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KNOWLEDGE AND ATTITUDE REGARDING CERVICAL CANCER AMONG WOMEN OF REPRODUCTIVE AGE IN WAH CANT, TAXILA, PUNJAB, PAKISTAN

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Abstract

Background: *Cervical cancer is a largely preventable malignancy, primarily associated with persistent infection with high-risk human papillomavirus (HPV). Despite the availability of HPV vaccination, cervical cancer screening, and effective treatment of precancerous lesions, inadequate awareness and limited uptake of preventive services remain important public health concerns in Pakistan. Local evidence regarding knowledge and attitudes among women of reproductive age in Wah Cantt/Taxila is limited.*

Objective*: To assess knowledge and attitudes regarding cervical cancer and its prevention among women of reproductive age in Wah Cantt, Taxila, Rawalpindi, Punjab, Pakistan, and to determine their associations with selected sociodemographic characteristics.*

Methodology*: A descriptive community-based cross-sectional study was conducted among 350 women aged 15–49 years residing in selected residential areas of Wah Cantt/Taxila from October 2025 to May 2026. Participants were selected using a multistage sampling technique. Data were collected through a structured questionnaire assessing sociodemographic characteristics, knowledge regarding cervical cancer, HPV, risk factors, symptoms, prevention, vaccination, and screening, and attitudes toward cervical cancer prevention. Data were analyzed using SPSS version 26. Frequencies and percentages were calculated, and Pearson's chi-square test was used to assess associations between sociodemographic characteristics and knowledge and attitudes. A two-tailed $p < .05$ was considered statistically significant.*

Results: *Of the 350 participants, 65.1% had heard of cervical cancer, but only 18.6% identified HPV as a causative agent, and 21.4% had heard of the Pap smear test. Only 40.3% reported knowledge of cervical cancer risk factors, and 20.0% reported knowledge of common symptoms. Most participants considered cervical cancer preventable (78.0%) and recognized early detection as beneficial for treatment outcomes (91.1%); however, only 49.4% recognized that screening could detect cervical cancer before symptoms appeared. Educational level and household income were significantly associated with knowledge ($p < .001$ for both). Attitudes toward cervical cancer prevention were significantly associated with age ($p = .012$), residence ($p = .002$), marital status ($p = .009$), education ($p < .001$), occupation ($p = .004$), and household income ($p < .001$).*

Conclusion: *Women of reproductive age in Wah Cantt/Taxila demonstrated reasonable general awareness of cervical cancer but substantial gaps in specific knowledge regarding HPV, symptoms, and cervical cancer screening. Higher education and household income were associated with better knowledge, while all examined sociodemographic characteristics were significantly associated with attitudes toward prevention. Targeted community-based health education, particularly among less-educated and lower-income women, is needed to improve cervical cancer literacy and awareness of HPV vaccination and screening.*

INTRODUCTION

Cervical cancer is a potentially preventable malignancy originating in the cervix and is predominantly associated with persistent infection with high-risk types of human papillomavirus (HPV). Although HPV infection is common, persistent infection with oncogenic HPV types can cause cervical precancerous changes that may progress to invasive cancer when not detected and treated appropriately. HPV vaccination, cervical cancer screening, and timely treatment of precancerous lesions provide important opportunities for preventing cervical cancer and reducing its associated morbidity and mortality (Arbyn et al., 2020; Sung et al., 2021). Despite the availability of effective preventive measures, cervical cancer continues to represent an important global public health problem, particularly in low- and middle-income countries, where inequalities in access to preventive healthcare, screening, diagnosis, and treatment contribute substantially to the disease burden (Sung et al., 2021).

Persistent infection with high-risk HPV is the principal causal factor for cervical cancer, particularly infection with HPV-16 and HPV-18. However, the development and progression of cervical cancer are also influenced by several reproductive, behavioral, and socioeconomic factors. Early age at sexual debut, multiple sexual partners, smoking, immunosuppression, and inadequate access to preventive healthcare may increase the risk of persistent HPV infection and progression of cervical lesions (Arbyn et al., 2020). Therefore, cervical cancer prevention requires more than the availability of screening technologies; it also requires adequate awareness among women, appropriate health-seeking behavior, acceptance of preventive services, and access to timely healthcare.

Cervical cancer represents an important women's health concern in Pakistan. Recent reports by the International Agency for Research on Cancer indicate that thousands of Pakistani women develop cervical cancer each year, placing the disease among the important cancers affecting women in the country (IARC, 2024). Evidence

from Pakistani studies indicates that awareness regarding cervical cancer, HPV infection, screening, and vaccination remains inadequate among substantial proportions of women. Shamaun et al. (2023), in a study conducted among women attending a tertiary-care gynecology outpatient department in Karachi, identified important deficiencies in awareness regarding cervical cancer screening and HPV vaccination. The findings indicated that inadequate knowledge may represent an important barrier to the effective utilization of cervical cancer preventive services.

