

# Opportunistic Cervical Cancer Screening Using Liquid-Based Cytology in a Gynaecology Outpatient Setting: A Cross-Sectional Study

Kaustav Das<sup>1</sup>, Prashant Suryarao<sup>2</sup>

<sup>1</sup>Dr. D.Y. Patil Medical College, Hospital and Research Centre, Pune, Maharashtra – 411018, India

<sup>2</sup>Department of Obstetrics and Gynaecology, Dr. D.Y. Patil Medical College, Hospital and Research Centre, Pune, Maharashtra – 411018, India

**Corresponding Author:** Kaustav Das, Dr. D.Y. Patil Medical College, Hospital and Research Centre, Pune, Maharashtra – 411018, India  
**E-mail:** kushkaustav@gmail.com

Received: 31, Aug, 2025  
Accepted: 18, Sep, 2025

## ABSTRACT

**Background:** Cervical cancer is a major public health issue, particularly in low- and middle-income countries. Early detection through effective screening methods is crucial for reducing morbidity and mortality. Opportunistic cervical cytology testing in outpatient settings plays an important role in the early identification of precancerous lesions.

**Materials and Methods:** This cross-sectional study aimed to evaluate the effectiveness of liquid-based cytology (LBC) in detecting precancerous lesions and cervical cancer in a defined population. One hundred women aged between 25 and 75 years were screened using LBC. Cytological specimens were processed and analyzed by experienced cytopathologists.

**Results:** The detection rate of precancerous lesions was 13% ( $n = 13$ ), and cervical cancer was detected in 2% ( $n = 2$ ) of patients. Most patients attending the outpatient department (OPD) were in the fourth decade of life (30–39 years; 37 cases, 37%), followed by the third decade (20–29 years; 23 cases, 23%). Of the patients diagnosed with low-grade squamous intraepithelial lesions (LSIL) or high-grade squamous intraepithelial lesions (HSIL), 72.7% (8 out of 11) were in the 51–70 years age group.

**Conclusion:** LBC demonstrated a detection rate of 13% for premalignant lesions and 2% for cervical cancer in this opportunistic screening population. The majority of LSIL/HSIL cases occurred in women aged 51–70 years, suggesting that older age groups may benefit from targeted screening efforts. These findings provide valuable insights into the performance of LBC in this setting and can inform the development of effective cervical cancer screening programs to reduce disease burden.

**Keywords:** Cervical cancer; Premalignant lesion; LBC; PAP smear; Cancer screening

## INTRODUCTION

There are around 527,624 new instances of cervical cancer identified each year, and there are 2784 million women worldwide who are 15 years of age or older who are at risk of acquiring the disease. In the world, cervical cancer is the second most prevalent disease in women between the ages of 15 and 44, making it the fourth most frequent cancer in females overall<sup>1,2</sup>. When the incidence of cancer fatalities

among both sexes is taken into account, cervical cancer ranks second<sup>3</sup>.

There are low-tech, affordable screening techniques that have the potential to drastically lower the number of cervical cancer fatalities now occurring in developing nations<sup>4</sup>.

The primary risk factor for cervical intraepithelial neoplasia (CIN) and invasive cervical cancer is sexually transmitted human papillomavirus (HPV)

DOI: <http://doi.org/10.18502/ijhoscr.v20i2.21776>

Copyright © 2026 Tehran University of Medical Sciences. This work is licensed under a Creative Commons Attribution-Noncommercial 4.0 International license (<http://creativecommons.org/licenses/by-nc/4.0>). Non-commercial uses of the work are permitted, provided the original work is properly cited.

infection<sup>5</sup>. 4.1% of women with normal cytology across the world have HPV 16 and/or HPV 18 on their bodies<sup>6</sup>. Nearly 76.7% of cervical cancers in India are caused by HPV serotypes 16 and 18.

Cervical cancer incidence and death have decreased in industrialised nations as a result of routine cytology screening programmes. In contrast, high-risk developing nations still have essentially uncontrolled rates of cervical cancer due to inadequate or non-existent screening programmes<sup>7</sup>. The most reliable way to prevent and identify cervical cancer is with a Pap smear, yet there are still questions about how accurate this crucial screening tool really is. Recent meta-analyses have found that Pap smear sensitivities might be as low as 20% and as high as 50%<sup>8,9</sup>.

