BACKGROUND: The increasing incidence of oropharyngeal squamous cell cancer (OPSCC) is well established. However, up-to-date incidence estimates and trends for head and neck squamous cell cancers (HNSCCs) overall, including major anatomic sites, and non-oropharyngeal (non-OP) HNSCCs by sex, race, and age in the United States are not well described. METHODS: A retrospective analysis of incident HNSCCs during 1992 through 2014 using the Surveillance, Epidemiology, and End Results database was performed to evaluate the incidence of HNSCCs overall, OPSCC, and non-OP HNSCC (those of the larynx, oral cavity, hypopharynx, nasopharynx, and nasal cavity). Incidence rates were calculated overall and by subgroups of interest, and incidence rate ratios were used to compare rates between groups. The incidence rates presented were per 100,000 population and were age adjusted to the 2000 US standard population (19 age groups; Census P25-1130). The annual percent change (APC) was modeled with and without joinpoints.

RESULTS: The incidence of HNSCC overall declined (average APC [aAPC], -0.8; \( P < .001 \)) despite significant increases in the incidence of OPSCCs, most notably between 2000 and 2014 (APC, 2.1; \( P < .001 \)). Significant declines in incidence were observed for all non-OP HNSCC sites for both women and men (\( P < .001 \) each). Among women, the risk of OPSCC also significantly decreased (aAPC, -0.8; \( P = .002 \)), whereas the risk among men was stable during 1992 through 2001 (APC, 0.4; \( P = .42 \)) and then significantly increased from 2001 to 2014 (APC, 2.7; \( P < .001 \)). Decreases in the risk of non-OP HNSCC were especially large for black women (aAPC, -2.6; \( P < .001 \)) and men (aAPC, -3.0; \( P < .001 \)). Although the incidence of HNSCC previously was highest among black individuals, since 2009 its incidence has been higher among white compared with black individuals. CONCLUSIONS: The incidence of HNSCC is declining, especially for non-OP HNSCC and among black individuals.

INTRODUCTION
A decade ago, it became apparent that the epidemiology of head and neck squamous cell cancers (HNSCCs) had changed.1 Although the incidence of HNSCC was highest among black individuals, notable increases in the incidence of oropharyngeal SCC (OPSCC) were observed,1,2 especially among younger age cohorts, men, and white individuals.1,3,4 At the time, an “epidemic” of HNSCC was described. Despite these observations, to the best of our knowledge it is unknown whether the incidence of HNSCC is commensurate with the projected epidemic and remains higher among black compared with white individuals.

Recent data have supported the need for the renewed epidemiologic analysis of HNSCC. The incidence of OPSCC is increasing among older as well as younger individuals,5 and human papillomavirus (HPV) is responsible for an increasing percentage of OPSCCs diagnosed among women and nonwhite individuals.6 The incidence of oral cavity SCC in younger women and more recent birth cohorts of white men and women also appears to be increasing.7,9 However, the incidence of nonoropharyngeal (non-OP) HNSCC overall was reported to decrease between 1995 and 2005.10 To our knowledge, there has been no recent examination of the incidence of the major non-OP anatomic sites overall by sex or race. Therefore, we performed a comprehensive investigation of HNSCC incidence trends using the most recently available US registry data to understand the evolving epidemiology of HNSCC.
MATERIALS AND METHODS
Data from the Surveillance, Epidemiology, and End Results (SEER) database regarding the incident diagnosis of HNSCC between 1992 and 2014 from all 13 US registries were analyzed. Data were restricted to SCC histology (International Classification of Diseases for Oncology, 3rd Edition [ICD-O-3] codes 8050-8076, 8078, 8083, 8084, and 8094). OP tumor sites included ICD-O-3 codes C01.9 (base of tongue), C02.4 (lingual tonsil), C09.0 to C09.9 (tonsil); C10.0 (vallecula), C10.1 (anterior surface of the epiglottis), C10.2 to C10.9 (oropharynx), C14.2 (Waldeyer’s ring), C14.0 (pharynx not otherwise specified), C05.1 (soft palate), and C05.2 (uvula). Oral cavity tumor sites included ICD-O-3 codes C0.3 to C00.6, C0.9, C2.0 to C2.3, C2.8 to C3.1, C3.9 to C4.1, C4.8 to C5.0, C5.8 to C6.2, and C6.8 to C6.9. Nasopharyngeal tumor sites included ICD-O-3 codes C11.0 to C11.3 and C11.8 to C11.9. The ICD-O-3 code for the nasal cavity was C30.0. Hypopharyngeal tumor sites included ICD-O-3 codes C12.9 to C13.2 and C13.8 to C13.9. Laryngeal tumor sites included ICD-O-3 codes C32.0 to C32.3 and C32.8 to C32.9. The oral cavity, larynx, hypopharynx, nasal cavity, and nasopharynx were grouped together as non-OP for some analyses.

