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Indian Cervical Cancers: Understanding of Epidemiological Profile through the National Cancer Registry Programs Findings

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Abstract: ***According to a recent analysis from the Lancet research, India has the highest rate of cervical cancer malignancies in all of Asia. The study claims that India alone is responsible for 23% of cervical cancer-related deaths in Asia. According to the GLOBOCAN report 2020, India has a high mortality rate of 62.42%, which is higher than that of both Asia and the rest of the globe. Due to the severe lack of resources, cervical cancer is a big issue in India. Based on an analysis of data from a significant cancer registry network, this study investigates the epidemiological characteristics of cervical cancer in India in great detail. In accordance with the PBCR 2020 (ICMR-NCDIR; 2020), the truncated rate (TR) in the districts of Aizawl, Dibrugarh, and Kollam was six times, five times, and four times larger, respectively, than the TR rate in the districts of Papumpare, Mizoram, and Pasighat. In the entire country, we discovered considerable regional and socioeconomic variations in the incidence of cervical cancer, with a clear gradient of increased incidence in areas with lower levels of human development. Combining HIV testing and cervical cancer screening during a single appointment with a primary care provider would be a cost-effective option.***
Keywords: cervical cancer, truncated rate, national cancer registry.

I. INTRODUCTION

The cervical cancer inequalities throughout the world are unsurpassed. When compared to high-resource nations, countries with inadequate resources experience two to four times as many new cases and deaths (about 84% of all cases and 88% of mortality) every year [1]. In India alone, 77,348 individuals died, and 1,23,907 new cases were identified, in accordance with GLOBOCAN 2020 records [2].

According to the most recent Lancet report on the disease, India has the greatest percentage of cervical cancer cases in Asia, next to China. In accordance with the study, India and China accounted for 23% and 17%, cervical cancer death respectively, out of the 40% total fatalities due to cervical cancer.

A crucial element in achieving the goals established by the WHO to eradicate cervical cancer as a public health issue to lower the incidence of the illness below a threshold of 4 cases per 100 000 women-years is to monitor progress and provide timely evidence [3].

Cancer incidence rate can be measured by trend analysis, which also describes the trend and pattern (upward or downward) [4]. It aids in assessing both primary and secondary preventative actions in addition to helping in planning health care [5]. The age-specific rate for a certain time period was frequently used to illustrate population-based cancer rates, which were frequently summarized by the period/year of diagnosis [6].

Population Based Cancer Registries (PBCR), a unit of the National Centre for Disease Informatics and Research (NCDIR) in the Indian Council of Medical Research (ICMR), Bengaluru, have been collecting data on cancer systematically since 1981[8]. The NCRP is a key player in cancer surveillance since it collects and compiles data on cancer incidence, trends, outcomes, and predictions. According to a recent NCRP study [7], the age-adjusted incidence rate (AAR) of cervical cancer has dramatically grown since the early 1980s.

It is essential to know about the epidemiology and clinical aspects of cervical cancer in order to assess the efficacy of prevention and therapeutic strategies.

In addition, it facilitates planning, and the goal of this study, which is based on the most recent NCRP data, is to provide an overview of the epidemiology and clinical analysis of cervical cancer in the country with the goal of improving prevention measures and service provision and identifying any gaps in cancer treatment services.

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II. MATERIAL & METHODS

The most recent NCRP figures were obtained from 28 population-based cancer registries (PBCRs) as well as 58 Hospital-Based Cancer registries (HBCRs), and they cover a five-year reporting period (2012–2016). The five areas included in the 28 PBCRs are the north, northeast region (NER), east, centre, west, and south. The PBCRs collect data on newly diagnosed cancer cases from numerous registration sources, such as hospitals, clinics, diagnostic centres, and other important registration sources, throughout a well-defined geographic area among people who have lived there for at least a year prior to diagnosis [9].

The information provided by a PBCR's data is essential for understanding the prevalence of cancer and changes in occurrence patterns over time. An HBCR is a database that is established at a specific hospital and compiles data on cancer patients who get care from various hospital departments. They include essential information about the disease's clinical presentation, treatment choices, and consequences, including survival and death.

The NCRP classifies tumours using the International Classification of Diseases for Oncology, which specifies malignancies as having a behaviour code of 3 [10]. The number of AAR per 100,000 people was calculated using the average world population. Then, according to Segi (1960) [11], the incidence rate was shown as a function of age cohort and time (midpoints). Using the anatomical locations (cervix), these five PBCRs were fitted with an APC model under the presumption that new cancer cases would follow a Poisson distribution. Data on the incidence of CC (ICD-10: C53) for five PBCRs in Bangalore (2012–2016), Chennai (2012–2016), Delhi (2012–2016), Bhopal (2012–2016), and Barshi rural (2012–2016) were obtained from the NCRP database, which was available with the coordinating unit [12]. The population estimates for each PBCR were supplied by the Census of India, and the corresponding censuses were utilised to forecast the population by age group for the ensuing five years (Census India 2011) [13].

