Original Article

Female cancer screening in India: Results from the National Family Health Survey (NFHS-5) and the way forward

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Abstract

The incidence of cancer is increasing in India, reflecting global trends. This study attempts to identify various socioeconomic factors associated with breast and cervical cancer screening in females aged 30-49 years using the National Family Health Survey-5 (NFHS-5) data. Data focused on sociodemographic variables, cancer awareness, and information on breast and cervical cancer screening. Poisson regression was used to identify factors and reported adjusted prevalence ratio (APR) and 95% confidence intervals (CI). The proportion of women who had undergone breast and cervical cancer screening all over India was 0.9% and 1.9%, respectively. Socioeconomic factors seem to play a role as the poor and middle wealth index groups were less likely to undertake breast (APR = 0.60; 95%CI: 0.37, 0.99) and cervical cancer (APR = 0.68; 95%CI: 0.51, 0.92) screening compared to the wealthier groups. Moreover, 43% of participants in the poor wealth index category had not undergone cervical cancer screening (APR = 0.57; 95%CI: 0.33, 0.96). Further, women who watched messages on visual media were more likely to undergo screening for breast (APR = 2.00; 95%CI: 1.12, 3.57) and cervical cancer (APR = 1.46; 95%CI: 1.18, 1.82) within a week. In conclusion, screening for cancer among Indian females is remarkably low, which highlights the need for a uniform protocol for message dissemination on cancer and to collect information based on risk assessment. Furthermore, the negligible community participation in cancer screening points to the potential role of sociodemographic characteristics in taking up cancer screening, which was reflected in less participation among socioeconomically disadvantaged groups.

Keywords: Adjusted prevalence ratio, cancer screening, NFHS 5 survey, Poisson regression, sampling weight

Introduction

The emergence of noncommunicable diseases, particularly cancer, as a major health problem in India has raised concerns for the public health systems. The National Cancer Registry Programme reports that the cancer incidence in India will increase from 1.3 million in 2020 to 1.57 million by 2025, resulting in a 12% increase by 2025.[1] The age-adjusted rates for males and females in India were relatively low (105.7 and 100.9 per 100,000, respectively).[2] Conversely, the age-standardized rates (ASR) reported for males and females globally were 212.5 and 186.2 per 100,000 respectively,[2,3] In India, the leading cancer sites among men are oral cavity and lungs, whereas breast and cervix are the common sites among women.[4] The ASR for lung and oral cavity are 11 and 10.1, and the corresponding figures for breast and uterine cervix are 25.8 and 22.0, respectively.[5]

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While tobacco remains a preventable risk factor for oral cancer, the majority of cases are diagnosed in advanced stages, missing out on ample opportunities for early detection. Similarly, the leading cancer among females, viz. breast and cervical cancers, could be diagnosed early with minimum resources in community settings. Nearly one-third of global cervical cancer deaths are in India, and it mandates early detection as a way to reduce mortality. The role of early detection is also vital for breast cancer, considering the cumulative risk of developing breast cancer is 2.7% while the mortality risk is 1.5%.[6] Nearly 71% of spending for health care is met by out-of-pocket expenditure.[7] This results in an exponential financial burden, forcing the household to resort to other means of financing and later succumbing to financial debt.[8] Given the morbidity, mortality, and economic implications of health expenditure associated with breast and cervical cancer in India, both primary prevention and early detection need equal importance.

The significance of early detection of common cancers was envisaged in the National Cancer Control Programme 1984–1985.[9] Screening and early diagnosis are two components of early detection. Cancer screening is performed among apparently healthy individuals, mainly for those cancers with a long natural history, and on the assumption that diagnosis of the disease in the preclinical/asymptomatic phase or an early stage of onset facilitates early treatment, resulting in mortality reduction and increased quality of life. There are sustained programs to tackle cancer as part of the noncommunicable diseases (NCD). One such program is the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS), initiated by the Ministry of Health and Family Welfare, Government of India, in 2010. One of the priority areas was screening for NCDs, which also included breast, oral, and cervical cancer.[8,9] In a country like India, with a large, heterogeneous population, screening of common cancers requires comprehensive coverage, and the tertiary centers alone cannot meet the targets of equitable cancer detection services. Integrating cancer prevention and control services in the primary health system, supported by a referral system to higher centers and back referrals for follow-up care, is key to an effective public health strategy.

