

## RESEARCH ARTICLE

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# Prevalence and Predictors of Cervical Cancer Screening among Reproductive Age Group Women: Evidence from Cross-Sectional Study in Rohtak and Delhi

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### Abstract

**Background:** The present study aims to estimate the prevalence and determine the factors for cervical cancer screening among women in the reproductive age group in Delhi and Rohtak, India. **Methods:** The data were utilized from a survey conducted as part of a larger study to increase the access to cervical cancer screening and care by MAMTA-Health Institute for Mother and Child in collaboration with the Health Departments of Palam, New Delhi, and Rohtak, Haryana between 2015 and 2017. Data pertaining to the socio-economic and demographic information along with the information related to cervical cancer screening were utilized for the present study. The sample size was 1020 women in reproductive age group. Descriptive statistics (percentage and frequency distribution), bivariate analysis along with multivariable analysis were done to represent the results. The Fisher exact test was used to test the level of significance during bivariate analysis. **Results:** About 35.2% [Delhi: 44.9% and Rohtak: 23.8%] of the respondents had heard about cervical cancer screening. Further about 3.9% [Delhi-2.9% and Haryana-5.1%] had screened for cervical cancer. Women who had heard about cervical cancer were five times more likely to go for screening [aOR: 5.27; CI: 2.53,10.96]. It was found that women over 30 years of age had 12.04 significantly higher odds of going for cervical cancer screening in reference to women aged 30 years and less [aOR: 12.04; CI: 3.01,53.20]. Women from households with a monthly income of more than 15000 had 2.98 significantly higher odds of going for cervical cancer screening in reference to women from households with an income of 5000 and less [aOR : 2.98; CI: 1.12,9.09]. **Conclusion:** Findings suggest that awareness about cervical cancer screening test along with its thorough knowledge about its benefits would be an effective intervention to increase the uptake of cervical cancer screening.

**Keywords:** Cervical cancer screening- human papillomavirus- women- India

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### Introduction

Cervical cancer is the fourth most prevalent malignancy in women throughout the world (World Health Organization, 2020). Between 2018 and 2030, the yearly number of new instances of cervical cancer is predicted to climb from 570,000 to 700,000, while the annual number of fatalities is expected to rise from 311,000 to 400,000 if no further action is taken (World Health Organization, 2020). It is approximately twice as common in low- and middle-income nations, with death rates three times higher than in high-income ones (World Health Organization, 2020). Every year, around 122,844 cases of cervical cancer get identified in India (Ferlay et al., 2015). Women in India have a 1.6 percent cumulative risk of acquiring cervical cancer and a 1.0 percent cumulative death risk from cervical cancer, accounting for roughly one-third of

all cervical cancer fatalities worldwide every year (Ferlay et al., 2015; Monica and Mishra, 2020).

In 2018, the World Health Organization (WHO) called for universal human papillomavirus (HPV) vaccination, screening, early detection, and treatment of cervical pre-cancer and cancer to eliminate cervical cancer as a public health concern (Bhatla et al., 2021; World Health Organization, 2017). In 1976, the National Cancer Control Program (NCCP) was established in India. The major goal was to prevent malignancies via health education; secondary goals included screening for cervical, oral, and breast cancers, improving existing cancer treatment facilities, and providing palliative care to patients at the end of their lives (Bhatla et al., 2021). The first step in reducing the burden of cervical and breast cancers is to conduct effective screening (Monica and Mishra, 2020). Effective population-based screening programmes may

easily lower the incidence of cervical cancers, according to experience from the developed world (Herrmann et al., 2018; Kitchener et al., 2006). Cervical cancer mortality rates can also be lowered by such treatments or screening (Binka et al., 2019; Herrmann et al., 2018; Kitchener et al., 2006). Previous studies argued that cervical cancer screening through a simple test like visual inspection with acetic acid/ visual inspection using Lugol's iodine (VIA/VILI) is affordable, feasible, and an accurate tool for implementation in all health-care settings (Bobdey et al., 2016). The widespread use of the Papanicolaou (Pap) test to detect cervical abnormalities has been credited with a dramatic drop in cervical cancer incidence in the United States over the past 50 years (Akers et al., 2007; Katz et al., 2007). In 1998, there were an estimated 13,700 new cases of squamous cell carcinoma of the cervix and an associated 4900 deaths in the United States. This represents a remarkable 79% reduction in incidence and a 75% reduction in mortality since 1950 (Akers et al., 2007; Katz et al., 2007).

