RESEARCH ARTICLE

Socioeconomic Inequality in the Prevalence of Smoking and Smokeless Tobacco use in India

Jarnail Singh Thakur[1], Shankar Prinja[1], Nidhi Bhatnagar[1]*, Saroj Rana[1], Dhirendra Narain Sinha[2], Poonam Khetarpal Singh[2]

Abstract

> **Background:** Tobacco consumption has been identified as the single biggest cause of inequality in morbidity and mortality. Understanding pattern of socioeconomic equalities in tobacco consumption in India will help in designing targeted public health control measures. **Materials and Methods:** Nationally representative data from the India Global Adult Tobacco Survey (GATS) conducted in 2009-2010 was analyzed. The survey provided information on 69,030 respondents aged 15 years and above. Data were analyzed according to regions for estimating prevalence of current tobacco consumption (both smoking and smokeless) across wealth quintiles. Multiple logistic regression analysis predicted the impact of socioeconomic determinants on both forms of current tobacco consumption adjusting for other socio-demographic variables. **Results:** Trends of smoking and smokeless tobacco consumption across wealth quintiles were significant in different regions of India. Higher prevalence of smoking and smokeless tobacco consumption was observed in the medium wealth quintiles. Risk of tobacco consumption among the poorest compared to the richest quintile was 1.6 times higher for smoking and 3.1 times higher for smokeless forms. Declining odds ratios of both forms of tobacco consumption with rising education were visible across regions. Poverty was a strong predictor in north and south Indian region for smoking and in all regions for smokeless tobacco use. **Conclusions:** Poverty and poor education are strong risk factors for both forms of tobacco consumption in India. Public health policies, therefore, need to be targeted towards the poor and uneducated.

Keywords: Tobacco - wealth quintiles - smoking - smokeless - India - public health policy

Introduction

Inequalities in the health sector have been widely documented in the developing world in regard to reproductive health, child health, communicable diseases and until recently, in non-communicable diseases (Blas et al., 2011). Tobacco consumption across the world has been identified as the single biggest cause of inequality in morbidity and mortality between rich and poor (Jarvis and Wardle, 2006). The past two decades have seen an increasing association of smoking with markers of social disadvantages (Kunst et al., 2004). The association between smoking and poverty is apparent at all levels beginning from the lower age of initiation, more consumption and lower quit rates in socially disadvantaged section (Jha et al., 2006; Bauld et al., 2007; Mathur et al., 2008).

There are publications describing national level inequalities in prevalence of tobacco consumption (Subramanian et al., 2004; Gupta, 2006; Pampel et al., 2011). However, in a big country like India there are variations across states and regions. More often studies

in the past have combined both forms of tobacco use for analysis (Harper and Kinnon, 2012; Palipudi et al., 2012) or have measured the smoking tobacco consumption only (Eik et al., 2010; Hosseinpoor et al., 2012; Nagelhout et al., 2012). They need to be analyzed separately as smokeless tobacco consumption is a major problem in India. Such information will play a key role for designing targeted smokeless tobacco control interventions. This paper provides information from the analysis utilizing the GATS data on socio-economic inequity associated with smoking and smokeless tobacco consumption across different regions comprising 29 states and two Union Territories in India (Center for Disease Control, 2009).

Materials and Methods

GATS (Global Adult Tobacco Survey) data from Indian states and union territories conducted during 2009-2010 was used for analyses. GATS is a global survey for systematically monitoring adult tobacco use and tracking key tobacco control indicators (Ministry of Health and Family Welfare, 2010). The survey covered 29

[1]Community Medicine, PGIMER, Chandigarh, [2]South East Asian Regional Office, World Health Organization, New Delhi, India
*For correspondence: nidsbhatnagar@yahoo.com

