

**Table 2.6. Case-control studies of second-hand tobacco smoke and cancers of the upper aerodigestive tract**

Reference, study location, period	Organ site (ICD code)	Characteristics of cases	Characteristics of controls	Exposure assessment	Second-hand tobacco smoke categories	Relative risk (95% CI or p value)	Adjustment for potential confounders	Comments
Tan <i>et al.</i> (1997) United States 1986–1993	Squamous cell carcinoma of head and neck	59 (27 men, 32 women) non smoking head and neck cancer patients diagnosed in a single hospital, aged from 14 to 84 years	177 (81 men, 96 women) non smoking patients selected in the Department of Internal Medicine of the same hospital of cases; frequency matched by period of diagnosis, age (within 10 years), sex, race, and alcohol consumption	Cases and controls (or their spouses) were interviewed by telephone to ascertain their exposure to second-hand tobacco smoke at home and in the workplace	Never exposed At home At work Either home/work Never exposed At home At work Either home/work Never exposed At home At work Either home/work	<i>Men and women</i> 1.00 2.80 (0.006) 10.16 (< 0.001) 5.34 (< 0.001) <i>Men</i> 1.00 1.15 (0.79) 11.63 (< 0.001) 3.75 (0.015) <i>Women</i> 1.00 7.35 (< 0.001) 8.89 (0.002) 8.00 (< 0.001)	No adjustment for potential confounders	Small sample size. No adjustment for potential confounders. Interviews were done by telephone and there was no information about the percentages of interviews done with spouses. An effort was made to confirm the lifelong absence of any form of tobacco use

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Zhang <i>et al.</i> (2000) United States 1992–1994	Squamous cell carcinoma of head and neck	155 (97 men, 58 women) from a hospital in New York City, aged < 60–70 or more years; response rate 90.1%; 100% histologically confirmed	166 (106 men, 60 women); free from cancer selected in the blood bank centre of the same hospital of cases; frequency matched by sex and age; response rate 89.8%	Cases and controls completed a self structured questionnaire	Never exposed Ever at home or work <i>Degree of second-hand tobacco smoke exposure</i> Never Moderate Heavy p for trend <i>Second-hand tobacco smoke at home</i> Never Occasionally Regularly p for trend <i>Second-hand tobacco smoke at work</i> Never Occasionally Regularly p for trend <i>Spouse smoking</i> No Yes	1.0 2.4 (0.9–6.8) 1.0 2.1 (0.7–6.1) 3.6 (1.1–11.5) 0.0249 1.0 1.6 (0.8–3.3) 1.7 (0.8–3.3) 0.1574 1.0 1.0 (0.5–2.1) 1.0 (0.5–2.1) 0.9240 1.0 1.7 (0.8–3.7)	Sex, age, ethnicity, education, alcohol, use of marijuana; cigarette smoking (pack-years)	Small sample size. Only 10 cases and 27 controls never exposed to second-hand tobacco smoke. The data from this study were included in the pooled analysis of Lee <i>et al.</i> (2008)

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Lee <i>et al.</i> (2008) central Europe, Latin America, North America 1992–2006	Head and neck cancers (97% squamous cell carcinoma)	Group of never tobacco users: 542 (325 men, 217 women) and group of never tobacco and alcohol users: 257 (112 men, 145 women) from hospitals in study centres, aged < 40–> 75 years; according to study centres, response rates from 49% to 98%; 100% histologically confirmed	Group of never tobacco users: 2 197 (1 261 men, 936 women) and group of never tobacco and alcohol users: 1 013 (454 men, 559 women); majority hospital based, but some population-based; most frequency matched by sex, age, hospital and ethnicity; according to study centres response rates from 67,5% to 97%	Face-to-face interviews, administered through standardized structured questionnaire	<i>Never tobacco users</i> Never exposed Ever at home or work <i>Duration of ETS at home (years)</i> Never 1–15 > 15 p for trend <i>Frequency of second-hand tobacco smoke at home (hours/day)</i> 0–3 > 3 <i>Duration of second-hand tobacco smoke at work (years)</i> Never 1–15 > 15 p for trend <i>Frequency of second-hand tobacco smoke at work (hours/day)</i> Never 1–3 > 3	1.00 1.07 (0.85–1.34)  1.00 1.28 (0.91–1.80) 1.60 (1.12–2.28) < 0.01  1.00 1.76 (0.83–3.73)  1.00 0.86 (0.60–1.24) 1.55 (1.04–2.30) 0.13  1.00 1.16 (0.001–6.01) 1.14 (0.04–32.76)	Sex, age, ethnicity, education, study centre and alcohol (for never tobacco users only).	Pooling analysis including several studies. Large sample size split for analysis in two groups without the main risk factors to head and neck cancers (tobacco smoking and alcohol drinking)

