

# Prevalence and determinants of co-use of alcohol and tobacco among men in working age group (18-59 years) in India

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## ABSTRACT

**Background:** The relationship between tobacco and alcohol use is very important in making strategies containing use of these products. Alcohol and tobacco use were studied separately in Indian studies, which can undermine their co-occurrences. The objective of the study is to know the prevalence and socio-economic determinants of co-occurrence of alcohol and tobacco use among men in working age groups.

**Data Sources:** The data from the Study on Global Ageing and Adult Health (SAGE) Wave1 was used. It was a cross sectional household survey, which collected information from adults aged 18 years and above.

**Results:** The prevalence of co-use of tobacco and alcohol among men aged 18-59 years was 23.5%. High use of tobacco was found among alcohol user. Age cohorts were also the important determinants of alcohol and tobacco use. The inverted U or V-shape relation was found between age groups and co-use of tobacco and alcohol. The prevalence was lowest for age groups 18-24 years and 50-59 years. Low education attainment and working in informal sector were the main risk factors for high co-use of these substances among men. The study also tried to look at the relationship between the co-use of alcohol and tobacco with some selected health indicators. Use of alcohol and tobacco was significantly related with under nutrition and increasing blood pressure levels among men in India.

**Conclusion:** To contain the use of alcohol and tobacco to improve health condition among adult men, policies and strategies must be formed keeping the importance of their co-occurrences.

*Key words:* Co-use, Alcohol and Tobacco, Men, India

## INTRODUCTION

Several studies have shown the association between high consumption of alcohol and tobacco with adverse health outcomes as well as harmful social and economic

consequences [1-3]. Excessive use of tobacco among men may lead to long-term morbidity and premature deaths [1,4]. In case of alcohol consumption, some studies reported negative or no relation to health [5,6]. Heavy drinking damages the physical and psychological

health of the drinker, as well as diminishes the health and well-being of people around the drinker [7]. However, the negative impact is more severe among people who use both these substances [8]. Many large-scale studies in the United States of America found that alcohol drinking is often combined with tobacco use and this co-use resulted in further drug abuse [8-10]. Compared to women, men showed a higher use of tobacco and alcohol in studies from Asian countries including India, resulting in higher death rates due to cancer and related diseases [2-3, 11-13]. A study in Sri-Lanka also revealed the association between alcohol and tobacco use [14]. All these studies pointed out the high use of both tobacco and alcohol.

It becomes imperative to assess the prevalence of the co-occurrences of tobacco and alcohol use in India for several reasons. Studies from India which have examined separately the use of tobacco and alcohol undermine their co-occurrence; i.e. though the association between alcohol and tobacco use has been exhibited in these studies, the prevalence of co-use of these products was not estimated. The Indian population is subject to socioeconomic and demographic changes. These transitions result in a large proportion of the population comprising of people in the working age group. The 2007 Global adult tobacco survey India documented an increased prevalence of tobacco use among the male population from 27% in the age group of 15-24 years to 61% in the age group of 45-64 years [15]. As shown by Lopez, changes in age structure of the population led to increased death due to smoking [16]. The gender relations and norms existing in Indian society resulted in greater access and thereby higher use of alcohol and tobacco among men, eventually causing poor health and mortality among them [17-18]. The role that factors such as education and occupation play in tobacco and alcohol consumption has also been emphasised in many studies. Lower levels of education related to high tobacco use as well as to tobacco-related morbidities in India [18-19]. Men employed in the unskilled labor force were at a higher risk of using tobacco [18]. Due to these demographic and economic changes, the burden of tobacco and alcohol related morbidities and disorders are likely to increase further. To reduce the consumption of these products and thereby their harmful effects, we must understand their interdependence. Understanding the determinants and the nature of the relationship between tobacco and alcohol use among men in working age groups is critical in making strategies to improve public health. This study focuses on understanding the co-occurrence of alcohol and tobacco, which has not yet been done in the Indian context. It also investigates the role of education and occupation in influencing co-occurrences of tobacco and alcohol. Furthermore, it tries to explore the health implications of these co-occurrences.

