

SHORT ARTICLE

Secondary Analysis of NCD Risk Factors in Northeast India: Insights from the National Cancer Registry Program

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ABSTRACT

Background: The Northeastern Region (NER) of India faces a high cumulative cancer risk, with elevated incidence and mortality rates reported by the National Cancer Registry Program (NCRP). Population-Based Cancer Registries (PBCRs) are crucial in providing essential cancer data for the region. **Aims:** The study aimed to analyze the distribution of major cancer-associated behavioural and metabolic risk factors at the population level. Its purpose was to support PBCRs in developing a cancer risk factor surveillance program. **Methodology:** This study adapted the National NCD Monitoring Study (NNMS) cross-sectional, multistage cluster random sampling method, tailoring it to the unique cancer profile of 12 PBCR areas across eight NER states. **Results:** The survey achieved a 97% response rate. Current tobacco use prevalence (smoke or smokeless) was 45.7% (95% CI: 40.7-50.7), higher in men (61.8%) than women (28.0%). Current alcohol use was 22.3% overall, with men (35.2%) and urban areas (28.7%) showing higher prevalence. Insufficient physical activity was reported by 43.7% in urban areas and 52.5% in women. **Conclusion:** Insights from the study will aid policymakers in addressing the rising cancer burden through multipronged approaches, including behaviour modification and communication campaigns, to develop locally relevant preventive strategies.

KEYWORDS

Cancer Risk Factors, National Family Health Survey, Alcohol Consumption.

INTRODUCTION

The burden of chronic non-communicable diseases (NCDs) is rising in low- and middle-income countries like India, alongside persistent challenges in nutrition, infectious disease control, and maternal and child health. The prevalence of cardiovascular diseases, respiratory diseases, diabetes, cancer, and mental disorders is projected to grow significantly in the next 25 years (1). Cancer, a major contributor to this burden, is particularly prevalent in India's northeastern region, where unique demographic, socio-cultural, and dietary factors exacerbate health issues. For example, Aizawl district in Mizoram recorded the highest AAR of cancer in males (269.4 per 100,000) (2). Additionally, 39% of Indian men aged 15–49 report using tobacco products, according to NFHS-V

(2019–20). NER faces significant health challenges, such as high alcohol consumption rates (22% among men) and frequent use in tribal populations (3). To achieve national NCD targets by 2025, the Government of India established the Global NCD Monitoring Targets in 2013 (4). Large national and sub-national surveys—including NFHS, GATS, the Magnitude of Substance Use Study, the India Diabetes Study, and LASI—vary in aims, methods, and definitions (5-9). Early screening and preventive measures could prevent 60% of cancer deaths, guiding region-specific strategies.

MATERIAL & METHODS

Study Type and Study Design: This cross-sectional study used multistage cluster random sampling to assess cancer-related risk factors in the

Northeastern Region (NER) of India. Data collection spanned November 2019 to April 2021, with delays due to the COVID-19 pandemic. The Central Coordinating Agency (CCA) at NCDIR Bengaluru supervised implementation.

Study Setting and Population: The study covered territories under 12 Population-Based Cancer Registries (PBCRs) across eight states. The target population included residents aged 18–69 years in their usual residences and institutional populations in communal settings such as hotels, jails, hospitals, and dormitories.

Criteria

Inclusion: Adults aged 18–69 years, including those living in institutional settings.

Exclusion: Individuals unable to provide informed consent or with significant communication barriers.

Sample Size Calculation: Sample size estimation considered alcohol consumption (17.1%), tobacco use (28.6%), and physical inactivity (54.5%), with a design effect of 1.5 and a 10% non-response rate, resulting in a total estimate of 23,040. States with complete PBCR coverage had a sample size of 2,880 each.

Data Collection and Analysis: Data were collected via portable devices and synchronized to the ICMR-NCDIR Central Server. Weights were applied to account for sample size and population proportions. Trained teams followed standardized protocols, with safety measures including PPE use and electronic data capture. Analysis used STATA 14.1, employing Chi-square tests to identify statistically significant differences, with P-values <0.001 indicating high significance.

Ethical Approval: Ethical approval for the survey (NCDIR/IEC/2017/2) was granted by the Ethics Review Committee of the CCA, ICMR-NCDIR. Each participating PBCR also obtained consent from their respective ethics committees. The goal and objectives of the survey were explained to eligible adult participants. All adults were included in the study upon providing informed written consent.

RESULTS

We conducted a survey targeting a sample of 23,040 participants, with 22,550 respondents completing the interview. The overall completion rate was 98.53%, with a small percentage (1.47%) of non-responses. Among the adult respondents, 95.4% (21,321) completed the interview. The survey was designed to capture data on cancer risk factors, including behavioural and metabolic risk factor. At the household level, cancer cases were identified in urban and rural areas. Urban regions had a higher percentage of cancer cases, with 1.5% of households reporting cancer, compared to 0.8% in rural areas.

