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Non-Communicable Disease among Men in India: How far Occupation and Health Behaviour Matter?

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Abstract: Non-communicable diseases are a global health challenge. Since India has a huge working age population, it becomes important to study the non-communicable disease prevalence among men in the backdrop of the ongoing demographic and epidemiological transition. By using fourth round of National Family Health Survey (2015–2016), the paper aims to measure selected non-communicable diseases i.e. asthma, diabetes and heart disease by different occupational groups and assess various covariates of these diseases. Bi-variate and multivariate logistic regression models are carried out with special reference to occupation, adjusting for socio-economic variables. Results indicate that agricultural workers are prone to asthma and people who are engaged in professional/legislative and services/clerical occupation suffer considerably from diabetes. Major risk factors of these diseases are higher age, consumption of alcohol and having hypertension. Education and wealth improvement are major deterents of lowering diabetes. Identifying workers with higher risk factors of non-communicable disease and investment in health insurance programs, dissemination of knowledge and better health behaviour pertaining to these non-communicable diseses are essential for public health interventions. These efforts will not only have direct impact on workers' health but also improve their productivity; thus, propelling the nation towards economic development.

Keywords: Men, Non-Communicable Disease, Occupation, Prevalence, Risk factors, India.

Introduction

Non-communicable diseases (henceforth, NCDs) are a global health challenge. Over the last two decades the morbidity and mortality burden of NCDs is rising rapidly (Naghavi et al. 2017). In the year 2016, NCDs accounted for 40.5 million deaths, accounting for 71 percent of the overall 56.9 million of total global deaths (World Health Statistics, 2018). Moreover, the burden of NCDs is higher in developing countries than in developed countries. Over 80 percent of the total global deaths occur due to NCDs in low and middle-income countries (WHO, 2018). Similar to the global trends, India is also witnessing the most noxious increase in the burden of non-communicable diseases. Accounting for 63 percent of total deaths, deaths due to NCDs in India increased from 3.4 million in 1990 to 5.9 million in 2016 (WHO, 2018).

NCDs occur due to a combination of genetic, physiological, environmental, and behavioural factors. The four main NCDs that contribute majorly to global deaths are cardiovascular (henceforth, CVDs), cancer, respiratory disease, and diabetes. Among these, CVDs account for most of the NCD deaths followed by cancer, respiratory disease and diabetes (Terzic and Waldman, 2011; World Health Statistics, 2018). For instance, CVDs contribute to

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45 percent of all NCD deaths (World Health Statistics, 2018). Further, most of the NCDs are strongly associated and causally linked with four particular behaviours: consumption of smoking and smokeless tobacco, less physical activity, unhealthy diet, and the harmful use of alcohol. These behaviours lead to four key metabolic/physiological changes: raised blood pressure, overweight/obesity, elevated blood glucose, and blood cholesterol levels 2. (WHO, 2018). Social determinants of health are essential to a healthy life (Marmot et al., 2005) and therefore, a large of body literature emphasizes on various socioeconomic and demographic risk factors of NCDs (Chowdhury et al., 2016; Kumar and Ram, 2017; Yin et al., 2017). For instance, while with an increase in age, NCDs increase (WHO, 2018; Lee & Lee 2020; Vijayakarthikeyan and Dhanuraja, 2020) however, with improvement in education, NCDs decreases (Chowdhury, 2016; Kumar and Ram, 2017). NCDs also occur as comorbidities (Patel et al., 2011).

Previous studies have shown occupation as one of the most important determinants of several NCDs such as high blood pressure, asthma, diabetes and heart disease (Tenkanen et al., 1997; Undhad et al., 2011). Occupation and work culture influence lifestyle and related risk factors for NCDs (Bloom et al., 2012). It is generally thought that the lower occupational grade is associated with lower income, lesser social identification and hence are more prone to vulnerable conditions of ill-health; also, they often do not have resources to deal with the consequences of diseases resulting in disparities in health (Chang, 2009; Clays, 2007). For example, an increased risk of asthma among males has been observed in machine operators, assemblers, mining labourers, constructers, and those in manufacturing sector (Agrawal et al., 2014). Not working adults are also at high risk of asthma (Patel et al., 2019). While the risk of diabetes among males has been observed among unskilled and semi-skilled manual occupations (Heden et al., 2014), high prevalence of hypertension has been observed among blue-collar occupation (Landsbergis et al., 2016); in metal-processing workers, carpenters/painters, electricians and among middle socio-economic categories mainly engaged in manual skilled and unskilled occupation (Patel et al., 2019).

