



# Predicting the factors related to cervical cancer screening in secondary school female teachers in Shahrekord: Application of PEN-3 model factors about cervical cancer screening in female teachers

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## Abstract

**Background and aims:** Cervical cancer is one of the most common cancers in women. Cervical cancer screening is one of the essential measures for preventing this disease, and its purpose is to detect lesions in the premalignant stage and reduce the risk of death from this cancer. This study aimed to predict the factors related to cervical cancer screening in secondary school teachers using the PEN-3 model in Shahrekord, southwest Iran.

**Methods:** This descriptive-analytical study was conducted on secondary school female teachers in the academic year 2019-2020. The samples were 228 individuals who were selected by convenience random sampling. The research tools were a demographic information checklist, uterine screening performance information, and a questionnaire based on PEN-3 model constructs (perceptual, enabling, and reinforcing factors). Data analysis was done using SPSS version 22.

**Results:** Regarding cervical cancer screening (Pap smear test), 59.82% of the teachers had a history of undergoing Pap smear tests, of which 35.43% had performed the test regularly. Pearson's correlation coefficient showed a direct and significant correlation between PEN-3 model constructs (perceptual, enabling, and reinforcing factors) and a history of cervical cancer screening ( $P < 0.001$ ). In the regression analysis of demographic variables and PEN-3 model constructs, the predictive value of these variables for cervical cancer screening was obtained at 0.57%.

**Conclusion:** Based on the findings of the study and given the role of PEN-3 model constructs (perceptual factors, enabling factors, and reinforcing elements) in predicting cervical cancer screening behavior, comprehensive planning for intervention and use of this educational model and gaining knowledge about the cultural and socioeconomic factors for cervical cancer screening seems useful.

**Keywords:** PEN-3 model, Cervical cancer screening, Female teachers

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## Introduction

Cancer includes over 200 diseases and develops due to uncontrolled and unplanned growth and proliferation of body cells caused by various environmental and genetic factors. Statistics show that the number of people suffering from this disease is increasing globally, especially in Iran. According to the latest statistical and epidemiological surveys in Iran, after cardiovascular disease and accidents, cancer is considered the second cause of death (1). Every year more than 10 million new cases of cancer are diagnosed, and over 20 million people across the world live with the diagnosis of cancer.

The annual incidence of cancers in Iran is about 70 000 cases, and the associated mortality rate is around 30 000 people; due to increased life expectancy, it is projected that the incidence rate will increase substantially in the coming decades (2).

According to the report of the World Health

Organization, 25% of women's deaths are due to malignant tumors, of which 18% are due to cervical cancer (3). In Iran, cervical cancer is one of the most common cancers in women, the prevalence of which is 6.64%. It is the fourth leading cancer among women (4).

The average age of patients with this cancer in Iran is 52.2 years, while the peak age of this cancer in Iran is 50-55 years, and the highest incidence rate has been reported in two age periods: 35-39 years and 60-64 years (5).

Low age at first intercourse, high parity, low socioeconomic status, weak immune system, smoking, having multiple sexual partners, infection with human papillomavirus, contraceptive pills, spouse's penile cancer, spouse's other wife's development of cervical cancer, and the poor health status are some possible risk factors for this cancer (6-8).

Cervical cancer screening is one of the critical measures for preventing this disease, and its purpose is to detect

lesions in the premalignant stage and reduce the risk of death from this cancer (9). As a simple, cheap, and uncomplicated method, the Pap smear test is still the choice in cervical cancer screening (10).

According to the National Cervical Cancer Program, screening should be done for all women after marriage, and after three normal Pap smear samples (once a year), this test should be repeated every three years. This screening is done for free in comprehensive healthcare centers, but unfortunately, the related statistics could be more satisfactory (6).

The research shows that women face many cultural, emotional and functional, social, religious, geographical, and economic barriers to accessing services to perform the pap smear test.

Among the reasons for not referring to take this test can be factors such as lack of knowledge about the necessity of taking the test, lack of doctor's recommendation, stress, feeling ashamed at the time of taking the test, high cost, low age, old age, busyness, unethical behavior of health care workers, the lack of respect for patient privacy, the fear of a positive test result, and the aggressiveness of the follow-up methods in case of a positive test (11,12).

