

## Prevalence of Chronic Bronchitis among Women and its Association with Household Cooking Behaviour: A Cross-Sectional Study in Odisha, India

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### Original Research Article

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**Abstract:** Increasing prevalence of chronic bronchitis in developing countries has been a significant challenge for public health in recent decades Globally, about 50% of all households and 90% of rural households use solid fuels (coal and biomass) as the main domestic source of energy, thus exposing approximately 50% of the world population—close to 3 billion people—to the harmful effects of these combustion products. Biomass and solid fuels are a major source of indoor air pollution, but in developing countries the health effects of indoor air pollution are poorly understood. In this study we examined the effect of cooking smoke produced by biomass and solid fuel combustion on the reported prevalence of chronic bronchitis among women in Odisha, India. A population based cross sectional study was conducted to determine the prevalence of chronic bronchitis among women and its association with household cooking behavior in 65 AWCS of Baliana Block, Khurdha District, Odisha comprising of 50,000 populations. 882 subjects aged between 15 to 49 years were interviewed using the International Union against Tuberculosis and Lung Disease (IUATLD) English questionnaire. Descriptive statistics used for determining the prevalence of Chronic bronchitis among women and logistic regression used to establish the associations between Chronic bronchitis and household cooking practices were estimated. The current study shows that the prevalence of the chronic bronchitis among women was found to be 4.42 percent in the study area. This study also gives information that the most commonly reported respiratory symptoms among study participants were breathlessness, 15.42%, followed by cough, 11.65%, wheeze, 6.36% and phlegm, 5.09%. In multivariate adjusted model solid biomass fuel use was found to be significantly associated with higher odds of chronic bronchitis with [AOR; 1.39 95% CI (1.01-1.92) followed by hours of cooking per day (>3hours/day) AOR; 1.83 95% CI (1.40-2.40), years of cooking (more than 10yrs) AOR; 4.13(1.08-15.74). The results of this study suggests that an association between indoor pollution from biomass cooking fuel and chronic bronchitis. The longer the exposures to solid fuel in home, the greater their risk for chronic bronchitis, implying evidence of chronic toxicity of solid fuel use in home environment.

**Keywords:** Chronic bronchitis, Prevalence, Solid biomass fuels, Indoor air pollution, Women, IUATLD.

### INTRODUCTION

Exposure to air pollution due to combustion of biomass fuels remains one of the significant risk factor for chronic respiratory diseases in the developing countries. It is estimated that an average woman in India may be subjected to 60,000 hours of exposure to smoke due to combustion of biomass fuels in her life time [1]. Studies both in India and other countries have confirmed that exposure to biomass fuels has a significant association to chronic respiratory diseases such as chronic bronchitis, asthma, and respiratory failure [2]. About 3 billion people worldwide, including 6.5 million Americans, and nearly 700 million people in India rely on solid biomass fuel for their household

energy needs [3]. This accounts for 4 million annual deaths worldwide and was ranked the fourth leading risk factor for morbidity and mortality in the 2010 Global Burden of Disease Study.

### METHODS

The objective of this study was to know the prevalence of chronic bronchitis (CB) among women and its association with household cooking practice. A Population-based cross-sectional study in Baliana Block of Khurdha District, Odisha was conducted to determine the prevalence of chronic bronchitis and its association with household cooking behavior among women of 15-49 yrs of age group by using simple

random technique. The sample size was calculated by using Open Epi tools. 882 subjects aged between 15 to 49 years were interviewed by using the International Union against Tuberculosis and Lung Disease (IUATLD) English questionnaire. CB was measured using the validated questionnaire. Participants experienced cough & phlegm for > 3 months of the year >2yrs, was considered for CB. Other symptoms of respiratory illness such as chronic cough (with/without phlegm), wheeze, and breathlessness was also recorded and exposures variables were cooking behaviour among women: type of fuel used for cooking such as biomass and solid fuels versus cleaner fuels, years of cooking, place of cooking & duration of cooking. Data has been collected and entered in to “Redcap” (Research Electronic Data Capture). Data has been analyzed with the help of the statistical software, STATA (version 11.0). Descriptive statistics used for determining the prevalence of CB among women and logistic regression used to establish the associations between CB and household cooking practice.

