Estimating the Public Health Consequences of Menthol Cigarettes on Smoking Prevalence and Premature Mortality from 1980 through 2018

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References

- Thuy TT Le, and David Mendez. "An estimation of the harm of menthol cigarettes in the United States from 1980 to 2018." Tobacco Control 31.4 (2022): 564-568.

- David Mendez and Thuy TT Le. "Consequences of a match made in hell: the harm caused by menthol smoking to the African American population over 1980–2018." Tobacco control 31.4 (2022): 569-571.

Disclosures

- We have no conflict of interests to declare.
- Support for this study is provided by grant U54CA229974 from the National Institutes of Health (NIH), and the Food and Drug Administration (FDA).
- The content presented is solely the responsibility of the authors and does not necessarily represent the official views of the NIH or the FDA.

Introduction

- The 2009 Family Smoking Prevention and Tobacco Control Act required the Food and Drug Administration’s (FDA) Tobacco Products Scientific Advisory Committee (TPSAC) to submit a report and recommendations that address "the issue of the impact of the use of menthol in cigarettes on the public health including such use among children, African Americans, Hispanics, and other racial and ethnic minorities."

Introduction

- In 2011, the TPSAC submitted a report to the FDA with the following conclusions:
  - **Menthol cigarettes have an adverse impact on public health in the United States.**
  - **There are no public health benefits of menthol compared to non-menthol cigarettes.**

Introduction

- Consequently, the TPSAC Menthol Report made the following overall recommendation to the FDA:
    - **Removal of menthol cigarettes from the marketplace would benefit public health in the United States.**
- In 2013 and again in 2018, the FDA sought public comment, research results and other information on the impact of menthol cigarettes on smoking initiation, prevalence and other factors to inform regulatory actions that the FDA might take on menthol cigarettes.

Introduction

- In April 2021, the FDA announced plans to ban menthol cigarettes, in response to a lawsuit filed by the African American Tobacco Control Leadership (AATCLC), Action on Smoking and Health (ASH), the American Medical Association (AMA), and the National Medical Association (NMA) on Saving Black Lives.

- In April 2022, the FDA proposed rules prohibiting menthol cigarettes and flavored cigars to prevent youth initiation, and significantly reduce tobacco-related disease and death.

Objective

- To quantify the harm caused by menthol cigarettes, we estimated the excess smoking prevalence, smoking initiation, and mortality due to menthol cigarettes for
  - **the US General Population**
  - **the African American Population**

  from 1980 through 2018.

Modeling of Menthol Cigarette Effects

- An established simulation model of smoking prevalence and health effects (the Mendez-Warner model) was modified to track menthol smokers.

- The modified model was set to compare health effects of cigarette smoking on the US population over the past 40 years under two scenarios:

