

## Supplemental Online Content

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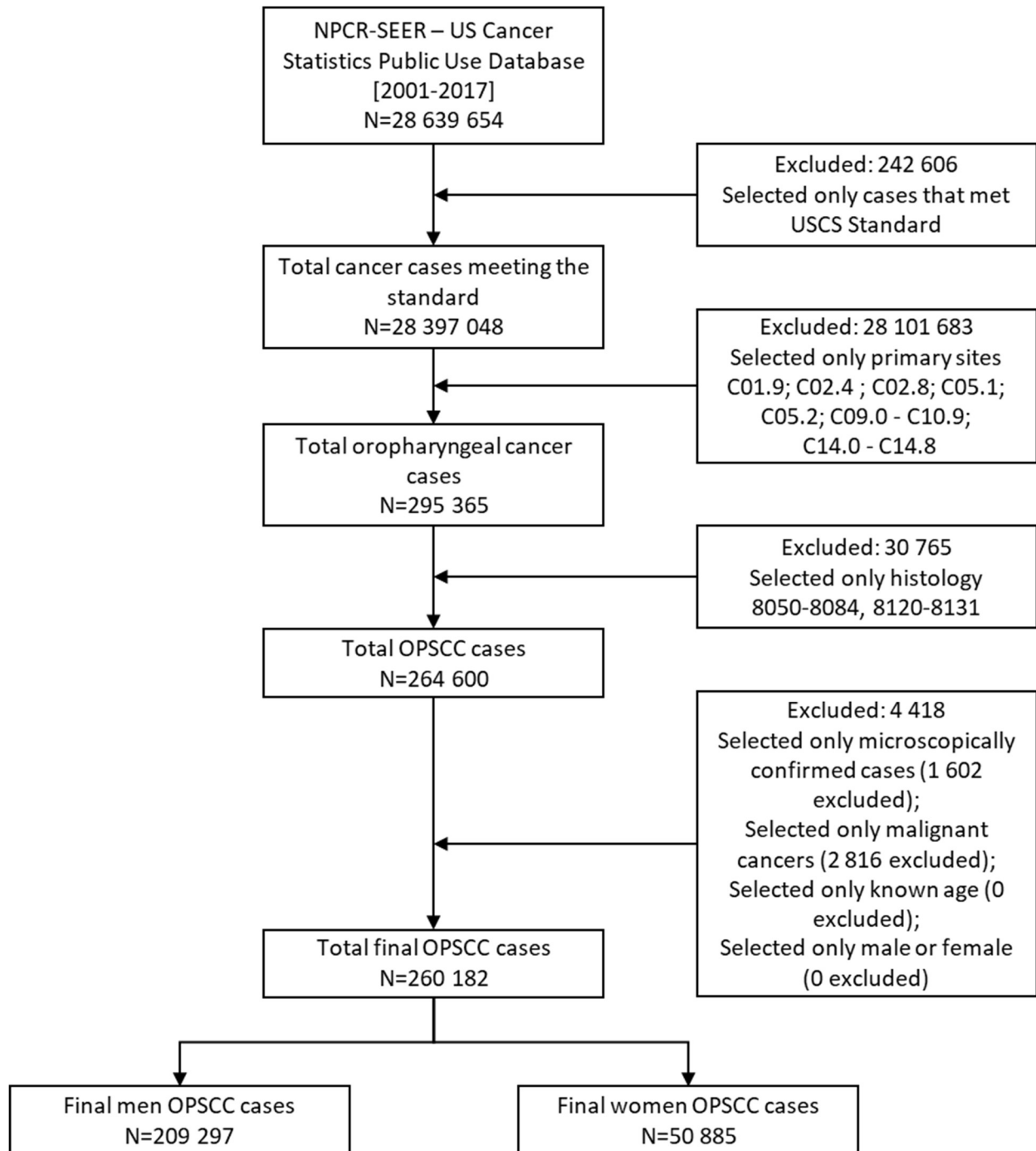
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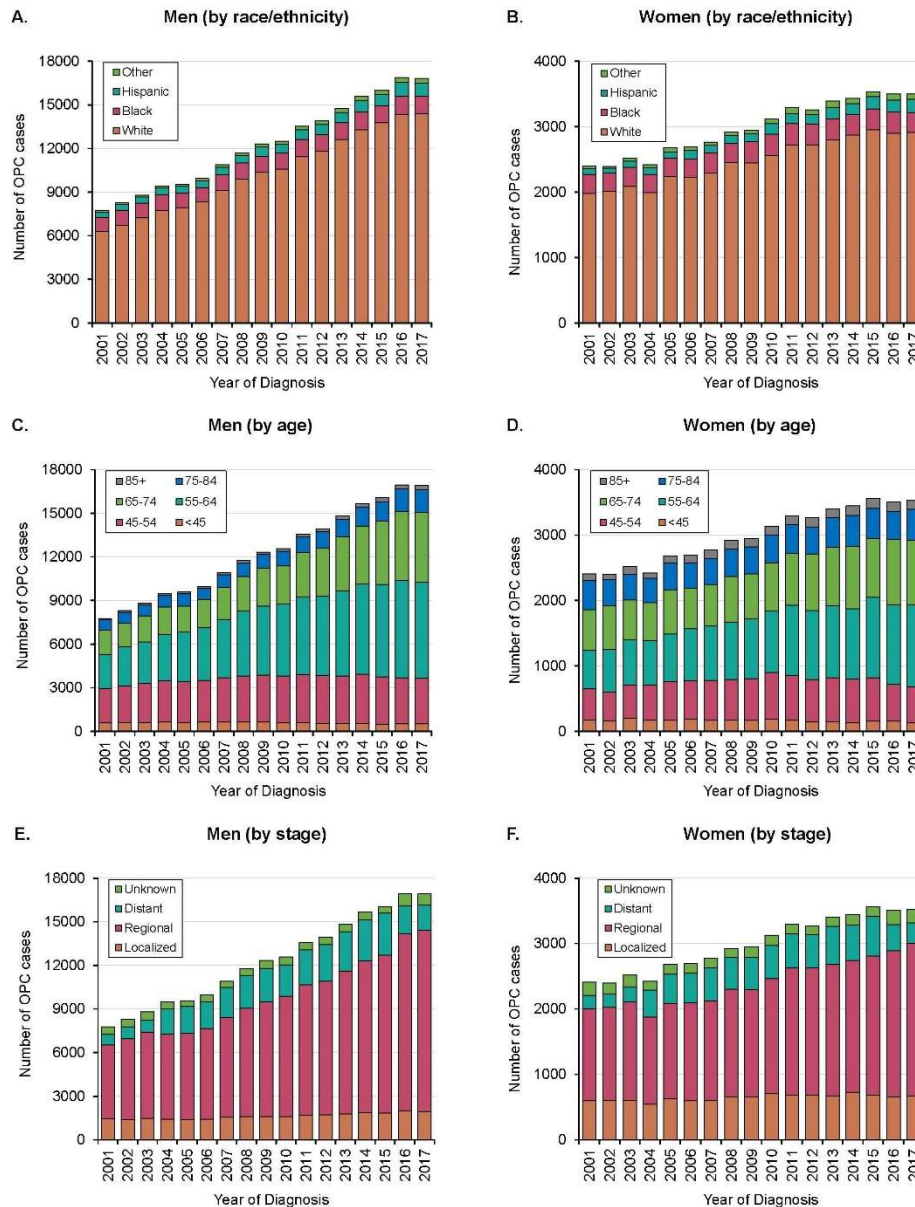
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This supplemental material has been provided by the authors to give readers additional information about their work.

**eFigure 1.** Diagram depicting the sample flow of the study population

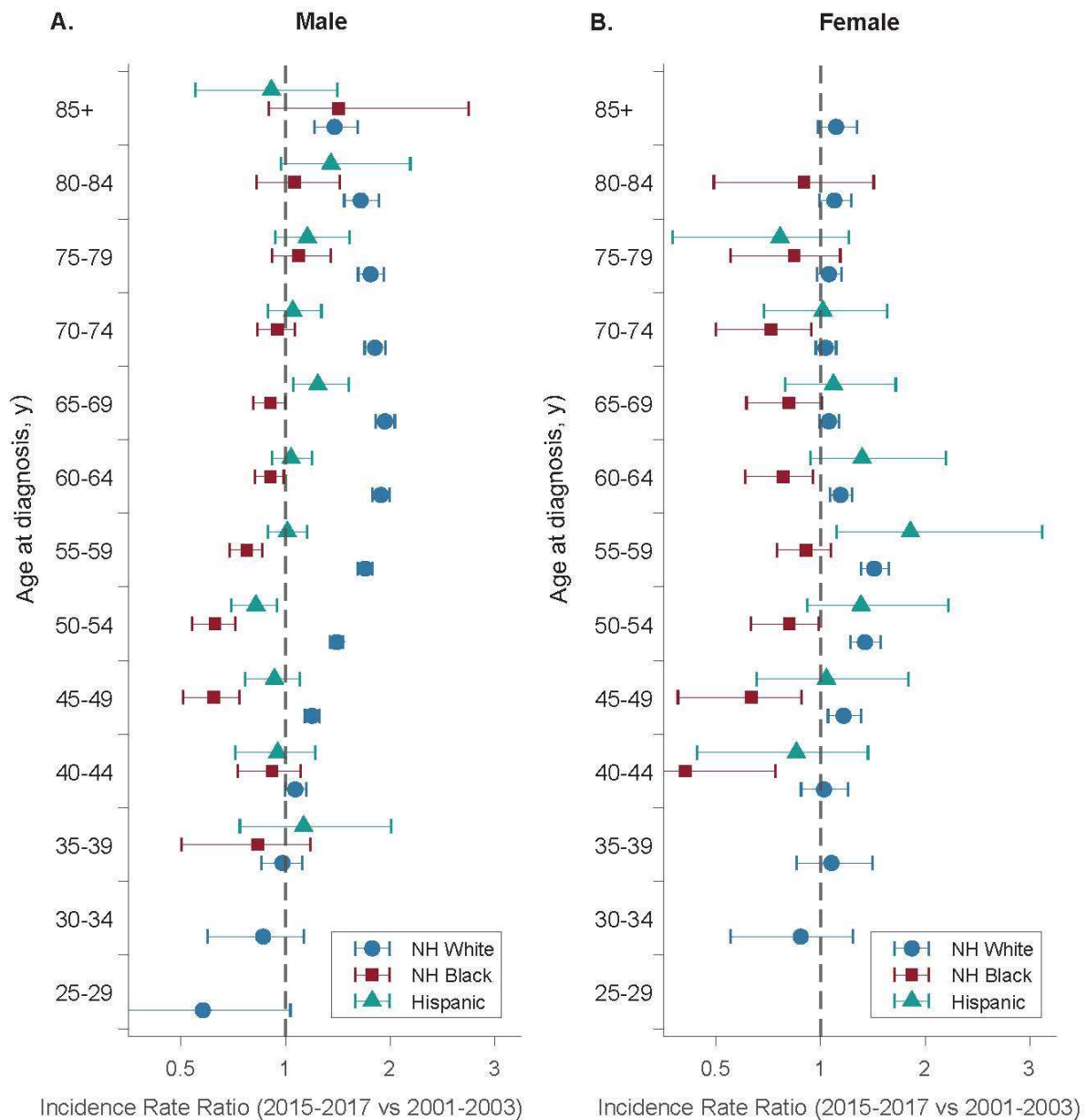


**eFigure 2.** Burden (annual number of cases) of oropharyngeal cancer according to race/ethnicity, age, and stage at diagnosis among men and women: NPCR and SEER (2001-2017)



