b>19.83±11.20</b>	<b>30.72±9.13</b>	<b>30.69±9.11</b>	<b>&lt;.001*</b>

The Friedman test was used to analyze repeated measures data. P value is significant <.05

**Table (7): Distribution of Practices Among Studied Women Regarding Cervical Cancer Pre- and Post-Educational Program (n=185).**

Items	Pre		Post		Follow up		test ( P value)
	N	%	N	%	N	%	
- Ever had any gynecological examination?							
Done	58	31.4	137	74.1	137	74.1	Q test ( $<.001^*$ )
Not done	127	68.6	48	25.9	48	25.9	
- Ever got Pap smear test?							
Done	17	9.2	17	9.2	44	23.8	Q test ( $<.001^*$ )
Not done	168	90.8	168	90.8	141	76.2	
- Have you ever screened for cancer of the cervix?							
Done	43	23.2	52	28.1	82	44.3	Q test ( $<.001^*$ )
Not done	142	76.8	133	71.9	103	55.7	
If Not done (n=168), reason for not doing							
- Lack of information	47	28.0	11	6.5	11	5.9	$\chi^2$ ( $<.001^*$ )
- Lack of screening service	60	35.7	96	57.1	85	45.9	
- Expensive service cost.	9	5.4	9	5.4	9	4.9	
- Long waiting time.	52	31.0	52	31.0	36	19.5	

Q test was Cochran's Q test; x<sup>2</sup> is chi-square test. P value is significant <.05

**Table (8): Correlation between total knowledge and total attitude of studied sample pre, post, and follow up intervention (n=185).**

Variables	Timing	Total attitude	
		r	P value
Total knowledge	Pre	.842	<.001*
	Post	.380	<.001*
	Follow	.373	<.001*

r is Pearson correlation & P value is significant (two tailed significance) ≤.05

**Table (9): Changes in women's Knowledge and attitude before and after intervention (n=185).**

Items	Pre		Post		Follow up		Test P value
	N	%	N	%	N	%	
- Knowledge							
Poor	144	77.8	19	10.3	42	22.7	<.001*#
Satisfactory	25	13.5	30	16.2	50	27.0	
Good	16	8.6	136	73.5	93	50.3	
- attitude							
Positive	73	39.5	138	74.6	138	74.6	<.001*\$
Negative	112	60.5	47	25.4	47	25.4	

# Friedman test, \$ Cochran's Q test. P value is significant <.05

**Table (10): Relation between knowledge, attitude, and practice (pre, post, and follow up intervention)**

Items		Pre intervention				Post intervention				Follow up			
Doing any gynecological examination													
		Done ( n=58)		Not Done (n=127 )		Done (n=137)		Not Done (n=48)		Done (n=137)		Not Done (n=48)	
Knowledge	Poor	31	21.5	113	78.5	4	21.1	15	78.9	17	40.5	25	59.5
	Satisfactory	12	48.0	13	52.0	20	66.7	10	33.3	18	36.0	32	64.0
	Good	15	93.8	1	6.3	34	25.0	102	75.0	23	24.7	70	75.3
	X <sup>2</sup> (P value)	38.62(<0.001*) <sup>mc</sup>				20.87(<0.001*) <sup>mc</sup>				4.02(.122)			
Attitude	Positive	51	69.9	22	30.1	52	37.7	86	62.3	52	37.7	86	62.3
	Negative	7	6.3	105	93.8	6	12.8	41	87.2	6	12.8	41	87.2
	X <sup>2</sup> (P value)	83.1(<.001*)				10.11(.001*)				10.11(.001*)			
Getting Pap smear test													
		Done n=17		Not Done (n=168)		Done n=17		Not Done (n=168)		Done (n=44)		Not Done (n=141)	
Knowledge	Poor	15	10.4	129	89.6	3	15.8	16	84.2	9	21.4	33	40.5
	Satisfactory	2	8.0	23	92.0	7	23.3	23	76.7	3	6.0	47	36.0
	Good	0	0	16	100.0	7	5.1	129	94.9	5	5.4	88	24.7
	X <sup>2</sup> (P value)	1.92(.433) <sup>mc</sup>				10.84(.007*) <sup>mc</sup>				9.77(.008*) <sup>mc</sup>			
Attitude	Positive	13	17.8	60	82.2	14	10.1	124	89.9	14	10.1	124	89.9
	Negative	4	3.6	108	96.4	3	6.4	44	93.6	3	6.4	44	93.6
	X <sup>2</sup> (P value)	10.73(.001*)				.595(.441*)				.595(.441*)			
Screening for cancer of the cervix													
		Done (n=43)		Not Done (n=142)		Done (n=52)		Not Done (n=133)		Done (n=82)		Not Done (n=103)	
Knowledge	Poor	19	13.2	125	86.8	2	10.5	17	89.5	9	21.4	33	78.6
	Satisfactory	9	36.0	16	64.0	15	50.0	15	50.0	15	30.0	35	70.0
	Good	15	93.8	1	6.3	26	19.1	110	80.9	19	20.4	74	79.6
	X <sup>2</sup> (P value)	55.01(<0.001*) <sup>mc</sup>				15.06(.001*) <sup>mc</sup>				1.77(.427) <sup>mc</sup>			
Attitude	Positive	40	54.8	33	45.2	40	29	98	71	40	29	98	71
	Negative	3	2.7	109	97.3	3	6.4	44	93.6	3	6.4	44	93.6
	X <sup>2</sup> (P value)	67.28(<.001*)				10.04(.002*)				10.04(.002*)			