states (including Delhi) and two Union Territories (UTs)- Chandigarh and Puducherry representing 99.92% of the total population of India. North region included seven states and UTs (North region: Jammu Kashmir, Punjab, Haryana, Himachal Pradesh, Chandigarh, Uttarakhand, Delhi.); Central zone had four states (Central Zone: Rajasthan, Uttar Pradesh, Madhya Pradesh, Chhattisgarh); East zone included four states (East Region: West Bengal, Jharkhand, Odisha, Bihar); North East zone included Sikkim, Arunachal Pradesh, Nagaland, Manipur, Mizoram, Tripura, Meghalaya and Assam; West region included two states and one UT (West Region: Gujarat, Maharashtra, Goa) and South region included four states and one UT (South region: Andhra Pradesh, Kerala, Karnataka, Tamil Nadu, Puducherry) respectively. Target sample for the survey was 79690. However the sample size achieved in the survey was 69296. Among these cases 45, were neglect cases who refused to answer to education and occupation questions. 221 cases that did not have complete data for assets were also excluded. Thus the sample size considered for analysis in this study was 69030. Complete details of the methodology adopted for survey is reported in the following reference citation (Ministry of Health and Family Welfare, 2010). This paper assessed prevalence of tobacco use and its association with socio-economic determinants across six regions of country (North, Central, East, North East, West and South).

Statistical analyses

Current smoking tobacco use and current smokeless tobacco consumption were the two dependent variables used in this analysis. Current smoking was defined as the use of any smoked tobacco product, either daily or occasionally using the following questions: 'Do you currently smoke tobacco on a daily basis, less than daily, or not at all' and 'Do you currently use smokeless tobacco on a daily basis, less than daily, or not at all' (Ministry of Health and Family Welfare, 2010). Former tobacco users were defined as the number of ever tobacco smokers or smokeless tobacco users who currently do not smoke or use any form of tobacco. Never tobacco users were defined as adults who reported that they neither smoked nor used smokeless tobacco in their life time. Household

assets were used to assess the socio-economic class by applying Principal component analysis (PAC) (McKenzie and David, 2005; Vyas and Lilani, 2006).

SPSS version 18.0 was used to analyze the data. Equity ratio of prevalence of both forms of tobacco consumption among the poorest to richest was calculated in order to see the status of smoking among region of India. Trend of tobacco consumption across wealth quintiles in different regions was tested using Chi-square test for trend. Region-wise odds ratios for current smoking and smokeless tobacco consumption *versus* no tobacco consumption was computed using a multiple logistic regression model wherein wealth index was computed adjusting for other variables. Odds ratios were computed taking the highest wealth and education category as reference. The dependent variable was tobacco use (tobacco user-1; never tobacco user-0). Former tobacco users were removed from the analysis due to the fact that current tobacco use may not directly influence from current socioeconomic and demographic status.

Results

The prevalence of smoking and smokeless tobacco across wealth quintiles in different regions of India is given in Table 1. The trend of smoking and smokeless tobacco consumption across wealth quintiles was significant across all regions of India. Higher prevalence of smoking and smokeless tobacco consumption was observed in the medium wealth quintiles at national level and across all regions except East and West region for smoking and North and North East region for smokeless tobacco consumption respectively. More consumption of smoking and smokeless tobacco was observed in poorest and poor quintiles as compared to the rich and richest quintiles. The equity ratio of smoking and smokeless tobacco consumption in poorest compared to the richest quintile was 1.6 and 3.1 respectively at national level.

Odds ratios for current smoking and smokeless tobacco use *versus* no tobacco use were computed using a multiple logistic regression model incorporating education and income variable as predictor for different regions in Table 2. For educational level, odds ratios were computed taking

Table 1. Prevalence of Smoking and Smokeless Tobacco Consumption among Adults Age 15 Years and Above Across Wealth Quintiles in Different Regions of India

