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TOBACCO USE AND ITS IMPACT ON RESPIRATORY HEALTH: A STATISTICAL APPROACH

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ABSTRACT

Background: Tobacco use, which is the cause of several respiratory diseases, generally starts in the teens. Therefore, we have examined the risk of respiratory symptoms with major focus upon active and passive smoke exposure in adults among the persons living in the newly-formed Jharkhand State of Eastern India. An intensive survey is an initiative to investigate the tobacco use in various age groups especially in adults.

Methods: The questionnaire data of the population-based sample (n = 600) was analyzed. Multiple regression models were carried out to study the current respiratory health as dependent variables, whereas Tobacco Intake, Continuous Tobacco use, Age, Education level, Job Category, Income, General Health and Past Health of the tobacco users in the study area as independent variables after adjusting for age, gender, smoking and socioeconomic status. Data analysis was performed using SPSS 16.0 software and the results accounted are based upon the analysis obtained from the Multiple Regression, Chi-square test and Analysis of Variance (ANOVA) Test.

Results: Out of the total 700 distributed questionnaires, 600 of them were accurately filled and therefore considered for the present investigation. As per our analysis, about 66.5% of the adult population exposed to tobacco is defined by the 18-25 years while 21% as defined by the 26-33 years. Of this, 38% of the reported individuals were "students" who were exposed either to the tobacco smoking or chewing.

Conclusion: The Eastern India, especially the Jharkhand state, has a huge problem of widespread tobacco use in both forms among adults, particularly among the 18-25 year age group. The prevalence of smoking is higher among rural population, while the school and college going youth are affected in the ratio of 38% from tobacco exposure in the Ranchi province.

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Key words: Tobacco Use, Respiratory Health, Environmental Tobacco smoke, Tobacco control, Intensive Survey.

1. Introduction

Globally, tobacco is responsible for the death of 1 in 10 adults (about 5 million deaths each year) with 2.41 (1.80.3.15) million deaths in developing countries and 2.43 million in developed countries [3] and [6]. Among these, 3.84 million deaths were reported for men. The leading causes of death from smoking were found to be cardiovascular diseases (1.69 million deaths), chronic obstructive pulmonary disease (0.97 million deaths) and lung cancer (0.85 million deaths) [6]. Fifty per cent of unnecessary deaths due to tobacco occurs in middle age (35.69 years), robbing around 22 years of normal life expectancy [3]. In developed countries, smoking is estimated to cause over 90% of the lung cancer in men and about 70% of it among women. In these countries, 56%-80% of deaths are due to chronic respiratory diseases, and 22% of cardiovascular deaths are attributable to tobacco. The attributed mortality is greater in males (13.3%) than in females (3.8%). Globally, the attributable fractions for mortality due to tobacco smoking are about 12% for vascular disease, 66% for the cancer of the trachea, and bronchus and lung cancer combined, and 38% for chronic respiratory diseases, [7]. Globally, the disease consequences of tobacco use (smoking) have been more extensively and better documented than perhaps for any comparable risk factor. This is partly due to the fact that for decades, until recently, the tobacco industry kept on challenging the validity of the findings and refused to accept results that were long accepted by all health scientists. In part, it is also due to the fact that the spectrum of the diseases caused by tobacco use is very large.

Tobacco is the most important preventable cause of disease burden and death all over the world [10] and [12]. In spite of the known association of major diseases with tobacco, its continued use is very bothersome for both the health professionals and the policy-planners alike [2] and [4]. There is an urgent need to face this challenge and curb its use. This is especially important among the youth as they are more likely to start the habit in their formative years but are also more likely to quit the habit in time before any harm occurs. There is enough evidence to show that majority of smokers starts the tobacco use before 18 years of age [8]. Such information is however lacking in India.

