

Access this article online
Quick Response Code:

Website: www.jehp.net
DOI: 10.4103/jehp.jehp_156_19

Challenges of health promotion and education strategies to prevent cervical cancer in India: A systematic review

Jissa Vinoda Thulaseedharan, Kirstin Grosse Frie¹, Rengaswamy Sankaranarayanan^{2,3}

Achutha Menon Centre for Health Science Studies, Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum, Kerala, India, ¹Institute for Medical Epidemiology, Biostatistics and Informatics, Martin-Luther-University Halle-Wittenberg, Halle (Saale), Germany, ²Research Triangle Institute Global India Private Limited (RTI International), New Delhi, 100 037, India, ³International Agency for Research on Cancer (IARC/WHO), Lyon CEDEX 08, France

Address for correspondence:

Dr. Jissa Vinoda Thulaseedharan, Achutha Menon Centre for Health Science Studies, Sree Chitra Tirunal Institute for Medical Sciences and Technology, Medical College PO, Trivandrum - 695 011, Kerala, India. E-mail: jissa@sctimst.ac.in

Received: 18-03-2019
Accepted: 13-07-2019

Abstract:

BACKGROUND: Although there is a reduction in cervical cancer incidence over the years, it keeps the second position of the most common cancers among females in India. The aim of this review is to understand the challenges of health promotion and education strategies to prevent cervical cancer in India.

MATERIALS AND METHODS: This review is based on 78 studies published during 1993–2017 on the topics of awareness, attitude, and acceptance toward cervical cancer, screening, and human papilloma virus vaccination among Indians. The extracted information was summarized according to different populations such as people from different social and community groups, women and men attended clinics, students (nursing/medical/nonmedical), health-care providers (doctors, nurses, and other health workers), migrated Indians, and cervical cancer patients.

RESULTS: The awareness about cervical cancer and its prevention was very poor among women from different communities and the majority had a negative attitude toward screening and vaccination in general. The health professionals and medical students were more aware of cervical cancer and its prevention compared to the general population. Majority of students irrespective of medical or nonmedical background had a positive attitude toward vaccination. Only a small proportion of women in the general population were ever screened.

CONCLUSIONS: Observations from this review indicate immediate attention of the public health authority to take appropriate actions to educate and motivate general population toward cervical cancer prevention and to improve the facilities to incorporate the much needed preventive and early detection interventions in India.

Keywords:

Cervical cancer, India, prevention and control

Introduction

Cervical cancer is a long-term and rare outcome of persistent infection with one of the common oncogenic type human papillomavirus (HPV) infections.^[1] One or more of the symptoms such as vaginal discharge, sometimes foul-smelling, irregular bleeding, postcoital spotting or bleeding, and postmenopausal spotting or bleeding are the symptoms of early-stage

cervical cancer followed by urinary frequency and urgency, backache, low abdominal pain, kidney failure, and even more severe symptoms in later stages.^[2]

Cervical cancer prevention includes primary, secondary, and tertiary level activities. Health education and vaccination against HPV infection are components of primary prevention, whereas secondary prevention focuses on early detection.^[2] Early diagnosis and screening are the two components of

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

How to cite this article: Thulaseedharan JV, Frie KG, Sankaranarayanan R. Challenges of health promotion and education strategies to prevent cervical cancer in India: A systematic review. *J Edu Health Promot* 2019;8:216.

early detection. Early diagnosis helps to identify and treat at an early stage in symptomatic women when having a better prognosis, whereas screening identifies precancers in asymptomatic women before they progress to invasive cervical cancer.^[3] Diagnosis, management, and palliative care are part of tertiary prevention.^[2]

Globally, one out of every five incident cervical cancer patients is from India.^[4] The recent report of the global burden of disease study shows that cervical cancer incidence declined from the first position in 1990 to the third position in 2016 among all cancers in India and the Globocan 2018 shows that still, cervical cancer is in the second position of the most common cancers among women in India.^[5,6] Although there is a reduction, the incidence of cervical cancer in rural India is still high compared to other parts of India.^[7-9] In addition, the differences in quality and accessibility of health services make a wide variation in cervical cancer survival in India.^[10-12]

Quadrivalent and bivalent prophylactic HPV vaccines are licensed in India, but socio-cultural issues, high cost as well as the negative arguments precludes the implementation of HPV vaccination through the national immunization program in India.^[13,14] However, the states of Delhi and Punjab initiated routine vaccination of 12-year-old girls a few years back as part of their immunization program.^[15] The Pap smear, visual inspection with acetic acid (VIA) and HPV testing with opportunistic screening are available in India, particularly in urban areas, but the vast majority of women have never been screened in India.^[14] Tamil Nadu and Sikkim are the two states implemented cervical cancer screening through primary care services in India.^[16]

In this context, we reviewed to understand the challenges of health promotion and education strategies to prevent cervical cancer in India through the level of awareness, attitude, and acceptance toward cervical cancer prevention among different groups of people in India. We summarized the results of 78 studies to give a comprehensive overview about the level of awareness concerning cervical cancer and its prevention; attitude toward HPV infection, cervical cancer, HPV vaccination and screening; and the acceptance of vaccination, screening, and treatment among different population groups in India.

Materials and Methods

Search strategy

We aimed to identify all papers assessing awareness, attitude, and acceptance with regard to cervical cancer in India between 1980 and 2017, available in PubMed. With

the research terms “NOT American Indian” in the strategy and using the following terminology ((((((*acceptance*) OR *attitude*) OR *perception*)OR *knowledge*) OR *awareness*) OR *acceptability*)OR *acceptation*) AND (*cervical cancer* OR *HPV*) AND (*India* OR *Indian* NOT *American Indian*) AND (“1980/01/01”[*Date-Publication*]：“2017/12/31”[*Date-Publication*]), we identified 270 records. Further, we identified one additional record through Web of Science, Cochrane Library, and IndMED using the same strategy and 10 records using cross-references and Google searches.

Inclusion criteria

The first and second author went through all abstracts and excluded the studies that were not dealing with the awareness and/or attitude and/or acceptance toward cervical cancer prevention. The articles those were dealing with the opinion of decision-makers, politicians, and/or committees; epidemiological studies on risk factors or survival; and studies dealing with the determinants of participation in cervical cancer screening demonstration projects were also excluded from the list. Overall, 77 papers and one dissertation were eligible for analysis and were listed in the order of publication years.^[17-94] The review process is explained in Figure 1.

Data extraction

Both the first and second authors went through all the articles and prepared a database in excel sheet by extracting the basic information such as first author, publication year, title, study location, study methods, and details of participants [Appendix 1:Description of studies-Extracted information]. Of the 78 studies, only one study was published in 1993,^[17] 25 in 2001–2011,^[18-26] but 52 in the last 6 years (2012–2017).^[27-94]

The first author extracted information from the selected studies mainly under three headings such as awareness, attitude, and experience, in which

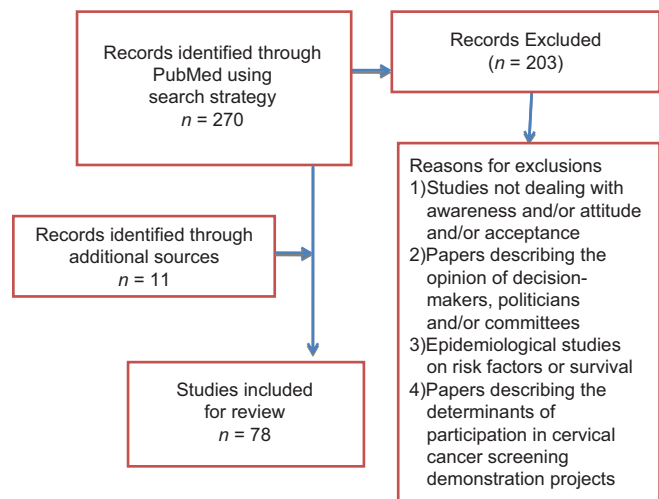


Figure 1: Flow chart showing selection of reviewed records

awareness was assessed in 60, attitude in 50, and experience in 33 studies with overlapping of these three elements in many of the studies. This was further verified by the second author. The details of studies in separate sections are provided in Table 1 with proper citations.

