What the research says...

CAsToR Briefing

August 2026

The Center for the Assessment of Tobacco Regulations (CAsToR) aims to provide evidence-based and expert-informed modeling of the behavioral and public health impacts of FDA tobacco rules or other regulatory actions, focusing on Impact Analysis, Behavior and Health Effects as Scientific Domains.

Modeling the impact of tobacco control regulations on chronic obstructive pulmonary disease (COPD) using the COPD-NHM

This brief summarizes recent work by Dr. Luz M. Sánchez-Romero and team to develop a COPD natural history simulation model (COPD-NHM) for evaluating the public health effects of tobacco regulations. [1, 2]

Key takeaways

- COPD is a progressive, but preventable and treatable lung disease. The main public health prevention intervention is smoking cessation.
- The COPD-Natural History Model (COPD-NHM) is a simulation model that uses input data on individual smoking history, transitions between COPD severity stages, and COPD-associated mortality to simulate incidence and progression of COPD for individuals from the U.S. population.
- The COPD-NHM is used to estimate how tobacco control regulations or treatment approaches might impact the COPD disease burden in U.S. adults.

What is chronic obstructive pulmonary disease (COPD)?

Chronic obstructive pulmonary disease (COPD) occurs when airflow is obstructed. It can take the form of chronic bronchitis, emphysema, or a combination of both.

Preserved Ratio Impaired Spirometry (PRISm) is a respiratory pattern that people may experience before transitioning to more or less severe lung symptoms.

COPD is the 4th cause of death and 3rd cause of disability in the U.S, costing $49 billion a year. COPD is a progressive, but preventable and treatable lung disease.

The main cause for COPD is cigarette smoking, though it is made worse by exposure to air pollution and genetic risk factors.

How do tobacco regulations affect future prevalence of COPD?

Researchers are interested in predicting how tobacco regulations might impact population health in the long-term, especially for diseases primarily caused by smoking cigarettes.

The main public health intervention to reduce COPD burden is smoking cessation.

We can predict how tobacco regulations might affect COPD disease burden by using the **COPD Natural History Model (COPD-NHM)**, a microsimulation model.

What is the COPD-Natural History Model (COPD-NHM)?

The COPD-NHM is a microsimulation model of the relationship between cigarette use and COPD. The model simulates U.S. individuals and their smoking and COPD history. It can forecast when U.S. adults who smoke cigarettes transition across the different COPD severity stages.

The model can project how many people who have a history of smoking in the U.S. population will develop COPD over time, and the severity of the disease, including how many people will die from COPD and other diseases.

TCORS | **C**enter for the **A**ssessment of **T**obacco **R**egulations [**CA**s**T**o**R**]

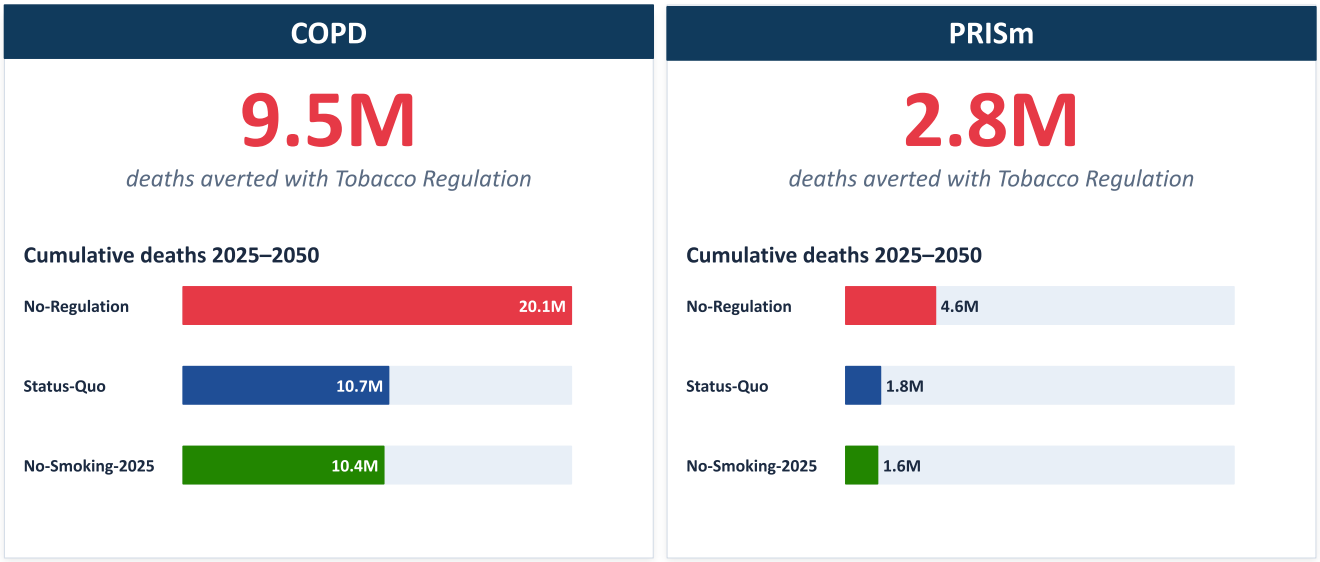
tcors.umich.edu | **CastorPAD@umich.edu**

