

Prevalence and Determinants of Non-Communicable Disease among Reproductive Aged Women in India

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ABSTRACT

Background: Based on an increased prevalence of diabetes, asthma and hypertension among women in reproductive age, understanding the risk factors of non-communicable diseases (NCDs) is crucial to inform policy and program interventions to address the problem.

Objectives: This study is to examine the prevalence and determinants of non-communicable diseases across socioeconomic characteristics among reproductive age women. The data is derived from the National Family Health Survey conducted in 2019–2021. The effective sample size for the present paper was 72415 women aged 15-49 years in India.

Methods: Descriptive statistics along with bivariate analysis were conducted to find the preliminary results. Additionally, multi-variable logistic regression analysis is conducted to find the relationship between NCDs and behavioral factors such as alcohol consumption and tobacco use in the present study.

Results: It is revealed about 10% of women had any of the NCDs followed by 4.7% hypertension, 2.7% thyroid, 1.9% diabetes, 1.6% Asthama, 0.7% heart diseases, 0.6% chronic kidney diseases and 0.1% Cancer. A proportion of 16.4% of women smoked tobacco whereas 12.8% of women consumed chew tobacco. Also, a proportion of 10.3% of women consumed alcohol in the study. The odds of having NCDs among women who chew tobacco and consume alcohol are 1.40 times higher odds of having NCDs among women compared to its counterparts.

Conclusion: Screening and early detection of the same non-communicable diseases such as hypertension and diabetes are especially emphasized among people who smoke and chew tobacco and consume alcohol. In addition, interventions focused on correctable factors such as smoking drinking and the associated obesity may help prevent an increased burden on NCD in Indian women.

1. Background

Non-Communicable Diseases (NCDs) are the major killer diseases globally. They share the common risk factors such as smoking, harmful use of alcohol, physical inactivity, and low fruits/vegetable consumption. Non communicable diseases (NCDs) are currently on the rise and it is estimated that more than 40 million people globally have

NCDs [6]. Among the NCDs are coronary heart diseases, hypertension, diabetes, obesity, cancer, and mental health issues. Unfortunately, NCDs have been the leading cause of death in women in the past three decades, with two out of three women dying due to NCDs [18], especially in low and middle-income countries. Literature suggests that women are more likely to experience the co-occurrence of behavioral risk factors thus increasing the risk of NCDs among them and in the future generation [5, 10, 12]. Multiple studies in different socio-cultural settings show that higher consumption of alcohol increases the risk of coronary artery disease and related mortality [9, 11, 15, 16]. The socioeconomic determinants of NCDs among women are well documented with a higher risk among women in poor resource settings [1, 3, 14, 19]. The prevalence of overweight and central obesity which are risk factors for NCDs have been found to be consistently higher in women in India than men in multiple studies [4, 8, 17]. Women spend a significant proportion of their time at the workplace and share similar work burdens with their male colleagues. Therefore, the working environment contributes significantly to their daily life, which later affects their health status. According to the World Health Organization, environmental hazardous exposure from living and working environments are the top risk factors for chronic disease mortality [7]. Non-communicable diseases (NCDs) are currently on the rise, and it is estimated that more than 40 million people globally have NCDs [7]. Among the NCDs are coronary heart diseases, hypertension, diabetes, obesity, cancer, and mental health issues. Unfortunately, NCDs have been the leading cause of death in women in the past 3 decades, with two out of three women dying due to NCDs [18], especially in low and middle-income countries.

Rational of the study

Although, studies focusing on behavioural risk factors of NCDs with a sample of Indian women are still lacking. Based on an increased prevalence of diabetes, asthma and hypertension among women in reproductive age, understanding the risk factors of NCDs is crucial to inform policy and program interventions to address the problem. Therefore, this study is to examine the associations of behavioural factors and a variety of socioeconomic characteristics with prevalence of NCDs in reproductive aged women in India.

