

**Web Table 1.** Characteristics of US Studies with Information on Snuff Use and Chewing Tobacco in the International Head and Neck Cancer Epidemiology (INHANCE) Consortium, 1981–2006

Study Location (Reference No.) <sup>a</sup>	Recruitment Period	Age Eligibility	Case Source	Case Participation Rate, %	Control Source	Control Participation Rate, %	Matched Factors	Definition of Snuff Use and Chewing Tobacco Use
Seattle (1, 2)	1985–1995	18–65	Cancer registry	54.4,63.3 <sup>a</sup>	Random digit dialing	63.0,60.9 <sup>b</sup>	Age, sex	Six months or longer
Iowa (3)	1993–2006	>18	Hospital	87	Hospital – unhealthy	92	Age, sex	One can/pouch a week for at least a year
Los Angeles (4)	1999–2004	18–65	Cancer registry	49	Neighborhood	68	Age, sex, neighborhood	Six months or longer
Houston (5)	2001–2006	≥18	Hospital	95	Hospital visitors	>80	Age, sex, ethnicity	Ever use
Boston (6)	1999–2003	≥18	Hospital	88.7	Residential records	48.7	Age, sex, neighborhood	Ever use
Baltimore (7)	2000–2005	NA	Hospital	100	Hospital – benign conditions	70	age, sex, HPV status	Daily for longer than one year
North Carolina (8)	1996–1997	>17	Hospital	88	Hospital – unhealthy	86	Age, sex	Six months or longer
North Carolina (9)	2002–2006	20–80	Cancer registry	82	DMV files	61	Age, sex, ethnicity	20 times or more entire life
New York MSKCC (10)	1992–1994	NA	Hospital	—	Blood donors	—	Age, sex	Ever use
New York multicenter (11)	1981–1990	21–80	Hospital	91	Hospital – unhealthy	97	Age, sex, hospital, year of interview	Once a week for at least a year
US multicenter (12)	1983–1984	18–79	Cancer registry	75	Random digit dialing and health care rosters	76	Age, sex, ethnicity	Six months or longer

MSKCC, Memorial-Sloan Kettering Cancer Center; DMV, Department of Motor Vehicles.

<sup>a</sup>Publications referenced are representative of the study and do not necessarily report estimates for smokeless tobacco.

<sup>b</sup>Two response rates are reported because data were collected at two time points: 1985 to 1989 among men and 1990 to 1995 among men and women.

**Web Table 2.** Odds Ratios for Snuff Use and Head and Neck Cancer Among Ever Cigarette Smokers Stratified by Former and Current Cigarette Smoking in the International Head and Neck Cancer Epidemiology (INHANCE) Consortium, US Studies, 1981–2006

Snuff Use <sup>a</sup>	Former Cigarette Smokers				Current Cigarette Smokers			
	Cases	Controls	OR <sup>c</sup>	95% CI	Cases	Controls	OR <sup>c</sup>	95% CI
Never <sup>b</sup>	1485	2715	1.00	Referent	3423	1730	1.00	Referent
Ever	75	116	0.85	0.60, 1.21	92	48	0.86	0.57, 1.31
Missing	0	1			3	0		
<b>Frequency (per day)<sup>d</sup></b>								
Never	1161	1986	1.00	Referent	2411	1195	1.00	Referent
>0 to ≤2	39	74	0.72	0.44, 1.18	56	30	0.70	0.40, 1.23
>2	26	31	0.78	0.40, 1.51	12	6	0.81	0.25, 2.62
Missing	3	2			12	2		
<b>Duration (years)</b>								
Never	1485	2715	1.00	Referent	3423	1730	1.00	Referent
>0 to ≤20	61	97	0.85	0.58, 1.26	73	43	0.77	0.49, 1.21
>20	13	17	0.86	0.36, 2.03	18	5	1.45	0.46, 4.55
Missing	1	3			4	0		

CI, confidence interval; OR, odds ratio.

<sup>a</sup>Boston study excluded from analyses of snuff use since information on snuff use not available.

<sup>b</sup>Never defined as never using snuff. Ever defined as ever using snuff.