Vertical bars represent the burden (annual number of cases). Panels **A** and **B** show burden according to race/ethnicity in men and women, respectively. Panels **C** and **D** show burden according to age at diagnosis in men and women, respectively. Panels **E** and **F** show burden according to the stage at diagnosis in men and women, respectively. Abbreviations: NPCR, National Program of Cancer Registries; SEER, Surveillance Epidemiology, and End Results program

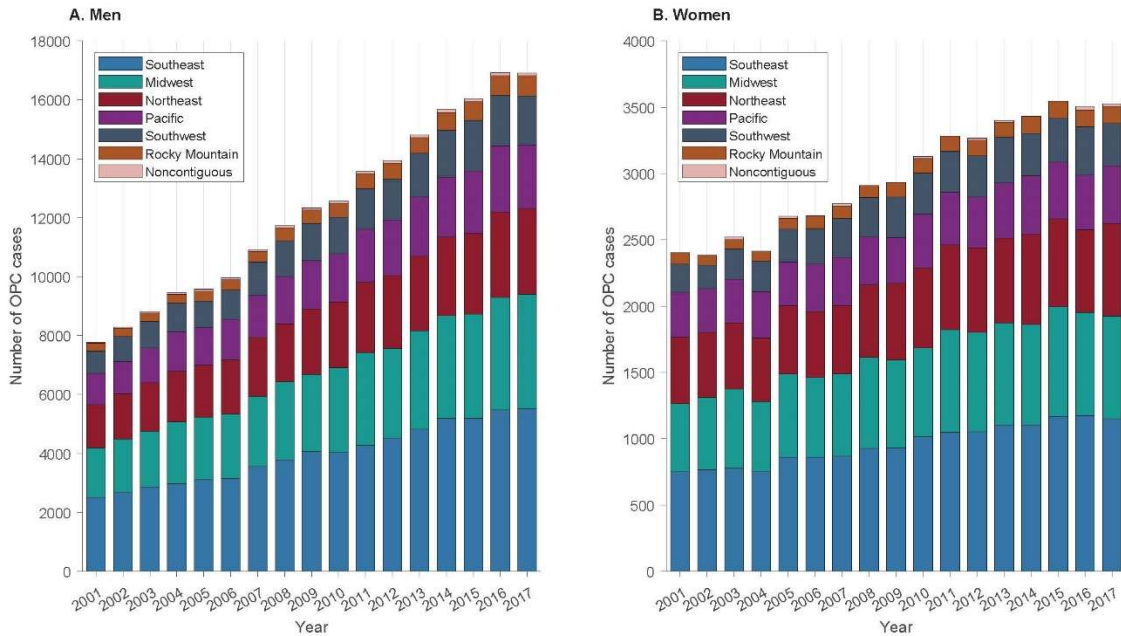
**eFigure 3.** Rate Ratios for oropharyngeal cancer among men and women, comparing incidence rates in 2015-2017 versus 2001-2003, among major race/ethnic groups: NPCR and SEER (2001-2017). Also See Supplement Tables S7 and S8.



**Panel A** illustrates rate ratios comparing incidence rates in 2015-2017 versus that in 2001-2003 among White men, Black men, and Hispanic men. **Panel B** illustrates rate ratios comparing incidence rates in 2015-2017 versus that in 2001-2003 among White women, Black women, and Hispanic women.

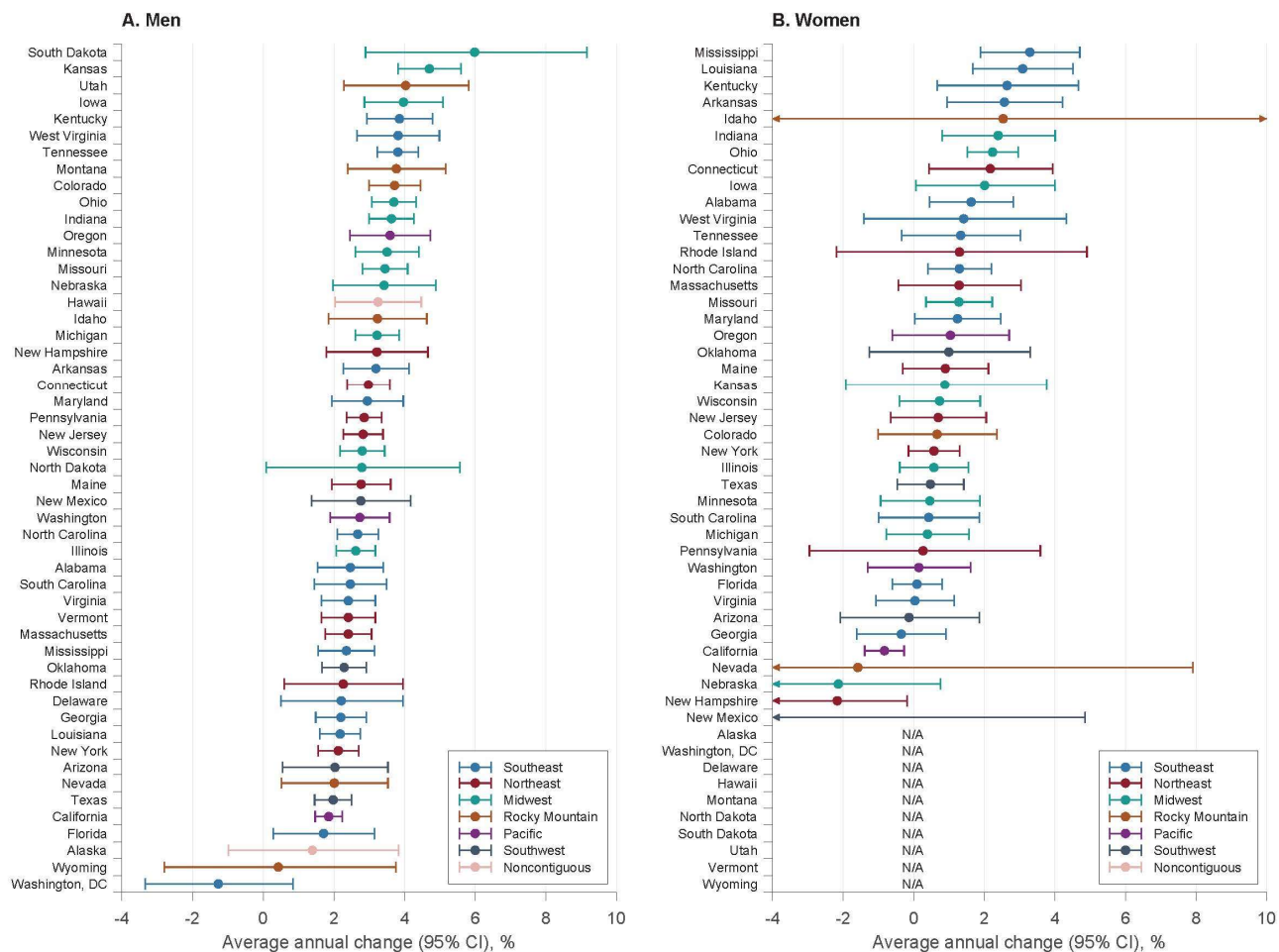
Abbreviations: NPCR, National Program of Cancer Registries; SEER, Surveillance Epidemiology, and End Results program

**eFigure 4.** Annual number of oropharyngeal cancer cases diagnosed among men and women according to geographic regions



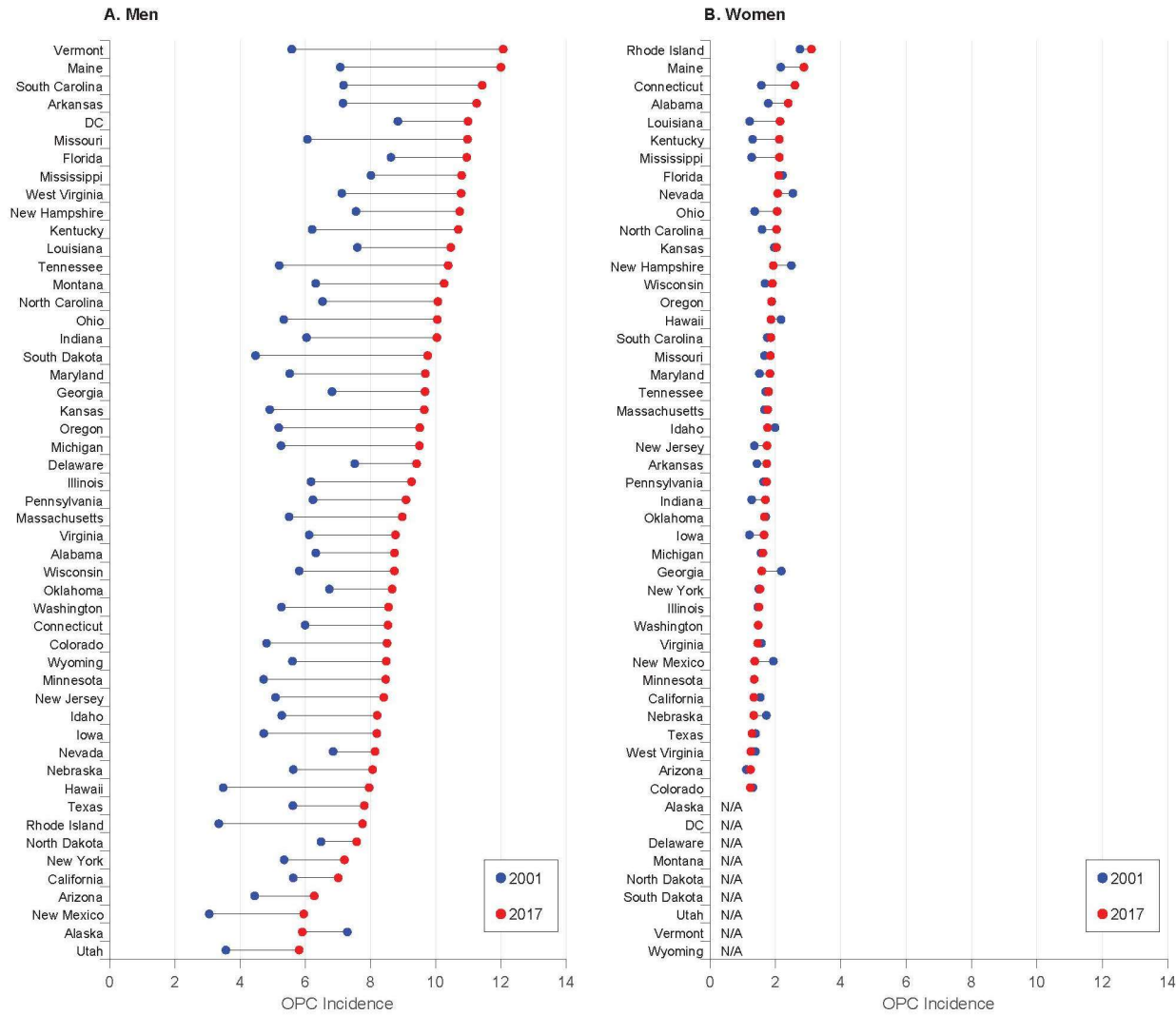
**Panels A and B** illustrate oropharyngeal cancer burden among men and women, respectively, according to seven geographic regions—Northeast, Southeast, Midwest, Rocky Mountain, Pacific, Southwest, and non-contiguous.