Statistical Analysis
The distribution of OP and non-OP cases was compared across risk factors using the Pearson chi-square test (SAS Institute Inc, Cary, North Carolina). Incidence rates were calculated overall and by subgroup, and incidence rate ratios (IRRs) were used to compare the rates between groups. The incidence rates presented were per 100,000 population and were age adjusted to the 2000 US standard population (19 age groups; Census P25-1130). The annual percent change (APC) in incidence was modeled with and without joinpoints. Models that best represent the data were used. The average APC (aAPC) represented the change in incidence between 1992 and 2014, whereas the APC for specified shorter time periods was derived from joinpoint models. Race/ethnicity was categorized as white non-Hispanic (white), black non-Hispanic (black), Asian non-Hispanic (Asian), Hispanic, Asian Pacific Islander, and American Indian/Alaska Native and Asian (AIAN).

RESULTS
There were 98,856 incident cases of HNSCC diagnosed between 1992 and 2014, including 30,792 cases of OPSCC (31%) and 68,064 cases of non-OP HNSCC (69%). Characteristics of the patients with HNSCC are summarized in Supporting Table 1. The majority were aged ≥50 years (87.0%), men (73.1%), white (73.4%), and ever married (77.4%). The most common anatomic site of HNSCC was the oropharynx (30,792 cases; 31.1%) followed by the oral cavity (28,797; 29.1%) and larynx (28,234 cases; 28.6%). Cancers of the nasal cavity, nasopharynx, and hypopharynx were uncommon (range, 1.3%-5.2%). Patients with OPSCC were more likely than those with non-OP HNSCC to be young (<50 years of age: 15.0% vs 12.1%), men (78.7% vs 70.7%), and white (76.6% vs 71.9%), and to present with regional disease (66.6% vs 41.9%) (P < .001 for each) (see Supporting Table 1).

The number of OPSCC cases tripled between 1992 and 2014. In the past 10 years alone, the number of OPSCC cases increased by 56%, from 5964 cases in 2000 to 2004 to 9291 cases in 2010 to 2014. The number of non-OP HNSCC cases also increased, but more modestly (by 11%), from 14,058 cases in 2000 to 2004 to 15,671 cases in 2010 to 2014. This was driven primarily by increases in tumors of the nasal cavity (43% increase from 240 in 2000-2004 to 344 in 2010-2014), nasopharynx (32% increase from 628 in 2000-2004 to 829 in 2010-2014), and oral cavity (21% increase from 5954 in 2000-2004 to 7178 in 2010-2014), but also included decreases in tumors of the larynx (0.5% decrease from 5945 in 2000-2004 to 5915 in 2010-2014) and hypopharynx (0.4% decrease from 1232 in 2000-2004 to 1227 in 2010-2014).

Incidence
The incidence rate of HNSCC overall during the study period was 11.2 per 100,000 population. The incidence rates of SCC of the oropharynx, oral cavity, and larynx were 3.4, 3.3, and 3.2 per 100,000 population, respectively. The incidence of other non-OP HNSCC sites was <1.0 per 100,000 population for each. In Table 1, incidence rates are summarized by sex, age groups, and race/ethnicity. The rate of HNSCC overall was significantly higher among men compared with women (17.9 vs 5.5 per 100,000 population; P < .001), and at every anatomic site. The risk of OPSCC was 4-fold higher among men compared with women, whereas the risk for non-OP HNSCC was 3-fold higher for men than women. For non-OP HNSCC, the magnitude of the sex difference in risk was most notable for cancers of the larynx and hypopharynx (IRRs, 4.5-5.1; P < .001 for each) and attenuated for those of the oral cavity, nasopharynx, and nasal cavity (IRRs, 1.8-2.7).