Similar concerns have been reported in Punjab. Haleem et al. (2023) assessed women's knowledge, attitudes, and practices regarding cervical cancer screening in Lahore and reported limited awareness of screening methods together with low screening utilization. The study also demonstrated variations in awareness and screening behavior according to sociodemographic characteristics, suggesting that women's educational and socioeconomic circumstances may influence their understanding and utilization of preventive services. Khan et al. (2022) likewise reported inadequate knowledge and unfavorable attitudes toward cervical cancer screening among women in Punjab, highlighting the continuing need for improved awareness and preventive health education.

More recent evidence suggests that knowledge deficiencies continue to exist despite increasing attention to cervical cancer prevention. Khan et al. (2025) assessed knowledge, attitudes, and practices regarding cervical cancer screening among 370 women attending gynecology clinics at tertiary-care hospitals in Islamabad and found that 84.7% of participants had poor knowledge regarding cervical cancer. Education, occupation, and income were significantly associated with knowledge, while a substantial proportion of participants expressed a desire for additional information regarding cervical cancer and its prevention. These findings demonstrate that access to healthcare does not necessarily ensure adequate knowledge regarding cervical cancer prevention and indicate the continuing need for targeted health education among women of reproductive age.

Evidence from the Rawalpindi region is particularly relevant to the study by Nazir et al. (2025), which reported that 66.6% of participants demonstrated adequate knowledge, 52.1% demonstrated an adequate attitude, and 89.4% demonstrated adequate preventive practices according to the study's operational definitions. The study further identified significant associations between demographic characteristics and knowledge, attitude, and practice, as well as a significant relationship between knowledge and attitude. These findings provide useful regional evidence; however, the study population was recruited through a hospital-based setting, and its findings may not necessarily represent women residing in other communities within the wider Rawalpindi region.

The existing literature therefore demonstrates that women's knowledge and attitudes toward cervical cancer vary across different Pakistani populations. Studies conducted in Karachi, Lahore, Islamabad, and Rawalpindi have reported differences in levels of awareness, attitudes, and preventive practices (Shamaun et al., 2023; Haleem et al., 2023; Khan et al., 2025; Nazir et al., 2025). Such variations indicate that findings from one geographical or healthcare setting cannot automatically be generalized to another population. Wah Cantt and Taxila constitute an important community setting within the Rawalpindi region, yet evidence specifically assessing women of reproductive age in this locality remains limited.

A further gap is that much of the existing Pakistani evidence has been generated from women attending hospitals or specialized healthcare facilities. Hospital-based populations may have greater exposure to healthcare professionals and health information than women who do not routinely utilize healthcare services. Consequently, their knowledge and attitudes may differ from those of women in the wider community. A community-focused assessment of women of reproductive age in Wah Cantt and Taxila can therefore provide more context-specific information regarding their understanding of

cervical cancer and their perceptions toward its prevention.

Another important gap concerns the changing context of cervical cancer prevention in Pakistan. Recent national efforts to strengthen HPV vaccination and cervical cancer prevention have increased the importance of assessing women's current knowledge regarding HPV, cervical cancer, vaccination, and screening. However, much of the available Pakistani evidence was collected before these recent developments. Khan et al. (2025) demonstrated that considerable knowledge deficiencies remain among women accessing tertiary healthcare, indicating that updated and locally relevant evidence is required to determine whether women in specific communities are adequately informed about cervical cancer prevention.

The rationale for conducting the present study is therefore based on the preventable nature of cervical cancer, its continuing burden among Pakistani women, persistent deficiencies in knowledge identified by recent studies, and the limited availability of locality-specific evidence from Wah Cantt and Taxila. Understanding women's knowledge and attitudes is important because preventive interventions can only achieve population-level benefits when women recognize the importance of cervical cancer prevention and are appropriately informed about HPV vaccination and screening. Assessing these factors within the local population can identify specific misconceptions, information gaps, and attitudinal barriers that may be addressed through targeted public health education.

The proposed study is also significant because it generates baseline evidence regarding cervical cancer knowledge and attitudes among women of reproductive age in Wah Cantt and Taxila. The findings may assist public health professionals in designing targeted awareness interventions addressing knowledge deficiencies related to HPV, risk factors, symptoms, prevention, vaccination, and screening. Healthcare providers may also use the findings to strengthen counselling and communication with women regarding cervical cancer prevention. Furthermore, locally generated evidence may assist health planners in developing community-level educational activities and prevention strategies appropriate to the characteristics and needs of women in the area. The study may also provide a basis for future research examining the relationship between knowledge, attitudes, and actual cervical cancer screening uptake.

The aim of this study is to assess knowledge and attitudes regarding cervical cancer and its prevention among women of reproductive age in Wah Cantt, Taxila, Rawalpindi, Punjab, Pakistan.

The objectives of the study are:

1. To assess the level of knowledge regarding cervical cancer among women of reproductive age.
2. To assess the attitudes of women of reproductive age toward cervical cancer and its prevention.
3. To assess women's knowledge regarding HPV, risk factors, signs and symptoms, prevention, HPV vaccination, and cervical cancer screening.
4. To determine the association between selected sociodemographic characteristics and knowledge regarding cervical cancer.
5. To determine the association between selected sociodemographic characteristics and attitudes toward cervical cancer prevention.

