

Does Lifestyle Matters in Prevalence of Tuberculosis: Evidence from India

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Introduction and Context

Smoking, drinking and tobacco use continues to be the leading cause of preventable death worldwide. However, the burden of this health behaviour (related with smoking, drinking and chewing tobacco) is shifting from developed to developing countries. By 2030, it is estimated that 10 million people per year will die from these health behaviors with 70 percent of those deaths occurring in developing countries (Reddy et al., 2006). World Health Organization has projected that by 2015, 59 percent of the total deaths in India would be due to non-communicable diseases. Again, in India the proportion of all deaths that can be attributed to these three health behaviors are expected to rise from 1.4 percent in 1990 to 13.3 percent in 2020 (Reddy et al., 2006). All three of these health behaviors are well known risk factors for tuberculosis and cardiovascular diseases. Holzman (2001) has found a link between tobacco consumption and its related health problems like malaria, tuberculosis and HIV in Africa. He has noted that the average life expectancy in Africa is declining due to these health problems. He is also of the view that tobacco related diseases are expected to become Africa's biggest killer within 20 years (only 1 out of every 84 Africans). Generally, there is socio-economic differentials in these behaviors at macro level environments (such as national, regional and states level) as well as at micro level environments (household and individual level). The local area variation in health behaviors may be largely due to socio-cultural influences, while regional or state level variations may largely induced by public policies on smoking, alcohol drinking and chewing tobacco.

Smoking is a risk factor for mortality from several medical causes. The hazards of smoking depend on several factors such as the age at which smoking began, number of cigarettes smoked per day, cigarettes characteristics (such as tar and nicotine content or filter type) and degree of inhalation. Many of these factors vary overtime and across generations because of

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changes in the socio-economic determinants of smoking such as income and tobacco control efforts including tobacco trade and advertising laws and prices (including taxes). India is at third position in tobacco production after China and USA. About 6 million Indian farmers are engaged in growing tobacco (Gupta and Shankar, 2003). At the same time the enormous health costs have made tobacco control a serious issue. In many parts of the world tobacco consumption mostly takes the form of smoking cigarettes but in South Asia, tobacco consumption takes many different forms. In addition to manufactured cigarettes, hand-rolled cigarettes called Bidis are more commonly used. Tobacco can also be chewed inside a *paan* or ghutka or betel leaf. Tobacco is widely consumed and remains as the single most important preventable risk factors with 47 percent of men and 15 percent of women being regular consumers of tobacco (*country-cooperation strategy, 2006-2011 India*).

Additionally, alcohol use disorders have been prevalent across all societies. The pattern of alcohol use varies depending on age, religion, education, type of drink and other socio-demographic characteristics. Nizard (1993) has assessed number of deaths due to alcohol and tobacco consumption in France and has tried to explain how many deaths in a given year (1986) are brought on prematurely by drinking and smoking. Since 1970, 47 percent of developing countries in transition and 35 percent of developed countries have increased their consumption of absolute alcohol per adult (*World Health Organization, 1999*). Ezzati and Lopez (2003) have explained that in 2000, smoking was an important cause of global mortality. They have estimated that in 2000, 4.83 million premature deaths in the world were attributable to smoking (2.41 million in developing countries and 2.43 million in industrialized countries). Out of these deaths, 3.84 million were men. The leading causes of death from smoking were cardiovascular diseases, chronic diseases, lung cancer and tuberculosis.

Gro Harlem Brundtland Director, General World Health Organization says, "***Tuberculosis which many of us belived would disappear in our life time has staged a frightening comeback.***" Tuberculosis is an airborne contagious disease that is transmitted by coughing or sneezing. Once a person becomes infected any condition that weakens that immune system can trigger the development of active tuberculosis. Exposure to cooking smoke can increase the risk of tuberculosis by reducing resistance to initial infection or by promoting the development of active tuberculosis in already infected persons. Tuberculosis is common in India where about half of the adult population is infected with tuberculosis bacteria; millions have active disease and about half a million die from it every year (Mishra et al, 2002). Air pollution is a major public health problem in developing countries. The air pollution is also affected by use of biomass fuels such as wood, animal dung, crop residues and grasses for cooking and heating. This air pollution is also increased the prevalence of tuberculosis. In the south Asia, as many as 80 percent of all homes, cook with biomass fuels. This biomass fuel emits carbon monoxide, nitrogen oxides, formaldehyde and dozen of toxic polyaromatic hydrocarbons. This biomass cooking fuel generates various types of diseases like chronic bronchitis, asthma and tuberculosis.

It is also linked with lung cancer and blindness because combustion is incomplete burning them in open fire places or in simple indoor cook stove releases large amount of health-damaging air pollutants.

Tuberculosis has a potential influence on the overall mortality and has been a concern for the government of India. It has also been found that the prevalence of various lifestyle indicators such as smoking, alcohol drinking and chewing tobacco has also been increasing. Although, it is presumed that the lifestyle indicators have a close association with prevalence of tuberculosis, only a few studies have attempted to study the same in Indian context. In view of this, the present study attempts to understand the association between some selected lifestyle indicators and its association with tuberculosis. It has been thought over that such an attempt using the most recent available data will benefit the policy makers in understanding the current situation and the subsequent need for further program and planning.

