

**TCORS 2.0**

University of  
Michigan &  
Georgetown  
University

Center for the  
**Assessment of Tobacco  
Regulations**  
[CA<sub>s</sub>TO<sub>R</sub>]



**SCHOOL OF PUBLIC HEALTH**  
UNIVERSITY OF MICHIGAN

# Tobacco Transitions Tool: Development of a Web Aid to Facilitate Exploration of Tobacco Use Patterns and Transitions in PATH

**Jihyoun Jeon**

Andrew Brouwer, Evelyn Jimenez-Mendoza,  
Ritesh Mistry and Rafael Meza  
University of Michigan

TRS Annual Meeting  
10/18/2021

# DISCLOSURES

I have no conflicts of interest to disclose.

The content presented is solely the responsibility of the authors and does not necessarily represent the official views of the NCI or the Food and Drug Administration.

Funding sources: NCI/FDA grant U54CA229974 (TCORS-CAsToR)

# Objective

- To understand how tobacco use patterns are changing in the US
  - New and emerging tobacco products such as electronic nicotine delivery systems (ENDS)
  - Provide insights into tobacco regulatory research
- To monitor the dynamics of tobacco use and estimate transition rates across product use categories
  - May vary depending on use definitions, type of products, sociodemographic factors
  - Interactive web aid tools to facilitate exploration of tobacco use patterns
- Population Assessment of Tobacco and Health Study (PATH)
  - Nationally representative longitudinal data for US population
  - Detailed information on multiple tobacco products

# Motivation - CISNET smoking parameter estimates

## CISNET Publication Support and Modeling Resources

Home About Contact Choose Publication ▾ Model Stress Tests ▾

Patterns of Birth Cohort-Specific Smoking Histories, 1965-2009  
Holford TR, Levy DT, McKay LA, et al., Am J Prev Med 2013;46(2).

Summary >

Fig. 2: Current prevalence ▾

Current smoker prevalence by gender,  
calendar year, and birth cohort.

As published in AJPM 2014, Figure 2,  
[Males](#) | [Females](#)

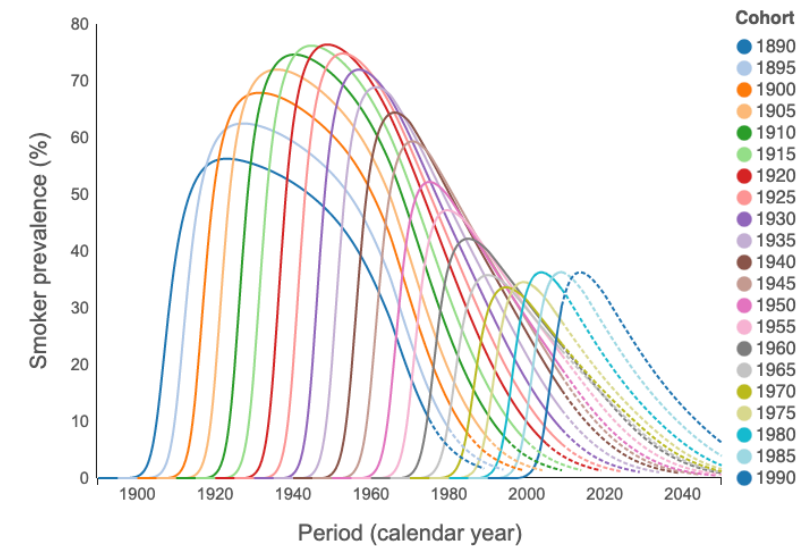
Fig. 3: Former prevalence >

Fig. 4: Smoking initiation >

Fig. 5: Smoking cessation >

Fig. 6: Mean cigarettes per day >

Fig. 7: Population prevalence comparison >



Period/Cohort by cohort: male  
All Cohorts from 1890 to 1990 in 5 year intervals  
Dashed lines indicate regions of extrapolation

Male Female Both Chart Table Show advanced

Copy URL to clipboard

<https://resources.cisnet.cancer.gov/projects/>

## Motivation - CISNET smoking parameter estimates

Several researchers  
and modelers,  
including some from  
the FDA, have used  
these estimates

The NEW ENGLAND JOURNAL of MEDICINE

### SPECIAL REPORT

## Potential Public Health Effects of Reducing Nicotine Levels in Cigarettes in the United States

Benjamin J. Apelberg, Ph.D., M.H.S., Shari P. Feirman, Ph.D., Esther Salazar, Ph.D.,  
Catherine G. Corey, M.S.P.H., Bridget K. Ambrose, Ph.D., M.P.H., Antonio Paredes, M.S.,  
Elise Richman, M.P.H., Stephen J. Verzi, Ph.D., Eric D. Vugrin, Ph.D., Nancy S. Brodsky, Ph.D.,  
and Brian L. Rostron, Ph.D., M.P.H.

