Table 2.1. Case–control studies of in-home coal use and lung cancer in China

Reference, study location, period	Characteristics of cases	Characteristics of controls	Exposure assessment	Exposure categories	No. of exposed cases	Odds ratios (95% CI)[a]	Adjustment for potential confounders	Comments
Northern China								
Wu-Williams *et al*. (1990) Shenyang and Harbin, Northern China 1985–87	965 incident female cases from local registries: age < 70 years; cytologically verified	959 women, selected by multistage random sampling from general populations of Shenyang and Harbin, frequency-matched by 5-year age group	In-person interview using structured questionnaire	Duration of heating device use (years) versus no exposure			Age, education, smoking, study area	
				Kang				
				1–39	384	1.4 (0.8–2.4)		
				40–49	132	1.1 (0.6–2.8)		
				≥ 50	415	1.6 (0.9–2.8)		
				*Burning kangs**				
				1–20	106	1.2 (0.9–1.7)		
				≥ 21	173	1.5 (1.1–2.0)		
				Coal stoves				
				21–40	511	1.2 (1.0–1.6)		
				≥ 41	253	1.3 (1.0–1.7)		
				Non-coal stove				
				1–20	367	0.8 (0.6–1.1)		
				21–20	259	0.7 (0.5–0.9)		
				> 31	118	0.8 (0.5–1.1)		
				Heated walls/floors				
				1–20	127	1.5 (1.1–2.1)		
				> 21	243	1.4 (1.1–1.9)		
				Coal heaters				
				1–20	258	1.2 (1.0–1.6)		
				> 21	173	1.1 (0.8–1.4)		
				Central heat				
				1–20	258	1.0 (0.8–1.3)		
				> 21	173	0.8 (0.6–1.0)		

Table 2.1. Case–control studies of in-home coal use and lung cancer in China

Reference, study location, period	Characteristics of cases	Characteristics of controls	Exposure assessment	Exposure categories	No. of exposed cases	Odds ratios (95% CI)[a]	Adjustment for potential confounders	Comments
Xu *et al*. (1989), Shenyang, China, 1985-87	1249 cases (729 men, 520 women) in Shenyang aged 30–69 years, Cell type histologically confirmed in 83% of men and 73% of women.	1345 population-based controls (788 men, 557 women), selected by 3-stage procedure from urban Shenyang, frequency-matched on gender and age.	In-person interview using a structured questionnaire. Developed continuous index of indoor exposure to coal emissions from heating and cooking.	No use (referent)			Age, education, smoking	Population overlapped with the study by Wu-Williams *et al*. (1990).
				Burning kang				
				Men				
				1–19	91	1.7 ($p < 0.05$)		
				> 20	82	2.1 ($p < 0.05$)		
				Women				
				1–19	40	1.3 ($p > 0.05$)		
				> 20	65	2.3 ($p < 0.05$)		
				Coal stove with pipes to other rooms				
				Men				
				1–19	119	1.1 ($p > 0.05$)		
				> 20	48	2.3 ($p < 0.05$)		
				Women				
				1–19	81	1.4 ($p > 0.05$)		
				> 20	35	1.5 ($p > 0.05$)		
				Cooking place in bedroom				
				Men				
				1–29	5	1.2 ($p > 0.05$)		
				> 30	84	2.1 ($p < 0.05$)		
				Women				
				1-29	34	1.5 ($p > 0.05$)		
				30+	51	1.8 ($p < 0.05$)		

