IJBMC International Journal of Body, Mind and Culture

Volume 13, Issue 1, pp 101-111
DOI: 10.61838/ijbmc.v13i1.1028

Article type:
Original Research

Cervical Cancer Literacy and Screening Adherence among Female University Staff in Iraq: A Correlational Study

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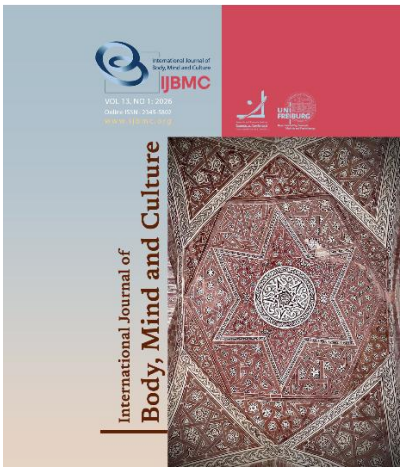


Article history:

Received 18 Sep 2025
Revised 24 Nov 2025
Accepted 12 Dec 2025
Published online 01 Jan 2026

How to cite this article:
Fadil, M. M., & Oleiwi, S. S. (2026). Cervical Cancer Literacy and Screening Adherence among Female University Staff in Iraq: A Correlational Study. International Journal of Body, Mind and Culture, 13(1), 101-111.

ABSTRACT

Objective: To examine the association between cervical cancer health literacy and adherence to preventive cervical cancer screening among female university staff in Karbala, Iraq.

Methods and Materials: A cross-sectional correlational study was conducted in January 2025 at the University of Karbala. Using simple random sampling from staff lists, 285 female employees (20–65 years) completed a structured questionnaire including: (1) an Arabic-translated and content-validated Cervical Cancer Awareness Measure (CCAM), and (2) an adherence-to-screening scale. 17 experts assessed content validity; internal consistency was acceptable to excellent (Cronbach's alpha reported in the manuscript). Data were analyzed using descriptive statistics, Pearson's correlation, and simple linear regression (SPSS v26).

Findings: Most participants demonstrated high cervical cancer literacy (mean ≈ 37.46 ± 5.76; 64.2% high). Screening adherence was mostly moderate (mean ≈ 15.97 ± 3.11; 57.2% moderate; 22.1% low). Cervical cancer literacy showed a significant positive correlation with screening adherence ($r \approx 0.260$, $p < 0.01$). In regression analysis, literacy significantly predicted adherence ($\beta \approx 0.260$; $p < 0.001$), explaining about 6.8% of variance ($R^2 \approx 0.068$)

Conclusion: Higher cervical cancer health literacy was associated with better screening adherence, yet adherence remained suboptimal despite generally high literacy. Multi-level, culturally tailored interventions beyond information provision—addressing barriers, motivation, and service access—are recommended to improve screening uptake.

Keywords: cervical cancer literacy, health literacy, screening adherence, cross-sectional, Iraq.

Introduction

Cervical cancer remains a significant global health challenge, particularly in low- and middle-income countries (LMICs), where late-stage diagnosis and insufficient screening contribute to higher mortality rates (Dozie et al., 2023). It is the fourth most common malignancy among women worldwide (Al-Abedi et al., 2024; Endale et al., 2022). The World Health Organization (WHO) recommends that women aged 30 to 49 undergo cervical cancer screening every 3–5 years using visual inspection with acetic acid (Dozie et al., 2023) or high-risk human papillomavirus (HPV) testing (Banks et al., 2022).

In Iraq, cervical cancer ranks as the 12th most common cancer among women aged 15–44 and the 15th among all women (Ibrahim-Ojoawo et al., 2024). Studies suggest that the lack of awareness, misconceptions, and cultural barriers contribute to low uptake of preventive screening practices, including Pap smears and HPV testing (Soeung et al., 2022; Abd Ali & Musihb, 2024).