A previous study found that the prevalence of cervical cancer screening was not up to the mark of national level estimates in the districts of Haryana and Delhi (Monica and Mishra, 2020). Furthermore, a similar study found that marital status, economic position, and location of residence were all shared exposures geographically linked to cervical screening uptake (Monica and Mishra, 2020). Other Study also argued that cervical cancer screening depends upon age, marital status, education, income levels and employment status of the respondent (Lin, 2008). Women with a higher socio-economic status, higher education, and higher income were more likely to undergo cervical cancer screening (Lin, 2008). Also, employed females are more likely to go for screening because of their greater opportunity cost, better earnings, and capacity to afford out-of-pocket expenses (Wu, 2003). Study also found that cultural barriers are an obstacle to effective cervical cancer screening among women in India (Cousins, 2018). Furthermore, in addition to the aforementioned reasons, a lack of communication between the healthcare provider and the patient about the benefits of cervical screening may contribute to a poor cervical cancer screening procedure (Wellensiek et al., 2002).

However, there are studies which had focused on the prevalence of cervical cancer screening, and its predictors at national and subnational levels in India (Monica and Mishra, 2020; Wu, 2003; Lin, 2008; Wellensiek et al., 2002). There is a dearth of literature which in particular focus on the district levels prevalence and predictors of cervical cancer screening. Therefore, the present study aims to estimate the prevalence and determine the factors for cervical cancer screening among women in the reproductive age group in Delhi and Rohtak, India.

## Materials and Methods

Present study utilized the data from a survey conducted as part of a larger study "Increasing access to cervical cancer screening and care through the community-centric continuum of care initiative in India" conducted by MAMTA-HIMC between 2015 and 2017. The aim of

the survey was to look into women's perceptions towards cervical cancer screening and its uptake. The research was carried out in two different cities: New Delhi and Rohtak. The research was carried out in New Delhi's Palam and neighbouring areas, as well as Rohtak's Gaukaran neighbourhood. The sites were chosen because of its accessibility and proximity to the medical facility, allowing for quick screening and referrals. Second, in order to define an adequate sample, the population of the chosen locations was considered. The face-to-face interviews were conducted in regional language.

### Sample estimation

As there were no accurate estimates available at the research location, proxy indicators were used to establish the sample size for the survey. The proxy indicator was chosen with the project's goal in mind, which is to increase cervical cancer literacy. When calculating the sample size, there were two assumptions taken into consideration when using women literacy. To begin with, it was thought that literate women would be better able to grasp information concerning cervical cancer. Second, women's literacy is an essential proxy indicator of a society's socio-economic status. The sample of 547 cases from Rajnagar in Palam and 463 cases from Gaukaran in Rohtak were selected, which was rounded to 550 and 470 in Palam, Delhi and Rohtak, respectively. Thus, a total of 1020 samples were collected from both these sites. The sampling frame was the number of households with at least one woman in the age group of 21-49 years. The households were then randomly selected; and subsequently one woman from each household was selected. If one household had more than one eligible woman, then one was randomly selected.

### Variable description

#### Outcome variables

The outcome variable was cervical cancer screening among women, which was binary in nature. The variable assessed using the question "Have you ever been screened for cervical cancer?" coded as no and yes. The operational definition of cervical cancer screening was based on the signs and symptoms and Visual Inspection through Acetic Acid (VIA) test using questions having 'Yes' or 'No' response.

#### Explanatory variables

Age was recoded as 30 years and less and more than 30 years. Age at marriage was recoded as less than 18 years and 18 and above years. Educational status was recoded as not educated, primary, secondary and higher. Marital status was recoded as never married, married and widowed/divorced/separated. Employment status was recoded as not employed and employed. Employment was considered "yes" if the respondent was involved in wages employment. Income was recoded into five quintiles (in rupees) 5,000 and less, 5,000-8,000, 8,000-10,000, 10,000-15,000 and more than 15,000.

#### Statistical approach

Descriptive statistics (percentage and frequency distribution) and bivariate analysis were done to represent

the preliminary results. The outcome variable was cervical cancer screening and explanatory variable was heard about cervical cancer screening test, age, age at marriage, educational status, marital status, employment status, income and state of residence. The Fisher exact test was used to test the level of significance during bivariate analysis. Multivariate logistic regression analysis was used to determine the factors for cervical cancer screening among women. The results were presented in the form of adjusted odds ratio (aOR) with 95% confidence interval (CI). To present the aOR the model was adjusted for all the background characteristics (heard about cervical cancer screening test, age, age at marriage, educational status, marital status, employment status, income and state of residence). Variance inflation factor (VIF) was estimated to check the multicollinearity and it was found that there was no evidence of multicollinearity among the variable used. Data analysis was done using Statistical software for data science (STATA) version 14.