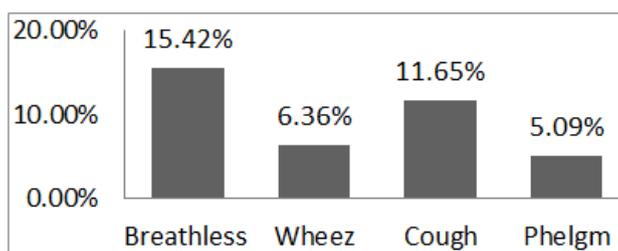
**RESULTS AND DISCUSSIONS**

The overall prevalence of chronic bronchitis found among women was 4.42%. The most commonly

reported respiratory symptoms among study participants were breathlessness, 15.42%, followed by cough, 11.65%, wheeze, 6.36% and phlegm, 5.09%. In multivariate adjusted model solid biomass fuel use was found to be significantly associated with higher odds of chronic bronchitis with [AOR; 1.39 95% CI (1.01-1.92)] followed by hours of cooking per day (>3hours/day) AOR; 1.83 95% CI (1.40-2.40), years of cooking (more than 10yrs) AOR; 4.13(1.08-15.74). The prevalence of chronic bronchitis was 4.42% among women in our study, which was higher compared to the study conducted by Agrawal S, 2012, where the overall prevalence in adults more than 35 years or older in India was 3.49% (4.29% in males and 2.7% in females) and in INSEARCH multicentric study, the overall chronic bronchitis prevalence (age adjusted for those above 35 years of age) was 3.50 % (Male= 4.20%, Female= 2.73 %). The results of this study suggests that an association between indoor pollution from biomass cooking fuel and chronic bronchitis. The longer the exposures to solid fuel in home, the greater their risk for chronic bronchitis, implying evidence of chronic toxicity of solid fuel use in home environment.

**Table 1 : Basic socio- demographic characteristics of participants (n= 882)**

Variables	Solid Biomass fuel user (n= 643) (%)	Cleaner fuel user (n= 239) (%)	P- Value
Age (Mean ± SD)	28.21 ±10.70	26.54 ±11.47	0.04
Education (n, %)			
No formal education	148 (23.01)	11 (4.66)	0.00
Primary	191 (29.71)	48 (20.08)	
Secondary	251 (39.04)	136 (56.90)	
College or above	53 (8.24)	44 (18.41)	
Wealth Index (n, %)			
Low	594 (92.37)	164 (68.62)	0.00
Medium	43 (6.68)	55 (23.01)	
High	6 (0.93)	20 (8.37)	
Occupation (n, %)			
House wife	410 (63.76)	131 (54.81)	0.00
Service/ Business/labor	100 (15.55)	22 (9.21)	
Student	133 (20.68)	86 (35.98)	
Social Caste (n, %)			
General	298 (46.35)	47 (19.66)	0.00
OBC	46 (7.15)	7 (2.92)	
SC	209 (32.50)	117 (48.95)	
ST	90 (13.99)	68 (28.45)	
Religion (n, %)			
Hindu	616 (95.80)	236 (98.74)	0.102
Muslim	20 (3.11)	1 (0.42)	
Christian	2 (0.31)	0	
Other	5 (0.78)	2 (0.84)	



**Fig-1: Respiratory symptoms present among study participants (n=882)**

**Table-2: Association between household cooking behaviour & chronic bronchitis (n=882)**

Cooking Characteristics	OR (95% CI)	AOR (95%CI)	P Value
Primary cooking fuel (Ref; Cleaner Fuel (LPG, Electricity))			
Solid Biomass	4.8(1.42-16.17)	1.39(1.01-1.92)	0.039*
Place of Cooking (Ref; Separate room for Kitchen)			
Cook and Sleep in the same room	2.47(0.75-8.14)	2.55(0.76-8.49)	0.12
Hours of cooking/day (Ref; =<3 hours/day)			
>3hours/day	2.16(1.04-4.48)	1.83(1.4-2.40)	0.001*
Years of Cooking (Ref; 5yrs or less)			
6-10 years	0.70(0.17-2.74)	0.66(0.17-2.99)	0.66
More than 10yrs	4.14(1.79-9.56)	4.13(1.08-15.7)	0.037*

\*The model adjusted for age, wealth index, education &amp; occupation

**CONCLUSIONS**

The prevalence of chronic bronchitis was 4.42% in this study. The results of this study suggested that there was a significant association between indoor air pollution from biomass cooking fuel and chronic bronchitis. The findings have important program and policy implications for countries such as India, where large proportions of the population still rely on polluting biomass fuels for cooking and heating. Decreasing household biomass and solid fuel use and increasing use of improved stove technology may decrease the health effects of indoor air pollution. Results of the study could be helpful in cleaner fuel policies in the state/country.

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