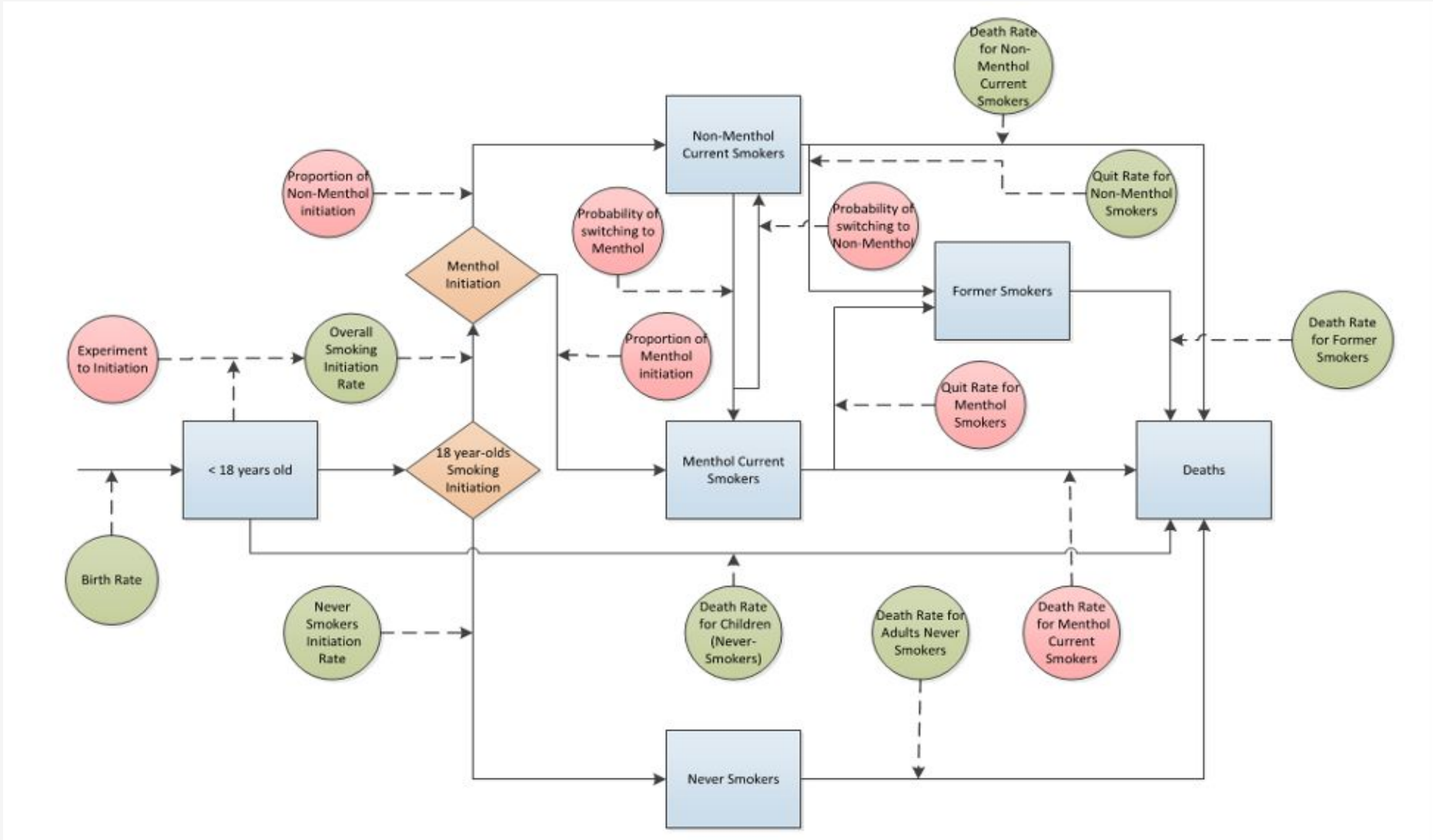
    - Status-quo – simulating what was happening from 1980 through 2018.

    - No menthol scenario – simulating the scenario in which menthol cigarettes were assumed nonexistent over 1980-2018.

- The analysis was repeated for the African American population.

Methods

Simulation Model



Methods

To project the harm of menthol cigarettes over 1980-2018, we:

- Populated the model with the 1980 data and parameters. Then conducted a simulation scenario over 1980-2018 updating all parameters frequently (**status-quo scenario**).
- Constructed an alternative (**counterfactual**) scenario over the same period in which the effect of menthol cigarettes was removed over 1980-2018.
- Compared both scenarios to quantify the public health harm attributable to menthol over the 1980-2018 period.