2. Methodology

Data source

The data were derived from the National Family Health Survey (NFHS-5) which is conducted in 2019-2021. It provided the information about population health and nutrition of people in India from each state and union territory of the country. All five rounds of NFHS were conducted under the stewardship of the Ministry of Health and Family Welfare (MoHFW), the Government of India. MoHFW designated the International Institute for Population Sciences (IIPS), Mumbai as the nodal agency for conducting the surveys. Like NFHS-4, NFHS-5 also provides district-level estimates for many important indicators. The contents of NFHS-5 are similar to NFHS-4 to allow comparisons over time. However, NFHS-5 includes some new topics, such as preschool education, disability, access to a toilet facility, death registration, bathing practices

during menstruation, and methods and reasons for abortion. The NFHS-5 provides information for 707 districts, 28 states, and 8 union territories

Sampling

The NFHS-5 sample was designed to provide national, state/union territory (UT), and district level estimates of various indicators covered in the survey. A uniform sample design, which is representative at the national, state/union territory, and district levels, was adopted in each round of the survey. Each district is stratified into urban and rural areas. NFHS-5 samples is a stratified two-stage sample. The 2011 census served as the sampling frame for the selection of PSUs. PSUs were villages in rural areas and Census Enumeration Blocks (CEBs) in urban areas. The details of sampling process is describe in NFHS-5 Report (Refrence NFHS-5).

Sample size

A total of 664,972 households were selected for the sample, of which 653,144 were occupied. Among the occupied households, 636,699 were successfully interviewed, for a response rate of 98 percent In the interviewed households, 747,176 eligible women aged 15-49 were identified for individual women's interviews. Interviews were completed with 724,115 women, for a response rate of 97 percent. In all, there were 111,179 eligible men aged 15-54 in households selected for the state module. Interviews were completed with 101,839 men, for a response rate of 92 percent.

3. Variable description

Outcome variable

The outcome variable was the presence of Any NCD which was recorded as Yes or No. The diseases considered for measuring NCDs were diabetes, hypertension, heart diseases, asthma, thyroid, and chronic kidney diseases. Explanatory variable: The information related to socio-demographic variables including the age of the participants, education status, place of residence (urban and rural), religion, marital status, caste, and other things like smoking tobacco, chewing tobacco, and alcohol consumption these data were extracted from the Demography health survey (DHS).

Individual characteristics

Age was grouped into 15-24 years, 25-34 years, and 35-49 years. Educational status was categorized as educated, primary, secondary, and higher. Working status was coded as no and yes. The variable on the working status was under the state module and hence cannot be used for multivariate analysis. Marital status was coded as never married or others included those who were divorced, separated, or widowed. Furthermore, media exposure was coded as exposed (yes) and not exposed (no). the variable was generated using the question of whether women watch Television, read the newspaper, or listened to the radio. If the response was positive to any of these it was coded as yes otherwise no.

Household characteristics

The variable wealth status was generated using the information given in the NFHS 2019-21 survey. Households were given a score based on the number and kinds of consumer goods they own, ranging from a television to a car or bicycle, housing characteristics such as toilet facilities, source of drinking water, and flooring materials. Religion was coded as Hindu, Muslim, Christian, and others are included like Buddhist, Sikh, Jain etc. caste was coded as a scheduled tribe, other backward class, and others that included those who were identified as having higher social status. The place of residence was coded as urban and rural, and the region of India was coded as north, central, east, northeast, west, and south.

Behavioral characteristics

Cigarettes, bidis, cigars, hookah, gutkha/panan masala, paan, and khaini are tobacco products commonly consumed in India. The variable ‘smoke tobacco’ was generated using question a. Do you currently smoke cigarettes? b. Do you currently smoke bidis? C. Do you currently smoke a cigar? and e. Do you currently smoke hookah? All the responses were recoded as no and yes. And if the female respondents smoked any of these products, they were coded as yes and otherwise no.

To variable ‘consume smokeless tobacco’ was generated using the questions Do you currently chew tobacco? Do you currently consume gutkha/panan masala with tobacco? Do you currently consume paan with tobacco? and Do you currently consume khaini? All the responses were recoded as No and Yes. And if the female respondents consumed any of these products, they were coded as yes and otherwise no.