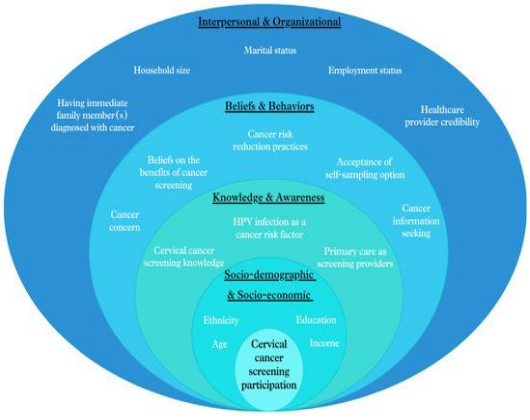
One of the critical determinants influencing women's health-seeking behavior is health literacy, which the Centers for Disease Control and Prevention (CDC) defines as "the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions." Cervical cancer literacy (CCL), a subset of health literacy, reflects an individual's ability to access, comprehend, and apply knowledge related to cervical cancer prevention and screening (Ayamolowo et al., 2020; Al-Abedi et al., 2024). Low CCL is often associated with poor participation in preventive health behaviors, including screening adherence (Dost & Özdemir, 2024; Abd Ali & Musihb, 2024). This study is theoretically grounded in three prominent models of health behavior: the Health Belief Model (HBM), the Theory of Planned Behavior (TPB), and Nutbeam's Health Literacy Framework.

According to the HBM, an individual's likelihood to take preventive action is influenced by perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy. In this context, higher CCL may enhance knowledge of cervical cancer, improve awareness of personal risk, and boost confidence in navigating the healthcare system (Yirsaw et al., 2024; Jasim & Oleiwi, 2023). The TPB complements this by highlighting the roles of attitudes, subjective norms, and perceived behavioral control in shaping health intentions and actions. Cervical cancer literacy may positively influence these factors, leading to higher intentions to screen and greater adherence (Mansoor & Yasir, 2016; Riza et al., 2020).

Nutbeam's framework further explains how health literacy enables individuals to make informed health decisions through functional and interactive competencies (Urstad et al., 2022). To visually represent the health literacy concept underpinning this study, the Integrated Model of Health Literacy is adopted in Figure 1. This model identifies four core competencies—access, understand, appraise, and apply health information—across the domains of healthcare, disease prevention, and health promotion. It provides a comprehensive structure for assessing how health literacy operates in real-life health decisions such as cervical cancer screening (Mekonen et al., 2024).

Figure 1

Integrated Model of Health Literacy adapted from (Sørensen et al., 2012).



This model is essential for conceptualizing the pathways through which cervical cancer health literacy (CCHL) may influence adherence to screening recommendations (Huang & Tan, 2024).

Objectives of the Study

1-To assess the cervical cancer literacy and adherence to preventive screening among female staff

2- To investigate the differences in cervical cancer literacy and adherence to preventive screening among female staff with respect to their socio-demographic characteristics.

Research Hypothesis:

H1: Higher levels of cervical cancer health literacy will be positively correlated with greater adherence to preventive screening among female university staff.

Methods and Materials

Study Design and Sitting

A descriptive cross-sectional correlational design was used to examine the association between cervical cancer literacy and adherence to preventive screening, using a single measurement wave (15 Oct 2024 – 01 Jul 2025). The study was conducted at 18 colleges of the University of Karbala, Iraq. All on-campus data collection occurred in staff offices to maximize accessibility.

Population, Sampling, and Sample Size Justification

The target population for this study comprised female staff members (academic and administrative) working at the University of Karbala, aged between 20 and 65 years. The study focused on exploring the relationship between cervical cancer literacy and adherence to preventive screening among this group.

A simple random sampling technique was employed to ensure that each eligible participant had an equal chance of being selected. The study population consisted of 1,450 female staff members from 18 colleges, who were stratified by college to ensure adequate representation. A list of all eligible female staff members was obtained from the university's administrative records, and each individual was assigned a unique number. A computer-generated randomization process was then used to select participants from each stratum. This method was chosen to minimize selection bias and enhance the generalizability of the findings.

The sample size was calculated using Steven Thompson's formula, assuming a population size of 1,450, a 95% confidence level, and a 5% margin of error. Based on these parameters, an appropriate sample size was determined to ensure representativeness. To account for possible non-response or incomplete data, the sample size was increased by 25%, yielding a target of approximately 258 participants. Ultimately, 285 completed responses were included in the final analysis.