**eFigure 5.** Average annual percentage change in oropharyngeal cancer incidence among men and women by US state and Washington, District of Columbia: NPCR and SEER (2001-2017)



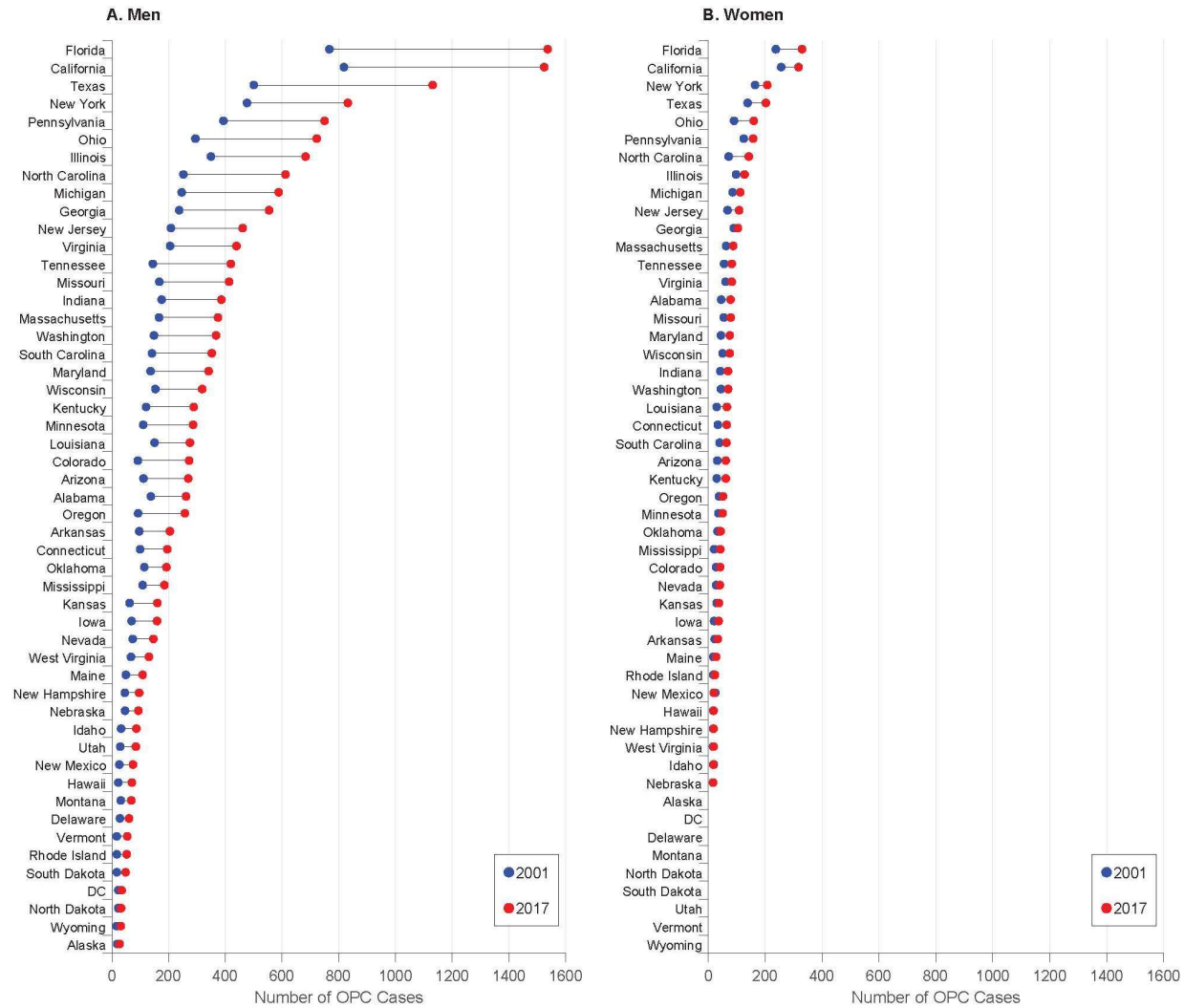
**Panels A and B** illustrate the average annual percentage change from 2001 to 2017 among men and women, respectively, by US states stratified according to seven geographic regions—Northeast, Southeast, Midwest, Rocky Mountain, Pacific, Southwest, and non-contiguous.

**eFigure 6.** Oropharyngeal cancer incidence among men and women in 2001 and 2017 by US state and Washington, District of Columbia: NPCR and SEER (2001-2017)





**eFigure 7.** Oropharyngeal cancer burden among men and women in 2001 and 2017 by US state and Washington, District of Columbia: NPCR and SEER (2001-2017)



**eTable 1.** Overall oropharyngeal cancer incidence among men and women by race/ethnicity, age at diagnosis, SEER summary stage at diagnosis, US region, and tumor size during 2001-2017 in the United States

Characteristics	Men		Women	
	Cases No. (%)	Rate <sup>a</sup> (95% CI)	Cases No. (%)	Rate <sup>a</sup> (95% CI)
<b>NPCR-SEER Database</b>				
Overall	209,297 (100)	7.64 (7.60 – 7.67)	50,885 (100)	1.67 (1.66 – 1.68)
Race/ethnicity				
NH White	175,814 (84.0)	8.47 (8.43 – 8.51)	42,142 (82.8)	1.85 (1.83 – 1.87)
NH Black	18,720 (8.9)	7.19 (7.08 – 7.30)	5,182 (10.2)	1.58 (1.54 – 1.62)
Hispanic	10,318 (4.9)	4.30 (4.21 – 4.39)	2,303 (4.5)	0.84 (0.80 – 0.87)
Other <sup>b</sup>	4,445 (2.1)	3.36 (3.26 – 3.46)	1,258 (2.5)	0.81 (0.77 – 0.86)
Age at diagnosis, y				
<45	10,019 (4.8)	0.70 (0.68 – 0.71)	2,817 (5.5)	0.19 (0.19 – 0.20)
45-54	51,456 (24.6)	14.24 (14.12 – 14.37)	10,118 (19.9)	2.71 (2.66 – 2.76)
55-64	78,761 (37.6)	27.88 (27.69 – 28.08)	15,703 (30.9)	5.17 (5.09 – 5.25)
65-74	48,442 (23.1)	27.61 (27.37 – 27.86)	12,925 (25.4)	6.43 (6.32 – 6.54)
75-84	17,542 (8.4)	18.78 (18.51 – 19.06)	7,204 (14.2)	5.57 (5.44 – 5.70)
85+	3,077 (1.5)	10.44 (10.08 – 10.82)	2,118 (4.2)	3.47 (3.32 – 3.62)
Stage at diagnosis				
Localized	27,621 (13.2)	1.03 (1.02 – 1.04)	10,949 (21.5)	0.36 (0.35 – 0.37)
Regional	138,911 (66.4)	5.04 (5.01 – 5.06)	29,763 (58.5)	0.98 (0.97 – 0.99)
Distant	33,699 (16.1)	1.23 (1.21 – 1.24)	7,415 (14.6)	0.24 (0.24 – 0.25)
Unknown	9,066 (4.3)	0.34 (0.33 – 0.35)	2,758 (5.4)	0.09 (0.09 – 0.09)
US regions <sup>c</sup>				
Southeast	67,689 (32.3)	8.91 (8.84 – 8.98)	16,299 (32)	1.91 (1.88 – 1.94)
Southwest	21,186 (10.1)	6.92 (6.82 – 7.01)	4,867 (9.6)	1.46 (1.42 – 1.5)
Northeast	36,970 (17.7)	7.16 (7.09 – 7.23)	9,806 (19.3)	1.66 (1.62 – 1.69)
Midwest	46,588 (22.3)	7.56 (7.49 – 7.63)	11,492 (22.6)	1.69 (1.66 – 1.72)
Rocky Mountain	7,737 (3.7)	6.65 (6.5 – 6.8)	1,737 (3.4)	1.44 (1.38 – 1.51)
Pacific	27,874 (13.3)	6.89 (6.81 – 6.97)	6,427 (12.6)	1.45 (1.41 – 1.48)
Non-contiguous	1,253 (0.6)	6.53 (6.17 – 6.91)	257 (0.5)	1.31 (1.15 – 1.48)
<b>SEER-18 Database</b>				
Overall	49,764 (100)	6.92 (6.86 – 6.98)	12,012 (100)	1.50 (1.47 – 1.52)
Tumor size				
≤1	2,626 (5.3)	0.36 (0.35 – 0.38)	825 (6.9)	0.10 (0.10 – 0.11)
>1 to ≤2	7,438 (14.9)	1.03 (1.00 – 1.05)	2,029 (16.9)	0.25 (0.24 – 0.27)
>2 to ≤4	17,685 (35.5)	2.46 (2.42 – 2.50)	3,957 (32.9)	0.49 (0.48 – 0.51)
>4	7,753 (15.6)	1.08 (1.06 – 1.11)	1,503 (12.5)	0.19 (0.18 – 0.20)
Unknown	13,697 (27.5)	1.91 (1.88 – 1.94)	3,548 (29.5)	0.44 (0.43 – 0.46)

Abbreviations: NPCR, National Program of Cancer Registries; SEER, Surveillance Epidemiology, and End Results program

<sup>a</sup> Rates were calculated as number of cases per 100 000 person-year and age-adjusted to the 2000 US standard population.