Cigarette smoking causes 5 million deaths per year worldwide, and it is estimated that the annual death toll from smoking will climb to 10 million deaths by 2030, with 7 million deaths in developing countries [10] and [12]. Cigarette smoke damages the lower respiratory tract [17], increases oxidative stress, and increases the risk of bronchitis, chronic obstructive lung disease, cancer, and death [10], [12] and [16]. Tobacco companies have gradually shifted their market from high-income to low-income countries, where many people are poorly informed about the health risks of tobacco use and antismoking policy is relatively weak [18]. Although much research has been focused on the

relationship between smoking and adverse outcomes such as cancer, respiratory illnesses, and cardiovascular disease, the problem of smoking and its relation to malnutrition, child survival, and poverty have not been well characterized. Tobacco-related disease kills an estimated half million people a year in India, [4]. Most adult addicts to tobacco start young. Data on tobacco use by rural children or youth in India [5], [8] and [14] are few and only recently available [15]. This pilot survey assessed the degree, nature and pattern of tobacco use by children in rural areas and the need for a large study.

2. Material and methods

2.1. Study design and sampling

The above is a questionnaire-based cross-sectional study of different regions in and around the Ranchi district of the Jharkhand state of India. The data collection for this study was from January to June 2005; January to April 2006; August to November 2008; and January to April 2009.

2.2. Study Population

The entire population type was clearly differentiated as urban, semi-urban and rural type depending upon the socio-economic background of the people of the Ranchi city and its province. The people in the said area belong to either middle or lower income groups and people in higher income group is less commonly seen. Majority of the study population comprised of the age between 18-25 years which is believed to be from the student-type from the host institution, local schools and colleges as well as the University. This was followed by workers working as employees/staff of the governmental and private sectors, people within home domain included housewives, retired employees, other elderly people, and businessmen, retailers, etc., which were classed as “adults” from the urban or semi-urban population; while “adults” from rural set-up included the local tribes, working class included guards, peons, carpenters, sweepers, maidservants, etc. The observed age spectrum was between 10 and 81 years, with a few exceptions. “Adults” were appropriately graded between (2)–(9) for different age groups. Grade 1 for 10–17, Grade 2 for 18–25, Grade 3 for 26–33, Grade 4 for 34–41, Grade 5 for 42–49, Grade 6 for 50–57, Grade 7 for 58–65, Grade 8 for 66-73 and Grade 9 for 74–81.

2.3. Questionnaire

The questionnaire was adapted and standardized from its original one, as prepared for a study by the State University of New York at Buffalo [11]. Special

attention was given to include the Indian conditions for both population types. The objective of the questionnaire was to observe a relation between tobacco and health. The questionnaire was framed as Passive Smoking and Respiratory Health, to observe the impact of the environmental tobacco smoke along with respirable suspended particulate matter on an individuals' respiratory health over a period of time, as short and long term exposure [1]. This was further re-framed as Tobacco Use and Health, to comparatively assess the impact of tobacco smoke on respiratory health and tobacco chewing on oral health. Both versions of the questionnaire were chiefly divided into nine balanced sections as: Smoke Exposure History; Breathing Trouble; Hospital Utilization and Access to Care; Recent Disability; Health-related Quality of Life; the Epworth Sleepiness Scale; Respiratory Specific Quality of Life; Identification and Demographic Information.

3. Survey administration

The present study is part of the main project titled "Impacts of Environmental Tobacco Smoke on Respiratory Health of Adult" initiated at the State University of New York at Buffalo.

3.1. Surveillance

Out of the total of 700 questionnaires distributed, only 600 were returned completely filled and with other appropriate information needed, and at the same time their peak flow rates are also measured using a handy *AsthmaMentor* Peak Flow Meter (© 2002 Respironics HealthScan, Inc.; US Patent No. 5,320,170; 391,506) . The remaining 100 are not included in the present study. 20 of them were not returned to us, 50 were incomplete in different respects while 30 were soiled beyond recognition. Thus, we have considered them as no-response.

3.2. Exploration

This paper focuses upon the smoker types and their respiratory health conditions, and therefore suitable ways to monitor both short- and long-term exposure to tobacco on respiratory health of adult are explored statistically.

4. Data interpretation

We have analyzed the data using SPSS version 16.0 (SPSS South Asia Pvt. Limited). Firstly, we have calculated a tobacco exposure score for male and female exposure percentages (see Table 1). We have found that 87% male and 13% female are habitually smoking or chewing tobacco. Among the male

exposures around 70% are exposed with the effect of the tobacco smoking or chewing. Secondly, we have also calculated a similar score for various types of exposure, e.g. active smoking, passive smoking, for Ex-smoker and Non-Smoker (see Table 1). We have observed about 45% of the population is of active smoking type while 47% is of passive smoking type. Only 6% out of the 100% is not exposed to any form of tobacco (see Table 1).