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Lee <i>et al.</i> (2008) (contd.)					<i>Never tobacco or alcohol users</i>			
					Never exposed	1.00		
					Ever at home or work	1.30 (0.94–1.81)		
					<i>Duration of second-hand tobacco smoke at home (years)</i>			
					Never	1.00		
					1–15	2.04 (1.21–3.43)		
					> 15	1.75 (1.06–2.90)		
					<i>p for trend</i>	< 0.01		
					<i>Frequency of second-hand tobacco smoke at home (hours/day)</i>			
					0–3	1.00		
					> 3	6.11 (0.03–1449)		
					<i>Duration of second-hand tobacco smoke at work (years)</i>			
					Never	1.00		
					1–15	1.12 (0.61–2.06)		
					> 15	2.59 (1.35–4.95)		
					<i>p for trend</i>	< 0.01		
					<i>Frequency of second-hand tobacco smoke at work (hours/day)</i>			
					Never	1.00		
					1–3	2.04 (0.69–6.07)		
					> 3	1.16 (0.46–2.96)		

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Lee <i>et al.</i> (2008) central Europe, Latin America, North America 1992–2006	Oral cavity	Group of never tobacco users: 146 and group of never tobacco and alcohol users: 92, from hospitals in study centres; 100% histologically confirmed	Group of never tobacco users: 2 010 and group of never tobacco and alcohol users: 932; majority hospital based, but some population-based; most frequency matched by sex, age, hospital and ethnicity	Face-to-face interviews, administered through standardized structured questionnaire	<i>Never tobacco users</i> Never exposed Ever at home or work <i>Duration of second-hand tobacco smoke at home (years)</i> Never 1–15 > 15 p for trend <i>Duration of second-hand tobacco smoke at work (years)</i> Never 1–15 > 15 p for trend <i>Never tobacco or alcohol users</i> Never exposed Ever at home or work <i>Duration of second-hand tobacco smoke at home (years)</i> Never 1–15 > 15 p for trend <i>Duration of second-hand tobacco smoke at work (years)</i> Never 1–15 > 15 p for trend	1.00 0.93 (0.61–1.41) 1.00 1.58 (0.73–3.41) 1.06 (0.53–2.11) 0.78 1.00 0.65 (0.28–1.51) 1.31 (0.57–3.00) 0.75 1.00 1.17 (0.68–2.01) 1.00 2.27 (0.84–6.10) 1.37 (0.56–3.35) 0.44 1.00 0.90 (0.26–3.10) 2.07 (0.49–8.72) 0.49	Sex, age, ethnicity, education, study centre and alcohol (for never tobacco users only)	

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Lee <i>et al.</i> (2008) central Europe, Latin America, North America 1992–2006	Pharynx	Group of never tobacco users: 225 (206 oropharynx and 19 hypopharynx) and group of never tobacco and alcohol users: 92 (85 oropharynx and 7 hypopharynx), from hospitals in study centres; 100% histologically confirmed	Group of never tobacco users: 1 939 and group of never tobacco and alcohol users: 930; majority hospital based, but some population-based; most frequency matched by sex, age, hospital and ethnicity	Face-to-face interviews, administered through standardized questionnaire	<i>Never tobacco users</i> Never exposed Ever at home or work <i>Duration of second-hand tobacco smoke at home (years)</i> Never 1–15 > 15 p for trend <i>Duration of second-hand tobacco smoke at work (years)</i> Never 1–15 > 15 p for trend <i>Never tobacco or alcohol users</i> Never exposed Ever at home or work <i>Duration of second-hand tobacco smoke at home (years)</i> Never 1–15 > 15 p for trend <i>Duration of second-hand tobacco smoke at work (years)</i> Never 1–15 > 15 p for trend	1.00 1.30 (0.31–5.34) 1.00 1.88 (0.42–8.50) 4.13 (1.43–11.89) 0.02 1.00 0.81 (0.26–2.50) 5.16 (0.28–95.95) 0.37 1.00 1.33 (0.78–2.26) 1.00 2.83 (1.03–7.81) 4.15 (1.50–11.47) < 0.01 1.00 0.80 (0.21–3.13) 3.99 (1.06–15.08) 0.13	Sex, age, ethnicity, education, study centre and alcohol (for never tobacco users only)	