Although many centers nationwide have undertaken screening, nationally representative screening data on common cancers was not present in the public domain until the NFHS-4 was published.[6] The NFHS-5 carried out during 2019-2021 comprises a representative sample of households from all the states and union territories (UTs) in India.[10] The present paper aims to identify the factors associated with cervical and breast cancer screening status region-wise based on NFHS–5 data after accounting for the sampling design used in the survey.

Methods

Study design

The NFHS-5 is a large-scale multi-round cross-sectional survey, conducted in two phases using a representative sample of households all over India conducted between June 17, 2019, and January 30, 2021. The NFHS-5 provides information for 707 districts, 28 states, and 8 UTs. A multi-stage sampling technique was used for the selection of individuals. The first stage represents different states, followed by districts in the second stage. Further, each district was stratified into urban and rural areas. Apart from general questionnaires used in earlier surveys, the NFHS-5 collected data on the screening status of individuals aged 30-49 years for common cancers.

Data sources and sample size

The data on breast and cervical cancer screening status of women in India and other relevant variables were extracted from the NFHS-5 survey through the Demographic and Health Survey (DHS) portal. In the NFHS-5 survey, information on "whether the respondent has ever undergone clinical breast examination and cervix examination in their lifetime" was captured from women participants with a dichotomous response as "yes" or "no" options. Apart from this, information on sociodemographic variables such as type of residence, education level, and wealth index, as well as aids of cancer awareness such as print and visual media, including Internet use, were also collected.

This study illustrates region-wise cancer screening status among women in India. The regions are divided into northern states, southern states, and UTs. Tamil Nadu, Kerala, Karnataka, Andhra Pradesh, and Telangana were classified as southern states. All other states are considered as northern states. Andaman, Dadra and Daman, Delhi, Chandigarh, Lakshadweep, Puducherry, Ladakh, and Jammu Kashmir are listed as UTs.

Statistical methods

The Shapiro–Wilk test was used to test the normality of quantitative variables. Continuous variables were presented with mean and standard deviation or median and interquartile range (IQR) as appropriate. Categorical variables were reported in terms of frequency and percentage. The region-wise descriptive statistics were reported throughout India. The strength of association of sociodemographic parameters such as type of residence, education level, and wealth index, as well as awareness predictors such as the use of radio, television, newspaper, and Internet effect with breast and cervical cancer screening status, was carried out by Poisson regression analysis. Further, Poisson regression was used as an appropriate technique for analyzing this data because the proportion of women who underwent cancer screening was relatively low.[11,12] Both unadjusted and adjusted prevalence ratios, 95% confidence interval (CI), and *P* value were reported. The factors that are statistically significant at an alpha level below 0.2 in the univariate analysis were considered for the multivariable analysis.[11] In addition, the sampling weight was carried throughout all the analyses used as a reference for the NFHS-5 sampling procedure.[13] Statistical analysis was performed using STATA 16.0. In STATA, the "svy" command was used to account for the sampling weight from the NFHS-5 survey.

Ethical considerations

The data for this study was obtained from the DHS portal. This study does not require approval from the Ethics committee as it used anonymized secondary data.

Results

Sample characteristics

A total of 3,57,353 women were reported for screening of breast and cervical cancers all over India, of which nearly three-fourths were from the rural areas of the country [Table 1]. With reference to education, 39% screened had secondary education, followed by illiterates (36.4%), while among those with higher education, only 9.4% had undergone screening. In the secondary education group, 44% of the subjects were from southern districts, followed by UTs (43.3%). From the wealth index perspective, participation in screening was found to be more among the "poor group" (41.55%), closely followed by the middle wealth index group (20.86%). This table also explains the source of awareness regarding cancer screening in different regions of India. It was observed that visual media source like television was the most preferred (70%) for cancer awareness, followed by the Internet (22.86%).