Table 2.1. Case–control studies of in-home coal use and lung cancer in China

Reference, study location, period	Characteristics of cases	Characteristics of controls	Exposure assessment	Exposure categories	No. of exposed cases	Odds ratios (95% CI)[a]	Adjustment for potential confounders	Comments
Xu *et al*. (1989) (contd)				**Indoor air index versus < 1**				The indoor air index ranged from 0 to 3, with values below 1 indicating potential for relatively low lifetime exposure to indoor air pollution from burning coal.
				Men				
				1.0–1.4	258	1.1 (0.8–1.4)		
				1.5–1.9	168	1.2 (0.9–1.6)		
				> 2.0	94	1.6 (1.1–2.3)		
				Women				
				1.0–1.4	183	1.2 (0.9–1.6)		
				1.5–1.9	110	1.3 (0.9–1.9)		
				> 2.0	56	1.5 (1.0–2.4)		
				Perceived indoor smokiness during heating versus none				
				Men				
				Somewhat smoky	249	1.2 (1.0–1.5)		
				Smoky	198	1.3 (1.0–1.7)		
				Women				
				Somewhat smoky	146	1.2 (0.9–1.6)		
				Smoky	116	2.0 (1.4–2.8)		
Sun (1992), Harbin, China, 1985–87	418 women, in whom 266 (63.6%) histologically or cytologically confirmed. Overlaps with Xu *et al*. (1989)	398 community controls, women randomly selected from Harbin (sampling method not specified)	Questionnaire	Using smoky (soft) coal	NG	2.26 (1.53–3.33) p<0.001	Pneumonia, pulmonary emphysema, smoky (soft) coal, tuberculosis, non-smoky coal (possibly anthracite), smoking, bronchitis, family cancer history, open fire basin, heating by open fire basin before 16 years old	
				Time-trend effect	NG	1.36 (1.01–1.83)		
				Using brazier (presumably unvented)				

Table 2.1. Case–control studies of in-home coal use and lung cancer in China

Reference, study location, period	Characteristics of cases	Characteristics of controls	Exposure assessment	Exposure categories	No. of exposed cases	Odds ratios (95% CI)[a]	Adjustment for potential confounders	Comments
Dai *et al*. (1996), Harbin, China, 1992–93	120 nonsmoking women, 30–69 years old, lived in Harbin >10 years, 100% pathologically confirmed.	120 randomly selected community controls matched on gender, 5-year age group, and nonsmoking status	In-person interview using a questionnaire.	*Coal stove in bedroom* 1–19 years ≥ 20 years (sic) *Coal heating* 1–24 years 25–34 years	 NG NG NG NG	 4.46 (1.61–12.33) 18.75 (3.94–29.32) 5.81 (1.67–20.22) 4.70 (1.28–17.18)	Not specified	
Wang *et al*. (1996), Shenyang City, Liaoning Province, China, 1992–94	135 incident female lung cancer cases from 18 hospitals, all non-smokers, age 35-69 years. 54.5% adenocarcinoma, 16.4% squamous cell, 20.4% small or oat cell.	135 non-smoking controls matched for gender and age, randomly chosen from urban areas of Shenyang.	In-person interview using a structured questionnaire	*Bivariate analysis* Cooking fumes exposure Coal smoke exposure during cooking *Multivariate analysis* Coal smoke exposure during cooking	 NG NG NG	 3.79 (2.29–6.27) 2.37 (1.44–3.91) Not statistically significant[NG]	Not specified	Modeled results may have been conservative. Coal use not associated with lung cancer, but 100/135 cases and 107/135 controls used coal. No association of 'kang' use for heating and lung cancer
Zhou *et al*. (2000), Shenyang City, Liaoning Province, China, 1991–95	72 female incident cases of adenocarcinoma, aged 35–69 years, from 18 major hospitals	72 women randomly selected from the Shenyang general population, age-matched (± 5 years) to Liaoning lung cancer cases in 1988–89	In person interview using standardized questionnaire	*Kitchen location versus separate kitchen* In living room In bedroom *Smokiness during cooking versus none* Slight Medium Heavy *p* for trend	 63 3 15 35 3	 1.40 (0.41–4.88) 1.00 (0.11–8.93) 0.73 (0.28–1.90) 2.71 (1.09–6.80) 1.32 (0.18–9.50) 0.027	Not specified	Exposure to coal smoke was not associated with adenocarcinoma, but both cases and controls had 'high level' of exposure to coal smoke. Fuel type not specified