Methodology

A descriptive community-based cross-sectional study was conducted in Wah Cantt/Taxila, Rawalpindi District, Punjab, Pakistan. Wah Cantt is an important urban locality in Rawalpindi District and comprises diverse residential communities with access to healthcare facilities, educational institutions, workplaces, and other community services. The study was conducted among women of reproductive age residing in selected residential areas of Wah Cantt/Taxila. Data collection was carried out from October 2025 to May 2026.

The study population comprised women of reproductive age residing in the selected residential areas of Wah Cantt/Taxila, Rawalpindi District, Punjab, Pakistan. Women aged 15–49 years who had been residing in the selected areas for at least six months were eligible to participate. Permanent residents of the selected

study areas who were able to understand and respond to the questionnaire were included. Women who were seriously ill, unable to participate in the interview, or unwilling to provide informed consent were excluded from the study.

The sample size was determined using the single population proportion formula. The calculation was based on an assumed proportion of 50% for adequate knowledge regarding cervical cancer and its prevention, as no sufficiently comparable estimate was available for the specific study setting. A 95% confidence level and a 5% margin of error were used. The calculated sample size was subsequently adjusted for the anticipated non-response rate. Where applicable, a design effect was incorporated because of the multistage sampling procedure. The final required sample size was 350 participants.

A multistage sampling technique was employed to select study participants. Selected residential areas or communities of Wah Cantt/Taxila were identified as sampling clusters, and a predetermined number of clusters were selected using a lottery or simple random sampling method. The required number of participants was then allocated proportionally according to the estimated number of eligible women in each selected cluster. Eligible women were subsequently selected from households using a systematic random sampling technique. When more than one eligible woman was present in a household, one participant was selected using a simple random or lottery method to avoid overrepresentation of individual households.

The primary outcome variables were knowledge and attitude regarding cervical cancer and its prevention among women of reproductive age. Knowledge was assessed in relation to cervical cancer, human papillomavirus (HPV), risk factors, signs and symptoms, prevention, HPV vaccination, and cervical cancer screening. Knowledge scores were calculated according to the predefined scoring criteria of the study instrument. Attitude was assessed in relation to participants' perceptions and views regarding cervical cancer prevention, HPV vaccination, cervical cancer screening, perceived susceptibility, perceived benefits of preventive measures, and willingness to seek preventive healthcare services. Attitude scores were categorized as favorable or unfavorable according to the predefined scoring criteria. The independent variables included age, educational level, occupation, household income, and residence.

Data were collected using a structured, pretested, interviewer-administered questionnaire adapted from previously published studies and modified according to the objectives and cultural context of the present study (Hirani et al., 2021; Shamaun et al., 2023). The questionnaire comprised sections covering sociodemographic characteristics, knowledge regarding cervical cancer and its prevention, and attitudes toward cervical cancer prevention and screening. Each correct response to the knowledge items was assigned one point, whereas incorrect or "do not know" responses received zero points.

The collected data were coded and entered into SPSS version 26 for statistical analysis. Descriptive statistics were used to summarize the characteristics of the study participants. Frequencies and percentages were calculated for categorical variables, whereas means and standard deviations were calculated for continuous variables where appropriate. Knowledge scores were calculated by summing the responses to the knowledge items, while knowledge and attitude scores were categorized according to the predefined scoring criteria. Individual knowledge items concerning HPV, risk factors, signs and symptoms, prevention, HPV vaccination, and cervical cancer screening were presented as frequencies and percentages. Pearson's chi-square (χ^2) test was used to assess the associations between selected sociodemographic characteristics and levels of knowledge and attitude. All statistical tests were two-tailed, and a p-value $< .05$ was considered statistically significant.

Ethical approval was obtained from the relevant Ethical Review Committee before commencement of the study. Permission was also obtained from the relevant local authorities or community representatives where required. Participants were

informed about the purpose of the study, the voluntary nature of participation, confidentiality of information, and their right to withdraw from the study at any time without consequence. Written informed consent was obtained from each participant before data collection.

Results

Table 1 Socio-demographic characteristics of participants (n = 350)

Variable	Response	f (%)
Age (years)	15–23	116 (33.1)
	24–32	124 (35.4)
	33–41	67 (19.1)
	42–49	43 (12.3)
Residence	Rural	87 (24.9)
	Urban	263 (75.1)
Marital status	Married	191 (54.6)
	Single	115 (32.9)
	Divorced	29 (8.3)
	Widowed	15 (4.3)
Educational level	Illiterate	37 (10.6)
	Primary	30 (8.6)
	Matric	57 (16.3)
	Secondary	84 (24.0)
	Intermediate	28 (8.0)
	Graduate	114 (32.6)
Occupation	Housewife	89 (25.4)
	Student	70 (20.0)
	Working women	156 (44.6)
	Others	35 (10.0)
Monthly income (PKR)	≤30,000	120 (34.3)
	30,000–50,000	77 (22.0)
	50,000–100,000	74 (21.1)
	≥100,000	79 (22.6)