		Poorest %, (95% CI)	Poor %, (95% CI)	Medium%, (95% CI)	Rich %, (95% CI)	Richest %, (95% CI)	p value
Smoking Tobacco	India	18.0 (17.3,18.6)	17.3 (16.7,17.9)	20.6 (19.9,21.2)	14.7 (14.1,15.2)	11.4 (10.8,12.0)	<0.01
	North	24.6 (22.8,26.4)	19.4 (17.7,21.2)	28.0 (25.7,30.2)	13.8 (9.9,11.9)	10.9 (9.9,11.9)	<0.01
	Central	17.8 (16.3,19.3)	16.1 (14.3,18.0)	19.8 (18.5,21.1)	10.1 (8.5,11.6)	7.7 (5.8,9.6)	<0.01
	East	13.2 (11.8,14.6)	16.9 (15.2,18.7)	14.0 (12.8,14.0)	16.7 (14.7,18.7)	13.9 (11.5,16.4)	<0.01
	North East	22.8 (21.3,24.30)	23.7 (22.3,25.2)	28.6 (27.2,30.1)	25.0 (23.5,26.5)	23.8 (21.8, 25.9)	<0.01
	West	9.6 (8.1,11.1)	9.1 (7.7,10.5)	10.7 (9.3,12.1)	6.6 (5.5,7.6)	5.3 (4.3,6.4)	<0.01
	South	15.0 (13.1,16.6)	14.1 (12.8,15.3)	21.2 (19.3,23.0)	12.0 (10.8,13.2)	7.2 (6.0,8.4)	<0.01
Smokeless Tobacco	India	30.9 (30.1,31.7)	22.9 (22.1,23.7)	36.4 (35.6,37.1)	16.6 (16.0,17.2)	10.0 (9.5,10.6)	<0.01
	North	10.2 (9.0,11.5)	10.5 (9.2,11.9)	11.2 (9.6,12.8)	7.0 (6.2,7.7)	3.3 (2.7,3.9)	<0.01
	Central	31.7 (29.9,33.5)	25.2 (23.0,27.3)	41.0 (39.4,42.5)	19.0 (17.1,20.8)	10.8 (8.6,13.1)	<0.01
	East	49.1 (47.1,51.2)	27.5 (25.4,29.6)	48.1 (46.4,49.8)	22.5 (20.3,24.7)	16.5 (13.9,19.1)	<0.01
	North East	41.5 (39.7,43.2)	37.9 (36.2,39.5)	37.9 (36.4,39.4)	32.0 (30.3,33.6)	31.3 (29.1,33.6)	<0.01
	West	29.5 (27.2,31.8)	22.9 (20.9,25.0)	35.8 (33.7,38.0)	18.0 (16.4,19.6)	6.7 (5.5,7.8)	<0.01
	South	15.3 (13.6,16.9)	10.1 (9.1,11.2)	23.4 (21.4,25.3)	9.1 (8.0,10.1)	4.4 (3.4,5.3)	<0.01

*Data source: GATS 2009–2010 (Figure in parentheses represent 95% CI of prevalence); **Chi square of trend, p<0.01 at 0.01 level

Table 2. Predictors of Current Smoking and Smokeless Tobacco Consumption among Adults Age 15 Years and Above in Different Regions of India Using Logistic Regression Analysis

