

# Sociodemographic risk factors of cardiovascular disease in rural Lucknow

Syed Esam Mahmood<sup>1</sup>, Pankaj Bhardwaj<sup>2</sup>, Jyoti Prakash Srivastava<sup>2</sup>, Kush Prasad Mathur<sup>3</sup>, Zeeshan Haider Zaidi<sup>2</sup>, Iram Shaifali<sup>4</sup>

<sup>1</sup>Department of Community Medicine, Rohilkhand medical college and Hospital, Bareilly – 24300, India

<sup>2</sup>Era's Lucknow medical college and Hospital, Lucknow – 226 003, India

<sup>3</sup>Katmandu Medical College, Nepal

<sup>4</sup>Department of Pharmacology, Rohilkhand medical college and Hospital, Bareilly – 243006, India

## ABSTRACT

**Background:** The burden of cardiovascular diseases in India has increased. The data regarding socio-demographic patterning of cardiovascular disease risk factors is scarce. **Objectives:** The socio-demographic patterning of cardiovascular disease risk factors in rural Lucknow was assessed. **Methods:** The cross-sectional survey was conducted among adults aged 18 years and above using a predesigned performa. Stratified random sampling and Probability Proportionate to Size technique was used. Three hundred and seventy three individuals gave consent and participated in the study. Prevalence rates of tobacco use, alcohol consumption, physical inactivity, low vegetable and fruit consumption, increased body mass index and raised blood pressure were determined. Data analysis was performed using SPSS windows version 14.0 software. **Results:** Only 14.7% of respondents admitted to alcohol consumption. The prevalence of smoking and smokeless tobacco use was 27.9% and 24.1% respectively. Sedentary physical activity was observed in 37.0% of respondents. Majority of respondents had low fruit intake (88.2%) and low vegetable intake (99.1%). Also 15.3% of respondents had an increased body mass index while 20.9% respondents had a raised blood pressure. Alcohol consumption, tobacco use, body mass index and waist circumference was higher among males. CVD risk factors studied were highly prevalent among those aged between 18-40 years of age. Hypertension increased with the increase in age. Alcohol and tobacco use and low fruit and vegetable intake were more common in the lower socioeconomic groups. **Conclusions:** High burden of cardiovascular disease risk factors was observed in the study population. Such information is useful for designing community based interventions to reduce risk factors in the population.

**Key words:** Cardiovascular disease; risk factors; rural areas

## INTRODUCTION

A risk factor is defined as any attribute or characteristic, or exposure of an individual whose presence or absence raises the probability of an adverse outcome. Ten common modifiable risk factors such as unhealthy diet, physical inactivity, smoking, alcohol use, tobacco use, overweight, raised blood pressure, raised total cholesterol levels and

raised blood sugar are highly prevalent among the world population.<sup>[1]</sup>

In India, Non-communicable diseases especially cardiovascular diseases (CVD) were responsible for 53 percent of deaths and 44 percent of disability adjusted life years lost in 2005.<sup>[2]</sup>

A total of nearly 64 million cases of CVD are likely in the year 2015, of which nearly 61 million would be Coronary heart diseases (CHD). Deaths from this group of diseases are likely to amount to be a staggering 3.4 million.<sup>[3]</sup>

The existing data suggests increase in burden of non communicable diseases in rural populations of India. This can be attributed to their adoption of urban lifestyle including affluent diet and unhealthy food choices.<sup>[4, 5]</sup>

**Address for correspondence:** Dr. Syed Esam Mahmood  
Assistant Professor  
Department of Community Medicine  
Rohilkhand medical college and Hospital  
Bareilly – 243006, UP, India; Phone: 8127537806

E-mail: semahmood@gmail.com

**DOI:** 10.5530/ijmedph.2.1.10

The literature on socio-demographic patterning of cardiovascular disease risk factors in rural India is scarce. Such information is useful for predicting the future course of epidemic and designing community based interventions to reduce risk factors in the population. Thereby the present study was undertaken to provide the data on prevalence of cardiovascular disease risk factors by age, gender and socioeconomic status amongst adults aged 18 years and above in rural Lucknow.