<sup>c</sup>Odds ratios adjusted for sex, age (years), race (white, black, Hispanic, Asian and Pacific Islander, and other races/ethnicities), education (junior high school or less, some high school, high school graduate, technical school or some college, and college graduate or more), frequency of alcohol use (ml/day truncated at the 95<sup>th</sup> percentile among alcohol drinkers to account for extreme values), duration of cigar smoking (years), duration of pipe smoking (years), and duration of cigarette smoking (years).

<sup>d</sup>New York multicenter and Seattle studies excluded from analyses of snuff use frequency since information on frequency was not available or not easily standardized with other studies.

**Web Table 3.** Odds Ratios for Tobacco Chewing and Head and Neck Cancer Stratified by Cigarette Smoking in the International Head and Neck Cancer Epidemiology (INHANCE) Consortium, US Studies, 1981–2006

Tobacco Chewing	Former Cigarette Smokers				Current Cigarette Smokers			
	Cases	Controls	OR <sup>b</sup>	95% CI	Cases	Controls	OR <sup>b</sup>	95% CI
Never <sup>a</sup>	1610	2914	1.00	Referent	3499	1789	1.00	Referent
Ever	158	229	0.97	0.75, 1.26	223	92	1.00	0.74, 1.35
Missing	1	1			2	0		
<b>Frequency (per day)<sup>c</sup></b>								
Never	1290	2204	1.00	Referent	2507	1266	1.00	Referent
>0 to ≤2	110	165	0.92	0.67, 1.27	162	61	0.94	0.64, 1.37
>2	28	27	1	0.52, 1.93	15	6	0.33	0.34, 3.28
Missing	10	9			13	3		
<b>Duration (years)</b>								
Never	1610	2914	1.00	Referent	3499	1789	1.00	Referent
>0 to ≤20	97	160	0.88	0.65, 1.20	174	66	1.09	0.78, 1.54
>20	37	50	1.07	0.64, 1.79	36	17	0.71	0.35, 1.42
Missing	25	20			15	9		

CI, confidence interval; OR, odds ratio.

<sup>a</sup>Never defined as never chewing tobacco. Ever defined as ever chewing tobacco.

<sup>b</sup>Odds ratios among never cigarette smokers adjusted for sex, age (years), race (white, black, Hispanic, Asian and Pacific Islander, and other races/ethnicities), education (junior high school or less, some high school, high school graduate, technical school or some college, and college graduate or more), frequency of alcohol use (ml/day truncated at the 95<sup>th</sup> percentile among alcohol drinkers to account for extreme values), duration of cigar smoking (years), duration of pipe smoking (years), and duration of cigarette smoking (years).

<sup>c</sup>New York multicenter and Seattle studies excluded from analyses of chewing tobacco frequency since information on frequency was not available or not easily standardized with other studies.

**Web Table 4.** Odds Ratios for Tobacco Chewing or Snuff Use and Head and Neck Cancer Among Never Cigarette Smoking Omitting One Study/Center at a Time, International Head and Neck Cancer Epidemiology (INHANCE) Consortium, US Studies, 1981–2006

Study/Center Omitted <sup>a</sup>	Tobacco Chewing <sup>b</sup>		Snuff Use <sup>c</sup>	
	OR <sup>d</sup>	95% CI	OR <sup>d</sup>	95% CI
New York multicenter	1.14	0.76, 1.73	1.60	1.00, 2.57
Seattle (1985–1989)	1.21	0.81, 1.80	1.74	1.09, 2.78
Seattle (1990–1995)	1.20	0.81, 1.77	1.75	1.11, 2.78
Iowa	1.23	0.82, 1.86	2.05	1.27, 3.32
North Carolina (1994–1997)	1.17	0.78, 1.74	1.54	0.95, 2.48
Los Angeles	1.28	0.86, 1.90	1.84	1.15, 2.95
Houston	1.19	0.77, 1.85	1.77	1.03, 3.04
Boston	1.16	0.78, 1.73	--	--
US multicenter — Atlanta	1.25	0.84, 1.86	1.72	1.07, 2.77
US multicenter — Los Angeles	1.22	0.82, 1.82	1.69	1.06, 2.69
US multicenter — New Jersey	1.18	0.80, 1.76	1.64	1.03, 2.62
US multicenter — San Francisco	1.22	0.82, 1.81	1.72	1.09, 2.74
New York (MSKCC)	1.13	0.76, 1.68	1.72	1.09, 2.73
North Carolina (2002–2006)	1.18	0.75, 1.86	1.63	0.94, 2.81
Baltimore	1.22	0.82, 1.81	1.72	1.08, 2.72

<sup>a</sup>Estimates from models which include all studies except study specified.