## DATA SOURCE

The data used was from the Study on Global Ageing and Adult Health (SAGE) Wave1, conducted in 2007-08 in India. A multistage, stratified, random cluster sampling design was used. The data was collected from six states: Assam, Karnataka, Maharashtra, Rajasthan, Uttar Pradesh and West Bengal. The same primary sampling units (PSUs) and households covered in the World Health Survey (WHS-2003) comprised the baseline sample for SAGE Wave1-India in 2007-08. The primary sampling units were stratified by region and location (urban/rural) and, within each stratum, enumeration areas were selected [20]. The details are also given on the SAGE website ([www.who.int/healthinfo/systems/sage](http://www.who.int/healthinfo/systems/sage)). It was a cross-sectional household survey, which collected information for adults aged 18 years and above by face-to-face interviews. Anthropometric measures such as height, weight, and blood pressure were collected. The sample size was 2615 which comprised men in the age group 18-59 years who were our study population.

## Tobacco and alcohol use classification

Questions relating to tobacco and alcohol behavior were asked to the respondents. The four categories of tobacco use were defined as follows:

- Never tobacco user: Respondents who reported having never consumed tobacco previously
- Past tobacco user: Respondents who reported having consumed tobacco previously, but stopped consuming it since the last one year
- Current nondaily tobacco user: Respondents who reported consuming tobacco, but not on a daily basis
- Current daily tobacco user: Respondents who reported consuming tobacco on a daily basis

Similarly, alcohol behavior was divided into four categories.

- Never alcohol user: Respondents who reported having never consumed alcohol previously.
- Past alcohol user: Respondents who reported having consumed alcohol previously, but stopped consuming it since the last one year.
- Current nonheavy alcohol user: Respondents who reported consuming alcohol, but less than one day per week.
- Current heavy alcohol user: Respondents who reported consuming alcohol more than one day per week.

The combined use of tobacco and alcohol was in the following categories:

- Lifetime abstainer: Respondents who reported having never consumed alcohol and tobacco any time in their life.

- Past user: Respondents who reported having consumed tobacco or alcohol previously, but did not use both of the substances since the last one year.
- Current single user: Respondents who reported consuming alcohol or tobacco but not both.
- Current co-user: Respondents who reported consuming alcohol and tobacco both together.

### Health indicators

Height and weight of the respondents taken during the survey were used to calculate Body Mass Index (BMI) as per the following formula:

$$BMI = \frac{Weight (Kg)}{Height (M)^2}$$

The classification of BMI followed the WHO standard; i.e. ranging from BMI less than 18.5 which was categorized as underweight to BMI greater than 25.0 which was overweight.

Systolic and diastolic blood pressure levels were collected three times for each respondent. The average of these three systolic and diastolic blood pressures was taken as the final systolic and diastolic blood pressure level of the respondent. They were then categorised as hypertensive, if systolic blood pressure was greater than 150 mmHg or diastolic blood pressure greater than 90 mmHg. The presence of any one of the self-reported chronic condition (such as stroke, diabetes, chronic lung disease, asthma, depression, and hypertension) was documented as a single morbidity. The presence of more than one self-reported chronic conditions was categorised as multiple morbidity.

### Statistical analysis

The bi-variate analysis was used to see the distribution and differences between socioeconomic variables and co-use of tobacco and alcohol. Missing values were excluded from the analysis. To account for the survey year-specific age and gender structure, estimates were weighted using the 2001 Indian Census population. To assess the co-occurrence of tobacco and alcohol use, multinomial logistic regression analysis was used. Multinomial logistic regression defined for a response variable with three or more discrete outcomes. It did not make any assumptions of normality, linearity and homogeneity of variance for the independent variables. Three regression models were used with three different base outcomes. The base outcomes were Lifetime abstainer, Past users and Single users. The odds ratios of co-use were reported each time. The risk (odds ratios) of co-using

tobacco and alcohol were calculated by Age, Educational Attainment, Occupational Sectors and Wealth Index. These odds ratios were also adjusted for other factors such as Place of Residence, Caste and Religion for the six states.