Based on the studies carried out in Iran and other countries, the strategies to control cervical cancer at the first level of the health service delivery system are: identifying and removing cultural and social barriers, planning to correct beliefs and attitudes about cervical cancer, and adopting of health behaviors as well as health education through designed and targeted health communication.

It is better to investigate the factors of not conducting screening among meaningful educational occupations such as professors, teachers, health workers and doctors, nurses, and paramedics because these people play an essential role in the education of society. For example, the part of teachers as educators and the role of students as a bridge of communication with the family is crucial and straightforward (13-15).

The PEN-3 model is one of the models for studying behavior in education and health promotion, and the factors that influence a person's behavior are examined in this model.

This model has different structures: perceptual factors, enabling factors, and reinforcing factors, which are associated with positive, negative, and ineffective self-beliefs. Identifying these factors is very important for the use of interventions (16). The role of the PEN-3 pattern in other diseases has also been demonstrated (17).

This pattern consists of three dimensions, each indicated by one of the letters P, E, and N. These three dimensions are internally related and dependent. The first dimension, health education, includes the following PEN:

P (Person): Health education should sensitize and commit the person to improve healthy behaviors.

E (Extended Family): Health education should be directed not only to the individual's immediate family but

also to the individual's extended family or relatives.

N (Neighbourhood): Health education should be directed towards improving the health of the neighborhood and society. Engaging community leaders in culturally appropriate health planning is essential (18).

In the second dimension, the PEN-3 model refers to the educational diagnosis of health behavior:

P (Perception): Perception is related to knowledge, beliefs, attitudes, and values that can facilitate or prevent motivation to change a specific behavior.

E (Enablers): These are regular social forces that can increase health behaviors or prevent them from occurring by creating barriers. Enablers include available resources, accessibility, referral points, and types of services.

N (Nurturers): These are reinforcing factors that a person may receive from others who are important to them, such as extended family members, peers, employers, health workers, religious leaders, or government officials (19).

The third dimension of the PEN-3 model is called the cultural fit of health beliefs;

P (Positive): Positive perceptions, enablers, and nurturers that help engage the person, family, or community in positive health practices. These positive health practices lead to individual, family, and social empowerment.

E (intermediate): They include functions that are neither good nor bad and therefore do not need to be changed.

N (Negative): These include negative perceptions, enablers, and nurturers that involve the person, family, and/or community in negative practices that cause harm to health (20).

Few studies with this model have been conducted in Iran; therefore, because the context for health and preventive behaviors of people in the society is provided in comprehensive health service centers, women's culture, beliefs, and opinions significantly impact the acceptance of cancer screening methods. This study investigates whether the PEN-3 model has a role in identifying the factors related to cervical cancer screening among secondary school teachers in Shahrekord, southwest Iran.

## Materials and Methods

The study population of this descriptive-analytical study included all female teachers of the first- and second-grade secondary schools across Shahrekord in the academic year 2019-2020. According to the report from the Department of Planning and Statistics of the General Education Department of Shahrekord, the total number of female secondary school teachers working in Shahrekord in the academic year 2019-2020 was drawn. Then, the sample size was decided to be at least 190 using the sample size calculation formula 
$$z = \frac{(z_1 + z_2)^2 (1 - r^2)}{r^2} \times 2,$$
 and given a 20% probability of dropout due to not answering all the items.

Finally, simple random sampling selected the minimum sample size according to the table. To carry out the study in the specified academic areas, the researcher referred to the schools chosen after obtaining

permission from the Research and Technology Deputy of the Shahrekord University of Medical Sciences and the General Department of Education of Shahrekord, coordinating with the Education Departments of the 1st and 2nd Districts and then with the school principals, and encouraging the teachers to cooperate with the study after presenting necessary explanations about the objectives and procedure of the study to them. The inclusion criteria were working in selected schools, married, and volunteering to participate in the study. The exclusion criteria were suffering from cervical cancer and lack of volunteering to participate in the study. To comply with ethical considerations, before completing the questionnaires, verbal consent was obtained from the participants. They were also ensured that the questionnaires would be anonymous and that their information would be kept confidential. The questionnaires were collected in person by the researchers.

Based on the research questions, an appropriate research instrument and a demographic characteristics checklist were used to collect data. The research tool was a researcher-made questionnaire consisting of 28 items based on the PEN-3 model and literature review, whose content validity was theoretically confirmed by consultation with ten experts.