Using Joinpoint Trend Analysis Software (Version 4.8.0.1), the National Cancer Institute calculated the annual percent change (APC) for the chosen time periods [14]. In addition, there are other indicators, including cumulative risk, which is the likelihood of developing cancer in any anatomical region between the ages of 0-74 years, notwithstanding the absence of any other major causes of death [15]. According to Mathur et al. (2020), the prevalence of cervical cancer is mentioned for each PBCR site along with its ranking among the top anatomical locations and its proportion in comparison to the other frequently reported cancer sites. The clinical profile is described [13].

In accordance with the age distribution, morphologic type (IC0-10-C53 categorization), general technique of diagnosis, and clinical severity of the disease.

The three different forms of clinical illness extent are localised metastasis (restricted to the primary site), loco-regional metastasis (with spread to local lymph nodes), and distant metastasis (spread to many bodily regions). Age-specific incidence rate (ASpR) statistics were used to predict the projected number of cervical cancer patients using data from 28 PBCRs from 2012 to 2016 [6]. The census growth rate (2001–2011) and several distribution techniques were used to estimate the population of the five-year age group in order to predict the population of each State and Union Territory for the year 2025. In order to predict the number of cancer cases in India, region-specific data from the PBCR were collected and shown [9].

The ASpR and projected number of cervical cancer cases for the year 2025 were determined by applying the ASpR, according to anatomical sites and gender, to the anticipated population of a corresponding region [6].

III. RESULT

A. Lifetime Risk and Incidence of Cervical Cancer:

Data from the chosen PBCR composite period, which spans from 2012 to 2016, is used in the research. Table 1 shows the average annual number of cancer patients for all locations in India between 2012 and 2016, along with the incidence rate, cumulative risk by sex, and mortality rate for each place. It is obtained from a report on the national cancer registry programme.

According to the newly released NCRP 2020 report, the age-adjusted incidence rate (AAR) per 100,000 people was high in metro and urban cities, with values ranging from 48.0 (Hyderabad) to 7.0 (Meghalaya). The AAR of cervical cancer is highest in the northeastern region of India, which includes Barshi and rural Bangalore. It ranged from 4.8 (in Dibrugarh) to 27.7 (in the district of Papumpare).

According to the Relative Proportion of Cervical Cancer to All Cancer Sites (%), Osmanabad and Beed had the greatest proportion (26.1%), while Thipuram district had the lowest proportion (5.5%). The data shows that Delhi and Pasighat have the highest and lowest numbers of cervical cancer cases, respectively.

B. Age-adjusted incidence rates (AAR) throughout time trends

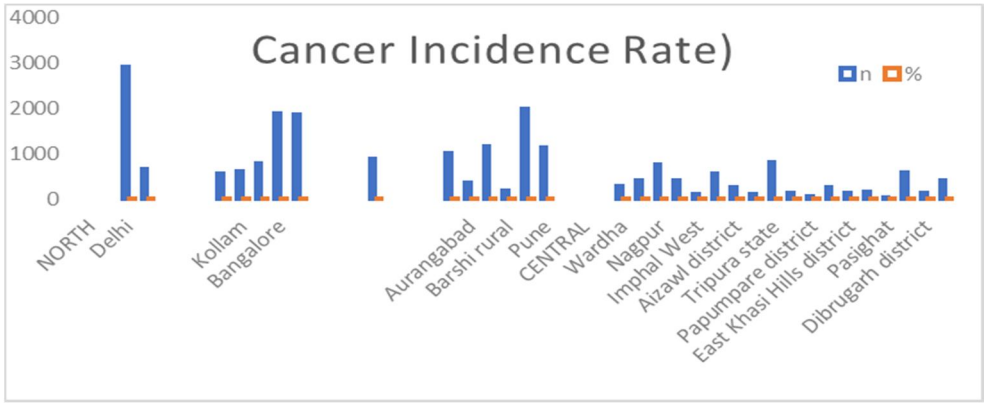
One of the most common locations for cancer is the uterine cervix. In West Arunachal, the incidence of cervical cancer was greatest in the Papumpare district (27.7 per 100,000), followed by the Aizawl district (27.4 per 100,000), Mizoram (23.2 per 100,000), and Pasighat (20.3 per 100,000). The Dibrugarh district has the lowest AAR (4.8 per 100,000), which was observed over time.

