

# Prevalence and Determinants of Non-Communicable Disease Risk Factors among Adult Population in Rural Manipur: A Cross-Sectional Study

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## Abstract

**Background:** Owing to epidemiological transition and factors like rapid urbanization, the prevalence of non-communicable diseases has risen to alarming levels instigating global attention. Early detection of risk factors is of paramount importance when it comes to combating non-communicable diseases. Risk factors for non-communicable diseases can be broadly classified into behavioural and metabolic risk factors.

**Objectives:** To assess the prevalence of non-communicable disease risk factors and determine their association with sociodemographic variables among the adult population of rural Manipur.

**Methods:** A cross-sectional study was conducted among adult population in rural areas of Bishnupur district, Manipur during February and March 2023. Multistage stratified random sampling technique was employed. Data were collected from 426 individuals using interviewer-administered questionnaire. Descriptive statistics like mean with standard deviation and percentage were used. Chi-square test was used for statistical significance.

**Results:** The overall prevalence of current smoking was 22.3%, and 55.6% of respondents were currently using smokeless tobacco products. The prevalence of current alcohol consumption was 25.8%, 77.5% of the respondents had insufficient consumption of fruits and/or vegetables, 30% had insufficient physical activity, 21.4% were having daily salt intake of >5g, 58.2% were found to have overweight/obesity, and 47.4% were found with raised blood pressure. Occupation was found to be significantly associated with all non-communicable disease risk factors assessed in this study.

**Conclusion:** Life-style behaviour modification interventions are a must to reduce risk factors of non-communicable diseases.

**Key-words:** Non-communicable diseases, risk factors, rural Manipur.

**Key Messages:** The high prevalence of modifiable non-communicable risk factors and its significant association with sociodemographic characteristics like occupation affirms the importance of primary prevention using interventions like lifestyle behaviour modifications.

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## Introduction

Chronic diseases, commonly referred to as noncommunicable diseases (NCDs), are long-lasting conditions brought on by a confluence of behavioural, physiological, environmental, and genetic variables. Diabetes, malignancies, chronic respiratory conditions including asthma and chronic obstructive pulmonary disease, and cardiovascular disorders like heart attacks and strokes are the primary categories of noncommunicable NCDs. All age ranges, geographical areas, and nations are impacted by NCD.<sup>1</sup>

Non-communicable diseases (NCDs) are commonly linked to older age groups; nevertheless, data indicates that 17 million NCD fatalities happen before the age of 70. 74% of all deaths and 86% of premature deaths worldwide are caused by NCDs. 77 percent of NCD-related deaths take place in low- and middle-income nations.<sup>1</sup>In Southeast Asia, NCDs are having a major and growing impact on development and health. Sixty-two percent (9 million people) of the projected fatalities that occur in this region each year are under the age of seventy.<sup>2</sup>

In India, NCDs accounted for 5.2 million deaths in 2008.<sup>3</sup> In 2014, NCDs are estimated to account for 60% of total deaths: cardiovascular diseases 26%, cancers 7%, chronic respiratory diseases 13%, diabetes 2% and other NCDs 12%. The probability of dying between 30 and 70 years of age from the four main NCDs was twenty-six percent.<sup>4</sup>

In Manipur, 64.5% of the total disease burden is due to premature deaths and 35.5% due to disability or morbidity. As of 2019, Ischaemic Heart Diseases, type 2 diabetes mellitus and stroke are among the top 15 causes of DALYs in the state, contributing to around 61.6%. High Blood pressure, elevated plasma glucose, high BMI, smoking, alcohol consumption, diet low in fruits and whole grains are the top risk factors for NCD in the state.<sup>5</sup>

Modifiable behavioural risk factors and metabolic risk factors are two main categories into which risk factors for non-communicable diseases can be divided. The metabolic risk factors include elevated blood pressure, overweight/obesity, high blood glucose levels, and high blood fat levels; the modifiable behavioural risk factors include tobacco

use, physical inactivity, unhealthy diet, and harmful alcohol use.<sup>1</sup>

In India, the prevalence of current tobacco smoking was 15% in 2011, total alcohol per capita consumption was 4.3 litres of pure alcohol in 2010, raised blood pressure and obesity were 21.1% and 1.9% respectively in 2008.<sup>4</sup> In Manipur, among women and men, use of any type of tobacco is 41.6% and 67.3% respectively, alcohol drinking is 1.6% and 67.3% respectively, the prevalence of raised blood pressure is 14% and 27% respectively, and the proportion of very high random blood glucose value (>160 mg/dl) is 3.5% and 5.8% respectively.<sup>6</sup>

Due to changes in epidemiology and variables such as increased urbanization, the incidence of non-communicable illnesses has increased to dangerous levels, drawing attention from all over the world. NCDs are acknowledged as a significant obstacle to sustainable development in the 2030 Agenda for Sustainable Development.<sup>1</sup> Early detection of risk factors is of paramount importance when it comes to combating non-communicable diseases. This study aims to assess the prevalence of non-communicable disease risk factors and determine their association with the sociodemographic variables among the adult population of rural Manipur.