Description of study methods and participants

There were 64 quantitative studies and eight qualitative studies,^[19,22,26,30-32,36,87] whereas six studies used both methods for collecting information.^[23,44,66,69,73,90] Majority of the studies were cross-sectional surveys using interviews or questionnaires. Few studies were pre- and post-test evaluations,^[48,60,71,86] one was a longitudinal study,^[35] and the remaining included qualitative interviews, in-depth interviews, and focus group discussions.^[19,22,23,26,30-32,36,44,66,69,73,87,90]

- The studies consist of different populations such as women and men from different community groups^[17,20,24,25,31,32,35,39,41,43,45,47,51,61,66,69,71,73,79,80,85,86,90,92,93]
- And attended clinics^[27,29,42,52,59,67,68,72,75,76,82]
- Students (nursing/medical/paramedical/nonmedical)^[38,40,46,48,50,56,58,60,64,69,74,81,83,89]
- Health-care providers (doctors, nurses, and other health workers);^[18,28,36,53-57,62,63,65,66,77,78,88,91,94] migrated Indians;^[19,21,26,27,30,33,34,37,49,84,87] and cervical cancer patients.^[23]

Some of the studies had more than one group of participants.^[22,27,56,65,66,69,77,81] The results were compiled and presented according to the above categories of populations.

Results

Many sections included information from both quantitative and qualitative studies, and the extracted information did not have a unique nature to allow easy compilation. Tables 2-7 presents the summary of the information extracted from the studies those have some form of uniqueness to summarize. The other information is presented in the text in this section. The awareness regarding other risk factors of cervical cancer [Third column in the awareness section, Table 1] was excluded from further analysis due to its extreme difficulty in compiling the diverse nature of assessment in different studies.

Awareness

The recognition of cervical cancer as a disease varied according to the population and location of studies. In general nurses and health professionals had a relatively higher level of awareness. The awareness about symptoms as well as HPV infection was also shown a similar pattern [Table 2].

Awareness about the Pap test is very minimal (3.5%–9.7%) among women in the community. Medical students had better knowledge about the Pap tests compared to nonmedical, nursing, and paramedical students, and more than 74% of nurses were aware of the Pap test as a screening tool for cervical cancer. In the community, majority of participants were unaware of the HPV vaccine. Moderate-to-good proportion of nursing or medical students were aware of the vaccine [Table 3], but they had low awareness regarding cost and type of vaccine.^[64] Among nurses and health-care providers, the awareness about HPV vaccination varied from 25% to 81% [Table 3].

One qualitative study in Uttar Pradesh reported that even those who heard about or ever had a Pap test or who came for screening were not aware of the purpose of the test, and also the providers had knowledge gaps about the preventive nature of cervical cancer. The same study also reported that many of the providers were aware of the link between HPV and cervical cancer.^[22] However, another multicentric study reported that health-care providers in India had a poor understanding of the etiology.^[31] In one study conducted in Mysore, parents of adolescents had very poor knowledge about HPV and its relation to cervical cancer.^[32] Two studies among migrated Indian women revealed that Indians were less aware about Pap test and its purpose than women from other origins.^[26,34] There was only one study among cervical cancer patients, and it was observed that women ignored the initial symptoms for a long time and did not think that those symptoms would turn as cancer in future.^[23] As per the results from a multicentric study, most Indian participants poorly understood about what a vaccine does.^[31] None of the parents participated in a study knew about the HPV vaccine,^[73] but several parents participated in another study read about the new HPV vaccine.^[32]

Attitude

About human papilloma virus infection or cervical cancer

Only 3% of the parents who participated in a study were willing to discuss cervical cancer with their young daughters, and 40% of them preferred to discuss these matters only when their daughters are over 19 years of age, followed by 34% who felt that it is only appropriate to discuss the matter with 15–18 years old girls.^[70] Migrated Indian women in Canada often spoke about Pap test and cervical cancer in terms of sexuality and mentioned the inappropriateness of discussing the topic in public.^[26] About 30% of women attending gynecology clinics believed cervical cancer is not as serious as other cancers, and 35% of the women perceived themselves to be not at risk. In the same study, one-third of the women

Table 1: Summary of studies describing the information on awareness, attitude, and experience

Study number	First author	Year of publication	Awareness about			Attitude about			Acceptance/experience with			
			Cervical cancer as a disease	HPV or other risk factors	Prevention Screening	Symptoms or cure	HPV infection or cervical cancer	Vaccine Screening	Vaccine screening	Treatment		
1	Dhamija ^[17]	1993	Y		Y							
2	Pał ^[18]	2001			Y			Y		Y		Y
3	McCaffery ^{[19]*}	2003			Y			Y		Y		Y
4	Desai ^[20]	2004		Y	Y			Y		Y		Y
5	Forrest ^[21]	2004			Y			Y		Y		Y
6	Dabash ^{[22]*}	2005		Y	Y		Y	Y		Y		Y
7	Ramanakumar ^{[23]**}	2005			Y			Y		Y		Y
8	Aswathy ^[24]	2006			Y			Y		Y		Y
9	Basu ^[25]	2006			Y			Y		Y		Y
10	Oelke ^{[26]*}	2007			Y		Y	Y		Y		Y
11	Brotto ^[27]	2008			Y			Y		Y		Y
12	Ross ^[28]	2008			Y			Y		Y		Y
13	Roy ^[29]	2008	Y		Y		Y	Y		Y		Y
14	Wong ^{[30]*}	2008			Y			Y		Y		Y
15	Bingham ^{[31]*}	2009		Y	Y			Y		Y		Y
16	Madhivanan ^{[32]*}	2009	Y	Y	Y			Y		Y		Y
17	Marlow ^[33]	2009			Y			Y		Y		Y
18	Dunn ^[34]	2010			Y			Y		Y		Y
19	Jayant ^[35]	2010	Y		Y			Y		Y		Y
20	Krupp ^{[36]*}	2010			Y			Y		Y		Y
21	Robb ^[37]	2010			Y			Y		Y		Y
22	Saha ^[38]	2010	Y	Y	Y			Y		Y		Y
23	Basu ^[39]	2011	Y	Y	Y			Y		Y		Y
24	Joy ^[40]	2011	Y	Y	Y			Y		Y		Y
25	LaMontagne ^[41]	2011	Y		Y			Y		Y		Y
26	Tiwari ^[42]	2011	Y		Y			Y		Y		Y
27	Aswathy ^[43]	2012	Y	Y	Y			Y		Y		Y
28	Beining ^{[44]**}	2012	Y	Y	Y			Y		Y		Y
29	Donta ^[45]	2012	Y		Y			Y		Y		Y
30	Hussain ^[46]	2012	Y		Y			Y		Y		Y
31	Isaac ^[47]	2012	Y		Y			Y		Y		Y
32	Naik ^[48]	2012	Y	Y	Y			Y		Y		Y
33	Naing ^[49]	2012	Y		Y			Y		Y		Y
34	Pandey ^[50]	2012	Y	Y	Y			Y		Y		Y
35	Raychaudhari ^[51]	2012	Y	Y	Y			Y		Y		Y
36	Castellino ^[52]	2012	Y	Y	Y			Y		Y		Y
37	Shah ^[53]	2012	Y	Y	Y			Y		Y		Y
38	Singh ^[54]	2012	Y	Y	Y			Y		Y		Y

Contd...