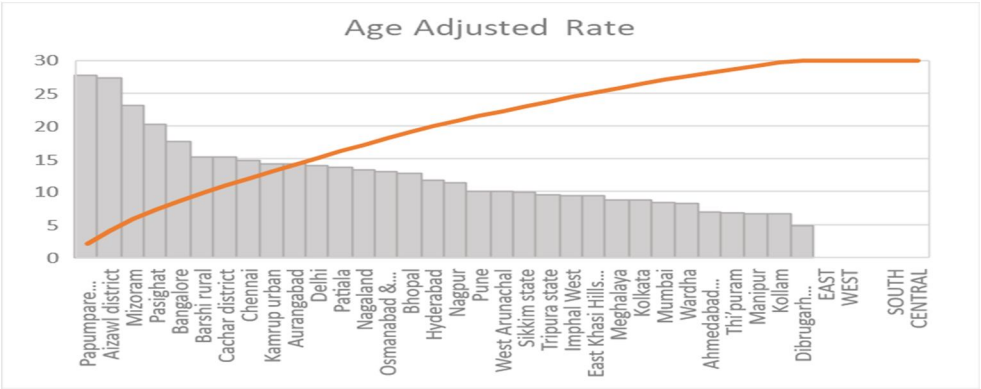
C. Truncated Rate Trends Throughout Time (age 35-65 years)

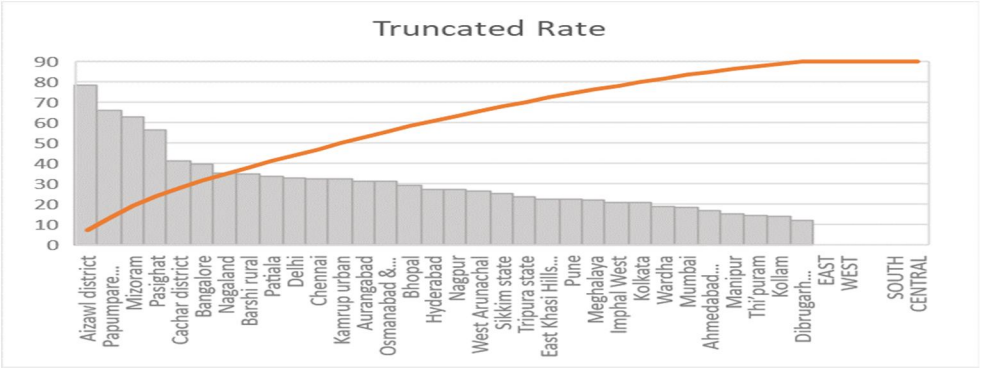
The Aizawl district in Mizoram state has a very high truncated rate (TR) or cancer rate for the reproductive age group (78.5). Truncated Rate trends through time (age 35–65 years). The decreasing order of TR is seen in Pasighat (56.2), Mizoram (62.8), and Papumpare district (66). In contrast, the TR in the districts of Dibrugarh (12.1), Kollam (13.8), and Thipuram (14.2) was low.

D. Cervical Cancer's Location as a Major Cancer Site

According to data, cervical cancer is most common in the district of Papumpare, followed by those in other areas, including Aizawl and Mizoram. In India's Papumpare district, there is a 27.7 per 100,000 incidence rate of cervical cancer, which is the highest rate in all of Asia. Thipuram (ranked 29th), Ahmedabad (ranked 28th), and the Central Region (ranked 27th) are home to the three lowest-ranked people.