## Subjects and Methods

A cross-sectional study was conducted from 1<sup>st</sup> February to 31<sup>st</sup> March 2023 in the rural areas of Bishnupur district, Manipur among general population aged 18 years and above and residing in the district for at least one year. Pregnant women, those who are too frail or bedridden, mentally unfit and those with physical disability were excluded from the study.

Sample size of 422 was calculated by taking prevalence of alcohol intake among men in rural Manipur at 52% (as per NFHS-5), 5% allowable error and 10% non-response rate for a two-tailed hypothesis at 95% confidence interval. Multistage stratified random sampling technique was used to select study participants.

Data were collected using structured questionnaire modified from WHO STEPS instrument,<sup>7</sup>digital sphygmomanometer (OMRON

HEM-7300), digital weighing machine (OMRON), portable stadiometer and, flexible non-stretchable measuring tape. Participants were approached at their homes.

Data collected were checked for consistency and completeness. Then, data analysis was performed using SPSS v. 26. For descriptives, mean with standard deviation and percentage were used. Chi square test was used to find out the association between sociodemographic variables and non-communicable disease risk factors at 95% confidence interval. A p-value of less than 0.05 was considered statistically significant.

Informed written consent was taken from all the participants before collecting data. Steps were taken to maintain confidentiality. Ethical approval was obtained from the Research Ethics Board, RIMS, Imphal [No. A/REB/Prop(SP)186/161/02/2023].

### Results:

Four hundred and thirty eligible participants were approached, out of which 426 responded yielding response rate of 98.1%. Mean age of the participants was  $43.49 \pm 14.681$  years. Other sociodemographic characteristics of the participants are given in Table 1.

**Table 1: Sociodemographic characteristics (N=426)**

Sl. No.	Variables		Frequency	Percentage
1	Age group	18-29	98	23.0
		30-44	128	30.0
		45-59	117	27.5
		60-69	83	19.5
2	Gender	Female	209	49.1
		Male	217	50.9
3	Education	No formal education	60	14.1
		Up to 10th	192	45.1
		Up to 12th	92	21.6
		Graduate	73	17.1
		Post graduate	9	2.1
4	Religion	Hindu	268	62.9
		Others	158	37.1
5	Marital status	Single	60	14.1
		Married	358	84.0
		Widowed	7	1.6
		Divorce	1	0.2
6	Occupation	Govt employee	33	7.7
		Homemaker	107	25.1
		Non-govt employee	30	7.0
		Self-employed	142	33.3
		Retired	40	9.4
		Student	24	5.6
		Unemployed	50	11.7
7	Socio-economic status (BG Prasad scale, 2021)	Class I	63	14.8
		Class II	123	28.9
		Class III	139	32.6
		Class IV	82	19.2
		Class V	19	4.5

The overall prevalence of current smoking was 22.3% (Table 2). Among the ever and current smokers, the mean age in years when smoking started was  $21.62 \pm 7.33$  years; and among the current smokers the median number of cigarettes (sticks) smoked per week (IQR) was 9 (4 – 28). 55.6% of respondents were currently using smokeless tobacco products. The prevalence of current alcohol consumption was 25.8%, 8.2% of participants were heavy episodic drinkers (Table 2). The mean age when first alcoholic drink experienced was  $22.43 \pm 6.02$  years and the type of alcoholic beverage most consumed was found to

be local-brewed alcoholic drinks.

It was observed that 77.5% of respondents had insufficient consumption of fruits and/or vegetables, 30% had insufficient physical activity, 21.4% were having daily salt intake of  $>5g$ , 20.9% were having at least one NCD, 14.3% were currently under medication for NCD, 1.6% were taking traditional/herbal remedy. 58.2% were found to have overweight/obesity ( $BMI \geq 23kg/m^2$ ), and 47.4% were found with raised blood pressure (Table 2).