To determine the reliability of the questionnaire, it was administered to 30 participants. Cronbach's alpha ( $\alpha$ ) was obtained at 0.72 for perceptual factors, 0.70 for enabling factors, and 0.76 for reinforcing elements (21).

To measure the performance of the cervical cancer screening method, items with yes and no answers (scored 0 and 1) were used.

To measure the perceptual factors, a 5-point Likert scale [Absolutely agree (score 5), agree (score 4), neither agree nor disagree (score 3), disagree (score 2), and disagree (score 1)]. Items with yes and no answers (scored 0 and 1) were used to measure enabling and reinforcing factors.

Finally, the data were analyzed using correlation, simple regression, and descriptive tests in SPSS software (22).

## Results

The mean and standard deviation of the age of the teachers participating in the study was  $41.83 \pm 11.30$ . The mean age at first pregnancy was  $23.44 \pm 9.67$ , the mean number of teachers with a history of genital tract infection was  $26.76 \pm 8.93$ , the mean number of miscarriages and stillbirths was  $2.97 \pm 0.73$ , the mean parity was  $2.44 \pm 1.47$ , and the mean regular menstrual cycle was  $217.84 \pm 12.35$ .

For performance regarding cancer screening, among the perceptual factors in the positive beliefs, the belief that cancer can be prevented by screening (85.96%) and belief in the timely detection and control of cancer (74.13%) were drawn as the most frequently reported beliefs. Among the negative thoughts, the unpleasant experience of the previous test (41.22%) and feeling ashamed of screening (36.84%) were the most frequently reported reasons for the lack of undergoing screening tests. Among the enabling factors mentioned in the positive characteristics of screening, the attention and follow-up of healthcare center personnel to perform the test (75.76%) and free screening services (56.58%) were drawn. Among the negative and inhibiting factors of screening, busy work and lack of time were expressed by 80.71%. Among the reinforcing elements, the wife's encouragement (77/63%) was mentioned as the reason for screening, and the wife's opposition (40/78%) was said among the negative factors (Table 1).

Pearson's correlation test showed that there was a direct correlation between the history of cervical cancer screening and demographic variables ( $P < 0.05$ ) and also between PEN-3 model constructs (perceptual, enabling, and reinforcing factors) and history of cervical cancer screening ( $P < 0.001$ ) (Table 2).

In the regression analysis between demographic variables (age at first pregnancy, parity, regular menstrual cycle, history of genital infection, history of abortion and stillbirth) and the constructs of the PEN-3 model (perceptual, enabling, and reinforcing factors), the predictive value of these variables was obtained at 0.57%. Among these variables, the predictive value of perceptual

**Table 1.** Constructs of the PEN-3 model (perceptual, enabling, and reinforcing factors) regarding cervical cancer screening among school teachers

Factors	Positive	No. (%)	Negative	No. (%)
Perceptual factors	Knowing how to screen for cervical cancer	112 (49.12)	Lack of belief in the effectiveness of screening	78 (34.21)
	Having a family history of cervical cancer	144 (63.15)	Feeling ashamed	84 (36.84)
	Belief in the timely detection and control of cancer	169 (74.13)	Fear and anxiety about taking the test	38 (16.66)
	The belief that cancer can be prevented by screening	196 (85.96)	Unpleasant previous test experience	94 (41.22)
Enabling factors	Access to healthcare centers at times other than working hours	61 (26.75)	Busyness and lack of time	184 (80.71)
	Attention and follow-up of healthcare centers' personnel to perform the test	175 (75.76)	Lack of follow-up by the personnel of healthcare centers	55 (24.12)
	Free screening services	129 (56.58)	Lack of skill of the personnel of healthcare centers	54 (23.36)
Reinforcing factors	Spouse's encouragement	177 (77.63)	Wife's opposition	93 (40.78)
	Colleagues' encouragement	164 (71.92)	The social stigma of screening test	26 (11.48)
	Mass media's encouragement	68 (29.82)		
	Healthcare personnel's encouragement	91 (39.91)		