Broadly, the present study attempts to understand the levels and patterns of selected lifestyle indicators and its association with tuberculosis prevalence in India. Specifically, the objectives are:

- To study the levels and patterns of selected lifestyle indicators among women and men.
- To understand the regional variation in the levels and patterns of selected lifestyle indicators among women and men.
- To study the association of selected lifestyle indicators with the prevalence of tuberculosis.

Data and Methodology

The present study utilizes the data from 2nd (1998-99) and 3rd round (2005-06) of National Family Health Surveys in India. NFHS-2 and NFHS-3 has collected information from a national representative sample of 91,196 and 109,041 households population, 89,199 and 124,385 women aged (15-49) respectively and 74369 men aged (15-54) only in NFHS-3. For our analysis purpose both household file and individual file have been used. This is because in NFHS-2, all variables under study such as smoking, chewing tobacco, alcohol drinking and suffer from tuberculosis (for usual residents) is available in the household file. However, in NFHS-3, some information like smoking, drinking alcohol and chewing tobacco is available in individual file but suffer from tuberculosis (for usual residents) is asked in household file. So at the time of analysis, we have excluded all visitors from the household file.

The data has been analyzed through SPSS 15.0 and our analytical approach includes both bivariate and multivariate analysis. The bivariate analysis examines the association between selected independent variables and dependent variables. Again, logistic regression has been

carried out to find out the extent that the independent variables can predict the dependent variables. Keeping in view the objectives of the present analysis and existing literature besides the availability of data, a number of variables have been considered for the present analysis. In order to understand the regional variation in the prevalence of tuberculosis, various states have been merged into six regions as per the NFHS criteria. The six region are: **North region** (*Delhi, Haryana, Himachal Pradesh, Jammu & Kashmir, Punjab, Rajasthan, and Uttaranchal*); **Central region** (*Chhattisgarh, Madhya Pradesh, and Uttar Pradesh*); **East region** (*Bihar, Jharkhand, Orissa, and West Bengal*); **North-East region** (*Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, and Tripura*); **West region** (*Goa, Gujarat, and Maharashtra*); and **South region** (*Andhra Pradesh, Karnataka, Kerala, and Tamil Nadu*).

Results and Discussion

Table 1: Percentage of women aged 15-49 years, those who are smoking, drinking alcohol, chewing tobacco and suffering from tuberculosis according to residence, India (1998-99 and 2005-06)

| | 1998-99 | | | 2005-06 | | |
|------------------------|--------------|--------------|---------------|--------------|--------------|---------------|
| | Urban | Rural | Total | Urban | Rural | Total |
| Lifestyle indicators | | | | | | |
| Smoke | 0.46 | 2.22 | 1.72 | 0.57 | 2.14 | 1.62 |
| Drink alcohol | 0.37 | 2.54 | 1.92 | 0.59 | 3.08 | 2.25 |
| Chew Tobacco | 6.62 | 10.59 | 9.46 | 5.57 | 10.06 | 8.57 |
| Tuberculosis | 0.35 | 0.63 | 0.55 | 0.29 | 0.51 | 0.44 |
| Number of women | 33387 | 84007 | 117394 | 39025 | 78562 | 117587 |

Note: Smoke refers to smoke cigarettes or bidis/cigar or pipe

Chewing tobacco refers to chewing tobacco/ghutka/paan masala

Table1 depicts the percentage of women aged 15-49 years currently smoking, drinking alcohol, chewing tobacco and suffering from tuberculosis by place of residence for all India. The percentage of women who smoke and chew tobacco and those who are suffering from TB has declined from 1998-99 to 2005-06, while those women who drink alcohol have increased from 1.92 percent to 2.25 percent during the time period under analysis. Also compared to urban females, rural females have reported higher use of alcohol, smoking and chewing tobacco during the same period, while percentage of TB patients is also higher in rural females than their counterparts.

Table 2: Percentage of men aged 15-49 years, those who are smoking, drinking alcohol, chewing tobacco and suffering from tuberculosis according to residence, India (1998-99 and 2005-06)

| | 1998-99 | | | 2005-06 | | |
|----------------------|--------------|--------------|---------------|--------------|--------------|--------------|
| | Urban | Rural | Total | Urban | Rural | Total |
| Lifestyle indicators | | | | | | |
| Smoke | 19.69 | 30.48 | 27.26 | 28.65 | 35.17 | 32.76 |
| Drink alcohol | 11.97 | 18.07 | 16.26 | 30.79 | 32.17 | 31.66 |
| Chew Tobacco | 20.66 | 29.48 | 26.85 | 31.03 | 39.21 | 36.19 |
| Tuberculosis | 0.42 | 0.81 | 0.69 | 0.35 | 0.72 | 0.59 |
| Number of men | 35963 | 84887 | 120850 | 24927 | 42628 | 67555 |

As compared to 1998-99, there is drastic change in percentage of men who drink alcohol as it has increased from 16 percent to 32 percent in 2005-06 and percentage of men who smoke and chew tobacco has increased by nearly 5 percent and 10 percent respectively while those men who are suffering from TB has declined from 0.69 percent to 0.59 percent during these time period (**Table 2**). Rural males have reported higher percentage of these lifestyle indicators as well as TB patients than their counterparts during both time periods. Also the uses of these substances are higher in urban as well as rural male in 2005-06 as compared to 1998-99.