Women who consume alcohol were coded as no and yes. To variable was generated using the question “Do you currently drink alcohol?” the response was coded as no and yes.

Statistical analysis

Descriptive statistics along with bivariate analysis were performed at the initial stage. The Chi-square test was used to find the significance level for the prevalence estimates of NCD by background characteristics. The logistic regression analysis was used to estimate the extent of association between any NCDs and behavioral factors along with other individual factors and with household factors. The binary logistic regression model usually put into a more compact form is as follows.

$$\text{Logit}[P(Y = 1)] = \beta_0 + \beta X$$

The parameter β_0 estimates the log odds of any NCD for the reference group, while β estimates the maximum likelihood, the differential log add of NCD associated with a set of predictors X , as compared to the reference group. All the analyses have been conducted using SPSS version 20.

4. Results

Background Characteristics of the respondents

Table 1 shows the socioeconomic profile of women aged 15-49 years in India. It depicts that majority of a group of the respondent (36.4%) were of age group 35-49 years, 33.3% of 15-24 years of age group, followed by 30.3% of 25 -34 years. Most of the respondents (51.1%) were having secondary education and 23.1% had no education only 14.1 had higher education and 11.7% were primary education. Moreover, the working status of the participants was 73.9% were no working status and 26.1% were doing work. Most of the women were married 70.8% and never married was 25.05% and others were 4.2%. Most of the respondents were Hindu 76.4% and 12.7% were Muslim and others were 11%. Most of the participants were belonging to a rural area which was 75.2% and in an urban area 24.8%. The majority of the respondents belonged to OBC which 40.2% followed by schedule tribe 20.3%, schedule caste 19.6% other 19.9%. 16.7% of the participants were overweight followed by 17.9% underweight and 6.3% of the women were obese. Regarding the wealth status of the participant's majority of poorer were 22.1% followed by the middle 20.9% and richer 19.3%. A proportion of 0.4% of the women smoked tobacco whereas 5.6% of the women use to chew tobacco and 2.1% of the women consumed alcohol in this study.

Prevalence of NCD by Types of Diseases

Figure 1 presents the percentage of NCD among women aged 15 -49 years. A about 2.0% of women were diabetics and 4.7% were hypertension. Additionally, 1.6% had asthma, whereas 2.7% were having thyroid, 0.7% had heart diseases and 0.1% had cancer, and 0.6% had chronic kidney diseases. Moreover, 9.9% of the women had any NCDs.

Prevalence of NCD by background characteristics

Table 2 presents the percentage of women aged 15-49 years having any NCDs by their background characteristics. It was revealed that women in the age group of 35-49 had 15.5% of any NCD followed by 25-24 had 8.1% and 15-24 had 3.5%. According to their education status, the prevalence of any NCD was higher among the primary educated women. Women who had working status had any NCD of 10.2% which was statistically significant. Furthermore, according to their marital status, another category includes the women living with their partners who were more exposed to any NCD which was 15.6% followed by married women at 11.0%. Among the women who consumed chewed tobacco and alcohol consumption had any NCD 16.4% and 12.8 % respectively.

Determinants of NCD by background characteristics

Table 3 presents the logistic regression estimates for women having NCD by their backgrounds characteristics. Women aged 35-49 had significantly higher odds (OR=3.26, $p < 0.000$) of having any NCD in comparison to women aged 15-24 years. The odds of having NCD among women with higher secondary educational status were 25% higher than the odd of having NCD among women who had no education. The odd of having NCD among women who were divorced/ separated/ widowed 1.93 times more

likely having NCD than never married women. The odds had significantly ($OR=1.27$, $p < 0.00$) higher among media exposure women compare to encounter part. Obess women had higher odds as compared to underweight women. Similarly, women who smoked tobacco had 39% significantly higher odds of having any NCDs than women who did not smoke tobacco. Women who consumed smokeless tobacco had 28% significantly higher odds of having NCDs than women who did not consume smokeless tobacco. Besides, the odds of having NCDs among women who consumed alcohol were 18% significantly lower than those who did not consume alcohol. Those women belong to Muslim religion had significantly higher odds ($OR=1.24$, $p < 0.000$) of having any NCD in comparison to Hindu women. Similarly, others caste women had significantly higher odds of any NCD compared scheduled tribe. The odds of any NCD in richest women had 1.57 times more likely having NCD than Poorest women in India. The odds of NCD in Northeast women had higher ($OR=1.26$, $p < 0.000$) as compared to North region.