# Methods

# Tobacco Transitions Tool (TTT)

- A web aid tool to facilitate the exploration of tobacco use and transition patterns
- Weighted prevalence and transition rates between Waves 1-5 in PATH study (2013-2019)
  - Various tobacco use definition based on use frequency in the past 30 days & regular use criteria
  - **Single** tobacco use: **Cigarette (menthol/non-menthol) and ENDS**
  - **Dual** tobacco use of cigarette and ENDS
  - Stratified by sex, age, race/ethnicity
- Developed using R-Markdown
  - Facilitate presentation of multiple interactive tables and figures
  - Facilitate interactive exploration of estimates
  - Facilitate update as new data becomes available

# Results



# ENDS and Cigarette Prevalence and Transition rates in PATH Waves 1-5

- Current Use definition
  - Youth: Use definition by frequency (1+, 5+, 10+, 20+, 30 days use in the past 30 day)
  - Adults: Use definition by someday/everyday use or frequency (1+, 5+, 10+, 20+, 30 days use in the past 30 day)
- Established/regular use condition
  - Have smoked 100+ cigarettes in their lifetime
  - Have used ENDS fairly regularly
- Stratified by Race/Ethnicity
  - All races combined, Non-Hispanic White, Non-Hispanic Black, Non-Hispanic Other, Hispanic
- Stratified by age group
  - Youth (ages 12-17), Adults (ages 18+)
  - Ages 12-14, 15-17, 18-24, 25-44, 45-64, 65+

# Prevalence and Transition rates in PATH Waves 1-5

- Cross-section prevalence of single product use (Cigarettes and ENDS)
- Cross-section prevalence of cigarette use (menthol vs. non-menthol)
- Cross-section prevalence of dual product use (Cigarettes and ENDS)
- Transition rates of dual product use between Waves in all combinations
- Longitudinal trajectories across Waves 1-5

# TTT tool

# Cross-sectional prevalence of single product use

Adults (ages 18+)

Adults-Males

Adults-Females

Everyday/Someday

1+ days

5+ days

10+ days

20+ days

30 days

All races

Non-Hispanic White

Non-Hispanic Black

Non-Hispanic Other

Hispanic

	Never regular		Non-Current		Current someday use		Current everyday use	
	Population	Prevalence	Population	Prevalence	Population	Prevalence	Population	Prevalence
Cigarette Use								
Wave 1 (N=32173)	15853	61.7%	4918	20.1%	2381	3.7%	9021	14.5%
Wave 2 (N=28288)	13442	58.7%	5152	22.6%	2235	4.5%	7459	14.2%
Wave 3 (N=28080)	13732	57.9%	5335	23.7%	1999	4.2%	7014	14.1%
Wave 4 (N=33574)	17606	59%	6103	23.3%	2323	4.2%	7542	13.6%
Wave 5 (N=32672)	18412	59.3%	6188	24.2%	2011	4%	6061	12.4%
ENDS Use								
Wave 1 (N=32246)	29984	96.6%	687	1%	942	1.4%	633	1%
Wave 2 (N=28252)	25068	94.2%	1435	2.5%	1016	1.8%	733	1.4%
Wave 3 (N=27940)	23948	92.5%	2255	4.1%	948	1.8%	789	1.6%
Wave 4 (N=33537)	28214	91.6%	3341	5.2%	1048	1.6%	934	1.7%
Wave 5 (N=32672)	26567	89.6%	3148	5.7%	1454	2.2%	95% CI: 2.3% - 2.8% 2.5%	

# Transition rates: ENDS/Cigarette use

Adults (ages 18+)