## RESULTS

### Socio-economic profile of men aged 18-59 years

Table 1 represents the socio-economic profile of adult men aged 18-59 years. The majority (85.4%) of men were married. One-third of men had 'higher and above' education. Another 29.4% of men had 'less than primary or no education'. Self-employment and informal employment were the major occupations. Bigger states such as Uttar Pradesh and Maharashtra had the highest percentages of samples, which was understandable, as they both were the most populous states in India.

### Use of tobacco and alcohol among men aged 18-59 years

Figure 1 represents the percent distribution of men by tobacco and alcohol use. The percentage of men using tobacco on daily and non-daily basis was 60.2% and 3.8% respectively. Approximately one-third of men had never used tobacco. Alcohol use was less reported than tobacco use. Overall, 9.4% of men were current heavy consumers of alcohol and another 17.6% of men were current non-heavy consumers of alcohol. Almost two-third of men reported to have never consumed alcohol. The prevalence of co-use of tobacco and alcohol among men aged 18-59 years was 23.5% (Figure 2). Another 40.5% of men were only using tobacco and 3.5% of men only consuming alcohol. It can be inferred from the two figures that most of the current alcohol consumers were also consuming tobacco. Another 29.6% of men were lifetime abstainers from tobacco and alcohol.

### Prevalence of co-use of tobacco and alcohol by age, education and occupation

As shown in figure 3, the prevalence of co-use of alcohol and tobacco showed an inverted U or V-shape. The prevalence was lowest for the age group of 18-24 years (8.6%), it increased to the maximum in the age group of 30-39 years (31.2%) and then it declined again in the age group of 50-59 years (19.1). Increasing education related negatively with the co-use of tobacco and alcohol. The prevalence of co-use of tobacco and alcohol was highest for men with 'no education or less than primary education' (34.6%). The prevalence declined with increase in education and it was lowest for men with higher and above education (14.6%). The prevalence of co-use of tobacco and alcohol presented an

**TABLE 1. Percentage of men aged 18-59 years by socio-economic characteristics**

		<b>N</b>	<b>PERCENTAGE</b>
<b>PLACE OF RESIDENCE</b>	Urban	647	22.8
	Rural	1968	77.2
<b>MARITAL STATUS</b>	Single	175	12.1
	Married	2330	85.4
	Widowed/Divorced	109	2.5
<b>CASTE</b>	SC/ST	622	27.0
	Others	1797	73.0
<b>RELIGION</b>	Muslim	300	12.6
	Hindu	2033	83.6
	Others	100	3.8
<b>EDUCATIONAL STATUS</b>	No Education/Less than primary	819	29.4
	Primary	428	16.9
	Secondary	467	19.9
	Higher and above	719	33.8
<b>OCCUPATIONAL SECTORS</b>	Not working	81	4.7
	Public	265	7.6
	Private	315	12.4
	Self-employed	1165	47.6
	Informal employment	606	27.8
<b>WEALTH QUINTILE</b>	Poorest	449	20.8
	Poorer	495	21.0
	Middle	505	20.8
	Richer	557	17.5
	Richest	594	19.9
<b>STATE</b>	Assam	289	6.2
	Karnataka	306	11.8
	Maharashtra	499	20.5
	Rajasthan	510	12.5
	Uttar Pradesh	534	32.6
	West Bengal	477	16.3