The present paper is conceptualized based on the following arguments. First, although studies in India (Ajay et al., 2008; Kumar and Ram, 2017; Vijayakarthikeyan & Dhanuraja, 2020) have tried to find out the determinants of asthma, diabetes and heart disease, very few attempted to study factors associated with the NCDs among different occupational groups in India. Our study is a comprehensive study focusing on the three major types of NCDS among different occupational groups in India. Second, most of the studies (Undhad et al., 2011; Chowdhury et al., 2016) have considered hypertension as an outcome variable; however, literature (Lee and Lee 2020; Pan et al., 2020) suggests that hypertension may influence the occurrence of NCDs. Therefore, in the present study, we try to keep hypertension as an exposure variable and investigate how it affects the other NCDs. Third, India is presently undergoing both demographic and epidemiological transitions, which warrants special attention while studying NCDs. India, with an estimated population of 1.2 billion, has 62.5% of its population in the 15-59 years age group (SRS, 2011). Thus, it becomes important to study the NCD prevalence among workers and non-workers. Fourth, identifying occupations with higher risk of major NCDs is essential for group-interventions of working class, especially for middle-income countries like India, where NCD prevalence is escalating. The rapid increase in NCDs is of great public health importance. This paper aims to measure the selected NCDs (asthma, diabetes, and heart disease) by different occupational groups among male population aged 15-54 years and to assess various covariates of these diseases in India concerning occupation and behavioural practices.

Data and Methods

The data used in the study is taken from the fourth round of the National Family Health Survey -2015-2016 (henceforth, NFHS) conducted by International Institute for Population Sciences under the stewardship of the Ministry of Health and Family Welfare, Government of India (MoHFW-GOI). NFHS-4 is a nationally representative sample survey of households. The survey applied a two-stage stratified random sampling design. It provides data on demographic, socio-economic and health indicators at national and regional level, and from fourth round of survey onwards, it provides data on 640 districts in the country as per the 2011 census. NFHS-4 interviewed 601,509 households with a total sample of 699,686 women aged 15-49 years and 112,122 men aged 15-54 years. The present study is based on 1,03,079 men aged 15–54 years who reported their current occupation and completed bio-marker tests at the time of survey (IIPS and ICF, 2017).

Outcome variables

NFHS provides information on major chronic diseases, namely asthma, cancer, diabetes, heart disease, and hypertension. However, for this study, we focused on three NCDs: asthma, diabetes, and heart disease, which are self-reported. Questions on these diseases are directly asked the respondent: "Do you currently have a. Asthma, b. Diabetes, and c. Heart disease. Thereafter, the response is coded as '0' for no and '1' for yes.

Exposure variables

The main exposure variable of the study is occupation. In NFHS-4, information on the respondent's current occupation was obtained through self-reports at the time of the survey. There are 98 categories of occupations that is reported in NFHS-4. These occupations are coded using the revised Indian National Classification of Occupations (NCO) 2004, which is based on and is compatible with categories given by ILO (International Labour Organization). For the present study, the occupations are recoded in five broad categories: Professional occupation, Agricultural occupation, Manual skilled and unskilled occupation, Services/Clerical and not working population.

Respondent's age is coded into four broad categories of 15-24 years, 25-34 years, 35-44 years and 45-54 years. Place of residence is categorized as rural and urban. Respondent's completed years of schooling is classified into four categories of no education, up to primary education, up to secondary education, and up to higher education. Household economic status is measured by an index based on household ownership of assets and graded. It is coded into five categories i.e. poorest, poor, middle, richer, and richest. The religion of the household head is classified as Hindu, Muslim and Others. The caste of the household head is classified into four categories: Schedule caste (SC), Schedule Tribes (ST), Other Backword Class (OBC), and others. This study also includes two behavioural habits of the respondents (alcohol consumption and smoking).

Hypertension is computed by using the OMRON BP monitor in NFHS-4. Blood pressure measurements for each respondent was taken three times with an interval of five minutes between readings. Forty-eight percent of men reported that their blood pressure was ever measured prior to the survey and 7 percent of them reported that on two or more occasions, they were told by a doctor or health professional that they have high blood pressure. However, only 2 percent of men are currently taking medicine to lower their blood pressure (IIPS and ICF, 2017). We considered the second and third measurement to determine the systolic and diastolic blood pressure. Finally, respondents whose average systolic blood pressure (SBP) was

>140 mm Hg and/or average diastolic blood pressure (DBP) was >90 mm Hg and/or self-reported use of any medication to lower their high blood pressure are considered to have elevated blood pressure readings and if average systolic blood pressure (SBP) was <140 mm Hg or average diastolic blood pressure (DBP) was <90 mm Hg are considered normal. Then, it is coded as '0' for no and '1' for yes.