CAsToR is funded by the National Cancer Institute of the National Institutes of Health (NIH) and FDA Center for Tobacco Products (CTP) under Award Number 5U54CA229974. The content is solely the responsibility of the authors and does not necessarily represent the official views of the NIH or the Food and Drug Administration.

CAsToR Briefing

Modeling the impact of tobacco control regulations on COPD.

Tobacco Regulation Averted ~12M COPD and PRISm Deaths by 2050



Projecting the number of cumulative deaths from COPD and PRISm between 2025-2050 under three regulation scenarios demonstrates the impact of tobacco control in averting tobacco-related deaths. In the "No-Smoking-2025" scenario, smoking initiation rates were set to 0% and cessation rates were set to 100% starting from 2024.

The model can also estimate how changes, such as tobacco control regulations and new treatments, might impact COPD prevalence.

In a first analysis, the model was used to compare future COPD cases under three scenarios: a "**no-regulation**" scenario without any tobacco control, a "**status quo**" scenario under current tobacco control, and a "**no-smoking**" scenario in which all cigarette use stops in 2025 (i.e., no one initiated and everyone who used them quit).

The information generated by the model (summarized in the above graphic) can be used to compare how different approaches to regulation or treatment may impact COPD disease burden.

Next, the research team will explore the impact of specific tobacco control policies and regulations on smoking and COPD rates.

How the COPD-NHM informs policy

The COPD-NHM can provide valuable forecasts of potential policy effects to inform public policy.

By simulating the long-term impact of potential policies on COPD disease burden, the COPD-NHM provides predictions of how tobacco regulation or the lack thereof would affect chronic lung diseases in the future.

Citations

[1] Sánchez Romero, L. M., Y. Li, M. K. Han, and R. Meza. 2026. "C16-09 Quantifying the Long-Term Impact of US Tobacco Control on COPD Burden: Results From the COPD-Natural History Model." American Journal of Respiratory and Critical Care Medicine 212 (Supplement_1): aamag162.992. https://doi.org/10.1093/ajrccm/aamag162.992.

[2] Robayo M, Obeng-Nyarkoh PI, Hartmann-Boyce J, Valentín-Figueroa ME, Cook S, Sánchez-Romero LM. The Burden of Chronic Obstructive Pulmonary Disease in the US: A Systematic Review of Nationally Representative Health Surveys. Int J Chron Obstruct Pulmon Dis. 2026;21:582740. https://doi.org/10.2147/COPD.S582740.

Conflicts of interest: None. None of the authors accept funds from the tobacco or vaping industries. ***Funding***: The COPD-NHM is supported by the NCI-NIH and FDA CTP Awards Number K01CA26037, U01CA253858, NCI-FDA U54CA229974, and R01DA045016 from NIDA. The content is solely the responsibility of the authors and does not necessarily represent the official views of the funders.