The incidence of HNSCC overall increased with age, with an approximately 2-fold higher risk among older
| TABLE 1. IR\(^a\) and IRR\(^b\) of OPSCC and Non-OP HNSCC per 100,000 Population by Sex, Age, and Race From 1992 Through 2014, Including the aAPC\(^c\) |
|---|
| **All HNSCC** | **OPSCC** | **Non-OP HNSCC** |
| **IR per 100,000 Population (95% CI)** | **IRR** | **aAPC; P** | **IR per 100,000 Population (95% CI)** | **IRR** | **aAPC; P** | **IR per 100,000 Population (95% CI)** | **IRR** | **aAPC; P** |
| Overall | 11.2 (11.1-11.3) | -0.8; <.001 | 3.4 (3.4-3.5) | 1.2; <.001 | 7.8 (7.7-7.8) | -1.6; <.001 |
| **Sex** | | | | | | | |
| Women | 5.5 (5.5-5.6) | Reference | -1.2; <.001 | 1.4 (1.3-1.4) | Reference | -0.8; .002 | 4.1 (4.1-4.2) | Reference | -1.0; .003 |
| Men | 17.9 (17.8-18.0) | 3.2 | -0.8; <.001 | 5.8 (5.7-5.9) | 4.2 | 1.7; <.001 | 12.1 (12.0-12.2) | 2.9 | -2.0; <.001 |
| **Age, y** | | | | | | | |
| <30 | 0.1 (0.1-0.1) | 0.0 | 0.04; .95 | 0.0 (0.0-0.0) | 0.0 | - | 0.1 (0.1-0.1) | 0.0 | -0.1; .89 |
| 30-39 | 1.5 (1.4-1.5) | 0.1 | -0.7; .02 | 0.3 (0.3-0.4) | 0.0 | -0.3; .70 | 1.1 (1.1-1.2) | 0.1 | -0.8; .02 |
| 40-49 | 7.7 (7.6-7.9) | 0.3 | -1.0; <.001 | 3.1 (3.0-3.1) | 0.3 | 0.5; .17 | 4.7 (4.6-4.8) | 0.3 | -2.0; <.001 |
| 50-59 | 23.9 (23.6-24.2) | Reference | -0.6; <.001 | 9.3 (9.1-9.5) | Reference | 2.0; <.001 | 14.6 (14.3-14.8) | Reference | 2.0; <.001 |
| 60-69 | 41.5 (41.1-42.0) | 1.7 | -1.1; <.001 | 13.4 (13.1-13.6) | 1.4 | 1.5; <.001 | 28.2 (27.8-28.6) | 1.9 | 2.4; <.001 |
| 70-79 | 47.0 (46.3-47.6) | 2.0 | -1.0; <.001 | 11.4 (11.1-11.7) | 1.2 | 1.4; 29 | 35.6 (35.0-36.1) | 2.4 | -1.9; .02 |
| >80 | 38.5 (37.8-39.2) | 1.6 | -0.02; .90 | 7.0 (6.7-7.3) | 0.7 | 0.7; 10 | 31.5 (30.9-32.2) | 2.2 | -0.2; .12 |
| **Race/ethnicity** | | | | | | | |
| White NH | 12.2 (12.1-12.3) | Reference | -0.2; .02 | 4.0 (3.9-4.0) | Reference | 2.0; <.001 | 8.2 (8.2-8.3) | Reference | -1.4; <.001 |
| Black NH | 14.3 (14.0-14.5) | 1.2 | -2.8; <.001 | 4.4 (3.4-4.6) | 1.1 | -1.8; <.001 | 9.8 (9.6-10.1) | 1.2 | -3.3; <.001 |
| Hispanic | 7.2 (7.0-7.4) | 0.6 | -0.9; .04 | 1.9 (1.8-2.0) | 0.5 | 1.0; .13 | 5.3 (5.1-5.4) | 0.6 | -1.5; <.001 |
| Asian NH | 6.8 (6.6-6.9) | 0.6 | -1.3; .01 | 1.2 (1.2-1.3) | 0.3 | -0.3; .63 | 5.5 (5.4-5.7) | 0.7 | -1.1; .11 |
| AIAN NH | 8.6 (7.9-9.3) | 0.7 | 0.5; .24 | 2.4 (2.1-2.8) | 0.6 | - | 6.2 (5.6-6.8) | 0.7 | - |
| **Calendar period** | | | | | | | |
| 1992-1999 | 12.2 (12.1-12.3) | Reference | -1.6; <.001 | 3.1 (3.0-3.2) | Reference | -0.3; .55 | 9.1 (8.9-9.2) | Reference | -2.0; <.001 |
| 2000-2009 | 10.7 (10.6-10.8) | 0.9; <.001 | -0.49; .24 | 3.4 (3.3-3.4) | 1.1; <.001 | 2.3; <.001 | 7.4 (7.3-7.4) | 0.8; <.001 | -1.7; <.001 |
| 2010-2014 | 10.8 (10.6-10.9) | 0.9; <.001 | -0.1; .73 | 3.9 (3.8-4.0) | 1.3; <.001 | 2.6; .02 | 6.9 (6.8-7.0) | 0.8; <.001 | -1.6; .009 |