Table 3: Percentage of women aged 15-49 years, those who are smoking, drinking alcohol, chewing tobacco and suffering from tuberculosis by region, India (1998-99 and 2005-06)

| Region | 1998-99 | | | | | 2005-06 | | | | |
|--------------|-------------|---------------|--------------|-------------|---------------|-------------|---------------|--------------|-------------|---------------|
| | Smoke | Drink alcohol | Chew tobacco | TB | No. of women | Smoke | Drink alcohol | Chew tobacco | TB | No. of women |
| India | 1.72 | 1.92 | 9.46 | 0.55 | 117394 | 1.62 | 2.25 | 8.57 | 0.44 | 117587 |
| North | 2.51 | 0.16 | 1.82 | 0.38 | 15472 | 2.37 | 0.20 | 2.01 | 0.24 | 15649 |
| Central | 1.58 | 1.08 | 9.59 | 0.71 | 25324 | 1.94 | 1.89 | 11.23 | 0.47 | 26929 |
| East | 2.71 | 2.98 | 12.53 | 0.76 | 25602 | 2.71 | 3.48 | 12.75 | 0.72 | 26083 |
| North-East | 3.33 | 9.14 | 21.87 | 0.69 | 4558 | 2.19 | 7.81 | 27.28 | 0.57 | 4779 |
| West | 0.36 | 0.59 | 11.74 | 0.39 | 17439 | 0.40 | 0.54 | 6.82 | 0.40 | 17723 |
| South | 1.09 | 2.32 | 7.37 | 0.39 | 28999 | 0.48 | 2.75 | 3.41 | 0.25 | 26424 |

Table 3 shows the percentage of women who use any substances and those who suffer from tuberculosis by regions. It has been observed that higher percentages of women from North-East region are using any substances than those women from other regions of India. As may be seen in 1998-99, about three percent of women from North-East smoke; nine percent consume alcohol and 22 percent chew tobacco. The same is about three percent, three percent and 13 percent respectively among the women from Eastern region. It has also seen that the prevalence of tuberculosis is the highest among women from eastern region (0.76 percent) while it is the lowest among women from northern region (0.38 percent). Similar trend may be seen in 2005-06. The table further clarifies that higher percentage of women from north-eastern region consume alcohol (8 percent) and chew tobacco (27 percent) than those women from other regions. However, the percent of women who smoke has marginally declined among women from north-eastern region.

The analysis depicts that those women who are from North-East region have reported higher chew tobacco than the other substances like alcohol and smoke followed by Eastern and Western part of women. **Table 4** shows that among all the regions, men who belong to North-East have the highest use of these substances in both time periods. In each region the percentage of smoking, alcohol drinking and chew tobacco is increasing during 1998-99 to 2005-06 periods. Again, a remarkable increase has been noticed in the consumption of alcohol and chewing tobacco during the analysis period. So far as the prevalence of tuberculosis is concerned, a declining pattern has been emerged among the men from all regions except those from western region.

Table 4: Percentage of men aged 15-49 years, those who are smoking, drinking alcohol, chewing tobacco and suffering from tuberculosis by region, India (1998-99 and 2005-06)

| Region | 1998-99 | | | | | 2005-06 | | | | |
|--------------|--------------|---------------|--------------|-------------|---------------|--------------|---------------|--------------|-------------|--------------|
| | Smoke | Drink alcohol | Chew tobacco | TB | No. of men | Smoke | Drink alcohol | Chew tobacco | TB | No. of men |
| India | 27.26 | 16.26 | 26.85 | 0.69 | 120850 | 32.76 | 31.66 | 36.19 | 0.59 | 67555 |
| North | 30.57 | 17.16 | 13.66 | 0.51 | 16328 | 35.02 | 27.55 | 21.78 | 0.52 | 9650 |
| Central | 31.06 | 14.66 | 36.76 | 0.85 | 26352 | 36.59 | 28.96 | 47.87 | 0.70 | 15896 |
| East | 29.32 | 17.38 | 38.11 | 0.96 | 26393 | 36.15 | 35.31 | 47.66 | 0.71 | 13546 |
| North-East | 33.26 | 26.09 | 42.52 | 1.02 | 4558 | 40.76 | 40.19 | 54.91 | 0.89 | 2766 |
| West | 15.15 | 9.69 | 30.7 | 0.43 | 18821 | 20.51 | 21.51 | 39.6 | 0.57 | 11118 |
| South | 26.98 | 18.88 | 9.64 | 0.53 | 28398 | 31.77 | 40.07 | 16.18 | 0.35 | 14579 |