<sup>b</sup>Odds ratios for ever users compared to never users where never user defined as never chewing tobacco and ever user defined as ever chewing tobacco.

<sup>c</sup>Odds ratios for ever users compared to never users where never user defined as never using snuff and ever user defined as ever using snuff.

<sup>d</sup>Odds ratios among never cigarette smokers adjusted for sex, age (years), race (white, black, Hispanic, Asian and Pacific Islander, and other races/ethnicities), education (junior high school or less, some high school, high school graduate, technical school or some college, and college graduate or more), frequency of alcohol use (ml/day truncated at the 95<sup>th</sup> percentile among alcohol drinkers to account for extreme values), duration of cigar smoking (years), and duration of pipe smoking (years).

**Web Table 5.** Odds Ratios for Snuff Use and Head and Neck Cancer Stratified by Cigarette Smoking in the International Head and Neck Cancer Epidemiology (INHANCE) Consortium, US Studies, Sensitivity Analysis Across Various Adjustment Sets, 1981–2006

Snuff Use <sup>a</sup>	Never Cigarette Smokers				Ever Cigarette Smokers			
	Reduced Adj <sup>c</sup>		Full Adj <sup>d</sup>		Reduced Adj <sup>c</sup>		Full Adj <sup>d</sup>	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Never <sup>b</sup>	1.00	Referent	1.00	Referent	1.00	Referent	1.00	Referent
Ever	1.69 <sup>f</sup>	1.07, 2.66	1.70	1.05, 2.74	0.79 <sup>f</sup>	0.61, 1.04	0.86	0.65, 1.13
<b>Frequency (per day)<sup>e</sup></b>								
Never	1.00	Referent	1.00	Referent	1.00	Referent	1.00	Referent
>0 to ≤2	1.47	0.83, 2.63	1.52	0.82, 2.82	0.64	0.45, 0.93	0.73	0.49, 1.06
>2	1.34	0.46, 3.90	1.41	0.49, 4.10	0.74	0.42, 1.33	0.76	0.43, 1.36
<b>Duration (years)</b>								
Never	1.00	Referent	1.00	Referent	1.00	Referent	1.00	Referent
>0 to ≤20	1.53	0.79, 2.96	1.51	0.77, 2.94	0.77	0.57, 1.03	0.82	0.61, 1.11
>20	1.70	0.90, 3.19	1.73	0.88, 3.39	0.99	0.50, 1.95	1.17	0.58, 2.37

CI, confidence interval; OR, odds ratio.

<sup>a</sup>Boston study excluded from analyses of snuff use since information on snuff use not available.

<sup>b</sup>Never defined as never using snuff. Ever defined as ever using snuff.

<sup>c</sup>Odds ratios adjusted for sex, age (years), race (white, black, Hispanic, Asian and Pacific Islander, and other races/ethnicities), education (junior high school or less, some high school, high school graduate, technical school or some college, and college graduate or more), and frequency of alcohol use (ml/day truncated at the 95<sup>th</sup> percentile among alcohol drinkers to account for extreme values). Odds ratios among ever cigarette smokers adjusted for same variables plus duration of cigarette smoking (years).

<sup>d</sup>Odds ratios adjusted for sex, age (years), race (white, black, Hispanic, Asian and Pacific Islander, and other races/ethnicities), education (junior high school or less, some high school, high school graduate, technical school or some college, and college graduate or more), frequency of alcohol use (ml/day truncated at the 95<sup>th</sup> percentile among alcohol drinkers to account for extreme values), duration of cigar smoking use (years), duration of pipe smoking (years), and duration of tobacco chewing (years). Odds ratios among ever cigarette smokers adjusted for same variables plus duration of cigarette smoking (years). 82 individuals drop from analyses for missing data on duration of chewing tobacco.