	India OR,95%CI	North OR,95%CI	Central OR,95%CI	East OR,95%CI	North East OR,95%CI	West OR,95%CI	South OR,95%CI
Education-smoking							
No formal education/less than primary	2.7 (2.5,2.9)c	2.8 (2.3,3.4)c	5.0 (3.6,7.0)c	1.9 (1.4,2.4)c	2.4 (2.0,2.9)c	2.8 (1.9,3.9)c	3.8 (2.9,5.1)c
Completed primary/less than Secondary	1.8 (1.7,1.9)c	1.8 (1.5,2.3)c	2.6 (1.9,3.6)c	1.5 (1.2,1.9)c	1.7 (1.5,2.0)c	1.5 (1.0,2.1)a	1.9 (1.5,2.5)c
Completed secondary/high school	1.3 (1.2,1.5)c	1.5 (1.2,1.8)c	1.7 (1.2,2.4)c	1.1 (0.9,1.4)	1.3 (1.1,1.6)c	1.2 (0.8,1.6)	1.3 (1.0,1.7)a
Completed college/University or above (RC)	1	1	1	1	1	1	1
Education-smokeless tobacco							
No formal education/less than primary	2.1 (1.9,2.3)c	3.4 (2.5,4.6)c	1.9 (1.5,2.3)c	3.1 (2.4,3.8)c	1.5 (1.3,1.7)c	2.8 (2.2,3.7)c	6.5 (4.4,9.8)c
Completed primary/less than Secondary	1.9 (1.8,2.1)c	2.6 (1.9,3.4)c	1.9 (1.5,2.5)c	1.9 (1.5,2.3)c	1.7 (1.5,1.9)c	2.2 (1.7,2.8)c	3.5 (2.3,5.2)c
Completed secondary/high school	1.4 (1.3,1.5)c	1.5 (1.1,2.1)b	1.3 (1.0,1.7)a	1.7 (1.3,2.1)c	1.4 (1.2,1.6)c	1.4 (1.1,1.8)b	1.9 (1.3,2.9)b
Completed college/University or above (RC)	1	1	1	1	1	1	1
Wealth quintiles-smoking							
Poorest	1.3 (1.1,1.4)c	2.2 (1.8,2.6)c	1.4 (1.0,2.0)a	0.7 (0.5,0.9)b	0.8 (0.6,0.9)b	1.7 (1.2,2.3)b	1.6 (1.2,2.1)c
Poor	1.3 (1.2,1.4)c	1.8 (1.5,2.1)c	1.4 (1.0,2.0)a	1.0 (0.8,1.4)	0.9 (0.8,1.0)	1.4 (1.0,1.9)a	1.6 (1.2,1.99)c
Medium	1.2 (1.1,1.3)c	2.4 (1.9,2.9)c	1.7 (0.9,1.6)	0.7 (0.9,0.9)b	0.9 (0.8,1.1)	1.4 (1.0,1.9)a	1.8 (1.4,2.4)c
Rich	1.2 (1.1,1.3)b	1.3 (1.1,1.5)c	1.0 (0.7,1.4)	1.2 (0.9,1.5)	1.0 (0.8,1.1)	1.1 (0.8,1.5)	1.3 (1.0,1.6)
Richest (RC)	1	1	1	1	1	1	1
Wealth quintiles-smokeless tobacco							
Poorest	2.9 (2.7,3.2)c	2.3 (1.7,2.9)c	2.9 (2.2,3.9)c	3.3 (2.6,4.1)c	1.3 (1.2,1.5)c	4.1 (3.2,5.2)c	1.9 (1.4,2.6)c
Poor	2.1 (1.9,2.3)c	2.4 (1.9,3.1)c	2.1 (1.6,2.8)c	1.4 (1.1,1.8)b	1.2 (1.0,1.4)b	2.9 (2.3,3.8)c	1.7 (1.3,2.7)c
Medium	3.3 (3.1,3.6)c	2.3 (1.8,3.1)c	3.9 (3.0,5.3)c	2.4 (1.9,3.1)c	1.1 (1.0,1.3)	4.6 (3.6,5.8)c	2.5 (1.9,3.3)c
Rich	1.5 (1.4,1.7)c	1.8 (1.5,2.3)c	1.8 (1.3,2.3)c	1.2 (0.9,1.5)	0.9 (0.8,1.0)	2.6 (2.1,3.2)c	1.5 (1.1,2.0)c
Richest (RC)	1	1	1	1	1	1	1

*Data source: GATS 2009-2010; RC=Reference categories; OR=Odd ratio; [a]p<0.05; [b]p<0.01; [c]p<0.001

highest level of education (completed college) as the reference. Similarly for Wealth index, odds ratios were computed taking the highest wealth category as reference value. The risk of smoking in the subjects with lower education status was significantly more than subjects with highest level of education. The trend of decreasing prevalence of smoking tobacco use with increasing education level was significant across all regions. The largest difference was observed in central, OR 5.0 (3.6-7.0) and south India, OR 3.8 (2.9-5.1). Significant difference in smokeless tobacco consumption was observed with subjects in the lower education category having higher risk than subjects in the higher education categories. The trend was significant across all regions demonstrating decreasing prevalence of smokeless tobacco consumption with increasing level of education. Large difference was observed in South region, OR 6.5 (4.4-9.8) and North region, OR 3.4 (2.5-4.6) of India. Across socio-economic categories, trend of decreasing odds of smoking with increasing wealth was significant for north and south region. For smokeless tobacco, trend of decreasing odds of tobacco consumption with increasing wealth was significant across all regions.

Discussion

Substantial socioeconomic inequalities exist in the health sector. Health behaviors, and the inequitable distribution of determinants of population health e.g. socio-economic status, influence the future incidence of common chronic diseases and thus have a considerable impact on health status (Balarajan et al., 2011). Rio political declaration on social determinants of health, 2011 emphasize the importance of social and health equity through action on social determinants (Rio Political Declaration, 2013).

Inequities in tobacco consumption across social determinants are well recognized and wide spread. In line with previous studies, (Eek et al., 2012; Harper and Kinnon, 2012; Hosseinpoor et al., 2012; Nagelhout et al., 2012; Palpudi et al., 2012) we found that respondents with lower education and income were more likely to consume tobacco than respondents with higher education and income. Study utilizing data from GATS-India highlighted total tobacco consumption in rural areas of country to be 38.4% compared to urban areas with smoking prevalence of 25.3% (Bhawna, 2013). Risk of smoking and smokeless tobacco consumption reported in the poorest class was more than the richest class across all regions. Significant trend of consumption of both forms of tobacco according to wealth quintiles was observed across regions of India. Trend of socio-economic inequality of tobacco consumption is visible across regions. Decreasing odds of smoking tobacco use with increasing wealth was reported in North and South India. Further research is required to understand the determinants of this pattern of tobacco consumption.