Table 5: Percentage of women aged 15-49 years, those who are smoking, drinking alcohol, chewing tobacco and suffering from tuberculosis by selected background characteristics, India (1998-99 and 2005-06)

| Background Characteristics | 1998-99 | | | | | 2005-06 | | | | |
|----------------------------|-------------|---------------|--------------|-------------|---------------|-------------|---------------|--------------|-------------|---------------|
| | Smoke | Drink alcohol | Chew tobacco | TB | No. of women | Smoke | Drink alcohol | Chew tobacco | TB | No. of women |
| Age | | | | | | | | | | |
| 15-24 | 0.42 | 0.85 | 3.34 | 0.26 | 42200 | 0.31 | 1.20 | 3.72 | 0.32 | 43380 |
| 25-34 | 1.48 | 2.13 | 9.27 | 0.60 | 38202 | 1.45 | 2.52 | 8.99 | 0.52 | 36113 |
| 35-49 | 3.44 | 2.93 | 16.64 | 0.76 | 36992 | 3.26 | 3.19 | 13.70 | 0.49 | 38094 |
| Education | | | | | | | | | | |
| No education | 3.20 | 3.50 | 13.99 | 0.81 | 55480 | 3.49 | 4.32 | 13.74 | 0.73 | 48154 |
| Primary | 0.82 | 0.97 | 10.06 | 0.51 | 19251 | 0.79 | 1.42 | 9.97 | 0.31 | 17264 |
| Secondary | 0.24 | 0.38 | 4.18 | 0.27 | 29436 | 0.17 | 0.60 | 3.76 | 0.23 | 43653 |
| Higher | 0.11 | 0.14 | 1.37 | 0.17 | 13227 | 0.15 | 0.69 | 1.14 | 0.08 | 8516 |
| Religion | | | | | | | | | | |
| Hindu | 1.67 | 2.10 | 9.42 | 0.53 | 94747 | 1.64 | 2.45 | 8.46 | 0.43 | 94357 |
| Muslim | 2.09 | 0.22 | 9.87 | 0.67 | 15132 | 1.81 | 0.24 | 9.23 | 0.56 | 16222 |
| Christian | 2.64 | 3.28 | 10.42 | 0.68 | 3379 | 1.48 | 4.23 | 11.11 | 0.52 | 2907 |
| Sikh | 0.00 | 0.05 | 0.05 | 0.29 | 2052 | 0.05 | 0.05 | 0.14 | 0.04 | 2165 |
| Others | 1.33 | 5.87 | 16.07 | 0.65 | 2084 | 0.77 | 8.93 | 13.73 | 0.40 | 1936 |
| SLI | | | | | | | | | | |
| Low | 3.18 | 4.00 | 15.53 | 0.85 | 37061 | 3.52 | 4.85 | 15.13 | 0.85 | 30119 |
| Medium | 1.40 | 1.38 | 8.48 | 0.51 | 54649 | 1.67 | 2.07 | 9.39 | 0.43 | 38002 |
| High | 0.33 | 0.25 | 3.16 | 0.23 | 25684 | 0.51 | 0.84 | 4.15 | 0.21 | 49466 |
| Caste | | | | | | | | | | |
| SC | 2.52 | 1.52 | 11.67 | 0.76 | 20840 | 2.56 | 1.97 | 10.78 | 0.56 | 22033 |
| ST | 3.20 | 12.26 | 19.60 | 0.82 | 10068 | 2.85 | 14.46 | 21.48 | 0.60 | 9619 |
| OBC | 1.61 | 1.26 | 7.83 | 0.50 | 38227 | 1.54 | 1.20 | 6.07 | 0.44 | 46315 |
| General | 1.10 | 0.43 | 7.21 | 0.44 | 48259 | 0.88 | 0.59 | 6.71 | 0.33 | 39620 |
| Marital status | | | | | | | | | | |
| Never married | 0.29 | 0.58 | 2.14 | 0.22 | 18866 | 0.15 | 0.77 | 2.48 | 0.30 | 23841 |
| Married | 1.85 | 2.10 | 10.23 | 0.59 | 92461 | 1.92 | 2.52 | 9.71 | 0.46 | 88105 |
| Widowed | 4.71 | 3.83 | 21.48 | 0.81 | 4203 | 3.61 | 5.04 | 16.11 | 0.56 | 3905 |
| Divorced /Separated | 2.60 | 2.21 | 18.48 | 1.11 | 1864 | 1.84 | 2.36 | 17.22 | 0.78 | 1736 |
| India | 1.72 | 1.92 | 9.46 | 0.55 | 117394 | 1.62 | 2.25 | 8.57 | 0.44 | 117587 |

Note:

SLI- Standard of living status ,SC- Scheduled caste, ST- Scheduled tribes,

Table 5 reveals that the percentage of women who smoke; drink alcohol or chew tobacco increases with increase in age. Similarly, the prevalence of tuberculosis is higher among those relatively aged women (35-49) than those younger to them (15-24). In each age group the consumption of alcohol is higher in 2005-06 as compared to 1998-99. Substance use is higher among those illiterate women than those with any level of education. This table shows a clear picture that with increase in education the substance use decreases. Again, the prevalence of TB is high among the illiterate women.