Sociodemographic Characteristics: The study included participants from both urban and rural areas across eight northeastern states. A total of 71.2% of participants were aged 18–44 years, with 24.9% in the 45–69 age group. The gender distribution showed that 70.3% of men and 72.1% of women were in the younger age range (18–44 years). Education levels varied significantly by location: 13.2% of urban participants had less than a Class 6 education, compared to 26.4% in rural areas. Higher education (graduate or diploma) was reported by 21% of urban residents, compared to 8.9% of rural residents. Occupational patterns also reflected urban-rural differences, with professional roles being more common among urban participants (14.1%) than rural ones (7.2%). In rural areas, 60.6% of women were homemakers, reflecting traditional gender roles. Among all women, over 80% had been pregnant, and 98% had breastfed. Economic strain was significant, with 51.6% of respondents living in poverty, contributing to late diagnoses and limited healthcare access. Many participants were engaged in manual labour (20.7%) or agriculture (17.7%). Awareness of cancer prevention was low, with only 5.2% of respondents aware of the HPV vaccine and 24.4% aware of cancer screening. Most participants (80.3%) received information through social or mainstream media.

Behavioural Risk Factors: Regarding tobacco use, 45.7% of respondents reported using tobacco in some form (smoked or smokeless) in the past 12 months. Urban areas had a higher prevalence of smoked tobacco use (21.7%) compared to rural areas (12.3%), with daily use being more common in urban areas. Smokeless tobacco use was also significant in both areas, with 31.8% of urban residents and 34.5% of rural residents reporting daily use. Men exhibited higher rates of tobacco use overall, with 61.8% using tobacco (smoked or smokeless), compared to 28.0% in women. Exposure to second-hand tobacco smoke at home was reported by 42.6% of urban respondents and 38.9% of rural respondents, with no significant gender differences.

Alcohol consumption was reported by 22.3% of participants, with men (35.2%) being more likely to consume alcohol than women (8.2%). The prevalence was higher in urban residents (28.7%) compared to rural residents (19.0%). Heavy episodic drinking was also more common in men, with 13.6% of men reporting this behaviour, compared to 0.5% of women. Notably, 3% of individuals reported that alcohol consumption affected their daily activities.

Insufficient physical activity was reported by 43.7% in urban areas and 33.3% in rural areas, with

women (52.5%) showing significantly higher inactivity than men (22.3%). Participation in moderate-intensity physical activities at home or work remained high, with over 80% of participants engaged in such tasks. However, fruit and vegetable consumption was low, with an average of only 0.8 days per week. A large portion of participants (75%)

regularly consumed fermented, preserved, or salt-cured foods. The prevalence of metabolic risk factors linked to non-communicable diseases (NCDs) among adults aged 18–69 years in Northeast India, categorized by place of residence, sex, age group, and region, is detailed in Table 2.

Table 1 Prevalence of behavioural risk factors associated with NCDs among adults aged 18–69 years in NE India stratified by place of residence, sex, age group and region.

Behavioural risk factors	Place of Residence		Sex		Age Group		
	Urban n (%)	Rural n (%)	Men n (%)	Women n (%)	18-29 years n (%)	30-49 years n (%)	50-69 years n (%)
Current tobacco use (smoke and/or smokeless variety) (in last 12 months)	63 (48.8)	111 (44.0)	123 (61.8)	51 (28.0)	27 (32.5)	93 (50.5)	54 (47.4)
Current daily smoked tobacco use (in last 12 months)	28 (21.7)	31 (12.3)	49 (24.6)	10 (5.5)	6 (7.2)	35 (19.0)	18 (15.8)
Current daily smokeless tobacco use (in last 12 months)	41 (31.8)	87 (34.5)	85 (42.7)	43 (23.6)	17 (20.5)	73 (39.7)	38 (33.3)
Second-hand tobacco smoke exposure at home (in past 30 days)	55 (42.6)	98 (38.9)	75 (37.7)	78 (42.9)	41 (49.4)	69 (37.5)	43 (37.7)
Current alcohol use (in last 12 months)	37 (28.7)	48 (19.0)	70 (35.2)	15 (8.2)	16 (19.3)	52 (28.3)	17 (14.9)
Heavy episodic drinking^a	12 (9.3)	16 (6.3)	27 (13.6)	1 (0.5)	2 (2.4)	20 (10.9)	6 (5.3)
Insufficient physical activity^b	55 (43.7)	84 (33.3)	44 (22.3)	95 (52.5)	31 (37.8)	59 (32.4)	49 (43.0)
P value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

^aHeavy episodic drinking constitutes those who reported drinking ≥ 6 standard drinks (equivalent to 60g of pure alcohol or ethanol) in a single drinking occasion in the last 30 days of the interview; ^binsufficient physical activity constitutes those who engaged in < 150 minutes of moderate-intensity physical activity per week OR < 75 minutes of vigorous-intensity physical activity per week OR an equivalent combination of moderate- and vigorous-intensity physical activity accumulating < 600 MET – minutes per week; *Current daily alcohol & tobacco use: Local smoked tobacco or alcohol products daily in the last 12 months preceding the survey.