*Ethical approval*

The study was approved by the MAMTA Health Institute for Mother and Child’s Ethics Committee. Participants were given information about the study’s purpose and importance, and they gave their verbal informed consent. The participant’s assent and the guardian’s consent were obtained when the respondent was under the age of 18 years. To maintain the confidentiality of the data proper measures were being maintained.

**Results**

Table S1 represents the socio-economic profile of the study population. It was found that about 57.0% of the respondents were aged more than 30 years (Delhi: 61.3% and Rohtak: 51.9%). About 74% of the respondents were those whose age at marriage was 18 years and above (Delhi: 65.6% and 83.8%). Respondents with higher educational levels were 54.1% (Delhi: 58.2% and Rohtak: 49.4%). About 6.6% of the respondents were never married (Delhi: 5.3% and Rohtak: 8.1%). Nearly 13.7% of the respondents were employed (Delhi: 15.6% and Rohtak: 11.5%). About 22.1% of the respondents had a family income of less than Rupees 5000 (Delhi: 7.8% and Rohtak: 38.7%). About 53.9% and 46.1% of respondents were from Delhi and Rohtak.

Table 1 represents the knowledge and attitude

about the screening of cervical cancer. It was found that about 90.1% [Delhi: 92.7% and Rohtak: 87.0%] of the respondents reported that cervical cancer could be cured if detected at stages. About 35.2% [Delhi: 44.9% and Rohtak: 23.8%] of the respondents had heard about cervical cancer screening. About 79.1% [Delhi: 91.1% and Rohtak: 52.7%] of the respondents believed that cervical cancer screening test gives a 100% chance for early diagnosis of cervical cancer. Almost 26.2% [Delhi: 35.2% and Rohtak: 6.3%] of the respondents reported that cervical cancer screening test is sufficient in order to eliminate the risk of cervical cancer. About 52.4% [Delhi: 74.5% and Rohtak: 3.6%] of the respondents believed that the pap smear test increases the susceptibility to cervical cancer in the future. About 90.5% [Delhi: 90.7% and Rohtak: 90.2%] of the respondents reported that they should undergo screening for cervical cancer. It was found that about 3.9% [Delhi-2.9% and Haryana-5.1%] were screened for cervical cancer.

Table 2 represents the percentage of women who went for cervical screening by their background characteristics. Higher percentage of women who had heard about the cervical cancer screening test went for actual cervical screening test [(Total: 7.5%; p-value: <0.001) (Delhi: 5.7%; p-value: 0.007) and (Rohtak: 11.6 %; p-value: <0.001)]. Higher percentage of women aged more than 30 years [(Total: 6.4%; p-value: <0.001) (Delhi: 4.5%; p-value: 0.007) and (Rohtak: 9.0%; p-value: <0.001)] went for cervical cancer screening. A higher percentage of women with secondary educational status went for cervical cancer screening in Rohtak (9.4%; p-value:0.098). A higher percentage of employed women went for cervical cancer screening in Rohtak (11.1%; p-value: 0.045). A higher percentage of women from Rohtak went for cervical cancer screening (5.1%; p-value: 0.077).

Table 3 represents the logistic regression estimates for the screening of cervical cancer among women. The model was adjusted for all the background factors to reveal the adjusted estimates. The women who heard about cervical cancer screening test were 5.27 times significantly more likely to go for cervical cancer screening test in reference to women who did not hear about cervical cancer screening test [aOR: 5.27; CI: 2.53,10.96]. It was found that women over 30 years of age had 12.04 significantly higher odds of going for cervical cancer screening in reference to women aged 30 years and less [aOR: 12.045; CI: 3.01, 53.20]. Employed women were 95% more likely to go for cervical cancer screening in reference to women who

Table 1. Knowledge and Attitude about Screening of Cervical Cancer

Variables	Total (n=1020)		Delhi (n=550)		Rohtak (n=470)	
	n	%	n	%	n	%
Cervical cancer can be cured if detected at early stages	919	90.1	510	92.7	409	87
Heard about cervical cancer screening test	359	35.2	247	44.9	112	23.8
Cervical cancer screening test gives a 100% chance for early diagnosis of cervical cancer*	284	79.1	225	91.1	59	52.7
Cervical screening test sufficient to in order to eliminate risk of cervical cancer*	94	26.2	87	35.2	7	6.3
Pap smear test increases the susceptibility to cervical cancer in the future*	188	52.4	184	74.5	4	3.6
Should undergo screening for cervical cancer*	325	90.5	224	90.7	101	90.2

n, Sample; %, Percentage; \*, The sample size will be 359, 247 and 112 respectively

