ABSTRACT

Background: Indoor air pollution mainly arising from the burning of cooking fuels has been shown to be a significant contributor to poor respiratory health, especially amongst women. The aim of this study was to investigate the respiratory health of women from India and Thailand using different types of cooking fuels and residing in urban, urban slum and rural areas, and to understand the indoor environmental factors associated with poor respiratory health outcomes.

Methods: This cross-sectional observational study was conducted in 375 adult women from Pune city and Vadu village in India and the Muang and Saraphi districts of Thailand. The women were randomly selected from the different residential locations and further stratified depending on the type of cooking fuel used at homes (LPG, kerosene and biomass in India, LPG and biomass in Thailand). After obtaining a written informed consent, all women were administrated a questionnaire that captured demographic, environmental factors and respiratory health outcomes. Spirometry was also performed both before and after a short-acting bronchodilator. After performing double-data entry, data was analyzed using SPSS statistical software.

Results: The overall prevalence of respiratory symptoms in places from India and Thailand were 12.0% for cough, 6.7% for phlegm, 3.6% for wheeze and 4.0% for breathlessness, while prevalences of respiratory diseases were 2.2% for asthma, 5.3% for questionnaire-defined COPD, 3.2% for spirometry-defined COPD (FEV₁/FVC < .70) and 7.5% for COPD defined by post bronchodilator (PB) FEV₁/FVC < 75%. Using a post-bronchodilator (PB) FEV₁/FVC value of < 70%, the prevalence of COPD amongst Indian women was 3.2% and 0% amongst Thai women. When a PB FEV₁/FVC < 75% was used to define COPD, the prevalence increased to 11.9% and 1.5% respectively. When FEF₂₅₋₇₅% < 65% was used to define small airways obstruction as a marker of early COPD, the prevalence was 77.5% in India and 33.3% in Thailand. Thai women had better lung function values and lower prevalence of COPD than Indian women. The number of windows in Thai homes were almost 2 times more than Indian homes (1.8 ± 0.7 vs 1.1 ± 0.6; p = .000). Use of biomass fuel was associated with a higher prevalence of COPD in India (1.9% and 9.3% for LPG vs 9.3% and 18.6% for biomass fuel using PB FEV₁/FVC < 70% and PB FEV₁/FVC < 75% respectively). I found small airways obstruction was significantly associated with average number of hours spent for cooking/day [Odds ratio with confidence intervals: 2.30 (1.0-5.29); p = .026]. Small airways obstruction was also common in women whose husbands smoked. Prevalence of small airways obstruction was significantly different between LPG (32.0%) and biomass fuel (38.5%) users in Thailand (p < 0.001) and in women > 40 yrs from India (p = .03) and Thailand (p = .01). In Thailand, women cooking using biomass fuel had a higher FVC% than those using LPG (99% vs 88%; p = .001). Although contrary to expectation, the number of windows/room in home using biomass fuel were higher than LPG users (2.2 ± 0.9 vs 1.7 ± 0.5; p < 0.001), indicating that home ventilation is a more important predictor of respiratory health outcomes, than the type of cooking fuel used.

Conclusions: Indian women using biomass fuel for cooking have a higher prevalence of breathlessness than those using LPG or kerosene. Moreover, the prevalence of cough, phlegm and wheeze were higher in Indian women than Thai women irrespective of type of cooking fuel used. The prevalence of COPD was higher in Indian women compared to Thai women. The prevalence rates varied depending upon the definition criteria of COPD used. Use of biomass fuel was associated with a higher prevalence of COPD. The number of windows in the house was found to be a significant predictor of respiratory health outcomes indicating that home ventilation is a critical determinant of lung health in women. The high prevalence of small airways obstruction in Indian (77.5%) and Thai women (33.3%) merits further investigation.