Tobacco Use in King County Washington: A Medicaid Data Analysis Report

Executive Summary

Background

Commercial tobacco use remains the leading cause of preventable disability and death in the United States. In 2019, tobacco use was responsible for an estimated 14.7 million years of life lost due to poor health, disability, or early death, nearly all of which is attributable to cigarette smoking. The cost of tobacco use is a staggering $130 billion in direct health spending and upwards of $185 billion in indirect health spending due to productivity losses annually. Medicaid beneficiaries smoke cigarettes at over twice the rate of those with commercial insurance and face a disproportionate burden of tobacco-related illnesses, making them particularly important for states to target in their public health interventions. However, while effective tobacco cessation treatments exist, these are often underused in the Medicaid population. Currently, there is no systematic way for state tobacco control programs to identify tobacco users and intervene with targeted public health strategies. Without infrastructure for active surveillance, tobacco control efforts may not reach the populations with the greatest need.

Washington as a Model State

Washington state collects self-reported tobacco use data through its Medicaid enrollment form. Washington also has a relatively advanced data infrastructure for Medicaid and all-payer claims data from which to conduct surveillance of tobacco cessation treatment in the Medicaid population. In collaboration with CDC, ASTHO engaged partners in Washington to examine the extent to which state and territorial health agencies (S/THAs) could utilize Medicaid claims and enrollment data to identify tobacco users in the Medicaid population, utilization of cessation services, and associated comorbidities to inform opportunities for more strategic clinical interventions and population health strategies.

Key Findings

Claims data and self-reported tobacco use during Medicaid enrollment represent complementary assessment methods and data streams that capture distinct populations of tobacco users with important sociodemographic differences. Each has its own limitations and significantly undercounts tobacco users when used alone, but combined provide a robust tool for surveilling tobacco use and cessation services. Notably, claims data enhances the capture of individuals who are reluctant to identify themselves as tobacco users, and tends to capture individuals who are younger, women, and from racial and ethnic minoritized groups. Self-report data may enhance the capture of individuals who do not access medical care, including cessation-specific services. The data presented in this case study also demonstrates potentially significant disparities in receipt of tobacco cessation therapies across minority groups and how an effective data infrastructure can help S/THAs target outreach, inform public health campaigns, and assess their effects in the Medicaid population.

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[1] Commercial tobacco refers to products that are made and sold by tobacco companies. It does not include traditional tobacco used by Indigenous groups for religious or ceremonial purposes. Commercial tobacco will be referred to as "tobacco" in this document.

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Challenges and Policy Solutions

Effective tobacco surveillance requires coordination between multiple state agencies and departments, robust data-sharing processes, and personnel with the expertise to work with claims and other administrative data sources. These resources are often limited for many S/THAs. States should consider bolstering data infrastructure and developing clearly articulated processes for data-sharing among state Medicaid agencies and regional health departments. Advancing shared support service models that allow S/THAs with expertise and resources to provide technical assistance and data analysis for less resourced S/THAs could enhance capacity for state tobacco control efforts. Finally, given the limitations of any one data source to capture tobacco use, states could consider adding a question to Medicaid enrollment forms about tobacco use and use standardized language, including identifying smoking versus other forms of tobacco use and the frequency with which beneficiaries use tobacco.

BACKGROUND

Cigarette smoking among adults has declined over the last 50 years. However, commercial tobacco use, hence forth just referred to as tobacco use, is the leading cause of death in the United States. Significant socioeconomic and racial disparities persist among tobacco users—people living in or near poverty use tobacco more frequently and heavily, and they suffer from a greater burden of tobacco-related diseases than those with higher incomes. This disparity is seen among members enrolled in Medicaid, which includes low-income families and individuals, as well as categorically eligible children, parents, pregnant women, seniors, and people with disabilities. More than one in four Medicaid beneficiaries use some form of tobacco compared to 16.2% of those with private insurance. Specifically, in 2021, rates of cigarette smoking among Medicaid beneficiaries were 2.5 times greater than those with private insurance (21.5% versus 8.6%, respectively). This high rate of tobacco use among Medicaid beneficiaries is costly for states, with over $39 billion spent annually by Medicaid on smoking-related medical services.

While effective treatments for tobacco cessation exist, these treatments do not always reach the populations with the most need. A 2015 survey found that, among Medicaid tobacco users, 74% were advised by a health provider to quit, yet less than half received information on medications or other methods to help them quit. Identifying datasets relevant to Medicaid beneficiaries for analyzing tobacco use trends, comorbidities, and receipt of cessation treatment is critical in understanding systematic barriers to treatment and developing appropriate interventions and tobacco control policies.

To date, there exists a lack of data infrastructure among S/THAs necessary for tobacco use surveillance in the Medicaid population. S/THAs typically rely on indirect estimates of tobacco use from national surveys (e.g., Behavioral Risk Factor Surveillance System, BRFSS; the Tobacco Supplement to the Current Population Survey, TUS-CPS; Youth Risk Behavior Surveillance System, YRBSS), as well as some state-specific population surveys (e.g., the Healthy Youth Survey in Washington). Data from national surveys are limited in that they are not granular enough to identify and follow-up on specific populations for targeted health interventions, might not capture use of cessation services, and data is often delayed by at least two years. While claims data—including Medicaid and all-payer claims data (APCD)—may offer greater specificity and timeliness, S/THAs often face barriers to access that data or may not have the resources to maintain active surveillance programs using extant claims. If barriers in data infrastructure could be overcome, there is substantial opportunity to improve the surveillance of tobacco use and increase the number of individuals receiving evidence-based treatment for their tobacco use.

In collaboration with CDC, ASTHO engaged partners in Washington to examine the extent to which S/THAs could utilize Medicaid claims to identify people who use tobacco in the Medicaid population, the utilization of cessation services, and associated comorbidities to inform opportunities for more strategic clinical interventions and population health strategies. To demonstrate the value of Washington's robust data sharing infrastructure, this analysis combines Medicaid claims and eligibility data with other enrollment data to identify tobacco users, characterize common comorbidities, and analyze the prevalence of tobacco use cessation treatment in King County from 2016 – 2023.

DATA LANDSCAPE IN WASHINGTON

Washington presents a unique opportunity to study tobacco use in the Medicaid population. In a recent scan of state Medicaid application forms conducted by ASTHO, Washington is one of five states that actively collects tobacco use data through Medicaid eligibility forms (**Figure 1**). When combined with claims data, this self-reported information significantly strengthens the ability to detect tobacco use among Medicaid beneficiaries and better allows for strategic targeting of people in need of cessation services.

Figure 1: States Collecting Tobacco Use Data Through Medicaid Eligibility Forms
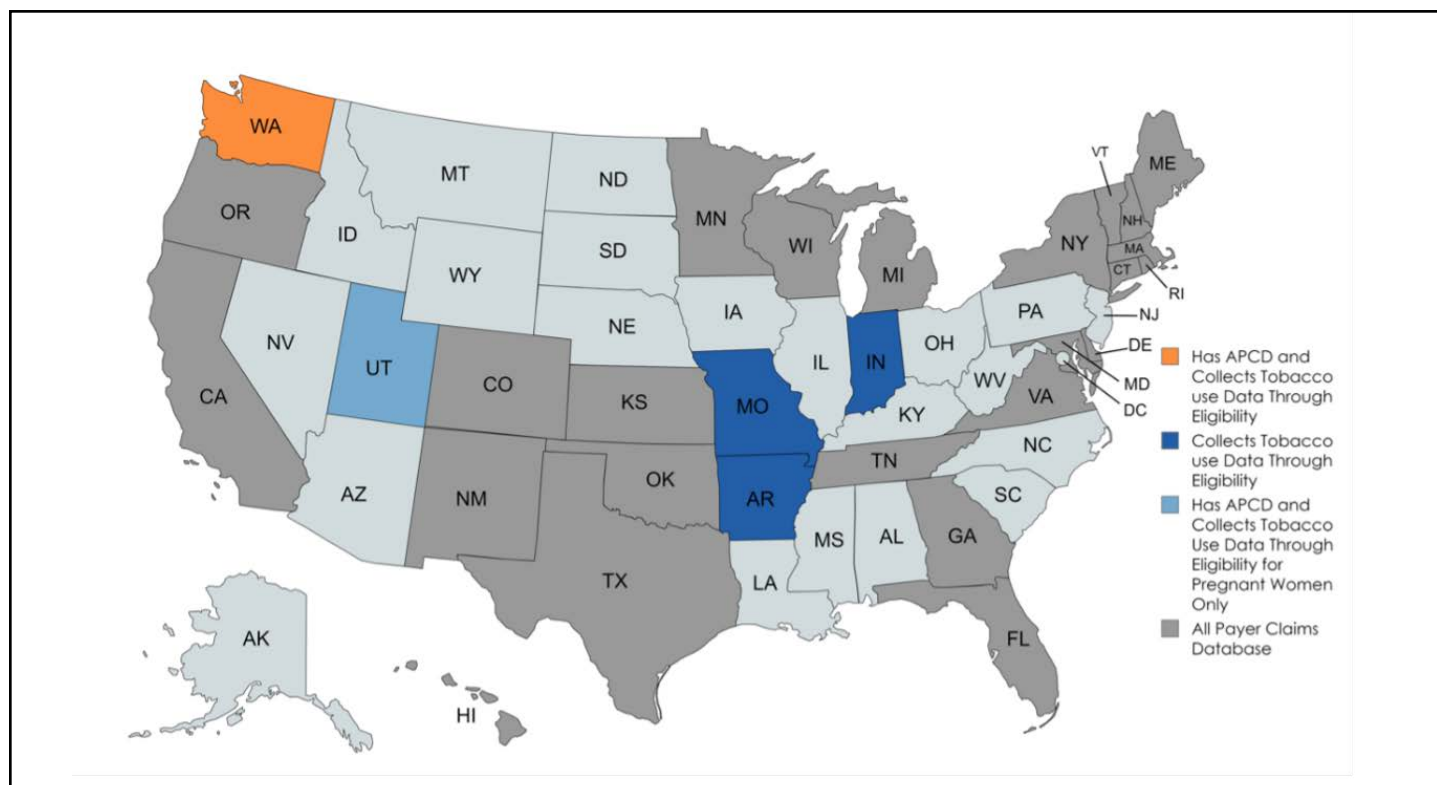
Self-Reported Tobacco-Use Data