Table 2.1. Case–control studies of in-home coal use and lung cancer in China

Reference, study location, period	Characteristics of cases	Characteristics of controls	Exposure assessment	Exposure categories	No. of exposed cases	Odds ratios (95% CI)[a]	Adjustment for potential confounders	Comments
Kleinerman *et al*. (2002), 2 prefectures (Pingliang and Qingyang) of Gansu Province, China, 1994–98	846 patients (626 men, 220 women) diagnosed by an expert review panel of physicians, aged 35–70 years	1740 randomly selected controls from the 1968 and 1990 population census lists of the 2 prefectures, frequency-matched on sex, age and prefecture.	Structured questionnaire interview ascertained 30-year history of main cooking and heating fuels, and annual average coal use	**Men**			Sex, age, prefecture, television and cattle ownership (for socioeconomic status), tobacco use	Indoor levels of PM_{10}, PAH, and gaseous pollutants were measured in 25 homes that burned coal and biomass. No significant differences in pollutant levels or ventilation rates were observed.
				Main fuel coal versus biomass	220	1.41 (1.09–1.82)		
				Amount of coal used, tertile versus 0				
				1	95	1.04 (0.77–1.39)		
				2	148	1.00 (0.76–1.34)		
				3	108	1.44 (1.02–2.04)		
				p for trend		0.04		
				Percentage of time using coal versus 0				
				0.7–56	62	1.69 (1.15–2.47)		
				> 56	207	1.60 (1.22–2.10)		
				p for trend		0.013		
				Women				
				Main fuel coal versus biomass	58	1.03 (0.66–1.63)		
				Amount of coal used, tertile versus 0				
				1	51	1.48 (0.94–2.32)		
				2	59	1.18 (0.75–1.88)		
				3	26	0.93 (0.52–1.67)		
				p for trend		0.53		
				Percentage of time using coal versus 0				
				0.7–56	62	2.83 (1.60–5.00)		
				> 56	207	1.33 (0.83–2.14)		
				p for trend		0.63		

Table 2.1. Case–control studies of in-home coal use and lung cancer in China

Reference, study location, period	Characteristics of cases	Characteristics of controls	Exposure assessment	Exposure categories	No. of exposed cases	Odds ratios (95% CI)[a]	Adjustment for potential confounders	Comments
Galeone et al. (2008), Harbin, China, 1987–90	218 newly diagnosed, histologically confirmed, lived in Heilongjiang province.	436 controls selected from patients admitted for non-lung diseases, matched on sex, 5-year age group, and area of residence.	In-person interview using a questionnaire.	Ever coal use for cooking Yes Ever coal use for heating Yes	200 195	2.47(1.27–4.77) 1.86 (0.98–3.53)	Sex, age, area of residence, smoking status, duration and amount of smoking, income, family history of cancer, occupational exposure to lung carcinogens	

Table 2.1. Case–control studies of in-home coal use and lung cancer in China

Reference, study location, period	Characteristics of cases	Characteristics of controls	Exposure assessment	Exposure categories	No. of exposed cases	Odds ratios (95% CI)[a]	Adjustment for potential confounders	Comments
Xuanwei County, Yunnan								
He *et al*. (1991); Liu *et al*. (1991), Xuanwei, China 1985-1986	110 diagnosed lung cancer patients (56 men, 54 women)	426 persons (224 men, 202 women) matched on gender, age (± 2 yrs) occupation (all farmers) and village of residence; 1–5 controls per case (mean, 3.87)	In person interview using a structured, field-tested questionnaire	**Men**			Unclear	Although the analyses were duplicated in both studies, the Working Group noted discrepancies in the results. The instability of the risk estimates is demonstrated with the different choice of category cutpoints in both studies. Matching by village provided matching on indoor fuel type and home type, allowing more incisive analysis of other factors such as smoking and duration and frequency of cooking food
				Often cooks food	**12**	3.36 (1.27-8.88)		
				Women				
				Age started cooking versus > 15 years				
				11–15	**30**	2.37 (1.09-5.15)		
				≤ 10	**11**	1.25 (0.45-3.49)		
				p for trend		> 0.05		
				Years of cooking versus ≤ 30				
				31-44	**28**	9.18 (*1.76-47.49*)		
				≥ 45	**19**	14.70 (1.61-134.03)		
				p for trend		> 0.05		
				≥ 45 years using unventilated fire pit (versus < 45 years)				
				Men	**34**	1.78 (0.46–6.93)		
				Women	**33**	0.73 (0.20–2.60)		