The association between sociodemographics and participation in breast cancer screening is reported in Table 2. In this analysis, both screened and nonscreened population were considered. The adjusted prevalence ratio (APR) showed that there was no difference between rural and urban areas (APR = 0.99; 95% CI: 0.79, 1.26) for breast cancer screening. However, when each region was considered, women from rural North India had a 27% less chance of breast cancer screening (APR = 0.73; 95%CI: 0.61, 0.88) compared to their urban counterparts. With reference to education, among those without formal education, 47% had not attended screening (APR = 0.53; 95% CI: 0.31,

Table 1: Distribution of sociodemographic and awareness characteristics among individuals involved in cancer screening

	Breast and cervical cancer screening			
Sociodemographic parameters	**Overall *n*=3,57,353 *n* (%)**	**North *n*=2,44,568 *n* (%)**	**South *n*=64,698 *n* (%)**	**UT *n*=48087 *n* (%)**
Type of place of residence				
Urban	92574 (25.91)	55437 (22.67)	19975 (30.87)	17162 (35.69)
Rural	264779 (74.09)	189131 (77.33)	44723 (69.13)	30925 (64.31)
Education				
No education	130054 (36.39)	94951 (38.82)	19609 (30.31)	15494 (32.22)
Primary	55241 (15.46)	40055 (16.38)	9074 (14.03)	6112 (12.71)
Secondary	139755 (39.11)	90273 (36.91)	28657 (44.29)	20825 (43.31)
Higher	32303 (9.04)	7358 (11.37)	7358 (11.37)	5656 (11.76)
Wealth Index				
Poor	148498 (41.55)	120669 (49.35)	14490 (22.40)	13309 (27.68)
Middle	74540 (20.86)	47688 (19.50)	19108 (29.53)	7744 (16.10)
Rich	134315 (37.59)	76181 (31.15)	31100 (48.07)	27034 (56.22)
Awareness parameters				
Radio				
No	330402 (92.46)	231195 (94.53)	59642 (92.19)	39565 (82.28)
Yes	22530 (6.30)	10283 (4.20)	4108 (6.35)	8139 (16.93)
Not an Adjure resident	4421 (1.24)	3090 (1.26)	948 (1.47)	383 (0.80)
Television				
No	104224 (29.17)	88817 (36.32)	6399 (9.89)	9008 (18.73)
Yes	248708 (69.60)	152661 (62.42)	57351 (88.64)	38696 (80.47)
Not an Adjure resident	4421 (1.24)	3090 (1.26)	948 (1.47)	383 (0.80)
Frequency of reading newspapers				
Not at all	265566 (74.31)	188368 (77.02)	41724 (64.49)	35474 (73.77)
Less than once a week	51944 (14.54)	33889 (13.86)	10965 (16.95)	7090 (14.74)
At least one a week	39843 (11.15)	22311 (9.12)	12009 (18.56)	5523 (11.49)
Frequency of listening to radio				
Not at all	310660 (86.93)	217582 (88.97)	55102 (85.17)	37976 (78.97)
Less than once a week	32285 (9.03)	19989 (8.17)	5860 (9.06)	6436 (13.38)
At least once a week	14408 (4.03)	6997 (2.86)	3736 (5.77)	3675 (7.64)
Frequency of watching television				
Not at all	105133 (29.42)	86496 (35.37)	7278 (11.25)	11359 (23.62)
Less than once a week	75939 (21.25)	55473 (22.68)	10047 (15.53)	10419 (21.67)
At least once a week	176281 (49.33)	102599 (41.95)	47373 (73.22)	26309 (54.71)
Use of Internet				
Never	41447 (77.14)	29148 (79.19)	7415 (76.18)	4884 (67.93)
Yes	12284 (22.86)	7659 (20.81)	2319 (23.82)	2306 (32.07)