**Table (11): Relation between demographic characteristics and level of knowledge (pre-post- follow up)**

Items	Level of knowledge																	
	Pre N=185						Post (N=185 )						Follow(N=185)					
	Poor		Average		Good		Poor		Average		Good		Poor		Average		Good	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Age (Years)																		
20-	54	37.5	3	12.0	0	0	7	36.8	11	36.7	39	28.7	14	33.3	13	26.0	30	32.3
30-	38	26.4	11	44.0	8	50.0	6	31.6	4	13.3	47	34.6	12	28.6	14	28.0	31	33.3
40-	25	17.4	10	40.0	8	50.0	4	21.1	3	10.0	36	26.5	8	19.0	11	22.0	24	25.8
50-	13	9.0	0	0	0	0	1	5.3	8	26.7	4	2.9	7	16.7	4	8.0	2	2.2
60-	14	9.7	1	4	0	0	1	5.3	4	13.3	10	7.4	1	2.4	8	16.0	6	6.5
P value	30.20(<.001) <sup>MC</sup>						28.35(<.001) <sup>MC</sup>						16.15(.042) <sup>MC</sup>					
Educational level																		
Read and write	22	15.3	1	4	0	0	1	5.3	5	16.7	17	12.5	5	11.9	7	14	11	11.8
Middle education	66	45.8	5	20	0	0	11	57.9	17	56.7	43	31.6	19	45.2	19	38	33	35.5
High education	56	38.9	19	76	16	100	7	36.8	8	26.7	76	55.9	18	42.9	24	48	49	52.7
P value	29.94(<.001) <sup>MC</sup>						12.26(.015) <sup>MC</sup>						1.44(.844)					
Marital status																		
Married.	79	54.9	22	88	16	100	10	52.6	13	43.3	94	69.1	22	52.4	29	58	66	71
Single (widowed/ divorced)	50	34.7	1	4	0	0	6	31.6	14	46.7	31	22.8	13	31	18	36	20	21.5
inmarried	15	10.4	2	8	0	0	3	15.8	3	10	11	8.1	7	16.7	3	6	7	7.5
P value	21.30(<0.001) <sup>MC</sup>						9.26(.055)						7.97(.090) <sup>MC</sup>					
Place of residence																		
Rural	83	57.6	20	80.0	13	81.3	9	47.4	13	43.3	94	69.1	22	52.4	35	70.0	59	63.4
Urban	61	42.4	5	20.0	3	18.8	10	52.6	17	56.7	42	30.9	20	47.6	15	30.0	34	36.6
P value	7.13(.034) <sup>MC</sup>						9.12(.012*) <sup>MC</sup>						3.07(.225) <sup>MC</sup>					
<sup>MC</sup> is Monte Carlo for Chi square test; P value is significant <.05																		