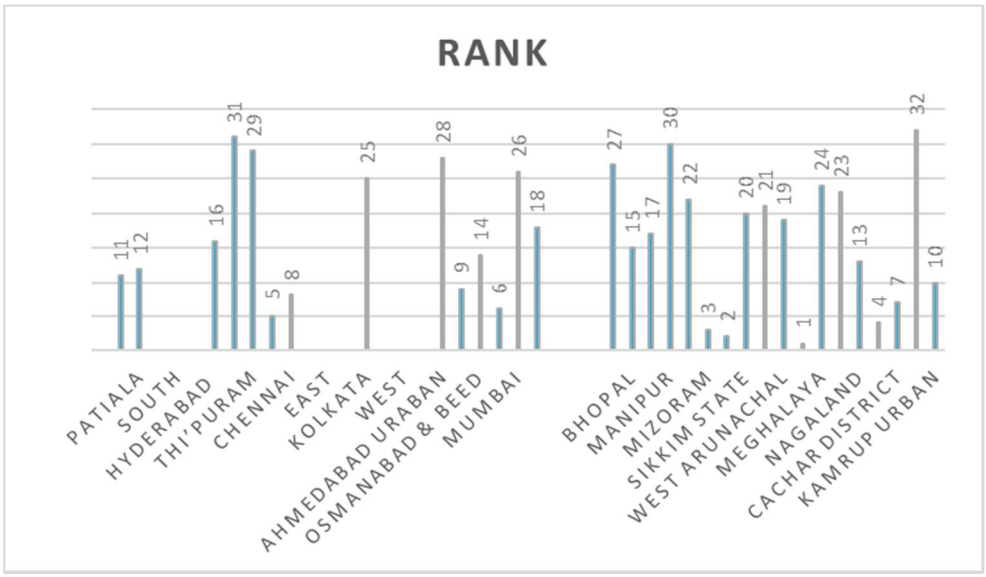


Fig. 1 Number of cases (n) recorded for Cancer Cervix Uteri and its Relative Proportion to All Sites of Cancer (%), Crude (CR), Age Adjusted (AAR), and Truncated (TR) Incidence Rates per 100,000 population, and its Rank in 28 PBCRs under NCRP.

E. Age-Adjusted Incidence Rates (AAR) Throughout Time Trends

Analysis of the annual percent change rate with age adjusted rate (AAR) over the time course in all 28 PBCRs reveals that, in 10 PBCRs, the occurrence rate of cervical cancer decreased significantly, with the notable exception of Pune and the Dibrugarh district, where it decreased somewhat but not significantly. The lowest APC rates in Imphal West (-5.7), Thipuram taluk (-4.3), Chennai (-3.5), Nagpur, and Kollam (-3.1) were more significant since the highest APC rates in Mizoram and Aurangabad (2.1) were not statistically significant.

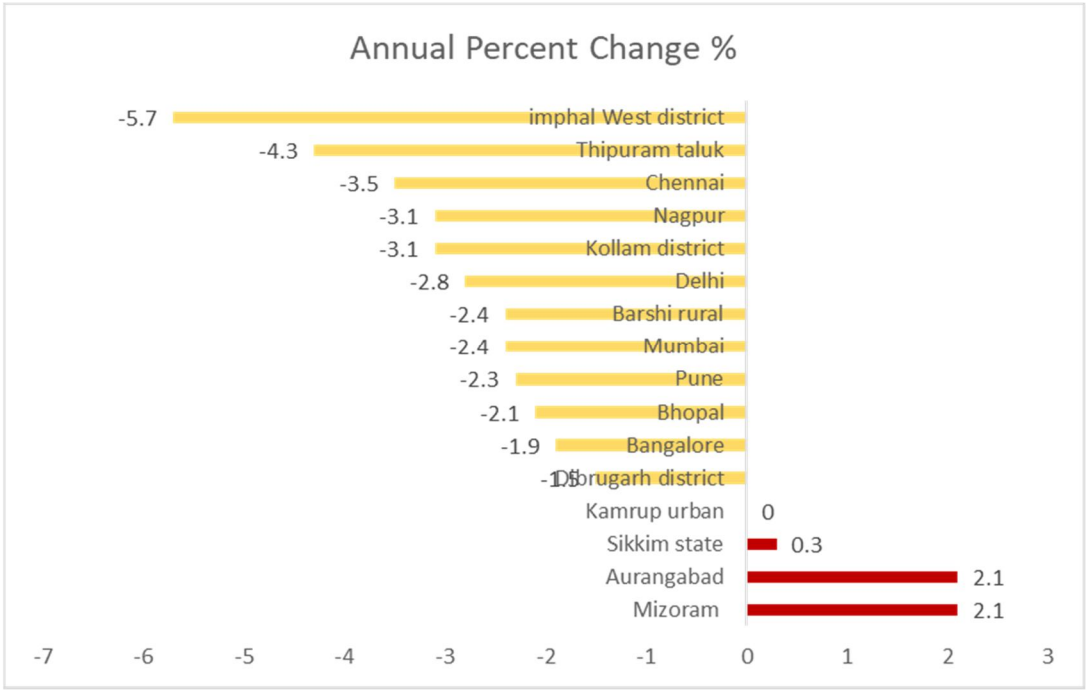


Fig. 2 Shows the annual percent change (APC) in age-adjusted incidence rates (AAR) for cancer of the cervix uterus across time.

F. Cervical Cancer Clinical Spectrum

The locoregional illness was pathologically widespread in 60.0% of cancer patients with uterine cervix carcinoma. In 32.8% of the occurrences, localization occurred. In contrast to the low metastatic rate of less than 1%, the proportion of locally isolated patients that progressed to locoregional illness was about 50%. Just 5.1% of patients who had cancer of the uterine cervix experienced distant organ metastases. The percentage of occurrences without a name is 2.2%.