Methods

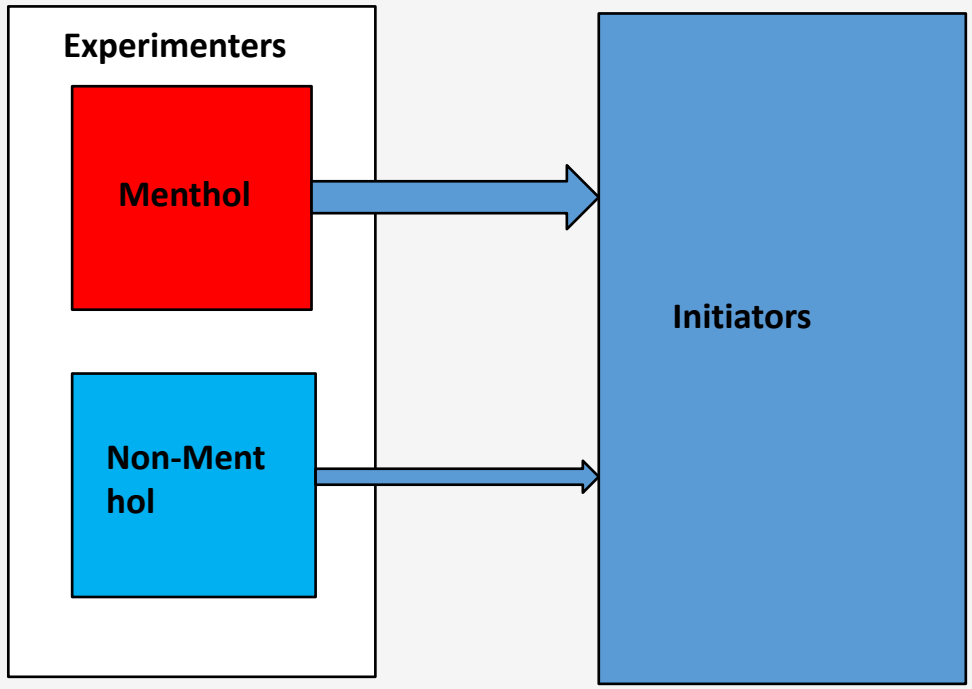
Our Public Health performance measures are:

- Number of menthol-smoking-related premature deaths
- Number of Life Years Lost (LYL)
- Number of new smokers due to menthol

Methods

Initiation rates:

- Under the status quo scenario (γ): average smoking rates among 18-24-year-olds in the 1980-2018 NHIS.
- Under Counterfactual Scenario (γ')



$$\gamma' = \frac{\gamma}{K_4 \times K_5 + (1 - K_4)}$$

γ = Initiation rate under status-quo

γ' = Initiation rate under counterfactual

K_4 = Proportion of Menthol experimenters

K_5 = Ratio of Yields from experimenter to smoker (Menthol/Non-Menthol)

Methods

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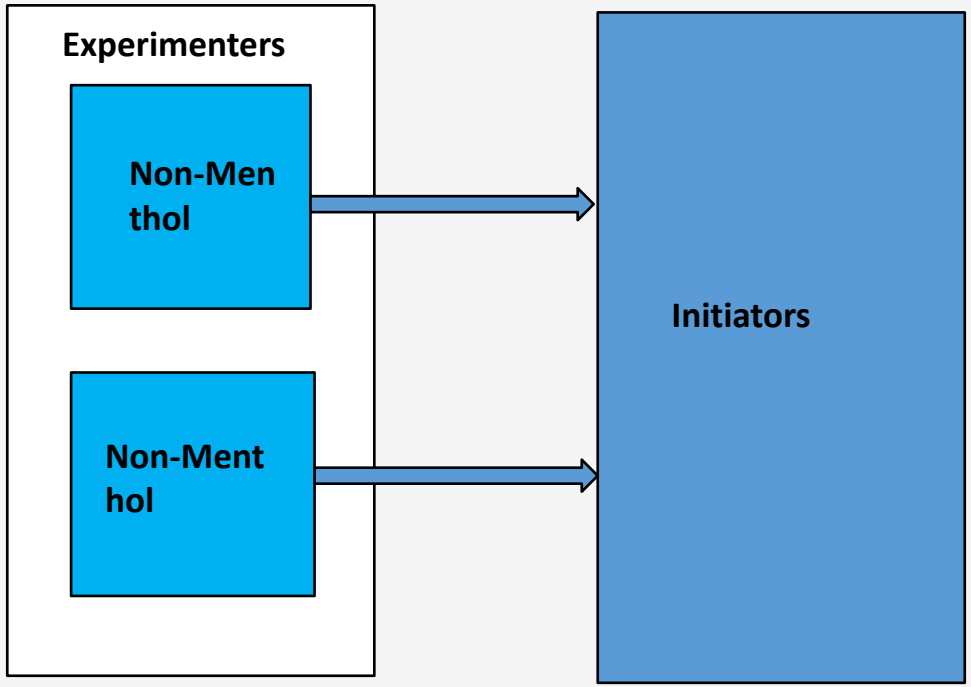