<sup>e</sup>New York multicenter and Seattle studies excluded from analyses of snuff use frequency since information on frequency was not available or not easily standardized with other studies.

<sup>f</sup>Although ORs were not adjusted duration of cigar smoking or duration of pipe smoking, individuals with missing data for these variables were excluded to compare estimates from sensitivity analysis to estimates from main analysis. If such individuals were included, then the OR (95% CI) for ever snuff use would be 1.72 (1.09, 2.69) among never cigarette smokers and 0.81 (0.62, 1.05) among ever cigarette smokers.

**Web Table 6.** Odds Ratios for Tobacco Chewing and Head and Neck Cancer Stratified by Cigarette Smoking in the International Head and Neck Cancer Epidemiology (INHANCE) Consortium, US Studies, Sensitivity Analysis Across Various Adjustment Sets, 1981–2006

Tobacco Chewing	Never Cigarette Smokers				Ever Cigarette Smokers			
	Reduced Adj <sup>b</sup>		Full Adj <sup>c</sup>		Reduced Adj <sup>b</sup>		Full Adj <sup>c</sup>	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Never <sup>a</sup>	1.00	Referent	1.00	Referent	1.00	Referent	1.00	Referent
Ever	1.38 <sup>e</sup>	0.94, 2.01	1.00	0.66, 1.52	0.93 <sup>e</sup>	0.76, 1.12	0.98	0.80, 1.20
<b>Frequency (per day)<sup>d</sup></b>								
Never	1.00	Referent	1.00	Referent	1.00	Referent	1.00	Referent
>0 to ≤2	1.17	0.71, 1.91	0.82	0.47, 1.43	0.85	0.67, 1.07	0.90	0.70, 1.16
>2	1.55	0.61, 3.93	1.43	0.55, 3.70	0.96	0.54, 1.70	1.04	0.58, 1.89
<b>Duration (years)</b>								
Never	1.00	Referent	1.00	Referent	1.00	Referent	1.00	Referent
>0 to ≤20	1.39	0.82, 2.37	1.05	0.59, 1.85	0.94	0.75, 1.17	0.98	0.77, 1.23
>20	1.31	0.73, 2.34	0.83	0.44, 1.58	0.82	0.54, 1.24	0.88	0.57, 1.37

CI, confidence interval; OR, odds ratio.

<sup>a</sup>Never defined as never chewing tobacco. Ever defined as ever chewing tobacco.

<sup>b</sup>Odds ratios adjusted for sex, age (years), race (white, black, Hispanic, Asian and Pacific Islander, and other races/ethnicities), education (junior high school or less, some high school, high school graduate, technical school or some college, and college graduate or more), and frequency of alcohol use (ml/day truncated at the 95<sup>th</sup> percentile among alcohol drinkers to account for extreme values). Odds ratios among ever cigarette smokers adjusted for same variables plus duration of cigarette smoking (years).

<sup>c</sup>Odds ratios adjusted for sex, age (years), race (white, black, Hispanic, Asian and Pacific Islander, and other races/ethnicities), education (junior high school or less, some high school, high school graduate, technical school or some college, and college graduate or more), frequency of alcohol use (ml/day truncated at the 95<sup>th</sup> percentile among alcohol drinkers to account for extreme values), duration of cigar smoking use (years), duration of pipe smoking (years), and duration of snuff use (years). Odds ratios among ever cigarette smokers adjusted for same variables plus duration of cigarette smoking (years). . 11 individuals drop from analyses for missing data on duration of snuff use.

<sup>d</sup>New York multicenter and Seattle studies excluded from analyses of chewing tobacco frequency since information on frequency was not available or not easily standardized with other studies.

<sup>e</sup>Although ORs were not adjusted duration of cigar smoking or duration of pipe smoking, individuals with missing data for these variables were excluded to compare estimates from sensitivity analysis to estimates from main analysis. If such individuals were included, then the OR (95% CI) for ever tobacco chewing would be 1.44 (0.99, 2.09) among never cigarette smokers and 0.93 (0.77, 1.12) among ever cigarette smokers.

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