## MATERIALS AND METHODS

This cross sectional study was carried out in villages of Kakori block of Lucknow district. Stratified random sampling and Probability Proportionate to Size technique was used to select the study subjects. All villages in the study area were primary sample units (PSU) i.e. strata. All adults aged 18 years and above from the PSUs selected formed sampling units. Considering the prevalence rate of any of the cardiovascular risk factors approximately 35 per cent the sample size was calculated.<sup>[6]</sup>

The following formula was used: Sample size =  $4PQ/L^2$ . Where, P is Prevalence = 35%, Q = 100 – P = 65% and L is absolute error = 5%. Sample size came out to be 364. A total of 373 individuals (204 men and 169 women) gave consent and participated in the study. Information on socio-demographic variables (age, gender and socioeconomic status) and cardiovascular risk factors (tobacco use [smoked and smokeless], alcohol use, diet, physical activity, overweight, obesity and hypertension) were collected using a redesigned and pretested questionnaire.

Following Operational Definitions were put to use in the present study:

1. Current smoker- someone who at the time of survey, smoked in any form either daily or occasionally.
2. Current smokeless tobacco use- reported consumption of smokeless tobacco in any form at the time of the survey either daily or occasionally.
3. Current drinker- Those who consumed 1 or more drinks of any type of alcohol in the year preceding the survey.
4. Low fruit and vegetable intake- consumption of fruit and vegetable intake less than two servings per day.

5. Sedentary physical activity- work mostly sitting, transport not walking or using bicycle, and rest and leisure involves mostly sitting.
6. Overweight - body mass index level of  $> 25 \text{ Kg/m}^2$ .
7. Abdominal obesity (Increased waist circumference):  $\geq 90 \text{ cms}$  for males and  $\geq 80 \text{ cms}$  for females.
8. Hypertension- mean systolic BP  $\geq 140 \text{ mmHg}$  and/or mean diastolic BP  $\geq 90 \text{ mmHg}$  or history of anti hypertensive treatment fifteen days before the survey.

Modified Prasad's classification was applied to measure the individual's socioeconomic status.<sup>[7]</sup>

Data entry and statistical analysis were performed using the Microsoft Excel and Statistical Package of Social Sciences (SPSS) windows version 14.0 software.

## RESULTS

Three hundred and seventy three individuals were surveyed. Majority of the respondents were between 18-40 years of age (59.5%) and were males (54.7%). Higher proportion of respondents belonged to lower middle class applying modified Prasad's classification (50.4%). [Table 1]

Only 14.7% respondents admitted to alcoholic consumption. One hundred and four (27.9%) individuals were smokers and ninety (24.1%) individuals used smokeless tobacco. Thirty seven percent of respondents had sedentary physical activity. Majority of respondents had a low fruit intake (88.2%) and a low vegetable intake (99.1%). About 15.3% of respondents had an increased body mass index while 22.5% had an increased waist circumference. Also 20.9% of individuals had hypertension. Alcohol consumption, tobacco use, body mass index and waist circumference were significantly higher among males as compared to females. [Table 2]

CVD risk factors were highly prevalent among those aged between 18-40 years of age. Hypertension was significantly higher among those aged 40 years and above. [Table 3]

Age standardised prevalence of risk factors by socioeconomic position and gender was studied. Alcohol and tobacco use and low fruit and vegetable intake were more common in the lower socioeconomic groups. [Table 4]

## DISCUSSION

In the present study males were higher in proportion (54.7%). This is different from that reported in census 2001, for District Lucknow (888 females per 1000 males) as our study was limited to field practice areas only.<sup>[8]</sup>

In our study the prevalence of smoking was 27.9% and smokeless tobacco use was 24.1%. More than 14% of all adults smoke tobacco and 26% use smokeless tobacco in India.<sup>[9]</sup>

Our findings are comparable to those (16.0%) reported by the cross-sectional study conducted in rural Pune<sup>6</sup>. The prevalence of current smoking was reported to be 19.9% in a rural South India study.<sup>[10]</sup>