**Table 2.** Relationship of PEN-3 model items and demographic variables to cervical cancer screening

Row		1	2	3	4	5	6	7	8	9
1	History of cervical cancer screening (Pap smear test)	1								
2	Age at first pregnancy	0.14 <i>P</i> >0.05	1							
3	Parity	0.11 <i>P</i> >0.05	0.37 <i>P</i> <0.001	1						
4	Regular menstrual cycle	0.31 <i>P</i> <0.001	0.29 <i>P</i> <0.05	0.39 <i>P</i> <0.001	1					
5	History of genital tract infection	0.59 <i>P</i> <0.001	0.17 <i>P</i> >0.05	0.34 <i>P</i> <0.001	0.41 <i>P</i> <0.001	1				
6	History of abortion and stillbirth	0.37 <i>P</i> <0.001	0.39 <i>P</i> <0.001	0.39 <i>P</i> <0.001	0.39 <i>P</i> <0.001	0.39 <i>P</i> <0.001	1			
7	Perceptual factors	0.57 <i>P</i> <0.001	0.32 <i>P</i> <0.001	0.27 <i>P</i> <0.001	0.42 <i>P</i> <0.001	0.38 <i>P</i> <0.001	0.21 <i>P</i> <0.05	1		
8	Enabling factors	0.49 <i>P</i> <0.001	0.13 <i>P</i> >0.05	0.16 <i>P</i> >0.05	0.19 <i>P</i> >0.05	0.26 <i>P</i> <0.05	0.23 <i>P</i> <0.05	0.43 <i>P</i> <0.001	1	
9	Reinforcing factors	0.46 <i>P</i> <0.001	0.27 <i>P</i> <0.001	0.39 <i>P</i> <0.001	14/0 <i>P</i> >0.05	0.11 <i>P</i> >0.05	0.13 <i>P</i> >0.05	0.44 <i>P</i> <0.001	0.39 <i>P</i> <0.001	1

factors, enabling factors, and history of genital tract infection was higher (Table 3).

**Discussion**

This study was conducted to use the PEN-3 model for predicting the factors related to cervical cancer screening among secondary school teachers in Shahrekord.

The study’s findings showed that 47.82% of the teachers had a history of performing Pap smear tests, of which 31.43% had performed the screening test regularly. In this regard, a study in Hamadan, western Iran, showed that 53.6% of the samples still needed to be screened (21). In Mohebi and colleagues’ study, 36.88% of women in Qom had never undergone this test, 11.25% of women used Pap smear tests regularly, and 51.87% irregularly participated in cervical cancer screening (22).

Morowatisharifabad et al also surveyed cervical cancer screening in women of Chaharmahal and Bakhtiari and reported that 36.3% of women had undergone this test once and 6% twice (23). Ruzigana and colleagues’ study showed that only 13.3% of women without symptoms had been referred for screening, and out of 84% of women with symptoms, more than a third had never undergone a speculum examination (24). In a study by Rositch et al, although 69% knew that a Pap smear aims to detect cervical cancer, 14% had done it only once (25). In this regard, it is argued that one of the main reasons for women’s unfavorable performance in doing cervical cancer screening tests regularly is caused by their poor awareness and insufficient knowledge of the disease because awareness is a necessary prerequisite for changing attitude, behavior and making the right decision about adaptation to behavior (26).

Among the perceptual factors in the positive beliefs section, the belief that cancer can be prevented by screening and the belief in timely detection and control of cancer had the most cases.

**Table 3.** Prediction of PEN-3 model items and demographic variables concerning cervical cancer screening

Independent variables	Standardized beta	P value	R2
Age at first pregnancy	0.113	0.034	
Parity	0.121	0.027	
Regular menstrual cycle	0.116	0.029	
History of genital tract infection	0.137	<i>P</i> <0.001	0.57
History of abortion and stillbirth	0.133	<i>P</i> <0.001	
Perceptual factors	0.141	<i>P</i> <0.001	
Enabling factors	0.139	<i>P</i> <0.001	
Reinforcing factors	0.131	<i>P</i> <0.001	

In the study by Lee et al in Singapore on cervical cancer screening, 58.9% of women did not consider themselves susceptible to cervical cancer, and 48.7% believed that cancer could not be prevented (27). Parikh et al also pointed out in his study that part of the spread of this cancer is due to the lack of appropriate screening tests. Among the causes of such behavior (not performing tests), he points to the lack of information and economic, cultural, and belief system problems (28).

The results showed that there were some perceptions of some types of eating habits that were part of their culture, and there was no feeling of requiring behavior change (29) which is in line with the findings of the present study and cultural, religious, and economic factors are influential in screening behavior.