Abbreviations: 95% CI, 95% confidence interval; aAPC, average annual percent change; AIAN, American Indian/Alaska Native and Asian; IR, incidence rate; IRR, incidence rate ratio; NH, non-Hispanic; non-OP HNSCC, nonoropharyngeal head and neck squamous cell cancer; OPSCC, oropharyngeal squamous cell cancer.

\(a\) An IR is the risk of a specified diagnosis, calculated as the number of new diagnoses per 100,000 population of the specific sex, age, or race group who do not previously have this diagnosis during the time period of interest. For example, an IR of 10 signifies that for each 100,000 individuals without HNSCC, 10 were diagnosed with HNSCC during the time period between 1992 and 2014. The IRs in this table were age adjusted to the 2000 US standard population (19 age groups; Census P25-1130), thereby providing a population-based estimate for the rate of diagnosis.

\(b\) IRRs compare risk between variables. For example, an IRR of 3.2 for men indicates that the IR was 3.2 times higher among men compared with women during the time period studied.

\(c\) The aAPC provides an estimate of the change in the rate of diagnosis during that time period. A significant aAPC indicates an increase (>0) or decrease (<0) in incidence (risk) during the time period, whereas a nonsignificant aAPC indicates that IRs were stable during that time period.
age groups (aged 60-69 years, 70-79 years, and ≥80 years compared with aged 50-59 years). This increase in risk among those aged 60 to 79 years was more modest for OPSCC (IRRs, 1.2-1.4) (Table 1) compared with non-OP HNSCC (IRRs, 1.9-2.4). As expected, the risk of both OPSCC and non-OP HNSCC was substantially lower for those aged <50 years (Table 1).

When regard to race, the risk of HNSCC was found to be significantly higher among black individuals compared with white individuals from 1992 through 2014 overall (IRR, 1.2; \(P<.001\)), but became higher among white compared with black individuals beginning in 2009. The risk of HNSCC was significantly lower among Hispanic and AIAN individuals compared with white individuals (IRR, 0.6-0.7; \(P<.001\) for each). Similar patterns by race were observed for OPSCC and non-OP HNSCCs, and when examining incidence during the last decade.

**Incidence Trends**

When considering changes in incidence during the study period, the rate of HNSCC overall declined (aAPC, -0.8; \(P<.001\)) (Fig. 1). This observed decrease occurred despite significant increases in the incidence of OPSCC, most notably between 2000 and 2014 (APC, 2.1; \(P<.001\)). Significant declines were observed for each of the non-OP sites (oral cavity, larynx, nasopharynx, hypopharynx, and nasal cavity) (Fig. 1). For non-OP HNSCCs, a decrease was observed between 1992 and 2014 (aAPC, -1.6; \(P<.001\)) and faster decreases were noted between 1996 and 2003 (APC, -3.1; \(P<.001\)).