In our study only 14.7% respondents admitted to the alcoholic consumption habit which is similar to the observation reported (15.9%) in a study conducted in rural Andhra Pradesh.<sup>[11]</sup>

Sedentary physical activity was observed in 37.0% of respondents in the present study. Physical activity was uncommon in a Kerala study.<sup>[12]</sup>

Prevalence of hypertension in this study (20.9%) is comparable to the prevalences reported in previous studies.<sup>[10,11]</sup>

The current study indicates that the majority of respondents had low fruit intake (88.2%) and low vegetable intake (99.1%) respectively. Similar findings have been reported in a rural Haryana study.<sup>[13]</sup>

The suboptimal intake by the study population could be attributed to their high cost, or the low priority given to protective foods in Indian diets. It has been demonstrated that daily intake of fresh fruit and vegetables (including berries, green leafy and cruciferous vegetables and legumes), in an adequate quantity (400–500 g/d) is recommended to reduce the risk of coronary heart disease, stroke and high blood pressure.<sup>[14]</sup>

A systematic review on ecological, case–control and cohort studies found a significant protective association for CHD with consumption of fruit and vegetables or surrogate nutrients.<sup>[15]</sup>

The risk factors like alcohol consumption, tobacco use, increased body mass index and waist circumference were significantly higher among males as compared to females. The Global Adult Tobacco Survey reported a

higher prevalence of smoking and smokeless tobacco use among males (24% and 32.9%) than among females (3% and 18.4%).<sup>[9]</sup>

CVD risk factors were highly prevalent among those aged between 18–40 years of age. The Global Adult Tobacco Survey reported similar trends regarding tobacco use. A higher prevalence of obesity measures was also observed for similar age group in a previous study conducted among people of Asian Indian origin.<sup>[16]</sup> In our study hypertension was significantly higher among those aged 40 years and above. The study conducted among people of Asian Indian origin also reported similar results.<sup>[16]</sup>

Alcohol consumption, tobacco use and low fruit and vegetable intake were more common in the lower socioeconomic groups. Similar trends have been observed in a cross-sectional study conducted in rural populations of north, centre and south India.<sup>[17]</sup>

Although our study is limited to field practice areas of the rural centre it had a representative mix of subjects with different age groups. Marked differences in methodologies between studies make comparisons of risk factor data and their interpretation difficult. The high prevalence of CVD risk factors among the rural population in our study especially among the younger age groups suggests an early initiation of CVD among them in future.

Adoption of healthy lifestyles by all individuals is critical for the prevention of cardiovascular diseases and an indispensable part of the management of those with cardiovascular diseases. Public education is best achieved by means of simple, action oriented messages that build on the community's existing knowledge of the risks and value of treating cardiovascular diseases.

**Table 1: Distribution of respondents according to their socio demographic characteristics:**

| Socio demographic characteristics | Males (n=204) | Females (n=169) | Total (n=373) |
|-----------------------------------|---------------|-----------------|---------------|
|                                   | No. (%)       | No. (%)         | No. (%)       |
| <b>Age:</b>                       |               |                 |               |
| 18–30yrs                          | 58 (15.5%)    | 62 (16.6%)      | 120 (32.2%)   |
| 31–40yrs                          | 60 (16.1%)    | 42 (11.3%)      | 102 (27.3%)   |
| 41–50yrs                          | 27 (7.2%)     | 20 (5.4%)       | 47 (12.6%)    |
| 51–60yrs                          | 28 (7.5%)     | 25 (6.7%)       | 53 (14.2%)    |
| >60yrs                            | 31 (8.3%)     | 20 (5.4%)       | 51 (13.7%)    |
| <b>Socio-economic status:</b>     |               |                 |               |
| I                                 | 10 (2.7%)     | 4 (1.1%)        | 14 (3.8%)     |
| II                                | 12 (3.2%)     | 10 (2.7%)       | 22 (5.9%)     |
| III                               | 22 (5.9%)     | 16 (4.3%)       | 38 (10.2%)    |
| IV                                | 109 (29.2%)   | 79 (21.2%)      | 188 (50.4%)   |
| V                                 | 51 (13.7%)    | 60 (16.1%)      | 111 (29.8%)   |