Among the negative beliefs, the unpleasant experience of the previous test and feeling ashamed of screening were the most critical factors that prevented screening. In the study of Mohebi et al, fear of the test result and feeling ashamed were the essential obstacles to performing a Pap smear test (22). Among the enabling factors mentioned in the positive screening factors, the attention and follow-up of healthcare center personnel to perform the test and free screening services were mentioned. In the negative

and inhibiting factors of screening, busyness and lack of time were mentioned. Among the reinforcing elements, the wife's encouragement was drawn as the reason for screening, and the wife's opposition was a negative factor. The study of Fitzgibbon and Beech on the role of nutritional culture in children's education using the PEN-3 model showed that dietary problems in society are caused by the culture of the community and the way parents view obesity as a reinforcing factor in society (30).

Also, in the study of Pakseresht et al, which was conducted on women's viewpoints about cervical cancer, three main results were obtained, including weak health information, neglect of the disease, and the need for treatment and support, among which neglect of the disease was divided into three subclasses: inattention to the risk of cervical cancer, negligence in screening, and lack of self-care motivation (26). This finding is in agreement with the present study.

Also, the study's findings showed a direct correlation between the constructs of the PEN-3 model (perceptual, enabling, and reinforcing factors) and the history of cervical cancer screening. In the regression analysis of demographic variables and PEN-3 model constructs, the predictive value of these variables for cervical cancer screening was drawn at 0.57%.

In this regard, Moradi and colleagues' study in Sanandaj high school students in which the PEN-3 model was used for analysis showed low nutritional knowledge, beliefs, and values. The influence of peers, the role of parents, the media, and the accessibility of some concepts were obtained that are not only dependent on the individual and are also influenced by factors outside the individual; therefore, all influential factors should be taken into account in designing interventions to improve fruit and vegetable consumption (31), which is consistent with the findings of the present study. Factors such as knowledge, beliefs, and values, the influence of colleagues, the role of the spouse, the media, and access to healthcare centers are among the contributing factors to screening behavior. Therefore, attention should be given to the individual's internal and external factors for behavioral change in educational interventions.

Because part of the model was used in this study, it is recommended to use it to identify the cultural, social, and economic factors influencing cervical cancer screening.

### Conclusion

Based on the findings of the study and given the role of PEN-3 model constructs (perceptual factors, enabling factors, and reinforcing elements) in predicting cervical cancer screening behavior, comprehensive planning for intervention and use of this educational model and gaining knowledge about the cultural and socioeconomic factors for cervical cancer screening seems useful.

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### Authors' Contribution

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### Competing Interests

There is no conflict of interest.

### Ethical Approval

Ethical considerations in this study included obtaining permission from the Ethics Committee of Research Assistant of Shahrekord University of Medical Sciences (IR.SKUMS.REC.1398.151) and obtaining written consent to participate in the study from the participants.

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### References

- Daryani S, Shojaeezadeh D, Batebi A, Yazdavi Charati J, Naghibi A. The effect of education based on a health belief model in women's practice with regard to the Pap smear test. *J Cancer Policy*. 2016;8:51-6. doi: [10.1016/j.jcpc.2015.11.001](https://doi.org/10.1016/j.jcpc.2015.11.001).
- Heiydari S, Salahshorian A, Rafie F, Hoseini F. Correlation of perceived social support and size of social network with quality of life dimension in cancer patients. *Feyz*. 2008;12(2):15-22. [Persian].
- Rabiei L, Masoudi R, Lotfizadeh M. Evaluation of the Effectiveness of Nutritional Education based on Health Belief Model on Self-Esteem and BMI of Overweight and at Risk of Overweight Adolescent Girls. *Int J Pediatr*. 2017;5(8) 5417-28.
- Yakhforushha A, Solhi M, Ebadi Fard Azar F. Effects of education via health belief model on knowledge and attitude of voluntary health workers regarding pap smear in urban centers of Qazvin. *Adv Nurs Midwifery*. 2009;18(63):27-33. [Persian].
- Sharifi M, Mohammadi Z, Makvandi Z, Rostami P, Moradi A. Assessment of cervical cancer screening and its barriers in 18-50 year old women referring to Asad Abad comprehensive health centers. *Pajouhan Sci J*. 2018;16(2):35-45. doi: [10.21859/psj.16.2.35](https://doi.org/10.21859/psj.16.2.35). [Persian].
- Gultekin M, Ramirez PT, Broutet N, Hutubessy R. World Health Organization call for action to eliminate cervical cancer globally. *Int J Gynecol Cancer*. 2020;30(4):426-7. doi: [10.1136/ijgc-2020-001285](https://doi.org/10.1136/ijgc-2020-001285).
- Tsu VD, Njama-Meya D, Lim J, Murray M, de Sanjose S. Opportunities and challenges for introducing HPV testing for cervical cancer screening in sub-Saharan Africa. *Prev Med*. 2018;114:205-8. doi: [10.1016/j.ypmed.2018.07.012](https://doi.org/10.1016/j.ypmed.2018.07.012).
- Toliman PJ, Kaldor JM, Tabrizi SN, Vallely AJ. Innovative approaches to cervical cancer screening in low- and middle-income countries. *Climacteric*. 2018;21(3):235-8. doi: [10.1080/13697137.2018.1439917](https://doi.org/10.1080/13697137.2018.1439917).
- Fontham ETH, Wolf AMD, Church TR, Etzioni R, Flowers CR, Herzig A, et al. Cervical cancer screening for individuals