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Table 1 results showed that the largest proportion of participants were aged 24–32 years (35.4%), followed by those aged 15–23 years (33.1%), while 12.3% were aged 42–49 years. Most participants were from urban areas (75.1%) and were married (54.6%). Regarding education, graduates constituted the largest group (32.6%), followed by participants with secondary education (24.0%). Working women represented the largest occupational category (44.6%), whereas 25.4% were housewives and 20.0% were students. In terms of monthly household income, 34.3% of participants reported an income of ≤30,000 PKR, while approximately one-fifth reported incomes of 30,000–50,000 PKR (22.0%), 50,000–100,000 PKR (21.1%), and ≥100,000 PKR (22.6%).

Table 2 Knowledge and Awareness Regarding Cervical Cancer Among Participants (n = 350)

Variables	Response	f (%)
Heard about cervical cancer	Yes	228 (65.1)
	No	122 (34.9)
Know the risk factors for cervical cancer	Yes	141 (40.3)
	No	209 (59.7)
Knowledge on risk factors of cervical cancer*	Sexually transmitted disease	107 (75.9)
	Smoking	84 (59.6)
	Having multiple sexual partners	94 (66.7)
	Poor dietary habit	28 (19.9)
	Early marriage	90 (63.8)
	Family history of cervical cancer	13 (9.2)
	Others	13 (9.2)
HPV is a causative agent of cervical cancer	Yes	65 (18.6)
	No	285 (81.4)
Know common symptoms of cervical cancer	Yes	70 (20.0)
	No	280 (80.0)
Knowledge on symptoms of cervical cancer	Intra- or post-coital bleeding	41 (58.6)
	Bleeding after menopause	27 (38.6)
	Persistent blood-stained vaginal discharge	51 (72.9)
	Lower abdominal pain	23 (32.9)
	Others	1 (1.4)
Cervical cancer is preventable	Yes	229 (65.4)
	No	121 (34.6)
Cervical cancer is curable	Yes	149 (42.6)
	No	201 (57.4)
Heard about Pap smear test	Yes	75 (21.4)
	No	275 (78.6)
If yes, where did you hear about Pap smear for the first time?	Relatives	45 (60.0)
	Friends	62 (82.7)
	Health workers	86 (114.7)
	Mass media	144 (192.0)
	Others	14 (18.7)
How many times should a healthy woman undergo Pap smear test?	Only once	18 (24.0)
	Two times only	24 (32.0)

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Variables	Response	f (%)
	At least three times and above	33 (44.0)

Table 2 results showed that 65.1% of participants had heard about cervical cancer; however, only 40.3% reported knowing its risk factors. Among those who knew the risk factors, sexually transmitted diseases were the most frequently recognized (75.9%), followed by multiple sexual partners (66.7%), early marriage (63.8%), and smoking (59.6%). Awareness of HPV as a causative agent was low, with only 18.6% identifying it correctly. Similarly, only 20.0% reported knowledge of common symptoms. Among participants who reported symptom knowledge, persistent blood-stained vaginal discharge was the most frequently recognized symptom (72.9%), followed by intra- or post-coital bleeding (58.6%). Although 65.4% considered cervical cancer preventable, only 42.6% considered it curable. Awareness of cervical cancer screening was particularly limited, as only 21.4% had heard of the Pap smear test. Among those aware of the test, 44.0% reported that a healthy woman should undergo it at least three times or more.

Table 3 Perceptions and Beliefs Regarding Cervical Cancer Among Participants (n = 350)

Variables	Response	f (%)
Believe having multiple sexual partners is a risk factor for cervical cancer	Yes	259 (74.0)
	No	91 (26.0)
Believe cervical cancer is transmittable through sexual intercourse	Yes	78 (22.3)
	No	272 (77.7)
Believe HIV positivity increases the chance of getting cervical cancer	Yes	222 (63.4)
	No	128 (36.6)
Believe use of oral contraceptive pills is a risk factor for cervical cancer	Yes	48 (13.7)
	No	302 (86.3)
Think that smoking is a risk factor for cervical cancer	Yes	236 (67.4)
	No	114 (32.6)
Think early marriage is a risk factor for cervical cancer	Yes	256 (73.1)
	No	94 (26.9)
Think cervical cancer is a major health problem for females of reproductive age	Yes	309 (88.3)
	No	41 (11.7)
Think it is possible to detect cervical cancer with early screening before symptoms appear	Yes	173 (49.4)
	No	177 (50.6)
Think early detection, of cervical cancer is good for treatment outcome	Yes	319 (91.1)
	No	31 (8.9)
Believe cervical cancer is preventable	Yes	273 (78.0)
	No	77 (22.0)
Think it is possible to cure cervical cancer	Yes	166 (47.4)
	No	184 (52.6)