Liquid-based cytology (LBC), a more effective method for processing cervical samples, was created in the 1990s to address the shortcomings of traditional Pap smear (CPS).

This study is aimed to assess opportunistic cervical cancer screening by Liquid Based Cytology (LBC) at a tertiary care hospital in women aged 25-75 years.

The objectives of this study are to determine the prevalence of precancerous cervical lesions in the study population and Identify factors that are associated with an increased risk of developing cervical cancer.

## MATERIALS AND METHODS

An observational hospital-based cross-sectional study was carried out from October to November 2024 among women attending the gynaecology outpatient department (OPD) belonging to the age group of 25-75 years.

A sample of participants was selected from people at tertiary care hospital belonging to the age group of 25-75 years at convenience by using consecutive sampling. Both symptomatic and asymptomatic women presenting for routine gynaecological consultation were included. Data was collected through structured questionnaire about screening of cervical cancer and associated factors. Additional questions explored demographic information.

Data was collected using preformed data collection form and case record form. Data entry was done in Microsoft Excel and analysed using SPSS (Statistical

Package for Social Sciences) Software version 20/Epi Info/ Primer/ Win-pepi. Categorical variable was expressed in terms of frequency and percentage and continuous variables in terms of mean and SD.

Participants (n=100) were provided with detailed information about the study's purpose, procedures, and potential risks and benefits. Written informed consent was obtained before data collection.

All participant data was treated with strict confidentiality. Data was anonymized, and only aggregated results was reported.

## Study conduct

People at tertiary care hospital belonging to the age group of 25-75 years in Pune were voluntarily invited for the study. An informed consent was taken from the participants who agreed to participate in the study and sociodemographic variables were collected on a self-reported questionnaire.

The screening approach was opportunistic, defined as cervical cytology offered at the point of healthcare contact when women presented to the OPD for various gynaecological indications. This approach differs from organized population-based screening, which typically involves systematic invitations, predefined age cohorts, and scheduled screening intervals.

**Inclusion criteria:** Women aged 25-75 years who visited tertiary care hospital OPD (symptomatic and asymptomatic).

**Exclusion criteria:** Participants who were unwilling to give consent for the study.

## RESULT

This observational cross-sectional study was carried out among people at tertiary care hospital belonging to the age group of 25-75 years who came to Gynaecology OPD of Dr. D.Y. Patil Medical College Hospital and Research Centre, Pune.

Clinical history regarding age, socioeconomic status, parity and complaints were obtained from the patient, and thorough physical examination was done. Per speculum examination was done. Exfoliative cytology specimens were collected for Liquid based cytology.

Most of the cases who attended the OPD were in the fourth decade of life (37 cases, 37%) followed by 23

cases (23%) in the third decade. Minimum age of the patient screened was 25 years of age and the age group of 51 – 70 years. Age wise distribution of cases is shown in Table 1 and chart 1.

maximum age was 75 years. About 72.7% of cases who were diagnosed with LSIL and HSIL were in the

**Table 1:** Age wise distribution of cases

Age	Total	Normal	Atrophic	ASCUS	Inflammatory	LSIL	HSIL	Carcinoma	Unsatisfactory
25-30	13	13	-	-	-	-	-	-	-
31-35	10	8	-	-	1	1	-	-	-
36-40	13	11	-	-	1	-	-	-	1
41-45	19	18	-	-	1	-	-	-	-
46-50	17	13	1	1	-	-	1	-	1
51-55	8	6	-	1	-	-	-	1	-
56-60	3	1	-	-	-	2	-	-	-
>60	17	7	1	-	-	5	2	1	1
TOTAL	100	77	2	2	3	8	3	2	3