*The sum does not add up to the total because of some missing values*

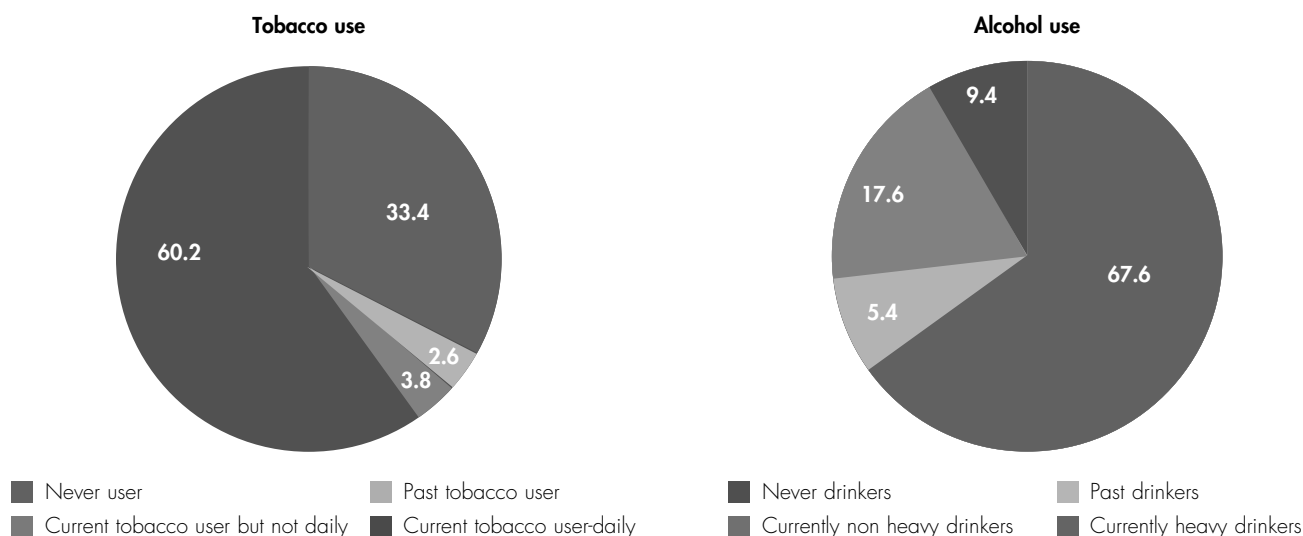
interesting picture. Men who were employed in the informal sector (30.8%) had the highest prevalence followed by men who were employed in the private sector (23.0%) and then the self-employed (22.0%). Men who were not working or working in the public sectors had the lowest prevalence (8.6% and 15.6%) of co-use of tobacco and alcohol.

#### **Adjusted risk of socio-economic characteristics on co-use of tobacco and alcohol among men aged 18-59 years**

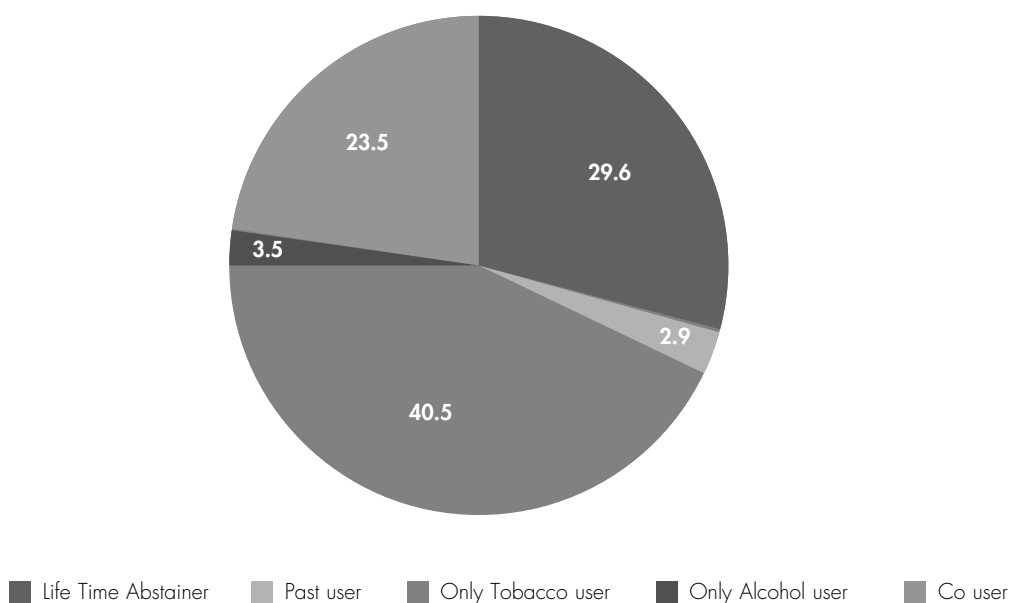
Table 2 presents the odds ratio of co-occurrence of tobacco and alcohol use comparing with other user