Instruments

A structured, self-administered questionnaire was used to collect data. It consisted of the following sections:

1. Socio-demographic Data: Included age, marital status, educational level, smoking status, awareness of human papillomavirus (HPV), and source of information about cervical cancer screening.

2. Cervical Cancer Literacy: This section was adapted from the Cervical Cancer Awareness Measure (CCAM) and included 10 items addressing knowledge of symptoms, risk factors, and prevention methods. Responses were recorded using a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

Total scores ranged from 10 to 50. Scores were categorized as follows: low literacy (10–20), moderate literacy (21–35), and high literacy (36–50). Reverse coding was applied to negatively worded items to ensure accurate scoring. Higher scores indicated better literacy regarding cervical cancer (Nwafor-Orizu et al., 2018; Richards, 2009).

3. Adherence to Preventive Screening: This section assessed participants' engagement in preventive practices, including Pap smear testing and HPV vaccination, using a scale from previous studies (Rimande-Joel & Ekenedo, 2019). It consisted of 9 items; one question was removed based on expert opinion because it was deemed unsuitable for our community. The response options coded as: Always = 3, Sometimes = 2, Never = 1. The total score ranged from 8 (if all responses were “Never”) to 24 (if all were “Always”). Scores were categorized into three levels: low adherence (8–13), moderate adherence (14–18), and high adherence (19–24). Low scores reflected poor adherence, moderate scores reflected partial adherence, and high scores indicated strong adherence to preventive screening.

Inclusion Criteria

1-Female employees aged between 20 and 65 years.

2-Currently working at a university or college in Iraq.

3-Willingness to participate and provide informed consent.

4-No history of cervical cancer diagnosis or hysterectomy.

Exclusion Criteria

1-Refusal to participate.

2-Incomplete questionnaire data.

3-Participation in the pilot study.

The Validity of the Study Instrument: To ensure content validity, a panel of 17 experts in nursing, public health, and gynecology was consulted. All experts had more than five years of experience in their respective fields. They were asked to evaluate each item in the questionnaire for relevance, clarity, and cultural appropriateness. Based on the experts' evaluations, several items were revised, added, or removed to improve the instrument's adequacy. Their feedback was carefully considered, and appropriate modifications were made accordingly. As a result of this process, the study instrument was deemed valid in terms of content. The experts were distributed across the relevant fields to provide a comprehensive and multidisciplinary review.

Instruments Reliability: the Alpha Cronbach coefficient was used to assess the internal consistency of the questions. This was done using IBM SPSS (Statistical Package for the Social Sciences) version 26.0 on 30 randomly selected female staff members. Cronbach's alpha indicates excellent reliability for the Cervical cancer literacy scale (.904) and good reliability for the Adherence to preventive screening scale (.727). These findings indicate that the questionnaires had adequate internal consistency and measurement equivalence.

Data collection

The data was gathered in January 2025. Five days a week, from 8:30 a.m. to 2:30 p.m., colleges were visited. A Likert-scale self-report questionnaire to evaluate female staff's awareness of cervical cancer and their adherence to screening for the disease was employed to gather information after staff agreed to take part in the study, with the researcher outlining the goal of the study to collect data and participants. It took each participant around 15 to 25 minutes to complete the questionnaire.

Analysis

1- Descriptive Analysis

In the descriptive analysis, the researcher employed a range of mathematical and statistical techniques to quantify the essential attributes of the data. This was accomplished by creating tables and charts, which served as visual aids to convey the key characteristics of the dataset effectively. The primary objective of employing descriptive statistics was to present a clear, categorized, and summarized representation of the data, facilitating easy comprehension for the intended audience. This methodological approach ensured a thorough exploration of the dataset, enhancing the overall interpretability of the research findings:

Utilizing statistical tables such as Frequencies (No.) and Percent (%), and computing the average scores overall mean score (M ±).

The mean score is computed as follows: Total mean of scores=(Maximum total scores-Minimum total scores)/Levels; Cervical Cancer Literacy (Low= 10-23.33; Moderate=23.34-36.66; High= 36.67-50); Adherence to Preventive Screening (Low= 8-13.33; Moderate=13.34-18.66; High= 18.67-24). Additionally, the standard deviation test ±SD is employed.