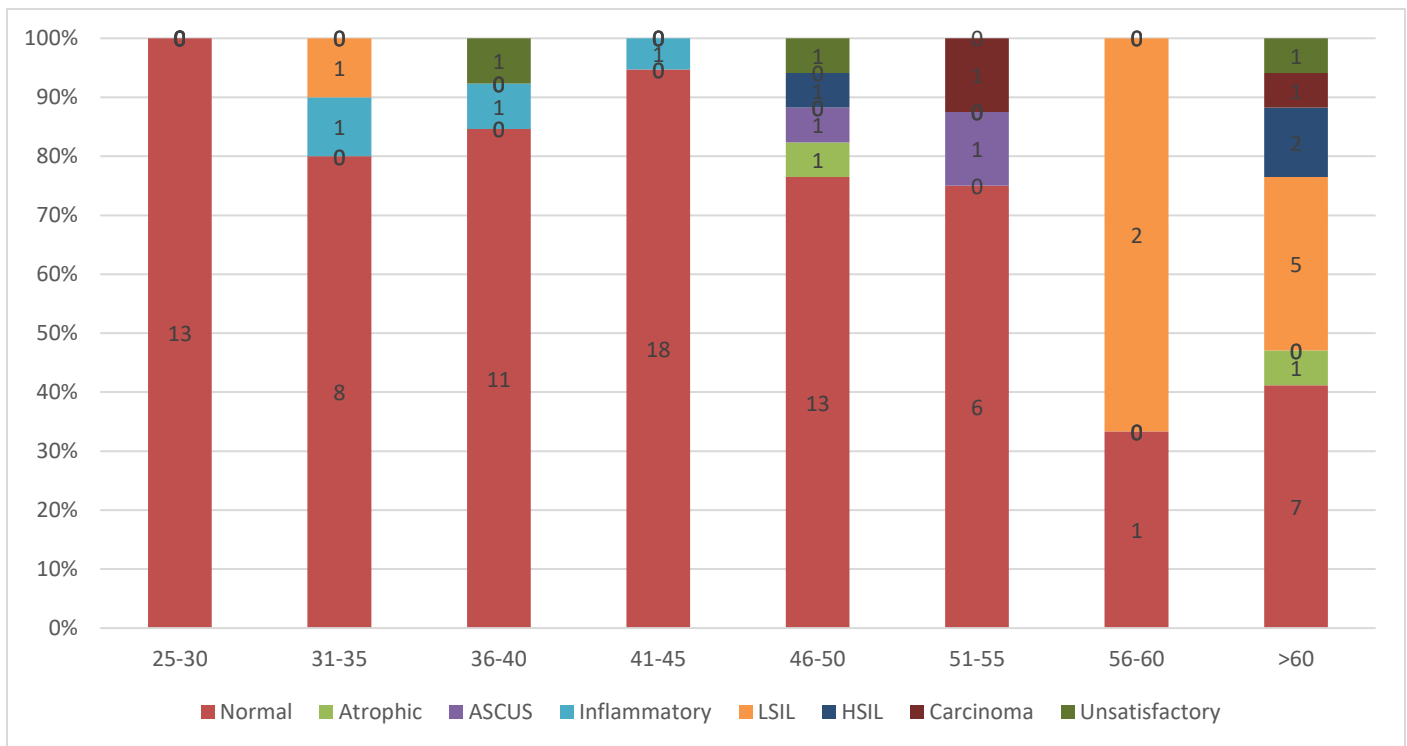


Chart 1: Age wise distribution of cases

Out of 100 cases, 36 cases (36%) of cases belonged to class II of modified Prasad’s classification<sup>10</sup> followed by 24 cases (24%) of cases in class III. Out of

26 cases with dysplasia/carcinoma, 12 cases (46.1 %) of cases belonged to class III. (Table 2 and chart 2).

Class (rupees)	Total No. of cases	Normal Cases	Abnormal Cases
I (5571 and above)	10	10	-
II (2786-2785)	36	28	8
III (836-2785)	24	12	12
IV (836-1670)	12	10	2
V (Below 836)	18	14	4
Total	100	74	26

Table 2: Case

distribution according to socio-economic status (Modified prasad's classification)<sup>10</sup>