Table 2: Factors associated with breast cancer screening status

Sociodemographic parameters	Overall (*n*=357353)				North (*n*=244568)				South (*n*=64698)				UT (*n*=48087)			
	Crude		Adjusted		Crude		Adjusted		Crude		Adjusted		Crude		Adjusted	
	PR (95% CI)	*P*	PR (95% CI)	*P*	PR (95% CI)	*P*	PR (95% CI)	*P*	PR (95% CI)	*P*	PR (95% CI)	*P*	PR (95% CI)	*P*	PR (95% CI)	*P*
Type of place of residence																
Urban	1		1		1		1		1		1		1		1	
Rural	0.67 (0.49,0.93)	0.016*	0.99 (0.79,1.26)	0.987	0.45 (0.34,0.59)	<0.001*	0.73 (0.61,0.88)	0.002**	0.96 (0.79,0.68)	0.789	0.98 (0.74,1.29)	0.870	0.77 (0.26,2.31)	0.598	1.06 (0.55,2.04)	0.855
Education																
No education	0.31 (0.24,0.39)	<0.001*	0.53 (0.31,0.91)	0.022**	0.29 (0.26,0.33)	<0.001*	0.84 (0.39,1.77)	0.628	0.42 (0.17,1.03)	0.055*	0.35 (0.11,1.09)	0.065	0.32 (0.15,0.68)	0.009*	0.52 (0.12,2.26)	0.334
Primary	0.84 (0.38,1.87)	0.667	1.13 (0.79,1.62)	0.490	0.34 (0.24,0.49)	<0.001*	0.73 (0.42,0.28)	0.260	1.49 (0.84,2.63)	0.134*	1.23 (0.63,2.38)	0.465	0.304 (0.21,0.44)	0.208*	0.47 (0.19,1.14)	0.084
Secondary	0.65 (0.53,0.80)	<0.001*	0.71 (0.62,0.82)	<0.001**	0.54 (0.45,0.65)	<0.001*	0.68 (0.58,0.79)	<0.001**	0.74 (0.56,0.97)	0.034*	0.69 (0.47,1.04)	0.068	1.09 (0.46,2.55)	0.457	1.32 (0.79,2.21)	0.253
Higher	1		1		1		1		1		1		1		1	
Wealth Index																
Poor	0.39 (0.27,0.58)	<0.001*	0.60 (0.37,0.99)	0.049**	0.33 (0.19,0.57)	<0.001*	0.59 (0.36,0.97)	0.040**	0.89 (0.59,1.35)	0.518	1.01 (0.77,1.33)	0.945	0.42 (0.18,0.97)	0.044*	0.63 (0.35,1.15)	0.116
Middle	0.60 (0.39,0.91)	0.017*	0.68 (0.51,0.92)	0.013**	0.39 (0.26,0.61)	<0.001*	0.56 (0.36,0.87)	0.012**	0.74 (0.54,1.02)	0.058*	0.77 (0.66,0.89)	0.006**	0.43 (0.15,1.18)	0.091*	0.59 (0.21,1.63)	0.263
Rich	1		1		1		1		1		1		1		1	
Awareness parameters																
Frequency of reading newspapers																
Not at all	1		1		1		1		1		1		1		1	
Less than once a week	1.72 (0.74,4.01)	0.198	1.18 (0.51,2.70)	0.691	3.63 (2.54,5.19)	<0.001*	2.54 (1.70,3.78)	<0.001**	0.82 (0.48,1.43)	0.409	0.70 (0.57,0.85)	0.006**	2.36 (1.65,3.38)	0.001*	1.71 (1.01,2.89)	0.047**
At least one a week	1.35 (0.68,2.72)	0.376	0.79 (0.39,1.60)	0.507	2.21 (1.83,2.68)	<0.001*	1.40 (1.03,1.91)	0.034**	0.75 (0.34,1.66)	0.399	0.59 (0.36,0.96)	0.040**	2.32 (1.24,4.34)	0.014*	1.65 (0.64,4.26)	0.257
Frequency of watching television																
Not at all	1		1		1		1		1		1		1		1	
Less than once a week	2.71 (1.39,5.26)	0.004*	2.00 (1.12,3.57)	0.020**	3.38 (1.24,9.18)	0.020*	2.02 (0.86,4.77)	4.77	1.24 (0.78,1.95)	0.284	1.14 (0.80,1.62)	0.377	0.76 (0.31,1.84)	0.490	0.49 (0.17,1.42)	0.162
At least once a week	3.54 (2.05,6.11)	<0.001*	2.44 (1.14,5.23)	0.024**	2.37 (0.97,5.82)	0.058*	1.21 (0.51,2.88)	0.653	2.03 (1.53,2.68)	0.001*	1.82 (1.37,2.43)	0.003**	1.15 (0.47,2.82)	0.737	0.65 (0.30,1.39)	0.232

PR-Prevalence Ratio; CI-Confidence interval; *P* value using Poisson regression. *-<0.2 is considered as significant in Univariate analysis. **-<0.05 is considered significant in multivariate analysis.