**Table 2: Prevalence of NCD risk factors among adult population in rural Manipur (N=426)**

Variables	Characteristics	Category	n	%
<b>Behavioural risk factors</b>				
Smoking	Ever smoker	No	328	77.0
		Yes	98	23.0
	Current smoker	No	331	77.7
		Yes	95	22.3
	Current smokeless tobacco user	No	189	44.4
		Yes	237	55.6
Alcohol consumption	Ever drinker	No	281	66.0
		Yes	145	34.0
	Current drinker	No	316	74.2
		Yes	110	25.8
	Heavy episodic drinking	No	391	91.8
		Yes	35	8.2
Diet	Vegetable and/or fruit intake	$<5$ servings/day	330	77.5
		$\geq 5$ servings/day	96	22.5
	Salt intake	$\leq 5g$ per day	335	78.6
		$>5g$ per day	91	21.4
Physical activity	Level of activity	Insufficient*	128	30.0
		Sufficient†	298	70.0
<b>Metabolic risk factors</b>				
Overweight / Obese	$BMI \geq 23kg/m^2$	No	178	41.8
		Yes	248	58.2
Raised blood pressure	$\geq 140mmHg$ systolic BP and/ or $\geq 90mmHg$ diastolic BP or previously diagnosed hypertension	No	224	52.6
		Yes	202	47.4
* $<600$ MET minute/week				
† $\geq 600$ MET minute/week				

Smoking was found to be significantly associated with gender and occupation. Use of smokeless

tobacco was found to be significantly associated with age, gender, marital status, religion, educational

qualification, occupation, and socioeconomic status. Alcohol consumption was significantly associated with gender, educational qualification, and occupation. Inadequate vegetable or fruit consumption was found to be significantly associated with religion and occupation. Inadequate physical

activity was significantly associated age, gender, religion, and occupation. Overweight and obesity were found to be significantly associated with age, marital status and occupation. Raised blood pressure was found to be significantly associated with age, gender, marital status, and occupation (Table 3).

**Table 3: Association of NCD risk factors by socio-demographic characteristics (N=426)**

Variables	Categories	Smoking (%)	Smokeless tobacco use (%)	Alcohol consumption (%)	Insufficient fruit/vegetable intake (%)	Insufficient physical activity (%)	Overweight/Obese (%)	Raised blood pressure (%)
Age (in years)	18-29	18.4%	44.9%	18.4%	76.5%	39.8%	39.8%	25.5%
	30-44	21.9%	62.5%	28.9%	77.3%	24.2%	64.1%	41.4%
	45-59	19.7%	60.7%	30.8%	80.3%	23.9%	66.7%	59.0%
	60-69	31.3%	50.6%	22.9%	74.7%	36.1%	59.0%	66.3%
	<i>P-value</i>	0.154	0.028	0.148	0.809	0.018	0.000	0.000
Gender	Female	2.9%	63.2%	2.4%	78.5%	35.4%	60.8%	36.8%
	Male	41.0%	48.4%	48.4%	76.5%	24.9%	55.8%	57.6%
	<i>P-value</i>	0.000	0.002	0.000	0.644	0.020	0.277	0.000
Marital status	Non-married	16.2%	36.8%	20.6%	79.4%	36.8%	44.1%	32.4%
	Married	23.5%	59.2%	26.8%	77.1%	28.8%	60.9%	50.3%
	<i>P-value</i>	0.207	0.001	0.364	0.753	0.196	0.020	0.008
Religion	Hindu	22.8%	43.7%	28.4%	70.1%	41.8%	56.3%	44.4%
	Others	21.5%	75.9%	21.5%	89.9%	10.1%	61.4%	52.5%
	<i>P-value</i>	0.810	0.000	0.137	0.000	0.000	0.415	0.109
Education level	No formal education	18.3%	68.3%	8.3%	86.7%	30.0%	66.7%	48.3%
	Up to 10th	24.0%	63.5%	24.5%	79.7%	35.4%	57.3%	45.8%
	Up to 12th	23.9%	52.2%	32.6%	72.8%	26.1%	56.5%	47.8%
	Graduate	20.5%	32.9%	35.6%	72.6%	19.2%	54.8%	50.7%
	Post-graduate	11.1%	22.2%	22.2%	55.6%	44.4%	66.7%	44.4%
	<i>P-value</i>	0.778	0.000	0.003	0.090	0.081	0.835	0.967
Occupation	Unemployed/Retired	29.5%	42.6%	31.1%	60.7%	45.9%	44.3%	42.6%
	Working	30.3%	63.2%	36.8%	82.5%	22.6%	61.1%	53.4%
	Student	8.3%	8.3%	12.5%	58.3%	29.2%	33.3%	29.2%
	Homemaker	3.7%	57.0%	1.9%	80.4%	37.4%	65.4%	41.1%
	<i>P-value</i>	0.000	0.000	0.000	0.000	0.001	0.003	0.031
Socio-economic status*	Class I	14.3%	39.7%	22.2%	71.4%	30.2%	58.7%	44.4%
	Class II	25.2%	49.6%	35.0%	71.5%	36.6%	65.0%	47.2%
	Class III	19.4%	56.1%	19.4%	81.3%	29.5%	56.1%	48.2%
	Class IV	25.6%	72.0%	25.6%	80.5%	25.6%	50.0%	45.1%
	Class V	36.8%	73.7%	26.3%	94.7%	10.5%	63.2%	63.2%
	<i>P-value</i>	0.169	0.001	0.067	0.071	0.151	0.151	0.667