Methodology

The prevalence rate in the study is defined as persons reporting from specific non-communicable disease per 1000 population in different occupation by various socio-economic demographic and life-style factors. Prevalence of specific occupations and non-communicable diseases is estimated using bivariate. Similar to previous studies (Kumar and Ram, 2017; Singh and Srivastava, 2018), logistic regression model is used to identify the predictors of specific disease of an individual. The data is analysed using STATA 14.1.

Results

The socio-demographic profile of men aged 15-54 years is described in Table 1. The maximum proportion of the population is from agriculture (27.62 percent) followed by manual skilled and unskilled workers (25.85 percent) and minimum proportion of population are from professional occupation (6.28 percent). Around one-fifth of men are not working y. Three out of five respondents are in the age-group 15-34 years, and a majority of respondents live in rural areas. More than half of the respondents have secondary education, and 1 out of 5 men belong to households with the highest wealth quintile. Around 82 percent and 13 percent population belong to Hindu and Muslim religions, respectively; 2 out of 5 people belong to OBC and about 29 percent of people are from SC and ST caste. Around 30 percent of respondents consume alcohol and 25 percent smokes; 16 percent respondents have high blood pressure.

Prevalence of NCDs

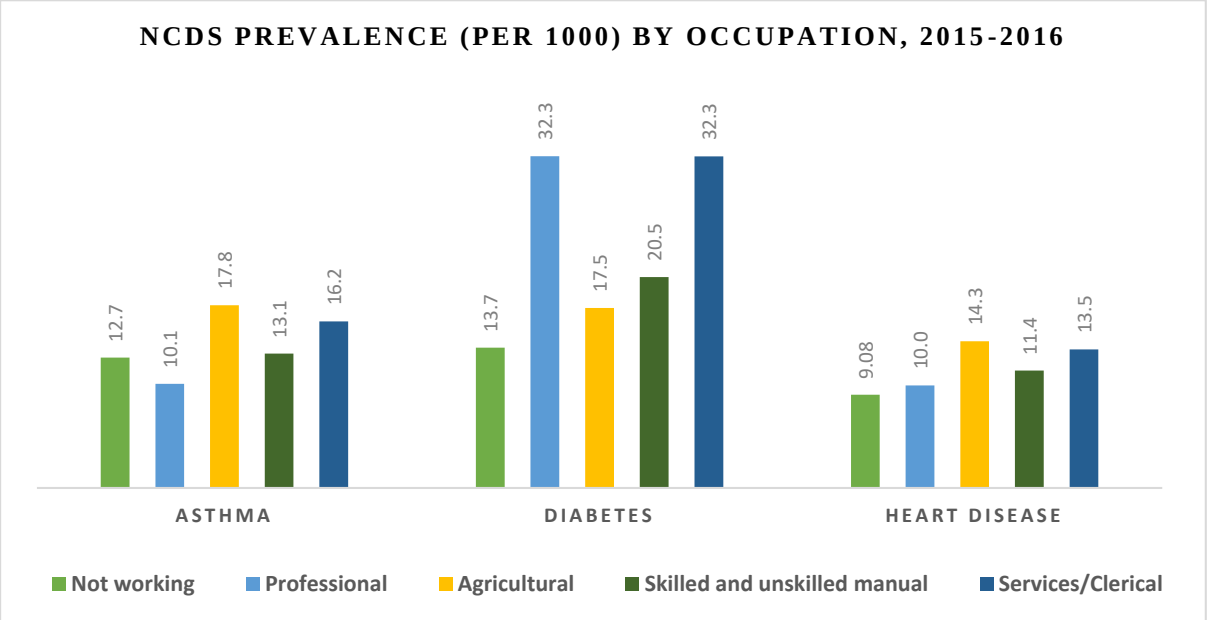
Figure 1 shows the prevalence of selected NCDs (Asthma, Diabetes, and Heart Disease) by occupation among males in India, 2015-2016. Asthma and heart disease prevalence is highest among agricultural and allied occupations (17.8 & 14.3 per 1000, respectively), followed by services/clerical occupation. Diabetes prevalence is highest among professionals and services/ clerical occupations (32.3 per 1000) and lowest among non-workers.