Table 2 Prevalence of metabolic risk factors associated with NCDs among adults in NE India aged 18–69 years categorized by place of residence, sex, age group and region.

Metabolic risk factors	Place of Residence		Sex		Age Group		
	Urban n (%)	Rural n (%)	Men n (%)	Women n (%)	18-29 years n (%)	30-49 years n (%)	50-69 years n (%)
Overweight (BMI ≥ 25.0 Kg/m²)	46 (36.2)	38 (15.3)	41 (20.6)	43 (24.4)	10 (12.5)	50 (27.6)	24 (21.1)
Obesity (BMI ≥ 30.0 Kg/m²)	7 (5.5)	7 (2.8)	5 (2.5)	9 (5.1)	1 (1.3)	8 (4.4)	5 (4.4)
Central obesity^a	53 (41.7)	56 (22.5)	33 (16.6)	76 (42.9)	14 (17.5)	59 (32.4)	36 (31.6)
Raised blood pressure^b	45 (34.9)	72 (28.7)	70 (35.2)	47 (26.0)	8 (9.6)	51 (27.9)	58 (50.9)
Raised fasting blood glucose^c	15 (14.9)	15 (6.6)	18 (10.8)	12 (7.5)	1 (1.5)	14 (8.8)	15 (14.6)
p value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

^aCentral obesity was defined as having a waist circumference of ≥ 90 cm in males and ≥ 80 cm in females; ^bRaised blood pressure was when the systolic blood pressure was ≥ 140 mm of Hg and/or diastolic blood pressure ≥ 90 mm of Hg including those on medication for raised BP among adults aged 18–69 years; ^cRaised fasting blood glucose was when the values of fasting blood glucose were ≥ 126 mg/dl including those on medication for raised blood glucose among adults aged 18–69 year.

Cancer Burden

There are 6711 cases of cancer per 100,000 people in urban regions, 14671 cases in rural areas, and

21382 cases overall. In metropolitan areas, the percentage of people with cancer is 1.5%; in rural areas, it is 0.8%; and altogether, it is 1%. Urban

cancer survivors have been living for 83.5 months, rural survivors for 48.6 months, and survivors from a combination of urban and rural areas for 64.1 months. More than 75% of participants reported consuming fermented, preserved, or salt-cured foods, which are recognized dietary risk factors for cancer. These findings underline the importance of dietary interventions in reducing cancer risk in the region.

DISCUSSION

This study analyzed patterns of alcohol and tobacco use and physical activity among men and women in Northeast India (NER). Tobacco usage in the region aligns with GATS-2 (2016–2017) findings, which reported that 48% of adults in Assam smoked tobacco, compared to 29% nationwide. Assam also had higher rates of smokeless tobacco use (42%) compared to the national average (21%). According to the National NCD Monitoring Survey (2021), 28% of individuals aged 18–69 used tobacco, with 12.6% smoking and 24.7% using smokeless tobacco. Over 40% of people in NER consume tobacco, with Tripura having the highest rate at 64.5%. Smokeless tobacco is linked to elevated risks of oral potentially malignant disorders and cancers of the esophagus, head, and neck. GATS-2 also reported that smokeless tobacco use was more prevalent than smoking in most states. Tobacco accounts for 57% of cancers in men and 28% in women. NFHS-5 highlights Mizoram as having the highest tobacco consumption among northeastern states, with 72.9% of men and 61.6% of women aged 15 and older using tobacco (10).

According to NFHS-5 (2019–21), alcohol consumption is significantly higher among men than women. 19% of men and only 1% of women drink alcohol regularly. Among women, 1.6% in rural areas and 0.6% in cities drink, while 19.9% of men in rural areas and 16.5% in cities consume alcohol. Arunachal Pradesh has the highest alcohol consumption, with 24% of women and 53% of men drinking. Other regions with high consumption among men include Telangana, Jharkhand, Bastar (Chhattisgarh), and parts of Uttarakhand, Tripura, and Odisha, where 30–40% of men drink. Lakshadweep has the lowest alcohol consumption at 0.4%. Overall, the results are consistent with the present study.

