

Supplementary Appendix 1. Calibration of the Smoking and Vaping Model

A previous version of the Smoking and Vaping Model (SAVM) was developed based on data from the National Health Interview Survey (NHIS) through the year 2013.¹ That model had been shown to validate well overall, but underestimated the decline in smoking rates at younger ages. Due to the importance of these age groups to future smoking rates, we recalibrated model parameters against 2013-2018 NHIS data. We compare 2018 model predictions for smoking and vaping prevalence by gender and age to the 2018 NHIS observed data. Because NHIS and SAVM begin in 2013 with slightly different levels of the smoking prevalence, we compare the relative change in smoking prevalence $[(2018 \text{ prevalence} - 2013 \text{ prevalence})/2013 \text{ prevalence}]$, and then change initiation and/or cessation parameters to recalibrate the model when needed..

Based on comparison of relative changes and confidence intervals, we adjusted the parameters of model until the model predictions were within 10% of the survey estimates for 2018. In our final calibration relative to the initial model,¹ we reduced the smoking initiation rate of those below age 24 by 40% and the switching rate from smoking to NVP use at ages 18-24 was doubled for those below ages 18 in order to calibrate smoking at younger ages. We also reduced the cessation rate by 20% except females ages 25-54 (reduced 10%) to better predict smoking at older ages. To account for the potential reduction in the percent of smokers who switch to NVP (e.g., as those most attracted to NVPs have already switched and technological advance slows), switching rates were reduced by 10% annually starting in 2018 at all ages.

The predictions of smoking prevalence from the re-calibrated SAVM are compared to the NHIS data in Table S1.1. Current smoking is defined as having smoked ≥ 100 cigarettes during one's lifetime and currently smoking every day or some days. From 2013 to 2018, SAVM adult smoking prevalence for males falls from 21.4% to 16.6% compared reduction from 20.3% (95%

CI: 19.5%-21.2%) to 15.8% (95% CI: 15.0%-16.6%) from NHIS, and for females from 15.9% in 2013 to 12.5% in 2018 compared with 15.4% (95% CI: 14.7%-16.1%) to 12.0% (95% CI: 11.3%-12.6%) from NHIS. While SAVM estimates are above NHIS estimates for both males and females, prevalence in relative terms declines by 22.4% for males compared to 22.2% in NHIS, and by 21.4% for females compared to 22.1% in NHIS. While discrepancies in relative reductions were greater for some age groups (e.g., males ages 18-24, females ages 45-64 and males and females age 65+), the 2018 SAVM predictions were within NHIS CIs except for males and females ages 25-44.

Table S1.1 also shows future predictions. In the calibrated model, male smoking prevalence declines from 16.6% in 2018 to 7.5% in 2040 and 5.7% in 2060, while female prevalence declines from 12.5% in 2018 to 6.0% in 2040 and 4.5% in 2060. Much of reduction results from the reduced initiation rates.

Table S1.2 compares the NVP prevalence with the NHIS NVP rate, measured by those who used e-cigarettes at least 10 days in the last 30 days. We do not examine relative changes from 2012-2018, because the SAVM begins in 2013 with NVP prevalence at 0. The age 18 and above NVP prevalence increases from 3.1% in 2018 to 7.1% in 2060 for males, and from 1.9% in 2018 to 4.6% in 2060 for females. The NVP rates increase from ages 18-24 to 25-44 and then decline with age.

Supplement 1.1. Recalibrated SAVM Smoking Prevalence (%) vs. National Health Interview Survey (NHIS)
Estimates with 95% Confidence Intervals (CIs), 2013-2060, By Age and Gender

