

Understanding Cancer Epidemiology in Himachal Pradesh, India

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Abstract



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Keywords

- ▶ cancer incidence
- ▶ age distribution
- ▶ gender distribution
- ▶ high-incidence regions
- ▶ public health strategies

Objective This study investigated the distribution of cancer cases across different age groups, sexes, and regions in Himachal Pradesh, India, with the aim of informing targeted public health strategies.

Materials and Methods Cancer incidence data were collected from various age groups, sexes, and blocks.

Statistical Analysis Chi-square tests were used to assess the significance of differences in cancer patient distribution according to age, sex, and region.

Results Cancer incidence increased with age, peaking in the 58 to 67 years age group. The highest number of patient was reported, particularly among individuals aged 38 years and above. Minimal cases were observed in the youngest age groups (< 17 and 18–27 years), while a significant increase was noted in the middle age groups (28–57 years). Cancer cases were nearly equally distributed between males (50.1%) and females (49.9%). A chi-square value of 180.18 indicated a statistically significant difference in cancer incidence according to age and sex. Gender-specific trends revealed higher cancer incidences in females during middle age (28–57 years) and in males during older age (58 years and above). The highest number of cases was 18.1%, followed by 14.7 and 14.6%, while the lowest incidence was 1.5%.

Conclusion The present study underscores the need for comprehensive and targeted public health strategies to manage cancer burdens effectively. Focusing on high-incidence regions and ensuring equitable health care access for all genders can improve cancer outcomes and reduce mortality rates associated with the disease.

Introduction

Cancer, as defined by Holland,¹ is a disease characterized by the uncontrolled division of abnormal cells that invade surrounding tissues, potentially leading to death if left untreated.² There are more than 200 distinct types of cancer, typically named after the organ or cell type of origin. A

hallmark of cancer cells is their reduced adhesion compared with normal cells,^{3,4} which facilitates detachment and dissemination to other body parts via the blood or lymphatic system. This process, known as metastasis, results in the formation of new neoplasms called metastatic tumors.

Several behavioral factors are associated with cancer incidence, screening, recurrence, and mortality. For example,

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cigarette smoking significantly contributes to mortality rates of various cancers, including those of the lung, oral cavity, esophagus, larynx, bladder, stomach, pancreas, kidney, and cervix.¹

Cancer is emerging as a significant public health concern in India, including in Himachal Pradesh. India ranks third globally in estimated new cancer cases, with 1.2 million diagnoses in 2018, and second in cancer-related deaths, with 785,000 mortalities that year. According to the Global Cancer Observatory (GLOBOCAN, 2018), the age-standardized rates per 100,000 people were 89.4 for cancer incidence and 61.4 for cancer mortality. Cancer can affect any part of the body and individuals of all ages, although the risk generally increases with age, particularly from middle age onwards. The incidence rates quadruple between ages 40 and 80 for all cancer types combined.^{5,6}

Breast cancer is the most common form of cancer affecting both men and women. In India, the most prevalent cancers among men are oral cancer (age-standardized rate: 13.9), lung cancer (7.8), stomach cancer (6.2), colorectal cancer (5.8), and esophageal cancer (5.5%). Among women, the most prevalent types are breast cancer (24.77), cervical cancer (14.77), ovarian cancer (5.55), oral cancer (4.33), and colorectal cancer (3.11). The incidence rates of various cancers vary significantly across Indian regions, with a minimum fivefold difference for any cancer type.^{7,8} Approximately 18.1 million individuals worldwide live with cancer (National Cancer Institute, 2020). Lung, stomach, liver, colon, and breast cancer cases cause the most cancer deaths annually. Cancer is a major public health burden in both developed and developing countries, with approximately 70% of all cancer deaths in 2020 occurring in low- and middle-income countries (World Health Organization International Agency for Research on Cancer, 2020). In India, approximately 850,000 new cancer cases are diagnosed annually, with approximately 580,000 cancer-related deaths each year.⁹