Table 3 results showed that participants demonstrated varying perceptions regarding cervical cancer risk factors, prevention, and early detection. Most participants believed that multiple sexual partners (74.0%) and early marriage (73.1%) were risk factors, while 67.4% identified smoking as a risk factor and 63.4% believed that HIV positivity increased the risk of cervical cancer. In contrast, only 13.7% considered oral contraceptive use a risk factor. Notably, 22.3% believed that cervical cancer was transmissible through sexual intercourse. A substantial proportion (88.3%) considered cervical cancer a major health problem among women of reproductive age, and 91.1% believed that early detection improved treatment outcomes. However, only 49.4% recognized that cervical cancer could be detected through screening before symptoms appeared. Although 78.0% believed that cervical cancer was preventable, less than half (47.4%) believed that it was curable, indicating variability in perceptions concerning disease prevention, transmission, and treatment.

Table 4 Association between sociodemographic characteristics and knowledge regarding cervical cancer (n=350)

Variable	Category	Poor n (%)	Moderate n (%)	Good n (%)	χ^2	*P*
Age	15–23	35 (30.2)	53 (45.7)	28 (24.1)	8.24	.221
	24–32	28 (22.6)	62 (50.0)	34 (27.4)		
	33–41	13 (19.4)	31 (46.3)	23 (34.3)		
	42–49	7 (16.3)	18 (41.9)	18 (41.9)		
Residence	Rural	25 (28.7)	40 (46.0)	22 (25.3)	2.43	.297
	Urban	55 (20.9)	140 (53.2)	68 (25.9)		
Marital status	Married	46 (24.1)	92 (48.2)	53 (27.7)	1.07	.983
	Single	31 (27.0)	56 (48.7)	28 (24.3)		
	Divorced	7 (24.1)	13 (44.8)	9 (31.0)		
	Widowed	3 (20.0)	8 (53.3)	4 (26.7)		
Educational level	Illiterate	16 (43.2)	15 (40.5)	6 (16.2)	53.98	<.001
	Primary	10 (33.3)	13 (43.3)	7 (23.3)		
	Matric	13 (22.8)	29 (50.9)	15 (26.3)		
	Secondary	11 (13.1)	42 (50.0)	31 (36.9)		
	Intermediate	3 (10.7)	12 (42.9)	13 (46.4)		
	Graduate	8 (7.0)	38 (33.3)	68 (59.6)		
Occupation	Housewife	25 (28.1)	43 (48.3)	21 (23.6)	11.64	.071
	Student	14 (20.0)	31 (44.3)	25 (35.7)		
	Working women	25 (16.0)	65 (41.7)	66 (42.3)		
	Others	10 (28.6)	15 (42.9)	10 (28.6)		
Monthly income (PKR)	≤30,000	38 (31.7)	57 (47.5)	25 (20.8)	28.79	<.001
	30,000–50,000	19 (24.7)	36 (46.8)	22 (28.6)		
	50,000–100,000	11 (14.9)	32 (43.2)	31 (41.9)		

Variable	Category	Poor n (%)	Moderate n (%)	Good n (%)	χ^2	*P*
	≥100,000	10 (12.7)	27 (34.2)	42 (53.2)		

Table 4 results showed that educational level and monthly household income were significantly associated with knowledge regarding cervical cancer. Participants with higher educational attainment demonstrated a greater proportion of good knowledge, ranging from 16.2% among illiterate participants to 59.6% among graduates (χ^2 = 53.98, p < .001). Similarly, good knowledge increased across income categories, from 20.8% among participants earning ≤30,000 PKR to 53.2% among those earning ≥100,000 PKR (χ^2 = 28.79, p < .001). In contrast, no statistically significant associations were observed between knowledge level and age (χ^2 = 8.24, p = .221), residence (χ^2 = 2.43, p = .297), marital status (χ^2 = 1.07, p = .983), or occupation (χ^2 = 11.64, p = .071). These findings indicated that educational attainment and household income were the sociodemographic characteristics most strongly associated with cervical cancer knowledge in the study population.

Table 5 Association between sociodemographic characteristics and attitudes toward cervical cancer prevention (n =350)

Variable	**Category**	**Negative n (%)**	**Positive n (%)**	**χ^2**	***P***
Age	15–23	63 (54.3)	53 (45.7)	10.94	.012
	24–32	49 (39.5)	75 (60.5)		
	33–41	24 (35.8)	43 (64.2)		
	42–49	13 (30.2)	30 (69.8)		
Residence	Rural	45 (51.7)	42 (48.3)	9.67	.002
	Urban	87 (33.1)	176 (66.9)		
Marital status	Married	77 (40.3)	114 (59.7)	11.69	.009
	Single	61 (53.0)	54 (47.0)		
	Divorced	14 (48.3)	15 (51.7)		
	Widowed	12 (80.0)	3 (20.0)		
Educational level	Illiterate	26 (70.3)	11 (29.7)	39.05	<.001
	Primary	16 (53.3)	14 (46.7)		
	Matric	23 (40.4)	34 (59.6)		
	Secondary	26 (31.0)	58 (69.0)		
	Intermediate	8 (28.6)	20 (71.4)		
	Graduate	22 (19.3)	92 (80.7)		
Occupation	Housewife	46 (51.7)	43 (48.3)	13.56	.004
	Student	26 (37.1)	44 (62.9)		
	Working women	44 (28.2)	112 (71.8)		
	Others	12 (34.3)	23 (65.7)		
Monthly income (PKR)	≤30,000	67 (55.8)	53 (44.2)	23.90	<.001
	30,000–50,000	30 (39.0)	47 (61.0)		
	50,000–100,000	21 (28.4)	53 (71.6)		