Table 2. Proportion Women who Went for Cervical Cancer Screening by Their Background Characteristics

Background characteristics	Total (n=1020)		Delhi (n=550)		Rohtak (n=470)	
	%	p-value	%	p-value	%	p-value
Heard about cervical cancer screening test		<0.001		<0.001		<0.001
No	20 (2)		4 (0.7)		15 (3.1)	
Yes	77 (7.5)		31 (5.7)		55 (11.6)	
Age (in years)		<0.001		0.007		<0.001
30 years and less	7 (0.7)		3 (0.5)		4 (0.9)	
More than 30 years	65 (6.4)		25 (4.5)		42 (9.0)	
Age at marriage (in years)		0.989		0.432		0.781
Less than 18	39 (3.8)		20 (3.7)		19 (4.0)	
18 and above	41 (4)		14 (2.5)		25 (5.3)	
Educational status		0.24		0.455		0.098
Not educated	47 (4.6)		0 (0.0)		33 (7.0)	
Primary	49 (4.8)		28 (5.1)		21 (4.5)	
Secondary	60 (5.9)		13 (2.3)		44 (9.4)	
Higher	30 (2.9)		15 (2.8)		14 (3.0)	
Marital status		0.721		0.836		0.14
Never married	30 (2.9)		19 (3.5)		0 (0.0)	
Married	42 (4.1)		17 (3.1)		25 (5.3)	
Widowed/Divorced/Separated	43 (4.2)		0 (0.0)		49 (10.5)	
Employment Status		0.103		0.726		0.045
Not employed	36 (3.5)		15 (2.8)		20 (4.3)	
Employed	65 (6.4)		19 (3.5)		52 (11.1)	
Income (in Rupees)		0.215		0.204		0.247
5,000 and less	41 (4)		0 (0.0)		24 (5.0)	
5,000-8,000	26 (2.5)		12 (2.2)		13 (2.7)	
8,000-10,000	43 (4.2)		17 (3.0)		33 (7.1)	
1,0000-15,000	24 (2.4)		8 (1.4)		39 (8.3)	
More than 15,000	71 (7.0)		35 (6.3)		41 (8.7)	
State		0.077				
Delhi	30 (2.9)					
Rohtak	52 (5.1)					

p-value based on fisher exact test

were not employed [aOR: 1.95; CI: 0.87; 4.46]. Women from households with a monthly income of more than rupees 15000 had 2.98 significantly higher odds of going for cervical cancer screening in reference to women from households with an income of 5000 and less [AOR: 2.98; CI: 1.12, 9.09]. Women from Rohtak had significantly higher odds of going for cervical cancer screening than women from Delhi [aOR: 2.94; CI: 1.32; 6.54].

## Discussion

The present study found that only 3.9% [Delhi-2.9% and Haryana-5.1%] of women in Delhi and Rohtak went for cervical cancer screening which is far below that the national average for cervical cancer screening was 22%, which itself is considered low (Monica and Mishra, 2020). Previous studies also revealed similar results that cervical cancer screening is very low in the Indian context (Srivastava et al., 2018). A study from

rural areas of southern India found that only 2.2% of the total respondents went for the Papsmear test (Sudhir and Krishna, 2014). The plausible reason for low cervical cancer screening was due to low awareness for cervical screening test in the region. The present study also found that only about 35% of the total respondents had heard about the cervical cancer screening test in Delhi and Rohtak.

It has been argued that because the primary health care facilities are often overburdened and under-resourced, the awareness and knowledge about cervical cancer screening and actual screening for cervical cancer is low in India among women in India (Siddharthar et al., 2014). Awareness about cervical cancer screening was low in the present study where about 35.2% of the women responded that they had heard about the cervical cancer screening test. One study also cited almost similar estimates for India where 40.2% of the women knew about cervical cancer screening (Taneja et al., 2021). Incorrect knowledge



Table 3. Logistic Regression Estimates for the Screening of Cervical Cancer among Women (n=1020)