In this analysis, socio-economic determinants were studied as predictors of both forms of tobacco consumption but in the long term tobacco use itself results in social inequalities. In disadvantaged sections

of society, expenditure on tobacco use replaces other essential expenditures. In the long-term, these families suffer serious morbidity and mortality due to tobacco use which widens the inequality gap more (Johnson et al., 2011). Monitoring of tobacco epidemic across states and region will be necessary to increase the effectiveness of existing public health strategies and for development of new interventions. Study found probability of making quit attempt was higher among tobacco users who were more educated (OR-1.40, CI 1.04-1.94), having a higher socio-economic status (SES) (OR-2.39, CI 1.54-3.69), and belonging to non-agricultural laborer occupational group (OR-1.90, CI 1.29-2.78) (Sarkar et al., 2013). Public health policy and health promotion interventions (a part of the socio-political context) need to look carefully into these inequities in health and risk factor distribution. The application of an equity focus could enrich and modify tobacco control policies in several ways. Adoption of a population-based approach that relies on health education to encourage healthy behavior has worsened social inequalities in health as major benefits have been harnessed by upper socioeconomic classes (Prinja and Kumar, 2009). Many tobacco control measures have the potential to achieve large reductions among lower income groups. These include banning of advertisements, raising tobacco prices, work place interventions, provision of cessation aids, and telephone help lines (Kunst et al., 2004). Taxation has been reported to be the most effective measure that can curb the smoking epidemic in poor. A 10% increase in bidi prices could reduce bidi consumption by 9.2%. A 10% increase in cigarette prices could reduce cigarette consumption by 3.4% (John et al., 2005). Also there is a need of rational taxation measures in India. The taxes placed on tobacco products are very low especially for the products consumed by the lower socio-economic class e.g. bidis, open tobacco products, smokeless tobacco like gutkha etc. Effective tobacco taxation can be ensured by eliminating the regulatory distinctions between hand-made and machine-made bidis, removing the exemptions to small producers and restricting the availability of unbranded bidis (Thakur et al., 2011). There is also a need to specifically target the tobacco control measures to growing middle income group in India. High consumption of both forms of tobacco was observed in this income quintile in the study.

Effectively addressing inequities in health involves not only new sets of intervention, but modifications to the way that public health programs are organized and operate, by identifying the inequities in social determinants of health, and promoting appropriate interventions to address those inequities through public health programs (Erik et al., 2011). Integration of tobacco control with NCD and other national programs in all policies is required to achieve good results (Thakur et al., 2011a; 2011b). Inter ministerial group on tobacco control in India should also discuss the widespread inequality prevalent in smoking and smokeless tobacco use and ways to address the underlying social determinants.

The findings in this paper are subject to a few limitations. The prevalence results are based on self-reports without bioassay validation. Former tobacco users were excluded from the logistic regression. The proportion of former users was different in different states and their distribution by socio-demographic variables used in the analysis might be different. This might affect some comparisons. The information on frequency and length of smoking, though available in GATS data, was not considered in the present study. Despite these limitations, our study provides evidence of wide socio-economic inequalities in smoking and smokeless tobacco use across different regions in India. Reaching the lower socio-economic groups and addressing inequalities by focusing on social determinants is essential to achieve significant reductions in tobacco consumption in India.

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References

Balarajan Y, Selvaraj S, Subramanian SV (2011). India: Towards Universal Health Coverage 4; Health care and equity in India. *Lancet*, **377**, 505-15.

Bhawna G (2013). Burden of smoked and smokeless tobacco consumption in india - results from the global adult tobacco survey India (GATS-India)- 2009-201. *Asian Pac J Cancer Prev*, **14**, 3323-9.

Blas E, Sommerfeld J, Kurup AS (2011). Social determinants approaches to public health: from concept to practice.

Bauld L, Judge K, Platt S (2007). Assessing the impact of smoking cessation services on reducing health inequalities in England: observational study. *Tob Control*, **16**, 400-4.