Variable	Category	Negative n (%)	Positive n (%)	χ^2	*P*
	≥100,000	20 (25.3)	59 (74.7)		

Table 5 results showed statistically significant associations between attitude toward cervical cancer prevention and all examined sociodemographic characteristics. Positive attitudes increased across age groups, from 45.7% among participants aged 15–23 years to 69.8% among those aged 42–49 years (χ^2 = 10.94, p = .012). Urban participants demonstrated a higher proportion of positive attitudes than rural participants (66.9% vs. 48.3%; χ^2 = 9.67, p = .002). Positive attitudes also varied significantly by marital status (χ^2 = 11.69, p = .009), with the highest proportion among married participants (59.7%) and the lowest among widowed participants (20.0%). Educational level showed a significant association with attitude (χ^2 = 39.05, p < .001), with positive attitudes ranging from 29.7% among illiterate participants to 80.7% among graduates. Occupation was also significantly associated with attitude (χ^2 = 13.56, p = .004), while positive attitudes were reported by 71.8% of working women compared with 48.3% of housewives. Similarly, positive attitudes increased with monthly household income, from 44.2% among participants earning ≤30,000 PKR to 74.7% among those earning ≥100,000 PKR (χ^2 = 23.90, p < .001).

Discussion

The present study aimed to assess knowledge, perceptions and beliefs, and attitudes regarding cervical cancer prevention among women of reproductive age in Wah Cantt/Taxila, Punjab, Pakistan, and to determine whether sociodemographic characteristics were associated with knowledge and attitudes toward cervical cancer prevention. The findings demonstrated an important gap between general awareness of cervical cancer and specific knowledge concerning its causes, risk factors, symptoms, HPV, and screening. At the same time, a substantial proportion of women expressed positive perceptions regarding prevention and early detection. The study further showed that educational level and household income were significantly associated with knowledge, whereas age, residence, marital status, education, occupation, and household income were all significantly associated with attitudes toward cervical cancer prevention. These findings were broadly consistent with recent evidence from Pakistan indicating that awareness of cervical cancer prevention remained limited despite increasing recognition of the disease and its preventability.

The sociodemographic profile in Table 1 indicated that the sample predominantly comprised women aged 24–32 years, urban residents, married women, graduates, and working women. The relatively high proportion of educated and urban participants provided an important context for interpreting the knowledge findings because the study population was not predominantly characterized by the demographic groups traditionally considered to have the greatest barriers to health information. Nevertheless, substantial knowledge deficiencies were identified. A recent cross-sectional study among women attending tertiary-care gynecology clinics in Islamabad similarly reported substantial deficiencies in cervical cancer knowledge, with 84.7% classified as having poor knowledge; education, occupation, and income were significantly associated with knowledge (Khan et al., 2025). Similarly, Gao et al. (2025), in a study involving women from Pakistan and Afghanistan, found that education, urban background, and employment status were significantly related to knowledge about cervical cancer, HPV, and HPV vaccination, with more highly educated women demonstrating better understanding of prevention and early treatment. These findings supported the importance of considering socioeconomic and educational characteristics when interpreting cervical cancer prevention knowledge in Pakistani women.

Table 2 demonstrated that although 65.1% of participants had heard of cervical cancer, only 40.3% reported knowledge of its risk factors, 18.6% recognized HPV as the causative agent, 20.0% knew common symptoms, and only 21.4% had heard of the Pap smear. This pattern suggested that awareness of the disease did not necessarily translate into adequate understanding of its etiology, clinical manifestations, or screening. The particularly low recognition of HPV and Pap smear was consistent with previous Pakistani research. Shamaun et al. (2023) reported that only 41.2% of women attending a gynecology outpatient clinic in Karachi had heard of cervical cancer, 33.6% were aware of cervical screening, and only 1.8% knew about HPV vaccination, while 96.9% were unaware of cervical cancer risk factors. Similarly, Hirani et al. (2021) found that although 61.2% of women attending outpatient clinics in Karachi had heard of cervical cancer, knowledge and preventive practices remained inadequate; only a minority knew about HPV vaccination and Pap testing. More recent evidence from Punjab also indicated that HPV awareness remained low: Atif et al. (2025) reported that only 31.3% of university students had heard about HPV and 16.4% were aware of HPV vaccine availability, despite generally positive attitudes toward vaccination. Thus, the present findings reinforced the continuing distinction between having heard about cervical cancer and possessing actionable knowledge about HPV-related etiology and screening.