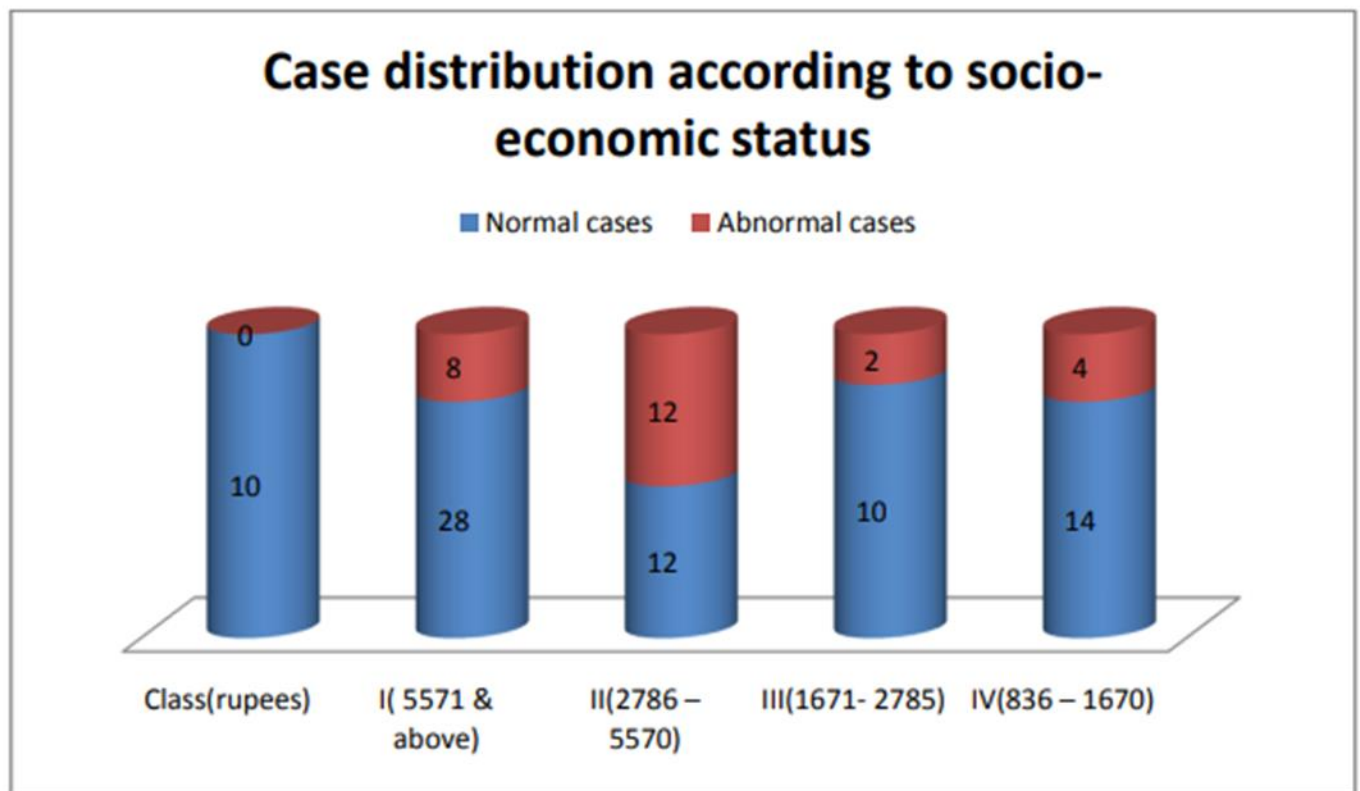


Chart 2: Case distribution according to socioeconomic status

**Table 3:** Case distribution according to parity

Gravida	Total No. of cases	No. of cases with dysplasia
Nulligravida	0	0 (0%)
1	22	0 (0%)
2	26	2 (2%)
3	32	4 (4%)
4	18	6 (6%)
5	2	1 (1%)



Chart 3: Case distribution according to parity

**Table 4:** Case distribution according to the presenting complaints

Complaints	No. of cases
White discharge P/V	38 (38%)
Lower abdomen pain	19 (19%)
Dysmenorrhea	18 (18%)
Post coital bleeding	16 (16%)
Bleeding P/V	9 (9%)