Table 2.1. Case–control studies of in-home coal use and lung cancer in China

Reference, study location, period	Characteristics of cases	Characteristics of controls	Exposure assessment	Exposure categories	No. of exposed cases	Odds ratios (95% CI)[a]	Adjustment for potential confounders	Comments
Lan *et al*. (1993), Xuanwei, China, 1988–90	139 nonsmoking women from throughout Xuanwei (55 confirmed by pathology or cytology, 84 by X-rays and clinical history)	139 age-matched (± 2 yrs) female population controls from throughout Xuanwei	Interview using standardized, field-tested questionnaire. Queried fuel type, history of smoky (bituminous) coal use, specifically from Laibin Coal Mine.	**Smoky coal from Laibin Mine**			Age, length of menstrual cycle, age of menopause, family history of lung cancer and chronic bronchitis	Methods unclear: all study subjects were former smokers but amount of past smoking was not specified nor was it considered as a potential confounder in the analysis;
				Use versus no use	74	7.53 (3.31–17.17)		
				Tons/year used versus 0				
				< 3	23	8.24 (2.33–29.17)		
				≥ 3	51	7.53 (3.03–18.72)		
				p for trend		< 0.001		
				Period started use versus never				
				After age 20	12	1.84 (0.56–6.05)		
				Before age 20	10	5.10 (0.97–26.81)		
				Lifelong	57	9.89 (3.95–24.75)		
				p for trend		<0.001		
Lan et al (2000) Xuanwei, China, 1995–96	122 incident lung cancer cases; 100% confirmed by different methods	122 population controls randomly from the list of household registrations; individually matched by sex, age, village and type of fuel currently used for cooking and heating	In-person interviews using a standardized questionnaire	Smoky coal use without ventilation (tons) vs. 130 tons ≥ 130	71	2.4 (1.3–4.4)	Total smoky coal use without ventilation, pack-years, COPD, and family history of lung cancer	

Table 2.1. Case–control studies of in-home coal use and lung cancer in China

Reference, study location, period	Characteristics of cases	Characteristics of controls	Exposure assessment	Exposure categories	No. of exposed cases	Odds ratios (95% CI)[a]	Adjustment for potential confounders	Comments
Lan et al (2008) Xuanwei, China, 1985–90	498 incident lung cancer cases; farmers, 18-85years old	498 population controls randomly from the list of household registrations through a three-stage randomized recruitment strategy; individually matched by sex and age.	In-person interviews using a standardized questionnaire	**Smoky coal use vs. Smokeless coal or wood**	475	7.7 (4.5–13.3)	Age, sex, literacy, lung cancer in 1st degree relatives, hours spent at home per day, coal mine work history, tobacco use, passive smoke exposure	Results were similar when looking at smoky coal versus smokeless coal or wood using the coal subtype used for the longest time throughout life.
				Males	246	9.0 (4.1-19.8)		
				Females	229	6.7 (3.2-14.2)		
				Coal subtype				
				Laibin	276	24.8 (12.4-49.6)		
				Longtan	44	11.6 (5.0-27.2)		
				Baoshan	12	6.0 (2.2-16.7)		
				Longchang	42	4.1 (2.0-8.6)		
				Yangchang	47	3.8 (1.8-8.3)		
				Wenxing	14	3.8 (1.4-10.5)		
				Tangtang	18	2.8 (1.2-6.6)		
				Shuanghe	4	1.1 (0.2-4.7)		
				Tainba	9	0.6 (0.2-1.9)		
				Yangliu	3	0.7 (0.2-3.1)		
Central China, excluding Xuanwei								
Huang *et al*. (1992), Chengdu, Sichuan, 1990–91	135 'pre-invasive' lung cancer patients at three provincial hospitals	135 healthy subjects without respiratory illness from the same hospitals, , matched on gender and age	In-person interview using a questionnaire	Indoor coal burning	NG	1.59 (1.01–2.07)	Unclear	The primary goal was to assess diet. [It is unclear what the reference group was, but it was possibly biomass]
Shen *et al*. (1996), Nanjing, China, 1986-93	263 cases (83 squamous, 180 adenocarcinoma) who were Nanjing residents for ≥ 20 years	263 population controls that were Nanjing residents; matched 1:1 for gender, age, ethnicity, and 'street address'	Standardized questionnaire	*Squamous-cell*			Unclear	Fuel types within 'solid fuel' category were not specified. Statistical tests were reported as one-sided, but implications are not clear.
				Solid fuel		4.97 (0.80–30.88)		
				Coal heating stove		3.72 (0.88–15.71)		
				Adenocarcinoma				