Most Medicaid beneficiaries in Washington state apply for coverage through the Washington Healthplanfinder online marketplace, which is operated by the Washington Health Benefits Exchange (WAHBE). During the enrollment process, beneficiaries are asked the following question on the application for healthcare coverage:[2]

> "Have any of the members listed above used tobacco products (more than four times per week) regularly in the past six months? Vape and e-cigarettes are not included. Please check the box for any member who has used tobacco products in the last six months."

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[2] The Application for Health Care Coverage is used to determine what coverage an individual qualifies for including Washington Apple Health (Medicaid), Apple Health for Kids (Children's Health Insurance Program), a tax credit for a Qualified Health Plan or full-cost private Qualified Health Plan and Qualified Dental Plan through Washington Healthplanfinder (for individuals, families, and small businesses).

There are some specific caveats to the tobacco use data collected. For these beneficiaries—which include adults 18-64 years of age, children, parents of children, or pregnant individuals—Medicaid coverage is administered by the Washington Health Care Authority (HCA). However, certain Medicaid beneficiaries—including those dually eligible for Medicare and Medicaid, people with disabilities, those who need long-term services and supports, and those who do not qualify for Medicaid due to immigration status—receive benefits through the Department of Social and Health Services (DSHS) and apply through a separate platform called Washington Connection. Tobacco use is not self-reported for individuals who receive benefits through DSHS. Thus, the population of beneficiaries who are not asked about their tobacco use in the enrollment process are qualitatively different from the population that is asked this question. The implications of this difference will be discussed more in detail at the end of the report.

Medicaid Claims and Eligibility

HCA manages Washington's Medicaid claims and eligibility data. Unlike self-reported enrollment data on tobacco use, claims data contain information on provider billed services. This includes receipt of tobacco cessation services, such as tobacco cessation counseling, nicotine replacement, and drug therapy (e.g., varenicline or buproprion). Diagnoses associated with provider services and filled prescriptions are also ascertainable. Claims data can identify tobacco use when a provider specifically lists it as an associated diagnosis for another service, bills for a specific cessation service (such as if tobacco cessation counseling is provided), or if a patient fills a prescription for nicotine replacement or a tobacco cessation therapy. Claims data incorporates sociodemographic variables captured during enrollment, provides a rich source to study individual-level outcomes, and gives the health system the ability to identify and follow-up with beneficiaries to improve care.

Public Health - Seattle King County (PHSKC)

Beginning in 2015, PHSKC has used Medicaid claims and eligibility data to conduct public health surveillance/assessment, program evaluation, performance measurement, and research analyses on Medicaid beneficiaries residing in King County. Through an annually updated data sharing agreement with HCA, PHSKC receives updated data each month and maintains historical data going back a decade. Building on this initial experience working with Medicaid claims and eligibility data, PHSKC expanded its access to claims data by adding Medicare fee-for-service and WA-APCD data in 2018 (both under data sharing agreements with HCA), which have been used to conduct population health analysis on the state level. Data for Medicaid claims are updated monthly, and the WA-APCD database updates are quarterly. In the context of local health departments in the United States, PHSKC's capacity and infrastructure to access and use health insurance claims data for routine public health practice is rare. PHSKC's routine use of claims data provides an enormous benefit in filling in the knowledge gap regarding the burden of illness and injury and use of healthcare services in the King County and Washington State population.

ASSESSING TOBACCO USE AND CESSATION SERVICES

This analysis takes advantage of two data streams to identify tobacco users within the Medicaid population in King County. The first source is claims data maintained by the HCA. The second source is the self-reported tobacco use data collected during the Medicaid enrollment process and provided by WAHBE. The data presented in this report was made possible through a public-academic collaboration between several organizations as shown in Figure 2. A team at PHSKC is able to access and download identifiable Medicaid claims data directly from the HCA's electronic data repository, ProviderOne. For this study, data were processed into analytic tables and combined with the self-reported tobacco use data from WAHBE, and then de-identified and encrypted. De-identified data was then sent to the University of Washington research team. This process requires programmatic and statistical expertise within the sharing public health department to turn raw Medicaid claims data into useful information for public health surveillance. It also benefits from a data sharing agreement between HCA and PHSKC which allows for automatic monthly transfer of updated claims data.

Figure 2: Data Sharing Information
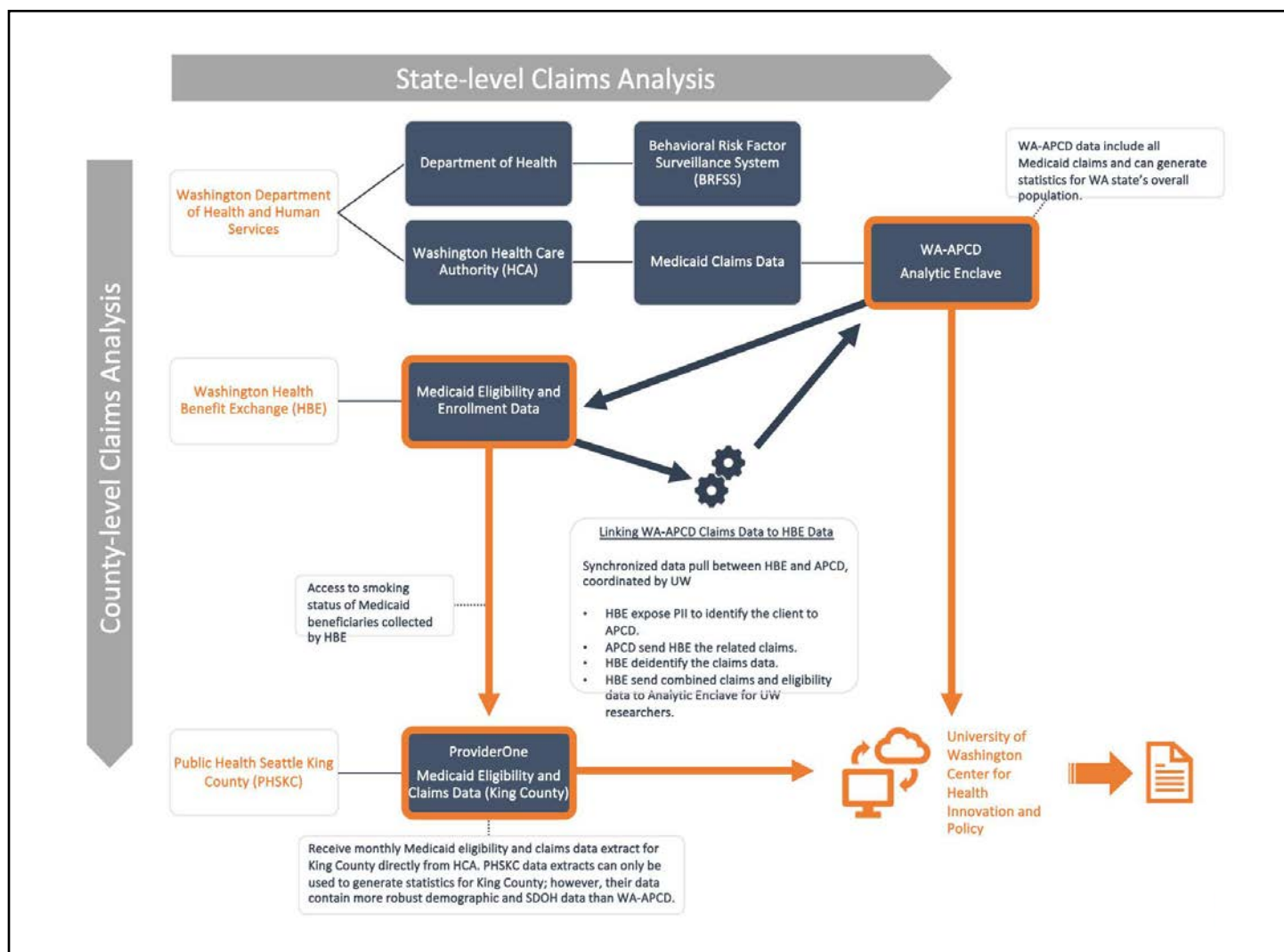
Guiding Questions

The analysis presented here focuses on the following guiding questions:

1. What is the utility of Medicaid claims data for identifying tobacco use and how does the addition of self-reported tobacco use data improve identification of tobacco users?