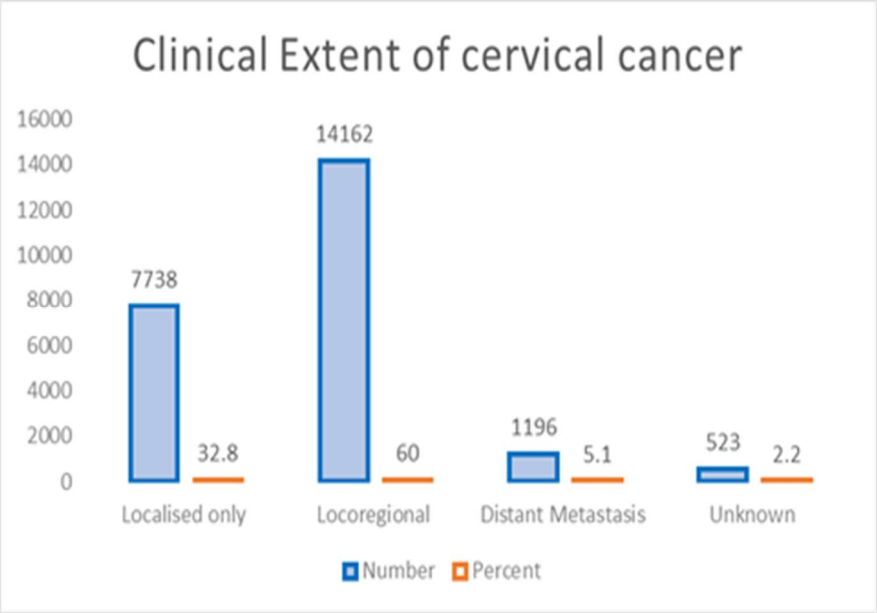


Fig. 3 Relative Proportion (%) and Number (n) in accordance with the Clinical Degree of the Disease of Cervical Cancer.

G. Symptomatic Severity of the Illness and Treatment of Cervical Cancer

More patients with cancer of the cervix and uterus had radiotherapy and chemotherapy. With localised cervical cancer cases at 25.1%, locoregional cases at 30.8%, distant metastases at 37.1%, and unknown cases at 33.1%, in terms of recommended treatment for cervical cancer, radiotherapy became the second most popular form of treatment. Clinically localised cervical uterine cancer patients received surgical treatment in around 7.7% of cases.

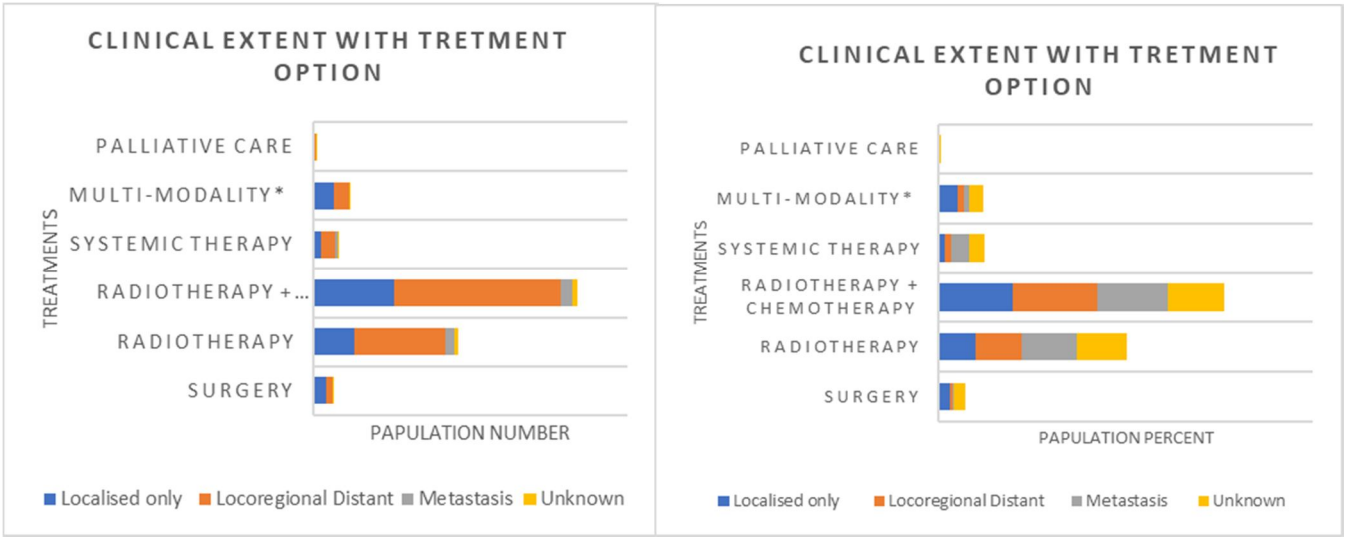


Fig. 4 Cancer Treatment Options based on Clinical Disease Extent According to the number (n) and relative percentage (%) of cancer in the cervix uteri.