2. Inferential approach

1. Cronbach's alpha

The analysis uses Cronbach's alpha, which assesses the internal consistency of the study instrument.

$\alpha = (N * \bar{c}) / (\bar{v} + (N - 1) * \bar{c})$

2. Tests of Normality

Non-normally distributed data were presented as median or mean ± standard deviation and compared using the Kolmogorov-Smirnov (K-S test) and the Shapiro-Wilk tests.

$D = \max | F(x) - S_n(x) |$

$W = ((\Sigma a_i * x_i)2) / \Sigma(x_i - \bar{x})2$

3. Non-Parametric Tests

Kruskal-Wallis H Test: It is used to assess differences in dependent variables across independent variables. This test is applicable when there are more than two categorical variables. When the p-value is below 0.05, it indicates a statistically significant difference.

$H = (12 / (N * (N + 1))) * \Sigma(R_i2 / n_i) - 3(N + 1)$

Mann-Whitney U Test

The Mann-Whitney U test, a nonparametric technique suitable for non-normally distributed data, is used to identify differences in dependent variables with respect to independent variables. It is specifically geared toward scenarios with two categorical variables. A significance level of 0.05 is used to determine whether differences are statistically significant.

$U = n\_1 * n\_2 + (n\_1 * (n\_1 + 1)) / 2 - R\_1$

4. Pearson's Correlation Coefficient

This test is used to correlate study variables, where (Foroutan & Bijani) indicates a negative correlation and (+r) indicates a positive correlation at the significant levels of 0.01** and 0.05*.

$r = (n * \Sigma xy - \Sigma x * \Sigma y) / \sqrt{[(n * \Sigma x^2 - (\Sigma x)^2) * (n * \Sigma y^2 - (\Sigma y)^2)]}$

5. Simple Linear Regression Analysis

To test which continuous variables can predict nurses' practices. In which (- β) means negative prediction and (+ β) positive predication.

$Y = \beta_0 + \beta_1 * X$

Ethical Considerations

Ethical approval was obtained from the Institutional Review Board of the College of Medicine, University of Karbala (Approval Code: IRB-KARBALA-2024/CCL). Participation was voluntary, and informed consent was obtained from all respondents. Confidentiality and anonymity were strictly maintained throughout the study.

Findings and Results

The study sample consisted of 285 female university staff members. The majority were aged 20–39 years (75.4%), with a mean age of 34.05 ± 9.925 years. Most participants held a Bachelor's degree (64.6%), followed by a Master's degree (23.5%). The majority were married (66.3%), and nearly all participants were non-smokers (98.6%). Notably, 54.7% were unaware of the HPV vaccine. The primary sources of information about the Pap test were specialist doctors (41.4%) and the internet (33.7%), as shown in Table 1. No significant issues with missing data were encountered.

Table 1

Distribution of Study Sample by Their Socio-demographic Variables (N = 285).

Variable	Categories	n	%
Age group (years)	20–29	104	36.5%
	30–39	111	39.0%
	40–49	49	17.2%
	≥50	21	7.4%
Marital status	Married	189	66.3%
	Single	96	33.7%
Educational level	Diploma	36	12.6%
	Bachelor's degree	184	64.6%
	Master's degree	66	23.2%
	Doctorate	3	1.1%
Smoking status	Smoker	4	1.4%
	Non-smoker	281	98.6%
Awareness of the HPV vaccine	Yes	129	45.3%
	No	156	54.7%
Source of Pap smear info	Specialist doctor	118	41.4%
	Internet	96	33.7%
	Social media	41	14.4%
	TV/radio	30	10.5%

Table 2

Overall Evaluation of Cervical Cancer Literacy and Adherence to Preventive Screening (N = 285)

Variable	Category	N	%	Mean ± SD
Cervical Cancer Literacy	Low (10–23.33)	6	2.1%	37.46 ± 5.764
	Moderate (23.34–36.66)	96	33.7%	
	High (36.67–50)	183	64.2%	
	Total	285	100%	
Adherence to Screening	Low (8–13.33)	63	22.1%	15.97 ± 3.113
	Moderate (13.34–18.66)	163	57.2%	
	High (18.67–24)	59	20.7%	
	Total	285	100%	

As presented in Table 2, cervical cancer literacy was high among 64.2% of respondents, with a mean score of 37.46 ± 5.764. A moderate level of literacy was reported by 33.7%, while only 2.1% had low literacy. Regarding adherence to preventive screening, 57.2% of respondents reported moderate adherence, 20.7% had high adherence, and 22.1% had low adherence. The mean adherence score was 15.97 ± 3.113.