Table 1: Contd...

Study number	First author	Year of publication	Awareness about			Attitude about			Acceptance/experience with	
			Cervical cancer as a disease	HPV or etiology	Other risk factors	Prevention Screening	Symptoms or cure	HPV infection or cervical cancer	Vaccine Screening	Vaccine screening Treatment
39	Gargano ^[65]	2013	Y	Y	Y	Y	Y	Y	Y	Y
40	Gupta ^[66]	2013	Y	Y	Y	Y	Y	Y	Y	Y
41	Goyal ^[57]	2013	Y	Y	Y	Y	Y	Y	Y	Y
42	Mehta ^[58]	2013	Y	Y	Y	Y	Y	Y	Y	Y
43	Pandey ^[59]	2013	Y	Y	Y	Y	Y	Y	Y	Y
44	Ramavath ^[60]	2013	Y	Y	Y	Y	Y	Y	Y	Y
45	Sarma ^[61]	2013	Y	Y	Y	Y	Y	Y	Y	Y
46	Shekhar ^[62]	2013	Y	Y	Y	Y	Y	Y	Y	Y
47	Thippeveeranna ^[63]	2013	Y	Y	Y	Y	Y	Y	Y	Y
48	Vikrant ^[64]	2013	Y	Y	Y	Y	Y	Y	Y	Y
49	Vineetha ^[65]	2013	Y	Y	Y	Y	Y	Y	Y	Y
50	Bansil ^{[66]**}	2014	Y	Y	Y	Y	Y	Y	Y	Y
51	Belani ^[67]	2014	Y	Y	Y	Y	Y	Y	Y	Y
52	Harsha kumar ^[68]	2014	Y	Y	Y	Y	Y	Y	Y	Y
53	Hussain ^{[69]**}	2014	Y	Y	Y	Y	Y	Y	Y	Y
54	Madhivanan ^[70]	2014	Y	Y	Y	Y	Y	Y	Y	Y
55	Mary ^{[71]§}	2014	Y	Y	Y	Y	Y	Y	Y	Y
56	Montgomery ^[72]	2014	Y	Y	Y	Y	Y	Y	Y	Y
57	Paul ^{[73]**}	2014	Y	Y	Y	Y	Y	Y	Y	Y
58	Pengpid ^[74]	2014	Y	Y	Y	Y	Y	Y	Y	Y
59	Siddharthar ^[75]	2014	Y	Y	Y	Y	Y	Y	Y	Y
60	Singh ^[76]	2014	Y	Y	Y	Y	Y	Y	Y	Y
61	Swapnajaswanth ^{[77]§}	2014	Y	Y	Y	Y	Y	Y	Y	Y
62	Devi ^[78]	2014	Y	Y	Y	Y	Y	Y	Y	Y
63	Tripathi ^[79]	2014	Y	Y	Y	Y	Y	Y	Y	Y
64	Khanna ^[80]	2015	Y	Y	Y	Y	Y	Y	Y	Y
65	Swarnapriya ^[81]	2015	Y	Y	Y	Y	Y	Y	Y	Y
66	Bansal ^[82]	2015	Y	Y	Y	Y	Y	Y	Y	Y
67	Doshi ^[83]	2015	Y	Y	Y	Y	Y	Y	Y	Y
68	Marlow ^[84]	2015	Y	Y	Y	Y	Y	Y	Y	Y
69	Sabeena ^[85]	2015	Y	Y	Y	Y	Y	Y	Y	Y
70	Shankar ^[86]	2015	Y	Y	Y	Y	Y	Y	Y	Y
71	Marlow ^{[87]*}	2015	Y	Y	Y	Y	Y	Y	Y	Y
72	Chawla ^[88]	2016	Y	Y	Y	Y	Y	Y	Y	Y
73	Rashid ^[89]	2016	Y	Y	Y	Y	Y	Y	Y	Y
74	Jain ^{[90]**}	2016	Y	Y	Y	Y	Y	Y	Y	Y

Contd...

Table 1: Contd...

Study number	First author	Year of publication	Awareness about			Attitude about			Acceptance/experience with		
			Cervical cancer as a disease	HPV or other risk factors	Prevention Screening	HPV infection or cervical cancer	Vaccine Screening	Vaccine screening	Treatment		
75	Jain ^[91]	2016	Y	Y	Y	Y	Y	Y	Y	Y	Y
76	Patra ^[92]	2017	Y	Y	Y	Y	Y	Y	Y	Y	Y
77	Veerakumar ^[93]	2017	Y	Y	Y	Y	Y	Y	Y	Y	Y
78	Canon ^[94]	2017	Y	Y	Y	Y	Y	Y	Y	Y	Y
Number of studies			33	29	39	5	26	28	3	29	3

*Study used qualitative methods, **Studies used qualitative and quantitative methods, §Specific questions were not provided but overall knowledge score is given. HPV=Human Papilloma virus.

Table 2: Awareness regarding cervical cancer, its symptoms and etiology

Cervical cancer as a disease
 Women in the community: 2.7%-87%^[17,32,35,39,43,44,45,51,61,73,90,92,93]
 Among men: 8.5%-66.3%^[39,45]
 Among women attended clinics: 15%-82%^[29,42,68,72,75,76,82]
 Among students: Nonmedical: 15%-66%^[38,40,46,60,69,89]
 Medical/nursing/paramedical: 30%-80%^[48,56,64]
 Among nurses/health professionals: 63%-86%^[54,56,62,88,91]

Symptoms of cervical cancer
 Women in the community: 10%-49%^[17,43,44,51,79,86,90,92,93]
 Among women attended clinics: 31%^[75]: Irregular menstrual bleeding was the most recognized symptom in two other studies (26.5%-29%)^[68,82]
 Among students: Medical/nursing/paramedical: 24%-78%^[48,64] The most common symptoms reported in other study was: menstrual problems (38.5%)^[56]
 Among nurses/health professionals: 56%-72%^[88,91] The most common symptoms reported in other studies were: foul smelling vaginal discharge 20.6%-94.25%; postmenopausal bleeding or menstrual abnormality: 33%-86.5%; postcoital vaginal bleeding: 26.3%-56%^[53,54,57,78]

HPV/etiology
 Women in the community: 0%-24%^[39,44,73,79,80,85,86,90]
 Among men: 14.2%^[39] Teachers: 30.7%^[86]
 Women/men attended Clinics: Women: 1%-43.7%^[59,72,82] Men: 32%^[67]
 Among students: Nonmedical: 22.8%-73.3%^[40,60,69,89]
 Medical/paramedical: 45%-96%^[50,58,64,81,83]
 Among nurses/health professionals: 23.4%-91%^[54,56,62,78,88]

Table 3: Awareness regarding cervical cancer screening and human papilloma virus vaccination