<sup>b</sup> Others include Asian/Pacific Islander, American Indian/Alaskan Native, and other.

<sup>c</sup> Southeast: Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, West Virginia; Southwest: Arizona, New Mexico, Oklahoma, Texas; Northeast: Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont; Midwest: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin; Rocky Mountain: Colorado, Idaho, Montana, Nevada, Utah, Wyoming; Pacific: California, Oregon, Washington; Non-contiguous: Alaska, Hawaii

**eTable 2.** Overall and Sex, Race and SEER Summary Stage specific Oropharyngeal Squamous cell carcinoma Incidence Rates<sup>a</sup> During 2001-2017 in the United States

Year of diagnosis	Overall		Sex				Race/Ethnicity								SEER Summary Stage							
			Male		Female		Non-Hispanic White		Non-Hispanic Black		Hispanic		Other <sup>b</sup>		Localized		Regional		Distant		Unknown	
	No. cases	Rate	No. cases	Rate	No. cases	Rate	No. cases	Rate	No. cases	Rate	No. cases	Rate	No. cases	Rate	No. cases	Rate	No. cases	Rate	No. cases	Rate	No. cases	Rate
2001	10,177	3.60	7,771	5.90	2,406	1.58	8,253	3.71	1,262	4.60	480	2.45	182	1.61	2,045	0.73	6,480	2.29	933	0.33	719	0.25
2002	10,690	3.69	8,293	6.12	2,397	1.55	8,734	3.86	1,298	4.61	473	2.30	185	1.54	1,971	0.68	7,003	2.41	1,015	0.35	701	0.24
2003	11,334	3.83	8,815	6.35	2,519	1.59	9,307	4.04	1,288	4.43	530	2.40	209	1.67	2,080	0.71	7,412	2.50	1,077	0.36	765	0.26
2004	11,877	3.92	9,455	6.62	2,422	1.51	9,730	4.16	1,360	4.51	552	2.37	235	1.76	1,954	0.65	7,160	2.35	2,174	0.72	589	0.20
2005	12,253	3.94	9,574	6.53	2,679	1.64	10,178	4.26	1,274	4.10	550	2.22	251	1.77	1,990	0.65	7,414	2.38	2,303	0.74	546	0.18
2006	12,650	3.97	9,957	6.61	2,693	1.61	10,553	4.34	1,253	3.93	595	2.26	249	1.71	2,016	0.64	7,712	2.41	2,316	0.72	606	0.19
2007	13,685	4.20	10,914	7.09	2,771	1.62	11,409	4.61	1,377	4.22	635	2.33	264	1.71	2,177	0.68	8,367	2.56	2,566	0.79	575	0.18
2008	14,670	4.39	11,748	7.42	2,922	1.67	12,325	4.89	1,416	4.16	647	2.25	282	1.75	2,235	0.68	9,100	2.72	2,749	0.82	586	0.18
2009	15,280	4.47	12,332	7.61	2,948	1.65	12,806	5.00	1,417	4.04	754	2.52	303	1.78	2,230	0.68	9,528	2.78	2,819	0.82	703	0.21
2010	15,686	4.48	12,558	7.54	3,128	1.72	13,148	5.04	1,411	3.96	758	2.37	369	2.14	2,295	0.67	10,035	2.85	2,660	0.76	696	0.20
2011	16,862	4.71	13,567	7.98	3,295	1.77	14,155	5.34	1,493	4.05	819	2.50	395	2.14	2,353	0.67	10,922	3.03	2,921	0.82	666	0.19
2012	17,210	4.71	13,942	8.03	3,268	1.71	14,560	5.40	1,436	3.78	833	2.37	381	2.00	2,413	0.67	11,101	3.02	3,043	0.84	653	0.18
2013	18,214	4.88	14,812	8.36	3,402	1.75	15,393	5.63	1,503	3.86	862	2.35	456	2.28	2,458	0.67	11,825	3.16	3,297	0.88	624	0.17
2014	19,111	5.02	15,667	8.66	3,444	1.74	16,146	5.83	1,537	3.84	955	2.49	473	2.24	2,576	0.68	12,450	3.26	3,396	0.89	689	0.18
2015	19,606	5.04	16,046	8.68	3,560	1.77	16,728	5.95	1,475	3.58	973	2.46	430	1.97	2,524	0.65	12,966	3.34	3,510	0.90	606	0.16
2016	20,436	5.16	16,931	9.01	3,505	1.70	17,230	6.05	1,598	3.77	1,107	2.67	501	2.19	2,643	0.67	14,405	3.64	2,301	0.58	1,087	0.28
2017	20,441	5.08	16,915	8.88	3,526	1.67	17,301	6.03	1,504	3.53	1,098	2.55	538	2.25	2,610	0.65	14,794	3.68	2,034	0.50	1,003	0.25

<sup>a</sup> Rates were calculated as number of cases per 100 000 person-year and age-adjusted to the 2000 US standard population.

<sup>b</sup> Others include Asian/Pacific Islander, American Indian/Alaskan Native, and other.

**eTable 3.** Sex and race-stratified oropharyngeal carcinoma incidence rates<sup>a</sup> over calendar year during 2001-2017 in the United States

Year of diagnosis	Sex															
	Male								Female							
	Non-Hispanic white		Non-Hispanic Black		Hispanic		Other <sup>b</sup>		Non-Hispanic white		Non-Hispanic Black		Hispanic		Other <sup>b</sup>	
	No. cases	Rate	No. cases	Rate	No. cases	Rate	No. cases	Rate	No. cases	Rate	No. cases	Rate	No. cases	Rate	No. cases	Rate
2001	6,273	6.00	974	8.14	392	4.32	132	2.53	1,980	1.64	288	1.88	88	0.89	50	0.85
2002	6,722	6.29	1,021	8.34	400	4.28	150	2.73	2,012	1.65	277	1.76	73	0.67	35	0.56
2003	7,222	6.63	997	7.81	436	4.34	160	2.76	2,085	1.70	291	1.82	94	0.79	49	0.77
2004	7,739	6.94	1,081	8.20	454	4.19	181	2.95	1,991	1.61	279	1.67	98	0.82	54	0.77
2005	7,944	6.98	991	7.31	451	3.98	188	2.89	2,234	1.77	283	1.63	99	0.76	63	0.83
2006	8,329	7.17	969	6.87	468	3.82	191	2.93	2,224	1.74	284	1.62	127	0.92	58	0.73
2007	9,121	7.71	1,064	7.49	523	4.13	206	2.96	2,288	1.76	313	1.75	112	0.80	58	0.68
2008	9,873	8.18	1,124	7.52	526	3.95	225	3.06	2,452	1.86	292	1.55	121	0.82	57	0.67
2009	10,360	8.42	1,095	7.06	632	4.69	245	3.15	2,446	1.84	322	1.67	122	0.73	58	0.64
2010	10,589	8.43	1,084	7.02	595	4.01	290	3.71	2,559	1.90	327	1.64	163	0.97	79	0.86
2011	11,430	8.95	1,171	7.29	668	4.41	298	3.54	2,725	1.98	322	1.57	151	0.88	97	0.97
2012	11,837	9.14	1,122	6.75	691	4.23	292	3.36	2,723	1.95	314	1.49	142	0.77	89	0.87
2013	12,599	9.57	1,173	6.87	693	4.10	347	3.76	2,794	1.97	330	1.53	169	0.87	109	1.05
2014	13,277	9.97	1,223	6.93	785	4.45	382	4.00	2,869	2.00	314	1.43	170	0.83	91	0.80
2015	13,777	10.16	1,157	6.40	783	4.28	329	3.28	2,951	2.05	318	1.39	190	0.92	101	0.87
2016	14,332	10.46	1,273	6.82	927	4.85	399	3.82	2,898	1.96	325	1.40	180	0.81	102	0.83
2017	14,390	10.42	1,201	6.47	894	4.50	430	3.93	2,911	1.95	303	1.26	204	0.89	108	0.85

<sup>a</sup> Rates were calculated as number of cases per 100 000 person-year and age-adjusted to the 2000 US standard population.

<sup>b</sup> Others include Asian/Pacific Islander, American Indian/Alaskan Native, and other.

**eTable 4.** Age-specific oropharyngeal cancer incidence rates<sup>a</sup> over calendar year during 2001-2017 among men in the United States

Year of diagnosis	<45		45-54		55-64		65-74		75-84		85+	
	No. cases	Rate	No. cases	Rate	No. cases	Rate	No. cases	Rate	No. cases	Rate	No. cases	Rate
<b>2001</b>	590	0.66	2,373	12.34	2,337	19.58	1,662	20.12	700	14.07	109	8.72
<b>2002</b>	620	0.69	2,504	12.87	2,676	21.06	1,626	19.59	758	14.97	109	8.51
<b>2003</b>	621	0.70	2,653	13.36	2,860	21.43	1,798	21.41	762	14.82	121	9.12
<b>2004</b>	650	0.74	2,830	13.96	3,193	22.83	1,874	22.05	800	15.39	108	7.89
<b>2005</b>	619	0.71	2,791	13.46	3,442	23.59	1,751	20.29	852	16.20	119	8.31
<b>2006</b>	641	0.74	2,843	13.44	3,644	23.92	1,931	21.92	767	14.47	131	8.69
<b>2007</b>	633	0.74	3,054	14.16	4,012	25.36	2,184	24.13	877	16.46	154	9.74
<b>2008</b>	642	0.76	3,171	14.47	4,453	27.28	2,369	24.93	955	17.82	158	9.57
<b>2009</b>	640	0.77	3,238	14.61	4,729	27.93	2,619	26.71	947	17.68	159	9.23
<b>2010</b>	569	0.69	3,239	14.50	4,940	28.08	2,636	25.95	989	18.23	185	10.30
<b>2011</b>	613	0.74	3,285	14.69	5,353	29.36	3,050	29.02	1,075	19.59	191	10.21
<b>2012</b>	548	0.66	3,280	14.80	5,466	29.60	3,311	29.55	1,113	19.96	224	11.48
<b>2013</b>	559	0.68	3,238	14.73	5,843	31.10	3,743	31.62	1,193	21.02	236	11.69
<b>2014</b>	535	0.66	3,383	15.46	6,226	32.51	3,967	32.16	1,298	22.31	258	12.36
<b>2015</b>	492	0.61	3,265	15.04	6,332	32.40	4,350	33.76	1,360	22.84	247	11.48
<b>2016</b>	521	0.65	3,173	14.77	6,666	33.56	4,759	35.53	1,560	25.47	252	11.39
<b>2017</b>	526	0.66	3,136	14.78	6,589	32.70	4,812	34.89	1,536	24.16	316	13.96

<sup>a</sup> Rates were calculated as number of cases per 100 000 person-year and age-adjusted to the 2000 US standard population.