**Table 2: Distribution of respondents by Risk factors for non-communicable disease:**

| Risk factors                           | Males (n=204) |             | Females (n=169) |         | Total (n=373) |         | P-value<br>Chi-square(df) |
|--|---------------|-------------|-----------------|---------|---------------|---------|---------------------------|
|  | No. (%)       | No. (%)     | No. (%)         | No. (%) | No. (%)       | No. (%) |                           |
| <b>Alcohol Consumption:</b>            |               |             |                 |         |               |         |                           |
| Present                                | 53 (14.2%)    | 2 (0.5%)    | 55 (14.7%)      |         |               |         | .000                      |
| Absent                                 | 151(40.5%)    | 167 (44.8%) | 318 (85.3%)     |         |               |         | 45.210(1)                 |
| <b>Smoking habit:</b>                  |               |             |                 |         |               |         |                           |
| Present                                | 97 (26.0%)    | 7 (1.9%)    | 104 (27.9%)     |         |               |         | .000                      |
| Absent                                 | 107 (28.7%)   | 162 (43.4%) | 269 (72.1%)     |         |               |         | 86.608(1)                 |
| <b>Smokeless tobacco use:</b>          |               |             |                 |         |               |         |                           |
| Present                                | 67 (18.0%)    | 23 (6.2%)   | 90 (24.1%)      |         |               |         | .000                      |
| Absent                                 | 137 (36.7%)   | 146 (39.1%) | 283 (75.9%)     |         |               |         | 18.678 (1)                |
| <b>Intensity of physical activity:</b> |               |             |                 |         |               |         |                           |
| Sedentary                              | 84 (22.5%)    | 54 (14.5%)  | 138 (37.0%)     |         |               |         | .066                      |
| Active                                 | 120 (32.2%)   | 115 (30.8%) | 235 (63.0%)     |         |               |         | 3.374(1)                  |
| <b>Low fruit intake:</b>               |               |             |                 |         |               |         |                           |
| Present                                | 180 (48.3%)   | 149 (39.9%) | 329 (88.2%)     |         |               |         | .983                      |
| Absent                                 | 24 (6.4%)     | 20 (5.4%)   | 44 (11.8%)      |         |               |         | .000(1)                   |
| <b>Low vegetable intake:</b>           |               |             |                 |         |               |         |                           |
| Present                                | 203 (54.4%)   | 167 (44.8%) | 370 (99.1)      |         |               |         | .456                      |
| Absent                                 | 1 (0.3%)      | 2 (0.5%)    | 3 (0.8%)        |         |               |         | .557(1)                   |
| <b>Increased Body mass index</b>       |               |             |                 |         |               |         |                           |
| Present                                | 24 (6.4%)     | 33 (8.8%)   | 57 (15.3%)      |         |               |         | .038                      |
| Absent                                 | 180 (48.3%)   | 136 (36.5%) | 316 (84.7%)     |         |               |         | 4.301(1)                  |
| <b>Hypertension</b>                    |               |             |                 |         |               |         |                           |
| Present                                | 43 (11.5%)    | 35 (9.4%)   | 78 (20.9%)      |         |               |         | .931                      |
| Absent                                 | 161 (43.2%)   | 134 (35.9%) | 295 (79.1%)     |         |               |         | .008(1)                   |
| <b>Increased waist circumference</b>   |               |             |                 |         |               |         |                           |
| Present                                | 25 (6.7%)     | 59 (15.8%)  | 84 (22.5%)      |         |               |         | .000                      |
| Absent                                 | 179 (48.0%)   | 110 (29.5%) | 289 (77.5%)     |         |               |         | 27.191(1)                 |