Table 1. Percentage Ratio of the Tobacco Users and Their Health Status

Sex Ratio	% Ratio	Type of smokers	% Ratio	Breathing Status	% Ratio	Age Group	% ratio	Health Status (Current / Past)	% Ratio Difference
Female	12.9	Active	44.8	Acute	2.2	10-17	4.38	Excellent	2.5
						18-25	66.42	Fair	1.8
		Ex-Smoker	0.4	Fine	51.2	26-33	20.99	Good	6.0
						34-41	10.22	Poor	1.8
		Non-Smoker	1.5	Rarely	36.6	42-49	7.66	Very Good	0.1
Male	87.1					50-57	5.84	Very Poor	0.0
		Not Exposed	6.0	Repeated	8.6	58-65	2.01		
						66-73	0.55		
		Passive	47.4	Worst	1.5	74-81	0.18		
TOTAL	100	Total	100	Total	100	Total		Total	100

We have found that 1.5% had the worst breathing and coughing, while around 11% of the reported cases were facing the breathing problem either repeatedly or acutely, and 37% of the ETS exposed cases were facing the breathing problem rarely however, the intensity of the problem was fairly high. To evaluate exposure stability over time, we have compared the self-reported duration of ETS exposure during the previous 4 weeks at the various levels. We have found that the percentage difference of persons having "excellent" and "fair health" conditions are 4.3% (2.5% + 1.8%) getting their health deteriorated from 24.8% to 29.1% within a month (see Table 1). In the list of original data the proportion of the persons having excellent and fair health condition is 29.1% at the time of collection of information which was 24.8% before one month. It was also observed that where individuals reported of having poor to very poor health conditions, the ratio increased from 3.6% to 5.4% after one month.

Upon evaluating the ETS exposure effect with respect to the age factor, it was seen that about 66.5% of the population of tobacco consumers is limited to the age grade (2) and 21% of the same is restricted to the age grade (3) (see Table 1).

The implication of the above observation is alarming and it indicates that it is the youth mass (age grade 2) of the population type which is exposed to the tobacco use very prominently. While considering the youth category, 38% are students while 7% is the unemployed class that is exposed to the tobacco smoking and chewing. While studying the form of the tobacco exposure we have found that around 41% are using the smoking forms of the tobacco and 7% are regional *Khaini* (chewing tobacco) users where, as around 30% are using both tobacco forms.

5. Statistical approach

Multiple regression model is carried out for current respiratory health as dependent variable, and Tobacco Intake, Continuous Tobacco use, Age, Education level, Job Category, Income, General Health and Past Health of the tobacco users in the study area as independent variables after adjusting for age, gender, smoking and socioeconomic status. Data analysis was performed using SPSS 16.0 software. We have carried out the ANOVA test to check the variability in the social characters with reference to the tobacco exposure. We have taken the five social characteristics under consideration. The characteristics are Gender, Education Level, Job Category, Religion and Income of the tobacco users in the study area. By carrying out the ANOVA test for the Respiratory Health with respect to the different respiratory symptoms, we have found that some of the symptoms are unanimously present in each and every group of the tobacco users. We have used the chi-square goodness of fit test to study the discrepancy in between the different natures of the tobacco intake. After performing the chi-square goodness of fit test we have found that in the study region the different forms of tobacco used by the tobacco users are not homogeneous.

5.1. ANOVA test for tobacco use in relation with social characters

In this paper we have carried out the ANOVA test to check the variability in the social characters with reference to the tobacco exposure. We have taken the five social characteristics under consideration. Each characteristic is described into some sub characteristics. The characteristics are Gender, Education Level, Job Category, Religion and Income of the tobacco users in the study area. By carrying out the ANOVA test on the Gender, it is found that the average variation between the groups of the tobacco users is more than the average variation within the group. The reason behind this is that the 87% male and 13% female are habitual of smoking or chewing tobacco. This large difference in the proportions of the male and female tobacco users indicate that in the study region tobacco exposure is more prevalent in the males as compared to the females.