The younger age demographic in the region may explain the relatively lower cancer prevalence in these groups, while older adults (45–69 years) face higher risks for metabolic-related cancers, especially breast and colorectal cancers. Gender and occupation are significant factors in cancer risk,

with men exhibiting higher tobacco and alcohol consumption, while women, particularly in rural areas, are more prone to sedentary lifestyles. Tobacco, especially smokeless tobacco, is strongly linked to head and neck cancers, while alcohol use in men and urban residents correlates with liver and gastrointestinal cancers. Sedentary behaviour, particularly among women (52.5%) and older adults, increases risks for metabolic cancers. Overweight and obesity are strongly associated with cancers like colorectal, breast, and endometrial cancers, with urban populations showing a higher prevalence. Hypertension, particularly in older urban adults, also contributes to cancer risk. While rural areas show a lower cancer burden, rising tobacco use and metabolic conditions like obesity are increasing cancer incidence.

CONCLUSION

India is experiencing a rising cancer burden, with the highest incidence and mortality rates reported in the northeastern region (NER). This survey aimed to assess major cancer-related behavioural and metabolic risk factors to support cancer registries in developing a risk factor surveillance program. By compiling data and tracking prevention efforts, the study provides insights to help policymakers address the growing cancer burden through behaviour modification and targeted communication campaigns for locally relevant preventive strategies.

RECOMMENDATION

The study recommends increasing awareness about the risks of tobacco and alcohol, particularly in regions with high prevalence rates. It suggests implementing stricter tobacco and alcohol control policies to curb usage. Expanding cancer screening programs, especially in high-risk groups and rural areas, is also emphasized for early detection. Encouraging healthier lifestyles, including physical activity and better dietary habits, is crucial, especially for rural populations and older adults. Finally, improving cancer data collection and monitoring systems is necessary to better track trends and risk factors, aiding in more effective prevention strategies.

LIMITATION OF THE STUDY

The study's strengths lie in its representative sample and use of primary national survey data to estimate the prevalence of key behavioural and metabolic NCD risk factors. The narrow confidence intervals suggest accurate estimations. High response rates, standardized tools (WHO-STEPS,

GATS), and rigorous quality control contribute to the stability of the findings. However, the study lacks sufficient power for gender-stratified estimates at the state and district levels or for rural vs. urban subgroups. Future research could focus on regional and national estimates. Self-reported data may lead to recall bias or misreporting of risk factors, though privacy measures were ensured.

RELEVANCE OF THE STUDY

This study is highly relevant as it provides essential data on cancer-related risk factors in India's Northeastern Region (NER), which has high cancer incidence and mortality rates. By identifying key behavioural and metabolic risk factors, the study supports the development of targeted prevention strategies and surveillance programs. The findings align with India's national NCD monitoring framework, providing actionable insights to achieve the 2025 national and global NCD targets, including reducing premature cancer deaths.

AUTHORS CONTRIBUTION

Both authors have contributed equally.

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Nil

CONFLICT OF INTEREST

There are no conflict of interest.

DECLARATION OF GENERATIVE AI AND AI ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

During the preparation of this work, the authors used Grammarly for grammar correction. After utilizing this tool, the authors reviewed and edited the content as necessary and take full responsibility for the content of the publication.

REFERENCES

1. Patel V, Chatterji S, Chisholm D, et al. Chronic diseases and injuries in India. *Lancet*. 2011;377(9763):413-28.
2. Report of National Cancer Registry Programme (ICMR-NCDIR), Bengaluru, India 2020.
3. International Institute for Population Sciences and MoHFW. 2021.
4. Ministry of Health and Family Welfare (MHFW), Government of India. National action plan and monitoring framework for prevention and control of noncommunicable diseases (NCDs) in India [Internet]. 2012.
5. Sarma PS, Sadanandan R, Thulaseedharan JV, et al. Prevalence of risk factors of non-communicable diseases in Kerala, India: results of a cross-sectional study. *BMJ Open*. 2019;9(11): e027880.
6. International Institute for Population Sciences. National Family Health Survey (NFHS-4) [Internet]. 2017.
7. Tata Institute of Social Sciences (TISS) Mumbai, Ministry of Health and Family Welfare Government of India. Global Adult Tobacco Survey GATS 2 India [Internet]. 2016.
8. Dhawan A, Mishra AK, Ambekar A, et al. Estimating the size of substance using street children in Delhi using Respondent-Driven Sampling (RDS). *Asian J Psychiatr*. 2020; 48:101890.
9. Tandon N, Anjana RM, Mohan V, et al. The increasing burden of diabetes and variations among the states of India: The Global Burden of Disease Study 1990–2016. *Lancet Glob Health*. 2018;6(12): e1352–62.
10. National Family Health Survey-5 (NFHS) [Internet].