There is an alarming increase in cancer cases in Himachal Pradesh, with approximately 8,500 cases detected annually, although many cases are unnoticed in remote areas (Times of India, 2023). Himachal Pradesh, with its rural charm, represents a unique context for studying cancer burden. Predominantly rural, 89.97% of its population lives in rural areas. Health indicators show that Himachal Pradesh performs better than other states, with a crude birth rate of 15.4, a crude death rate of 6.9, an infant mortality rate of 19, and a total fertility rate of 1.6.¹⁰

Despite these favorable indicators, the state's increasing incidence of cancer, attributed to tobacco use, lifestyle patterns, environmental risks, and genetic predispositions, presents significant public health challenges. In rural Himachal Pradesh, limited health care access exacerbates the cancer burden, complicating life for individuals, families, and communities. The state has 12 districts, each with a chief medical officer and divided into 75 health blocks, each led by a block medical officer. The health institutions included 3 zonal hospitals, 9 district/regional hospitals, 6 teaching hospitals, 79 civil hospitals, 93 community health centers, 585 primary health care centers, and 2,085 health subcenters.

Shimla district, with a population of 814,010 (2011 census), predominantly rural (75%), has a sex ratio of 916 females per 1,000 males and a literacy rate of 83.64%. Given the growing cancer burden, it is crucial to study cancer trends in Himachal Pradesh to inform advanced control measures. The present study aimed to examine the age and gender trends of cancer patients in rural Shimla district, Himachal Pradesh, India.

Methods

The present study employed a retrospective observational design to examine age and gender trends among cancer patients in rural Shimla, Himachal Pradesh, India. Cancer data were sourced from the Regional Cancer Hospital, Indira Gandhi Medical College, Shimla, for the period 2014 to 2022 as part of the Hospital-Based Cancer Registry. The inclusion criteria included confirmed cancer diagnoses in rural residents of Shimla district, excluding urban residents and nonresidents of Himachal Pradesh. The recorded demographic factors included age (below 11 years and 68 years and above), place of residence, gender, cancer type, and stage at diagnosis (classified as "early" for stages I and II or "advanced" for stages III and IV).

Results and Discussion

The present study addresses the following research questions:

Research Question 1: What is the age distribution of cancer patients in Shimla district's rural areas?

Age-Wise Distribution of Cancer Patients

The data on the frequency of cancer incidence across different age groups provide a clear illustration of the relationship between age and cancer risk. A detailed analysis and interpretation of the data are provided below.

► **Table 1** clearly indicates that the frequency of cancer incidence increases significantly with age. This trend is particularly evident when examining the cumulative percentage of cases in each age group. Older adults (those aged 58 years and above) had the highest frequency of cancer incidence. The 58 to 67 years and 68 years and above age

Table 1 Age-wise distribution of cancer patients in rural areas of Shimla district

Age	Frequency of incidence	%
Blow 11 y	16	0.4
12–17 y	22	0.6
18–27 y	99	2.6
28–37 y	194	5.2
38–47 y	456	12.2
48–57 y	814	21.7
58–67 y	1,111	29.7
68 and above	1,031	27.5
Total	3,743	100

groups together accounted for 2,142 patients, 57.2% of the total patients.

The incidence of cancer in middle-aged adults (38–57 years) has notably increased. Individuals aged between 38 and 57 years, accounted for 1,270 patients, 33.9% of the total patients. The incidence rate of young adults (18–37 years) has begun to increase, with 293 cases or 7.8% of the total cases occurring in individuals aged 18 to 37 years.

Among individuals younger than 18 years, children and adolescents (younger than 18 years) had a low frequency of cancer, accounting for only 38 cases or approximately 1.0% of the total cases.

Research **Question 2**: How does the incidence of cancer vary among different age groups in Shimla district's rural population?

Age-Wise Trend of Cancer Patients in Each Block

The data are presented in **Fig. 1** and the corresponding graph illustrates the distribution of cancer cases across various age groups in different regions. The analysis is as follows:

Fig. 1 shows that there is a clear trend toward increasing cancer incidence with advancing age. The number of cases was minimal in the youngest age groups and increased significantly from 28 years onwards, peaking in the 58 to 67 years age group. Theog consistently reported the greatest number of cases across all age groups, particularly those aged 38 years and older. Rampur and Jubbal and Kotkhai also had high incidences, especially in the middle to older age groups.