Figure 2

Distribution of Cervical Cancer Literacy Levels and Adherence to Preventive Screening.

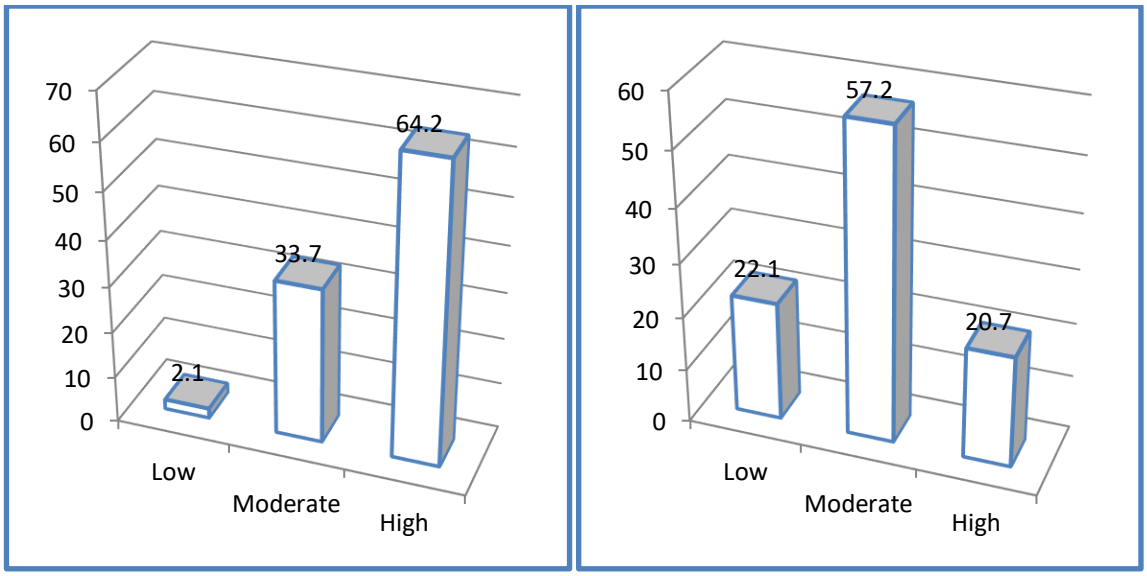


Figure 2 shows the distribution of cervical cancer literacy levels and adherence to preventive screening among female university staff. The figure complements the quantitative data presented in Table 2 by providing a clear visual comparison of the proportions of low, moderate, and high literacy and adherence levels.

Table 3

Pearson's Correlation Coefficients Between Age, Cervical Cancer Literacy, and Preventive Screening (N = 285).

Variable	1. Age	2. Cervical Cancer Literacy	3. Preventive Screening
1. Age	1		
2. Cervical Cancer Literacy	−0.091	1	
3. Preventive Screening	0.076	0.260	1

Note. Correlation is significant at the 0.01 level (2-tailed).

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E-ISSN: 2345-5802

As shown in Table 3, Pearson's correlation analysis revealed that age was not significantly associated with either cervical cancer literacy (r = –0.091, p > 0.05) or adherence to preventive screening (r = 0.076, p > 0.05). However, there was a statistically significant positive correlation between cervical cancer literacy and adherence to screening (r = 0.260, p < 0.01). Approximate 95% CI for r = 0.260 is (0.148, 0.366).

Table 4

Simple Linear Regression Predicting Adherence to Preventive Screening from Cervical Cancer Literacy (N = 285).