Cervical cancer screening
 In the community: Among women: 14.2%-74% (any method)^[17,20,24,43,44,79,90]
 3.5%-9.7% (Pap test)^[45,51,79,92]
 Among men: 3.5% among those who heard about ca cx^[45]
 Teachers: 35%^[86]
 Women attended clinics: 7%-82%^[27,29,42,52,68,72,75,76,86]
 Students: Nonmedical: 11% heard of Pap test^[38]
 Paramedical: 19%^[56] Nursing: 30%^[48]
 Dental: 38%^[83] Medical: 84.8%^[50]
 Among nurses/health professionals: 74%-100%^[53,54,57,62,63,78,91]
 Migrated Indian women: 64.5%^[37]

HPV vaccination
 In the community: Among women: 13%-14.5%^[51, 90]
 Among women attended clinics: 2.8%-28%^[59,72,75,76]
 Students: Nonmedical: 44% of girls and 31% of boys were aware about HPV vaccine^[89] Among students who aware that HPV infection causes cervical cancer, 81.8% were aware about HPV vaccine^[69]
 Medical/nursing/paramedical: 30.8%-75.6%^[48,50,58,64,83]
 Among nurses/health professionals: 25%-81%^[62,78] Among physicians, 47% knew that vaccine is licensed in India^[94]
 HPV=Human papilloma virus

believed that the disease can be easily cured and about 75% perceived that effective treatment is available.^[29] One study pointed out that many of the women diagnosed

Table 4: Readiness to accept human papilloma virus vaccination and screening

Readiness to accept HPV vaccine
In the community: Parents/women agreed to vaccinate their daughters; 13%-75%; ^[33,39,69,70] women willing to accept vaccination for themselves: 46%-47.6%; ^[49,72] women reported that their community will resist HPV vaccination: 9.1% ^[80]
Among men attended clinics: Vaccine acceptance was 83% and 98% among the dermatology patients and patients from ART's, respectively ^[67]
Among students: Nonmedical: 64%-75%; ^[38,60,69] Medical: 60%-88% ^[50,58,64,81]
Among nurses/health professionals: Female health professionals who had favorable attitude toward vaccination: 90%; ^[77] health professionals had more positive attitude (80%) as compared to nonhealth professionals (46.7%); ^[65] recommends vaccination to their patients: 30%-47% ^[88,94]
Willing to be screened
In the community: Among women; 25%-95.5% ^[21,43,44,51,66,79,92]
Among women attended clinics: 14%-21% ^[52,72]
Among migrated Indian women: 87% had a positive attitude toward the intention to use the HPV self test if offered ^[21]
Among nurses/health professionals: 62%-90% ^[77,82,91]
HPV=Human papilloma virus

Table 5: Perceptions on barriers and motivating factors to human papilloma virus vaccination

Perceived barriers ^[18,30-33,36,38,39,49,50,55,58,60,64,65,67,69,70,72,73,78,80,81,88,90,94]
1. Concerns about safety and effectiveness (e.g., Vaccine is not safe, not effective, cause many side effects, makes a false sense of security)
2. Cost (e.g., Cost is too high, not free of cost)
3. No Need (e.g., Perception of not being at risk)
4. Implementation issues (e.g., Vaccine should be part of immunization schedule, be of a government program, recommended by physicians, marketed as a vaccine preventing cancer instead of a vaccine preventing a sexually transmitted infection)
5. Psychosocial (e.g., Perception that vaccination will promote sexual promiscuity, conviction of adolescents that parents would suspect premarital sexual activity, conviction by parents that their adolescent daughters were unlikely to be sexually active, receiving HPV vaccine would make others think that the women were sexually active, resistance by religious communities, general anxiety, fear of injections, psycho-social distress)
Motivating factors to HPV vaccination (e.g., Protection offered by the vaccine, fear of cancer, health worker recommendation, belief that HPV infection is a serious health issue in India, spending money for an injection can save money for cancer treatment later)
HPV=Human papilloma virus

with cervical cancer feared disgrace, discrimination, guiltiness, and neglect by their husband and family.^[22] In another study, about 63% of the participants (healthy women attending family practice, obstetrics and gynecology clinics, and postnatal wards) revealed that they feel ashamed, embarrassed, guilty, scared, angry, or anxious if they had an HPV infection.^[72]

Readiness to accept human papilloma virus vaccination and willingness to screen

The information on vaccine acceptance and willingness to get screen is further summarized and provided

Table 6: Perceptions on barriers to screening

Perceived barriers ^[19,21,22,25-29,43,54,57,63,66,72,75,76,78,84]
1. Lack of awareness (e.g., of Cervical cancer, screening procedure, pap tests, where to get screening/pap test)
2. Lack of resources (e.g., time, money, access or availability to a facility, long waiting time in the hospital)
3. Provider-related barriers (scarcity of acceptable health practitioners, discomfort with pelvic examination by male providers, trust with ensuring confidentiality, language barriers, co-operation with clients, negative perceptions about the quality of public health services, worried about doing self-sampling properly)
4. No perceived need (e.g., Screening is not required if there is no problems, test is not important because we are old/young, Pap test is needed only to women who have had many sexual partners, only women who had babies need to do pap test, physician does not request)
5. Psychosocial (e.g., Lack of interest, lack of approval from husbands/relatives, fear of procedure/vaginal examinations/sight of instruments/fear of pain, anxiety related to having a Pap/scared about a test that detects cancer/fear of test result, shyness to be screened/embarrassment, worry about potential psychosocial harm to women and their partners and families, fear of dropping social image/worry about distrust or infidelity that may conveyed to one's partner, especially in monogamous relations, what the doctor might think if the women ask for a pap test, Pap test is a private matter and should not be discussed in the community)

Table 7: Screening attendance

Ever participation
Women from the community - 0.7%-12.2% ^[43,61,79,80,85]
Women attended clinics - 5%-25% ^[27,29,72,76,82]
Nurses/health professionals - 3.4%-25%; ^[53,57,63,77,78,91]
Doctors - 53% ^[77]
Migrated Indian women - 33.6%-87% ^[21,28, 84]
Paramedical Staff and students - 0%-8% ^[56,74]

in Table 4. More than 60% of students in all studies irrespective of medical or nonmedical background had a positive attitude toward the acceptance of HPV vaccination. Although the number of studies on health professionals and young men is very few, the participants of the available studies had a favorable attitude toward HPV vaccination. However, the vaccine acceptability by parents and women from different communities was low.

Even though a small proportion of women attended clinics were willing to be screened (14%–21%), the percentages of women in the community who have had a positive attitude toward screening varied from 33% to 95.5% in general [Table 4]. Female health professionals and nurses also had a favorable attitude toward screening. About 41% of nurses in a study reported that women should get Pap smears done only if they had symptoms^[18] and 84% of nurses in another study reported that married women to be screened at least once in a lifetime.^[78] The study among migrated Indian women in the UK reported that they do not need smear test if they do not have symptoms (65%), they are not sexually active (39%) and if they are not at risk (22%).^[84]

The perceived barriers and motivating factors to HPV vaccination, and perceived barriers for screening were identified from the studies, and a summary is provided in Tables 5 and 6.