\*BG Prasad scale 2021

## Discussion

In this study, we assessed seven non-communicable disease (NCD) risk factors. The prevalence of current smoking was comparable to studies from Kathmandu,<sup>8</sup> tribal districts of Himachal Pradesh<sup>9</sup> and Mokokchung district in Nagaland.<sup>10</sup> However, it was high as compared to other studies.<sup>11,12,13,14</sup> Prevalence of current smoking in rural Manipur was higher than the nation's overall prevalence<sup>15</sup> but lower than the prevalence in northeast India.<sup>16</sup> The prevalence of current smokeless tobacco use was comparable to a study by Tushi et al.,<sup>10</sup> but it was found to be higher than overall prevalence in India<sup>15</sup> (Mathur et al.) and northeast India<sup>16</sup> (Ramamoorthy et al.). Prevalence of alcohol consumption was found to be comparable to studies done in Kathmandu,<sup>8</sup> Himachal Pradesh<sup>9</sup> and the prevalence in northeast India.<sup>16</sup> However, it was higher than the overall national prevalence.<sup>15</sup>

High prevalence of inadequate vegetable or fruit intake was seen similar to other studies.<sup>9-13,15</sup> The prevalence of physical inactivity was lower than some studies<sup>11,12,14</sup> including national prevalence<sup>15</sup> but comparable to those with similar settings like tribal districts in Himachal Pradesh<sup>9</sup> and northeast India.<sup>16</sup> Overweight and obesity was found to be higher than that of the national<sup>15</sup> and northeast India<sup>16</sup> prevalence. Other studies<sup>8-11,13</sup> have also found lower prevalence. Prevalence of raised blood pressure was found to be higher than most studies<sup>8-13</sup> including the overall prevalence in India<sup>15</sup> and northeast India.<sup>16</sup>

Among the determinants of non-communicable diseases risk factors, other studies also show that age is significantly associated with overweight and obesity,<sup>11</sup> insufficient physical activity,<sup>13</sup> and raised blood pressure.<sup>8,12</sup> While some studies<sup>9</sup> show age is also significantly associated with current smoking, ours show significant association with current smokeless tobacco use. Like most studies,<sup>8,9,11-13</sup> we also found significant association between gender and tobacco use, alcohol consumption and insufficient physical activity. Al-Hanawi et al.<sup>12</sup> observed significant association between marital status and inadequate vegetable and fruit intake which was not observed in our study despite its high prevalence. Like some studies,<sup>9</sup> educational qualification was significantly associated with alcohol consumption. Though not

observed in our study, many studies<sup>8,9,12,13</sup> found that education qualification is significantly associated with insufficient physical activity, smoking and, inadequate vegetable and fruit intake. We found that occupation is significantly associated with all seven NCD risk factors assessed in this study, some studies<sup>8,12,13</sup> showed significant association with inadequate physical activity, tobacco use and alcohol consumption.

One limitation to this study could be erroneous recollection of age at which smoking started and age at which alcohol consumption started. It is also possible that social desirability bias may have been introduced for variables like number of cigarettes smoked in a week/day, number of smokeless tobacco product used in a week/day and number of alcoholic drinks on one occasion.

## Conclusion

In this study, we found significant association between age and use of smokeless tobacco products, insufficient physical activity, overweight /obesity and raised blood pressure. Proportion of smokeless tobacco users was highest among 30-44 years aged group, insufficient physical activity among 18-29 years age group, overweight and obesity among 45-59 years age group and raised blood pressure among 60-69 years age group.

We also found significant association between gender and smoking, use of smokeless tobacco products, alcohol consumption, insufficient physical activity and raised blood pressure; between marital status and use of smokeless tobacco products, overweight/obesity and raised blood pressure; between religion and use of smokeless tobacco products, insufficient fruits/vegetables intake and insufficient physical activities; between education level and use of smokeless tobacco products and alcohol consumption, and between socio-economic status and use of smokeless tobacco products. Occupation was found to have significant association with all seven risk factors of NCD assessed in this study.

It is our recommendation that interventions targeted to lifestyle and behaviour modifications among adult population and awareness of the

importance of proper diet tailored to address the rural areas appropriately and effectively should be employed for primary prevention of non-communicable diseases in rural Manipur.

**Ethical approval** was obtained from the Research Ethics Board, RIMS, Imphal [No. A/REB/Prop(SP)186/161/02/2023].

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