groups by age, education, occupation and wealth index. These odds ratios adjusted for variables such as Place of residence, Caste, Religion and States. It was interesting to find out that age was significantly associated with co-use of tobacco and alcohol. The odds ratio of co-use was significantly higher in the older age groups compare to the age group 18-24 years in both 'lifetime abstainer' and 'past user'. The effect of age was not significant for single users. Increasing education significantly associated with declining co-use of tobacco and alcohol among men. The odds ratio of co-using tobacco and alcohol significantly declined with increasing education as compared to both 'lifetime abstainers' and 'single users'. In comparison

**FIGURE 1. Percent distribution of men aged 18-59 years by tobacco use and alcohol use**



**FIGURE 2. Percent distribution of men aged 18-59 years by combined use of tobacco and alcohol**

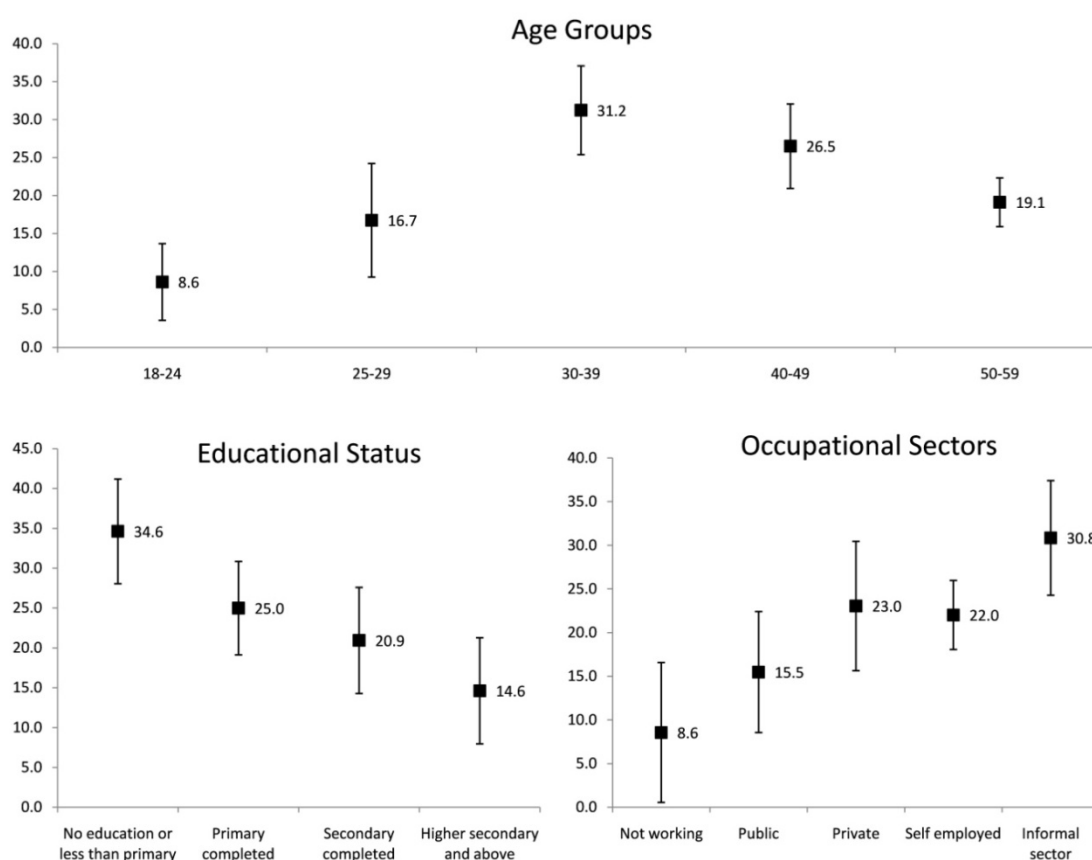


with lifetime abstainers, the odds ratio of co-use was significantly higher for men working in private and informal sectors compare to non-working men. However, these differences were not significant for single users. The relationship with wealth quintile was also interesting. Wealth did not correlate with the risk of co-use for lifetime abstainer and past users. The odds of co-using tobacco and alcohol significantly increased with increasing wealth quintile when compared to single users. Wealth may therefore play an important role in transitioning from single use to co-use of tobacco and alcohol.