Decision-making authority

Three papers had information on who is the final authority to take the decision on vaccinating their daughters. In one study, 61% of Indian women said that the decision whether to accept vaccination for their daughter would be taken by both parents together, 31% said they themselves, and 9% said their husband will take the decision.^[33] Others also noted the father's role as crucial in decision-making even though joint parental decision occurs.^[31,32]

Acceptance/experience

With vaccination

Three quantitative studies were found addressing acceptance or experience with HPV vaccination. The first study among pediatricians explored their practices by administering HPV vaccine to young girls.^[55] Among the participants, only 3.1% were routinely administering the vaccine, whereas 42.3% selectively and 46% were not at all administering HPV vaccine.^[55]

The second study explored the reasons for participation in HPV vaccination among parents or guardians of 9–14-year-old girls.^[41] Almost 65% of the respondents gave any of the following three reasons that are: it gives protection against cervical cancer, it prevents disease, or vaccines are good. The most-reported other reasons for participation was “followed others advice.” The major reason for partial or nonparticipation was “absent from school.”^[41] As per the third study, 6.8% of the medical or paramedical students were HPV vaccinated.^[81]

With screening

The ever participation in screening was ranging from 0% to 53% among different populations in India and from 34% to 87% among migrated Indian women [Table 7].

One study assessed the willingness of Anganwadi (a kind of government-run rural maternal and child health centers) workers to participate in screening before and after the intervention and found that 33% were ready to participate before the intervention, but it became 88% after the intervention.^[20] Another study reported that only 10% of the women who already had a Pap smear test came for follow-up visit.^[42] In a study on the concerns about self-sampling, about 63% of the participants said that self-sampling is easy, but 64% of women also reported that it hurts oneself.^[66]

Cost of services and transportation charges, not aware of the facility, lack of knowledge about screening, believed

that test is not necessary, their doctors did not advise them to get Pap smear done, and embarrassment were the most common reasons for nonaccess to the health system or nonparticipation in screening reported by the five studies.^[18,22,26,56,79] Migrated Sikh women also reported that the difference in health system affects their health decisions and screening behaviors.^[26]

With diagnosis and treatment

One study in Tamil Nadu among VIA-positive women who refused cryotherapy described the reasons why they did not undergo cryotherapy.^[46] Scared of treatment, responsibility to look after their children, no symptoms and hence do not want treatment, and husband did not allow were the most common reasons for refusal to receive cryotherapy.^[46] In another study in Uttar Pradesh (including participants from public, private, and military sectors; clients, community members, policy advocates, and providers), worry about self-esteem while undergoing diagnosis and treatment was reported as one of the worst experiences. Lack of confidentiality and privacy to discuss with doctors in front of their son or close relatives were also reported as main barriers while undergoing diagnosis and treatment.^[22] A third study was done among cervical cancer survivors in Mumbai. Economic burden, social negligence, fear of remission, and fear of death were the most reported personal and emotional problems they faced during the time of treatment. The positive impact of attending devotional programs, yoga, and meditation practices were also highlighted.^[23]

Discussion

The present review suggests that the awareness about cervical cancer, its symptoms, HPV infection, and the preventive nature of the disease were better among medical students and health professionals than among other population groups, where the majority of the people in the community were unaware of all these things. The better awareness of medical students and health professionals is connected with their education and their acquaintance within hospital setup. Hence, the better awareness in such a population is expected. However, the lack of knowledge regarding cervical cancer and its prevention in the general population is well explored in this study and that needs to be addressed properly.

It is observed that women diagnosed with cervical cancer were afraid of disgrace, guiltiness, and neglect by their husband and family.^[22] Women also had similar concern if they were diagnosed with HPV infection.^[72] Many women perceived themselves to be not at risk^[29] and also migrated women felt it inappropriate to discuss cervical cancer in public.^[26] These observations reveal that there is

a stigma associated with cervical cancer, HPV infection, and sexual behavior. The studies on attitude about HPV vaccination also reveal the same stigma that vaccination would promote sexual promiscuity or premarital sexual intercourse because of the notion of “vaccination for a sexually transmitted infection.”^[58] The studies also suggest that even doctors and pediatricians had the stigma on how to introduce this vaccine to their clients.^[36] Even though the parents and women from different communities showed a negative attitude, >60% of the students in all reviewed studies had a positive attitude toward acceptance of vaccination, but they were feared of asking the cost of vaccine to their parents because of the above-mentioned reasons.^[30] However, the studies suggest that health worker recommendation and having part of the immunization schedule can motivate people to accept HPV vaccination.^[18] These results highlight that providing information and motivate medical doctors, especially pediatricians to administer HPV vaccines is crucial to improve acceptance among parents and to increase coverage rates.

The proportion of women who ever participated in screening was moderate to high in migrated Indian women,^[21,28] but in the general population in India, it was very low with a slightly higher proportion among health professionals.^[53,57,63,77,78] It was also observed that an intervention can improve participation,^[20] but another study showed that the women coming for follow-up after screening was only 10%.^[42] The difference in screening participation between migrated women and the general population of women in India is a reflection of the difference between the two health systems where an organized cervical cancer screening is implemented in one place and such a program is not implemented in another place.

The lack of confidentiality and privacy were reported as major worries of women while attended screening.^[22] Furthermore, most often the husband or the head of the family is taking the decision on whether the women have to attend the screening.^[33] The personal and emotional problems associated with screening or the treatment of cervical cancer and the fear of social negligence among women is to be addressed and managed appropriately by the health system along with providing knowledge related to vaccination, screening, and the available facilities for screening in their nearby place.

Strength and limitations

The studies included in this review represent different populations from all over India and provides information regarding different groups of people in the population. However, the coverage of studies among migrated Indian women were limited to the hits we identified using our search criteria. We might have missed many

studies among migrates Indian women. However, that may not affect the findings of this review since the major purpose was to understand the level of awareness, attitude, and acceptance toward cervical cancer prevention and to explore the challenges of health promotion and education strategies to prevent cervical cancer in India. To the best of our knowledge literature, on such studies are not available.

It was a major challenge to summarize the diverse information from different types of studies. For certain subthemes, the number of studies was very few to make a good summary, and also there were very few studies focusing specific populations, for example, studies done among cervical cancer patients or survivors. Furthermore, the extracted information under the subthemes did not always show a unique pattern, may be due to local or regional differences and differences in study design and methods. Furthermore, many things were unanswered for instance, the attitude of health-care providers and the community toward women attended screening, and/or women diagnosed with HPV infection, cervical precursor, or cancer. Furthermore, the search may not cover all studies conducted in the field, especially the studies published in nonindexed journals. However, to a certain extent, the reviewed studies helped to explore the objectives reasonably.