**Figure 1.** Age-adjusted incidence rates and trends over time for head and neck squamous cell cancers (HNSCCs) overall by (A) site, (B) sex, and (C) race between 1992 and 2014. Incidence rates are represented on the y-axis (per 100,000 population) by calendar year using the selected joinpoint model for 1992 through 2014. For all HNSCC cases, there was a decline from 1992 to 2003 (annual percent change [APC], -1.8; \(P<.001\)) and the incidence remained stable from 2003 through 2014 (APC, 0.2; \(P=0.148\)). For the oropharynx, the incidence rates were stable from 1992 through 2000 (APC, -0.4; \(P=0.415\)) and increased from 2000 through 2014 (APC, 2.1; \(P<.001\)). For nonoropharyngeal (non-OP) HNSCC, the incidence rates declined between 1992 and 1996 (APC, -1.2; \(P=0.41\)), 1996 and 2003 (APC, -3.1; \(P<.001\)), and 2003 and 2014 (APC, -0.8; \(P<.001\)). Incidence rates for the larynx decreased from 1992 through 2014 (APC, -2.7; \(P<.001\)). Incidence rates for the oral cavity decreased from 1992 through 2005 (APC, -1.8; \(P<.001\)) and were stable from 2005 through 2014 (APC, 0.6; \(P=0.104\)). Incidence rates for the hypopharynx decreased from 1992 through 2006 (APC, -3.8; \(P<.001\)) and were stable from 2006 through 2014 (APC, -1.8; \(P=0.063\)). Incidence rates for the nasal cavity were stable over the period between 1992 and 2014 (APC, -0.7; \(P=0.75\)). Incidence trends for HNSCC by sex and race are shown in panels B and C, respectively. Incidence rates were age adjusted to the 2000 US standard population (19 age groups; Census P25-1130). AIAN indicates American Indian/Alaska Native and Asian; NH, non-Hispanic.
Given the similarity in trends observed for each of these non-OP sites, they hereafter will be referred to collectively as non-OP HNSCCs.

The significant declines in HNSCC incidence overall were observed for both women and men (P < .001 for both) (Fig. 1). However, the risk of OPSCC significantly decreased for women (aAPC, -2.0; P = .002) whereas the risk among men was stable from 1992 to 2001 (APC, 0.4; P = .42) and then increased significantly between 2001 and 2014 (APC, 2.7; P < .001) (Fig. 2A). The risk of non-OP HNSCC significantly decreased for both women and men in the study period, although at a faster rate for men (aAPC, -2.0) compared with women (aAPC, -1.0) (P < .001 for each) (Fig. 2B). For men, the rate of decline was more modest in the more recent calendar period (2004-2014: APC, -0.9; P < .001) than that observed between 1992 and 2004 (APC, -2.9; P < .001).

To account for the observed differences by sex, subsequent analyses exploring incidence trends by age and race were stratified by sex. Between 1992 and 2014, the incidence of OPSCC in women was stable for those aged < 60 years, but decreased significantly among those aged 60 to 69 years (aAPC, -1.6; P = .02) and 70 to 79 years (aAPC, -1.1; P = .005) (Fig. 3A). By contrast, there were significant increases noted in the incidence of OPSCC among men aged 50 to 79 years (aAPCs, 2.1-2.5) (Fig. 4A). It is interesting to note that for some ages the increases in incidence were more dramatic during specific time periods (eg, men aged 70-79 years had an APC of 4.8 between 1992-1998). For non-OP HNSCC, the incidence decreased among all age groups of men and the majority of age groups of women (except for those aged 30-39 years: aAPC, 1.3; P = .03), and nonsignificant declines were observed among women aged 40 to 49 years and ≥ 70 years. This increase among women aged 30 to 39 years was driven by an increasing incidence of cancer of the oral cavity.