5. Discussion

In this study using the nationally representative secondary data in India, we extremely explored the prevalence of major risk factors of NCD with tobacco use, alcohol consumption, overweight, and obesity among the reproductive-aged group women. Furthermore, we also examine the association on behavioral factors on the prevalence of NCD to understand the pattern of the problem how to prevent and control the NCD. The finding of this study revealed that a large number of females in India were having any NCD. The finding of this study showed a higher prevalence of understanding the pattern of the problem and how to best prevent and control it. The study revealed a higher prevalence of hypertension, thyroid followed by diabetes, asthma, and then heart diseases whereas 0.65% chronic kidney diseases and about 9.9% any NCD present among the women.

This study also found that tobacco product use and smoking and alcohol consumption were associated with an increased prevalence of non-communicable diseases in females. Other studies have shown that smokeless tobacco use, which is also a risk factor for oral cancers, causes and major prevalence related problems among Indian women, especially those with low socio-economic status. Combined exposure to alcohol consumption and tobacco use was strongly associated with a higher prevalence of NCDs among women. The higher population-attributable risk of smoking, using smokeless tobacco, and drinking alcohol for NCDs among women in the current study was noticeable and support the previous findings from India and other developing countries on the higher risk of smoking and alcohol consumption on hypertension and other NCDs Nethan et al. [13].

However, the results revealed that tobacco and alcohol use management and efficient preventive strategy against the increasing trend toward NCD needs to be developed. For example, evidence shows that a 10% increase in tobacco prices will reduce smoking by about 85 in low and middle-income countries. Similarly, tax increases could be a potential strategy for controlling tobacco use, especially among the poorest areas of the population, urbanization, and advertising. The adoption of unhealthy lifestyles that contribute to inappropriate dietary choices, such as urbanization and increased sugar and fat intake, has led to weight gain in the general population, especially in women. Similarly, studies have shown that maternal obesity is a major risk factor for gestational diabetes and preeclampsia in women Anand et al. [2].

Current study shows that women who are overweight and obese are more likely to have NCD and increased risk of NCD in women of reproductive age faces the results of other studies in both developed and developing countries, in addition, overweight and obese as factors associated with NCD agree that human body fat is associated with a higher level of cardiovascular disease. Furthermore, the lower level of education and increasing age being separated and divorced, and widowed were associated with a higher risk of NCD among women of reproductive age. However, the association of increasing age with the higher risk of NCDs can be explained by the negative biological effects as women grow older. Furthermore, the association of marital status and education with NCD was similar to past studies showing that lower levels of education and being divorced, separated, or widowed the odds of having NCD in comparison to uneducated and never-married women Yepes et al. [20].

Future research is needed to confirm this association and explore the underlying mechanism. On the other hand, the current study shows that women, who are in a high household economy, are more likely to develop NCD. However, this may be due to low utilization of medical services, poor socio-economic background, and low likelihood of being diagnosed and reporting a medical condition. This study used nationally representative secondary data the findings are generalized for women of reproductive age in India. The lack of information on several diseases and many behavioral factors is limited in this study to reveal the evidence around NCD risk factors with sufficient depth.

6. Conclusion

The result showed that smoking and smokeless tobacco use and alcohol intake and overweight were risk factors for non-communicable diseases in females. Research results encourage investment in the health of health decision-makers. Especially women exposed to the risk factors of NCDs. The finding is also related to the focus of the maternal and child health program on the risk of NCD such as maternal obesity due to the adverse effects on maternal and child health. Furthermore, the increased coexistence of tobacco and alcohol use required different strategies to address the female vulnerability to NCD. Screening and early detection of the same non-communicable diseases such as hypertension and diabetes are especially emphasized among people who smoke and chew tobacco and consume alcohol. In addition, interventions focused on correctable factors such as smoking drinking and the associated obesity may help prevent an increased burden on NCD in Indian women.