Adults-Males

Adults-Females

Everyday/Someday

1+ days

5+ days

10+ days

20+ days

30 days

All races

Non-Hispanic White

Non-Hispanic Black

Non-Hispanic Other

Hispanic

Wave1 & Wave2

Wave2 & Wave3

Wave3 & Wave4

Wave1 & Wave3

Wave2 & Wave4

Wave4 & Wave5

Wave1 & Wave4

Wave3 & Wave5

Wave2 & Wave5

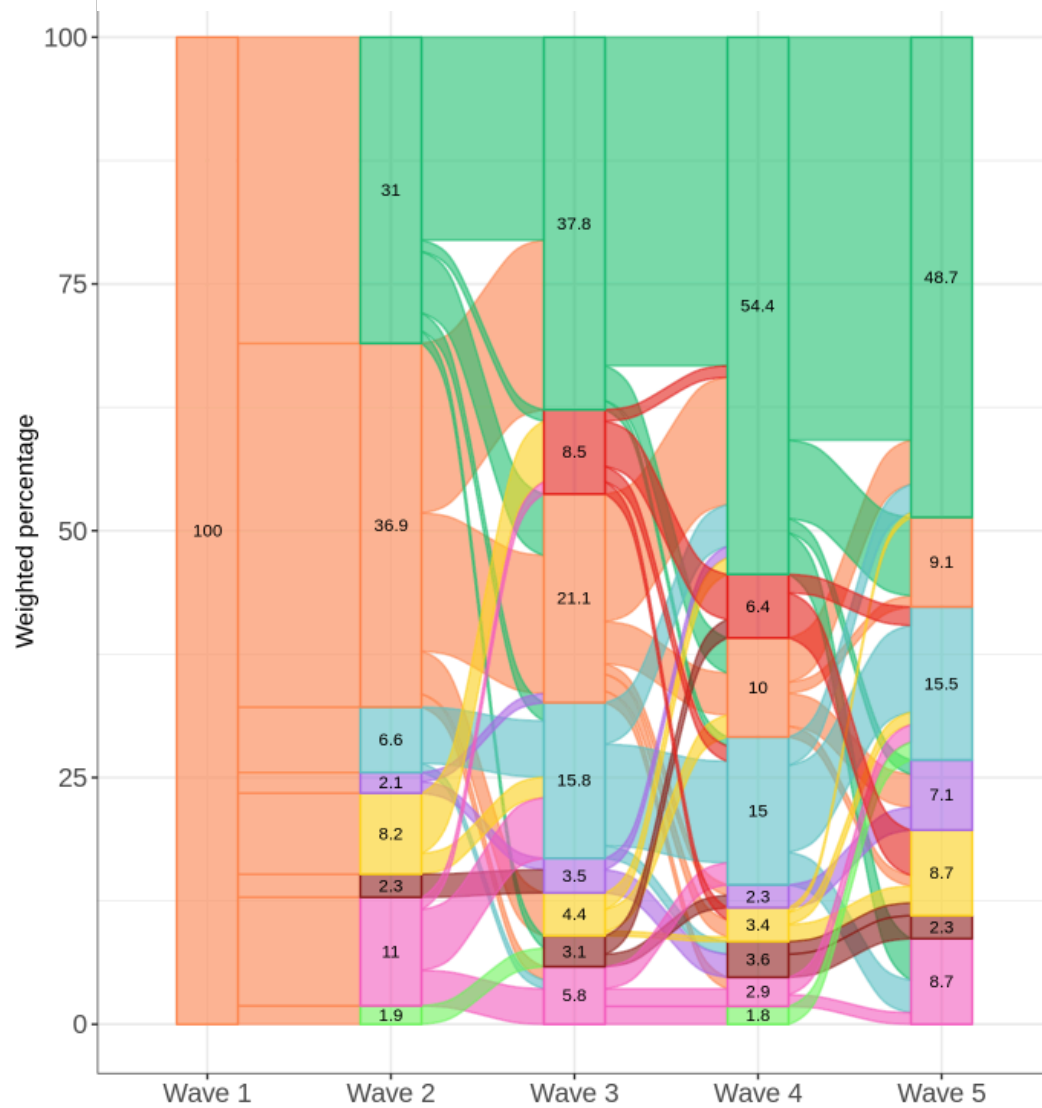
Wave1 & Wave5

Avg.1-year (Wave1-Wave4)