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Methods

Values of menthol-related parameters for the General US and African American population

General Population

Parameters	Baseline
Ratio of Yields from Experimenter to Smoker	1.8
Menthol Cessation Multiplier	0.76

African American Population

Parameters	Baseline
Ratio of Yields from Experimenter to Smoker	1.8
Menthol Cessation Multiplier	0.47

Results

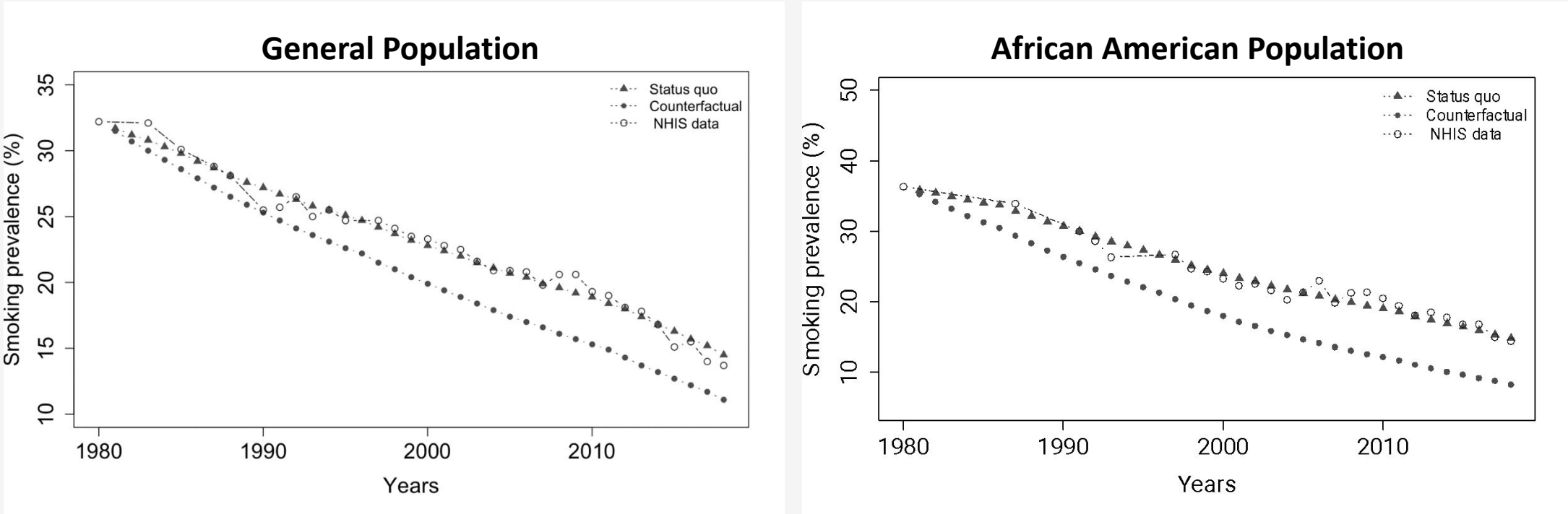


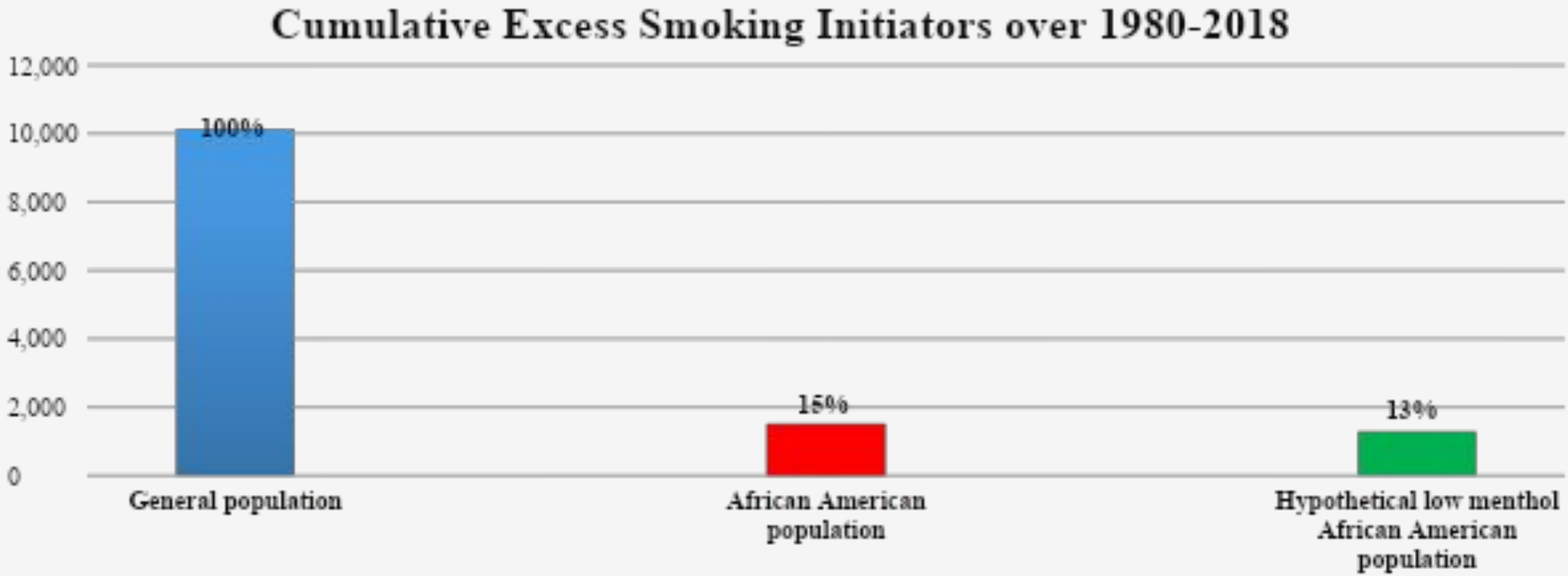
Figure 1: Simulated smoking prevalence under status quo ante and counterfactual scenarios and reported NHIS smoking prevalence over **1980–2018** in the general Population (left, pseudo-R^2 =0.98) and African American (right, pseudo-R^2 =0.95).