Predictor	B	SE B	B	T	p-value	R^2	F
Cervical Cancer Literacy	0.141	0.029	0.260	4.875	< .001	0.068	23.766

Note. *B = Unstandardized coefficient; SE B = Standard Error; β = Standardized coefficient.*

As presented in Table 4, A simple linear regression was conducted to determine whether cervical cancer literacy predicted adherence to preventive screening. The model was statistically significant: F(1, 283) = 23.766, p < 0.001, with R^2 = 0.068. Cervical cancer literacy accounted for 6.8% of the variance in adherence scores. For every one-unit increase in literacy, adherence increased by 0.141 units (β = 0.260, t = 4.875, p < 0.001).

Presents the results of non-parametric tests examining differences in cervical cancer literacy and adherence across various socio-demographic variables. These analyses aimed to identify whether factors such as education level, marital status, smoking status, awareness of the HPV vaccine, and source of information about the Pap test are associated with significant differences in participants' literacy and screening behaviors.

Table 5

Differences in Cervical Cancer Literacy and Screening Adherence According to Socio-demographic Variables (N = 285).

Socio-demographic Variable	Variable Category	Test Used	Literacy (p-value)	Adherence (p-value)
Education Level	Primary, Secondary, Higher	Kruskal-Wallis χ^2	.327	.115
Marital Status	Single, Married, Widowed	Kruskal-Wallis χ^2	.895	.227
Smoking Status	Smoker, Non-smoker	Mann–Whitney U	.164	.311
Awareness of HPV Vaccine	Yes, No	Mann–Whitney U	.006**	.081
Source of Pap Test Information	Social media, Doctors, TV, Other	Kruskal-Wallis χ^2	.030*	.205

*Note. *p < .05, **p < .01*

As shown in Table 5, statistically significant differences were found in literacy levels among participants who were aware of the HPV vaccine (p = .006) and among those who received Pap test information from different sources (p = .030). In contrast, no significant differences were observed in adherence rates across education level, marital status, smoking status, or any other socio-demographic characteristic.

Discussion and Conclusion

This study examined the relationship between cervical cancer health literacy (CCHL) and adherence to preventive screening among female university staff in Karbala, Iraq. Although 64.2% of participants demonstrated high levels of CCHL, screening adherence was only moderate, with a mean adherence score of 15.97 (±3.11). Notably, 22.1% of participants reported low adherence, and the overall adherence rate stood at 57.2%.

A statistically significant yet weak positive correlation was observed between CCHL and adherence to screening, indicating that health literacy accounted for only a small proportion of the variance in adherence behavior. This reflects a commonly observed "knowledge-to-action" gap in health behavior literature, whereby knowledge alone does not necessarily translate into action (Rubin et al., 2023). According to the Health Belief Model (HBM), additional factors—such as perceived barriers (e.g., financial cost, limited access, cultural stigma, fear, modesty) and cues to action (e.g., physician recommendations, social influence)—likely exert greater influence on screening adherence.

The high CCHL levels among this cohort are consistent with expectations for a university-educated population. These findings contrast with lower levels of awareness reported among university staff in Ethiopia (Tekle et al., 2020). Still, they are slightly lower than those observed in a Canadian study, in which 78% of university employees demonstrated high CCHL (Tatar et al., 2024). While the adherence rate in this study exceeds that reported in some LMICs, such as rural India and Ethiopia (35–42%) (Stroetmann et al., 2024), it remains suboptimal compared with high-income countries with well-established national screening programs (Arbyn et al., 2021). This disparity may be attributed to differences in health system infrastructure, the intensity of public education campaigns, and the accessibility and affordability of screening services.

Regression analysis confirmed that CCHL accounted for 6.7% of the variance in screening adherence. Additionally, specialist doctors were identified as the most influential source of information ($r = 0.260$, $p = 0.035$), reinforcing the central role of healthcare providers in promoting awareness and guiding preventive behaviors. Awareness of the HPV vaccine was also positively associated with CCHL, underscoring the value of targeted health promotion initiatives.