We next explored incidence trends by race and ethnicity. The incidence of HNSCC overall decreased among women across all race categories (see Supporting Fig. 1). The rate of decrease was fastest among black women (aAPC, -2.6; P < .001). Similarly, among men, the incidence of HNSCC overall decreased for all race categories (P < .001 for all except Asian Pacific Islander and AIAN men), with the fastest decrease noted among black men (aAPC, -3.0; P < .001) (see Supporting Fig. 2). The incidence of OPSCC decreased significantly among black women (aAPC, -1.8; P = .006), but was stable among white women (P = .42) (Fig. 3B). Given the small numbers in other race categories, trends in the incidence of OPSCC could not be evaluated. Among men, the incidence of OPSCC significantly decreased among black men (aAPC, -1.9; P < .001). However, a significant increase was observed among white men (aAPC, 2.8; P < .001) and a more modest increase was observed among Hispanic men (aAPC, 1.4; P = .096) (Fig. 4B). Examining only the past 10 years (2005-2014), similar trends were observed with increasing OPSCC incidence among white (aAPC, 3.5; P < .001) and Hispanic (aAPC, 4.8;
men, but not for black men (aAPC, -1.9; P<.001), white women (aAPC, -0.2; P = .42), or black women (aAPC, -1.8; P = .006). For non-OP HNSCCs, the incidence decreased significantly among women and men of every race (except for a stable incidence among Asian men). These decreases were largest for black men (aAPC, -3.4). In 2014, the incidence of non-OP HNSCC remained higher among black men than men of other races and ethnicities, although the disparities in rates were substantially less than in prior years (Fig. 4C). The incidence of non-OP HNSCC also decreased substantially among black women (aAPC, -3.0), first dropping below the rate in white women in 2003, with rates by 2014 of 3.2 versus 4.2 per 100,000 population (P = .02) in black versus white women (Fig. 3C).

Site-specific trends in non-OP HNSCC included a decreased incidence of cancers of the oral cavity (aAPC, -1.1 [P < .001] for men and aAPC, -0.4 [P = .02] for women), larynx (aAPC, -2.7 [P < .001] for men and aAPC, -3.1 [P < .001] for women), hypopharynx (aAPC, -3.1 [P < .001] for men and aAPC, -3.9 [P < .001] for women), nasopharynx (aAPC, -0.6 [P = .15] for men and aAPC, -1.0 [P = .06] for women), and nasal cavity (aAPC, 0.4 [P = .57] for men and an aAPC that could not be calculated for women) (see Supporting Fig. 3). When exploring the incidence of these non-OP sites stratified by sex and race, the incidence was found to decrease in all groups, except for the oral cavity, in which an increasing incidence was observed between 2006 and 2014 among white men (APC, 1.2; P = .04), but not men of other races, or among women overall. Among women aged 50 to 59 years, the incidence of SCC of the oral cavity also appeared to increase between 2006 and 2014 (APC, 3.3; P = .035), but this increase was not observed among women of other age groups.

![Figure 3](image-url)
DISCUSSION

The current analysis is a comprehensive evaluation of population-based incidence trends for HNSCC using what to our knowledge are the most current data available. Despite the consistent increases in the incidence of OPSCC, which now represents approximately 40% of HNSCC cases diagnosed in the United States, the incidence of HN cancers are declining overall, most notably among black men and women. Indeed, each of the major anatomic sites of HNSCCs can be considered as rare cancers, because the incidence is fewer than 6 cases per 100,000 individuals per year. The clinical importance of incidence trends is the risk of being diagnosed with the condition of interest. Therefore, the results of the current study demonstrate that the risk of HNSCC has decreased overall, but that the risk of being diagnosed with OPSCC has actually increased.

A rapid decline in the incidence of HNSCC occurred from 1992 to 2003. However, beginning around 2003, the incidence of HNSCC overall began to increase modestly, driven by larger increases in OPSCC noted among men. To the best of our knowledge, no recent analysis has included cancers of the hypopharynx, nasal cavity, and nasopharynx to describe current incidence trends of HNSCC overall or of non-OP HNSCCs. Prior work has shown a decline in HPV-unrelated cancers of the oral cavity and oropharynx,1,14,15 and a decline in laryngeal cancer using data up to 1997.16 This analysis is a more accurate representation of the comprehensive changes in incidence for all HPV-unrelated cancers: the incidence of non-OP HNSCCs consistently declined.
between 2003 and 2014 in all subgroups (ie, by sex, race, and tumor site, with few exceptions).