Table 2 shows the prevalence rate (per 1000) of Asthma, Diabetes and Heart Disease among men aged 15-54 years by socio-economic and demographic characteristics in different occupations in India. Overall, asthma prevalence is highest among agricultural occupation (17.8 per 1000), followed by clerical sales and services occupation (16.2 per 1000) and lowest among men engaged in professional occupations (10.1 per 1000). The prevalence of asthma among not working male in age group 45-54 years, illiterate, and smokers is found to be highest. Among males having agriculture as their primary occupation, high prevalence of asthma is seen in the age group 46-54 years, those who are illiterate or have primary level education, belong to the poorest wealth quintile, are from scheduled tribe, consume alcohol, and smoke. Moreover, professionals from poorer wealth quintile reported the highest prevalence of asthma (27.7 per 1000).

Table 1: Characteristics of men aged 15–54 years in NFHS IV, 2015–2016

Characteristics	N	Percent
Occupation		
Not working	22,572	21.9
Professional	6,478	6.3
Agriculture	28,472	27.6
Skilled and Unskilled manual	26,645	25.9
Services/Clerical	18,913	18.4
Age		
15-24	32,456	31.5
25-34	28,251	27.4
35-44	23,826	23.1
45-54	18,546	18.0
Residence		
Rural	64,709	62.8
Urban	38,370	37.2
Education		
Illiterate	13,581	13.2
Up to primary	13,052	12.7
Up to secondary	58,920	57.2
Higher	17,525	17.0
Wealth quintile		
Poorest	15,464	15.0
Poorer	19,561	19.0
Middle	21,886	21.2
Richer	22,726	22.1
Richest	23,441	22.7
Religion		
Hindu	84,386	81.9
Muslim	13,206	12.8
Others	5,487	5.3
Caste		
SC	20,524	19.9
ST	9,142	8.9
OBC	45,327	44.0
Others	28,086	27.3
Consume Alcohol		
No	72,569	70.4
Yes	30,510	29.6
Smoke		
No	77,715	75.4
Yes	25,364	24.6
Hypertension		
No	86,325	83.8
Yes	16,753	16.3

Figure 1: Prevalence of selected NCDs (Asthma, Diabetes, and Heart Disease) by occupation among adult males in India, 2015-2016



Overall, diabetes prevalence is highest among professionals and clerical sales and services occupation (32.3 per 1000) and lowest among not working males (13.7 per 1000). Males engaged in agricultural and manual skilled & unskilled occupations have lower prevalence of diabetes. The prevalence rate of diabetes is higher for males aged 45-54 years, in urban areas, smoking and consuming alcohol among all the occupational categories. Additionally, people from higher education and higher wealth quintile have higher prevalence of diabetes. Professionals belonging to scheduled tribe have the highest prevalence of diabetes (61.8 per 1000). Also, consumers of alcohol reported to have high prevalence of diabetes among professional occupation (37.2 per 1000). Unlike other occupations, men engaged in agriculture and belonging to scheduled tribes reported lowest prevalence of disease (7.0 per 1000).

Overall, heart disease prevalence is highest among agricultural workers (14.3 per 1000). The prevalence of heart disease is more among those in the age group 45-54 years, irrespective of their occupation. For instance, 39.8 per 1000 non-working male have a prevalence of heart disease, which is also the highest, followed by those engaged in services/clerical (27.8 per 1000), agriculture (23.3 per 1000), skilled and unskilled (23.2 per 1000) and professional (19.2 per 1000). Rural residents and who are neither working nor engaged in professional and agricultural activities reported higher prevalence of heart disease. On the other hand, males engaged in skilled and unskilled work and services/ clerical and belonging to urban areas reported to have more prevalence of heart disease. Among the non-working men, highest prevalence of heart disease is found among those belonging to the lowest wealth quintile (20.0 per 1000) and lowest prevalence among those who belong to the richest wealth quintile (3.9 per 1000). Prevalence of heart disease among the professional workers who belong to scheduled tribe is found to be highest (41.9 per 1000).