2. How does tobacco use vary across demographic groups within the Washington Medicaid population?

3. What is the relationship between tobacco use and chronic and behavioral health comorbidities?

4. How are tobacco cessation services distributed across patients? What are the time trends of different types of cessation treatment?

Study Population

Adult Washington Medicaid beneficiaries (18-64 years of age) who enrolled through the WAHBE between 2016 – 2023 were included in this analysis. Individuals who were dually-eligible for Medicare and Medicaid, as well as others who received benefits from DSHS and for whom self-reported tobacco use data was not available, were excluded (approximately 13.6% of the King County Medicaid beneficiary population). To ensure adequate capture of comorbidities and cessation services, beneficiaries were required to have at least seven months enrollment in any given year. If a beneficiary was enrolled for multiple years, only those years in which they met the minimum enrollment criteria were included in the study population.

Box 1: Criteria Used to Identify Tobacco Users in Claims Data

1. ICD-10-CM codes for tobacco use (**Z72.0, F17.xx, O99.33x, T65.21[124], T65.22[124], or T65.29[124]**).

2. ICD-10-CM procedure code for tobacco use counselling **Z71.6**.

3. CPT/HCPCS procedure code for tobacco use counselling (**99046, 99047, S9453, 4000F, 4001F**).

4. HCPCS procedure code for patient screened for tobacco use and identified as a tobacco user: **G9902, G9906, G9908**.

5. NDC codes for nicotine replacement therapy.

6. NDC codes for varenicline.

Identification of Tobacco Use

Tobacco use in claims data was identified using a combination of diagnosis codes, service codes, and pharmacy claims for tobacco-related therapies (National Drug Codes, NDCs) as shown in Box 1. Pharmacy claims represent filled prescriptions; thus, claims data cannot identify cases in which a beneficiary was provided with a prescription yet elected not to fill that prescription. Although buproprion is used as a tobacco cessation therapy, it is more commonly used to treat anxiety; consequently, buproprion was not included in the criteria for tobacco use in this analysis.

A beneficiary flagged as a person who uses tobacco in any year was assumed to be a tobacco user in all years. This decision is necessary due to the limitations of claims data. Lack of evidence of tobacco use in a given year does not mean the beneficiary was not using tobacco during that period, but rather that they did not receive a billable service or diagnosis from a clinician for their tobacco use (such as for patients with infrequent provider encounters). Thus, claims data under-represent the true tobacco use rate in the population.

To improve the detection of tobacco use, claims data were linked to WAHBE eligibility data which included an indicator for self-reported tobacco use and the years of enrollment. In Washington, tobacco use data is collected during first enrollment, but is inconsistently collected thereafter (e.g., not all beneficiaries have to re-enroll each year through WAHBE and so do not receive the tobacco use question every subsequent year of enrollment). As a result, tobacco use status is not refreshed for many beneficiaries in the Medicaid population. For this analysis, individuals who reported tobacco use during enrollment were assumed to be tobacco users in all years of the study period, similar to how we flagged individuals in claims. While this assumption is necessary to avoid misclassification of tobacco users, it does mean that neither claims nor self-reported enrollment data as currently collected in Washington can accurately identify changes in tobacco use behaviors, such as when patients quit their use. The final population of tobacco users included those who either self-reported tobacco use during enrollment, had evidence of tobacco use via claims criteria, or both. The group identified as tobacco users thus relied on two assessment methods with different definitions of a tobacco user.

The proportion of tobacco users who received cessation services was calculated annually. Tobacco cessation services included counseling, nicotine replacement therapy, or varenicline therapy. When screening for tobacco use across the Medicaid beneficiary population, only rare instances were found where providers billed for screening services (only 0.15% of beneficiary-years had evidence of tobacco screening), which are not reported here.
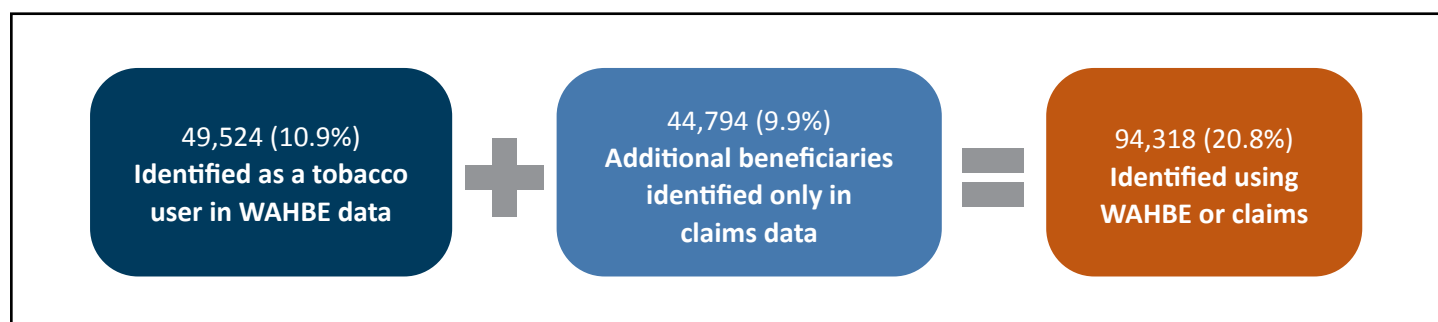
Statistical Analysis

Multivariable logistic regression models were used to assess the patient demographic and clinical characteristics associated with tobacco use and receipt of cessation services. The probability of tobacco use was modeled at the beneficiary level. Among enrollees identified to use tobacco, receipt of cessation services was modeled in two ways. First, characteristics associated with receipt of a cessation service at any point in the six-year period was modeled at the beneficiary level. Second, trends and in receipt of cessation services among the population and the characteristics of enrollees receiving those services in each of the years was modeled at the beneficiary-year level. The population of tobacco users for all analyses were those identified either through WAHBE or claims. Models included gender, race and ethnicity, preferred language, age group, and comorbidities. Associations between total comorbidity burden and specific comorbidity profiles were also assessed. Associations between receipt of any cessation services, counseling specifically, and drug therapy specifically were assessed for the subset of tobacco users after controlling for sociodemographic and clinical factors. Given that cessation treatment is also part of the claims criteria to identify a tobacco user, results from logistic models that included tobacco users overall, as well as just the subset identified through both self-report in the WAHBE and claims data are presented.

MAIN FINDINGS

The final study population included 454,420 adult Medicaid beneficiaries in King County, Washington, with 1,504,144 beneficiary-years available for analysis. The derivation of the study population is presented in Figure A1 in the Appendix. Figure 3 demonstrates the value of merging self-reported tobacco use data with claims data. A total of 94.318 (20.8%) beneficiaries were identified as tobacco users based on either self-reported WAHBE data or claims criteria, which is consistent with national estimates (e.g. the Behavioral Risk Factor Surveillance System data for 2016 – 2020 shows that 20% of King County Medicaid beneficiaries self-reported current smoking).

Figure 3: Identification of Tobacco Users in the King County, Washington Medicaid Population

49,524 (10.9%)
Identified as a tobacco user in WAHBE data

44,794 (9.9%)
Additional beneficiaries identified only in claims data

94,318 (20.8%)
Identified using WAHBE or claims

Importantly, neither data source appeared to be sufficient to identify the population of tobacco users. A total of 49,524 (10.9%) of beneficiaries self-reported their tobacco use in WAHBE data, whereas a total of 76,770 beneficiaries were identified as tobacco users in claims data. Of these tobacco users identified in claims, approximately 34% (N=31,976) also reported their tobacco use during enrollment, leaving 44,794(9.9%) additional beneficiaries who were identified only through claims data.

Beneficiaries identified in each dataset had important differences in sociodemographic characteristics (Appendix **Table A1**). Namely, relative to those only self-identifying as tobacco users during enrollment, beneficiaries who are identified as tobacco users in claims only are more likely to be women, from racial and ethnic minority groups, and non-English speakers. The population captured in claims only also had a greater burden of chronic medical and behavioral health conditions. Members who were identified in both datasets were also more likely to be older, female, White, and speak English relative to members identified on in the self-identifying data. In addition to these sociodemographic and clinical differences, claims data is expected to enhance the capture of beneficiaries who may be reluctant to identify themselves as tobacco users during enrollment, while self-report data is expected to enhance the capture of individuals who are less likely access or engage in medical care. For example, a beneficiary who is a tobacco user that rarely visits a primary doctor, has not sought treatment for their tobacco use, and has yet to develop a chronic condition related to their tobacco use necessitating care would be unlikely to be captured in claims data as there is no opportunity for a provider to identify and document tobacco use or generate a claim for tobacco cessation services. Similarly, claims data would also underrepresent individuals who have had limited interactions with healthcare providers as contact with medical providers are necessary to receive billable services. Further, not all sources of care are equivalent. Tobacco use diagnoses and cessation treatments are far more likely to be offered and billed for in primary care or certain specialty care settings, and less likely to be coded during other types of visits, such as an emergency department visit. Combining both streams of data provides a more complete picture of the tobacco users and appears to capture different subpopulations of beneficiaries.