- at average risk: 2020 guideline update from the American Cancer Society. *CA Cancer J Clin.* 2020;70(5):321-46. doi: [10.3322/caac.21628](https://doi.org/10.3322/caac.21628).
10. Chrysostomou AC, Stylianou DC, Constantinidou A, Kostrikis LG. Cervical cancer screening programs in Europe: the transition towards HPV vaccination and population-based HPV testing. *Viruses.* 2018;10(12):729. doi: [10.3390/v10120729](https://doi.org/10.3390/v10120729).
  11. Bahmani A, Rahmani K, Ahmadian F, Alizadeh Z, Akhtar B. Explanation of pap smear preventive behavior among women based on health belief model: a qualitative study. *Iran J Health Educ Health Promot.* 2017;5(1):5-14. doi: [10.18869/acadpub.ihepsaj.5.1.5](https://doi.org/10.18869/acadpub.ihepsaj.5.1.5). [Persian].
  12. Bennett KF, Waller J, Chorley AJ, Ferrer RA, Haddrell JB, Marlow LA. Barriers to cervical screening and interest in self-sampling among women who actively decline screening. *J Med Screen.* 2018;25(4):211-7. doi: [10.1177/0969141318767471](https://doi.org/10.1177/0969141318767471).
  13. Teoh D, Isaksson Vogel R, Hultman G, Monu M, Downs L, Geller MA, et al. Single health system adherence to 2012 cervical cancer screening guidelines at extremes of age and posthysterectomy. *Obstet Gynecol.* 2017;129(3):448-56. doi: [10.1097/aog.0000000000001895](https://doi.org/10.1097/aog.0000000000001895).
  14. Boka A, Nigatu D. Cervical cancer screening and associated factors among women attending gynecology out-patient department and maternal and child health at Mettu Karl Referral Hospital, South West, Ethiopia, 2019. *Int J Curr Res Life Sci.* 2019;8(1):2934-44.
  15. Farzaneh E, Heydari H, Shekarchi AA, Kamran A. Breast and cervical cancer-screening uptake among females in Ardabil, northwest Iran: a community-based study. *Onco Targets Ther.* 2017;10:985-92. doi: [10.2147/ott.s125344](https://doi.org/10.2147/ott.s125344).
  16. Naghibi A, Jamshidi P, Yazdani J, Rostami F. Identification of factors associated with breast cancer screening based on the PEN-3 model among female school teachers in Kermanshah. *Iran J Health Educ Health Promot.* 2016;4(1):58-64. doi: [10.18869/acadpub.ihepsaj.4.1.58](https://doi.org/10.18869/acadpub.ihepsaj.4.1.58). [Persian].
  17. McInvale Trejo K, Shaw-Ridley M. Barriers and enablers to nutrition and physical activity in Lima, Peru: an application of the Pen-3 cultural model among families living in Pueblos jóvenes. *Ethn Health.* 2021;26(6):911-21. doi: [10.1080/13557858.2019.1591347](https://doi.org/10.1080/13557858.2019.1591347).
  18. Martin P, Olanlesi-Aliu A, Daniels F. Towards the development of a community-based model for promoting cervical cancer prevention among Yoruba women in Ibadan Nigeria: application of PEN-3 model. *South Afr J Gynaecol Oncol.* 2019;11(2):22-6. doi: [10.1080/20742835.2019.1679528](https://doi.org/10.1080/20742835.2019.1679528).
  19. Moeini B, Rezapur-Shahkolai F, Jahanfar S, Naghdi A, Karami M, Ezzati-Rastegar K. Utilizing the PEN-3 model to identify socio-cultural factors affecting intimate partner violence against pregnant women in Suburban Hamadan. *Health Care Women Int.* 2019;40(11):1212-28. doi: [10.1080/07399332.2019.1578777](https://doi.org/10.1080/07399332.2019.1578777).