While considering the other form of social characteristic which is the Income under study, we have found that the habit of tobacco use is equally distributed

among the various income groups whereas in terms of the job category there are no observed variations in the tobacco exposure because in each job category the type of exposure is only changed. In this study, the proportion of the tobacco exposure is on an average same in every religion and hence, the habit of tobacco use becomes irrelevant, whereas in terms of the Education Level, it is observed that at different stages of education there are no variations in the tobacco users.

Table 2. Result of the ANOVA Test for different Social Characteristics

		Sum of Squares	df	Mean Square	F	Sig.
Gender	Between Groups	24.327	4	6.082	40.143	.000
	Within Groups	90.146	595	.152		
	Total	114.473	599			
Education level	Between Groups	3504.490	4	876.123	5.129	.000
	Within Groups	101644.428	595	170.831		
	Total	105148.918	599			
Job category	Between Groups	1696.115	4	424.029	8.075	.000
	Within Groups	31245.078	595	52.513		
	Total	32941.193	599			
Religion	Between Groups	26.917	4	6.729	.411	.801
	Within Groups	9739.401	595	16.369		
	Total	9766.318	599			
Salary	Between Groups	7.433	4	1.858	1.718	.144
	Within Groups	643.525	595	1.082		
	Total	650.958	599			

5.2. ANOVA test for respiratory health in relation with respiratory symptoms

By carrying out the ANOVA test for the Respiratory Health with respect to the different respiratory symptoms like Wheezing, Tightness of chest, Shortness of breath, Coughing, Asthma, Frequency of attack, and Exacerbations, we have found that some of the symptoms are unanimously present in each and every groups of the tobacco users. We have also observed that the symptoms like Wheezing, Asthma, Frequency of attack, Frequency at night time, Exacerbations are also present in each and every group and some of the symptoms like Tightness of chest, Shortness of breath or Coughing are found in only age grade 2 and 3.

This may be because the respiratory health of these user groups is very low ranked. It is understood to have come from the way they have rated their respiratory health scale.

Table 3. ANOVA Test for Respiratory Symptoms

		Sum of Squares	df	Mean Square	F	Sig.
Wheezing	Between Groups	1.297	4	.324	1.964	.099
	Within Groups	98.243	595	.165		
	Total	99.540	599			
Tightness of chest	Between Groups	4.463	4	1.116	6.857	.000
	Within Groups	96.802	595	.163		
	Total	101.265	599			
Shortness of breath	Between Groups	7.598	4	1.900	8.529	.000
	Within Groups	132.520	595	.223		
	Total	140.118	599			
Coughing	Between Groups	5.361	4	1.340	5.572	.000
	Within Groups	143.139	595	.241		
	Total	148.500	599			
Asthma	Between Groups	.241	4	.060	1.510	.198
	Within Groups	23.718	595	.040		
	Total	23.958	599			
Frequency of attack	Between Groups	635.208	4	158.802	1.232	.296
	Within Groups	76710.652	595	128.925		
	Total	77345.860	599			
Frequency at night time	Between Groups	934.267	4	233.567	2.078	.082
	Within Groups	66866.692	595	112.381		
	Total	67800.958	599			
Exacerbations	Between Groups	.168	4	.042	.170	.954
	Within Groups	147.030	595	.247		
	Total	147.198	599			

5.3. Chi-Square test for tobacco users of different nature

In this paper, we have made use of the chi-square goodness of fit test to study the discrepancy in between the different natures of the tobacco intake. We have taken the four different types of tobacco intake such as Smokers, Chewers, Mixed of both types and others. In different groups of tobacco users more than 50% are the smokers, 25% are the chewers and 15% tobacco users take in both forms of the tobacco.

Table 4. Chi-Square Goodness of fit test for the Tobacco intake

	Observed N	Expected N	Residual
No tobacco	253	240.0	13.0
Smokers	183	180.0	3.0
Chewers	88	90.0	-2.0
Mixed	62	60.0	2.0
Others	14	30.0	-16.0
Total	600		

After performing the chi-square goodness of fit test, we have found that in the present study region the different forms of tobacco used by the tobacco users are not homogeneous. The proportion of the tobacco intake in different forms is not the same as the smokers are more than 50%. Having considered the expected frequencies of the different tobacco intake forms to be 0.40, 0.30, 0.20 and 0.10, the critical value of the chi-square test statistics falls within the acceptance region (Table 5).