**Table 3: Distribution of respondents by Risk factors for non-communicable disease by age and gender:**

| Risk factors                  | Males (n=204) |            |            |            |            | Females (n=169) |            |            |            |            | Total (All ages) |         |               |                 |         |
|-------------------------------|---------------|------------|------------|------------|------------|-----------------|------------|------------|------------|------------|------------------|---------|---------------|-----------------|---------|
|                               | 18-30yrs      | 31-40yrs   | 41-50yrs   | 51-60yrs   | >60yrs     | P-value         | 18-30yrs   | 31-40yrs   | 41-50yrs   | 51-60yrs   | >60yrs           | P-value | Males (n=204) | Females (n=169) | P-value |
| Alcohol Consumption           | 14 (6.9%)     | 18 (8.8%)  | 7 (3.4%)   | 7 (3.4%)   | 7 (3.4%)   | .938            | 1 (0.6%)   | 0 (0.0%)   | 0 (0.0%)   | 1 (0.6%)   | 0 (0.0%)         | .596    | 53 (26.0%)    | 2 (1.2%)        | .000    |
| Smoking habit                 | 15 (7.4%)     | 31 (15.2%) | 15 (7.4%)  | 17 (8.3%)  | 19 (9.3%)  | .003            | 2 (1.2%)   | 1 (0.6%)   | 1 (0.6%)   | 1 (0.6%)   | 2 (1.2%)         | .694    | 97 (47.5%)    | 7 (4.1%)        | .000    |
| Smokeless tobacco use         | 20 (9.8%)     | 24 (11.8%) | 7 (3.4%)   | 6 (2.9%)   | 10 (4.9%)  | .447            | 6 (3.6%)   | 7 (4.1%)   | 3 (1.8%)   | 3 (1.8%)   | 4 (2.4%)         | .748    | 67 (32.8%)    | 23 (13.6%)      | .000    |
| Physical inactivity           | 23 (11.3%)    | 18 (8.8%)  | 9 (4.4%)   | 19 (9.3%)  | 15 (7.4%)  | .013            | 15 (8.9%)  | 14 (8.3%)  | 3 (1.8%)   | 14 (8.3%)  | 8 (4.7%)         | .020    | 84 (41.2%)    | 54 (32.0%)      | .066    |
| Low fruit intake              | 49 (24.0%)    | 52 (25.5%) | 25 (12.3%) | 26 (12.7%) | 28 (13.7%) | .712            | 56 (33.1%) | 32 (18.9%) | 19 (11.2%) | 23 (13.6%) | 19 (11.2%)       | .085    | 180 (88.2%)   | 149 (88.1%)     | .983    |
| Low vegetable intake          | 57 (27.9%)    | 60 (29.4%) | 27 (13.2%) | 28 (13.7%) | 31 (15.2%) | .639            | 62 (36.7%) | 41 (24.3%) | 19 (11.2%) | 25 (14.8%) | 20 (11.8%)       | .276    | 203 (99.5%)   | 167 (98.8%)     | .456    |
| Increased BMI                 | 6 (2.9%)      | 11 (5.4%)  | 2 (1.0%)   | 3 (1.5%)   | 2 (1.0%)   | .410            | 11 (6.5%)  | 5 (3.0%)   | 7 (4.1%)   | 5 (3.0%)   | 5 (3.0%)         | .276    | 24 (11.7%)    | 33 (19.5%)      | .038    |
| Hypertension                  | 6 (2.9%)      | 10 (4.9%)  | 7 (3.4%)   | 10 (4.9%)  | 10 (4.9%)  | .026            | 7 (4.1%)   | 6 (3.6%)   | 9 (5.3%)   | 7 (4.1%)   | 6 (3.6%)         | .009    | 43 (21.1%)    | 35 (20.7%)      | .931    |
| Increased waist circumference | 3 (1.5%)      | 12 (5.9%)  | 4 (2.0%)   | 3 (1.5%)   | 3 (1.5%)   | .167            | 15 (8.9%)  | 16 (9.5%)  | 11 (6.5%)  | 8 (4.7%)   | 9 (5.3%)         | .097    | 25 (12.2%)    | 59 (34.9%)      | .000    |