Characteristics of Tobacco Users

Table A2 in the Appendix summarizes the beneficiary characteristics associated with tobacco use among the 94,318 tobacco users identified in either WAHBE or claims. These results demonstrate well-known relationships. Men, American Indian/Alaska Native persons, persons identifying with more than one race/ethnicity, persons speaking a primary language other than English (specifically Chinese and Vietnamese), and those with chronic medical and behavioral health conditions were more likely to be identified as tobacco users than women, white persons, English speakers, and those without comorbidities. After adjusting for all other factors, the strongest predictor of tobacco use was the presence of a behavioral health condition. Beneficiaries with a behavioral health condition had nearly three times greater odds of smoking compared with those who did not have a behavioral health condition. In terms of adjusted percentages, 34.9% of enrollees with a behavioral health comorbidity use tobacco.

When specific comorbidities were examined, unsurprisingly there was a strong association between tobacco use (identified through either source), COPD, and substance use disorders (**Figure 4 and Appendix Table A3**). Among tobacco users, 27.8% had no chronic condition, whereas 21.6% had 5 or more chronic conditions. Importantly, approximately 72.2% of tobacco users also had a one or more chronic conditions (**Figure 5**).

Figure 4: Association between comorbidities and tobacco use among all Medicaid members. Tobacco users identified through WAHBE or claims.

Physical Health Conditions

Condition	OR	CI
Acute Myocardial Infarction	OR: 1.32	CI: 1.15 - 1.5
Asthma	OR: 1.4	CI: 1.35 - 1.45
Atrial Fibrillation and Flutter	OR: 0.76	CI: 0.69 - 0.85
Chronic Kidney Disease	OR: 0.99	CI: 0.93 - 1.05
Colorectal Cancer	OR: 1.03	CI: 0.85 - 1.26
COPD	OR: 3.79	CI: 3.57 - 4.01
Diabetes	OR: 0.99	CI: 0.95 - 1.03
Endometrial Cancer	OR: 0.77	CI: 0.55 - 1.04
Breast Cancer	OR: 0.78	CI: 0.68 - 0.9
Heart Failure	OR: 1.18	CI: 1.09 - 1.28
Hyperlipidemia	OR: 0.94	CI: 0.91 - 0.97
Hypertension	OR: 1.18	CI: 1.15 - 1.22
Ischemic Heart Disease	OR: 1.36	CI: 1.26 - 1.46
Lung Cancer	OR: 2.23	CI: 1.74 - 2.86
Prostate Cancer	OR: 0.81	CI: 0.63 - 1.04
Stroke	OR: 1.3	CI: 1.21 - 1.39
Urologic Cancer	OR: 1.01	CI: 0.75 - 1.34
Pneumonia	OR: 1.49	CI: 1.41 - 1.58

Behavioral Health Conditions

Condition	OR	CI
ADHD	OR: 0.82	CI: 0.78 - 0.85
Adjustment Disorder	OR: 1.01	CI: 0.98 - 1.05
Anxiety Disorder	OR: 1.09	CI: 1.07 - 1.12
Depression	OR: 1.25	CI: 1.22 - 1.28
Impulse/Conduct Disorder	OR: 1.75	CI: 1.62 - 1.9
Mania/Bipolar	OR: 1.35	CI: 1.29 - 1.42
Psychotic Disorder	OR: 1.5	CI: 1.45 - 1.55
Alcohol Use Disorder	OR: 2.27	CI: 2.2 - 2.34
Cannabis Use Disorder	OR: 2.6	CI: 2.51 - 2.7
Cocaine Use Disorder	OR: 2.21	CI: 2.05 - 2.38
Opioid Use Disorder	OR: 2.52	CI: 2.42 - 2.62
Other Stimulant Use Disorder	OR: 4.29	CI: 4.09 - 4.49
Other Substance Use Disorder	OR: 2.59	CI: 2.47 - 2.71
Sedative Use Disorder	OR: 1.73	CI: 1.57 - 1.92

Figure 5: Percentage of Medicaid beneficiaries using tobacco by number of comorbidities. Tobacco users identified through both WAHBE and claims.
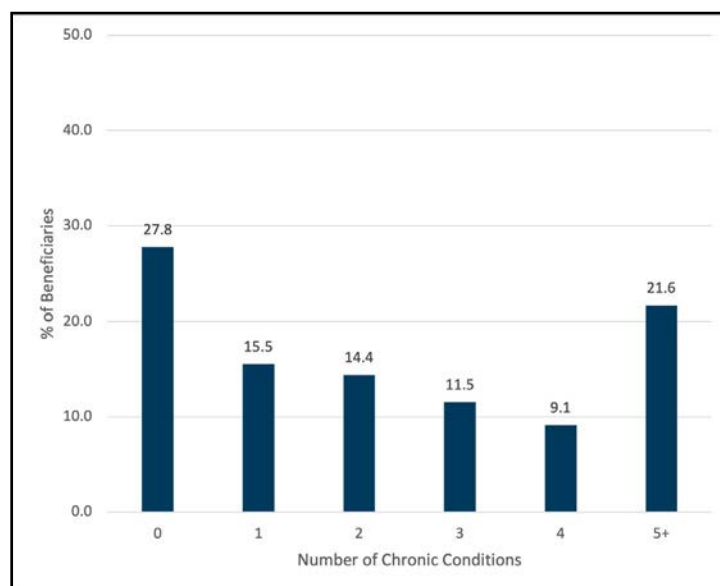
Tobacco Cessation Treatment

Table A4 in the Appendix summarizes receipt of any tobacco cessation services by patient characteristics among identified tobacco users. Across the whole sample, a total of 24.6% of tobacco users received at least one cessation service during the six-year study period. As tobacco cessation services contribute to the definition of a tobacco user for those identified through claims, this proportion is expected to be an overestimate. Among just those who self-reported tobacco use during enrollment and were in the claims data, 36.3% received at least one cessation service during the six-year period. Among people that were only identified by self-report, no tobacco users received cessation services, representing 19% (17,548) of all tobacco users in our study.

Figure 6 shows trends in tobacco cessation treatment in the Medicaid population relative to that of tobacco use for the Medicaid population as a whole. **Figure A2** in the Appendix breaks down these trends into counseling, nicotine replacement therapy, and varenicline therapy, specifically. The proportion of tobacco users receiving any cessation treatment remained relatively steady until 2020. During the COVID pandemic, both the proportion of Medicaid enrollees identified as tobacco users and those receiving cessation services declined. The decline in identified tobacco use likely related to both lower rates of healthcare use, and thus lower opportunity for providers to code a tobacco use diagnosis or service during 2021 and 2022. A similar decline was noted among tobacco users identified in the WAHBE and the claims dataset (Appendix **Figure A3**).

There were notable differences among beneficiaries who did and did not receive any cessation services (Appendix **Table A5**) overall. Perhaps more importantly, these differences varied depending on whether the entire sample of tobacco users was included in the analysis (e.g., those identified by claims or self-report) or just those who were only in the claims dataset or those who were in both the claims and those who self-reported tobacco use during enrollment. Notably, most racial and ethnic minorities and males appeared to be significantly less likely to receive cessation services regardless of which cohort was examined, while some non-English speakers (Chinese, Other language), people older than 24 years of age, and people with a physical health comorbidity and/or a behavioral health comorbidity were more likely to receive services . These findings are important both for public health reasons as well as for the insights they reveal about the different datasets.

Figure 6: Trends in tobacco use and cessation treatment from 2016 – 2021 in Washington state. Tobacco users identified in either WAHBE or claims. Cessation services identified in claims.
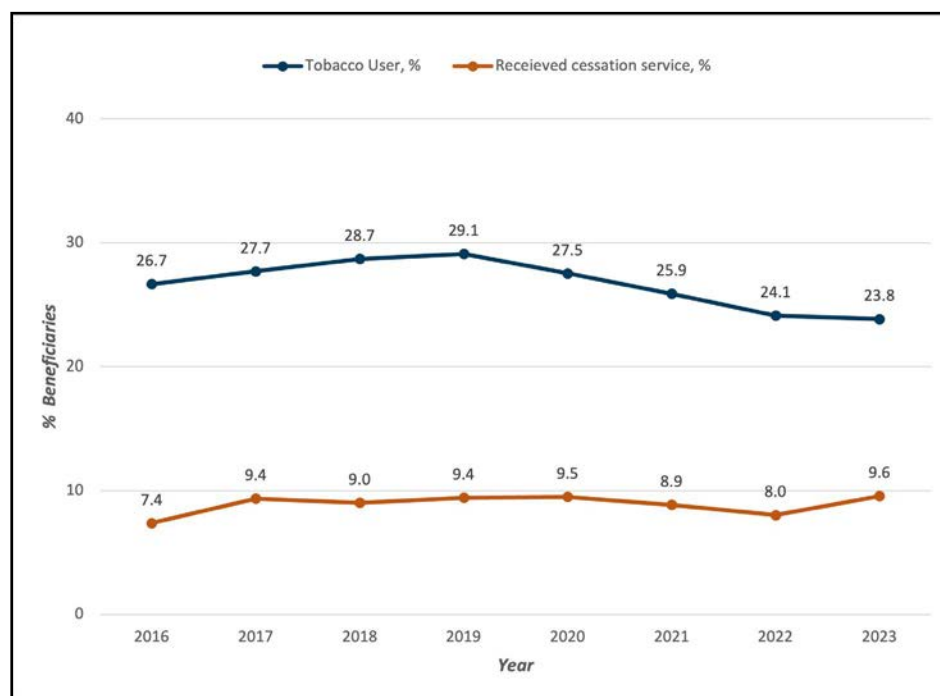
Note: Analysis of trends performed at the enrollee-year level.