Table5. Result of the Chi-Square Goodness of Fit Test Statistics

	Tobacco intake
Chi-Square	9.399[a]
df	4
Asymp. Sig.	.052

However, if the chi-square test was to be carried out with the assumptions of the homogeneous expected frequencies, then the assumptions are not fitted with the observed value of the frequencies of the tobacco users of different categories.

5.4. Regression Model for the Respiratory Health

In this paper, we have studied the average relationship of 8 different variables with respect to the Respiratory Health. These variables are understood to affect the Respiratory Health of the tobacco users. Such variables are Tobacco Intake, Continue Tobacco use, General Health, Past Health, Age, Education level, Job Category and Income (Table 6).

Table 6. Regression model for the Respiratory Health

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	124.969	1.076		116.179	.000	122.856	127.082
Tobacco intake	-.022	.016	-.017	-1.359	.175	-.055	.010
Continue tobacco use	.050	.057	.010	.883	.378	-.061	.161
Age	-.051	.022	-.032	-2.280	.023	-.095	-.007
Education level	.033	.018	.023	1.860	.063	-.002	.069
Job category	.030	.034	.012	.904	.366	-.036	.096
Salary	.154	.225	.008	.687	.492	-.287	.596
Your general health	-11.693	.382	-.614	-30.640	.000	-12.442	-10.943
Your past health	-7.737	.389	-.380	-19.882	.000	-8.501	-6.972

a Dependent Variable: Respiratory Health on a scale of 0 to 100.

Our regression analysis shows that some of the parameters may have a negative effect on the Respiratory Health and rest of the same may have a positive effect. Tobacco intake and the Age factor very badly affect the respiratory health of the tobacco user. The general health and the past health of the tobacco user also have a negative effect on the respiratory health whereas the Education level, Job category and the Income structure show the positive effect on the respiratory health. The possible explanation for this trend could be observed from the identification of an individual on the basis of education and living style.

In the present study, we have also conducted the multiple regression analysis by making use of the expression of the multiple regression model for the respiratory health. This expression may suitably be defined by the dependent variable (Y) which represents the Respiratory health while independent variables (X1, X2, ….., X8) represent Tobacco Intake, Continuously Tobacco use, Age, Education level, Job Category, Income, General Health and Past Health of the tobacco users in the study area. The multiple regression model can be interpreted

as Y =124.969 - 0.022 X1 + 0.050 X2 - 0.051 X3 + 0 .033 X4 + 0.030 X5 + 0.154 X6 -11.693 X7 -7.737 X8

From the histogram created for the Respiratory Health (Fig. 1) on a scale of 0 to 100 where 0 represents "dead health" and 100 represents "full health", we have observed the frequency distribution of the regression standardized residual to be following the standard normal distribution with the mean 6.06 E -16, and the standard deviation is found to be 0.993.