However, the substance use as well as the prevalence of tuberculosis decreases with increase in SLI of the household. Smoking, drinking alcohol and chewing tobacco has been found to be in the higher side among Christian women in both the time periods. The table further shows that higher percentage of scheduled tribe women has reported use of smoking, drinking alcohol and chewing tobacco in both the time periods than those women from other castes. The prevalence of TB is also at the higher side among these women. Analysis further portrays that during these time periods, higher percentage of Divorced/Separated have reported tuberculosis as compare to overall India level. However, substances use is higher among women who are from widowed group as compared to others.

Table 6 presents that with increase in age the substance use too increases among men and so also the prevalence of TB. Those males who belong to aged 35-49 the percentage of smoking, drink alcohol and chew tobacco are 44%, 26% and 35% in 1998-99 while 44%, 39% and 38% respectively in 2005-06. However, there seems an inverse relationship between substance use and education. Similar result may be seen so far as the prevalence of tuberculosis is concerned. Again, higher percentage of men from low SLI are smoking, drinking alcohol and chewing tobacco than their counterparts from high SLI. Further higher percentage of men from low SLI are also suffering from tuberculosis because they consume lower quality of alcohol, tobacco and smoke so they have higher chances of prevalence of TB than high SLI group. Likewise higher percentage of scheduled tribe men are consuming alcohol and chewing tobacco than those from other castes. Again, higher percentage of scheduled caste men seem to smoke compared to other caste people and this is true for both the time periods. Muslim people are reported more smoking than other religions (30% in 1998-99 and 36% in 2005-06) while drink alcohol is high among Sikh people which was 30% and 42% respectively in 1998-99 and 2005-06. Again Divorced/ Separated male have higher reported the prevalence of TB than the other marital status of male.

Table 6: Percentage of men aged 15-49 years, those who are smoking, drinking alcohol, chewing tobacco and suffering from tuberculosis by selected background characteristics, India (1998-99 and 2005-06)

| Background Characteristics | 1998-99 | | | | | 2005-06 | | | | |
|----------------------------|--------------|---------------|--------------|-------------|---------------|--------------|---------------|--------------|-------------|--------------|
| | Smoke | Drink alcohol | Chew tobacco | TB | No. of men | Smoke | Drink alcohol | Chew Tobacco | TB | No. of men |
| Age | | | | | | | | | | |
| 15-24 | 9.54 | 5.27 | 15.61 | 0.31 | 42385 | 18.86 | 19.12 | 29.47 | 0.26 | 24031 |
| 25-34 | 29.33 | 18.08 | 30.09 | 0.69 | 36945 | 36.07 | 38.15 | 41.75 | 0.47 | 19812 |
| 35-49 | 43.54 | 25.87 | 35.46 | 1.09 | 41520 | 44.09 | 38.97 | 38.35 | 0.98 | 23712 |
| Education | | | | | | | | | | |
| No education | 44.91 | 28.49 | 37.66 | 1.17 | 25321 | 50.58 | 42.54 | 45.24 | 1.22 | 12166 |
| Primary | 36.6 | 20.83 | 32.35 | 0.94 | 21894 | 43.33 | 38.79 | 43.87 | 0.72 | 11316 |
| Secondary | 21.87 | 12.79 | 24.13 | 0.55 | 47953 | 26.49 | 27.48 | 33.82 | 0.42 | 35626 |
| Higher | 11.94 | 6.74 | 16.57 | 0.27 | 25682 | 19.4 | 24.08 | 22.81 | 0.11 | 8447 |
| Religion | | | | | | | | | | |
| Hindu | 27.44 | 17.45 | 27.82 | 0.68 | 97913 | 32.94 | 34.13 | 36.98 | 0.59 | 55273 |
| Muslim | 29.71 | 4.35 | 24.23 | 0.84 | 15519 | 36.09 | 10.64 | 35.22 | 0.66 | 8456 |
| Christian | 29.47 | 24.68 | 18.02 | 0.97 | 3183 | 32.96 | 45.95 | 28.83 | 0.51 | 1533 |
| Sikh | 6.82 | 30.14 | 10.24 | 0.09 | 2140 | 9.67 | 42.09 | 14.15 | 0.14 | 1251 |
| Others | 18.49 | 21.73 | 31.53 | 0.48 | 2095 | 23.99 | 38.1 | 39.44 | 0.52 | 1042 |
| SLI | | | | | | | | | | |
| Low | 38.45 | 24.86 | 36.68 | 1.29 | 36774 | 43.07 | 40.5 | 47.85 | 1.19 | 15790 |
| Medium | 26.41 | 14.33 | 25.82 | 0.56 | 57721 | 36.65 | 32.62 | 39.53 | 0.61 | 22014 |
| High | 14.46 | 9.13 | 16.2 | 0.19 | 26355 | 24.99 | 26.68 | 28 | 0.26 | 29751 |
| Caste | | | | | | | | | | |
| SC | 33.04 | 22.39 | 29.02 | 0.95 | 21566 | 39.23 | 41.4 | 39.15 | 0.79 | 12745 |
| ST | 32.75 | 35.39 | 41.05 | 0.96 | 10124 | 36.76 | 49.43 | 50.09 | 1.12 | 5576 |
| OBC | 25.91 | 15.93 | 26.42 | 0.7 | 38951 | 31.32 | 29.7 | 35.26 | 0.49 | 26356 |
| General | 23.56 | 10.25 | 23.34 | 0.52 | 50209 | 29 | 24.95 | 32.26 | 0.46 | 22878 |
| Marital status | | | | | | | | | | |
| Never married | 8.34 | 4.44 | 13.31 | 0.35 | 41284 | 18.67 | 19.32 | 26.39 | 0.29 | 24036 |
| Married | 36.88 | 22.27 | 33.77 | 0.86 | 77848 | 40.37 | 38.34 | 41.33 | 0.7 | 42595 |
| Widowed | 48.56 | 27.68 | 41.61 | 1.47 | 1044 | 50.77 | 44.72 | 54.51 | 3.04 | 521 |
| Divorced /Separated | 41.39 | 26.49 | 33.33 | 1.48 | 674 | 46.4 | 45.54 | 53.1 | 1.81 | 403 |
| India | 27.26 | 16.26 | 26.85 | 0.69 | 120850 | 32.76 | 31.66 | 36.19 | 0.59 | 67555 |