	Y2-Never regular (N=33490; 56.8%)	Y2-Non-Current (N=14924; 23.6%)	Y2-Exclusive Cigarette 1+ days (N=22816; 16.6%)	Y2-Exclusive ENDS 1+ days (N=1799; 1.3%)	Y2-Cigarette 1+ days & ENDS 1+ days (N=2326; 1.6%)
Y1-Never regular (N=35692; 58.9%)	33490 (96.5%)	901 (2%)	993 (1.2%)	258 (0.3%)	50 (0%)
Y1-Non-Current (N=13040; 21.9%)	0 (0%)	11423 (93.9%)	1308 (5.1%)	216 (0.8%)	93 (0.3%)
Y1-Exclusive Cigarette 1+ days (N=22808; 16.5%)	0 (0%)	2071 (9.5%)	19425 (85.1%)	244 (1.1%)	1068 (4.3%)
Y1-Exclusive ENDS 1+ days (N=1633; 1.2%)	0 (0%)	401 (21.5%)	142 (8.8%)	95% CI: 52.5% - 61.4% 877 (57%)	213 (12.7%)
Y1-Cigarette 1+ days & ENDS 1+ days (N=2182; 1.5%)	0 (0%)	128 (5.5%)	948 (42.9%)	204 (9.5%)	902 (42%)

# PATH - Adult Females (ages 18+)

## Exclusive someday ENDS users at Wave 1



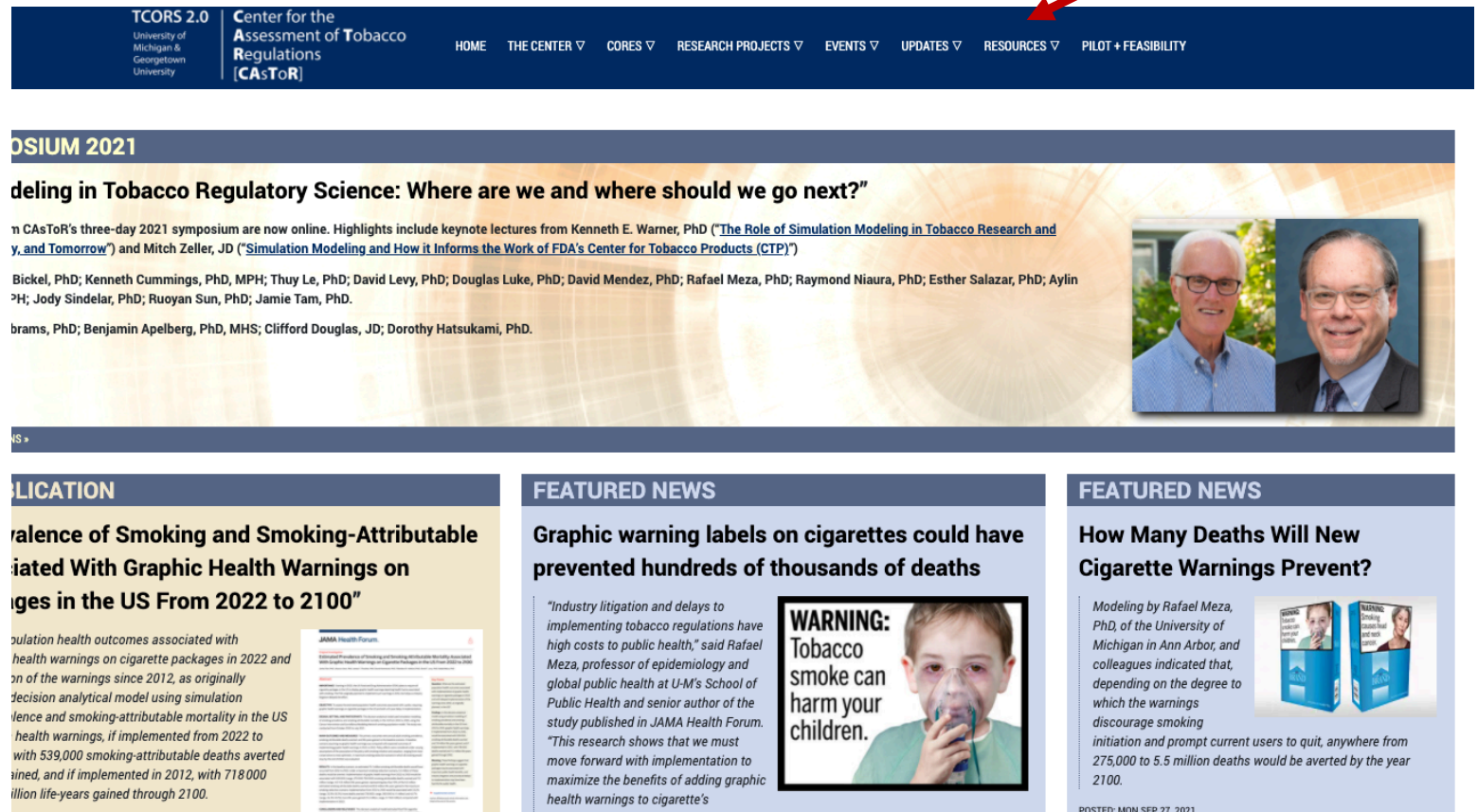
## Exclusive daily ENDS users at Wave 1



How to share  
the TTT tool?

