

TCORS 2.0

University of
Michigan &
Georgetown
University

Center for the
**Assessment of Tobacco
Regulations**
[CAStoR]

Modeling public health impacts of vaping

Ken Warner

University of Michigan

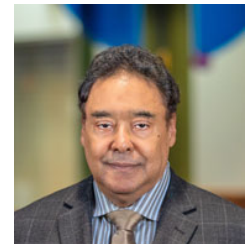
Presented to the Scientific Advisory Board on Vaping Products

November 1, 2021

Acknowledgments and disclosures

Financial support: National Cancer Institute
and FDA Center for Tobacco Products
(award # U54CA229974)

Brains and brawn behind Mendez-Warner
model: David Mendez



COI: None

Mendez-Warner model

- Since 1995
- 17 papers (4 radon, 11 smoking, 2 vaping)
- Today discuss most recent application to vaping
 - Mendez and Warner, “A Magic Bullet? The Potential Impact of E-Cigarettes on the Toll of Cigarette Smoking,” *NTR*, 2021)
 - Not *NTR*, 2019 recommended by staff

Mendez-Warner model

- Model follows groups of individuals distinguished by age, gender, smoking status
- Smoking initiation rate = NHIS 18-24 y-o smoking prevalence (7.8% in 2017 NHIS)
- Cessation rates (4.35% pop. avg. Mendez et al., *NTR*, 2017)
 - Cessation rates can be distinguished by age, difficulty quitting, and year (*Cessation rates are permanent quits, net of relapse*)
- Mortality rates distinguished by age and smoking status (including years quit for former smokers)

Application of M-W model to vaping, 2018-2100

(NTR, 2021)

- Range of assumptions (for this presentation):
 - Vaping-induced smoking initiation rate increase (0 or 10%)
 - Vaping-induced smoking cessation rate increase (10, 25, or 50%)
 - Relative harm of e-cigarettes compared to combustible tobacco cigarettes (5, 10, or 20% as harmful [*requires explanation*])

		Vaping does not increase smoking initiation			Vaping increases smoking initiation by 10%		
Vaping risk (% of cigs.)	Annual cess. rate increase due to vaping	Life-years saved (LYS) (millions)	LYS as % of LYL w/o vaping	E-quitters (millions)	Life-years saved (LYS) (millions)	LYS as % of LYL w/o vaping	E-quitters (millions)
5%	10%	5.7	1.9%	3.9	3.2	1.1%	4.1
	25%	13.2	4.3%	9.0	11.0	3.6%	9.4
	50%	23.6	7.7%	15.9	21.7	7.1%	16.6
10%	10%	4.9	1.6%	3.9	2.5	0.8%	4.1
	25%	11.5	3.8%	9.0	9.2	3.0%	9.4
	50%	20.5	6.7%	15.9	18.5	6.1%	16.6
20%	10%	3.5	1.2%	3.9	1.0	0.3%	4.1
	25%	8.2	2.7%	9.0	5.8	1.9%	9.4
	50%	14.6	4.8%	15.9	12.4	4.1%	16.6

		Vaping does not increase smoking initiation			Vaping increases smoking initiation by 10%		
Vaping risk (% of cigs.)	Annual cess. rate increase due to vaping	Life-years saved (LYS) (millions)	LYS as % of LYL w/o vaping	E-quitters (millions)	Life-years saved (LYS) (millions)	LYS as % of LYL w/o vaping	E-quitters (millions)
5%	10%	5.7	1.9%	3.9	3.2	1.1%	4.1
	25%	13.2	4.3%	9.0	11.0	3.6%	9.4
	50%	23.6	7.7%	15.9	21.7	7.1%	16.6
10%	10%	4.9	1.6%	3.9	2.5	0.8%	4.1
	25%	11.5	3.8%	9.0	9.2	3.0%	9.4
	50%	20.5	6.7%	15.9	18.5	6.1%	16.6
20%	10%	3.5	1.2%	3.9	1.0	0.3%	4.1
	25%	8.2	2.7%	9.0	5.8	1.9%	9.4
	50%	14.6	4.8%	15.9	12.4	4.1%	16.6

		Vaping does not increase smoking initiation			Vaping increases smoking initiation by 10%		
Vaping risk (% of cigs.)	Annual cess. rate increase due to vaping	Life-years saved (LYS) (millions)	LYS as % of LYL w/o vaping	E-quitters (millions)	Life-years saved (LYS) (millions)	LYS as % of LYL w/o vaping	E-quitters (millions)
5%	10%	5.7	1.9%	3.9	3.2	1.1%	4.1
	25%	13.2	4.3%	9.0	11.0	3.6%	9.4
	50%	23.6	7.7%	15.9	21.7	7.1%	16.6
10%	10%	4.9	1.6%	3.9	2.5	0.8%	4.1
	25%	11.5	3.8%	9.0	9.2	3.0%	9.4
	50%	20.5	6.7%	15.9	18.5	6.1%	16.6
20%	10%	3.5	1.2%	3.9	1.0	0.3%	4.1
	25%	8.2	2.7%	9.0	5.8	1.9%	9.4
	50%	14.6	4.8%	15.9	12.4	4.1%	16.6

Summary of findings (with stated assumptions)

1. In all scenarios, LYS are in millions, varying from
 - 1 million for most pessimistic assumptions
 - to 23.6 million for most optimistic assumptions
2. Vaping avoids 0.3% to 7.7% of LYL due to smoking (in absence of vaping)
 - **But** = 0.9% to 21% of maximum potential reduction in premature mortality
(Warner and Mendez, Tob. Control, 2021)
3. Vaping induces 3.9-16.6 million smokers to quit (“e-quitters”)
 - E-quitters gain, on average, 1.2-2.0 years of life (not shown)

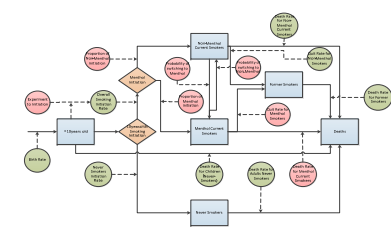
Additional findings

(from other simulations, not shown)

- For 162 scenarios simulated, 159 (98%) produce positive LYS.
 - Includes variations in vaping's effects on cessation by difficulty quitting
 - Includes variations in background rate of cessation by age
 - Does **not** include more optimistic cases in Mendez and Warner, i.e., no risk to e-cigs and larger cessation boosts. Article covers 360 scenarios. All of the extra scenarios produce substantially higher LYS.
- For the most conservative cases – maximum harm (20%), maximum smoking initiation ↑ (10%), minimum smoking cessation ↑ (10%) – 7 of 9 (78%) produce positive LYS.

Conclusions

- Vaping is highly likely to have a positive impact on public health (measured as life-years saved).
- While that impact is substantial (millions of LYS, millions of e-quitters), vaping is not likely to be the “magic bullet” that ends smoking.
 - *Impact is significant but modest compared to burden of smoking.*
- Health policy makers should consider vaping one more tool in armamentarium of smoking-cessation interventions.



Thanks



kwarnar@umich.edu