Despite high levels of health literacy, the moderate adherence observed suggests that knowledge alone is insufficient to drive preventive behavior. Within the HBM framework, this outcome can be interpreted as a function of competing influences—such as perceived barriers, benefits, and cues to action—that interact to shape health-related decision-making. Other unmeasured factors, including psychosocial dynamics, the health system's organizational characteristics, and prevailing sociocultural norms, may also contribute to the observed behavior.

No significant association was found between age and either CCHL or adherence. This may be attributed to the relatively homogeneous educational and occupational context of the study population, in which access to information is not strongly age-dependent.

This study has several limitations that should be considered when interpreting the findings: The study's design does not allow for causal inference between cervical cancer literacy and screening adherence; it only establishes correlation. The sample was drawn from a single university and consisted of literate, employed women—likely more educated and health-aware than the general female population in Iraq. This limits the generalizability of the findings. Both cervical cancer literacy (CCHL) and adherence behaviors were self-reported, which may be subject to social desirability or recall bias. Potential variables such as health insurance status, detailed gynecological history, partner support, and specific cultural beliefs were not assessed. While the CCAM tool was used and pilot-tested, further validation within the Iraqi Arabic context is recommended to confirm its psychometric robustness. The regression model accounted for only 6.7% of the variance in adherence, suggesting the influence of other psychosocial, cultural, or systemic factors not captured in the study.

This study underscores the significant yet modest positive correlation between cervical cancer health literacy (CCHL) and adherence to preventive screening among female university staff in Karbala, Iraq. Although participants exhibited relatively high levels of literacy, actual adherence to screening practices remained moderate, indicating a persistent gap between knowledge and action. The findings suggest that literacy

alone is not a sufficient driver of behavior change. The weak but statistically significant correlation ($r = .260$, $p < 0.01$) confirms that other factors—such as accessibility to services, cultural norms, and individual motivation—are influential.

Notably, health motivation emerged as a crucial determinant of screening behavior. While age and education level were not significantly correlated with either CCHL or adherence ($r = –.091$ and $r = .076$, respectively), marital status showed a notable association with higher screening rates, suggesting that social roles and responsibilities may affect health behavior more than demographic variables alone.

Furthermore, awareness of the HPV vaccine was significantly associated with higher literacy scores ($p = 0.013$), underscoring the importance of vaccine-related education in strengthening overall health literacy. The lack of a significant direct link between HPV awareness and adherence suggests that while knowledge may be increasing, it is not yet translating effectively into action.

These findings point to the need for multi-level, culturally tailored interventions that go beyond information dissemination to engage women in behavior change actively. Effective strategies may include university-based wellness programs, partnerships with healthcare providers, and the use of diverse communication platforms (e.g., workshops, printed materials, digital media) to enhance understanding and address perceived barriers.

In light of the study's conclusions and identified limitations, the following recommendations are proposed:

The Ministries of Health and Higher Education should collaborate to implement comprehensive, culturally sensitive cervical cancer education programs, particularly targeting university populations. These programs should emphasize the importance of early detection, the role of the HPV vaccine, and preventive screening steps. Incorporating such content into university curricula and campus health services would enhance reach and sustainability.

Introduce convenient, female-friendly screening services on campus or through mobile clinics. Reducing logistical and cultural barriers—such as privacy concerns, distance, or provider gender—can increase uptake. Develop behavioral interventions that focus on enhancing self-efficacy, reducing perceived barriers, and delivering clear cues to action. Tailored messaging should consider marital status, perceived risk, and readiness to act. Equip providers with communication skills that emphasize empathy, cultural competence, and clarity in conveying the importance of screening. This will help build trust and motivate behavior change.

Conduct mixed-methods studies to investigate further the psychosocial and systemic barriers to cervical cancer screening in Iraq. Including qualitative approaches will provide deeper insights into cultural norms, stigma, and individual beliefs. Assess the effectiveness of educational and motivational strategies over time to identify best practices and adapt programs to evolving needs.

Acknowledgments

The authors express their gratitude and appreciation to all participants.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants. An ethical consideration in this study was that participation was entirely optional.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

Funding

This research was conducted independently, with personal funding and without financial support from any governmental or private institution or organization.

Authors' Contributions

All authors equally contribute to this study.

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E-ISSN: 2345-5802