**eTable 5.** Age-specific oropharyngeal cancer incidence rates<sup>a</sup> over calendar year during 2001-2017 among Women in the United States

Year of diagnosis	<45		45-54		55-64		65-74		75-84		85+	
	No. cases	Rate	No. cases	Rate	No. cases	Rate	No. cases	Rate	No. cases	Rate	No. cases	Rate
<b>2001</b>	179	0.20	467	2.34	590	4.57	625	6.28	443	5.93	102	3.38
<b>2002</b>	162	0.18	439	2.17	648	4.74	670	6.76	400	5.30	78	2.56
<b>2003</b>	202	0.22	506	2.45	689	4.80	610	6.13	396	5.21	116	3.74
<b>2004</b>	172	0.19	538	2.56	674	4.49	586	5.86	370	4.88	82	2.61
<b>2005</b>	169	0.19	591	2.75	729	4.66	676	6.70	406	5.40	108	3.36
<b>2006</b>	188	0.21	583	2.66	797	4.88	616	6.02	392	5.14	117	3.53
<b>2007</b>	171	0.20	606	2.71	834	4.91	634	6.05	398	5.33	128	3.75
<b>2008</b>	179	0.21	612	2.70	881	5.02	692	6.36	422	5.63	136	3.88
<b>2009</b>	172	0.20	632	2.76	914	5.02	691	6.18	407	5.45	132	3.67
<b>2010</b>	183	0.22	719	3.11	940	4.98	732	6.28	425	5.66	129	3.49
<b>2011</b>	170	0.20	683	2.96	1,073	5.48	789	6.64	445	5.96	135	3.57
<b>2012</b>	145	0.17	645	2.82	1,053	5.30	867	6.82	415	5.57	143	3.69
<b>2013</b>	150	0.18	665	2.91	1,102	5.45	893	6.70	453	6.02	139	3.53
<b>2014</b>	130	0.15	665	2.94	1,078	5.24	955	6.87	473	6.18	143	3.56
<b>2015</b>	157	0.19	658	2.95	1,232	5.89	898	6.21	462	5.95	153	3.76
<b>2016</b>	157	0.19	560	2.53	1,215	5.71	1,002	6.68	426	5.35	145	3.52
<b>2017</b>	131	0.16	549	2.52	1,254	5.80	989	6.32	471	5.75	132	3.18

<sup>a</sup> Rates were calculated as number of cases per 100 000 person-year and age-adjusted to the 2000 US standard population

**eTable 6.** Oropharyngeal cancer incidence rates<sup>a</sup> during 2001-2017 according to SEER summary stage at diagnosis among men in the United States

Year of diagnosis	SEER Summary Stage 2000											
	Localized			Regional			Distant			Unknown		
	No. cases	Proportion	Rate	No. cases	Proportion	Rate	No. cases	Proportion	Rate	No. cases	Proportion	Rate
2001	1,446	18.6	1.12	5,078	65.3	3.82	725	9.3	0.55	522	6.7	0.40
2002	1,365	16.5	1.03	5,586	67.4	4.09	812	9.8	0.60	530	6.4	0.40
2003	1,475	16.7	1.09	5,912	67.1	4.22	850	9.6	0.62	578	6.6	0.42
2004	1,412	14.9	1.01	5,830	61.7	4.05	1,758	18.6	1.23	455	4.8	0.33
2005	1,369	14.3	0.96	5,954	62.2	4.02	1,852	19.3	1.26	399	4.2	0.28
2006	1,419	14.3	0.97	6,219	62.5	4.10	1,865	18.7	1.23	454	4.6	0.31
2007	1,572	14.4	1.06	6,848	62.7	4.41	2,065	18.9	1.34	429	3.9	0.29
2008	1,578	13.4	1.02	7,460	63.5	4.68	2,256	19.2	1.42	454	3.9	0.30
2009	1,581	12.8	1.01	7,882	63.9	4.83	2,329	18.9	1.43	540	4.4	0.34
2010	1,593	12.7	0.99	8,275	65.9	4.94	2,155	17.2	1.29	535	4.3	0.33
2011	1,672	12.3	1.01	8,979	66.2	5.23	2,402	17.7	1.42	514	3.8	0.31
2012	1,727	12.4	1.03	9,165	65.7	5.24	2,536	18.2	1.47	514	3.7	0.30
2013	1,789	12.1	1.03	9,814	66.3	5.51	2,715	18.3	1.53	494	3.3	0.29
2014	1,852	11.8	1.05	10,435	66.6	5.74	2,852	18.2	1.58	528	3.4	0.30
2015	1,847	11.5	1.02	10,837	67.5	5.85	2,902	18.1	1.56	460	2.9	0.25
2016	1,987	11.7	1.08	12,174	71.9	6.45	1,902	11.2	1.01	868	5.1	0.47
2017	1,937	11.5	1.04	12,463	73.7	6.52	1,723	10.2	0.90	792	4.7	0.42

Abbreviations: SEER, Surveillance Epidemiology, and End Results Program

<sup>a</sup>Rates were calculated as number of cases per 100 000 person-year and age-adjusted to the 2000 US standard population.

**eTable 7.** Oropharyngeal squamous cell carcinoma incidence rates<sup>a</sup> During 2001-2017 according to SEER Summary Stage at Diagnosis among Women

Year of diagnosis	SEER Summary Stage 2000											
	Localized			Regional			Distant			Unknown		
	No. cases	Proportion	Rate	No. cases	Proportion	Rate	No. cases	Proportion	Rate	No. cases	Proportion	Rate
2001	599	24.9	0.39	1,402	58.3	0.92	208	8.6	0.14	197	8.2	0.13
2002	606	25.3	0.39	1,417	59.1	0.92	203	8.5	0.13	171	7.1	0.11
2003	605	24.0	0.38	1,500	59.5	0.95	227	9.0	0.14	187	7.4	0.12
2004	542	22.4	0.34	1,330	54.9	0.83	416	17.2	0.26	134	5.5	0.08
2005	621	23.2	0.38	1,460	54.5	0.90	451	16.8	0.28	147	5.5	0.09
2006	597	22.2	0.36	1,493	55.4	0.89	451	16.7	0.27	152	5.6	0.09
2007	605	21.8	0.35	1,519	54.8	0.89	501	18.1	0.29	146	5.3	0.08
2008	657	22.5	0.37	1,640	56.1	0.94	493	16.9	0.28	132	4.5	0.08
2009	649	22.0	0.36	1,646	55.8	0.92	490	16.6	0.27	163	5.5	0.09
2010	702	22.4	0.39	1,760	56.3	0.97	505	16.1	0.28	161	5.1	0.09
2011	681	20.7	0.37	1,943	59.0	1.04	519	15.8	0.28	152	4.6	0.08
2012	686	21.0	0.36	1,936	59.2	1.01	507	15.5	0.27	139	4.3	0.07
2013	669	19.7	0.34	2,011	59.1	1.03	582	17.1	0.30	140	4.1	0.07
2014	724	21.0	0.37	2,015	58.5	1.02	544	15.8	0.27	161	4.7	0.08
2015	677	19.0	0.33	2,129	59.8	1.06	608	17.1	0.30	146	4.1	0.07
2016	656	18.7	0.32	2,231	63.7	1.09	399	11.4	0.19	219	6.2	0.11
2017	673	19.1	0.32	2,331	66.1	1.11	311	8.8	0.15	211	6.0	0.10

Abbreviations: SEER, Surveillance Epidemiology, and End Results Program

<sup>a</sup> Rates were calculated as number of cases per 100 000 person-year and age-adjusted to the 2000 US standard population



**eTable 8.** Rate ratios for oropharyngeal cancer incidence rates<sup>a</sup> over calendar year during 2001-2017 among men in the United States

Age Group	2001-2003		2015-2017		Rate Ratio <sup>b</sup>	95% CI
	No. Cases	Rate <sup>a</sup>	No. Cases	Rate <sup>a</sup>		
<b>Non-Hispanic White</b>						
25-29	28	0.16	18	0.09	0.56	(0.29 - 1.05)
30-34	74	0.37	58	0.31	0.82	(0.57 - 1.18)
35-39	288	1.32	229	1.28	0.97	(0.81 - 1.16)
40-44	1075	4.44	841	4.85	1.09	(1 - 1.2)
45-49	2471	10.67	2613	13.38	1.25	(1.19 - 1.33)
50-54	3574	16.98	5428	25.25	1.49	(1.43 - 1.55)
55-59	3487	20.41	8109	35.90	1.76	(1.69 - 1.83)
60-64	2894	22.02	8652	42.03	1.91	(1.83 - 1.99)
65-69	2289	21.23	7410	41.37	1.95	(1.86 - 2.04)
70-74	1844	19.12	4631	35.42	1.85	(1.75 - 1.96)
75-79	1254	15.94	2551	28.87	1.81	(1.69 - 1.94)
80-84	640	12.42	1256	21.32	1.72	(1.56 - 1.89)
85+	291	8.67	690	12.72	1.47	(1.28 - 1.69)
<b>Non-Hispanic Black</b>						
25-29	-	-	-	-	-	-
30-34	-	-	-	-	-	-
35-39	48	1.26	38	1.00	0.79	(0.5 - 1.23)
40-44	141	3.67	115	3.26	0.89	(0.69 - 1.14)
45-49	400	11.91	257	7.06	0.59	(0.5 - 0.7)
50-54	588	21.31	474	12.72	0.60	(0.53 - 0.67)
55-59	543	28.09	725	20.47	0.73	(0.65 - 0.82)
60-64	436	29.85	739	26.04	0.87	(0.77 - 0.98)
65-69	367	31.62	582	27.62	0.87	(0.77 - 1)
70-74	256	29.24	361	27.09	0.93	(0.79 - 1.09)
75-79	118	18.79	182	21.11	1.12	(0.89 - 1.43)
80-84	62	17.10	97	18.56	1.09	(0.78 - 1.52)
85+	18	7.66	48	11.53	1.51	(0.86 - 2.75)
<b>Hispanic</b>						
25-29	-	-	-	-	-	-
30-34	-	-	-	-	-	-
35-39	25	0.53	41	0.62	1.17	(0.7 - 2.01)
40-44	69	1.73	97	1.61	0.93	(0.68 - 1.29)
45-49	130	4.25	208	3.85	0.90	(0.72 - 1.13)
50-54	228	9.90	359	7.71	0.78	(0.66 - 0.92)
55-59	196	12.13	459	12.34	1.02	(0.86 - 1.21)
60-64	186	16.10	465	16.94	1.05	(0.89 - 1.25)
65-69	134	15.24	392	19.93	1.31	(1.07 - 1.6)
70-74	119	17.67	243	18.88	1.07	(0.85 - 1.34)
75-79	74	16.08	165	19.43	1.21	(0.91 - 1.61)
80-84	33	13.11	102	18.78	1.43	(0.96 - 2.19)
85+	23	14.34	61	12.62	0.88	(0.54 - 1.49)

<sup>a</sup> Rates were calculated as number of cases per 100 000 person-years and age adjusted to the 2000 US standard population.