LIMITATIONS

This data presented in this analysis has several limitations. First, both claims data and self-report data underrepresent the population of tobacco users. Claims data only captures services billed by providers (and their associated diagnoses). As a result, beneficiaries who are in frequent contact with healthcare providers will be more likely to have their tobacco use documented in claims data (and providers are more likely to document tobacco use when the patient receives cessation treatment). Beneficiaries who either choose not to access care or have barriers to care will be missing. Similarly, with self-reported data, harmful health behaviors are frequently underreported due to perceived stigma. Second, a nontrivial proportion of the Medicaid beneficiary population was excluded from this analysis due to lack of tobacco use data in the WAHBE. These beneficiaries were substantively different than the study population and included the majority of beneficiaries who were dually eligible for Medicare and Medicaid, disabled, and had long term care needs. This population likely has different rates of tobacco use and certainly a higher burden of comorbidities than the rest of Medicaid enrollees. Notably, patients with any comorbidity or any behavioral health condition are significantly less likely to be matched with WAHBE data than those without. Third, Medicaid enrollees have high rates of churn (i.e., gain and/or loss of coverage) in enrollment. This analysis set a moderate enrollment criteria threshold of seven out of 12 months to allow for some churn. However, individuals enrolled for fewer months in any given year would be excluded. Fourth, a beneficiary was flagged as a tobacco user if they ever had evidence of tobacco use or reported tobacco use on initial enrollment. The data does not identify patients who stop tobacco use and would not be adequate for ascertaining the effectiveness of tobacco cessation efforts on quitting year to year. Finally, self-reported tobacco use data from WAHBE does not distinguish forms of tobacco use. No form of tobacco use is safe, and it would be ideal to be able to distinguish between the various forms of tobacco use in self-reported data.

CHALLENGES

This analysis highlights the utility of linking multiple data sources to capture tobacco use and cessation services among Medicaid beneficiaries to enhance surveillance among S/THAs. Such an analysis could be challenging in states where tobacco use is not routinely collected during Medicaid enrollment and where adequate data infrastructure for surveillance with claims data is not in place. Analyzing claims data requires substantial staff capacity and bandwidth. Accordingly, use of claims data for public health practice has been largely confined to urban S/THAs. However, greater expertise with claims data among certain urban S/THAs presents an opportunity to build regional capacity under a shared services model, which is currently being explored in Washington through a partnership between PHSKC, Tacoma-Pierce County Health Department, and Spokane Regional Health District. Under this data partnership, Tacoma-Pierce County Health Department and Spokane Regional Health District access quarterly WA APCD data through PHSKC's Data Use Agreement, and additionally receive technical assistance from PHSKC epidemiologists on analyzing claims data, including sharing of code and other technical resources. As this partnership has gained momentum, additional health agencies in Washington state, including those in rural settings, have approached PHSKC to join the data partnership and explore models for accessing and using claims data tailored to rural, limited-resource settings.
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KEY CONSIDERATIONS AND RECOMMENDATIONS

Identifying tobacco users in the Medicaid population requires the use of multiple data sources and assessment methods. Both self-reported data collected during enrollment and claims data significantly undercount tobacco users. Moreover, the population of tobacco users identified via each assessment method have sociodemographic differences that are important for targeting public health interventions.

- **Ensure data-sharing structures are in place between S/THAs, state Medicaid agencies, and other state agencies that may own Medicaid data.** There is significant value for S/THAs to have access to Medicaid claims and eligibility data to enhance statewide surveillance efforts to monitor tobacco use as well as other conditions of concern for S/THAs.

- **Expand and support shared services models.** More highly resourced urban health departments can provide technical assistance and data sharing for less resourced health departments to expand the capacity for tobacco and chronic condition surveillance within states.

- **Consider adding a question on tobacco use to state Medicaid enrollment forms.** Other states may take inspiration from the tobacco use question present in Washington's Medicaid enrollment form. Washington state's eligibility form frames its question so beneficiaries know their answer will not impact access to health coverage. As demonstrated in this report, the self-reported data and claims data are complementary. One measure alone is not sufficient for detecting tobacco use in the Medicaid population. When designing self-report data, states might consider using standard language to capture tobacco use (similar to that used in national surveys). They may also might consider language that allows identification of different forms of tobacco use (e.g., cigarette smoking and e-cigarette use) and frequency of use.

APPENDIX

Figure A1: Cohort Derivation

4,261,565 beneficiary-year observations and **1,039.609** unique beneficiaries between January 1, 2016 – December 31, 2023

Age Exclusions:
Not between 18-64 years of age (N=1,866,649)

Dual-Eligibility Exclusions:
Patient is dual-eligible for Medicare (N=148,007)

Enrollment Exclusions:
Eligible for fewer than seven months of coverage during a given year (N=575,015)

HBE Data Match Exclusions:
Beneficiary does not have a match in the HBE smoking status data (N=167,753)

1,504,144 beneficiary-year observations and **454,420** unique beneficiaries

Table A1: Characteristics of tobacco users, stratified by data source by which they were identified.

	All Enrollees Using Tobacco	Enrollees Using Tobacco Identified in WAHBE	Enrollees Using Tobacco Identified in Claims	Enrollees Using Tobacco Identified Only in WAHBE	Enrollees Using Tobacco Identified Only in Claims
N	94,318	49,524	76,770	17,548	44,794
% Sample	100	53	81	19	47
Gender					
Female	38,486 (40.8%)	18,205 (36.8%)	32,891 (42.8%)	5,595 (31.9%)	20,281 (45.3%)
Male	55,358 (58.7%)	31,117 (62.8%)	43,469 (56.6%)	11,889 (67.8%)	24,241 (54.1%)
Unknown	474 (0.5%)	202 (0.4%)	410 (0.5%)	64 (0.4%)	272 (0.6%)
Race/Ethnicity					
AI/AN	2,613 (2.8%)	1,499 (3.0%)	2,046 (2.7%)	567 (3.2%)	1,114 (2.5%)
Asian	5,422 (5.7%)	2,970 (6.0%)	4,159 (5.4%)	1,263 (7.2%)	2,452 (5.5%)
Black	14,962 (15.9%)	6,996 (14.1%)	12,689 (16.5%)	22,73 (13.0%)	7,966 (17.8%)
Latino	2,893 (3.1%)	1,186 (2.4%)	2,308 (3.0%)	585 (3.3%)	1,707 (3.8%)
Multiple	14,550 (15.4%)	6,663 (13.5%)	1,2621 (16.4%)	1,929 (11.0%)	7,887 (17.6%)
NH/PI	3,598 (3.8%)	1,824 (3.7%)	2,734 (3.6%)	864 (4.9%)	1,774 (4.0%)
Unknown	3,762 (4.0%)	1,992 (4.0%)	2,695 (3.5%)	1,067 (6.1%)	1,770 (4.0%)
White	46,518 (49.3%)	26,394 (53.3%)	37,518 (48.9%)	9,000 (51.3%)	20,124 (44.9%)
Preferred Language					
Chinese	885 (0.9%)	622 (1.3%)	672 (0.9%)	213 (1.2%)	263 (0.6%)
English	89,817 (95.2%)	47,551 (96.0%)	73,076 (95.2%)	16,741 (95.4%)	42,266 (94.4%)
Other	1,627 (1.7%)	497 (1.0%)	1,421 (1.9%)	206 (1.2%)	1,130 (2.5%)
Russian	252 (0.3%)	99 (0.2%)	209 (0.3%)	43 (0.2%)	153 (0.3%)
Spanish	1,026 (1.1%)	293 (0.6%)	874 (1.1%)	152 (0.9%)	733 (1.6%)
Vietnamese	711 (0.8%)	462 (0.9%)	518 (0.7%)	193 (1.1%)	249 (0.6%)

	All Enrollees Using Tobacco	Enrollees Using Tobacco Identified in WAHBE	Enrollees Using Tobacco Identified in Claims	Enrollees Using Tobacco Identified Only in WAHBE	Enrollees Using Tobacco Identified Only in Claims
Age Group					
18-24	7,583 (8.0%)	2,862 (5.8%)	5,812 (7.6%)	1,771 (10.1%)	4721 (10.5%)
25-34	26,483 (28.1%)	13,365 (27.0%)	20,504 (26.7%)	5,979 (34.1%)	13,118 (29.3%)
35-44	25,071 (26.6%)	13,051 (26.4%)	2,0675 (26.9%)	4,396 (25.1%)	12,020 (26.8%)
45-54	17,384 (18.4%)	9,609 (19.4%)	14,611 (19.0%)	2,773 (15.8%)	7,775 (17.4%)
55-64	17,797 (18.9%)	10,637 (21.5%)	15,168 (19.8%)	2,629 (15.0%)	7,160 (16.0%)
Comorbidities					
No Comorbidities	26,181 (27.8%)	17,234 (34.8%)	14,595 (19.0%)	11,586 (66.0%)	8,947 (20.0%)
Physical Health Comorbidity	31,788 (33.7%)	14,856 (30.0%)	30,293 (39.5%)	1,495 (8.5%)	16,932 (37.8%)
Behavioral Health Comorbidity	61,310 (65.0%)	28,994 (58.5%)	55,951 (72.9%)	5,359 (30.5%)	32,316 (72.1%)

Groups are not mutually exclusive; sum will be greater than the whole.