H. Cervical Cancer Through Histopathology

The four forms of histopathological cervical cancer are epithelial, melanocytic, mesenchymal, and combined epithelial and mesenchymal. Malignancy primarily affects the lymph node. Epithelial carcinoma is the most frequent kind of cervical cancer of the three that are seldom discovered. According to the statistics, epithelial tumours account for 99.5% of instances, with the other three categories accounting together only 0.5%.

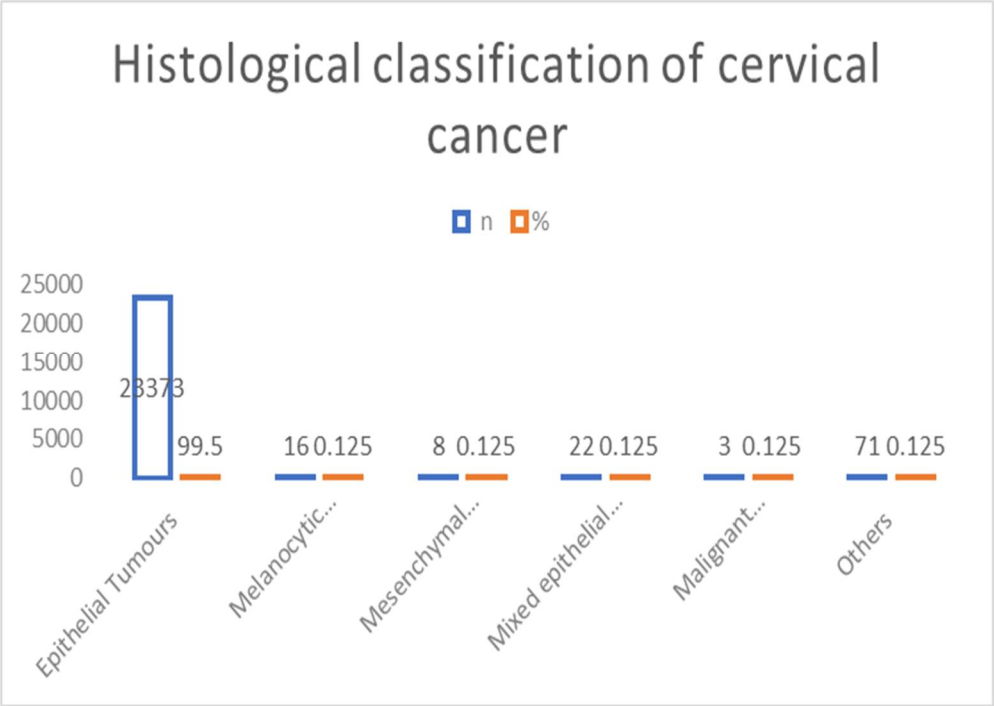


Fig. 5 Broad histological classification by number (n) and percentage (%) of cancer within the cervix uterus.

I. Educational Impact on Cervical Cance

For diseases like cervical cancer, education is crucial in the fight against them. The ability to read and write provides the chance to become aware of ailments, as well as the best chance to control them. According to the statistics, just 9.8% of women with cervical cancer were literate, and 38.8% were illiterate. Education levels in primary and secondary schools were 12.7% and 15.0%, respectively.

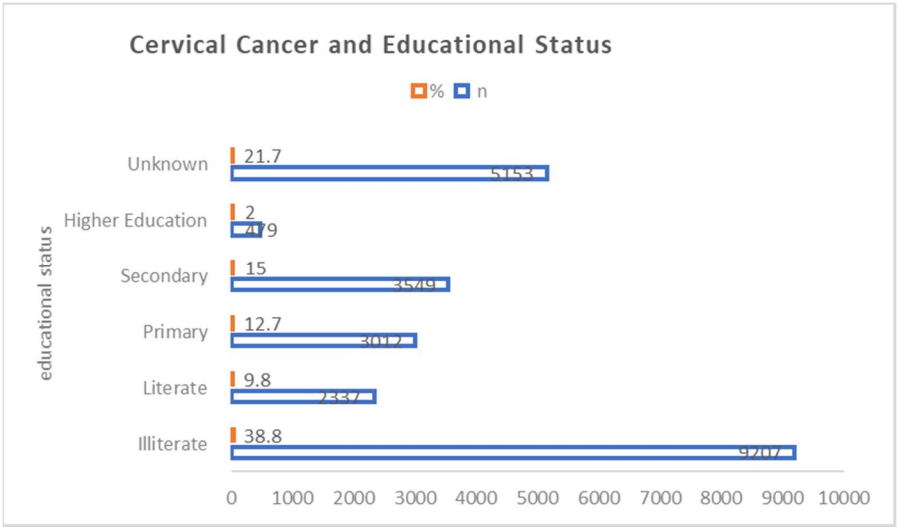


Fig. 6 Educational distribution among cervical cancer women

IV. CONCLUSIONS

The research we conducted offers a thorough and current assessment of regional and national trends of cervical cancer in 2020, showing disparities across geographic and socioeconomic factors as well as the advancements made at the national and regional levels over the past five years[16]. Throughout nations, across areas, and within regions, the incidence rates differed significantly (by 30 to 40 times).