<sup>b</sup> Rate ratios are calculated taking 2001-2003 incidence rates as reference points

- Statistic not displayed due to fewer than 16 cases.

**eTable 9.** Rate ratios for oropharyngeal cancer incidence rates<sup>a</sup> during 2001-2017 among Women

Age Group	2001-2003		2015-2017		Rate Ratio <sup>b</sup>	95% CI
	No. Cases	Rate <sup>a</sup>	No. Cases	Rate <sup>a</sup>		
<b>Non-Hispanic White</b>						
25-29	-	-	18	0.09	-	-
30-34	49	0.25	39	0.21	0.84	(0.54 - 1.31)
35-39	94	0.43	84	0.48	1.10	(0.81 - 1.5)
40-44	237	0.98	173	1.01	1.03	(0.84 - 1.26)
45-49	467	2.00	474	2.43	1.22	(1.07 - 1.39)
50-54	645	3.00	934	4.27	1.42	(1.29 - 1.58)
55-59	767	4.32	1525	6.52	1.51	(1.38 - 1.65)
60-64	816	5.78	1504	6.88	1.19	(1.09 - 1.3)
65-69	797	6.57	1378	7.09	1.08	(0.99 - 1.18)
70-74	820	7.00	1081	7.33	1.05	(0.96 - 1.15)
75-79	672	6.16	708	6.64	1.08	(0.97 - 1.2)
80-84	430	5.11	458	5.77	1.13	(0.99 - 1.29)
85+	264	3.30	378	3.78	1.15	(0.98 - 1.35)
<b>Non-Hispanic Black</b>						
25-29	-	-	-	-	-	-
30-34	-	-	-	-	-	-
35-39	-	-	-	-	-	-
40-44	65	1.50	26	0.65	0.44	(0.27 - 0.7)
45-49	89	2.32	57	1.39	0.60	(0.42 - 0.85)
50-54	134	4.15	135	3.19	0.77	(0.6 - 0.98)
55-59	138	5.91	213	5.18	0.88	(0.7 - 1.09)
60-64	126	6.83	175	5.03	0.74	(0.58 - 0.93)
65-69	96	6.20	130	4.76	0.77	(0.59 - 1.01)
70-74	91	7.04	88	4.77	0.68	(0.5 - 0.92)
75-79	54	5.16	54	4.13	0.80	(0.54 - 1.19)
80-84	27	3.81	30	3.28	0.86	(0.5 - 1.51)
85+	-	-	18	1.83	-	-
<b>Hispanic</b>						
25-29	-	-	-	-	-	-
30-34	-	-	-	-	-	-
35-39	-	-	-	-	-	-
40-44	24	0.63	30	0.51	0.81	(0.46 - 1.45)
45-49	23	0.76	42	0.80	1.06	(0.62 - 1.84)
50-54	28	1.17	75	1.62	1.39	(0.89 - 2.22)
55-59	22	1.24	89	2.31	1.86	(1.15 - 3.11)
60-64	29	2.18	92	3.04	1.40	(0.91 - 2.2)
65-69	35	3.23	83	3.62	1.12	(0.75 - 1.72)
70-74	31	3.50	58	3.57	1.02	(0.65 - 1.63)
75-79	25	3.84	32	2.77	0.72	(0.41 - 1.27)
80-84	-	-	33	4.08	-	-
85+	-	-	16	1.89	-	-

<sup>a</sup> Rates were calculated as number of cases per 100 000 person-years and age adjusted to the 2000 US standard population.

<sup>b</sup> Rate ratios are calculated taking 2001-2003 incidence rates as reference points

- Statistic not displayed due to fewer than 16 cases.

**eTable 10.** Trends in oropharyngeal cancer incidence rates<sup>a</sup> during 2001-2017 among men in the United States

	Trend <sup>b</sup>				
				Overall (2001-2017)	
	Year	APC (95% CI)	P Value	AAPC (95% CI)	P Value
<b>Men (Overall)</b>	2001-2017	2.71 (2.48 – 2.93)	<0.001	2.71 (2.48 – 2.93)	<0.001
<b>Race/Ethnicity</b>					
NHW	2001-2014	3.89 (3.59 – 4.18)	<0.001	3.48 (3.04 – 3.92)	<0.001
	2014-2017	1.71 (-0.51 – 3.98)	0.120		
NHB	2001-2017	-1.38 (-1.78 – -0.98)	<0.001	-1.38 (-1.78 – -0.98)	<0.001
Hispanic	2001-2017	0.62 (-0.01 – 1.26)	0.053	0.62 (-0.01 – 1.26)	0.053
Other <sup>c</sup>	2001-2017	1.98 (1.22 – 2.74)	<0.001	1.98 (1.22 – 2.74)	<0.001
<b>Age at diagnosis, y</b>					
<45	2001-2008	1.67 (0.13 – 3.23)	0.036	-0.50 (-1.31 – 0.32)	0.230
	2008-2017	-2.15 (-3.22 – -1.08)	0.001		
45-54	2001-2014	1.36 (0.99 – 1.73)	<0.001	0.83 (0.21 – 1.46)	0.009
	2014-2017	-1.43 (-4.65 – 1.89)	0.361		
55-64	2001-2014	3.72 (3.33 – 4.11)	<0.001	3.10 (2.35 – 3.84)	<0.001
	2014-2017	0.45 (-2.26 – 3.24)	0.726		
65-74	2001-2017	4.09 (3.69 – 4.49)	<0.001	4.09 (3.69 – 4.49)	<0.001
75-84	2001-2017	3.80 (3.33 – 4.28)	<0.001	3.80 (3.33 – 4.28)	<0.001
85+	2001-2017	3.09 (2.35 – 3.84)	<0.001	3.09 (2.35 – 3.84)	<0.001
<b>SEER Summary Stage 2000</b>					
Localized	2001-2005	-2.78 (-5.54 – 0.05)	0.054	-0.30 (-1.02 – 0.43)	0.425
	2005-2017	0.55 (0.05 – 1.05)	0.034		
Regional	2001-2005	0.52 (-2.31 – 3.43)	0.697	3.10 (2.38 – 3.83)	<0.001
	2005-2017	3.98 (3.54 – 4.42)	<0.001		
Distant	2001-2005	26.52 (11.66 – 43.35)	0.002	3.26 (-1.30 – 8.04)	0.164
	2005-2015	1.80 (-0.69 – 4.35)	0.137		
	2015-2017	-26.12 (-45.85 – 0.81)	0.055		
Other	2001-2014	-2.43 (-4.66 – -0.15)	0.039	1.09 (-2.74 – 5.06)	0.583
	2014-2017	17.85 (4.07 – 44.77)	0.108		
<b>Tumor size<sup>d</sup></b>					
≤1	2000-2016	3.94 (2.99 – 4.9)	<0.001	3.94 (2.99 – 4.9)	<0.001
>1 to ≤2	2000-2014	4.76 (4.06 – 5.47)	<0.001	3.23 (1.82 – 4.67)	<0.001
	2014-2016	-6.86 (-16.83 – 4.32)	0.197		
>2 to ≤4	2000-2014	5.14 (4.37 – 5.92)	<0.001	4.05 (2.55 – 5.58)	<0.001
	2014-2016	-3.23 (-14.05 – 8.94)	0.5571		
>4	2000-2016	4.58 (3.71 – 5.45)	<0.001	4.58 (3.71 – 5.45)	<0.001
Unknown	2000-2016	-2.48 (-3.72 – -1.23)	0.0008	-2.48 (-3.72 – -1.23)	0.0008

Abbreviations: APC, annual percentage change; AAPC, average annual percentage change; SEER, Surveillance Epidemiology, and End Results Program

<sup>a</sup> Rates were calculated as number of cases per 100 000 person-years and age adjusted to the 2000 US standard population.

<sup>b</sup> The calendar period of each segment was defined based on the identification of calendar years when a statistically significant change in the APC occurred (ie, the joinpoint).

<sup>c</sup> Others include Asian/Pacific Islander, American Indian/Alaskan Native, and other.

<sup>d</sup> Trends in annual Oropharyngeal Squamous Cell Carcinoma Incidence Rates according to AJCC/TNM Stage and Tumor Size are calculated using the SEER-18 Database

**eTable 11.** Trends in Oropharyngeal Squamous Cell Carcinoma Incidence Rates<sup>a</sup> During 2001-2017 among Women

	Trends <sup>b</sup>				
	Year	APC (95% CI)	P Value	Overall (2001-2017) AAPC (95% CI)	P Value
<b>Women (Overall)</b>	2001-2015 2015-2017	1.02 (0.70 – 1.34) -3.31 (-9.16 – 2.92)	<0.001 0.263	0.47 (-0.28 – 1.22)	0.221
<b>Race/Ethnicity</b>					
NHW	2001-2015 2015-2017	1.70 (1.36 – 2.03) -2.80 (-8.93 – 3.74)	<0.001 0.361	1.12 (0.34 – 1.91)	0.005
NHB	2001-2017	-1.91 (-2.35 – -1.47)	<0.001	-1.91 (-2.35 – -1.47)	<0.001
Hispanic	2001-2017	0.60 (-0.33 – 1.54)	0.189	0.60 (-0.33 – 1.54)	0.189
Other <sup>c,d</sup>	2001-2017	0.99 (-0.75 – 2.76)	0.246	0.99 (-0.75 – 2.76)	0.246
<b>Age at diagnosis, y</b>					
<45	2001-2017	-1.03 (-2.01 – -0.03)	0.044	-1.03 (-2.01 – -0.03)	0.044
45-54	2001-2011 2011-2017	2.80 (1.51 – 4.11) -2.53 (-5.09 – 0.10)	<0.001 0.058	0.77 (-0.38 – 1.93)	0.188
55-64	2001-2017	1.60 (1.26 – 1.95)	<0.001	1.60 (1.26 – 1.95)	<0.001
65-74	2001-2017	0.33 (-0.17 – 0.82)	0.180	0.33 (-0.17 – 0.82)	0.180
75-84	2001-2003 2003-2017	-5.96 (-19.57 – 9.96) 1.06 (0.33 – 1.81)	0.409 0.009	0.16 (-1.68 – 2.03)	0.867
85+	2001-2017	0.58 (-0.51 – 1.68)	0.279	0.58 (-0.51 – 1.68)	0.279
<b>SEER Summary Stage 2000</b>					
Localized	2001-2017	-0.90 (-1.42 – -0.38)	0.002	-0.90 (-1.42 – -0.38)	0.002
Regional	2001-2004 2001-2017	-2.82 (-6.44 – 0.95) 1.90 (1.53 – 2.27)	0.127 <0.001	1.00 (0.30 – 1.70)	0.005
Distant	2001-2005 2005-2015 2015-2017	23.87 (10.40 – 39.00) 0.30 (-2.17 – 2.84) -29.60 (-49.62 – -1.62)	0.002 0.790 0.041	1.16 (-3.39 – 5.93)	0.623
Other	2001-2013 2013-2017	-3.82 (-5.78 – -1.82) 9.42 (-1.55 – 21.61)	0.001 0.088	-0.67 (-3.36 – 2.10)	0.633
<b>Tumor size<sup>d</sup></b>					
≤1	2000-2016	1.95 (0.65 – 3.28)	0.006	1.95 (0.65 – 3.28)	0.006
>1 to ≤2	2000-2016	1.96 (1.15 – 2.77)	0.0001	1.96 (1.15 – 2.77)	0.0001
>2 to ≤4	2000-2016	2.6 (1.55 – 3.66)	0.0001	2.6 (1.55 – 3.66)	0.0001
>4	2000-2016	2.22 (1.1 – 3.36)	0.0007	2.22 (1.1 – 3.36)	0.0007
Unknown	2000-2016	-5.24 (-6.16 – -4.3)	<0.001	-5.24 (-6.16 – -4.3)	<0.001