Race and ethnicity combined into a mutually exclusive category. If an enrollee identifies as both Hispanic and another non-Hispanic race, they are categorized as multiple races. Enrollees may have both a physical and behavioral health condition, these categories are not mutually exclusive. Unit of analysis is the beneficiary.

Table A2: Patient characteristics associated with tobacco use among all tobacco users. Tobacco users identified through both WAHBE and claims.

95% CI

	OR	conf.low	conf.high	Adjusted %	p-value
Gender					
Female	Reference	-	-	11.3%	-
Male	2.14	2.11	2.18	21.4%	<0.001
Unknown	1.52	1.36	1.69	16.1%	<0.001
Race/Ethnicity					
AI/AN	1.84	1.74	1.94	30.1%	<0.001
Asian	0.383	0.37	0.397	8.2%	<0.001
Black	0.957	0.935	0.979	18.3%	0.0001
Latino	0.557	0.533	0.582	11.5%	<0.001
Multiple	1.11	1.08	1.14	20.6%	<0.001
NH/PI	0.85	0.817	0.884	16.6%	<0.001
Unknown	0.491	0.473	0.51	10.3%	<0.001
White	Reference	-	-	19.0%	-
Preferred Language					
Chinese	1.67	1.54	1.81	32.9%	<0.001
English	Reference	-	-	22.7%	-
Other	0.401	0.38	0.423	10.5%	<0.001
Russian	0.268	0.235	0.306	7.3%	<0.001
Spanish	0.298	0.279	0.319	8.1%	<0.001
Vietnamese	1.29	1.18	1.41	27.5%	<0.001

95% CI

	OR	conf.low	conf.high	Adjusted %	p-value
Age Group					
18-24	Reference	-	-	8.2%	-
25-34	1.97	1.91	2.02	14.9%	<0.001
35-44	2.95	2.87	3.04	20.8%	<0.001
45-54	2.93	2.84	3.02	20.6%	<0.001
55-64	2.51	2.43	2.59	18.2%	<0.001
Comorbidities*					
Physical Health Comorbidity	1.57	1.54	1.6	19.1%	<0.001
Behavioral Health Comorbidity	3.21	3.16	3.26	25.2%	<0.001

Groups are not mutually exclusive; sum will be greater than the whole.

Table A2: Patient characteristics associated with tobacco use among all tobacco users. Tobacco users identified through both WAHBE and claims.

	OR	conf.low	conf.high	Adjusted %	p-value
95% CI					
Gender					
Female	Reference	-	-	15.7%	-
Male	2.14	2.11	2.18	26.6%	<0.001
Unknown	1.52	1.36	1.69	23.6%	<0.001
Race/Ethnicity					
AI/AN	1.84	1.74	1.94	39.7%	<0.001
Asian	0.383	0.37	0.397	10.3%	<0.001
Black	0.957	0.935	0.979	23.1%	0.0001
Latino	0.557	0.533	0.582	8.6%	<0.001
Multiple	1.11	1.08	1.14	23.5%	<0.001
NH/PI	0.85	0.817	0.884	17.2%	<0.001
Unknown	0.491	0.473	0.51	11.4%	<0.001
White	Reference	-	-	25.8%	-
Preferred Language					
Chinese	1.67	1.54	1.81	15.7%	<0.001
English	Reference	-	-	22.8%	-
Other	0.401	0.38	0.423	8.5%	<0.001
Russian	0.268	0.235	0.306	6.5%	<0.001
Spanish	0.298	0.279	0.319	4.0%	<0.001
Vietnamese	1.29	1.18	1.41	12.7%	<0.001

	OR	conf.low	conf.high	Adjusted %	p-value
Age Group					
18-24	Reference	-	-	8.0%	-
25-34	1.97	1.91	2.02	18.9%	<0.001
35-44	2.95	2.87	3.04	27.1%	<0.001
45-54	2.93	2.84	3.02	28.8%	<0.001
55-64	2.51	2.43	2.59	26.5%	<0.001
Comorbidities*					
Physical Health Comorbidity	1.57	1.54	1.6	34.8%	<0.001
Behavioral Health Comorbidity	3.21	3.16	3.26	34.9%	<0.001

Groups are not mutually exclusive; sum will be greater than the whole.

Table A3: Association of specific comorbidities with tobacco use among all Medicaid members. Tobacco users identified through WAHBE or claims.

	OR	lower CI	upper CI
Physical Health Conditions			
Acute Myocardial Infarction	1.320	1.150	1.500
Asthma	1.400	1.350	1.450
Atrial Fibrillation and Flutter	0.764	0.691	0.845
Chronic Kidney Disease	0.992	0.933	1.050
Colorectal Cancer	1.030	0.845	1.260
COPD	3.790	3.570	4.010
Diabetes	0.989	0.947	1.030
Endometrial Cancer	0.765	0.552	1.040
Breast Cancer	0.781	0.678	0.897
Heart Failure	1.180	1.090	1.280
Hyperlipidemia	0.944	0.914	0.974
Hypertension	1.180	1.150	1.220
Ischemic Heart Disease	1.360	1.260	1.460
Lung Cancer	2.230	1.740	2.860
Prostate Cancer	0.812	0.628	1.040
Stroke	1.300	1.210	1.390
Urologic Cancer	1.010	0.748	1.340
Pneumonia	1.490	1.410	1.580

	OR	lower CI	upper CI
Behavioral Health Conditions			
ADHD	0.816	0.784	0.849
Adjustment Disorder	1.010	0.977	1.050
Anxiety Disorder	1.090	1.070	1.120
Depression	1.250	1.220	1.280
Impulse/Conduct Disorder	1.750	1.620	1.900
Mania/Bipolar	1.350	1.290	1.420
Psychotic Disorder	1.500	1.450	1.550
Alcohol Use Disorder	2.270	2.200	2.340
Cannabis Use Disorder	2.600	2.510	2.700
Cocaine Use Disorder	2.210	2.050	2.380
Opioid Use Disorder	2.520	2.420	2.620
Other Stimulant Use Disorder	4.290	4.090	4.490
Other Substance Use Disorder	2.590	2.470	2.710
Sedative Use Disorder	1.730	1.570	1.920

Models adjusted for gender, race/ethnicity, preferred language, and age group. Unit of analysis is the beneficiary.

Table A4: Characteristics of enrollees receiving tobacco cessation therapy at any point between 2016 – 2023, comparing all enrollees with tobacco use versus only those who self-identified during enrollment through WAHBE and Claims.

	WAHBE or Claims (Total)		WAHBE & Claims		Claims Only	
	N	% Sample	N	% Sample	N	% Sample
Total	**94,318**		**31,976**		**44,794**	
Ever Received Cessation Services	23,158	24.6	11,596	36.3	11,562	25.8
Gender						
Female	10,425	45.0	5,044	43.5	5381	46.5
Male	12,597	54.4	6,504	56.1	6093	52.7
Unknown	136	0.6	48	0.4	88	0.8
Race/Ethnicity						
AI/AN	483	2.1	271	2.3	212	1.8
Asian	1,239	5.4	568	4.9	671	5.8
Black	3,566	15.4	1,638	14.1	1928	16.7
Latino	497	2.1	168	1.4	329	2.8
Multiple	3,687	15.9	1,741	15.0	1946	16.8
NH/PI	688	3.0	313	2.7	375	3.2
Unknown	684	3.0	291	2.5	393	3.4
White	12,314	53.2	6,606	57.0	5708	49.4
Preferred Language						
Chinese	222	1.0	153	1.3	69	0.6
English	22,017	95.1	11,144	96.1	10873	94.0
Other	456	2.0	113	1.0	343	3.0
Russian	66	0.3	25	0.2	41	0.4
Spanish	211	0.9	50	0.4	161	1.4
Vietnamese	186	0.8	111	1.0	75	0.6

	WAHBE or Claims (Total)		WAHBE & Claims		Claims Only	
	N	% Sample	N	% Sample	N	% Sample
Total	**94,318**		**31,976**		**44,794**	
Age Group						
18-24	868	3.7	207	1.8	661	5.7
25-34	4,686	20.2	1,994	17.2	2692	23.3
35-44	6,355	27.4	3,039	26.2	3316	28.7
45-54	5,260	22.7	2,758	23.8	2502	21.6
55-64	5,989	25.9	3,598	31.0	2391	20.7
Comorbidities*						
No Comorbidities	2,592	11.2	1,171	10.1	1421	12.3
Physical Health Comorbidity	12,167	52.5	6,447	55.6	5720	49.5
Behavioral Health Comorbidity	18,544	80.1	9,370	80.8	9174	79.3

Groups are not mutually exclusive; sum will be greater than the whole.