This study also explores the epidemiological characteristics of cervical cancer in India in great depth, based on an analysis of data from a large cancer registry network. In line with the findings of the most recent research [7], the cervical cancer rate in the NER's Papumpare district is seven times higher than in the Dibrugarh district. If preventative measures, such as screening and HPV vaccination, are not scaled up in these groups, trends in these populations are anticipated to continue growing over the next few years, with a rise in the absolute number of cases also being fueled by the ageing and population expansion of the nation [10]. According to estimates, every 100 maternal deaths from cervical or breast cancer in areas with limited resources results in the premature deaths of 14 children before they turn 10 years old and causes 210 children to become maternal orphans, which emphasizes the devastating social repercussions of these cancers [17].

Dibrugarh district, Kollam district, and Manipur state have lower rates of cervical cancer incidence. However, the information provided by regional registries frequently only includes a small portion of the whole population and offers little to no coverage of rural regions, where women are more likely to be at risk. As a result, if trends are extended to the national level, they should be regarded with some caution.

The rise in incidence among young birth cohorts (those born in the middle of the 1960s or later) from a number of high-income regions confirms the ongoing need to promote screening participation, characterize the ideal screening age, enhance the efficacy of assessment, broaden programmed coverage, foster healthy sexual behavior, and raise HPV vaccination rates among adolescents [18] [19].

In the future decades, if effective preventative measures are not put into place in the nations where they are required due to the population's continued growth and the fact that people are living longer than ever before, it is predicted that the absolute number of cases and fatalities will continue to rise in all Indian areas. Only 20 to 30 percent of lower middle-income countries (LMICs) currently offer the HPV vaccine [20]. As a result, it is unlikely that most of these countries will experience the reduction in cervical cancer incidence and mortality that vaccination has already demonstrated in some high-income countries over the next few decades [21] [22].

The truncated rate covers the 35 - 65 age group, which is the median age range and an economically active age period. The majority of Aizawl's most productive women are affected by cervical cancer. According to the PBCR 2020 (ICMR-NCDIR; 2020), the truncated rate in Aizawl district was 6 times, Dibrugarh 5 times, and Kollam 4 times greater than the TR rate in Papumpare district, Mizoram, and Pasighat, respectively.

The annual percent changes are significantly decreasing throughout the southern region, with the exception of Hyderabad, which got three contributions from the east, two from the west, and one from the north region. These are the upbeat prognoses for the future.

The current budget allocation for cervical cancer control in LMICs is lower than 10% of the WHO's anticipated demand for 2019–2030, which presents a significant obstacle to meeting the WHO's goal of eliminating cervical cancer by 2050. These disparities in cancer diagnosis, treatment, and screening facilities are mirrored in this budget allocation [23]. A cost-effective solution would be to combine HIV testing with cervical cancer screening at a single visit to a primary health care. More crucially, this technique would help women with HIV, who have a higher chance of developing cancer even at a younger age [24]. In India, there are not enough resources to provide care for HIV-positive women with cervical cancer. It is necessary to construct a unique medical facility with an isolated ward and separate unit since HIV-positive women have a higher chance of developing cancer. The national cancer registry monitor should take into account the group of women with cervical cancer who are HIV positive.

In India, epithelial tumors are the only form that is predominant histopathological. According to the PBCR research, distinct metastases occur in just 1% of patients, but the progression of diseases that develop locally to locoregionally is high. The information may lead one to believe that the treatment for cervical cancer is improving daily and is slowing the spread of the disease. For cervical cancer, India offers a variety of cutting-edge treatment options. There are more options for local and locoregional tumors, but there are fewer options for separate metastases. Traditional medicine has its roots in the community, yet the most cutting-edge facilities are only found in metropolitan areas.

Education is one of the most significant variables for cervical cancer development, with 77% of Indian women being literate. The high proportion of illiteracy among cervical cancer cases demonstrates the lack of awareness among female patients. Increased awareness is necessary so that everyone is aware of the need for safety measures.