Figure 1. Histogram

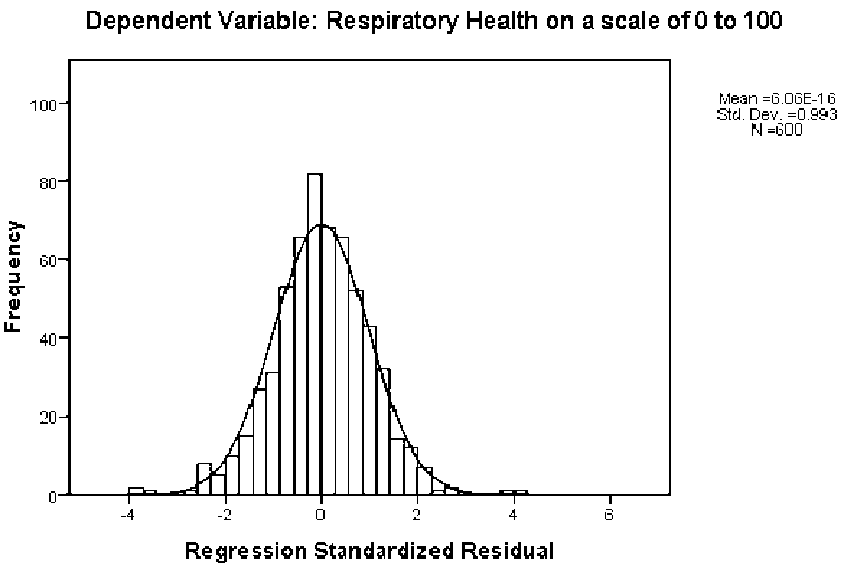
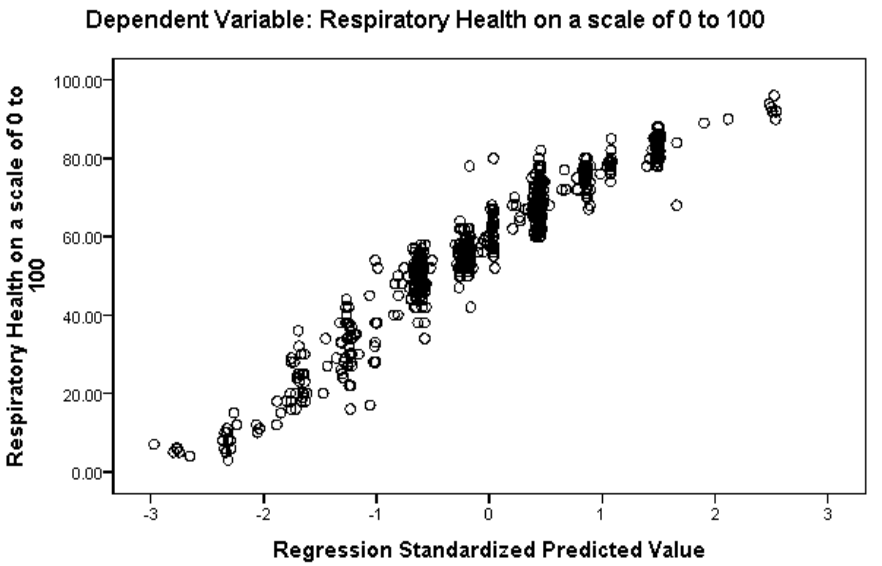


Figure 2. Scatter plot



In (Fig. 2), the scatter plot of the regression standardized predicted values for respiratory health on scale of 0 to 100 is shown. It is found that most of the tobacco users have rated their respiratory health from 50 to 80. As a result, much of the predicted values are scattered around 50 to 80. This is evident as the values are very densely marked in the scatter plot.

6. Discussion & conclusion

There have been studies in the past to investigate the trends of tobacco use in the previously combined state of Bihar [13] and also in Darabhanga district (Bihar) in 1967 [9]. However, this is possibly the first time that such a study reports exclusively for the newly formed state of Jharkhand.

Our study establishes statistically that of the 600 subjects from random populations, there were 253 (42.2%) non-consumers and 347 (57.8%) consumer of tobacco. There were 42.2% of active smokers who reported for repeated breathing trouble observed from their peak flow rates marked as PFM1, PFM2 and PFM3. Regarding the passive smokers, there were 47.4% who developed respiratory symptoms where a majority were those exposed for long term within their homes and as a result showed a decreased peak flow rate. Remaining tobacco users that belong both to smokeless tobacco and mixed type showed varying troubles with their respiratory symptoms: 14% wheezing, 12% Tightness of chest, 15.5% shortness of breath, (34%) coughing. For smokeless tobacco

users, they are also impairing their oral health but this is outside the scope of the present study.

It is understood from our present observations that the demographic parameters such as gender, age, caste, religion, education, work etc. under the set of environmental situations arising from rural or urban setup form the governing basis for getting hooked to tobacco habits. The age of an individual is regarded highly susceptible to developing habits like those of tobacco and alcohol. And as has been reported in the past, this study points to impaired respiratory health due to tobacco use. This is also evident from our results obtained from regression analysis. Ranchi and its province have shown vividness in its tobacco habits and consumption types which may mainly be attributed to its topology and culture. Further, it is also seen that the youth of this region is highly susceptible to developing the respiratory symptoms particularly if they are from low economic background and using tobacco.