The risk-factor findings in Table 2 also showed selective recognition of established risk factors. Among women who reported knowing risk factors, sexually transmitted infections, multiple sexual partners, early marriage, and smoking were relatively frequently identified, whereas family history and poor dietary habits were less commonly recognized. This pattern indicated that participants possessed fragmented rather than comprehensive knowledge of cervical cancer risk. The findings were compatible with the broader Pakistani literature showing that women may recognize selected behavioral or reproductive risk factors while remaining unfamiliar with HPV as the principal causal infection. Shamaun et al. (2023) similarly reported very limited knowledge of cervical cancer risk factors among Pakistani women. The finding that 65.4% considered cervical cancer preventable was encouraging, but the lower proportion identifying it as curable (42.6%) suggested uncertainty regarding prognosis and treatment. Importantly, only 21.4% had heard of Pap smear screening, indicating that recognition of preventability was not accompanied by equivalent awareness of established preventive screening approaches. Previous research in Karachi also found insufficient knowledge of Pap smear and HPV prevention despite relatively favorable attitudes toward learning about prevention (Riaz et al., 2020).

Table 3 further demonstrated that participants' perceptions and beliefs were mixed. A relatively high proportion recognized multiple sexual partners (74.0%), early marriage (73.1%), and smoking (67.4%) as risk factors, while 63.4% considered HIV positivity to increase risk. In contrast, only 13.7% identified oral contraceptive use as a risk factor, and only 22.3% believed that cervical cancer could be transmitted through sexual intercourse. Almost half of the women (49.4%) recognized that cervical cancer could be detected through screening before symptoms appeared, whereas 91.1% agreed that early detection improved treatment outcomes. The high proportion recognizing the importance of early detection and prevention was consistent with evidence that women may express favorable preventive beliefs even when specific knowledge remains incomplete. Riaz et al. (2020) similarly reported that approximately four-fifths of Pakistani women demonstrated a favorable attitude toward learning more about cervical cancer screening and preventive practices despite insufficient knowledge. Shahnaz et al. (2023) also observed that educational outreach substantially improved knowledge and positively influenced attitudes toward Pap smear testing among urban Pakistani women, demonstrating that knowledge and perceptions can respond to structured health education. The present findings therefore suggested that the existing positive perceptions

could provide an important basis for strengthening more specific and accurate preventive knowledge.

Table 4 showed that educational level and household income were significantly associated with knowledge of cervical cancer, whereas age, residence, marital status, and occupation did not demonstrate statistically significant associations. The gradient across education was particularly pronounced: good knowledge increased from 16.2% among illiterate women to 59.6% among graduates, while poor knowledge decreased from 43.2% to 7.0%. A similar socioeconomic gradient was observed for household income, with good knowledge increasing from 20.8% among women earning ≤30,000 PKR to 53.2% among those earning ≥100,000 PKR. These findings closely corresponded with the recent study by Khan et al. (2025), which identified education and income as significant determinants of cervical cancer knowledge among women attending tertiary-care hospitals in Islamabad. Gao et al. (2025) likewise found that higher education was associated with better knowledge of cervical cancer prevention and early treatment among Pakistani women. Earlier Pakistani evidence from Riaz et al. (2020) also demonstrated significant associations between education, socioeconomic status, and cervical cancer knowledge. The consistency of these findings across different Pakistani settings suggested that educational attainment and economic resources were important correlates of access to and comprehension of cervical cancer information. Nevertheless, the cross-sectional design did not establish that education or income directly caused better knowledge.

Table 5 showed statistically significant associations between attitude toward cervical cancer prevention and all examined sociodemographic characteristics. Positive attitudes increased from 45.7% among women aged 15–23 years to 69.8% among women aged 42–49 years, and urban women demonstrated a greater proportion of positive attitudes than rural women. Attitudes also varied by marital status, education, occupation, and income. The educational gradient was particularly marked, with positive attitudes increasing from 29.7% among illiterate women to 80.7% among graduates. Similarly, positive attitudes increased from 44.2% among women with household incomes of ≤30,000 PKR to 74.7% among those earning ≥100,000 PKR. These findings were compatible with recent Pakistani evidence demonstrating that demographic and socioeconomic characteristics influenced attitudes toward HPV and cervical cancer prevention. Atif et al. (2025) found that urban residence was associated with more positive attitudes toward HPV vaccination among university students in Punjab, while female sex and health-science education were also associated with more favorable attitudes. Gao et al. (2025) similarly reported significant relationships between education, urban residence, employment, and knowledge of cervical cancer and HPV among Pakistani women. In addition, Shamaun et al. (2023) identified important gaps in awareness and willingness regarding cervical screening among Pakistani women, reinforcing the relevance of demographic and informational differences in shaping preventive attitudes.