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Reference, study location, period	Characteristics of cases	Characteristics of controls	Exposure assessment	Exposure categories	No. of exposed cases	Odds ratios (95% CI)[a]	Adjustment for potential confounders	Comments
Shen *et al*. (1998), Nanjing, China, 1993	70 never-smoking women diagnosed with primary lung adenocarcinoma. All were Nanjing residents for ≥ 20 years.	70 healthy community controls, matched 1:1 by sex, age, neighbourhood, and occupation.	In-person interview using a standardized questionnaire	Coal stove for heating Gas fuel used in home		1.78 (0.79–4.02) (p = 0.08) 1.51 (0.47–4.78) (p = 0.24)	Unclear	The study's main purpose was to assess lung cancer risk associated with passive smoking. This study may overlap with Shen et al., 1996.
Zhong *et al*. (1999), Shanghai, China 1992–1994	504 never-smoking female incident cases, 35–69 years old, identified from the Shanghai Cancer Registry	601 never–smoking women, frequency-matched on age distribution of female lung cancer cases during 1987–89; randomly selected from the Shanghai Residential Registry	In-person interview using a structured questionnaire	**All lung cancer** Not cook in separate kitchen *Cooking fuel versus coal* Coal and gas Gas	248 96 255	1.28 (0.98–1.68) 0.92 (0.63–1.35) 0.90 (0.66–1.23) 1.64 (1.24–2.17)	Age, education, income, vitamin C intake, respondent status, exposure to environmental tobacco smoke, occupation, family history of lung cancer	

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Reference, study location, period	Characteristics of cases	Characteristics of controls	Exposure assessment	Exposure categories	No. of exposed cases	Odds ratios (95% CI)[a]	Adjustment for potential confounders	Comments
Southern China (Guangzhou and Hong Kong)								
Liu *et al*. (1993), Guangzhou, China 1983–84	316 incident cases (224 men, 92 women); 55% diagnosed by X-ray/clinical history, 13% by bronchoscopy, 32% by cytology or histology	316 hospital controls matched on gender, age, residential district, and date of diagnosis. Respiratory and coronary heart disease excluded.	Structured questionnaire and direct measurement of ventilation openings' areas in kitchen and living area.	*No separate kitchen*			Education, occupation, occupational exposure, history of tuberculosis, chronic bronchitis, family history of cancer, smoking, living area, passive smoking (women only)	The following factors were not statistically significantly associated with lung cancer risk: cooking fuel; frequency of cooking at home; number of meals prepared per day; chimney in kitchen; story of residence
				Men	152	2.4 (1.4–4.2)		
				Women	63	5.9 (2.1–16.0)		
				Poor air circulation				
				Men	134	2.1 (1.2–3.8)		
				Women	54	3.6 (1.4–9.3)		
				Ventilation opening size in living area (m^2/ person versus ≤ 0.4)				
				Men				
				0.5–0.9	86	0.39 (0.14–1.1)		
				1.0–1.9	38	0.30 (0.10–0.91)		
				2.0–3.9	22	0.24 (0.06–0.90)		
				≥ 4.0	31	0.14 (0.04–0.51)		
				p for trend		< 0.001		
				Women				
				0.5–0.9	36	0.36 (0.9–1.5)		
				1.0–1.9	22	0.25 (0.05–1.1)		
				2.0–3.9	9	0.14 (0.02–0.89)		
				≥ 4.0	9	0.02 (0.00–0.21)		
				p for trend		< 0.001		
				Ventilation opening size in kitchen (m^2/person versus ≤ 0.4)				
				Men				
				0.5–0.9	58	0.77 (0.36–1.7)		
				1.0–1.4	48	0.23 (0.10–0.56)		
				1.5–1.9	19	0.49 (0.16–1.5)		
				≥ 2.0	20	0.15 (0.05–0.44)		
				p for trend		< 0.001		

