

Table 2.8 Case–control studies of smokeless tobacco and oesophageal cancer

Reference, study location and period	Organ site (ICD code)	Characteristics of cases	Characteristics of controls	Exposure assessment	Exposure categories	Relative risk (95% CI)*	Adjustment for potential confounders	Comments
Martinez, (1969), Puerto Rico, 1966		179 epidermoid carcinomas of the oesophagus (130 men, 59 women) from a cancer registry. 73% histologically confirmed. Of the combined case group of 400 cases of oral, pharyngeal, and oesophageal cancer, 12% proxy interviews. Response rate not stated.	3 controls per case: 1 from the same hospital or clinic as the case and two who had lived in the same community as the case for at least 10 years. 12 percent proxy interviews	Interview by trained persons	No tobacco habit Ever only chewed tobacco	1.0 [1.94 (0.74–4.80)]	none	In Hamling and Lee meta-analysis, 2009.
Williams & Horm (1977), Williams et al., (1977) USA, 1969–71		Persons with cancer of the oesophagus. From among 7 518 persons (57% of randomly selected) incident invasive cancers who participated in the population-based Third National Cancer Survey; 95% histologically confirmed	Cancer at sites unrelated to tobacco	In-home interview by trained personnel. Proxy interviews permitted and occurred for 45% of interviews	<i>Among men</i> Non-user Moderate use Heavy use	1.0 0.9 $P > = 0.05$ -	Age, race, smoking	No exposed cases among women. In Hamling and Lee meta-analysis, 2009

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Brown et al. (1988), South Carolina, USA, 1982–84 (cancer cases) 1977–81 (cancer cases)		207 from selected hospitals in South Carolina; deaths in 8 coastal counties; 74 incident male oesophageal cancer cases (85% squamous-cell carcinoma), 143 male oesophageal cancer deaths, aged ≤ 79 years; response rate, 85% (incident cases), 94% (deceased cases and controls);% histologically confirmed not stated	422; 157 hospital patients matched on hospital, race, age ± 5 years; 285 deaths, matched on race, age, county of residence, year of death; controls with diagnosis at admission or cause of death related to alcoholic beverages or diet excluded; response rate, 95% (hospital controls)	Incident series interviewed in hospital; next-of-kin were interviewed at home for mortality series	Non-user of tobacco Smokeless tobacco only	1.0 1.2 (0.1–13.3)	Study series (incidence or mortality) and alcoholic beverages	Use defined as at least one pouch or plug of chewing tobacco or a small can of snuff per week for > = 1 year; In Boffetta meta-analysis, 2008. In Hamling and Lee meta-analysis, 2009
Lewin et al. (1998), Stockholm and southern Sweden, 1988–91		123 SCC of the oesophagus from hospitals and cancer registries in Stockholm county or southern health district, 40–79 years old; overall response rate, 90%; 100% histologically confirmed	756 from the population registry; stratified by region and age; response rate, 85%	Trained nurses administered the questionnaires. Most cases interviewed in hospital about 1 month after diagnosis. Location of interviews of controls not stated.	Never snuff use Ever snuff use Current snuff use Former snuff use > 50 g/week	1.0 1.2 (0.7–2.2) 1.1 (0.5–2.4) 1.3 (0.6–3.1) 1.9 (0.8–3.9)	Age, region, smoking, alcoholic beverages	Men only; In Boffetta meta-analysis, 2008. In Hamling and Lee meta-analysis, 2009