Results

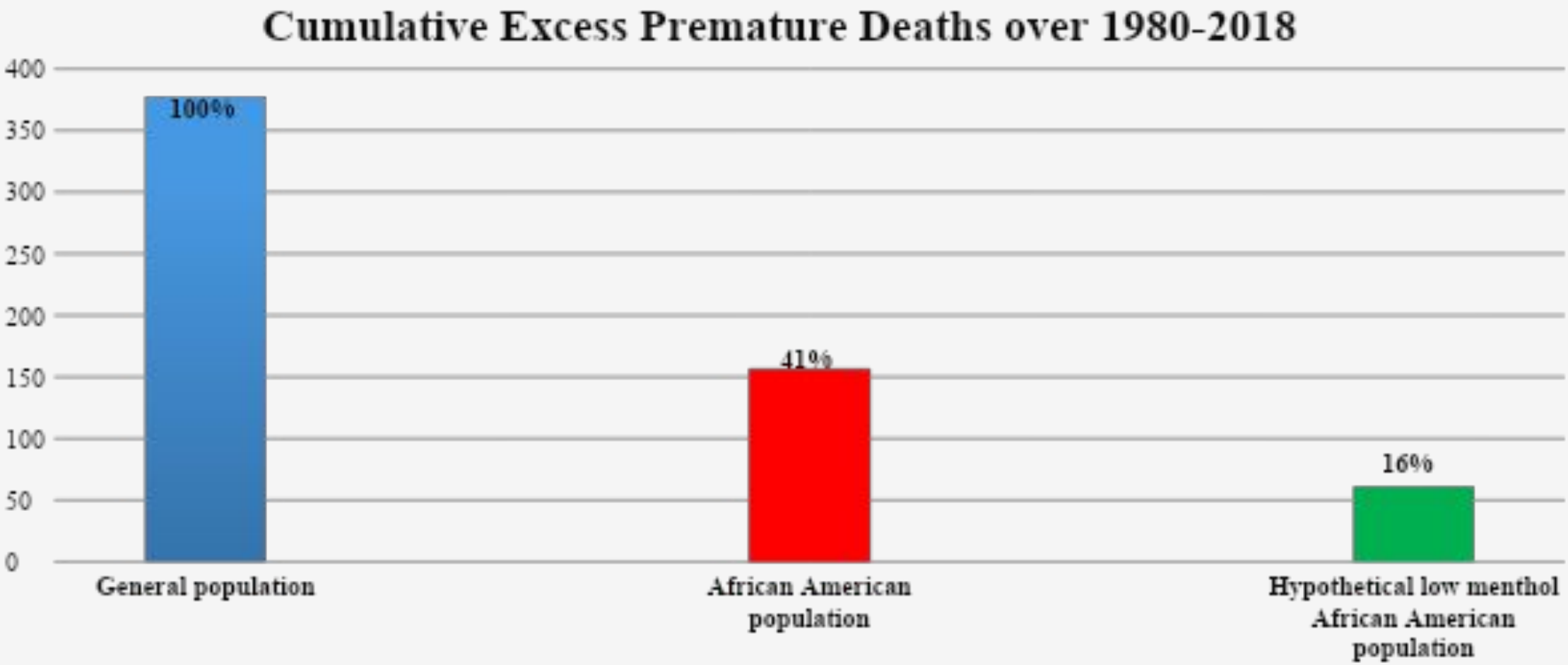
	Cumulative Excess Smoking Initiators	Cumulative Excess Deaths	Cumulative Excess Life Years Lost	Average Percentage of Population
General population	10,137,808 (100%)	377,528 (100%)	2,951,533 (100%)	(100%)
African American population	1,508,913 (15%)	156,471 (41%)	1,476,198 (50%)	(12%)
Hypothetical low menthol African American population	1,286,848 (13%)	61,132 (16%)	606,840 (21%)	(12%)

Table 1: Excess smoking initiation, smoking-related deaths, and life-years lost due to menthol cigarettes over 1980-2018 for the adult general, African American, and hypothetical low menthol African American population.