"Tobacco cessation treatment" includes counseling services, nicotine replacement therapy, and/ or varenicline. As tobacco cessation treatment is part of the algorithm to identify enrollees with tobacco use in claims, cessation services will be overrepresented in this population. The rate of cessation services among the WAHBE population that self-identified tobacco use may better reflect the actual uptake of cessation services among the Medicaid population with tobacco use. Race and ethnicity combined into a mutually exclusive category. If an enrollee identifies as both Hispanic and another non-Hispanic race, they are categorized as multiple races. Enrollees may have both a physical and behavioral health condition these categories are not mutually exclusive. Unit of analysis is the beneficiary.

Table A5: Association of patient characteristics with receipt of tobacco cessation treatment among all enrollees who use tobacco versus only those in claims data.

	Full Sample (WA HBE or Claims)				Claims Only				WAHBE & Claims			
	N=94,318				N=44,794							
		95% CI				95% CI				95% CI		
	OR			Adjusted %	OR			Adjusted %	Estimate			Adjusted %
Gender												
Female	REF			8.6%	REF			7.2%	REF			13.0%
Male	0.837	0.818	0.856	7.3%	0.922	0.892	0.952	6.7%	0.799	0.773	0.825	10.7%
Unknown	1.105	0.952	1.275	9.4%	1.387	1.156	1.652	8.7%	0.802	0.617	1.030	10.7%
Race/Ethnicity												
AI/AN	0.540	0.498	0.585	6.1%	0.486	0.429	0.549	5.5%	0.601	0.538	0.668	8.6%
Asian	0.758	0.712	0.806	8.3%	0.849	0.784	0.920	9.2%	0.723	0.654	0.798	10.2%
Black	0.805	0.780	0.831	8.8%	0.766	0.732	0.800	8.4%	0.850	0.812	0.890	11.8%
Latino	0.688	0.632	0.748	7.6%	0.690	0.619	0.766	7.6%	0.770	0.668	0.883	10.8%
Multiple	0.824	0.798	0.851	9.0%	0.779	0.745	0.815	8.5%	0.854	0.816	0.894	11.9%
NH/PI	0.758	0.706	0.812	8.3%	0.734	0.666	0.808	8.1%	0.877	0.790	0.972	12.2%
Unknown	0.842	0.785	0.901	9.1%	0.895	0.815	0.982	9.7%	0.954	0.858	1.060	13.1%
White	REF			10.7%	REF			10.7%	REF			13.6%
Preferred Language												
Chinese	1.243	1.087	1.417	9.8%	1.068	0.850	1.328	8.2%	1.230	1.040	1.460	11.8%
English	REF			7.5%	REF			7.7%	REF			9.8%
Other	1.366	1.257	1.482	10.0%	1.348	1.222	1.485	10.1%	1.400	1.190	1.640	13.2%
Russian	1.046	0.839	1.290	7.8%	0.983	0.738	1.286	7.6%	1.240	0.866	1.730	11.9%
Spanish	1.032	0.899	1.180	7.7%	1.098	0.936	1.282	8.4%	1.080	0.810	1.410	10.5%
Vietnamese	1.119	0.974	1.282	8.3%	1.059	0.856	1.300	8.1%	1.230	1.010	1.480	11.8%
Age Group												
18-24	REF			5.1%	REF			6.1%	REF			6.8%
25-34	1.216	1.135	1.305	6.2%	1.098	1.012	1.193	6.6%	1.240	1.090	1.430	8.7%
35-44	1.649	1.541	1.767	8.2%	1.475	1.362	1.600	8.7%	1.530	1.340	1.760	10.5%
45-54	2.033	1.898	2.179	10.0%	1.792	1.651	1.947	10.4%	1.850	1.620	2.130	12.4%
55-64	2.266	2.116	2.430	11.0%	1.872	1.723	2.037	10.8%	2.090	1.830	2.400	13.8%

|	Full Sample (WA HBE or Claims)			Claims Only			WAHBE & Claims			
N=94,318				N=44,794						
		95% CI				95% CI				95% CI	
	OR			Adjusted %	OR			Adjusted %	Estimate			Adjusted %
Comorbidities*											
Physical Health Comorbidity	2.010	1.962	2.058	11.5%	1.710	1.652	1.771	10.6%	1.990	1.930	2.060	15.4%
Behavioral Health Comorbidity	1.870	1.821	1.921	11.1%	1.626	1.566	1.688	10.4%	1.620	1.560	1.680	14.1%
Year											
2016	REF			8.8%	REF			8.7%	REF			12.0%
2017	1.122	1.070	1.177	9.8%	1.140	1.064	1.222	9.8%	1.100	1.030	1.180	13.0%
2018	0.979	0.932	1.028	8.7%	0.974	0.907	1.045	8.4%	0.967	0.904	1.040	11.6%
2019	0.975	0.929	1.024	8.6%	0.954	0.889	1.024	8.3%	0.986	0.921	1.060	11.8%
2020	0.967	0.922	1.014	8.6%	0.934	0.871	1.001	8.1%	1.010	0.940	1.080	12.0%
2021	0.883	0.842	0.926	7.9%	0.888	0.830	0.952	7.8%	0.907	0.849	0.970	11.0%
2022	0.775	0.739	0.813	7.0%	0.804	0.751	0.862	7.1%	0.796	0.744	0.851	9.8%
2023	0.903	0.861	0.947	8.1%	1.007	0.941	1.078	8.7%	0.882	0.824	0.944	10.7%

To account for the time-varying nature of cessation services, this analysis was performed using the beneficiary-year as the unit of analysis. REF denotes reference group. "Tobacco cessation treatment" includes counseling services, nicotine replacement therapy, and/or varenicline. As tobacco cessation treatment is part of the algorithm to identify enrollees with tobacco use in claims, cessation services will be overrepresented in this population. The rate of cessation services among the WAHBE population that self-identified tobacco use may better reflect the actual uptake of cessation services among the Medicaid population with tobacco use.

Race and ethnicity combined into a mutually exclusive category. If an enrollee identifies as both Hispanic and another non-Hispanic race, they are categorized as multiple races. Enrollees may have both a physical and behavioral health condition; these categories are not mutually exclusive.