**Association between the use of tobacco and alcohol with selected health indicators**

The percentage of men who reported having a stroke was higher in single users of tobacco and alcohol. Chronic lung disease was also high among the single user (4.8%) followed by the co-user (3.4%). Hypertension both self-reported as well as the measured was high among co-users of tobacco and alcohol. Around 39.5% of co-users of tobacco and alcohol were underweight (BMI<18.5) compared to lifetime abstainers (36.9%) and

**FIGURE 3. Prevalence of co-use (per 100 with 95% CI) of tobacco and alcohol among men in age 18-59 years by age, educational status and type of occupation.**



single users (26.7%). The use of both of the substances led to decreasing nutrition and enhanced blood pressure level among men.

## DISCUSSION

In the National Survey of Extent, Pattern and Trends of Drug Abuse in India 2004, 21% of adult men were found using alcohol in the last one year. In our study, 65% and 28% of men in the working age group (18-59 years) were using tobacco and alcohol respectively [21]. The consumption of alcohol was accompanied by tobacco use in India, as the majority of alcohol users were also tobacco users. The co-use of these products increased with age and then declined at older ages. There are many studies which have focused on tobacco use among men in India, but no study related to the co-use of tobacco and alcohol. Prevalence of alcohol use among men in India is (quite) low compared to (other) developed countries [22]. The prevalence of co-use of tobacco and alcohol in India was similar to studies done in Sri Lanka and USA [8-10]. This shows that the use of tobacco with alcohol is quite universal

despite differences in single use. Education was a major determinant of consumption of alcohol and tobacco use among men as documented in many studies [11-12,23-24]. Working men may have greater access to tobacco and alcohol resulting in the higher use of these substances among them compared to men who are not working [18-19]. Our study revealed that education and occupation were the major determinants of co-use of tobacco and alcohol use in India. Increasing education among men may influence knowledge and awareness about the harmful effects of tobacco and alcohol use which can reduce co-occurrences of tobacco and alcohol. Working in the informal sector was also a major risk factor for an increased use of tobacco and alcohol among men, as shown in other studies [11,25]. These are significant findings. Working in the informal sector is the major occupational sector in India and a high co-occurrence of tobacco and alcohol consumption in this group makes it a priority to contain the use of these products. Strategies to spread awareness and knowledge among men working in the informal sector can reduce the burden of these harmful habits. Accumulation of wealth was not associated with co-use of tobacco and alcohol in lifetime abstainer and past user categories but was quite significant for single users. This suggests that the

**TABLE 2. Odds ratio of co-use (95% CI) of tobacco and alcohol by Age, Education, Occupational sectors and Wealth quintile.**