Table 2: Prevalence rate (per 1000) of Asthma, Diabetes and Heart Disease among male aged 15-54 years by socioeconomic and demographic characteristics in different occupation in India, 2015-16

Covariates	Asthma					Diabetes					Heart Disease				
	Not Working	Professional	Agricultural	Skilled and unskilled	Services/ Clerical	Not Working	Professional	Agricultural	Skilled and unskilled	Services/ Clerical	Not Working	Professional	Agricultural	Skilled and unskilled	Services/ Clerical
Age	***	ns	***	***	***	***	***	***	***	***	***	***	***	***	***
15-24	9.1	12	7.6	6.6	8.5	5.4	5.0	4.1	1	3.3	4.2	8	8	4.8	6.1
25-34	12.7	8.6	10.3	9.9	7.7	13.5	11.6	8.1	8.5	10.5	14.8	9.7	8.6	5.6	8
35-44	25.4	8	16.8	13.4	17.3	46.4	33.2	15.3	30.4	33.7	27	4.5	15.4	17.2	14.1
45-54	44.8	14.5	33.7	28.1	34.9	84.3	82.8	39.1	56	89.6	39.8	19.2	23.3	23.2	27.8
Residence	ns	ns	ns	ns	ns	ns	ns	***	***	***	ns	ns	ns	ns	ns
Rural	12.3	12.2	18	14.2	16.3	12.4	29.4	17	16.2	28.9	9.3	10.1	14.5	10.7	12.9
Urban	13.2	8.8	15.9	11.7	16.2	15.4	34.2	23.4	25.8	34.8	8.8	9.9	12.1	12.3	13.9
Education	***	ns	***	***	***	***	ns	ns	ns	***	***	**	ns	ns	ns
Illiterate	36.1	16.4	23.6	17	27.9	36.4	9.5	15.6	15.8	29.4	27.8	33.8	18	11.9	17.7
Primary	33.1	26.8	23.5	17.4	28.3	29.7	9.1	18.2	19.3	40	29.9	17.9	17.8	12.4	12.4
Secondary	9.9	9.6	13.7	11	15.5	11.3	32.3	17	22	31.9	6.7	11	11.5	11.1	14.5
Higher	11.3	9.7	13.4	11.3	8.5	12	33.5	26.8	21.6	30.8	7.4	8.9	13.6	10.4	10
Wealth quintile	***	*	**		***	ns	*	***	***	***	***	ns	ns	ns	ns
Poorest	19.5	22	19.9	17.6	14.9	14.5	7.9	10.2	9.4	16.4	20	15.7	13.8	11.6	19.5
Poorer	10.9	27.7	19.9	15.3	17.5	11.5	24.6	13.3	8.1	19	7.2	4.3	14.8	12.3	9.3
Middle	16.1	12.7	16	10.2	10.5	14.9	10.2	18.3	21	21.4	9.8	5.4	16.3	11.1	12.9
Richer	13.6	7.9	16.8	11.7	27.3	16.2	29.4	26.6	23.3	35.1	10.9	10.8	13.8	9.8	19.6
Richest	7.9	8.1	10.9	12.2	10.5	11.6	40.1	36.7	40.9	43.3	3.9	10.9	9.1	13.1	9.4
Religion	ns	ns	***	ns	ns	***	*	ns	ns	***	ns	***	ns	***	ns
Hindu	12.7	10.8	18.2	13.3	16.6	12.7	29.4	17.3	20.4	31.7	8.8	9.7	14.2	11.8	12.5
Muslim	10.5	8.5	13.1	13	12	15.4	44.4	14	20.4	26.3	9.8	10	11	11.2	9.9
Others	18.6	4.3	17.8	10.7	23	24.6	51	27.4	22.4	61	12.2	13.6	20.8	7.5	41.4
Caste	ns	ns	ns	ns	***	ns	ns	***	***	ns	**	ns	ns	***	ns
SC	15.6	15.2	20.6	11.4	16.9	13.5	27	20	15.8	30.3	13	8.6	15.5	9.5	12.4
ST	8.3	30.9	24.1	19.8	16.6	8.5	61.8	7	10.5	24.7	6.1	41.9	18.4	13	12.9
OBC	14.3	10.5	17.6	14.2	18.4	14.1	30.7	17.8	22.1	33	8.2	8.9	13.5	11.1	15.4
Others	9.4	5.6	11.5	10.4	12.9	14.5	32.8	21.6	26	33.5	8.6	8.3	12	13.3	11.5
Consume Alcohol	***	ns	***	ns	*	***	ns	*	*	***	***	ns	***	ns	***
No	10.8	9.6	13.4	12.5	12.3	11.3	30.5	16.3	18.9	26.6	7.5	8.7	11.4	10.1	11
Yes	23.5	11.7	27.1	14.1	24.4	27.2	37.2	20.2	23.2	44.1	18.2	13.5	20.5	13.5	18.7
Smoking	***	ns	***	*	**	***	ns	ns	ns	ns	***	***	***	**	***
No	11	9.5	14.3	11.9	14.5	11.6	32.4	16.5	20.6	30.3	7.1	7.9	12	9.9	12
Yes	25.3	13	26.2	15.6	21.4	29.2	32	19.9	20.5	38.1	23.6	18.9	19.6	14.9	17.9
Hypertension	***	ns	***	***	ns	***	***	***	***	***	***	***	***	***	***
No	11.3	8.9	16.5	11.9	14	10.7	26.4	13.1	15.3	22.6	7.6	8.6	12.1	9.8	11.1
Yes	28	14.2	24.5	19	24.5	45.4	51.2	39.9	45.7	68.5	25	14.3	25.1	19.1	22.6
Total	**12.7**	**10.1**	**17.8**	**13.1**	**16.2**	**13.7**	**32.3**	**17.5**	**20.5**	**32.3**	**9.08**	**10**	**14.3**	**11.4**	**13.5**