Regions such as Chopal, Rohru, and Chirgaon exhibited a lower but still significant number of cases, particularly in older age groups.

Research **Question 3**: What are the specific age and gender distribution of patients with different types of cancer in Shimla district's rural areas?

Chi-Square Test Showing the Association between Age and Gender

The distribution of cancer cases by age and gender was significantly different according to the chi-square test. The analysis is as follows:

Table 2 shows gender differences in younger age groups (< 17 and 18–27 years); females tended to have higher cancer incidences than males did. In the middle aged group (aged 28–57 years), females had a greater incidence of cancer than males did. In older age groups (those aged 58 years and older), the trend reversed, with males showing higher cancer incidences than females. However, for both sexes, the incidence of cancer increased significantly with age, peaking in the 58 to 67 years age group and slightly decreasing in the 68 years and older age groups. The substantial increase in cancer cases in middle-aged and older adults highlights the need for targeted screening and early detection efforts in these age groups. The chi-square value (= 180.18) indicated a statistically significant difference in cancer incidence according to age and gender. This high value suggests that the distribution of cancer cases is not uniform across age groups or between genders.

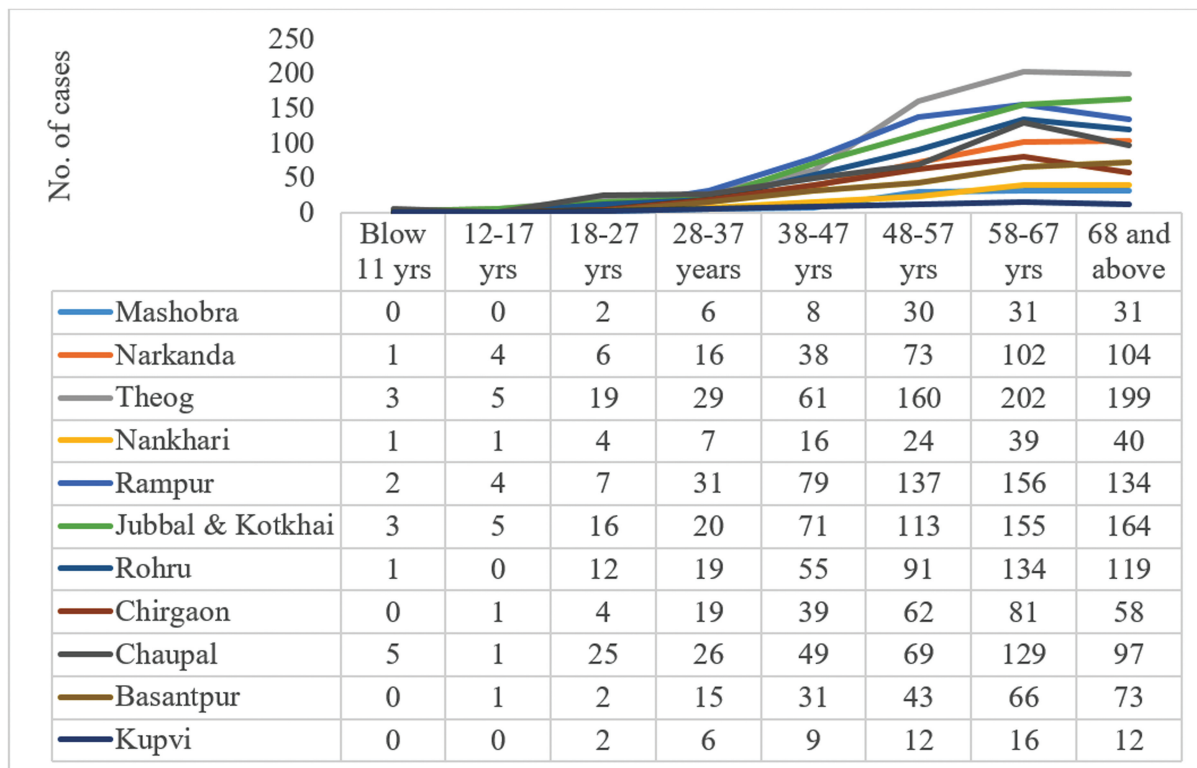


Fig. 1 Age-wise trend of cancer patients in each block of the Shimla district.