**Table (12): Relation between demographic characteristics and level of attitude (pre-post- follow up):**

Items	Level of Attitude											
	Pre				Post				Follow			
	Positive		Negative		Positive		Negative		Positive		Negative	
	N	%	N	%	N	%	N	%	N	%	N	%
Age (Years)												
20-	20	27.4	37	33.0	38	27.5	19	40.4	38	27.5	19	40.4
30-	22	30.1	35	31.2	41	29.7	16	34.0	41	29.7	16	34.0
40-	18	24.7	25	22.3	34	24.6	9	19.1	34	24.6	9	19.1
50-	9	12.3	4	3.6	13	9.4	0	0	13	9.4	0	0
60-	4	5.5	11	9.8	12	8.7	3	6.4	12	8.7	3	6.4
P value	6.42(.166) <sup>MC</sup>				7.22(.124) <sup>MC</sup>				7.22(.124) <sup>MC</sup>			
Educational level												
Read and write	20	4.1	3	17.9	6	12.3	17	12.8	6	12.3	17	12.8
Middle education	54	23.3	17	48.2	29	30.4	42	61.7	29	30.4	42	61.7
High education	38	72.9	53	33.9	12	57.2	79	25.5	12	57.2	79	25.5
P value	27.31(<.001) <sup>MC</sup>				16.11(<.001) <sup>MC</sup>				16.11(<.001) <sup>MC</sup>			
Marital status												
Married.	69	65.8	48	61.6	25	66.7	92	53.2	25	66.7	92	53.2
Single (widowed/ divorced)	34	23.3	17	30.4	13	27.5	38	27.7	13	27.5	38	27.7
Unmarried	9	11	8	8	9	5.8	8	19.1	9	5.8	8	19.1
P value	1.33(.546) <sup>MC</sup>				7.81(.020) <sup>MC</sup>				7.81(.020) <sup>MC</sup>			
Place of residence												
rural	49	67.1	67	59.8	94	68.1	22	46.8	94	68.1	22	46.8
urban	24	32.9	45	40.2	44	31.9	25	53.2	44	31.9	25	53.2
P value	1.08(.353) <sup>MC</sup>				6.80(.014*) <sup>MC</sup>				6.80(.014*) <sup>MC</sup>			
<sup>MC</sup> is Monte Carlo for Chi square test; <sup>s</sup> is fisher exact test ; P value is significant <.05												

## Discussion

One of the main causes of cancer-related illness and death for women globally is cervical cancer. However, it is preventable through early detection and vaccination. It is fine to overestimate the significance of cervical cancer screening programs, including Pap smears and HPV

testing. This program help in educating women at different ages to prevent infection with papiloma virus and diseased by cervical cancer. So, this study aimed to evaluate the impact of educational program on knowledge, practice and attitude of women regarding cervical cancer. This section synthesizes the findings

from the current study and compares them with results from other prominent studies in literature. The study explored the effectiveness of an educational program on women's knowledge, practices, and attitudes regarding cervical cancer screening among women of reproductive age.

### **Impact of Educational Program on Women's Knowledge.**

The current study demonstrated a statistically significant improvement in knowledge, attitudes, and practices regarding cervical cancer screening after the intervention ( $P < 0.001$ ). Consistent with both **Baik, Kim, Ha, Oh, Niyonzima, (2025)** and **Wang L., Wang Q., Zou & Liu(2024)**, who observed that higher educational attainment was a strong predictor of screening uptake. Educational programs, therefore, must be **tailored** to varying literacy levels to ensure equitable impact across different demographic segments. Also, this aligns with findings from other studies, such as **Ayanto, Belachew, Wordofa, (2024)** in Southern Ethiopia, who found that structured educational interventions were effective in increasing women's understanding of cervical cancer prevention.

Similarly, **Mengesha et al. (2020)** noted that rural women in Ethiopia showed impressive gains in knowledge after participating in educational programs on cervical cancer. The intervention's emphasis on promoting awareness about cervical cancer, including its risk factors, symptoms, and preventive measures like Pap smears, appears to

have successfully filled significant knowledge gaps.

This supports previous reviews, such as that by **Makadzange, Peeters, Joore, Kimman (2022)**, which highlighted the efficacy of health education interventions in increasing cervical cancer knowledge in low-resource settings. However, the current study also observes a decline in certain areas, notably in retention of Pap smear knowledge during follow-up assessments. This finding echoes the research of **Tekle et al. (2020)** and **Zhang, Janet, Chan, Akingbade, Carmen, (2022)**, who found that while initial improvements in knowledge were significant, long-term retention often diminished unless ongoing educational opportunities were provided.