Conclusions

From a public health perspective, the low level of awareness and negative attitude toward cervical cancer prevention in the population underscores the need for intensive efforts by the public health services in improving awareness and implement interventions aiming at the eventual elimination of this most preventable cancer. Effective cervical cancer prevention in India will substantially contributes to a notable reduction in the global burden of cervical cancer. It is very important to educate the general population about cervical cancer, its risk factors, and preventive measures in such a way that it should reduce the psychosocial barriers and misconceptions about cervical cancer and its prevention. The misconception like screening is not required in the absence of any symptoms and it is required only for women who have many sexual partners, have to be addressed adequately in the community. The role of socioeconomic status in the pathway of cervical cancer progression also should be considered while implementing educational programs. The women should be empowered to find resources and take decisions to access health care for them. If more and more people are aware of cervical cancer, then people would search for preventive measures and facilities for early detection. This will result in increasing demand for preventive measures that in turn will force the public

health system to increase and improve the facilities for prevention and early detection. The possibility of potential elimination of cervical cancer is a powerful concept that can drive investments for effective cervical cancer prevention in public health services.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Bosch FX, Muñoz N. The viral etiology of cervical cancer. *Virus Res* 2002;89:183-90.
2. World Health Organization. *Comprehensive Cervical Cancer Control – A Guide to Essential Practice*. 2nd ed. Switzerland: WHO Press; 2014. p. 38-44.
3. Miller AB. *Epidemiologic Studies in Cancer Prevention and Screening*. 1st ed. New York: Springer; 2013.
4. Sankaranarayanan R, Nessa A, Esmey PO, Dangou JM. Visual inspection methods for cervical cancer prevention. *Best Pract Res Clin Obstet Gynaecol* 2012;26:221-32.
5. India State-Level Disease Burden Initiative Cancer Collaborators. The burden of cancers and their variations across the states of India: The global burden of disease study 1990-2016. *Lancet Oncol* 2018;19:1289-306.
6. The Global Cancer Observatory. Globocan. IARC; 2018. Available from: <https://gco.iarc.fr/today/home>. [Last accessed on 2018 Dec 15].
7. Yeole BB. Trends in cancer incidence in female breast, cervix uteri, corpus uteri, and ovary in India. *Asian Pac J Cancer Prev* 2008;9:119-22.
8. Nandakumar A, Ramnath T, Chaturvedi M. The magnitude of cancer cervix in India. *Indian J Med Res* 2009;130:219-21.
9. Badwe RA, Dikshit R, Laversanne M, Bray F. Cancer incidence trends in India. *Jpn J Clin Oncol* 2014;44:401-7.
10. Sankaranarayanan R, Swaminathan R, Brenner H, Chen K, Chia KS, Chen JG, *et al.* Cancer survival in Africa, Asia, and central America: A population-based study. *Lancet Oncol* 2010;11:165-73.
11. Thulaseedharan JV, Malila N, Swaminathan R, Esmey PO, Cherian M, Muwonge R, *et al.* Survival of patients with cervix cancer in rural India. *Clin Gynecol Obstet* 2015;4:290-6. Available from: <http://dx.doi.org/10.14740/jcgo367w>. [Last accessed on 2018 Jun 20].
12. Jayant K, Sankaranarayanan R, Thorat RV, Muwonge R, Hingmire SJ, Panse NS, *et al.* Improved survival of cervical cancer patients in a screened population in rural India *Asian Pac J Cancer Prev* 2016;17:4837-44.
13. Nigam A, Saxena P, Acharya AS, Mishra A, Batra S. HPV vaccination in India: Critical appraisal. *ISRN Obstet Gynecol* 2014; vol. 2014, Article ID 394595. Available from: <http://dx.doi.org/10.1155/2014/394595>. [Last accessed on 2018 Jun 20].
14. Sankaranarayanan R, Bhatla N, Gravitt PE, Basu P, Esmey PO, Ashrafunnessa KS, *et al.* Human papillomavirus infection and cervical cancer prevention in India, Bangladesh, Sri Lanka and Nepal. *Vaccine* 2008;26 Suppl 12:M43-52.
15. Thulaseedharan JV. Evaluation of Sociodemographic, Reproductive and Screening-related Factors on Risk of and Survival from Cervical Cancer in Rural South India. Dissertation. Tampere: Acta Electronica Universitatis Tamperensis 1764; 2017. Available from: <http://tampub.uta.fi>. [Last accessed on 2017 Jul 22].
16. Sullivan R, Badwe RA, Rath GK, Pramesh CS, Shanta V, Digumarti R, *et al.* Cancer research in India: National priorities, global results. *Lancet Oncol* 2014;15:e213-22.
17. Dhamija S, Sehgal A, Luthra UK, Sehgal K. Factors associated with awareness and knowledge of cervical cancer in a community: Implication for health education programmes in developing countries. *J R Soc Health* 1993;113:184-6.
18. Pai M, Pai N, Bilal S, Ashok M, Radhika P. Cervical cancer screening: Is it a priority among nurses? *Natl Med J India* 2001;14:59-60.
19. McCaffery K, Forrest S, Waller J, Desai M, Szarewski A, Wardle J. Attitudes towards HPV testing: A qualitative study of beliefs among Indian, Pakistani, African-Caribbean and White British women in the UK. *Br J Cancer* 2003;88:42-6.
20. Desai M. An assessment of community based cancer screening program among Indian women using the anganwadi workers. *J Obstet Gynecol India* 2004;54:483-7.
21. Forrest S, McCaffery K, Waller J, Desai M, Szarewski A, Cadman L, *et al.* Attitudes to self-sampling for HPV among Indian, Pakistani, African-Caribbean and white British women in Manchester, UK. *J Med Screen* 2004;11:85-8.
22. Dabash R, Vajpayee J, Jacob M, Dzuba I, Lal N, Bradley J, *et al.* A strategic assessment of cervical cancer prevention and treatment services in 3 districts of Uttar Pradesh, India. *Reprod Health* 2005;2:11.
23. Ramanakumar AV, Balakrishna Y, Ramarao G. Coping mechanisms among long-term survivors of breast and cervical cancers in Mumbai, India. *Asian Pac J Cancer Prev* 2005;6:189-94.
24. Aswathy S, Sumithra S, Valsala LS, Sandheep S, Lohidas V, Shobha P, *et al.* Self reported morbidity and awareness regarding common cancers in elderly women. *J Commun Dis* 2006;38:106-11.
25. Basu P, Ghoshal M, Chattopadhyay K, Mittal S, Das P, Choudhury D, *et al.* Cervical screening by visual inspection with acetic acid (VIA) is well accepted by women – Results from a community-based study in rural India. *Asian Pac J Cancer Prev* 2006;7:604-8.
26. Oelke ND, Vollman AR. “Inside and outside”: Sikh women’s perspectives on cervical cancer screening. *Can J Nurs Res* 2007;39:174-89.
27. Brotto LA, Chou AY, Singh T, Woo JST. Reproductive health practices among Indian, Indo-Canadian, Canadian East Asian, and Euro-Canadian women: The role of acculturation. *J Obstet Gynaecol Can* 2008;30:229-38.
28. Ross JS, Nuñez-Smith M, Forsyth BA, Rosenbaum JR. Racial and ethnic differences in personal cervical cancer screening amongst post-graduate physicians: Results from a cross-sectional survey. *BMC Public Health* 2008;8:378.
29. Roy B, Tang TS. Cervical cancer screening in Kolkata, India: Beliefs and predictors of cervical cancer screening among women attending a women’s health clinic in Kolkata, India. *J Cancer Educ* 2008;23:253-9.
30. Wong LP. Young multiethnic women’s attitudes toward the HPV vaccine and HPV vaccination. *Int J Gynaecol Obstet* 2008;103:131-5.
31. Bingham A, Drake JK, LaMontagne DS. Sociocultural issues in the introduction of human papillomavirus vaccine in low-resource settings. *Arch Pediatr Adolesc Med* 2009;163:455-61.
32. Madhivanan P, Krupp K, Yashodha MN, Marlow L, Klausner JD, Reingold AL. Attitudes toward HPV vaccination among parents of adolescent girls in Mysore, India. *Vaccine* 2009;27:5203-8.
33. Marlow LA, Wardle J, Forster AS, Waller J. Ethnic differences in human papillomavirus awareness and vaccine acceptability. *J Epidemiol Community Health* 2009;63:1010-5.
34. Dunn RA, Tan AK. Cervical cancer screening in Malaysia: Are targeted interventions necessary? *Soc Sci Med* 2010;71:1089-93.
35. Jayant K, Nene BM, Badwe RA, Panse NS, Thorat RV, Khan FY. Rural cancer registry at Barshi, Maharashtra and its impact on