Table 2 Chi-square test showing the significance of differences between age and gender

Age	Gender of cancer patients		Total	Chi-square
	Male	Female		
< 17 y	24	14	38	180.18 ^a
18–27	35	64	99	
28–37	80	114	194	
38–47	149	307	456	
48–57	334	480	814	
58–67	602	509	1,111	
68 and above	654	377	1,031	
Total	1,878	1,865	3,743	

^a $p < 0.01$.

Conclusion

The comprehensive analysis of cancer incidence in Himachal Pradesh reveals crucial insights into the distribution of cases across age groups, genders, and regions, informing public health strategies and resource allocation. The data indicate a significant increase in cancer incidence with age, peaking in the 58 to 67 years age group, and highlight a noticeable increase in cases starting from 28 years onwards. This underscores the necessity for targeted cancer screening and early detection programs, particularly for older adults.

The nearly equal distribution of cancer cases between males (50.1%) and females (49.9%) suggests that cancer affects both genders similarly, emphasizing the need for gender-neutral public health interventions. Significant regional disparities are evident, with Theog, Rampur, and Jubbal and Kotkhai reporting the highest number of cases, collectively accounting for nearly half of the total cancer burden. Conversely, blocks such as Kupvi exhibit the lowest incidence rates. The chi-square analysis confirmed a statistically significant difference in cancer incidence by age and gender, but not by regional distribution within genders.

Based on these findings, several strategic initiatives are recommended: prioritizing health care resources in high-incidence regions to ensure equitable access; implementing widespread and regular cancer screening for high-risk age groups (38 years and older); conducting region-specific educational campaigns focusing on lifestyle changes, early detection, and cancer prevention; involving technical experts to educate rural populations on safe pesticide and chemical use; and strengthening surveillance systems to monitor cancer trends and evaluate intervention effectiveness.

The present study underscores the need for age-specific, gender-neutral, and region-specific public health strategies to manage and mitigate the cancer burden in Himachal Pradesh effectively. By focusing on high-incidence regions and ensuring equitable health care access, public health systems can improve cancer outcomes and reduce mortality rates associated with the disease.

Conflict of Interest

None declared.

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References

- Holland JC. *Psycho-Oncology*. 2nd ed. New York: Oxford University Press; 2009
- American Cancer Society. *Cancer Facts & Figure 2024*. Atlanta: American Cancer Society: Inc. Surveillance and Health Equity Science; 2024
- Laszlo J. *Understanding Cancer*. New York: Harper & Row; 1987
- Williams CJ, Dennis NR. *Cancer Biology and Management: An Introduction*. New York: Wiley; 1990
- Mor V, Masterson-Allen S, Goldberg RJ, Cummings FJ, Glicksman AS, Fretwell MD. Relationship between age at diagnosis and treatments received by cancer patients. *J Am Geriatr Soc* 1985; 33(09):585–589
- Sarafino EP. *Health Psychology: Bio Psychosocial Interactions*. New York: John Wiley & Sons, Inc; 1998
- Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin* 2018;68(06):394–424
- NCRP. *Consolidated Report of Hospital Based Cancer Registries 2012–2014*, National Cancer Registry Programme. Bangalore, Karnataka: Indian Council of Medical Research; 2016
- Dhanamani M, Lakshmi Devi S, Kannan S. Ethnomedicinal plants for cancer therapy- a review. *Hygeia-J Drugs Med* 2011;3(01): 1–10
- International Institute for Population Sciences (IIPS) and ICF. *National Family Health Survey (NFHS-5), 2019-* For additional information about the 2019–21 National Family Health Survey (NFHS-5), for related information, visit <http://www.rchiips.org/nfhs> or <http://www.iipsindia.ac.in>. Accessed August 18, 2024 at: <http://www.iipsindia.ac.in>