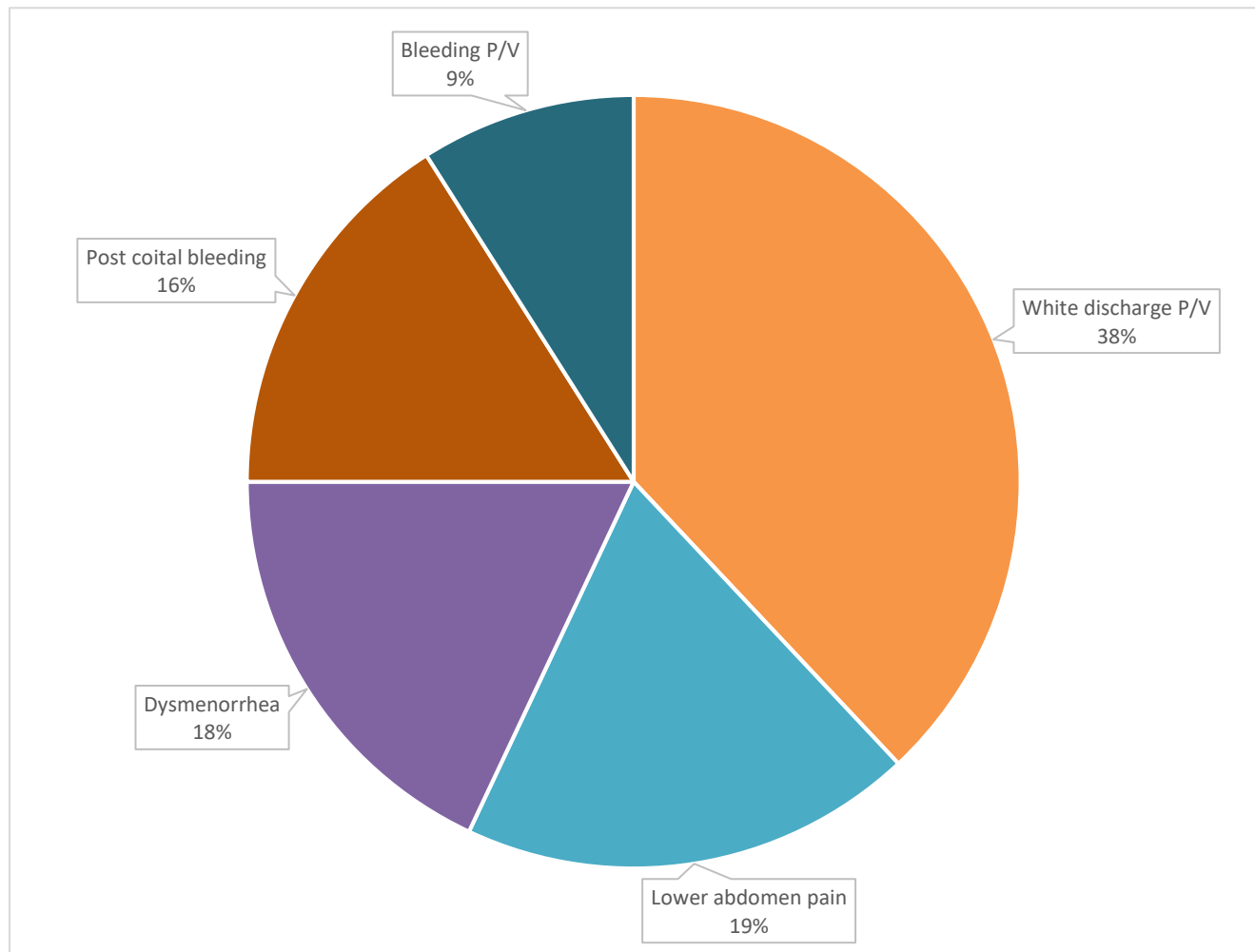


Chart 4: Case distribution according to presenting complaints

## DISCUSSION

The PAP smear was the sole screening method available for over 50 years, despite having a false negative rate. As a result, liquid-based cytology was created. This study was done to determine the prevalence of precancerous cervical lesions by LBC and to describe the distribution of factors associated with abnormal cytology, rather than to establish independent risk factors. 100 patients were consecutively recruited from those who came to the Gynaecology OPD of Dr. D.Y. Patil Medical College and Research Centre, Pune. Samples were taken from all the cases and the results were analysed.