- cancer control. *Natl Med J India* 2010;23:274-7.
36. Krupp K, Marlow LA, Kielmann K, Doddaiiah N, Mysore S, Reingold AL, et al. Factors associated with intention-to-recommend human papillomavirus vaccination among physicians in Mysore, India. *J Adolesc Health* 2010;46:379-84.
 37. Robb K, Wardle J, Stubbings S, Ramirez A, Austoker J, Macleod U, et al. Ethnic disparities in knowledge of cancer screening programmes in the UK. *J Med Screen* 2010;17:125-31.
 38. Saha A, Chaudhury AN, Bhowmik P, Chatterjee R. Awareness of cervical cancer among female students of premier colleges in Kolkata, India. *Asian Pac J Cancer Prev* 2010;11:1085-90.
 39. Basu P, Mittal S. Acceptability of human papillomavirus vaccine among the urban, affluent and educated parents of young girls residing in Kolkata, Eastern India. *J Obstet Gynaecol Res* 2011;37:393-401.
 40. Joy T, Sathian B, Bhattarai C, Chacko J. Awareness of cervix cancer risk factors in educated youth: A cross-sectional, questionnaire based survey in India, Nepal, and Sri Lanka. *Asian Pac J Cancer Prev* 2011;12:1707-12.
 41. LaMontagne DS, Barge S, Le NT, Mugisha E, Penny ME, Gandhi S, et al. Human papillomavirus vaccine delivery strategies that achieved high coverage in low- and middle-income countries. *Bull World Health Organ* 2011;89:821B-30B.
 42. Tiwari A, Kishore J, Tiwari A. Perceptions and concerns of women undergoing pap smear examination in a tertiary care hospital of India. *Indian J Cancer* 2011;48:477-82.
 43. Aswathy S, Quereshi MA, Kurian B, Leelamoni K. Cervical cancer screening: Current knowledge and practice among women in a rural population of Kerala, India. *Indian J Med Res* 2012;136:205-10.
 44. Beining RM. Screening for Cervical Cancer: an Exploratory Study of Urban Women in Tamil Nadu, India. Dissertation. Iowa: University of Iowa; 2012. Available from: <http://ir.uiowa.edu/etd/2820>. [Last accessed on 2018 Jan 5].
 45. Donta B, Begum S, Nair S, Naik DD, Mali BN, Bandiwadekar A. Awareness of cervical cancer among couples in a slum area of Mumbai. *Asian Pac J Cancer Prev* 2012;13:4901-3.
 46. Hussain S, Bharadwaj M, Nasare V, Kumari M, Sharma S, Hedau S, et al. Human papillomavirus infection among young adolescents in India: Impact of vaccination. *J Med Virol* 2012;84:298-305.
 47. Isaac R, Finkel M, Olver I, Annie IK, Prashanth HR, Subhashini J, et al. Translating evidence into practice in low resource settings: Cervical cancer screening tests are only part of the solution in rural India. *Asian Pac J Cancer Prev* 2012;13:4169-72.
 48. Naik PR, Nagaraj K, Nirgude AS. Awareness of cervical cancer and effectiveness of educational intervention programme among nursing students in a rural area of Andhra Pradesh. *Healthline J Indian Assoc Prev Soc Med* 2012;3:41-5. Available from: <https://pdfs.semanticscholar.org/94be/a0d67ef7248e718e5764b2fc3943f3034890.pdf>. [Last accessed on 2019 Jun 29].
 49. Naing C, Pereira J, Abe T, Eh Zhen Wei D, Rahman Bajera IB, Kavinda Perera UH. Predictors associated with the willingness to take human papilloma virus vaccination. *J Community Health* 2012;37:288-93.
 50. Pandey D, Vanya V, Bhagat S, Vs B, Shetty J. Awareness and attitude towards human papillomavirus (HPV) vaccine among medical students in a premier medical school in India. *PLoS One* 2012;7:e40619.
 51. Raychaudhuri S, Mandal S. Current status of knowledge, attitude and practice (KAP) and screening for cervical cancer in countries at different levels of development. *Asian Pac J Cancer Prev* 2012;13:4221-7.
 52. Castillino RB, Raddi SA, Dalal A. Assessment of knowledge and perceived barriers to prevention of cervical cancer among women attending gynecology OPD at KLE's Dr. Prabhakar core hospital and medical research centre, Belgaum, Karnataka with a view to develop an information booklet. *J South Asian Feder Obst Gynae* 2012;4:169-71. Available from: <https://pdfs.semanticscholar.org/5d12/5b40c6b9f7f59c601fb40980ddb2f2b6f38d.pdf>. [Last accessed on 2019 Jun 20].
 53. Shah V, Vyas S, Singh A, Shrivastava M. Awareness and knowledge of cervical cancer and its prevention among the nursing staff of a tertiary health institute in Ahmedabad, Gujarat, India. *Ecancermedicallscience* 2012;6:270.
 54. Singh E, Seth S, Rani V, Srivastava DK. Awareness of cervical cancer screening among nursing staff in a tertiary institution of rural India. *J Gynecol Oncol* 2012;23:141-6.
 55. Gargano LM, Thacker N, Choudhury P, Weiss PS, Russ RM, Pazol K, et al. Pediatricians' perceptions of vaccine effectiveness and safety are significant predictors of vaccine administration in India. *Int Health* 2013;5:205-10.
 56. Gupta M, Yadav M, Agarwal N, Arora R. Awareness of cervical cancer screening among paramedical staff and students in an institution of Northern India. *Natl J Community Med* 2013;4:333-6. Available from: <https://pdfs.semanticscholar.org/95c9/00eee33a7084753b64cf87ed4f5b50430192.pdf> [Last accessed on 2019 Jun 29].
 57. Goyal A, Vaishnav G, Shrivastava A, Verma R, Modi A. Knowledge, attitude and practices about cervical cancer and screening among nursing staff in a teaching hospital. *Int J Med Sci Public Health* 2013;2:249-53.
 58. Mehta S, Rajaram S, Goel G, Goel N. Awareness about human papilloma virus and its vaccine among medical students. *Indian J Community Med* 2013;38:92-4.
 59. Pandey S, Chandravati. Human papillomavirus-mediated cervical cancer awareness and Gardasil vaccination: A pilot survey among North Indian women. *J Community Health* 2013;38:907-10.
 60. Ramavath KK, Olyai R. Knowledge and awareness of HPV infection and vaccination among urban adolescents in India: A cross-sectional study. *J Obstet Gynaecol India* 2013;63:399-404.
 61. Sharma R, Bhasin SK, Agrawal S, Tewari R. Cancer related knowledge and behavior among women across various socio-economic strata: A study from Delhi, India. *South Asian J Cancer* 2013;2:66-9.
 62. Shekhar S, Sharma C, Thakur S, Raina N. Cervical cancer screening: Knowledge, attitude and practices among nursing staff in a tertiary level teaching institution of rural India. *Asian Pac J Cancer Prev* 2013;14:3641-5.
 63. Thippeveeranna C, Mohan SS, Singh LR, Singh NN. Knowledge, attitude and practice of the pap smear as a screening procedure among nurses in a tertiary hospital in North Eastern India. *Asian Pac J Cancer Prev* 2013;14:849-52.
 64. Vikrant CS, Ghongne BB. Knowledge and awareness of human papilloma virus (HPV), cervical cancer and HPV Vaccines among medical students. *Int J Pharm Bio Sci* 2013;4:205-17. Available from: <https://ijpbs.net/archive-issue.php?issueid=24>. [Last accessed on 2019 Jun 29].
 65. Vineetha J, Malathi GN, Preethy J. Attitude on human papilloma virus vaccination. *Int J Curr Microbiol Appl Sci* 2013;2:90-5. Available from: <https://www.ijcmas.com/Archives-12.php>. [Last accessed on 2019 Jun 29].
 66. Bansil P, Wittet S, Lim JL, Winkler JL, Paul P, Jeronimo J. Acceptability of self-collection sampling for HPV-DNA testing in low-resource settings: A mixed methods approach. *BMC Public Health* 2014;14:596.
 67. Belani HK, Sekar P, Guhaniyogi R, Abraham A, Bohjanen PR, Bohjanen K. Human papillomavirus vaccine acceptance among young men in Bangalore, India. *Int J Dermatol* 2014;53:e486-91.
 68. Harsha Kumar H, Tanya S. A study on knowledge and screening for cervical cancer among women in Mangalore city. *Ann Med Health Sci Res* 2014;4:751-6.
 69. Hussain S, Nasare V, Kumari M, Sharma S, Khan MA, Das BC, et al. Perception of human papillomavirus infection, cervical