0.91). However, with an increase in education, participation in screening had increased, particularly among those with secondary education. Nearly three-fourths of subjects with secondary education had undergone screening (APR: 0.71; 95% CI: 0.62, 0.82). When various regions were considered, the significance was high in the northern parts of India, where a third of the subjects with secondary education were less likely to undergo screening (APR = 0.68, 95% CI: 0.58, 0.79). We also looked into the sources of awareness for participants to undertake breast cancer screening. While considering audiovisual media for awareness generation, an important medium that has a prominent role in spreading awareness is television. Those who watched television even less than once a week (APR = 2; 95% CI: 1.12, 3.57) or at least once a week (APR = 2.44, 95% CI: 1.14, 5.23) had two times or more the chance of getting screened for breast cancer than those who had not watched visual awareness messages. From the "wealth index" point of view, women in the "poor wealth index category" had 40% less chance of appearing for breast cancer screening (APR = 0.60; 95% CI: 0.37, 0.99) and among "middle wealth income index group" (APR = 0.68; 95% CI: 0.51, 0.92), as compare to rich wealth index category. In the case of cervical cancer screening, a significant difference was noted among women in the "poor wealth index" category, where a 43% less chance of getting screened was observed (APR = 0.57, 95% CI: 0.33, 0.96) [Table 3]. However, no significant difference was observed in the "middle wealth index" group. Information related to awareness of cervical cancer was mainly found among subjects who had watched television. Viewing messages on cervical cancer even less than once a week had a chance of getting screened 1.5-fold compared to nonviewers (APR = 1.46, 95% CI: 1.18, 1.82) [Table 3]. No significant difference was observed among subjects who read newspapers.

Discussion

The NFHS-5 survey conducted in 2019–2021 reported that the proportion of women in India who had ever undergone a screening for cervical and breast cancers are 1.9% and 0.9%, respectively. The sociodemographic, as well as rural and urban settlement parameters, play a crucial role in cancer screening status among women in India. In addition to this, obesity, and maternal health are also found to be important parameters associated with breast and cervical cancer screening practices.[14] The World Health Organization (WHO) has advised screening at a minimum for women in the age group of 30-49 years at least once in a lifetime.[15] The NFHS-5 provided an overview of cancer screening in India among the 30- to 49-year age group. It has been reported that the proportion of the female population that has undergone screening is negligible in India.[16] In addition to the knowledge on screening prevalence, the NFHS-5 also allows exploring the knowledge associated with cancer screening in hindsight. According to the GLOBOCAN 2020 report, female breast cancer is the most commonly diagnosed cancer among both sexes, while cervical cancer is the fourth leading cancer among females. Moreover, the estimated death rates for female breast and cervical cancers were substantially higher in transitioning versus transitioned countries. In this scenario, early cancer detection assumes significance for seeking treatment at an early stage, leading to improved prognosis and better quality of life. The NFHS-5 report has pointed toward the urgent need to enhance screening of common female cancers, considering the low participation in cancer screening. Hence, it is important to understand the factors associated with screening for common female cancers in a culturally diverse country like India with a heterogeneous population.

One of the parameters looked upon was the source of awareness regarding cancer and how it influenced participation in cancer screening. Health education and breast screening are two key facilitators to reducing death from breast cancer.[17] A study by Sahu *et al.* on awareness of cancer and attitude toward cancer screening in India reported that television was the most important source of cancer awareness.[18] In the current study, a twofold increase in getting a cancer screening performed was observed among those who ever viewed cancer awareness messages than those who never viewed messages on television. The impact of cancer awareness among college teachers in India highlighted that more than 60% of teachers were using magazines and newspapers as a source of knowledge for breast cancer.[19] No significant association between print media and cancer awareness was observed in the NFHS-5 survey. However, for nationwide awareness generation, an empirical approach has to be planned, where the popularity of visual media and access to internet could be leveraged to make it beneficial to the public, considering the wide acceptance even in rural areas.