Note: Level of significance: ***= p<0.01, **= p<0.05, *= p<0.10; ns- not significant

Determinants of NCDs

Table 3 illustrates the results of multivariate logistic regression for having different NCDs (Asthma, Diabetes, and Heart Disease). When other factors are controlled, not working males are 1.38 times more likely to suffer from asthma than the reference category, agricultural workers. The odds of having asthma is increasing with increase in age. Compared to male aged 15-24 years, odds of reporting asthma are nearly four times higher for males aged 45-54 years (OR: 4.06; 95% CI: 3.34±4.93). Compared to poorest wealth quintile, the odds of reporting asthma are lower for richest quintile (OR: 0.63; 95% CI: 0.49±0.80). The odds of reporting asthma are 1.37 times higher for Muslims compared to the Hindus. SC and OBC population are more likely to suffer from asthma. Alcohol consumers and smokers are 1.20 times more

likely to have asthma compared to men who do not consume alcohol and are non-smokers. Men having high blood pressure are 1.16 times (95% CI:1.01±1.33) more likely to report asthma. Finally, residence and education do not emerge as significant predictors of reporting asthma.

Compared to men engaged in agricultural occupation, odds of reporting diabetes are higher for non-workers (OR: 1.89; 95% CI: 1.59±1.2.25), male engaged in professional occupation (OR: 1.36; 95% CI: 1.12±1.67), skilled-unskilled manual workers (OR: 1.18; 95% CI: 1.02±1.36) and clerical services (OR: 1.71; 95% CI: 1.48±1.97). The odds of having diabetes is increasing with increase in age. Odds of men suffering from diabetes in age 45 to 54 years is 13.5 times higher than those in the age cohort of 15 to 24 years, whereas in men with ages 25 to 34 years, it is 2.48 times higher only. The odds of reporting diabetes increased with increase in educational attainment; reaching to a high level at 1.71 (95% CI: 1.39±2.16) for those who have higher education comparedto illiterate male population. Significant higher odds of having diabetes are in men who are financially better off. Compared to poorest wealth quintile, the odds of reporting diabetes are highest for richest quintile (OR: 1.60; 95% CI: 1.30±1.98). The odds of reporting diabetes are 1.21 times higher for Muslim compared to their Hindu counterparts and ST population are 18 percent less likely to suffer from diabetes. Alcohol consumers are 1.22 times more likely to have diabetes (95% CI: 1.10±1.35) compared to men who do not consume alcohol. Men having hypertension are 1.57 times more likely (95% CI: 1.41±1.73) to have diabetes. Finally, residence and smoking do not emerge as significant predictors of reporting.

Compared to men engaged in agricultural occupation, odds of reporting heart disease are higher for not working men (OR: 1.28; 95% CI: 1.05±1.57). The odds of having heart disease increase with increase in age i.e. suffering from heart disease in age 45 to 54 years is 4.6 times higher than those in the age group 15 to 24 years, whereas in men with ages 35 to 44 years, it is 2.73 times higher. Significant higher odds of having heart disease are in men who have higher education. Compared to poorest wealth quintile, the odds of reporting heart disease are lowest for richest quintile (OR: 0.60; 95% CI: 0.47±0.78). The odds of heart disease are 18 percent higher among SC population compared to the other caste. Alcohol consumers and smokers are 1.26 times more likely to have heart disease compared to non-consumers of alcohol and smoking. Significant higher odds of having heart disease are men who have high blood pressure (OR: 1.45; 95% CI: 1.27±1.66). Residence does not show significant predictors of heart disease.