Figure A2: Trends in specific tobacco cessation services (counseling, NRT, varenicline) for Medicaid tobacco users. Tobacco users identified through both WAHBE and claims.
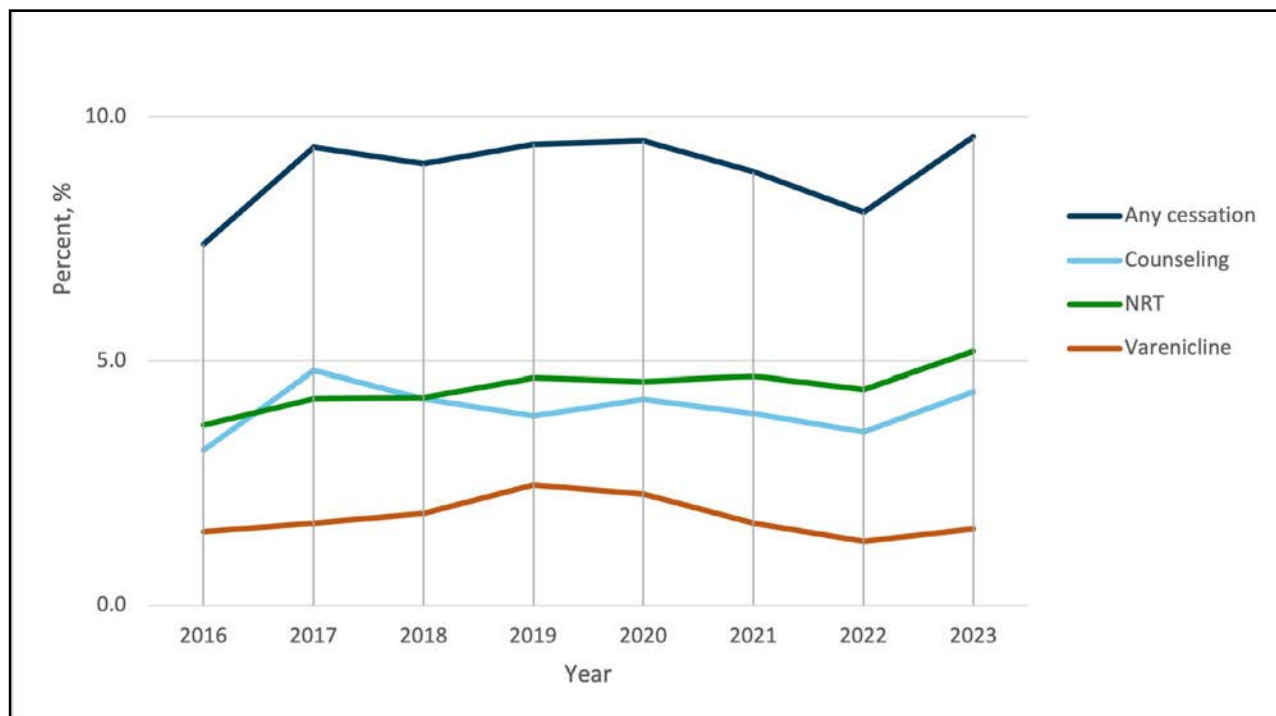
Figure A3: Trends in receipt of any tobacco cessation treatment, among beneficiaries self-reporting tobacco use on enrollment forms (WAHBE) & Claims.
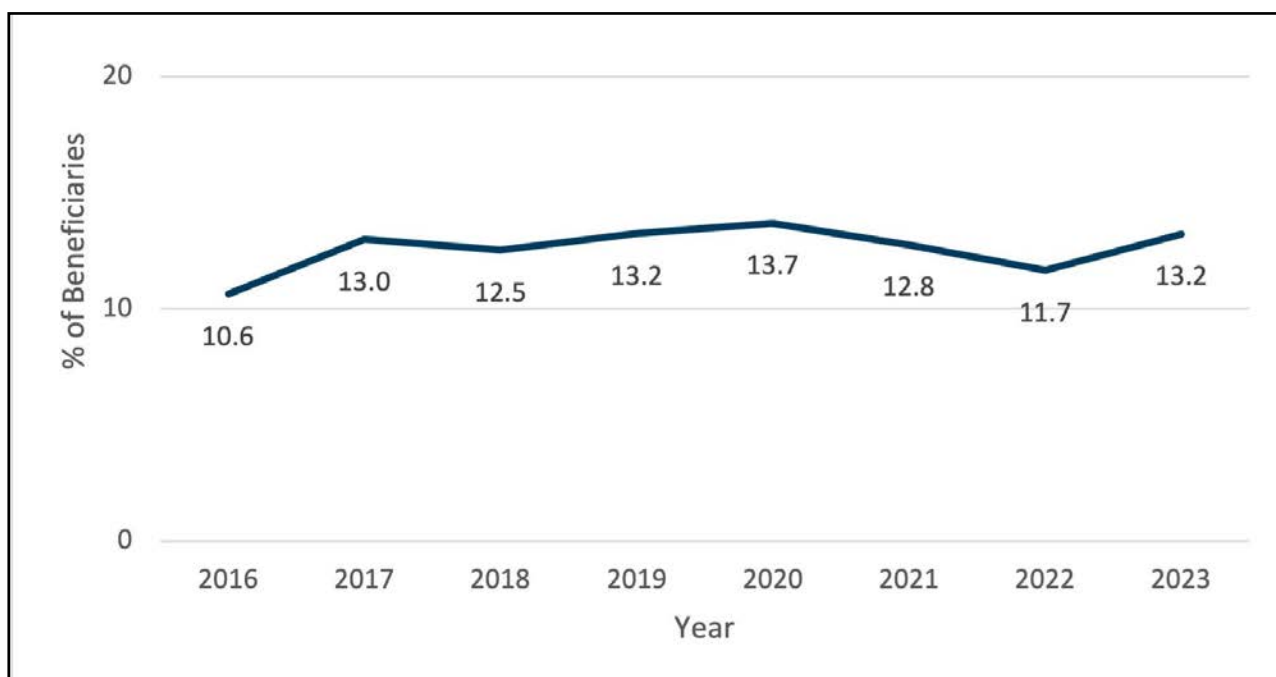
Table A6: Association of enrollee characteristics with tobacco cessation therapy among all enrollees who use tobacco, stratified by type of therapy. Population of enrollees using tobacco identified in either WAHBE or claims.

Total: N=94,318	Counseling				Any Medication (NRT or Varenicline)				Any cessation (Counseling or Medication)			
		95% CI				95% CI				95% CI		
	OR			Adjusted %	OR			Adjusted %	Estimate			Adjusted %
Gender												
Female	REF			5.4%				4.1%	REF			8.6%
Male	0.786	0.760	0.812	4.3%	0.862	0.839	0.886	3.5%	0.837	0.818	0.856	7.3%
Unknown	0.971	0.779	1.195	5.2%	1.238	1.040	1.462	5.0%	1.105	0.952	1.275	9.4%
Race/Ethnicity												
AI/AN	0.552	0.488	0.622	3.2%	0.501	0.453	0.552	3.1%	0.540	0.498	0.585	6.1%
Asian	0.916	0.842	0.996	5.2%	0.668	0.617	0.722	4.0%	0.758	0.712	0.806	8.3%
Black	0.883	0.843	0.924	5.0%	0.753	0.724	0.782	4.5%	0.805	0.780	0.831	8.8%
Latino	0.895	0.801	0.997	5.0%	0.561	0.501	0.628	3.4%	0.688	0.632	0.748	7.6%
Multiple	0.859	0.820	0.900	4.8%	0.798	0.767	0.829	4.8%	0.824	0.798	0.851	9.0%
NH/PI	1.063	0.972	1.160	5.9%	0.571	0.519	0.627	3.5%	0.758	0.706	0.812	8.3%
Unknown	0.947	0.859	1.041	5.3%	0.782	0.718	0.850	4.7%	0.842	0.785	0.901	9.1%
White	REF			5.6%				5.9%	REF			10.7%
Preferred Language												
Chinese	1.519	1.282	1.791	5.7%	1.028	0.858	1.223	4.4%	1.243	1.087	1.417	9.2%
English	REF			3.8%				4.3%	REF			7.5%
Other	1.411	1.259	1.577	5.3%	1.372	1.240	1.513	5.8%	1.366	1.257	1.482	10.0%
Russian	1.419	1.068	1.848	5.4%	0.826	0.620	1.078	3.6%	1.046	0.839	1.290	7.8%
Spanish	1.498	1.273	1.753	5.7%	0.588	0.470	0.726	2.6%	1.032	0.899	1.180	7.7%
Vietnamese	1.049	0.862	1.268	4.0%	1.198	1.012	1.412	5.1%	1.119	0.974	1.282	8.3%

Total: N=94,318	Counseling				Any Medication (NRT or Varenicline)				Any cessation (Counseling or Medication)			
		95% CI				95% CI				95% CI		
	OR			Adjusted %	OR			Adjusted %	Estimate			Adjusted %
Age Group												
18-24	REF			4.0%				2.1%	REF			5.6%
25-34	1.041	0.953	1.139	4.2%	1.545	1.399	1.711	3.1%	1.216	1.135	1.305	6.7%
35-44	1.255	1.150	1.371	5.0%	2.328	2.112	2.573	4.7%	1.649	1.541	1.767	8.8%
45-54	1.437	1.315	1.572	5.7%	3.018	2.736	3.338	5.9%	2.033	1.898	2.179	10.7%
55-64	1.526	1.397	1.670	6.0%	3.491	3.165	3.861	6.8%	2.266	2.116	2.430	11.8%
Comorbidities*												
Physical Health Comorbidity	1.990	1.922	2.060	6.8%	1.977	1.920	2.034	5.7%	2.010	1.962	2.058	11.5%
Behavioral Health Comorbidity	1.449	1.397	1.504	5.3%	2.168	2.097	2.242	6.0%	1.870	1.821	1.921	11.1%
Year												
2016	REF			4.8%				4.6%	REF			8.8%
2017	1.375	1.285	1.473	6.5%	0.964	0.909	1.022	4.4%	1.122	1.070	1.177	9.8%
2018	1.119	1.043	1.200	5.3%	0.895	0.844	0.949	4.1%	0.979	0.932	1.028	8.7%
2019	0.976	0.908	1.050	4.7%	0.971	0.916	1.029	4.5%	0.975	0.929	1.024	8.6%
2020	1.052	0.981	1.129	5.0%	0.926	0.875	0.981	4.3%	0.967	0.922	1.014	8.6%
2021	0.963	0.898	1.032	4.6%	0.854	0.807	0.904	4.0%	0.883	0.842	0.926	7.9%
2022	0.848	0.791	0.910	4.1%	0.750	0.709	0.795	3.5%	0.775	0.739	0.813	7.0%
2023	1.017	0.949	1.090	4.9%	0.850	0.803	0.900	3.9%	0.903	0.861	0.947	8.1%

REF: reference group, excluded from model. Any drug includes NRT and varenicline. Sample restricted to observations where enrollees was identified to use tobacco. Race and ethnicity combined into a mutually exclusive category. If an enrollee identifies as both Hispanic and another non-Hispanic race, they are categorized as multiple races. Enrollees may have both a physical and behavioral health condition; these categories are not mutually exclusive. Unit of analysis is beneficiary-year.