Declarations

Consent to participate

This study utilized secondary data from recent National Family Health Survey 5th round survey which was comprises detailed information on key domains of population, health and family welfare and associated domains like characteristics of the population; fertility; family planning; infant and child mortality; maternal and child health; nutrition and anaemia; morbidity and health care; women's empowerment etc. This survey has completed all ethical consensus from the review committee.

Conflict of Interest

None declared

Ethical Approval

Not required

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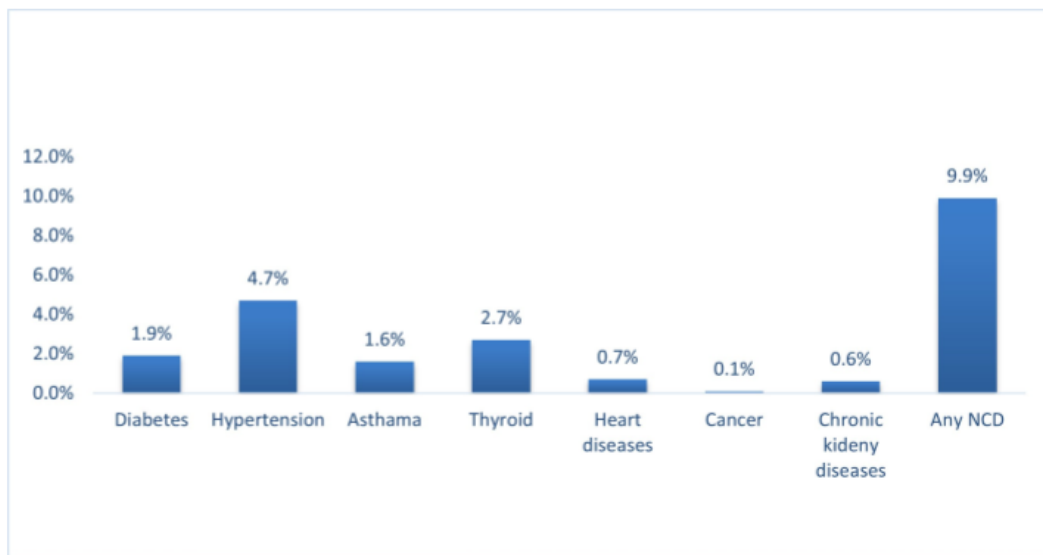


Figure 1. Percentage of NCD among women aged 15 -49 years in India, 2019-21.

Table 1.: Socioeconomic profile of women aged 15-49 years in India, 2019-21.

Background Characteristics	Sample	Percentage
Age		
15-24	241180	33.3
25-34	219428	30.3
35-49	263507	36.4
Education		
No education	167304	23.1
Primary	84983	11.7
Secondary	370012	51.1
Higher	101816	14.1
Working status		
No	80443	73.9
Yes	28342	26.1
Marital Status		
Never Married	181285	25
Married	512408	70.8
Others	30422	4.2

<i>Continue...</i>		
Media Exposure		
No	172014	24
Yes	552101	76
BMI		
Underweight	124989	17.9
Normal	420415	60.1
Overweight	116576	16.7
Obese	37382	5.3
Religion		
Hindu	546007	76.4
Muslim	90729	12.7
Others	78367	11
Caste		
Scheduled Tribe	139957	20.3
Scheduled Caste	135239	19.6
OBC	276881	40.2
Others	137377	19.9
Residence		
Urban	179535	24.8
Rural	544580	75.2
Wealth index		
Poorest	149844	20.7
Poorer	160340	22.1
Middle	151505	20.9
Richer	139607	19.3
Richest	122819	17
Smoke tobacco		
No	721281	99.6
Yes	2834	0.4
Chew tobacco		
No	683464	94.4
Yes	40651	5.6

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Alcohol Consumption		
No	710587	98
Yes	13528	2
Region		
North	147615	20
Central	170002	23
East	118357	16
Northeast	103433	14
West	71841	10
South	112867	16
Total	724115	100

Table 2.: Distribution of Any NCD among Women Aged 15-49 According to Background Characteristics, India, 2019-21.