Table 3: Determinants of Non-Communicable Diseases among men aged 15-24 years, India, 2015-16

Covariates	Asthma	Diabetes	Heart Disease
Occupation			
Agriculture®			
Not working	1.384***(1.147 1.671)	1.897***(1.599 2.251)	1.286**(1.05 1.574)
Professional	0.899 (0.657 1.23)	1.369***(1.12 1.672)	1.033 (0.773 1.381)
Skilled and Unskilled manual	0.87*(0.743 1.018)	1.186**(1.027 1.369)	0.841**(0.712 0.994)
Service & Clerical	1.084 (0.908 1.295)	1.716***(1.489 1.978)	1.148 (0.959 1.375)
Age			
15-24®			
25-34	1.399***(1.141 1.715)	2.48***(1.998 3.079)	1.615***(1.296 2.013)
35-44	2.32***(1.904 2.828)	6.262***(5.101 7.687)	2.739***(2.211 3.393)
45-54	4.061***(3.342 4.934)	13.567***(11.101 16.581)	4.647***(3.759 5.744)
Residence			
Rural®			
Urban	1.016 (0.876 1.178)	0.931 (0.832 1.042)	1.059 (0.909 1.234)
Education			
Illiterate®			
Up to primary	1.1 (0.914 1.323)	1.238**(1.018 1.505)	1.102 (0.896 1.355)
Up to secondary	0.936 (0.792 1.105)	1.514***(1.281 1.788)	1.183*(0.988 1.416)
Higher	0.834 (0.648 1.075)	1.71***(1.393 2.1)	1.254*(0.972 1.618)
Wealth quintile			
Poorest®			
Poorer	0.96 (0.807 1.143)	0.991 (0.813 1.208)	0.914 (0.759 1.101)
Middle	0.8**(0.662 0.967)	1.1 (0.905 1.336)	0.748***(0.612 0.914)
Richer	0.887 (0.725 1.085)	1.375***(1.13 1.673)	0.734***(0.592 0.911)
Richest	0.632***(0.496 0.806)	1.607***(1.304 1.98)	0.609***(0.475 0.782)
Religion			
Hindu®			
Muslim	1.371***(1.142 1.646)	1.216**(1.037 1.425)	1.3**(1.065 1.588)
Others	0.791**(0.638 0.981)	1.198**(1.028 1.395)	1.09 (0.892 1.334)
Caste			
Others®			
SC	1.311***(1.08 1.592)	1.044 (0.9 1.211)	1.183*(0.974 1.437)
ST	1.178 (0.954 1.455)	0.826**(0.695 0.981)	0.997 (0.806 1.234)
OBC	1.287***(1.093 1.516)	0.95 (0.845 1.069)	1.062 (0.901 1.251)
Alcohol			
No®			
Yes	1.203***(1.058 1.368)	1.223***(1.101 1.359)	1.262***(1.105 1.441)
Smoking			
No®			
Yes	1.207***(1.064 1.37)	0.923 (0.827 1.03)	1.26***(1.106 1.437)
Hypertension			
No®			
Yes	1.165**(1.015 1.339)	1.571***(1.419 1.738)	1.457***(1.272 1.669)

Level of significance: ***= p<0.01, **= p<0.05, *= p<0.10, ® Reference category

Discussion

The primary objective of the paper was to measure major NCDs (asthma, diabetes, and heart disease) by occupation and key risk factors, i.e. smoking, consumption of alcohol and hypertension. The results of bivariate analysis indicate that the prevalence of asthma, diabetes and heart disease is highest among the agricultural workers, professional and service/clerical and again, agricultural workers for the three respective NCDs. Similar results are found by Agrawal (2014) and Abrahamsen et al. (2017) that agricultural workers are at higher risk of suffering from asthma or other respiratory disease. Studies also show that males exposed to cereal flour/grain dust, welding fumes, and wood dust (Jeebhay and Quirce, 2007) develop high chances of getting asthma.