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Lee <i>et al.</i> (2008) central Europe, Latin America, North America 1992–2006	Larynx	Group of never tobacco users: 71 and group of never tobacco and alcohol users: 26, from hospitals in study centres; 100% histologically confirmed	Group of never tobacco users: 1 888 and group of never tobacco and alcohol users: 902; majority hospital based, but some population-based; most frequency matched by sex, age, hospital and ethnicity	Face-to-face interviews-administered through standardized questionnaire	<i>Never tobacco users</i> Never exposed Ever at home or work <i>Duration of second-hand tobacco smoke at home (years)</i> Never 1–15 > 15 p for trend <i>Duration of second-hand tobacco smoke at work (years)</i> Never 1–15 > 15 p for trend <i>Never tobacco or alcohol users</i> Never exposed Ever at home or work <i>Duration of second-hand tobacco smoke at home (years)</i> Never 1–15 > 15 p for trend <i>Duration of second-hand tobacco smoke at work (years)*</i> Never 1–15 > 15 p for trend	1.00 1.71 (0.98–3.00) 1.00 1.44 (0.59–3.53) 2.58 (1.20–5.57) 0.02 1.00 0.98 (0.43–2.23) 2.07 (1.04–4.11) 0.07 1.00 2.90 (1.09–7.73) 1.00 2.01 (0.43–9.36) 1.85 (0.53–6.49) 0.28 1.00 2.75 (0.71–10.61) 5.45 (1.69–17.52) < 0.01	Sex, age, ethnicity, education, study centre and alcohol (for never tobacco users only)	

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Ramroth <i>et al.</i> (2008) South-West Germany 1998–2000	Larynx	257 Germans (236 men, 21 women) from hospitals in the five study centres; 100% histologically confirmed. No information on response rate	769 Germans (702 men, 67 females) population-based controls selected from the population registries of the study areas; frequency matched by age and sex. No information on response rate	Face-to-face interviews-administered through standardized questionnaire	<i>Partner smoker</i>	1.00	Sex, age, ethnicity, education, study centre and alcohol (for never tobacco users only)	Dose-response effects not examined
					Never exposed	1.1 (0.78–1.7)		
					Ever exposed	1.2 (0.82–1.7)		
					<i>Working place</i>	1.00		
					Never exposed	1.2 (0.67–1.4)		
					Ever exposed	1.00		
					<i>During childhood</i>	1.2 (0.77–1.8)		
					Never exposed	1.00		
					Ever exposed	2.0 (0.39–10.7)		
					<i>Partner and working place</i>	1.00		
Never exposed	1.2 (0.77–1.8)							
Ever exposed	1.00							
<i>Partner and working places in non-smokers only</i>	1.00							
Never exposed	2.0 (0.39–10.7)							
Ever exposed	1.00							
Fukuda and Shibata (1990) Japan, 1982–1986	Naso-sinus	44 women 40–79 years with incident neoplasms of the maxillary sinuses; 96.6% response rate	88 population controls, individually matched on age, sex, and health-centre region; 93.4% response rate	Self-administered questionnaire	<i>Among non-smokers:</i>		None	
					<i>N° smokers in household</i>	1.00		
					0	1.40 (0.57–3.49)		
					1	5.73 (1.58–20.73)		
	> 1							