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Lagergren et al., (2000), Sweden, 1995–97		618 men < 80 years of age with incident oesophageal cancer identified through a rapid ascertainment method to identify all cases in Sweden from 1995–1997. 189 cases had adenocarcinomas of the oesophagus, 87% interview response rate; 262 had gastric cardia cancers, 85%; 167 squamous-cell cancers of the oesophagus, 72%; < 80 years old; 100% histologically confirmed	820 men from population of Sweden frequency matched to age and sex distribution of adenocarcinoma of the oesophagus cases; response rate, 73%	Face-to-face interviews shortly after cases' diagnoses. No proxies permitted.	<p>Never use of snuff Ever use of snuff</p> <p><i>Duration of use in years</i> 1–10 11–25 > 25 years of use</p> <p><i>Number of quids used per week</i> 1–14 15–35 > 35</p> <p>Never use of snuff Ever use of snuff</p> <p><i>Duration of use in years</i> 1–10 11–25 > 25 years of use</p> <p><i>Number of quids used per week</i> 1–14 15–35 > 35</p>	<p><i>Oesophagus (squamous cell carcinoma)</i> 1.0 1.4 (0.9–2.3)</p> <p>1.2 (0.5–2.5) 0.9 (0.4–2.1) 2.0 (0.9–4.1) p trend = 0.18</p> <p>1.2 (0.5–2.5) 2.1 (1.0–4.4) 1.0 (0.4–2.4) p trend = 0.27</p> <p><i>Oesophagus (adenocarcinoma)</i> 1.0 1.2 (0.7–2.0)</p> <p>0.9 (0.4–2.2) 0.8 (0.3–1.8) 1.9 (0.9–4.0) p trend = 0.31</p> <p>1.0 (0.4–2.3) 2.0 (1.0–4.3) 0.8 (0.3–2.0) p trend = 0.53</p>	Age, sex, tobacco smoking, alcoholic beverages, educational level, body mass index, reflux symptoms, intake of fruit and vegetables, energy intake, and physical activity	In Boffetta meta-analysis, 2008. In Hamling and Lee meta-analysis, 2009

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Asia Phukan et al. (2001), India, 1997–1998		502 (358 men, 144 women) histologically confirmed cancers of the oesophagus (predominantly squamous-cell cancer) from one hospital; response rate, 94%	Two visitors matched for age, sex	Interviewed at the hospital by project staff. Cases were interviewed before referral to the medical consultant.	<i>Men</i>	1.0	Alcoholic beverage drinking	*Dried tobacco chewed alone
					Non-chewer/nonsmoker	3.2 (1.6–9.5)		
					<i>Women</i>	1.0	Smoking	
					Non-chewer/nonsmoker	6.2 (2.4–12.1)		
					<i>Men</i>	1.0		
					Non-chewer/non-alcoholic beverage drinker	3.8 (1.9–8.5)		
					<i>Women</i>	1.0		
					Non-chewer/non-alcoholic beverage drinker	5.8 (2.1–12.4)		

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Nasrollahzadeh et al. (2008), northern Islamic Republic of Iran, 2003–2007		300 (150 men, 150 women) histologically confirmed cases of oesophageal squamous cell carcinoma from the only specialized clinic covering esophageal cancers; response rate, 100%	571 population-based controls (278 men, 293 women) individually matched for neighbourhood of residence, age, and sex. No proxy was used.	Interviewed at the clinic by project staff. Cases were interviewed at the same day as they underwent diagnostic upper gastrointestinal endoscopy.	<i>Tobacco type used</i> Never used Cigarettes only Hookah only Nass only More than one type <i>Nass chewing</i> Never Ever <i>Average intensity</i> Never used ≤ median (5.5 times/day) ≥ median <i>Duration</i> Never used ≤ median (26.5 yr) ≥ median <i>Cumulative use</i> Never used ≤ median (150 nass-years) ≥ median <i>Age started</i> Never used > median ≤ median (40 yr)	1 1.50 (0.92–2.43) 1.69 (0.76–3.77) 2.91 (1.46–5.77) 2.11 (1.15–3.86) 1 1.99 (1.21–3.28) 1 1.50 (0.73–3.09) 2.42 (1.31–4.47) p trend = 0.004 1 2.24 (1.21–4.16) 1.69 (0.83–3.44) p trend = 0.02 1 1.81 (0.97–3.40) 2.21 (1.15–4.27) p trend = 0.007 1 1.91 (0.98–3.75) 2.06 (1.09–3.89) p trend = 0.01	Categories were mutually exclusive. Matched results were adjusted for education, ethnicity, and total intake of fruit and vegetables. Matched results were adjusted for education and ethnicity	Only 2% of cases and 2% of controls were ever alcohol drinker. There was no significant association between alcohol use and risk of oesophageal cancer.