Abbreviations: APC, annual percentage change; AAPC, average annual percentage change; SEER, Surveillance Epidemiology, and End Results Program

<sup>a</sup> Rates were calculated as number of cases per 100 000 person-years and age adjusted to the 2000 US standard population.

<sup>b</sup> The calendar period of each segment was defined based on the identification of calendar years when a statistically significant change in the APC occurred (ie, the joinpoint).

<sup>c</sup> Others include Asian/Pacific Islander, American Indian/Alaskan Native, and other.

<sup>d</sup> Trends in annual Oropharyngeal Squamous Cell Carcinoma Incidence Rates according to AJCC/TNM Stage and Tumor Size are calculated using the SEER-18 Database

**eTable 12.** Trends in oropharyngeal cancer incidence rates<sup>a</sup> according to state residency during 2001-2017 among men in the United States

State	Trend <sup>b</sup>				
				Overall (2001-2017)	
	Year	APC (95% CI)	P Value	AAPC (95% CI)	P Value
Alaska	2001-2017	1.39 (-0.99 – 3.83)	0.233	1.39 (-0.99 – 3.83)	0.233
Alabama	2001-2017	2.47 (1.54 -3.40)	<0.001	2.47 (1.54 -3.40)	<0.001
Arkansas	2001-2017	3.19 (2.27 – 4.12)	<0.001	3.19 (2.27 – 4.12)	<0.001
Arizona	2001-2015 2015-2017	3.56 (2.84 – 4.29) -8.09 (-18.52 – 3.67)	<0.001 0.153	2.03 (0.55 – 3.53)	0.007
California	2001-2017	1.85 (1.47 – 2.24)	<0.001	1.85 (1.47 – 2.24)	<0.001
Colorado	2001-2017	3.72 (2.99 – 4.45)	<0.001	3.72 (2.99 – 4.45)	<0.001
Connecticut	2001-2017	2.98 (2.38 – 3.58)	<0.001	2.98 (2.38 – 3.58)	<0.001
DC	2001-2017	-1.27 (-3.34 – 0.84)	0.216	-1.27 (-3.34 – 0.84)	0.216
Delaware	2001-2017	2.21 (0.50 – 3.95)	0.015	2.21 (0.50 – 3.95)	0.015
Florida	2001-2011 2011-2014 2014-2017	1.96 (1.24 – 2.68) 5.20 (-2.44 – 13.45) -2.47 (-5.92 – 1.10)	<0.001 0.163 0.150	1.71 (0.28 – 3.15)	0.019
Georgia	2001-2017	2.20 (1.48 – 2.92)	<0.001	2.20 (1.48 – 2.92)	<0.001
Hawaii	2001-2017	3.25 (2.04 – 4.48)	<0.001	3.25 (2.04 – 4.48)	<0.001
Idaho	2001-2017	3.23 (1.86 – 4.63)	<0.001	3.23 (1.86 – 4.63)	<0.001
Illinois	2001-2017	2.62 (2.06 – 3.18)	<0.001	2.62 (2.06 – 3.18)	<0.001
Indiana	2001-2017	3.63 (2.99 – 4.27)	<0.001	3.63 (2.99 – 4.27)	<0.001
Iowa	2001-2017	3.97 (2.86 – 5.09)	<0.001	3.97 (2.86 – 5.09)	<0.001
Kansas	2001-2017	4.70 (3.82 – 5.60)	<0.001	4.70 (3.82 – 5.60)	<0.001
Kentucky	2001-2017	3.86 (2.93 – 4.79)	<0.001	3.86 (2.93 – 4.79)	<0.001
Louisiana	2001-2017	2.18 (1.60 – 2.75)	<0.001	2.18 (1.60 – 2.75)	<0.001
Massachusetts	2001-2017	2.41 (1.75 – 3.07)	<0.001	2.41 (1.75 – 3.07)	<0.001
Maryland	2001-2017	2.95 (1.94 – 3.96)	<0.001	2.95 (1.94 – 3.96)	<0.001
Maine	2001-2017	2.77 (1.94 – 3.61)	<0.001	2.77 (1.94 – 3.61)	<0.001
Michigan	2001-2017	3.22 (2.61 – 3.84)	<0.001	3.22 (2.61 – 3.84)	<0.001
Minnesota	2001-2017	3.50 (2.61 – 4.40)	<0.001	3.50 (2.61 – 4.40)	<0.001
Missouri	2001-2017	3.45 (2.81 – 4.09)	<0.001	3.45 (2.81 – 4.09)	<0.001
Mississippi <sup>c</sup>	2003-2017	2.35 (1.56 – 3.15)	<0.001	2.35 (1.56 – 3.15)	<0.001
Montana	2001-2017	3.77 (2.39 – 5.17)	<0.001	3.77 (2.39 – 5.17)	<0.001
North Carolina	2001-2017	2.68 (2.10 – 3.26)	<0.001	2.68 (2.10 – 3.26)	<0.001
North Dakota	2004-2017	2.79 (0.09 – 5.57)	0.044	2.79 (0.09 – 5.57)	0.044
Nebraska	2001-2017	3.42 (1.97 – 4.89)	<0.001	3.42 (1.97 – 4.89)	<0.001
New Hampshire	2001-2017	3.22 (1.79 – 4.66)	<0.001	3.22 (1.79 – 4.66)	<0.001
New Jersey	2001-2017	2.83 (2.27 – 3.39)	<0.001	2.83 (2.27 – 3.39)	<0.001
New Mexico	2001-2017	2.76 (1.36 – 4.18)	0.001	2.76 (1.36 – 4.18)	0.001
Nevada	2001-2017	2.01 (0.52 – 3.53)	0.012	2.01 (0.52 – 3.53)	0.012
New York	2001-2017	2.13 (1.55 – 2.70)	<0.001	2.13 (1.55 – 2.70)	<0.001
Ohio	2001-2017	3.70 (3.07 – 4.33)	<0.001	3.70 (3.07 – 4.33)	<0.001
Oklahoma	2001-2017	2.29 (1.67 – 2.92)	<0.001	2.29 (1.67 – 2.92)	<0.001
Oregon	2001-2017	3.59 (2.46 – 4.74)	<0.001	3.59 (2.46 – 4.74)	<0.001
Pennsylvania	2001-2017	2.86 (2.36 – 3.36)	<0.001	2.86 (2.36 – 3.36)	<0.001
Rhode Island	2001-2017	2.27 (0.60 – 3.96)	0.011	2.27 (0.60 – 3.96)	0.011
South Carolina	2001-2017	2.47 (1.45 – 3.49)	<0.001	2.47 (1.45 – 3.49)	<0.001
South Dakota	2002-2017	5.98 (2.90 – 9.16)	0.001	5.98 (2.90 – 9.16)	0.001
Tennessee	2001-2017	3.81 (3.23 – 4.39)	<0.001	3.81 (3.23 – 4.39)	<0.001

**eTable 12 (continued).** Trends in oropharyngeal cancer incidence rates<sup>a</sup> according to state residency during 2001-2017 among men in the United States

State	Trend <sup>b</sup>				
				Overall (2001-2017)	
	Year	APC (95% CI)	P Value	AAPC (95% CI)	P Value
Texas	2001-2017	1.98 (1.45 – 2.51)	<0.001	1.98 (1.45 – 2.51)	<0.001
Utah	2001-2017	4.03 (2.28 – 5.82)	<0.001	4.03 (2.28 – 5.82)	<0.001
Virginia	2001-2017	2.41 (1.64 – 3.18)	<0.001	2.41 (1.64 – 3.18)	<0.001
Vermont	2001-2017	2.41 (1.64 – 3.18)	<0.001	2.41 (1.64 – 3.18)	<0.001
Washington	2001-2017	2.73 (1.90 – 3.58)	<0.001	2.73 (1.90 – 3.58)	<0.001
Wisconsin	2001-2017	2.80 (2.17 – 3.44)	<0.001	2.80 (2.17 – 3.44)	<0.001
West Virginia	2001-2017	3.82 (2.66 – 4.99)	<0.001	3.82 (2.66 – 4.99)	<0.001
Wyoming	2003-2017	0.42 (-2.80 – 3.76)	0.776	0.42 (-2.80 – 3.76)	0.776

Abbreviations: APC, annual percentage change; AAPC, average annual percentage change;

<sup>a</sup> Rates were calculated as number of cases per 100 000 person-years and age adjusted to the 2000 US standard population.

<sup>b</sup> The calendar period of each segment was defined based on the identification of calendar years when a statistically significant change in the APC occurred (ie, the joinpoint).

<sup>c</sup> The data for Mississippi are available starting from 2003. Since 2001 and 2002 data are not available, Mississippi is excluded in all analysis except state specific incidence trends analysis.