The relationship between knowledge, health literacy, and preventive attitudes was further supported by recent evidence from Pakistan. Sohail (2025), studying 384 pregnant women in Lahore, found that health literacy was positively associated with willingness to undergo HPV testing, with comprehension of health information showing the strongest association. This finding was relevant to the present study because the observed educational gradient in both knowledge and attitudes suggested that the ability to understand and use health information may be an important pathway linking sociodemographic circumstances with preventive orientations. Evidence from outside Pakistan has also indicated that women's acceptance of HPV-based screening is influenced by their understanding of personal HPV risk, the meaning of a positive test, and the purpose of screening (Schmucker et al., 2022). Thus, the present findings suggested that improving cervical cancer literacy may be important not only for increasing factual

knowledge but also for strengthening favorable attitudes toward preventive services.

Overall, the findings indicated that women in Wah Cantt/Taxila possessed a moderate level of general awareness but substantial gaps in specific knowledge regarding HPV, symptoms, and cervical screening. The coexistence of favorable perceptions, particularly regarding preventability and the benefits of early detection with limited screening awareness, was notable. This pattern was also evident in recent Pakistani studies, where inadequate knowledge coexisted with willingness to receive information, screening, or HPV vaccination when services were accessible. Khan et al. (2025) reported that almost all participants expressed a desire for further information and that 99.7% were willing to receive HPV vaccination if it were provided free or at low cost. Similarly, Shahnaz et al. (2023) demonstrated a substantial improvement in cervical cancer knowledge following a brief educational intervention among urban Pakistani women. These findings collectively indicated that the knowledge deficit observed in the present study represented an important area for preventive health education, particularly through approaches that explain HPV causation, risk factors, early symptoms, screening purpose, and available preventive services in accessible language.

The findings should also be interpreted in light of the study design and measurement context. Because the study used a cross-sectional design, the statistically significant associations between sociodemographic characteristics and knowledge or attitudes should be interpreted as relationships rather than causal effects. In addition, differences in study settings, sampling strategies, participant characteristics, and measurement instruments may explain variation between the present findings and previous Pakistani studies. Nevertheless, the use of a community-based sample of women aged 15–49 years provided evidence from a population that extended beyond women already attending gynecology clinics. The results therefore contributed community-level information on the continuing gaps in cervical cancer prevention knowledge and the sociodemographic patterning of preventive attitudes among women of reproductive age in Wah Cantt/Taxila.

Conclusion

The study concluded that women of reproductive age in Wah Cantt/Taxila had moderate general awareness of cervical cancer but substantial gaps in specific knowledge regarding HPV, risk factors, symptoms, and cervical cancer screening. Although many participants recognized cervical cancer as preventable and acknowledged the importance of early detection, awareness of Pap smear screening and HPV remained limited. Higher educational attainment and household income were significantly associated with better knowledge, while age, residence, marital status, education, occupation, and income were significantly associated with attitudes toward cervical cancer prevention. These findings highlighted the need for targeted, community-based cervical cancer education that strengthens knowledge of HPV, risk factors, screening, and preventive practices, particularly among socioeconomically disadvantaged and less-educated women, to support informed uptake of available cervical cancer prevention services.

Limitation and Recommendations

The study had several limitations that should be considered when interpreting its findings. The cross-sectional design allowed assessment of knowledge, perceptions, beliefs, and attitudes at a single point in time and therefore did not permit determination of causal relationships between sociodemographic characteristics and study outcomes. The study was conducted among women of reproductive age in selected communities of Wah Cantt/Taxila, which may limit the generalizability of the findings to women living in other geographical, cultural, or socioeconomic settings. Data were collected through an interviewer-administered questionnaire and relied on participants' self-reported responses, which may have introduced recall or social desirability bias. In addition, the study primarily assessed knowledge and attitudes rather than objectively verified cervical cancer

screening or HPV vaccination practices. The use of a structured questionnaire may also have limited participants' ability to provide explanations beyond the predefined response options. Finally, because the study did not assess detailed healthcare-system factors such as availability, accessibility, affordability, and utilization of cervical cancer screening services, these potentially important determinants could not be examined.

Based on the findings, community-based cervical cancer awareness programs should be strengthened, with particular emphasis on HPV as the principal causative agent, recognized risk factors, early symptoms, HPV vaccination, and the purpose and recommended use of cervical cancer screening. Health education should particularly target women with lower educational attainment and lower household income, who demonstrated comparatively poorer knowledge and less favorable attitudes. Healthcare professionals, community health workers, educational institutions, and local health authorities should collaborate to provide culturally appropriate information through community sessions, primary healthcare facilities, and accessible media platforms. Screening-related education should emphasize that cervical cancer can be detected before symptoms develop and should provide clear information about available screening methods and where women can obtain these services. Efforts to improve awareness should be accompanied by accessible and affordable screening and HPV vaccination services. Future studies should use larger, multicenter, and longitudinal designs to examine changes in knowledge and attitudes over time and to determine whether educational interventions translate into actual screening and vaccination uptake. Further research should also investigate healthcare access, affordability, provider-related barriers, and sociocultural factors influencing cervical cancer prevention practices among women in Pakistan.

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