Overall, this study points to the limited health-seeking behavior of the population in general regarding cancer screening. Health-seeking behavior is governed by various factors, which include personal choice and community influencing factors, viz., community norms, household behavior, and the characteristics of the provider.[20] All these factors could have prominent roles in cancer screening due to the stigma associated with the disease and the inability to comprehend the significance of early cancer detection. Moreover, the inconsistency in accessing health care and the distribution of health care centers could have contributed to the existing problem. The current study evaluated, the role of socioeconomic parameters and their association with cancer screening. The wealth index is an important parameter that substantially influences the screening of breast and cervical cancers. The lower the wealth index, the lower the chance of getting screened was observed. Inequalities in socioeconomic factors, particularly income disparity, have played a profound role in the approach to cancer screening. Apprehensions regarding the diagnosis and the expenditure to be incurred for further investigations might have influenced the 'poor wealth index group' not to use facilities for cancer screening. A similar observation was reported in the Korea National Health and Nutrition Examination Survey conducted from 2013 to 2019, where the low-income group's health expenditure concern was considered a factor for nonparticipation.[21] From the educational point of view, a significant association between breast cancer

Table 3: Factors associated with cervical cancer screening status

Sociodemographic parameters	Overall (*n*=357353)				North (*n*=244568)				South (*n*=64698)				UT (*n*=48087)			
	Crude		Adjusted		Crude		Adjusted		Crude		Adjusted		Crude		Adjusted	
	PR (95% CI)	*P*	PR (95% CI)	*P*	PR (95% CI)	*P*	PR (95% CI)	*P*	PR (95% CI)	*P*	PR (95% CI)	*P*	PR (95% CI)	*P*	PR (95% CI)	*P*
Education																
No education	0.62 (0.39,0.99)	0.046*	0.976 (0.49,1.93)	0.942	0.52 (0.39,0.69)	<0.001*	0.95 (0.59,1.51)	0.817	0.96 (0.54,1.69)	0.855	0.88 (0.39,1.96)	0.704	0.51 (0.29,0.91)	0.029*	0.81 (0.58,1.12)	0.167
Primary	1.19 (0.79,1.81)	0.393	1.57 (1.16,2.13)	0.005**	0.81 (0.44,1.49)	0.473	1.33 (0.58,3.07)	0.481	1.74 (1.37,2.21)	0.002*	1.57 (1.28,1.94)	0.003**	0.47 (0.21,1.04)	0.061*	0.64 (0.37,1.11)	0.097
Secondary	0.97 (0.77,1.21)	0.760	1.06 (0.83,1.34)	0.635	0.82 (0.60,1.11)	0.181*	0.99 (0.74,1.33)	0.971	1.09 (0.76,1.56)	0.571	1.05 (0.66,1.65)	0.813	0.82 (0.63,1.08)	0.138*	0.89 (0.76,1.05)	0.141
Higher	1		1		1		1		1		1		1		1	
Wealth Index																
Poor	0.49 (0.34,0.72)	0.001*	0.57 (0.33,0.96)	0.036**	0.64 (0.39,1.03)	0.064*	0.58 (0.26,1.28)	0.163	0.89 (0.64,1.25)	0.418	0.83 (0.55,1.26)	0.308	0.19 (0.07,0.57)	0.008*	0.22 (0.07,0.73)	0.019**
Middle	0.81 (0.61,1.06)	0.125*	0.81 (0.58,1.13)	0.200	1.26 (0.97,1.63)	0.084*	0.62 (0.33,1.14)	0.116	0.96 (0.77,1.18)	0.619	0.89 (0.72,1.10)	0.225	0.56 (0.29,1.08)	0.076*	0.62 (0.28,1.35)	0.192
Rich	1		1		1		1		1		1		1		1	
Awareness related parameters																
Frequency of reading newspapers																
Not at all	1		1		1		1		1		1		1		1	
Less than once a week	1.43 (1.06,1.92)	0.020*	1.17 (0.80,1.69)	0.411	2.03 (1.37,3.02)	0.001*	1.73 (1.32,2.26)	<0.001**	0.96 (0.64,1.42)	0.779	0.92 (0.61,1.41)	0.648	1.64 (1.12,2.41)	0.018*	1.23 (1.08,1.40)	0.007**
At least one a week	1.13 (0.77,1.67)	0.510	0.89 (0.55,1.46)	0.660	1.57 (1.29,2.89)	<0.001*	1.38 (1.13,1.67)	0.003**	0.69 (0.50,0.94)	0.504	0.67 (0.47,0.98)	0.041**	1.19 (0.86,1.64)	0.262	0.81 (0.57,1.14)	0.186
Frequency of watching television																
Not at all	1		1		1		1		1		1		1		1	
Less than once a week	1.84 (1.43,2.38)	<0.001*	1.46 (1.18,1.82)	0.001**	1.74 (0.99,3.07)	0.054*	1.24 (0.93,1.67)	0.140	1.35 (1.22,1.49)	0.001*	1.28 (1.16,1.43)	0.002**	1.18 (0.95,1.48)	0.122*	0.83 (0.66,1.04)	0.091
At least once a week	2.04 (1.21,3.46)	0.009*	1.53 (0.86,2.73)	0.140	1.28 (0.78,2.07)	0.309	0.79 (0.59,1.07)	0.123	1.32 (0.93,1.86)	0.094*	1.27 (0.87,1.85)	0.171	1.62 (1.15,2.28)	0.012*	1.06 (0.79,1.41)	0.647