Table 2.1. Case–control studies of in-home coal use and lung cancer in China

Reference, study location, period	Characteristics of cases	Characteristics of controls	Exposure assessment	Exposure categories	No. of exposed cases	Odds ratios (95% CI)[a]	Adjustment for potential confounders	Comments
Liu *et al*. (1993) (contd)				Women				
				0.5–0.9	27	0.11 (0.02–0.60)		
				1.0–1.4	24	0.13 (0.02–0.74)		
				1.5–1.9	7	0.09 (0.01–0.63)		
				≥ 2.0	12	0.06 (0.01–0.32)		
				p for trend		<0.001		
				Height of room (versus < 2.8 m)				
				Men				
				2.8–3.1	72	0.91 (0.41–2.0)		
				≥ 3.2	91	0.64 (0.31–1.3)		
				p for trend		0.06		
				Women				
				2.8–3.1	30	0.54 (0.09–1.3)		
				≥ 3.2	40	0.23 (0.06–0.84)		
				p for trend		0.02		
Du *et al*. (1996), Guangzhou, 1985	849 (566 men, 283 women) deaths from lung cancer, age 19-98 yrs; 120 cases (28 men and 92 women) non-smokers	566 controls, defined as deaths unrelated to lung cancer matched for sex, age (+/- 2 years), and residence	Air sampling in 5 randomly selected households in the 4 districts	*Coal fumes exposure*	NG		None	Referent not given
				Men		0.89; p> 0.05		
				Women		2.21 (1.16-4.24)		
				Stratification by smoking				Referent not given
				Men				
				NS+ not exposed		0.26		
				S + not exposed		5.15 (2.77-9.57)		
				NS + exposed		1.50 (069-3.27)		
				S + exposed		4.29 (2.33-7.88)		
				Women				
				NS+ not exposed		0.50		
				S + not exposed		1.00 (ref.)		
				NS + exposed		1.56 (0.57-4.25)		
				S + exposed		2.89 (1.09-8.65)		

Table 2.1. Case–control studies of in-home coal use and lung cancer in China

Reference, study location, period	Characteristics of cases	Characteristics of controls	Exposure assessment	Exposure categories	No. of exposed cases	Odds ratios (95% CI)[a]	Adjustment for potential confounders	Comments
Lei *et al*. (1996), Guangzhou, 1986	792 cases deceased from primary lung cancer (563 men, 229 women), identified from 1986 death certificates	792 controls (563 men, 229 women) matched on street of residence, year of death, sex, age; without history of respiratory diseases or tumours	In person interviews with next-of-kin using a standardized questionnaire	*Exposure to coal smoke (versus infrequent)* Regular Men Women		 [1.08 (0.85-1.39)] *(*p > 0.05) [0.90 (0.57-1.42)] (*p* > 0.05)	None	91.9% of families used coal in the last 20 years (46.2% used wood simultaneously). Living condition index = living area per person / room ventilation. Association of living condition index with lung cancer risk in women may indirectly point to coal smoke exposure or cooking practices as risk factors.
Luo *et al*. (1996), Fuzhou, China	102 cases (78 men, 24 women; 57 adenocarcinomas, 39 SCC)	306 community controls matched on sex, age, and ethnicity	In person interview using a standardized questionnaire	*Indoor air pollution due to coal burning* Squamous-cell Adenocarcinoma	NG	7.6 (3.7-15.7) 14.1 [11.8-16.4] 6.0 [4.9-7.1]	Personal and passive smoking, deep inhalation of smoke, income, history of chronic bronchitis	
Koo *et al*. (1983), Hong Kong, China 1981–83	200 female lung cancer patients; mean age 61.8 years	200 female community controls, matched on age (± 5 years), residential district, and housing type; mean age 60.6 years	Interviews with semi-structured questionnaire, using a life history approach. Assessed use and duration of using biomass fuels, coal, kerosene, LPG and gas.	*Use of coal vs. no use* Yes *Use of wood vs. no use* Yes	3 179	0.32 (p= 0.15) 0.74 (p = 0.50)	Unclear	Kerosene use > 30 years vs. ≤ 30 yrs increased the risk of lung cancer but the authors hypothesized that this effect might reflect an underlying socioeconomic effect because kerosene is cheaper than LPG. Not clear if coal and wood use are mutually exclusive.