Note:

SLI- Standard of living status ,SC- Scheduled caste, ST- Scheduled tribes,

Table 7: Odds ratios from logistic regression assessing the association between selected background characteristics and prevalence of tuberculosis among women, India and Regions

| Background characteristics | North | Central | East | North-East | West | South | India |
|----------------------------------|-------|----------|--------|------------|---------|---------|---------|
| Smoke | | | | | | | |
| No [®] | 1.00 | 1.00 | 1.00 | 1.00 | NA | NA | 1.00 |
| Yes | 3.25 | 1.57 | 1.60* | 0.61 | NA | NA | 0.99 |
| Drink alcohol | | | | | | | |
| No [®] | NA | 1.00 | 1.00 | 1.00 | 1.00 | NA | 1.00 |
| Yes | NA | 0.36 | 0.49 | 0.25* | 3.32 | NA | 0.38** |
| Chew tobacco | | | | | | | |
| No [®] | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Yes | 2.42* | 1.01 | 1.49* | 1.12** | 4.78*** | 1.58 | 1.40** |
| Fuel used for cooking | | | | | | | |
| Modern [#] [®] | 1.00 | NA | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Traditional [@] | 2.05* | NA | 0.47 | 1.98* | 0.42 | 0.90 | 1.22* |
| No. of persons per room | | | | | | | |
| <3 [®] | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 3-4 | 2.48 | 0.76 | 0.82 | 1.56* | 1.47* | 0.89 | 1.05 |
| >4 | 3.68 | 0.80 | 1.28* | 1.43 | 2.16 | 1.49 | 1.24* |
| Type of house | | | | | | | |
| Pucca [®] | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Semi-pucca | 0.54 | 0.76 | 2.70** | 1.36* | 1.29 | 1.26 | 1.37* |
| Kachha | 1.59* | 1.45* | 2.41* | 1.17 | 7.35** | 1.79 | 1.81*** |
| Separate room for kitchen | | | | | | | |
| Yes [®] | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| No | 1.59 | 1.22** | 1.55* | 1.02** | 0.92 | 1.25 | 1.12* |
| Cooking under chimney | | | | | | | |
| Yes [®] | 1.00 | NA | NA | 1.00 | 1.00 | 1.00 | 1.00 |
| No | 2.00 | NA | NA | 1.16* | 0.43 | 1.65** | 1.749** |
| Age | | | | | | | |
| 15-24 [®] | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 25-34 | 3.75 | 1.28 | 2.29** | 1.27 | 2.19 | 1.97 | 1.66*** |
| 35-49 | 3.15 | 1.08* | 1.85 | 0.87 | 2.46 | 5.64*** | 1.51** |
| Place of residence | | | | | | | |
| Urban [®] | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Rural | 0.65 | 0.49** | 0.99* | 0.90 | 0.25** | 0.77 | 0.63*** |
| Education | | | | | | | |
| Literate [®] | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Illiterate | 1.54 | 1.47 | 2.03** | 2.62*** | 1.02 | 0.94 | 1.69*** |
| Religion | | | | | | | |
| Others [®] | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hindu | 1.97 | 0.92 | 0.54 | 1.15* | 1.82 | 0.90 | 0.71** |
| Caste | | | | | | | |
| Others [®] | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| SC/ST | 0.68 | 1.29 | 0.78 | 2.59*** | 1.49 | 2.05** | 1.42** |
| Marital status | | | | | | | |
| Never married [®] | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Married | 0.89 | 9.32** | 0.79 | 0.97 | 0.45 | 0.18** | 0.88 |
| Widowed/divorced | NA | 15.245** | 0.547 | 1.431* | 1.142 | 0.166* | 1.130* |