Age	Source	2013	2014	2018	Relative reduction*	2040	2060
Males							
18+	SAVM	21.4	20.4	16.6	-22.4%	7.5%	5.7%
	NHIS	20.3	18.8	15.8	-22.2%	-	-
	95% CI	19.5-21.2	17.9-19.7	15.0-16.6	-	-	-
18-24	SAVM	19.9	17.5	9.3	-53.3%	6.9%	6.9%
	NHIS	21.6	18.6	8.5	-60.6%	-	-
	95% CI	18.6-24.6	15.9-21.4	6.4-10.5	-	-	-
25-44	SAVM	27.3	26.4	22.1	-19.0%	7.3%	8.4%
	NHIS	23.1	22.9	19.1	-17.3%	-	-
	95% CI	21.6-24.5	21.3-24.4	17.5-20.7	-	-	-
45-64	SAVM	20.4	19.6	16.9	-17.2%	10.1%	4.6%
	NHIS	21.6	19.3	18.3	-15.3%	-	-
	95% CI	20.2-23.1	17.7-20.9	16.9-19.7	-	-	-
65+	SAVM	12.2	12.0	10.7	-12.3%	5.0%	3.5%
	NHIS	10.6	9.7	9.9	-6.6%	-	-
	95% CI	9.3-12.0	8.4-11.0	8.7-11.1	-	-	-
Females							
18+	SAVM	15.9	14.5	12.5	-21.4%	6.0%	4.5%
	NHIS	15.4	13.5	12.0	-22.1%	-	-
	95% CI	14.7-16.1	12.8-14.2	11.3-12.6	-	-	-
18-24	SAVM	15.0	11.5	7.1	-52.7%	4.9%	4.9%
	NHIS	15.4	11.1	7.3	-52.6%	-	-
	95% CI	13.0-17.8	9.0-13.3	5.2-9.4	-	-	-
25-44	SAVM	20.6	19.3	17.1	-17.0%	6.1%	6.6%
	NHIS	17	15.6	14.2	-16.5%	-	-
	95% CI	15.8-18.2	14.4-16.9	12.9-15.5	-	-	-
45-64	SAVM	16.2	15.1	13.6	-16.0%	8.3%	4.0%
	NHIS	18.1	15.8	14.3	-21.0%	-	-
	95% CI	16.8-19.3	14.6-17.1	13.1-15.5	-	-	-
65+	SAVM	8.2	7.6	6.9	-15.9%	3.8%	2.7%
	NHIS	7.6	7.6	7.3	-3.9%	-	-
	95% CI	6.6-8.6	6.5-8.6	6.4-8.2	-	-	-

Note: SAVM smoking prevalence of the initiation under age 24 is reduced 40% for both genders and the cessation rate is reduced 20% except 40% for males age above 65 and 10% for females at ages 25-54, and the switching rate is doubled at age 18-24 for those under age 18 for both gender (male: 8% for age under 18, 4.0% for age 18-24; female: 5.0% for age under 18, and 2.5% for age 18-24). *: Relative reduction in prevalence from 2013 to 2018.

Supplement 1.2. Nicotine Vaping Product Prevalence (%), validation SAVM vs. National Health Interview Survey (NHIS) Estimates with 95% Confidence Intervals (CIs), 2018-2060, by Age and Gender

Age	SAVM	NHIS 2018		SAVM	
	2018	mean	95% CI	2040	2060
Males					
18+	3.1%	3.1%	2.7%-3.5%	7.0%	7.1%
18-24	8.0%	6.8%	4.8%-8.8%	9.6%	9.6%
25-44	4.2%	4.7%	3.8%-5.6%	11.8%	10.7%
45-64	1.4%	1.5%	1.0%-1.9%	5.6%	7.1%
65+	0.5%	0.6%	0.3%-0.9%	1.5%	2.3%
Females					
18+	1.9%	1.5%	1.3%-1.8%	4.4%	4.6%
18-24	5.1%	3.1%	1.8%-4.5%	6.5%	6.5%
25-44	2.4%	1.9%	1.4%-2.3%	8.0%	7.5%
45-64	1.1%	1.3%	1.0%-1.7%	3.3%	4.8%
65+	0.4%	0.5%	0.3%-0.7%	0.8%	1.2%

Notes: CI= confidence interval. NVP users from National Health Interview Survey are those who use NVPs at least 10 of the past 30 days.

1. Levy DT, Tam J, Sanchez Romero LM, et al. The Public Health Implications of Vaping in the U.S.: The Smoking and Vaping Model. available as preprint2020.