Further, major risk factors associated with NCDs such as smoking tobacco, consuming alcohol and having hypertension have a higher prevalence of NCDs. For instance, agricultural workers who have the highest prevalence of asthma and those engaged in professional activities who have the highest prevalence of diabetes are the ones who consume alcohol, smokes and have hypertension compared to any other occupational categories. Thus, it indicates that the major risk factors are entangled with having major NCDs as well. The results of this study are also in the queue with other studies (Koethe, et al., 2015; Gupta, 2017 and Singh et al., 2018). However, Singh and Srivastava (2018) show that though alcohol consumption is a major risk factor for the occurrence of NCDs among Indian male population but smoking tobacco is not significantly associated with the set of NCDs (Diabetes, Heart Disease, and Respiratory infection).

Among other risk factors, findings from our study show that asthma prevalence is lower in urban areas except for those not working and engaged in services/clerical. Also, the risk of asthma decreases with an improvement in wealth quintile; an observation similar to a study by Kumar and Ram (2017). However, in the case of diabetes, older males, urban residents, primary educated, and those who belong to the richest show a higher prevalence. These findings are different than the existing literature (Agrawal et al., 2014; Gupta, 2017). The morbidity risk for diabetes and heart disease increased with an improvement of educational status of male adults (Chowdhury, 2016). Age has a positive association with the NCDs irrespective of the occupation that men are engaged in. The bivariate results of prevalence of three major NCDs (asthma, diabetes and heart disease) indicate that as age increases, men are more prone to develop NCDs whether working or not working. One of the possible reasons may be due to decrease in physical activity with increase in age and thus being more prone to NCDs (WHO, 2015). Studies by Fasoro et al. (2013) and Veeranki et al. (2013) also reveals that consumption of cigarettes goes up with increase in age. The results of regression analysis show that non-workers have significantly higher odds of being diagnosed with asthma, diabetes and heart disease. This might be because of physical inactivity coupled with the consumption of tobacco and alcohol and having hypertension.

Compared to the agricultural workers, those who are not working, are professionals and engaged in skill and unskilled manual labour have significantly higher odds of diabetes. The research findings show that those engaged in professional and services/clerical occupations are more prone to NCDs because of organizational stress. A study done by Yin et al. (2017) shows that income directly affects NCDs, whereas occupation indirectly affects NCDs. Our findings reveal that male adults in economically better-off households have a significantly increased morbidity risk for diabetes which draws similar conclusion by Agrawal, et al. (2014). Further,

it is found that the risk of asthma and heart disease was higher among poor people as the likelihood of reporting of these diseases decreased with an improvement in the wealth quintile. Similar observations have been made in previous studies from India by Kumar and Ram, 2017.

On the backdrop of rise of NCDs in India, the government of India launched the flagship health scheme called the Ayushman Bharat Pradhan Mantri Jan Arogya Yojana (PM-JAY) in 2018. The scheme was designed to serve the twin goals of universal health coverage and to meet the targets of the ongoing sustainable development goals. It is also the largest healthcare scheme in the world in terms of people benefitted. Since the scheme has different eligibility criteria in rural and urban areas for its beneficiaries, it makes it more inclusive in nature. In urban areas, it covers persons with varying occupation like begging, rag picking, domestic workers, street vendor to construction worker, sanitation worker. This inclusive nature of the scheme covers the entire gamut of unorganised workers in India, which is the predominant form of employment for a large section of Indian population. Proper awareness and implementation of the scheme will solve the plight of the poor workers in the unorganised sector where reasonable pay and healthy work environment is often questionable.

Conclusion

The present study provides the prevalence and risk factors of the three major NCDs by different occupational status in India. Moreover, by using a nationally representative recently published sample of a well-known large-scale survey in India, the study results can be generalised well. Since the studies on NCDs linking occupation and behavioural factors are minuscule in India and are mostly based on small localised and non-probability sample, this study adds to the existing literature. Health of middle-aged men is still not well highlighted in policy frame, perhaps with the assumption of male dominance in Indian society and partly due to patriarchal mentality that males are stronger. Thus, the current study has important policy implications. First, support and investment in social security and health insurance programs for employees should be taken up by the employers. Second, to reduce the harmful consumption of alcohol and tobacco, awareness programs should be organised at the community level. With the help of community health workers, education on health, nutritious diet, importance of physical activities can be given. Third, overall emphasis should be given on healthy lifestyle. However, given all the strengths, the study has certain limitation i.e., there is a chance for under/overestimation of the prevalence of chronic diseases because of the limitation of self-reporting.

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