**Table 4: Distribution of respondents by Risk factors for non-communicable disease by socioeconomic status:**

| Risk factors                  | Males socioeconomic status (n=204) |              |            |              |            | Females socioeconomic status (n=169) |          |              |            |              | Total (All socioeconomic status) |         |               |                 |
|-------------------------------|------------------------------------|--------------|------------|--------------|------------|--------------------------------------|----------|--------------|------------|--------------|----------------------------------|---------|---------------|-----------------|
|                               | Upper                              | Upper-middle | Middle     | Lower-middle | Lower      | P-value                              | Upper    | Upper-middle | Middle     | Lower-middle | Lower                            | P-value | Males (n=204) | Females (n=169) |
| Alcohol Consumption           | 1 (0.5%)                           | 3 (1.5%)     | 6 (2.9%)   | 29 (14.2%)   | 14 (6.9%)  | .839                                 | 0 (0.0%) | 0 (0.0%)     | 0 (0.0%)   | 0 (0.0%)     | 2 (1.2%)                         | .452    | 53 (26.0%)    | 2 (1.2%)        |
| Smoking habit                 | 5 (2.5%)                           | 3 (1.5%)     | 10 (4.9%)  | 50 (24.5%)   | 29 (14.2%) | .354                                 | 0 (0.0%) | 0 (0.0%)     | 0 (0.0%)   | 5 (3.0%)     | 2 (1.2%)                         | .672    | 97 (47.5%)    | 7 (4.1%)        |
| Smokeless tobacco use         | 3 (1.5%)                           | 3 (1.5%)     | 8 (3.9%)   | 34 (16.7%)   | 19 (9.3%)  | .897                                 | 0 (0.0%) | 0 (0.0%)     | 1 (0.6%)   | 13 (7.7%)    | 9 (5.3%)                         | .465    | 67 (32.8%)    | 23 (13.6%)      |
| Physical inactivity           | 5 (2.5%)                           | 6 (2.9%)     | 6 (2.9%)   | 45 (22.1%)   | 22 (10.8%) | .637                                 | 4 (3.0%) | 8 (6.0%)     | 22 (16.5%) | 32 (24.1%)   | 28 (21.1%)                       | .678    | 84 (41.2%)    | 54 (32.0%)      |
| Low fruit intake              | 8 (3.9%)                           | 12 (5.9%)    | 20 (9.8%)  | 94 (46.1%)   | 46 (22.5%) | .556                                 | 3 (1.8%) | 7 (4.1%)     | 14 (8.3%)  | 68 (40.2%)   | 57 (33.7%)                       | .144    | 180 (88.2%)   | 149 (88.1%)     |
| Low vegetable intake          | 10 (4.9%)                          | 12 (5.9%)    | 22 (10.8%) | 108 (52.9%)  | 51 (25.0%) | .928                                 | 3 (1.8%) | 10 (5.9%)    | 16 (9.5%)  | 79 (46.7%)   | 60 (35.5%)                       | .000    | 203 (99.5%)   | 167 (98.8%)     |
| Increased BMI                 | 1 (0.5%)                           | 2 (1.0%)     | 6 (2.9%)   | 11 (5.4%)    | 4 (2.0%)   | .168                                 | 2 (1.2%) | 2 (1.2%)     | 4 (2.4%)   | 15 (8.9%)    | 10 (5.9%)                        | .558    | 24 (11.7%)    | 33 (19.5%)      |
| Hypertension                  | 5 (2.5%)                           | 2 (1.0%)     | 5 (2.5%)   | 19 (9.3%)    | 12 (5.9%)  | .181                                 | 1 (1.6%) | 2 (1.2%)     | 8 (4.7%)   | 18 (10.7%)   | 6 (3.6%)                         | .012    | 43 (21.1%)    | 35 (20.7%)      |
| Increased waist circumference | 2 (1.0%)                           | 2 (1.0%)     | 6 (2.9%)   | 13 (6.4%)    | 2 (1.0%)   | .069                                 | 4 (2.4%) | 3 (1.8%)     | 7 (4.1%)   | 29 (17.2%)   | 16 (9.5%)                        | .040    | 25 (12.2%)    | 59 (34.9%)      |

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