Table 2.1. Case–control studies of in-home coal use and lung cancer in China

Reference, study location, period	Characteristics of cases	Characteristics of controls	Exposure assessment	Exposure categories	No. of exposed cases	Odds ratios (95% CI)[a]	Adjustment for potential confounders	Comments
Taiwan								
Ger *et al*. (1993), Taipei, Taiwan 1990–91	131 lung cancer patients (72 adenocarcinoma, 30 SCC, 29 small cell); 100% histopathologically confirmed	262 hospital controls (ophthalmology dept.) matched on sex, age (± 5 years), interview date, and insurance status; 262 neighbourhood controls matched on sex, age, and residence location.	In person interview using a structured questionnaire to query the use of coal and other fuels for cooking.	**Coal for cooking** *Adenocarcinoma* vs.hospital controls vs. neighbourhood controls *Squamous/small cell* vs.hospital controls vs. neighbourhood controls *Squamous/small cell* vs.hospital controls vs. neighbourhood controls	7 10 10 	 1.44 (0.44–4.69) 0.56 (0.20–1.54) 3.73 (1.27–11.02) 10.00 (2.19–45.61) 4.41 (1.20–16.20) 24.34 (2.97–199.49)	 Matching factors Matching factors Matching factors Matching factors Unclear Unclear	A higher percentage of proxy interviews were conducted for cases (21%) than controls from the neighbourhood (17%) or hospitals (12%) [Matching on location of residence may have influenced effects estimates for fuel type due to overmatching.]
Ko *et al*. (1997), Kaohsiung, Taiwan 1992–93	105 nonsmoking female lung cancer patients	105 (presumably nonsmoking) women from same hospital's ophthalmic service or coming to hospital for routine check-up; matched on age (± 2 years) and interview date	In-person interview using a structured questionnaire.	By age of exposure Cooking fuel Gas or none Coal < 20 yrs 20-40 years > 40 yrs		 1 0.5 (0.2–1.6) 1.1 (0.4-3.0) 1.1 (0.1-8.0)	Socioeconomic status, education, residential area	[Selection of cases and controls from same hospital may have caused overmatching on exposures. The near-significant positive association of lung cancer risk with wood/charcoal use is unusual, conceivably related to the matching strategy.] Further adjusting for other covariates (not specified) did not affect the statistical significance nor magnitude of effects.

Table 2.1. Case–control studies of in-home coal use and lung cancer in China

Reference, study location, period	Characteristics of cases	Characteristics of controls	Exposure assessment	Exposure categories	No. of exposed cases	Odds ratios (95% CI)[a]	Adjustment for potential confounders	Comments
Le *et al*. (2001), Kaohsiung, Taiwan 1993–1999	527 histologically confirmed cases (236 men, 291 women); 18–83 years old,. Cases were divided into SCC and small-cell carcinoma (28.2%) and adenocarcinoma (47.7%)	805 controls from same hospital without tobacco-related illness; matched on sex, age (± 2 years)	In person interview using a structured questionnaire	**Women** *Cooking fuel (versus none or gas)* SCC or small cell carcinoma Coal or anthracite Wood or charcoal Adenocarcinoma Coal or anthracite Wood or charcoal *Kitchen without fume extractor* SCC or small cell carcinoma Adenocarcinoma	 14 22 49 40 31 74	 1.2 (0.5–3.0) 3.1 (1.0–9.2) 2.1 (1.2–3.7) 3.0 (1.4–6.4) 3.0 (1.3-7.1) 3.9 (2.3-6.6)	Smoking, residential area (urban, suburban, rural), education, socioeconomic status	Only 7% of men reported cooking for the family and thus data were not shown. In women, stir frying, frying and deep frying after fumes emitted were statistically significantly associated with risk for adenocarcinoma but not SCC or small cell carcinoma. Long-term residence near industrial district was associated with lung cancer risk, especially in women.

[a] p-values are given when 95% CI not specified

COPD, chronic obstructive pulmonary disease; SCC, squamous cell carcinomas; LPG, liquid petroleum gas