  20. Peyman N, Ezzati-Rastgar K, Tehrani H. The impact of educational intervention based on PEN-3 model on oral health behavior in elementary school students. *Iran J Health Educ Health Promot.* 2016;4(2):149-57. doi: [10.18869/acadpub.ihepsaj.4.2.149](https://doi.org/10.18869/acadpub.ihepsaj.4.2.149). [Persian].
  21. Bakht R, Shobeiri F, Roshanaei G, Fakouri E. Factors affecting the screening of cervical cancer in addicted women in Hamadan in 2017: based on the model of protection motivation theory. *Hakim Seyed Esmail Jorjani Jour.* 2017;2(4). [Persian].
  22. Mohebi S, Sharifirad G, Gharlipour Z, Kamran A. The study of pap smear conduction and its related factors based on health belief model in women referring to health care centers in Qom during 2014. *J Educ Community Health.* 2016;2(4):25-33. doi: [10.21859/jech-02044](https://doi.org/10.21859/jech-02044). [Persian].
  23. Morowatisharifabad M, Norouzi S, Layeghy S, Norouzi A. Survey of cervix cancer screening determinants among 20-65 years old women based on health belief model in Lordegan, Chahar Mahal Bakhtiaryee, 2009. *Tolooebehdasht.* 2013;12(1):98-106. [Persian].
  24. Ruzigana G, Bazzet-Matabele L, Rulisa S, Martin AN, Ghebre RG. Cervical cancer screening at a tertiary care center in Rwanda. *Gynecol Oncol Rep.* 2017;21:13-6. doi: [10.1016/j.gore.2017.05.005](https://doi.org/10.1016/j.gore.2017.05.005).
  25. Rositch AF, Gatuguta A, Choi RY, Guthrie BL, Mackelprang RD, Bosire R, et al. Knowledge and acceptability of pap smears, self-sampling and HPV vaccination among adult women in Kenya. *PLoS One.* 2012;7(7):e40766. doi: [10.1371/journal.pone.0040766](https://doi.org/10.1371/journal.pone.0040766).
  26. Pakseresht S, Jafarzadeh-Kenarsari F, Rafat F, Rahebi SM. Exploration of women's perspective on cervical cancer: a qualitative study. *J Holist Nurs Midwifery.* 2016;26(4):43-51. [Persian].
  27. Lee J, Seow A, Ling SL, Peng LH. Improving adherence to regular pap smear screening among Asian women: a population-based study in Singapore. *Health Educ Behav.* 2002;29(2):207-18. doi: [10.1177/109019810202900206](https://doi.org/10.1177/109019810202900206).
  28. Parikh S, Brennan P, Boffetta P. Meta-analysis of social inequality and the risk of cervical cancer. *Int J Cancer.* 2003;105(5):687-91. doi: [10.1002/ijc.11141](https://doi.org/10.1002/ijc.11141).
  29. Brenna SM, Hardy E, Zeferino LC, Namura I. [Knowledge, attitudes, and practices related to the pap smear among women with cervical cancer]. *Cad Saude Publica.* 2001;17(4):909-14. doi: [10.1590/s0102-311x2001000400024](https://doi.org/10.1590/s0102-311x2001000400024). [Portuguese].
  30. Fitzgibbon ML, Beech BM. The role of culture in the context of school-based BMI screening. *Pediatrics.* 2009;124 Suppl 1:S50-62. doi: [10.1542/peds.2008-3586H](https://doi.org/10.1542/peds.2008-3586H).
  31. Moradi G, Rahimzadeh A, Amani S, Yousefi J, Rahmani K, Bagheri S. Barriers and strategies of fruit and vegetable consumption in high school students in Sanandaj. *J Educ Community Health.* 2018;5(2):18-25. doi: [10.21859/jech.5.2.18](https://doi.org/10.21859/jech.5.2.18). [Persian].

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