Table 1 and Chart 1 show the age wise distribution of cases. Out of the 100 cases, 37 cases (37%) of cases were in the fourth decade of life and most of the LSIL and HSIL cases were in the 6th decade, a finding similar to Sherwani RK et al.<sup>11</sup>, Richart et al.<sup>12</sup>

Table 2 and Chart 2 show the case distribution according to the socioeconomic status. About 46.1% of the abnormal smears belonged to Class III socioeconomic status and most of the dysplasia cases were observed in this group, which was similar to Sherwani RK et al.<sup>11</sup>, and Christopherson and Parker<sup>13</sup>, Pragya Sharma<sup>14</sup>. Parker noted that women from lower socioeconomic status married at a younger age and child birth. According to the most recent WHO study, 70% of cases come from lower socioeconomic status as a result of limited access to screening programs and delayed diagnosis and treatment<sup>1</sup>.

Table 3 and Chart 3 show the case distribution according to parity. Maximum cases who were diagnosed with carcinoma and dysplasia were of parity 4. M. Almonte et al.<sup>15</sup> reported more incidence of dysplasia when the parity was four.

Table 4 and Chart 4 show the case distribution according to the presenting complaints. Most common presenting complaint was white discharge per vaginum (36 cases, 36%), followed by lower abdominal pain (19 cases, 19%) and dysmenorrhea (18 cases, 18%). other minor complaints were post-coital bleeding (16 cases, 16%) and bleeding per vaginum. Sherwani et al.<sup>11</sup>, Kenneth and Yao<sup>16</sup>, and Pragya Sharma et al.<sup>14</sup>, also had patients with similar complaints. Kenneth and Yao noted that white discharge was correlated with neoplastic changes in

cervix similar to this study where majority of the dysplastic changes were in this subset of patients. Recent global guidelines recommend a shift toward HPV-based cervical cancer screening, with extended screening intervals and improved sensitivity for detecting high-grade lesions<sup>17</sup>, particularly among women aged 30 years and above (WHO, 2021; ACOG, 2021)<sup>18</sup>.

National cancer registry data continue to demonstrate a substantial cervical cancer burden in India<sup>19</sup>, highlighting the ongoing need for effective and accessible screening strategies within opportunistic and programmatic settings (Ramamoorthy T, 2022)<sup>20</sup>.

The analysis being descriptive, these observations should be interpreted as distributional patterns rather than statistically inferred risk factors.

## CONCLUSION

Though conventional Pap smear is a simple and cost-effective method of cervical screening which has been in use for more than 50 years, False Negative rate is an important disadvantage. To overcome this, LBC was developed. In LBC, visualisation will be better due to less obscuring materials. In the present OPD-based study, LBC was used as a cytological evaluation method and not as a comparative diagnostic test. LBC provides additional advantage of HPV DNA testing if required from same sample.

Out of the 100 patients of our study, 13 patients had premalignant lesion and 2 patients had carcinoma. This signifies the importance of screening, within a facility-based, opportunistic setting to reduce the morbidity and mortality associated with cervical cancer.

In a country where a greater number of people belong to lower socioeconomic status and with higher incidence of cervical cancer, screening plays an important role in prevention. So general public awareness and Governmental initiatives should be taken to increase number of women undergoing screening, while acknowledging that the present findings reflect OPD-based detection patterns rather than population-level estimates, as cervical cancer is preventable by early detection and intervention.

## Implications

The results of this cross-sectional study will add to the amount of knowledge already available on cervical cancer screening procedures. The findings could aid medical practitioners in deciding which screening method is best for their patient population.

Furthermore, identifying risk variables linked to aberrant screening findings helps direct focused activities for cervical cancer early identification and prevention. Additionally, by bettering the delivery of cervical cancer screening services, increased patient satisfaction and compliance may be ensured by knowing patient experiences and preferences.

## ACKNOWLEDGEMENTS

We would like to express our gratitude to Dr DY Patil Medical College, Hospital and Research Centre, Pune for funding this project. We are also grateful for the support by the Department of Obstetrics and Gynaecology, Dr DY Patil Medical College, Hospital and Research Centre, Pune.