**Changes in Attitudes Post-Intervention** In terms of attitudes, the current study reported a notable positive shift, especially in challenging cultural barriers to cervical cancer screening. The transition from a negative to a more positive attitude was captured in the post-intervention and follow-up phases. **Sarvestani, Jeihooni, Moradi, Dehghan, (2021)** similarly found that educational programs targeting marginalized communities often had a significant effect on changing cultural attitudes towards screening.

The **strong correlation** between baseline knowledge and positive attitude observed in this study, suggesting that women already well-informed about cervical cancer were more receptive to preventive measures. **Farag, Mohamed, Malk,**

**Hassan, (2024)** similarly reported that higher baseline knowledge among working women in Egypt predicted more favorable attitudes toward Pap smear tests and regular gynecological check-ups. Beside that; a study by **Eghbal, Karimy, Kasmaei, Roshan, Valipour, Attari, (2020)** in Iran demonstrated that increased knowledge directly influenced attitude change towards cervical cancer screening. However, as the current study progressed, the correlation between knowledge and attitude became moderate ( $r = 0.373$ ), indicating that while knowledge remains a key driver, **other factors**—such as family support, healthcare access, or ongoing motivation—also play roles in sustaining positive attitudes as indicated in the studies by **Lemma et al. (2022)** and **Tsegay et al. (2021)**.

**Changes in Practices:** Practices regarding cervical cancer prevention also saw considerable improvements with the education program, as evidenced by the increased uptake of gynecological examinations and cervical cancer screenings. This echoing the experience of **Dedey, Nsaful, Nartey, Labi, Adu-Aryee, Kuti & Clegg-Lampsey (2024)** in Ghana, where educational sessions directly correlated with improved cervical cancer screening rates among adolescents. By addressing misconceptions and emphasizing the value of early detection, the program fostered a shift from knowledge to tangible preventive actions. Also, supports the findings from **Osman, Abd Elkodoos, Reda, Soliman, Aboushady, (2023)**, which showed

that educational interventions raised practice rates in Egypt. However, some decline in the practice rates during the follow-up phase was noted, indicating that regular follow-ups and community-based interventions are essential for maintaining behavioral changes. This suggests the need for continuous promotion of cervical cancer screening behaviors, as echoed in **Zhang et al. (2022)** which highlighted the importance of recurring education to sustain preventive health practices.

### **Demographic factors affecting Knowledge, Attitude, and Practice Changes**

**Education, Age, and Marital Status:** Demographic characteristics proved pivotal for both initial knowledge levels and post-intervention outcomes. Women with lower education or those residing in rural areas showed the most pronounced improvements, echoing **Lemma et al. (2022)** in Ethiopia and **Mengesha et al. (2020)** in Gondar town, where educational interventions disproportionately benefited under-resourced groups. Additionally, marital status became more relevant after the intervention, possibly due to the influence of family or spousal support on healthcare decisions—a phenomenon also noted by **Makadzange et al. (2022)** across various African contexts.

Given the demographic differences, targeted educational strategies—using accessible language, culturally resonant examples, and repeated sessions—are crucial to ensuring that all women, regardless of background, can retain and act on cervical cancer

information (Zagloul, Hassan& Naser, 2021;WHO, 2022).

### **Cultural Barriers to Screening**

The current study showed a marked improvement in addressing the cultural barriers to cervical cancer screening, such as fear, misconceptions, or lack of awareness. This finding aligns closely with the outcomes of studies such as **Wang et al. (2024)** in Beijing, where a cross-sectional study indicated that educational initiatives addressing cultural and personal barriers could significantly increase awareness and encourage proactive screening behaviors. Also, this observation parallels findings from **Eghbal et al. (2020)** and **Ayanto et al. (2024)**, which reported that well-designed educational programs could overcome cultural hurdles and encourage women to approach medical screenings without stigma.

Although many studies advocate the effectiveness of educational programs in improving women's knowledge, attitudes, and practices (KAP) regarding cervical cancer, a closer look at the broader literature reveals instances of **limited or inconsistent outcomes** that contrast with the positive findings of the current study. The following points outline how certain research references present evidence **opposite** to, or not fully aligned with, the current study's results:

### **Limited or No Significant Improvement in Knowledge**

**Baik et al. (2025)** showed that many women were aware of cervical cancer, a substantial proportion remained uninformed about screening methods,

even after general awareness campaigns. This implies that mere exposure to information may not suffice to boost screening knowledge significantly, contradicting the current study's assertion of a marked post-intervention rise in awareness.