Note: [®] Reference Category; ***p<0.01, **p<0.05, *p<0.10; # includes Electricity, LPG and Kerosene. [@] includes Wood, Coal/Coke/Lignite, Crop residues, Dung cakes, Charcoal; NA means its values be very less frequency (Not significance)

Table 8: Odds ratios from logistic regression assessing the association between selected background characteristics and prevalence of tuberculosis among men, India and Regions

| Background characteristics | North | Central | East | North-East | West | South | India |
|----------------------------------|---------|---------|---------|------------|---------|---------|---------|
| Smoke | | | | | | | |
| No® | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Yes | 0.11*** | 0.47** | 1.81* | 0.62 | 0.83 | 1.48 | 1.02** |
| Drink alcohol | | | | | | | |
| No® | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Yes | 0.86 | 0.91 | 0.52 | 0.92 | 0.37** | 0.68 | 0.68 |
| Chew tobacco | | | | | | | |
| No® | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Yes | 1.68 | 0.74 | 1.49** | 1.35** | 1.25* | 0.79 | 1.12** |
| Fuel used for cooking | | | | | | | |
| Modern#® | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Traditional@ | 5.66 | 1.39 | 0.55 | 0.69 | 0.23** | 0.42 | 0.59** |
| No. of persons per room | | | | | | | |
| <3® | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 3-4 | 5.03* | 0.46** | 1.23* | 1.76** | 0.59 | 0.53 | 1.08 |
| >4 | 11.41* | 0.57 | 1.89* | 1.37* | 0.99 | 0.53 | 1.09** |
| Type of house | | | | | | | |
| Pucca® | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Semi-pucca | 0.96 | 2.15* | 3.40** | 1.11* | 1.46 | 3.03** | 1.74*** |
| Kachha | 1.49* | 1.63 | 1.49* | 1.46** | NA | 6.02*** | 1.82** |
| Separate room for kitchen | | | | | | | |
| Yes® | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| No | 2.78** | 1.78* | 0.46* | 1.01 | 1.37 | 0.76 | 1.16 |
| Cooking under chimney | | | | | | | |
| Yes® | 1.00 | 1.00 | NA | 1.00 | 1.00 | NA | 1.00 |
| No | 0.42 | 0.94 | NA | 2.59 | 0.39** | NA | 1.76** |
| Age | | | | | | | |
| 15-24® | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 25-34 | 1.34* | 2.79** | 2.03* | 1.71 | 1.92 | 1.22 | 1.90*** |
| 35-49 | 3.94 | 6.32*** | 3.30* | 1.63* | 2.26 | 2.99* | 3.26* |
| Place of residence | | | | | | | |
| Urban® | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Rural | 0.99 | 0.46** | 0.76 | 0.89 | 2.10 | 0.86 | 0.84 |
| Education | | | | | | | |
| Literate® | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Illiterate | 1.73* | 1.69* | 6.58*** | 2.74** | 1.12* | 1.16 | 1.83*** |
| Religion | | | | | | | |
| Others® | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hindu | 11.07** | 1.07 | 0.95 | 0.71 | 1.18 | 1.03 | 0.98 |
| Caste | | | | | | | |
| Others® | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| SC/ST | 0.91 | 1.71* | 0.87 | 1.34* | 1.00 | 1.01 | 1.31* |
| Marital status | | | | | | | |
| Never married® | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Married | 2.54 | 0.73 | 0.14** | 0.66 | 4.22** | 1.12 | 0.88 |
| Widowed/divorced | 39.46** | 0.834 | 1.27* | NA | 13.05** | 3.15 | 2.22** |

Note: ® reference category; ***p<0.01, **p<0.05, *p<0.10; # includes electricity, LPG and kerosene.

@ includes wood, coal/coke/lignite, crop residues, dung cakes, charcoal;

Na means its values be very less frequency (not significance)

Table 7 presents the odds ratios from logistic regression assessing the association between selected background characteristics and prevalence of tuberculosis among women during 2005-06. The results indicate that there is a positive effect of chewing tobacco, fuel used for cooking, number of persons per room, type of house, separate room for kitchen, cooking done under a chimney, age-group, educational status and caste on the likelihood of prevalence of tuberculosis among women in India. On the contrary, the variables like drinking alcohol, place of residence and religion has a negative effect on prevalence of tuberculosis. There are 40 percent more likely to occurrence of TB, if the women chew tobacco and the association is statistically significant. Again, the women belonging to household using modern fuel for cooking are less likely to suffer from TB as compared to women belonging to households using traditional fuel for cooking. Similarly, the women from households with more than four persons per room are 24 percent more likely to suffer from TB than those from households with less than three persons per room and the association is statistically significant. The chances of tuberculosis seem to be significantly 81 percent higher among those women residing in kachha houses than their counterparts residing in pucca houses. Again, the likelihood of tuberculosis is significantly higher among women aged 35-49 years than those aged 15-24 years. There seems an inverse association between the chances of tuberculosis and education of women.