TCORS-CAsToR resource webpage

[https://tcors.umich.edu/Resources\\_Research.php](https://tcors.umich.edu/Resources_Research.php)



**TCORS 2.0**  
University of Michigan & Georgetown University

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

HOME THE CENTER ▾ CORES ▾ RESEARCH PROJECTS ▾ EVENTS ▾ UPDATES ▾ **RESOURCES ▾** PILOT + FEASIBILITY



### SYMPOSIUM 2021

#### Modeling in Tobacco Regulatory Science: Where are we and where should we go next?"

TCAsToR's three-day 2021 symposium are now online. Highlights include keynote lectures from Kenneth E. Warner, PhD ("The Role of Simulation Modeling in Tobacco Research and Policy, Today and Tomorrow") and Mitch Zeller, JD ("Simulation Modeling and How it Informs the Work of FDA's Center for Tobacco Products (CTP)")

Bickel, PhD; Kenneth Cummings, PhD, MPH; Thuy Le, PhD; David Levy, PhD; Douglas Luke, PhD; David Mendez, PhD; Rafael Meza, PhD; Raymond Niaura, PhD; Esther Salazar, PhD; Aylin S. H. Jody Sindelar, PhD; Ruoyan Sun, PhD; Jamie Tam, PhD.


Warner, PhD; Benjamin Apelberg, PhD, MHS; Clifford Douglas, JD; Dorothy Hatsukami, PhD.



### PUBLICATION

#### Prevalence of Smoking and Smoking-Attributable Mortality Associated With Graphic Health Warnings on Cigarette Packages in the US From 2022 to 2100"


Simulation health outcomes associated with health warnings on cigarette packages in 2022 and 2100 of the warnings since 2012, as originally published in the decision analytical model using simulation. The model found that the implementation of graphic health warnings on cigarette packages in the US would avert 539,000 smoking-attributable deaths and 11 million life-years gained through 2100.



### FEATURED NEWS

#### Graphic warning labels on cigarettes could have prevented hundreds of thousands of deaths


"Industry litigation and delays to implementing tobacco regulations have high costs to public health," said Rafael Meza, professor of epidemiology and global public health at U-M's School of Public Health and senior author of the study published in JAMA Health Forum. "This research shows that we must move forward with implementation to maximize the benefits of adding graphic health warnings to cigarette's



### FEATURED NEWS

#### How Many Deaths Will New Cigarette Warnings Prevent?

Modeling by Rafael Meza, PhD, of the University of Michigan in Ann Arbor, and colleagues indicated that, depending on the degree to which the warnings discourage smoking initiation and prompt current users to quit, anywhere from 275,000 to 5.5 million deaths would be averted by the year 2100.



POSTED: MON SEP 27, 2021

Currently under development!!



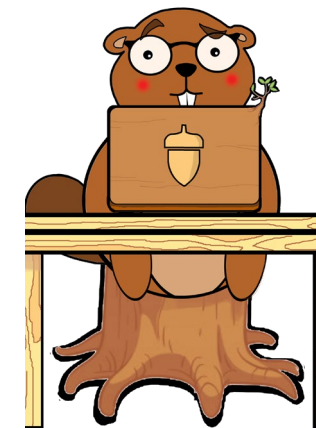
# Summary

- The TTT will facilitate rapid dissemination of tobacco transition estimates and analyses of patterns of tobacco product use
- The tool will be updated as new PATH data are released and more tobacco products are included
- The tool will be publicly available at <https://tcors.umich.edu/>
- Include other tobacco products, e.g., cigars
- Usability testing and stakeholder feedback pending



# Acknowledgments

- **Key collaborators**
  - **Andrew Brouwer, University of Michigan**
  - **Evelyn Jimenez-Mendoza, University of Michigan**
  - **Ritesh Mistry, University of Michigan**
  - **Rafael Meza, University of Michigan**
- **CAsToR-DAD team**
- **Funding sources**
  - **NCI/FDA grant U54CA229974 (TCORS-CAsToR)**



Thank you !!

Any Questions?

Jihyoun Jeon <jihjeon@umich.edu>

Rafael Meza <rmeza@umich.edu>