Background factors	aOR 95% CI
Heard about cervical cancer screening test	
No	Ref.
Yes	5.27* (2.53,10.96)
Age (in years)	
30 years and less	Ref.
More than 30 years	12.04* (3.01,53.20)
Age at marriage (in years)	
Less than 18	Ref.
18 and above	0.86 (0.35,2.11)
Educational status	
Not educated	Ref.
Primary	1.31 (0.43,4.01)
Secondary	1.31 (0.44,3.88)
Higher	0.60 (0.20,1.79)
Marital status	
Never married	Ref.
Married	0.35 (0.03,4.67)
Widowed/Divorced/Separated	0.28 (0.01,5.44)
Employment Status	
Not employed	Ref.
Employed	1.95 (0.87,4.46)
Income (in Rupees)	
5,000 and less	Ref.
5,000-8,000	0.73 (0.24,2.16)
8,000-10,000	1.90 (0.66,5.44)
10,000-15,000	1.17 (0.3,4.59)
More than 15,000	2.98* (1.12,9.09)
State	
Delhi	Ref.
Rohtak	2.94* (1.32,6.54)

Ref., Reference; \*if p<0.05; aOR, Adjusted odds ratio; CI, Confidence interval

and prevailing myths about screening tests also hinders the uptake of the services. This is in line with other studies where being aware and having correct knowledge influences the uptake of screening services (Ashtarian et al., 2017; Mutambara et al., 2017). Further increasing age was found to be a significant predictor for cervical cancer screening. Previous studies also reveal similar findings (Kaneko, 2018; Yi, 1994).

The studies argue that with the increase in age, the women become more aware and knowledgeable. The liable nature of adult women increases the odds for cervical cancer screening among them in reference to women from younger age group (Keetile et al., 2021). According to the American Cancer Society (ACS), women should begin cervical cancer screening at age 25 and have primary human papillomavirus (HPV) testing every five years through age 65 (preferred); if primary HPV testing is not available, women aged 25 to 65 should be screened with co-testing (HPV testing in combination

with cytology) every five years or cytology alone every three years (Fontham et al., 2020).

The educational status of women plays a significant role in cervical cancer screening among them. It was found that literate women had a higher prevalence of cervical cancer screening. The results were paired with the findings of previous studies, which argued that educated women are more aware of the advantages of cervical cancer screening, and hence the uptake for the same is high among them (Ba et al., 2021). Moreover, this finding does suggest that more educational-based programs about cervical cancer promote and increase awareness about cervical cancer screening in low resource settings (Ba et al., 2021).

Further, unemployed women and women from lower socio-economic status had low uptake of cervical cancer screening tests. This finding was consistent with previous studies (Al Rifai and Nakamura, 2015; Kangmennaang et al., 2018; Smith et al., 2008), which argued that deprived households are less likely to be well-informed and therefore unlikely to screen for cervical cancer (Kaneko, 2018; Keetile et al., 2021). This re-emphasizes the concept that individuals with financial means overcome barriers to care more easily than those who do not. Moreover, women of low socioeconomic status do not have access to information or insurance coverage, unlike women of higher SES status.

The study had few limitations that cannot be overlooked. Firstly, the study was not adequately powered to assess the determinants as the prevalence of outcome is very low. Secondly some of the confounding variables were added in the study that would otherwise confound the association. Thirdly, the data was cross-sectional in nature and hence causality cannot be established between the outcome and explanatory variables. Fourthly, the research was conducted in two districts namely Rohtak and Delhi that exhibit low resource settings. As a result, extrapolating the study's findings to other contexts may be difficult. Finally, because the responses about cervical cancer screening were self-reported, the study may have had a social desirability problem and could over or under report the issue. Along with the limitations, the present paper also had certain strengths. In order to have a fair representation of women in the selected districts, the current study used the representative sample size using the proxy indicator.

In conclusion, the uptake of cervical cancer screening uptake in the present study among women from reproductive age group was low in comparison to that of the recommended coverage of the target age group by the national guideline. Furthermore, finding do suggest that educational programs about cervical cancer screening, and tailored behaviour change communication strategies to address women's beliefs about screening tests should be undertaken in low resource settings to escalate the uptake of cervical cancer screening for early prevention and timely diagnosis of cervical cancer. Furthermore, the findings suggest that awareness about cervical cancer screening test along with its thorough knowledge about its benefits would be an effective intervention to increase the uptake of cervical cancer screening test.

## Author Contribution Statement

SM, SKR and PRG conceived the study. AR and RG collected and cleaned the data, and obtained ethics approval and consent. SS, KK and PRG analyzed the data. SS, KK, and PRG wrote the first draft of the paper. SM, and SKR reviewed and revised the manuscript. All authors approved the final version of the manuscript.

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### Ethics Approval

This study was approved by the Institutional Ethics Committees of MAMTA Health Institute for Mother and Child, New Delhi, India.

### Availability of Data and Materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

### Conflict of interest

All authors have no conflicts of interest.

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