**Wang et al. (2024)** - Beijing found that improvements in women's knowledge remained modest, with no statistically significant jump in certain topics (e.g., HPV etiology). This finding suggests that, contrary to the robust improvement seen in the current study, knowledge gains can be minimal if the intervention's design or delivery is not well tailored.

### **Persisting Cultural Barriers and Minimal Attitude Change**

**Dedey et al. (2024)**- Ghana acknowledged that; although high school interventions elevated awareness, deeply rooted cultural beliefs continued to dissuade some students from considering screening. This partial or minimal shift in attitude runs counter to the current study's conclusion that cultural barriers can be successfully addressed and significantly diminished through a single educational program. During the work of **Farag et al. – Beni-Suef University** with employed women, persistent misconceptions about cervical cancer screening lingered, leading to **only marginal changes** in attitudes post-intervention. This discrepancy suggests that while knowledge can improve, attitudes may remain resistant if the intervention fails to tackle cultural stigma or if it lacks ongoing reinforcement.

## Low Translation of Knowledge into Practice

**Hayyal, Sikanadar, Navadagi, Siddapur, (2023)** found that; despite a structured teaching program, the study reported that **actual Pap smear uptake remained low** in certain subgroups. This contrasts with the current research's claim of a notable rise in screening behaviors, indicating that enhanced knowledge does not always translate into practice without systemic support (e.g., free screening, easily accessible clinics). **Ayanto et al. (2024)** conducted a cluster randomized trial which demonstrated that even when couple education improved screening knowledge, logistical barriers (distance to facilities, cost, and fear of procedures) hindered real practice changes. Such findings question the current study's implication that an educational intervention alone is sufficient to yield significant, sustained improvements in screening rates.

## Weak or Inconsistent Correlation between Knowledge and Attitude

**Eghbal et al. (2020) – Rural Iran :** While some attitudinal improvement occurred, the correlation between higher knowledge and positive attitude was **not statistically significant** in certain domains, indicating a disjointed relationship. This observation contrasts with the strong baseline correlation and moderate sustained correlation reported in the current study. **Also; Seyraf, Hodayuni, Hosseini, Aghamolaei, Ghanbarnejad & Mouseli, (2022)** who use PEN-3 Model with quasi-experimental design. They found that changes in

knowledge did not always predict changes in attitude or participation. The authors highlighted that **socioeconomic and psychosocial factors** could override the impact of educational interventions, a nuance not fully addressed in the current study's findings.

## Declining or Insignificant Follow-up Results

**Sarvestani et al. (2021) – Fasa, Iran** apply an educational program boosted cervical cancer screening attitudes initially, follow-up evaluations showed a **significant decline** in both knowledge and attitudes, ultimately returning close to baseline levels. This suggests that, in contrast to the current study's moderately stable outcomes, long-term retention without continuous engagement can be minimal.

**Zhang et al. (2022) –** systematic review they noted that rural populations had a **short-term successes** often evaporated when interventions were not sustained or supported by broader healthcare infrastructure. Such findings question the longevity of improvements reported by the current study, especially if no ongoing reinforcement measures are in place.

## Conclusion

Based on the findings of this study, it can be concluded that Women's knowledge, practice and attitude were improved significantly following the adoption of the educational program which mean that the results of current study supported the suggested hypothesis.

## Recommendations:

Based on the results of this study, the following recommendations can be suggested:

- Enhance Professional Training: participate in continuous professional development programs that focus on cervical cancer screening guidelines, evidence-based practices, and culturally sensitive communication techniques.
- Provide Targeted Patient Education: deliver individualized counseling to women, emphasizing the importance of regular Pap smears and follow-up care.
- Use simple, clear language and culturally appropriate materials to address misconceptions and reduce anxiety about screening procedures.
- Encourage women to ask questions and share any concerns about screening during subsequent clinic visits to maintain engagement and retention of information.
- Incorporate Reinforcement Strategies: Schedule regular reminder sessions or follow-up visits for patients who have received initial education.

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