		LIFETIME ABSTAINER <sup>B</sup>	PAST USER <sup>B</sup>	SINGLE USER <sup>B</sup>
<b>AGE</b>	18-24#			
	25-29	1.75(0.76-44.06)	4.74(0.47-48.18)	1.13(0.49-2.59)
	30-39	3.98(1.87-8.48)***	1.91(0.44-8.24)	2.39(1.13-5.04)**
	40-49	4.10(1.88-8.91)***	1.66(0.37-7.50)	1.49(0.70-3.17)
	50-59	3.22(1.55-6.71)***	0.98(0.24-4.01)	1.18(0.57-2.34)
<b>EDUCATIONAL STATUS</b>	No Education/Less than primary#			
	Primary	0.71(0.48-1.05)*	0.99(0.50-1.97)	0.65(0.47-0.89)***
	Secondary	0.38(0.25-0.54)***	0.48(0.25-0.92)**	0.55(0.39-0.77)***
	Higher and above	0.31(0.21-0.46)***	0.62(0.31-1.24)	0.53(0.37-0.75)***
<b>OCCUPATIONAL SECTORS</b>	Not working#			
	Public	1.63(0.70-3.81)	2.77(0.72-10.76)	0.72(0.30-1.74)
	Private	2.31(1.02-5.25)**	3.04(0.83-11.19)*	0.85(0.36-1.99)
	Self-employed	1.69(0.77-3.68)	2.14(0.63-7.26)	0.60(0.27-1.37)
	Informal employment	2.74(1.22-6.16)***	4.39(1.2-16.05)**	0.82(0.35-1.90)
<b>WEALTH QUINTILE</b>	Poorest#			
	Poorer	1.30(0.84-2.03)	1.11(0.48-2.57)	1.40(0.99-1.98)*
	Middle	1.18(0.75-1.86)	0.66(0.29-1.49)	1.57(1.08-2.29)**
	Richer	0.98(0.62-1.57)	0.66(0.29-1.53)	1.56(1.05-2.32)**
	Richest	0.72(0.43-1.19)	0.56(0.23-1.38)	1.67(1.07-2.61)**

Adjusted for Place of residence, Caste, Religion and States

<sup>B</sup> base outcome, # reference category, \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

**TABLE 3. Prevalence of morbidities (per 100) by co-use of tobacco and alcohol.**

	LIFETIME ABSTAINER	PAST USER	SINGLE USER	CO-USER
Stroke (Self-reported)	0.3	0.9	1.5	0.9
Chronic Lung Disease (Self-reported)	2.8	1.1	4.8	3.4
Depression (Self-reported)	4.0	4.8	4.4	4.7
Hypertension (Self-reported)	5.9	4.2	5.9	7.2
Underweight (BMI < 18.5)	26.7	36.7	37.9	39.5
Hypertension (Systolic Blood Pressure > 140 mmHg or Diastolic Blood Pressure > 90 mmHg)	17.4	20.7	13.8	24.6

transition from single use to co-use of tobacco and alcohol is related to wealth. Wealthy men using a single product are more likely to ultimately use both products compared to men in the lower wealth quintile.

Tobacco and alcohol consumption present a high risk of mortality and morbidity related to cardiovascular diseases as well as lung and other types of cancers [25-27]. Use of tobacco and alcohol also reduces the nutrition condition of the users [2,28]. Alcohol is known to cause hypertension [29]. Our findings showed a relationship between increase in underweight and hypertension among men in India with co-use of tobacco and alcohol.

This study brings out the importance of considering the co-occurrences of these substances while making prevention strategies for their use, especially in India. Since the use of tobacco often accompanies the use of alcohol, prevention strategies focusing only on containing the use of any one substance may not be very successful [8,14].

### Limitation

The study has several limitations. The results are based on a cross-sectional survey, so the direction of



relationship could not be established. Alcohol use may also be associated with other drug use, as shown in some literature, but it was not possible to assess in our study due to the lack of information available about other drug use. Assessment of chronic morbidity, tobacco and alcohol use was self-reported by the respondents, which also influenced the results.

## CONCLUSION

The association between tobacco and alcohol use in India is consistent with the studies in different countries. Middle age groups, low education attainment and working in the informal sector were the main risk factors for high co-use of these substances. Affluent men were more likely to use both substances if they were a previous single user compared to men in lower wealth quintiles. These co-occurrences were also associated with poor health outcomes among men. India is going through age structural and demographic changes, which will result in a high proportion of the population in the working age groups. It may increase the burden of mortality and morbidity caused by resulting diseases. Taking into consideration the pattern of co-occurrences exhibited in the study as well as the health risks associated with the use of these substances, it is crucial to contain the use of both tobacco and alcohol. Interventions, policies, and strategies must be developed keeping in mind the clinical significance, the important determinants, and the demographic impact of the co-use of tobacco and alcohol.

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## Conflicts of interest

There are no conflicts of interests in preparation of this article.

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