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Title: Tuberculosis risk from exposure to solid fuel smoke: A systematic review and meta-analysis

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Body: Background: Studies, particularly from low and middle income countries suggest that exposure to smoke from household air pollution (HAP) is a risk factor to tuberculosis. The primary aim of this study is to quantify the risk to tuberculosis from exposure to smoke arising from different solid fuel types, to explore the publication bias and identify the cause for heterogeneity in reported effect sizes. Methods: We conducted a systematic review and meta-analysis of primary studies published in peer reviewed journals reporting effects size and confidence intervals following a pre-defined inclusion criteria. 16 studies were identified and results from these studies were used to conduct sub-group analysis and to calculate a pooled effect estimate. Results: The random pooled effect estimate (OR, 95% CI) was significantly higher among those exposed to biomass smoke (1.65, 1.16 – 2.36) compared to kerosene only (0.70, 0.13 – 3.87) and combined use of biomass and kerosene (1.30, 0.20 – 8.63). Analysis of data showed no publication bias (p=0.435) for studies conducted among never smokers and those which had adjusted for smoking. Significant heterogeneity was observed in diagnosis criteria for tuberculosis (coeff. = 0.397, p=0.029). Conclusion: The result suggests significant heterogeneity in risk estimates depending largely upon fuel types with significant risk obtained from exposure to biomass smoke. Most of the studies were small and with limited information on parameters and methods for assessing HAP. Future studies require improved methods for objective assessment of exposure as well as factors which modify exposure. Very few studies have provided reliable estimates of cumulative exposure to HAP.