PR-Prevalence Ratio; CI-Confidence interval; *P* value using Poisson regression. *-<0.2 is considered as significant in Univariate analysis. **-<0.05 is considered significant in multivariate analysis.

screening, secondary education, and "no education" was found, while for cervical cancer screening, the association was significant with primary education. The results have to be interpreted judiciously considering the data structure. Of all the data available, 68.4% were from the northern states of India, while the southern states and UTs contributed to one-third of the total sample. This points to the need for a robust mechanism to collect data on screening common cancers, considering the structure and size of the country's population. Screening Registries need to be initiated in centers nationwide where early cancer detection facilities are available. Organized population-based screening programs are resource-intensive. However, targeted breast and cervical cancer screening of high-risk groups based on uniformity of standards for data collection needs to be envisaged. It will help to understand various factors associated with screening and further down staging of cancers. A similar process could also be applied to oral cancer screening. The Community Based Assessment Check (CBAC) list has already been adopted under the NPCDCS program to identify high-risk people for NCDs in India.[22] In the state of Kerala, the State Health App Initiative for Lifestyle Intervention (SHAILI) has been launched to assist Accredited Social Health Activists in undertaking population-based risk factor assessment of common NCDs, including oral, cervical and breast cancers using pretested questionnaires. A person with a high CBAC score would be referred to the nearest Government Health Centre for screening and diagnosis by trained healthcare providers.[23] Training and retraining of health care providers, coupled with infrastructure development at Primary Health Centres (PHCs), could facilitate screening at these centers for the general public. These PHCs have an important role in public health education and early detection. Considering the demography, India's rural population constitutes 68.8% of the total population.[24] While basic health care facilities are being carried out at the primary levels of the health system in India, the twenty-first century disease pattern points to strengthening health systems to incorporate NCD control at all levels of the health system particularly at the primary level. This is essential to accomplish the mission of a one-third reduction in premature mortality due to NCDs by 2030 as envisaged in the UN Sustainable Development Goals.[25] Hence, health services must be designed to integrate facilities for cancer prevention and early detection particularly for the rural and urban poor.

Limitation

Information on cancer screening was captured based on self-reports. Hence, the chance of response bias or under-reporting will be high. This may affect the generalization of study findings. Further, a smaller sample size from southern states and UTs also might have influenced the study results. Irrespective of these limitations, the study provides vital information on the determinants associated with female cancer screening, which is helpful to plan cancer screening programs with increased participation in the country.

Conclusion

NFHS-5 data has exposed the lacunae in cancer screening in India, where the eligible population reported for screening was remarkably low. In this context, it is necessary to adopt a uniform protocol for data collection and reporting to ensure data consistency. It is expected that training of field staff working at health centers would be useful in alleviating the fear and stigma of cancer screening among the public, particularly among the socioeconomically disadvantaged groups, leading to enhanced participation in screening programs. Further, strengthening health care infrastructure at the primary care level could facilitate the screening of high-risk groups at these centers, thereby reducing community apprehensions.

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Conflicts of interest

There are no conflicts of interest.

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