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Yu <i>et al.</i> (1990) China, 1983–1985	Naso-pharynx	306 patients < 50 years old with incident nasopharyngeal carcinoma; 100% case response rate	306 population controls, individually matched on age, gender, and neighbourhood; control response rate not stated	Interviewer-administered questionnaire	Second-hand tobacco smoke exposure among nonsmokers: <i>At home</i> Never Ever Spouse smoked <i>When the subject was age 10</i> Father smoked Mother smoked Other household members smoked Lived with any smoker	1.0 0.7 (0.4–1.4) 0.8 (0.4–1.9) 0.6 (0.3–1.2) 0.7 (0.3–1.5) 1.0 (0.5–2.2) 0.7 (0.4–1.3)	Age and gender	
Zheng <i>et al.</i> (1993) US, 1986	Naso-sinus	147 death from cancer of the nasal cavity; data were collected as part of the 1986 National Mortality Followback Survey conducted by the National Center for Health Statistics (NCHS) representing 1% sample of US adult deaths (>25 years).	449 controls who died from one of a variety of causes, excluding any causes strongly linked to alcohol and/or tobacco use	Structured questionnaire sent to next of kin	Second-hand tobacco smoke exposure (spouse smoked) among non-smokers	<i>Nasal cancer</i> 3.0 (1.0-8.9) <i>MS cancer</i> 4.8 (0.9-24.7)	Age, alcohol use	Reported risks for active and involuntary smoking were of similar magnitude.

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Cheng <i>et al.</i> (1999) Taiwan, China, 1991–1994	Naso-pharynx	375 histologically confirmed incident nasopharyngeal cancer, 75 years, no previous NPC, residence in Taipei last 6 months; 99% response rate	327 healthy community controls individually matched to cases on sex, age and residence; 88% response rate	Questionnaire	<i>Among nonsmokers</i>		Age, sex, ethnicity, education, family history of NPC		
					<i>Childhood second-hand tobacco smoke exposure</i>	No			1.0
						Yes			0.6 (0.4–1.0)
					<i>Adulthood second-hand tobacco smoke exposure</i>	No			1.0
		Yes	0.7 (0.5–1.2)						
Yuan <i>et al.</i> (2000) China, 1987–1991	Naso-pharynx	935 histologically confirmed nasopharyngeal cancer; 84% response rate	1032 persons from the community frequency matched by age (5 yrs) and sex	In person interview by 4 trained interviewers employing a structured questionnaire.	<i>Among nonsmokers Lifetime second-hand tobacco smoke exposure exposure</i>		Age, sex, education, preserved foods and oranges/tangerines, cooking smoke, occupational exposure to chemical fumes, history of chronic ear and nose condition and family history of nasopharyngeal cancer		
					<i>Never</i>				1.0
					<i>Mother smoked</i>				2.30 (1.23–4.28)
					<i>mother &lt; 20 cigarettes per day</i>				1.65 (0.83–3.29)
					<i>mother ≥ 20 cigarettes per day</i>				4.24 (1.84–9.77)
					<i>Father smoked</i>				1.99 (1.18–3.35)
					<i>father &lt; 20 cigarettes per day</i>				1.73 (0.99–3.02)
					<i>father ≥ 20 cigarettes per day</i>				2.28 (1.31–3.99)
					<i>Household member smoked</i>				
					<i>Non-parental</i>				2.37 (1.20–4.71)
					<i>Any</i>				2.05 (1.22–3.44)
					<i>Total cigarettes per day by household member</i>				
<i>&lt; 20</i>		1.78 (1.02–3.13)							
<i>20–39</i>		2.23 (1.28–3.89)							
<i>40+</i>		2.51 (1.18–5.34)							

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Yuan <i>et al.</i> (2000) China (contd)					<i>Spouse smoked</i>			
					Yes	2.48 (1.42–4.31)		
					< 20 yrs	2.37 (1.28–4.41)		
					>20 yrs	2.59 (1.38–4.84)		
					< 20 cigarettes per day	2.44 (1.35–4.42)		
					20+ cigarettes per day	2.52 (1.36–4.65)		
					< 20 pack-yrs	2.47 (1.37–4.45)		
					20–39 pack-yrs	2.12 (1.07–4.19)		
					>40 pack-yrs	4.69 (1.60–13.70)		
					Non-spousal household member smoked	1.86 (1.09–3.18)		
					Any household member smoked	1.88 (1.12–3.16)		
					<i>Total household smoked</i>			
					< 20 cigarettes per day	1.81 (1.03–3.19)		
					20–39 cigarettes per day	1.70 (0.97–2.98)		
					>40 cigarettes per day	2.72 (1.39–5.31)		
					<i>Co-worker smoked</i>			
					< 3 hrs/day	1.99 (1.19–3.32)		
					>3 hrs/day	1.76 (1.03–3.02)		
						2.28 (1.32–3.93)		