**eTable 13.** Trends in oropharyngeal cancer incidence rates<sup>a</sup> according to state residency during 2001-2017 among women in the United States

State	Trend <sup>b</sup>				
	Year	APC (95% CI)	P Value	Overall (2001-2017) AAPC (95% CI)	P Value
Alaska	N/A	N/A	N/A	N/A	N/A
Alabama	2001-2017	1.63 (0.46 – 2.82)	0.010	1.63 (0.46 – 2.82)	0.010
Arkansas	2001-2017	2.57 (0.94 – 4.22)	0.004	2.57 (0.94 – 4.22)	0.004
Arizona	2001-2017	-0.13 (-2.08 – 1.86)	0.890	-0.13 (-2.08 – 1.86)	0.890
California	2001-2017	-0.83 (-1.38 – -0.27)	0.007	-0.83 (-1.38 – -0.27)	0.007
Colorado	2001-2017	0.67 (-1.00 – 2.36)	0.410	0.67 (-1.00 – 2.36)	0.410
Connecticut	2001-2017	2.17 (0.11 – 3.93)	0.017	2.17 (0.11 – 3.93)	0.017
DC	N/A	N/A	N/A	N/A	N/A
Delaware	N/A	N/A	N/A	N/A	N/A
Florida	2001-2017	0.10 (-0.60 – 0.80)	0.770	0.10 (-0.60 – 0.80)	0.770
Georgia	2001-2017	-0.35 (-1.60 – 0.92)	0.566	-0.35 (-1.60 – 0.92)	0.566
Hawaii	2005-2016	-1.38	N/A	-1.38	N/A
Idaho	2012-2016	2.54 (-15.65 – 24.64)	0.711	2.54 (-15.65 – 24.64)	0.711
Illinois	2001-2017	0.58 (-0.39 – 1.55)	0.225	0.58 (-0.39 – 1.55)	0.225
Indiana	2001-2017	2.39 (0.81 – 4.01)	0.006	2.39 (0.81 – 4.01)	0.006
Iowa	2001-2017	2.01 (0.06 – 4.00)	0.044	2.01 (0.06 – 4.00)	0.044
Kansas	2002-2017	0.89 (-1.92 – 3.77)	0.511	0.89 (-1.92 – 3.77)	0.511
Kentucky	2001-2017	2.65 (0.67 – 4.66)	0.012	2.65 (0.67 – 4.66)	0.012
Louisiana	2001-2017	3.09 (1.68 – 4.52)	<0.001	3.09 (1.68 – 4.52)	<0.001
Massachusetts	2001-2017	1.29 (-0.43 – 3.05)	0.132	1.29 (-0.43 – 3.05)	0.132
Maryland	2001-2017	1.24 (0.04 – 2.46)	0.044	1.24 (0.04 – 2.46)	0.044
Maine	2001-2017	0.90 (-0.30 – 2.12)	0.130	0.90 (-0.30 – 2.12)	0.130
Michigan	2001-2017	0.39 (-0.77 – 1.57)	0.482	0.39 (-0.77 – 1.57)	0.482
Minnesota	2001-2017	0.46 (-0.93 – 1.88)	0.494	0.46 (-0.93 – 1.88)	0.494
Missouri	2001-2017	1.28 (0.35 – 2.23)	0.010	1.28 (0.35 – 2.23)	0.010
Mississippi <sup>c</sup>	2003-2017	3.29 (1.90 – 4.71)	<0.001	3.29 (1.90 – 4.71)	<0.001
Montana	N/A	N/A	N/A	N/A	N/A
North Carolina	2001-2017	1.30 (0.40 – 2.20)	0.007	1.30 (0.40 – 2.20)	0.007
North Dakota	N/A	N/A	N/A	N/A	N/A
Nebraska	2001-2015	-2.13 (-4.94 – 0.76)	0.109	-2.13 (-4.94 – 0.76)	0.109
New Hampshire	2001-2017	-2.16 (-4.10 – -0.18)	0.036	-2.16 (-4.10 – -0.18)	0.036
New Jersey	2001-2017	0.70 (-0.64 – 2.06)	0.285	0.70 (-0.64 – 2.06)	0.285
New Mexico	2009-2016	-4.23 (-12.54 – 4.86)	0.177	-4.23 (-12.54 – 4.86)	0.177
Nevada	2001-2003 2003-2006 2006-2009 2009-2017	-26.90 (-51.22 – 9.55) 20.87 (-19.66 – 81.86) -11.31 (-37.85 – 26.58) 2.06 (-1.59 – 5.85)	0.107 0.300 0.441 0.219	-1.58 (-10.23 – 7.91)	0.735
New York	2001-2017	0.58 (-0.14 – 1.30)	0.109	0.58 (-0.14 – 1.30)	0.109
Ohio	2001-2017	2.24 (1.52 – 2.96)	<0.001	2.24 (1.52 – 2.96)	<0.001
Oklahoma	2001-2017	1.00 (-1.25 – 3.30)	0.362	1.00 (-1.25 – 3.30)	0.362
Oregon	2001-2017	1.04 (-0.59 – 2.71)	0.196	1.04 (-0.59 – 2.71)	0.196
Pennsylvania	2001-2007 2007-2011 2011-2017	-1.71 (-6.02 – 2.80) 8.09 (-4.19 – 21.94) -2.71 (-6.54 – 1.27)	0.408 0.178 0.155	0.27 (-2.95 – 3.59)	0.872
Rhode Island	2005-2017	1.30 (-2.18 – 4.91)	0.253	1.30 (-2.18 – 4.91)	0.253
South Carolina	2001-2017	0.43 (-0.98 – 1.86)	0.529	0.43 (-0.98 – 1.86)	0.529
South Dakota	N/A	N/A	N/A	N/A	N/A

**eTable 13 (continued).** Trends in oropharyngeal cancer incidence rates<sup>a</sup> according to state residency during 2001-2017 among women in the United States

State	Trend <sup>b</sup>				
				Overall (2001-2017)	
	Year	APC (95% CI)	P Value	AAPC (95% CI)	P Value
Tennessee	2001-2017	1.33 (-0.33 – 3.03)	0.110	1.33 (-0.33 – 3.03)	0.110
Texas	2001-2017	0.48 (-0.46 – 1.42)	0.297	0.48 (-0.46 – 1.42)	0.297
Utah	N/A	N/A	N/A	N/A	N/A
Virginia	2001-2017	0.04 (-1.06 – 1.15)	0.941	0.04 (-1.06 – 1.15)	0.941
Vermont	N/A	N/A	N/A	N/A	N/A
Washington	2001-2017	0.15 (-1.30 – 1.62)	0.829	0.15 (-1.30 – 1.62)	0.829
Wisconsin	2001-2017	0.74 (-0.40 – 1.89)	0.188	0.74 (-0.40 – 1.89)	0.188
West Virginia	2001-2017	1.42 (-1.41 – 4.33)	0.305	1.42 (-1.41 – 4.33)	0.305
Wyoming	N/A	N/A	N/A	N/A	N/A

Abbreviations: APC, annual percentage change; AAPC, average annual percentage change;

<sup>a</sup> Rates were calculated as number of cases per 100 000 person-years and age adjusted to the 2000 US standard population.

<sup>b</sup> The calendar period of each segment was defined based on the identification of calendar years when a statistically significant change in the APC occurred (ie, the joinpoint).

<sup>c</sup> The data for Mississippi are available starting from 2003. Since 2001 and 2002 data are not available, Mississippi is excluded in all analysis except state specific incidence trends analysis.



**eTable 14.** Observed and incidence-based Oropharyngeal Cancer Mortality Rates<sup>a</sup> by Sex During 2001-2017

Year of death	Observed mortality (Nationally)				Incidence-based mortality (SEER-13 regions)			
	Men		Women		Men		Women	
	No. death	Rate (95% CI)	No. death	Rate (95% CI)	No. death	Rate <sup>b</sup> (95% CI)	No. death	Rate <sup>b</sup> (95% CI)
2001	3920	3.14 (3.04-3.24)	1915	1.17 (1.12-1.23)	201	1.23 (1.07-1.42)	68	0.34 (0.26-0.43)
2002	3922	3.08 (2.98-3.18)	1919	1.16 (1.11-1.21)	220	1.33 (1.16-1.52)	91	0.44 (0.35-0.54)
2003	4054	3.09 (3-3.19)	1892	1.13 (1.07-1.18)	204	1.23 (1.06-1.41)	77	0.37 (0.3-0.47)
2004	3977	2.97 (2.88-3.06)	1951	1.14 (1.09-1.2)	202	1.16 (1.01-1.34)	70	0.34 (0.26-0.43)
2005	4026	2.93 (2.84-3.02)	1955	1.12 (1.07-1.17)	204	1.14 (0.99-1.31)	83	0.39 (0.31-0.49)
2006	4031	2.87 (2.78-2.96)	1891	1.07 (1.03-1.12)	202	1.09 (0.94-1.25)	71	0.33 (0.26-0.42)
2007	4219	2.92 (2.83-3.01)	1937	1.08 (1.03-1.13)	211	1.14 (0.99-1.31)	82	0.37 (0.3-0.46)
2008	4262	2.88 (2.79-2.97)	1933	1.06 (1.01-1.1)	242	1.26 (1.1-1.43)	58	0.26 (0.2-0.34)
2009	4160	2.75 (2.66-2.83)	1860	0.99 (0.95-1.04)	233	1.23 (1.08-1.41)	72	0.31 (0.24-0.39)
2010	4427	2.84 (2.75-2.93)	2033	1.07 (1.02-1.12)	250	1.24 (1.08-1.4)	79	0.33 (0.26-0.41)
2011	4746	2.96 (2.88-3.05)	1972	1.02 (0.97-1.06)	225	1.11 (0.96-1.26)	89	0.38 (0.3-0.47)
2012	4862	2.95 (2.87-3.04)	2025	1.02 (0.98-1.07)	258	1.23 (1.08-1.39)	70	0.28 (0.22-0.35)
2013	4808	2.84 (2.76-2.93)	2046	1.01 (0.97-1.06)	291	1.36 (1.2-1.53)	80	0.32 (0.25-0.4)
2014	5218	3.03 (2.95-3.11)	2060	1 (0.96-1.05)	281	1.29 (1.14-1.45)	74	0.29 (0.22-0.36)
2015	5298	2.98 (2.9-3.06)	2236	1.06 (1.01-1.1)	288	1.27 (1.12-1.43)	100	0.37 (0.3-0.45)
2016	5552	3.06 (2.98-3.14)	2289	1.06 (1.02-1.11)	329	1.41 (1.25-1.57)	93	0.35 (0.28-0.43)
2017	5648	3.05 (2.97-3.13)	2247	1.02 (0.98-1.07)	344	1.45 (1.3-1.62)	80	0.28 (0.22-0.36)

<sup>a</sup> Rates were calculated as number of deaths per 100 000 person-years and age adjusted to the 2000 US standard population.

<sup>b</sup> Based on cases diagnosed during 1992-2017