The incidence of HNSCC historically has been higher among black individuals compared with white individuals in the United States. However, to our knowledge, this is the first time the incidence of HNSCC has been lower among black individuals compared with white individuals, beginning around 2008 (Fig. 1). Furthermore, over the past 10 years, the incidence of non-OP HNSCCs has continued to dramatically decline among men (Fig. 2B). These changing trends in case burden mark a change in patients with HNSCC, with more cases of OPSCC and fewer cases of non-OP HNSCC. The evaluation of these changes is important to inform the need for specialty-specific HN oncologic providers (eg, staffing and training) because the continuing decline in OPSCCs remain rare. This, in combination with the extensive data regarding survival benefits for high-volume centers, support the need for the centralized care of patients with HNSCC.

Several novel findings by race were observed, including an increase in OPSCC among Hispanic men. Although the incidence of OPSCC remains lower among Hispanic compared with white men, it is steadily increasing among Hispanic men in parallel fashion to white men, with a dramatic increase noted in recent years (2006-2014: APC, 5.4 [P = .003]). Prior work has shown that the prevalence of HPV-positive tumors has increased over time across races, indicating that HPV also is driving incidence trends among these other racial groups. Among black individuals, the percentage of OPSCC cases caused by HPV is increasing, therefore suggesting that the dramatic reduction in the incidence of OPSCC noted among black individuals resulting from reductions in tobacco-related and alcohol-related cancers would be even larger if not for the increasing contribution of HPV-positive cancers among this group. Among women, the previous racial disparity in the incidence of OPSCC between white and black women no longer exists. These differences by race are important to consider both by clinicians and public health practitioners because there are well-established differences in access to care by race as well as prognostic differences.

When considering changes in the landscape of non-OP HNSCC, the incidence has declined in both women and men, although these declines are more dramatic among men. The incidence of non-OP HNSCC among white women began to surpass that of black women beginning in 2008, with continued, widening reverse disparities in cancer between the 2 races noted since that time. In men, the decrease in incidence has been steady and significant for black men, but less prominent for white men, and the burden of non-OP HNSCC remains higher for black men. These more rapid declines among black individuals may be explained by the larger decrease in daily smoking among black versus white individuals in the United States in recent decades.

In the current analysis, incidence trends of cancers of the nasal cavity, nasopharynx, oral cavity, larynx, and hypopharynx were found to be similar, and therefore were considered collectively as non-OP HNSCCs. Although these are rare cancers, determining changes in incidence is important to understand the contribution of etiologic agents. There were nonsignificant declines in the incidence of cancers of the nasal cavity and nasopharynx, whereas those of the oral cavity, larynx, and hypopharynx were found to be declining significantly. A significant increase in cancers of the oral cavity was confirmed in younger women, although these cancers remain rare with an unknown etiology driving this trend.

In younger age cohorts, increases in the incidence of OPSCC were observed (consistent with prior reports), but decreases of a similar magnitude were observed with regard to non-OP HNSCC. This declining incidence of non-OP HNSCC among younger age cohorts is the result of decades of success in reducing tobacco use in the United States. However, recent US population-based data observed a higher smoking prevalence among men and women aged 18 to 44 years compared with those aged 45 to 64 years (19% vs 8%), suggesting that the incidence of non-OP HNSCC may increase in the future once this younger cohort ages, unless tobacco cessation efforts are successful.

The current study has several limitations, including the use of registry data from 13 states and a lack of HPV data. Bias due to geographic variations is possible. Intrinsic to SEER data is the possibility of site misclassification. The site categories used were largely consistent with the literature, with a few modifications to reduce potential misclassification, and those with potential overlap were excluded. However, misclassification as a source of confounding remains. Although this is a comprehensive analysis of HNSCC, other cancers of the head and neck (eg, salivary gland, cutaneous, thyroid, etc) were not included.

We believe the current study offers a comprehensive analysis by sex, race, and anatomic site of the
epidemiology of HNSCC over 22 years in the United States. We have documented a striking prolonged decrease in the incidence of HNSCC among both men and women and increases in OPSCC not only among white individuals but among some other ethnic/racial groups as well.

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