

COPD and environmental risk factors other than smoking

3. Cooking and heating

Author : P N Lee

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1. Papers identified

Using the procedures described in “COPD and risk factors other than smoking. 1. Identifying papers”, 39 papers were identified as relevant.¹⁻³⁹ However, copies of four of these papers were not obtained, two as not being readily available via the British Library^{8,25} and two 2007 papers as only being e-publications ahead of print.^{1,38} Though it may be possible to obtain these in due course, the comments below are based on the remaining 35.

2. Specific studies

29 of these papers describe results from particular studies, though the number of actual populations studied may be somewhat less than this, due to multiple publications from the same study. Table 1 summarizes some relevant findings from these. Only one of these (a study in Denmark) is from Western Europe, none are from North America, with 9 from India, 5 from China, 5 from Latin America, 4 from Turkey, 3 from other Asian countries and 2 from African countries. Many of the studies adjusted for smoking, with some of those that did not adjust being studies of women in areas where smoking by women was very rare.

The most commonly studied exposure is use of biomass fuels for cooking/heating with nearly all the studies showing a significantly increased risk, often with a substantially raised relative risk, particularly elevated in conditions of poor ventilation – e.g. with no chimney. The evidence seems very clear here, but its relevance to affluent Western populations seems limited. The study in Denmark found that a reduction in risk of COPD associated with use of central heating (significant only in males) became non-significant after multivariate adjustment.

3. Reviews

The remaining 6 papers^{4,7,22,35-37} are reviews that relate wholly or partly to cooking and heating and COPD. Three of these are by Professor Kirk Smith and his colleagues of the University of California, Berkeley. The first two relate to the burden of disease from air pollution in India³⁵ or developing countries.³⁶ Smith includes COPD in his diseases with well documented evidence of risk from air pollution, from which attributable risks can be determined most accurately. In the final paper³⁷ he estimates 424,000 deaths annually from household fuel use in India, 423,010 in China and 1.6 million in the World, though these include other diseases as well as COPD. The review by Bruce et al⁴ is also wide ranging, but notes that “There is consistent evidence that [in developing countries] indoor air pollution increases the risk of chronic obstructive pulmonary disease ...”. Similar conclusions are reached in the review by Chen et al⁷ (with Smith again an author). They state that “Available evidence in the developing world would seem to argue strongly that indoor air pollution from coal-fire smoke is a risk factor for chronic lung disease in adults ...”. The final review, by Malik et al²² concerns chronic bronchitis in India and is somewhat old.

4. Conclusion

The evidence is very clear that in developing countries use of biomass fuels, particularly with poor ventilation, can substantially increase risk of COPD. However, I am not aware that in developing countries there is any evidence of a role of cooking and heating on risk of the disease.

5. References

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TABLE 1 Summary of studies relating COPD to cooking or heating

<u>Source</u>	<u>Study design^a</u>	<u>Country</u>	<u>Exposure</u>	<u>Endpoint^b</u>	<u>Result^c</u>	<u>Smoking adjusted</u>
Albala et al (1999) ²	C	Bolivia	PM ₁₀ in households	CB	+	No
Behera et al (1994) ³	C	India	Biomass v other fuels	Lung function	+	No
Cetink et al (2000) ⁵	C	Turkey	Biomass v other fuels	CB	+	Yes
Chapman et al (2005) ⁶	I	China	Chimney installed or not	COPD	+	No
Dennis et al (1996) ⁹	CC	Colombia	Wood v other fuels	OAD	+	No
Dossin et al (1994) ¹⁰	CC	Saudi Arabia	Use open fire of wood or biomass	COPD	+	No
Dutt et al (1996) ¹¹	C	India	Biomass v other fuels	Lung function	+	No
Ehrlich et al (2004) ¹²	C	South Africa	Use smoking fuel	CB	(+)	Yes
Ekici et al (2005) ¹³	C	Turkey	Biomass v LPG	CAD	+	No
Golshan et al (2002) ¹⁴	C	Iran	Use of biomass fuel	CB	+	Yes
Gupta et al (1997) ¹⁵	C	India	Use of wood or cow dung	COPD	+	No
Harris et al (1993) ¹⁶	C	Nigeria	Use of firewood	CB	+	No
Jindal et al (2006) ¹⁷	C	India	Various cooking fuels	CB	No other relationship	Yes
Kiraz et al (2003) ¹⁸	C	Turkey	Use of biomass fuel	CB, COPD	+	Yes
Liu et al (2005) ²⁰	C	China	Use of biomass fuel	COPD	+	Yes
Liu et al (2007) ¹⁹	C	China	Rural v urban (surrogate for fuel type)	COPD	+	Yes
Malik et al (1985) ²¹	C	India	Use of wood fuel	CB	+	No
Menezes et al (2005) ²³	C	5 Latin American countries	Use of biomass, use of coal	COPD	No association ^e	Yes
Pandey (1984) ²⁴	C	India	Time spent near fireplace	CB	+	Yes
Pandey et al (1985) ²⁶	C	India	Pollution from biomass and wood	Lung function	+(in smokers)	Yes
Peabody et al (2005) ²⁷	C	China	Use of coal	COPD	+	No
Pérez-Padilla et al (1996) ²⁸	CC	Mexico	Exposure to wood smoke	CB/CAO	+	Yes
Prescott et al (2003) ²⁹	C	Denmark	Use of central heating	COPD	No association	Yes
Qureshi et al (1994) ³⁰	C	India	Time spent near fireplace	CB	+	No

TABLE 1 Summary of studies relating COPD to cooking or heating (cont'd)

<u>Source</u>	<u>Study design</u> ^a	<u>Country</u>	<u>Exposure</u>	<u>Endpoint</u> ^b	<u>Result</u> ^c	<u>Smoking adjusted</u>
Regalada et al (2006) ³¹	C	Mexico	Use of biomass v gas; PM ₁₀ levels	Lung function	+	Yes
Saha et al (2005) ³²	C	India	Use of biomass fuel	Lung function	+	No
Sezer et al (2006) ³³	CC	Turkey	Exposure to biomass, wood ash	COPD	+(biomass only)	Yes
Shrestha et al (2005) ³⁴	C	Nepal	Unprocessed v processed fuel	COPD/asthma	Not significant	Yes
Zhou et al (1995) ³⁹	C	China	Indoor pollution from coal	COPD	+	?

^a Abbreviations used for study design:

C = cross-sectional

CC = case-control

I = intervention study

^b Abbreviations used for endpoint:

CAD = chronic airway disease

CAO = chronic airway obstruction

CB = chronic bronchitis

COPD = chronic obstructive pulmonary disease

OAD = obstructive airways disease

^c + indicates exposure significantly increased risk of disease or reduced lung function

^d Yes includes studies that restricted attention to nonsmokers

^e The authors note that they studied use of biomass and use of coal, but when presenting results for COPD they only state that there was a consistent pattern of higher prevalence in men, in older people, in those with less education, lower BMI and greater exposure to smoking, but do not mention biomass or coal here.