- cancer and HPV vaccination in North Indian population. *PLoS One* 2014;9:e112861.
70. Madhivanan P, Srinivas V, Marlow L, Mukherjee S, Narayanappa D, Mysore S, *et al.* Indian parents prefer vaccinating their daughters against HPV at older ages. *Asian Pac J Cancer Prev* 2014;15:107-10.
 71. Mary B, D'Sa JL. Evaluation of an educational program on cervical cancer for rural women in Mangalore, Southern India. *Asian Pac J Cancer Prev* 2014;15:6603-8.
 72. Montgomery MP, Dune T, Shetty PK, Shetty AK. Knowledge and acceptability of human papillomavirus vaccination and cervical cancer screening among women in Karnataka, India. *J Cancer Educ* 2015;30:130-7.
 73. Paul P, Tanner AE, Gravitt PE, Vijayaraghavan K, Shah KV, Zimet GD, *et al.* Acceptability of HPV vaccine implementation among parents in India. *Health Care Women Int* 2014;35:1148-61.
 74. Pengpid S, Peltzer K. Attitudes and practice of cervical cancer screening among female university students from 25 low, middle income and emerging economy countries. *Asian Pac J Cancer Prev* 2014;15:7235-9.
 75. Siddharthar J, Rajkumar B, Deivasigamani K. Knowledge, awareness and prevention of cervical cancer among women attending a tertiary care hospital in Puducherry, India. *J Clin Diagn Res* 2014;8:OC01-3.
 76. Singh M, Ranjan R, Das B, Gupta K. Knowledge, attitude and practice of cervical cancer screening in women visiting a tertiary care hospital of Delhi. *Indian J Cancer* 2014;51:319-23.
 77. Swapnajaswanth M, Suman G, Suryanarayana SP, Murthy NS. Perception and practices on screening and vaccination for carcinoma cervix among female healthcare professional in tertiary care hospitals in Bangalore, India. *Asian Pac J Cancer Prev* 2014;15:6095-8.
 78. Devi SS, Babu VA, Kumari DA. Nursing staff awareness of cervical cancer and pap smear screening in a remote medical college hospital in South India. *Int J Res Health Sci* 2014;2:1085-90. Available from: <http://www.ijrhrs.org/sites/default/files/IntJResHealthSci-2-4-1085.pdf>. [Last accessed on 2019 Jun 29].
 79. Tripathi N, Kadam YR, Dhobale RV, Gore AD. Barriers for early detection of cancer amongst Indian rural women. *South Asian J Cancer* 2014;3:122-7.
 80. Khanna N, Ramaseshan A, Arnold S, Panigrahi K, Macek MD, Padhi BK, *et al.* Community awareness of HPV screening and vaccination in Odisha. *Obstet Gynecol Int* 2015;2015:694560.
 81. Swarnapriya K, Kavitha D, Reddy GM. Knowledge, attitude and practices regarding HPV vaccination among medical and Para medical in students, India a cross sectional study. *Asian Pac J Cancer Prev* 2015;16:8473-7.
 82. Bansal AB, Pakhare AP, Kapoor N, Mehrotra R, Kokane AM. Knowledge, attitude, and practices related to cervical cancer among adult women: A hospital-based cross-sectional study. *J Nat Sci Biol Med* 2015;6:324-8.
 83. Doshi D, Reddy BS, Karunakar P, Deshpande K. HPV, cervical cancer and pap test related knowledge among a sample of female dental students in India. *Asian Pac J Cancer Prev* 2015;16:5415-20.
 84. Marlow LA, Wardle J, Waller J. Understanding cervical screening non-attendance among ethnic minority women in England. *Br J Cancer* 2015;113:833-9.
 85. Sabeena S, Bhat PV, Kamath V, Aswathyraj S, Arunkumar G. Knowledge, attitude and practice concerning human papilloma virus infection and its health effects among rural women, Karnataka, South India. *Asian Pac J Cancer Prev* 2015;16:5053-8.
 86. Shankar A, Rath G, Roy S, Malik A, Bhandari R, Kishor K, *et al.* Level of awareness of cervical and breast cancer risk factors and safe practices among college teachers of different states in India: Do awareness programmes have an impact on adoption of safe practices? *Asian Pac J Cancer Prev* 2015;16:927-32.
 87. Marlow LA, Waller J, Wardle J. Barriers to cervical cancer screening among ethnic minority women: A qualitative study. *J Fam Plann Reprod Health Care* 2015;41:248-54.
 88. Chawla PC, Chawla A, Chaudhary S. Knowledge, attitude and practice on human papillomavirus vaccination: A cross-sectional study among healthcare providers. *Indian J Med Res* 2016;144:741-9.
 89. Rashid S, Labani S, Das BC. Knowledge, awareness and attitude on HPV, HPV vaccine and cervical cancer among the college students in India. *PLoS One* 2016;11:e0166713.
 90. Jain N, Halder A, Mehrotra R. A mixed method research to identify perceived reasons and solutions for low uptake of cervical cancer screening in urban families of Bhopal region. *Scientifica (Cairo)* 2016;2016:5731627.
 91. Jain SM, Bagde MN, Bagde ND. Awareness of cervical cancer and pap smear among nursing staff at a rural tertiary care hospital in central India. *Indian J Cancer* 2016;53:63-6.
 92. Patra S, Upadhyay M, Chhabra P. Awareness of cervical cancer and willingness to participate in screening program: Public health policy implications. *J Cancer Res Ther* 2017;13:318-23.
 93. Veerakumar AM, Kar SS. Awareness and perceptions regarding common cancers among adult population in a rural area of Puducherry, India. *J Educ Health Promot* 2017;6:38.
 94. Canon C, Effeo V, Shetty V, Shetty AK. Knowledge and attitudes towards human papillomavirus (HPV) among academic and community physicians in Mangalore, India. *J Cancer Educ* 2017;32:382-91.