In conclusion, cervical cancer continues to be a major health concern in many areas of INDIA, with rates of the illness consistently above the cut-off established by the WHO Cervical Cancer Elimination Initiative in the majority of regions [25].We found significant regional and socioeconomic disparities in cervical cancer rates around the nation, with a pronounced gradient of rising incidence in regions with lower levels of human development. The incidence and death of cervical cancer will be reduced in the ensuing decades through organized screening initiatives, access to services for inexpensive and effective treatment, and increased HPV vaccination rates [26]. Using population-based cancer registries and other pertinent data, it is critical to continue monitoring cervical cancer nationally([27]), especially among the most underdeveloped regions and segments of the population [28]. An important component in understanding cancer disparities across and within nations is socioeconomic variables [29].

The comprehensive examination of the data will offer pertinent evidence and motivation for upcoming strategies intended to priorities national efforts, accelerate progress towards the WHO elimination targets, and, in doing so, address the stark variations in the incidence of cervical cancer and the epidemiological landscape across the country.

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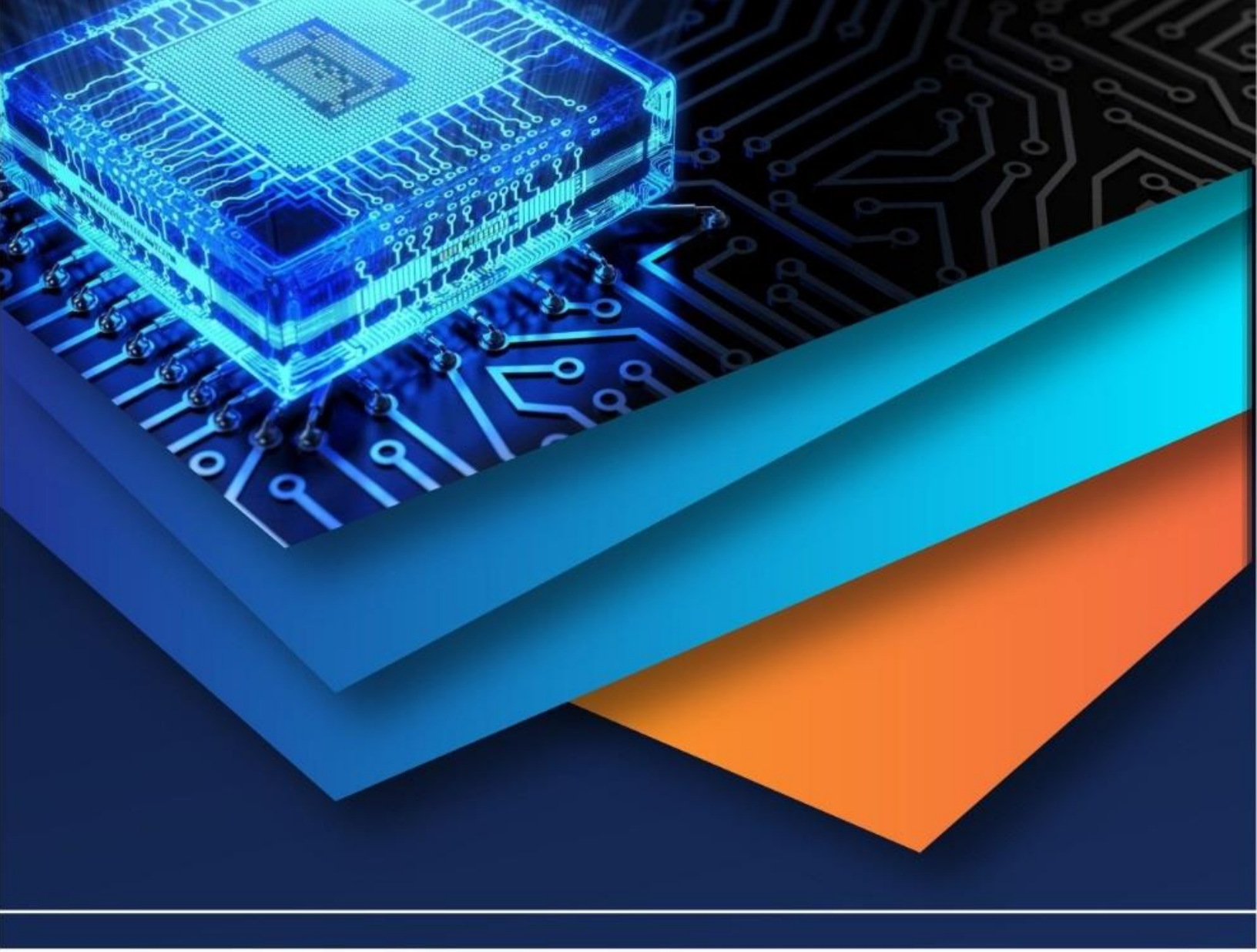

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