Exploring the regional variation, the same table reveals that in eastern region, after controlling the effects of other variables, the likelihood of tuberculosis is significantly 60 % high among those women who smoke than their counterparts who never smoke also those women who lives in kachha house the chances of prevalence of TB is two times more likely than those who lives in Pucca house. Although statistically significant similar pattern may be seen among the women from northern and central region. Those women who are from Central region and also who are married, their have 9 times more likely to prevalence of TB than those who are never married and it is statistically significant. In North-eastern region, SC/ST women have 2 times more likely TB prevalence than from other caste and it is significant at 1% level. It is further found that irrespective of region, women who chew tobacco are more likely to suffer from tuberculosis than their counterparts who do not chew tobacco. The association has come out to be statistically significant for the women from northern, eastern, northeastern and western regions of India.

Table 8 presents the odds ratios from logistic regression assessing the association between selected background characteristics and prevalence of tuberculosis among men during 2005-06. The results indicate that there is a positive statistically significant association of smoking, chewing tobacco, number of person per room, type of house, cooking done under a chimney, age group, educational status and caste on the likelihood of prevalence of tuberculosis among men in India. On the contrary, fuel used for cooking has a negative association with prevalence of TB because generally seen that in Indian context, at the time of cooking, male are not present at home. 82% percent are higher chances of TB prevalence among illiterate males

than their counterparts while Divorced males are 2 times more likely to prevalence than the other marital status of males.

At regional level, the likelihood of tuberculosis is significantly higher among the men chewing tobacco than those who do not chew tobacco and this is true for men belonging to eastern, western and northeastern regions of India. Analysis further clarifies that the chances of tuberculosis is less among those men consuming alcohol than those who are not currently consuming the same. However, the relationship is not statistically significant except for the men from western region. Again, chewing tobacco seems to have a significant positive association with prevalence of tuberculosis among the men from eastern, western and northeastern regions of India. However, although not statistically significant, there emerges an inverse association between the above mentioned variables in central and southern regions of India.

Summary and Conclusion

The study reveals that the consumption of alcohol has increased during 1998-99 to 2005-06. Interpreting the results by sex, it has also been found that compared to females, higher percentage of males are consuming alcohol; are smoking and are chewing tobacco. Again, substance use has been noticed to be at the higher side among the people residing in rural areas than their counterparts from urban areas and this is true for both periods under study. Analysis further reveals that there is a close relationship of place of residence, level of education, religion, caste, standard of living and marital status on the consumption of smoking, drinking and chewing tobacco during the periods under study. It is also evident that the higher percentage of women who belong to ST; from low SLI; are illiterate; and are residing in rural area are consuming alcohol. On the other hand, higher percentage of men who belong to ST or from low SLI are consuming alcohol and chewing tobacco. Again, irrespective of sex, higher percentages of illiterate people have been found to consume alcohol, chew tobacco as well as smoke. Regional variation in the consumption of smoking, chewing tobacco and alcohol drinking has also been observed from the study. Generally North-eastern people have reported higher use of these substances followed by Eastern and Western region people.

The study finds a marginal decline in the prevalence of tuberculosis, irrespective of sex and place of residence in India. The analysis further reveals that after controlling the effects of other variables, the variables like chewing tobacco, fuel used for cooking, number of persons per room, type of house, separate room for kitchen, cooking done under a chimney, age-group, educational status and caste significantly influence the likelihood of tuberculosis prevalence among Indian women. Similarly, it is the variables such as smoking, chewing tobacco, number of person per room, type of house, cooking done under a chimney, age group, educational status and caste of men that influences the chances of tuberculosis prevalence among Indian men. Again, there do exist variation in the attributes influencing the occurrences of tuberculosis in different regions of India.

For further analysis it may be compute a new variable i.e. composite index which is the combination of all three lifestyle indicators (smoking, alcohol drinking and chew tobacco) and other index which is based on combination of all background characteristics, and see the prevalence of tuberculosis through these two indexes. Also we can see the TB prevalence when region as a control variables.

Limitations

- Substance use presented in the study could be an under estimation because the person answering the household questionnaire may not be aware of some of his/her family member's use or not.
- Due to time constraints, in the study we have not explored the treatment seeking behaviour for tuberculosis patients.
- Due to not available of data like frequency of cigarettes smoking, frequency of alcohol drinking in NFHS-2. So we are unable to see the levels of frequencies of smoking and alcohol drinking.

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