Background Characteristics	No NCD	Any NCD	p-value
Age			
15-24	96.5	3.5	0.000
25-34	91.9	8.1	
35-49	84.5	15.5	
Education			
No education	90.1	9.9	0.000
Primary	88.8	11.2	
Secondary	91.3	8.7	
Higher	91.3	8.4	
Working status			
No	91.3	8.7	0.000
Yes	89.8	10.2	
Marital Status			
Never Married	96.6	3.4	0.000
Married	89	11	
Others	85	15	
Media Exposure			

Continue...

No	92.9	7.1	0.000
Yes	90.1	9.9	
Religion			
Hindu	91.3	8.7	0.000
Muslim	89	11	
Others	88.9	11.1	
Caste			
Scheduled Tribe	90.5	9.5	0.000
Scheduled Caste	93.4	6.6	
OBC	91.3	8.7	
Others	88.2	11.8	
Residence			
Urban	88.4	11.6	0.000
Rural	91.6	8.4	
Wealth index			
Poorest	93.9	6.1	0.000
Poorer	92.3	7.7	
Middle	90.7	9.3	
Richer	89	11	
Richest	87.2	12.8	
Smoke tobacco			
No	90.8	9.2	0.000
Yes	83.6	16.4	
Chew tobacco			
No	91	9	0.000
Yes	87.2	12.8	
Alcohol Consumption			
No	90.8	9.2	0.000
Yes	89.7	10.3	
Region			
North	88.7	11.3	0.000

Continue...

Central	93.8	6.2
East	90.9	9.1
Northeast	90.4	9.1
West	92.6	7.4
South	88	12
Total	90.8	9.2

Table 3.: Logistic regression estimate for NCD by Independent variables among women aged 15-49 years in India, 2019-21.

Independent Variables	Exp(B)	95% CI for Exp(B)		p-value
		Lower	Upper	
Age				
15-24	1			
25-34	1.66	1.52	1.82	0
35-49	3.26	2.98	3.57	0
Education				
No education	1.12	1.02	1.23	0.004
Primary	1.25	1.14	1.38	0.026
Secondary	1.19	1.1	1.28	0.074
Higher				
Working status				
No	1			
Yes	1.03	0.98	1.09	0.211
Marital Status				
Never Married	1			
Married	1.59	1.44	1.75	0
Others	1.93	1.69	2.2	0
Media Exposure				
No	1			
Yes	1.27	1.19	1.36	0
BMI				

<i>Continue...</i>				
Underweight	1			
Normal	1.09	1.01	1.18	0.027
Overweight	1.65	1.51	1.8	0
Obese	2.61	2.36	2.88	0
Behavioral characteristics				
Smoke tobacco				
No	1			
Yes	1.39	1.02	1.9	0.04
Chew tobacco				
No	1			
Yes	1.28	1.16	1.4	0
Alcohol Consumption				
No	1			
Yes	0.88	0.74	1.04	0.126
Household Characteristics				
Religion				
Hindu	1			
Muslim	1.24	1.15	1.33	0
others	1.17	1.08	1.27	0
Caste				
Scheduled Tribe	1			
Scheduled Caste	0.63	0.57	0.69	0.019
OBC	0.86	0.81	0.92	0
Others	1.05	0.98	1.13	0
Residence				
Urban				
Rural	0.98	0.92	1.03	0.409
Wealth index				
Poorest	1			
Poorer	1.19	1.09	1.29	0
Middle	1.27	1.16	1.39	0
Richer	1.44	1.31	1.58	0

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Richest	1.57	1.41	1.74	0.008
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Region

North	1			
Central	0.78	0.72	0.84	0
East	1.18	1.09	1.28	0
Northeast	1.26	1.15	1.39	0
West	0.74	0.68	0.81	0
South	1.16	1.08	1.25	0

Constant	0.017			0
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