Eek F, Ostergren Per-Olof, Diderichsen Finn, et al (2010). Differences in socioeconomic and gender inequalities in tobacco smoking in Denmark and Sweden; a cross sectional comparison of the equity effect of different public health policies. *BMC Public Health*, **10**, 9.

Global Tobacco Surveillance System (2013). Global adult tobacco survey: indicator guidelines: definitions and syntax. Atlanta: CDC (2009).

Gupta R (2006). Smoking, educational status and health inequity in India. *Indian J Med Res*, **124**, 15-22.

Harper S, Kinnon Mc B (2012). Global socioeconomic inequalities in tobacco use: internationally comparable estimates from the World Health Surveys. *Cancer Causes Control*, **23**, 11-25.

Hosseinpoor AR, Parker LA, Tursan d'Espaignet E, Chatterji S (2012). Socioeconomic inequality in smoking in low-income and middle-income countries: results from the world health survey. *PLoS ONE*, **7**, 42843.

Jarvis MJ, Wardle J (2006). Social patterning of health behaviours: the case of cigarette smoking. In: Marmot M, Wilkinson RG, editors. Social determinants of health, 2nd edition. Oxford: Oxford University Press, 224-37.

Johnson NW, Warnakulasuriya S, Gupta PC, et al (2011). Global oral health inequalities in incidence and outcomes for oral cancer: causes and solutions. *Adv Dental Res*, **23**, 237-46.

Jha P, Peto R, Zatonski W, et al (2006). Social inequalities in male mortality, and in male mortality from smoking: indirect estimation from national death rates in England and Wales, Poland, and North America. *Lancet*, **368**, 367-70.

John RM, Rao RK, Rao MG, et al (2010). The Economics of Tobacco and Tobacco Taxation in India. Paris: International Union Against Tuberculosis and Lung Disease.

Kunst A, Giskes K, Mackenbach J (2004). Socio-economic inequalities in smoking in the European Union. Applying an equity lens to tobacco control policies.

Mathur C, Stigler MH, Perry CL, Arora M, Reddy KS (2008). Differences in prevalence of tobacco use among Indian urban youth: the role of socioeconomic status. *Nicotine Tob Res*, **10**, 109-16.

McKenzie, David J (2005). Measuring inequality with asset indicators. *J Population Economics*, **18**, 229-60.

Ministry of Health and Family Welfare, Government of India. Global Adult Tobacco Survey Report, India 2009-10.

Nagelhout GE, Korte-de Boer de Diane, Kunst AE, et al (2012). Trends in socioeconomic inequalities in smoking prevalence, consumption, initiation, and cessation between 2001 and 2008 in the Netherlands. Findings from a national population survey. *BMC Public Health*, **12**, 303.

Pampel CF, Denney TJ, Krueger MP (2011). Cross-national sources of health inequality: education and tobacco use in the world health survey. *Demography*, **48**, 653-74.

Palipudi KM, Gupta PC, Sinha DN, et al (2012). Social determinants of health and tobacco use in thirteen low and middle income countries: evidence from global adult tobacco survey. *PLoS ONE*, **7**, 33466.

Prinja S, Kumar R (2009). Reducing health inequities in a generation: a dream or reality? *Bull World Health Organization*, **87**, 84.

Sarkar BK, Arora M, Gupta VK, et al (2013). Determinants of tobacco cessation behavior among smokers and smokeless tobacco users in the states of Gujarat and Andhra Pradesh, India. *Asian Pac J Cancer Prev*, **14**, 1931-5

Subramanian SV, Shailen N, Kelly M, et al (2004). Patterns and distribution of tobacco consumption in India: cross sectional multilevel evidence from the 1998-9 national family health survey. *BMJ*, **328**, 801-6.

Thakur JS, Garg R, Narain JP, Menabde N (2011). Tobacco use: a major risk factor for non-communicable diseases in South East Asia Region. *Indian J Public Health*, **55**, 155-61.

Thakur JS, Prinja S, Garg C, Mendis S, Menabde N (2011). Social and Economic implications of Non-communicable diseases in India. *Indian J Comm Med*, **36**, 13-22.

Vyas S, Seema, Kumaranayake L (2006). Constructing socioeconomic status indexes: how to use principal component analysis. *Health Policy Planning*, **21**, 459-68.