## CONFLICTS OF INTERESTS

The authors declare that they have no conflict of interest.

## REFERENCES

1. Ferlay J, Soerjomataram I, Dikshit R, et al. Cancer incidence and mortality worldwide: Sources, methods and major patterns in GLOBOCAN 2012. *Int J Cancer*. 2015;136(5):E359–86.
2. Bray F, Ren JS, Masuyer E, et al. Global estimates of cancer prevalence for 27 sites in the adult population in 2008. *Int J Cancer*. 2013;132(5):1133–45.
3. Mallath MK, Taylor DG, Badwe RA, et al. The growing burden of cancer in India: Epidemiology and social context. *Lancet Oncol*. 2014;15(6):e205–12.
4. International Agency for Research on Cancer. Latest world cancer statistics: Global cancer burden rises to 14.1 million new cases in 2012 [press release]. Lyon: IARC; 2013 Dec 12.
5. IARC Working Group on the Evaluation of Carcinogenic Risks to Humans. Human papilloma viruses. *IARC Monogr Eval Carcinog Risks Hum*. 1995;64:1-378.
6. Bruni L, Barrionuevo-Rosas L, Albero G, et al. ICO Information Centre on HPV and Cancer (HPV Information

Centre). Human Papillomavirus and Related Diseases in the World. Summary Report. 2017 19 April.

7. Cuzick J, Arbyn M, Sankaranarayanan R, et al. Overview of human papillomavirus-based and other novel options for cervical cancer screening in developed and developing countries. *Vaccine*. 2008;26(Suppl 10):K29–41.
8. Nanda K, McCrory DC, Myers ER, et al. Accuracy of the papanicolaou test in screening for and follow-up of cervical cytologic abnormalities: A systematic review. *Ann Intern Med*. 2000;132(10):810–9.
9. Fahey MT, Irwig L, Macaskill P. Meta-analysis of Pap test accuracy. *Am J Epidemiol*. 1995;141(7):680–9.
10. Rao TB. Methods of social classification. In: Rao TB, editor. *Rao's Sociology in Medicine*. 1st ed. Guntur: Sree Graphics; 2002.
11. Conventional Pap smear and Liquid based cytology for cervical cancer screening- A Comparative study. *Journal of cytology*. 2007;24(4): 167-172.
12. Richart RM. Natural history of cervical intraepithelial neoplasia. *Clin Obstet Gynecol*. 1967;10(4):748-84.
13. Parkin DM, Pisani P, Ferlay J. Cancer incidence, mortality and prevalence worldwide. Version 1.0. IARC CancerBase No. 5. Lyon: IARC Press; 2001.
14. Sharma P, Rahi M, Lal P. A community based cervical cancer screening program among women of Delhi using camp approach. *Indian J Community Med*. 2010;35(1):86-8.
15. Almonte M, Ferreccio C, Winkler JL, et al. Cervical cancer screening by visual inspection, HPV testing, Liquid based and conventional cytology in Amazonian Peru. *Int J Cancer*. 2007;121(4):796 – 802.
16. Hatch KD, Fu YS. Cervical and vaginal cancer. In: Berek JS, editor. *Novak's Gynecology*. 13th ed. Philadelphia: Lippincott Williams & Wilkins; 2002. PP: 471-93
17. Hu SY, Zhao XL, Zhang Y, et al. Interpretation of "WHO guideline for screening and treatment of cervical pre-cancer lesions for cervical cancer prevention, second edition". *Zhonghua Yi Xue Za Zhi*. 2021;101(34):2653-2657.
18. <https://www.who.int/news/item/06-07-2021-q-and-a-screening-and-treatment-cervical-pre-cancer-lesions-for-cervical-cancer-prevention?utm> (accessed on 22 Dec 2025).
19. <https://www.acog.org/clinical/clinicalguidance/practice-advisory/articles/2021/04/updated-cervical-cancer-screening-guidelines?utm> (accessed on 22 Dec 2025).
20. Ramamoorthy T, Sathishkumar K, Das P, et al. Epidemiology of human papillomavirus related cancers in India: findings from the National Cancer Registry Programme. *Ecancermedicalscience*. 2022;16:1444.