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Declaration of interests

The authors have no competing interests to declare. The views expressed in this publication are sole responsibility of the authors and there is no direct or indirect influence of any outside source. None of the authors of the present paper is affiliated to any tobacco-related agency.

REFERENCES

[1] AGARWAL, G. K., JHA, U. & JHA, R. K., (2005), Study of the impacts of Environmental Tobacco Smoke and Respiratory Suspended Particulate Matter on Respiratory Health of Adult. Proceedings of the First International Conference on Environmental Exposure and Health, Atlanta, Georgia.

[2] BLANC P. & TOREN K. (1999), How much asthma can be attributed to occupational factors? American Journal of Medicine,107:580–7.

[3] CHAN-YEUNG M, MALO J. L. & TARLO SM, (2003), Proceedings of the first Jack Pepys Occupational Asthma Symposium, American Journal of Respiratory and Critical Care Medicine;167:450–71.

[4] GUPTA P. C., HAMNER J. & MURTI P., (1992), Control of Tobacco-Related Cancers and Other Disease. Proceedings of an International Symposium. Mumbai, Oxford University Press, pp 353–355.

[5] JAYANT K., (1991), Identifying specific tobacco problems in Children and Tobacco: The Wider View, Eds. Charlton A, Moyer C. International Union against Cancer, Geneva, p 27.

[6] KOGEVINAS M., ANTO J. M. & SUNYER J., (1999), Occupational asthma in Europe and other industrialised areas: a population-based study, European Community Respiratory Health Survey Study Group. Lancet, 353:1750–4.

[7] KOGEVINAS M., ZOCK J. & JARVIS D., (2007), Exposure to substances in the workplace and new-onset asthma: an international prospective population based study (ECRHS-II). Lancet 370:336–41.

[8] LAHIRI V., (1991), Identifying specific tobacco problems In Children and Tobacco: The Wider View Eds. Charlton A, Moyer C, International Union against Cancer (UICC), Geneva, pp 25–26.

[9] MEHTA F. S., PINDBORG J. J, HAMNER J. E. (1971); Oral cancer and precancerous condition in India, Tata Institute of Fundamental Research, Mumbai, Munksgaard, Copenhagen, 113–126.

[10] MEYER J. D., HOLT D. L. & CHERRY N. M., (1999), SWORD '98: Surveillance of work-related and occupational respiratory disease in the UK, Occupation Medicine, 49:485–9.

[11] MISHRA, A., (2003), Questionnaire on the study: Impacts of Environmental Tobacco Smoke (ETS) on respiratory health of adults, State University of New York at Buffalo, USA.

[12] PETO R, LOPEZ A. D., BOREHAM J., THUN M. & HEATH C. J., (1996), Doll R. Mortality from smoking worldwide, Britain Medicinal Bulletin, 52: 12–21.

[13] SINHA D. N., GUPTA P. C. & PEDNEKAR M. S., (2003), Tobacco use in a rural area of Bihar, India, Indian Journal of Community Medicine, 28(4): 167–170.

[14] Survey Results, (1990), Children and Tobacco: Newsletter No. 1, International Union against Cancer (UICC), Geneva.

[15] U S Department of Health and Human Services, (1994), Preventing tobacco use among young people: A report of the Surgeon General, Atlanta, Georgia: Public.

[16] VAIDYA S.G., VAIDYA N. S. & NAIK U. D., (1992), Epidemiology of tobacco habits in Goa, India. *In:* Control of Tobacco-Related Cancers and

Other Diseases. Proceedings of an International Symposium, Eds. Gupta PC, Hamner J. and Murti P., Mumbai, Oxford University Press, pp 315–320.

[17] World Health Report, (2002), Quantifying selected major risks to health, World Health Organization 2002, Available from http://www.who.int.whr/2002/chapter4.pdf.

[18] YACH D. & BETTCHER D., (2000), Globalization of tobacco industry influence and new global responses, Tobacco Control, 9: 206-16, Health Service, Centre for Disease Control and prevention, Office on Smoking and Health, 1994.