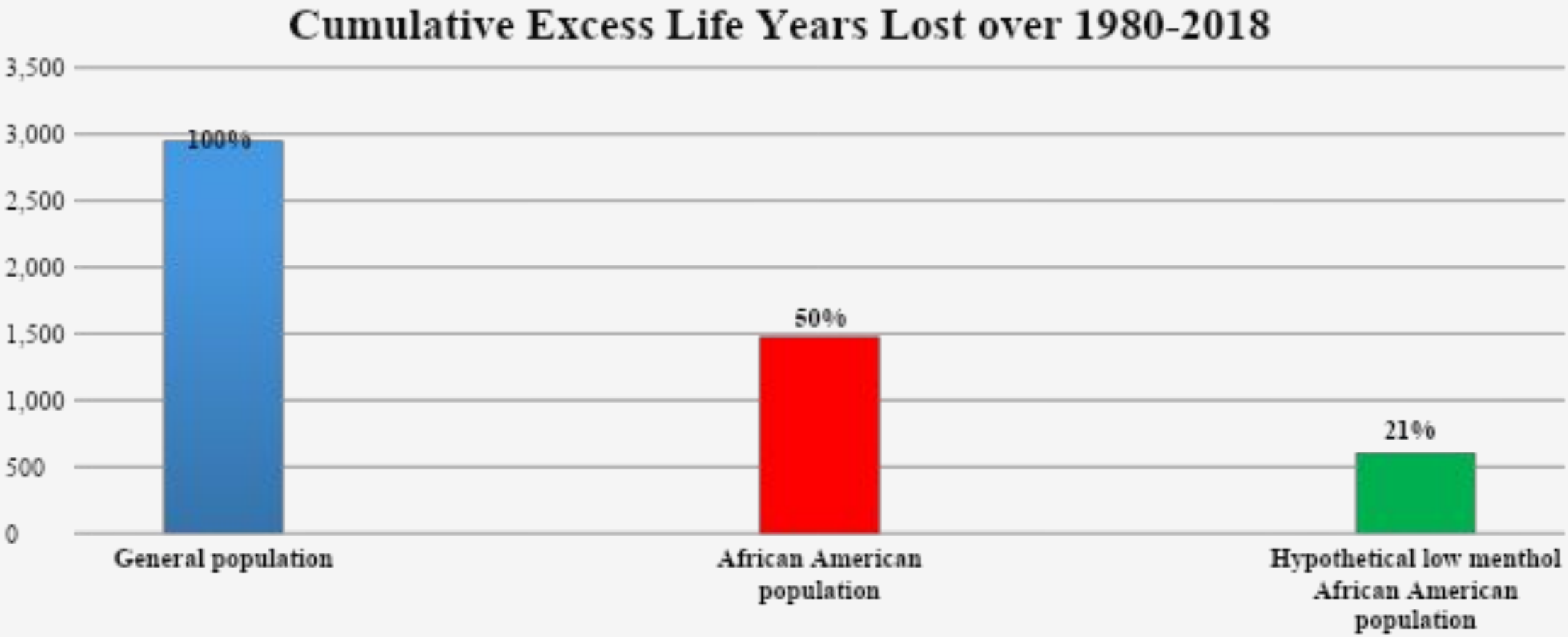
Results


Cumulative Excess Smoking Initiators over 1980-2018
12,000
10,000
8,000
6,000
4,000
2,000
0
100%
15%
13%
General population
African American population
Hypothetical low menthol African American population

Results


Cumulative Excess Premature Deaths over 1980-2018
400
350
300
250
200
150
100
50
0
100%
41%
16%
General population
African American population
Hypothetical low menthol African American population

Results


Cumulative Excess Life Years Lost over 1980-2018
3,500
3,000
2,500
2,000
1,500
1,000
500
0
100%
50%
21%
General population
African American population
Hypothetical low menthol African American population

Discussion

In general,

- From 1980 to 2018, menthol cigarettes were responsible for **millions of excess smoking initiators and hundreds of thousands of smoking-related deaths**.
- Menthol intensifies cigarette harm by increasing the chances that individuals transition from experimentation to regular smoking, and by amplifying dependency, which leads to delayed cessation. These effects increase the number of smokers and the amount of time they smoke.

Discussion

For the African American population,

- **Menthol smoking harms African Americans disproportionally**.
- The African American population is about **12%** of the US population, while the number of premature deaths due to menthol in the African American population is **41%** of that of the general US population.
- If African Americans had the same menthol profile as the general population, they would carry about **16%** of the menthol burden.

Limitations

- The results rely on some key parameters taken from the literature. Therefore, the uncertainty of our results is associated with that of those parameters.

- The simulation model assumes population characteristics that may not be an appropriate representation for all situations (e.g., homogeneity of compartments, proportionality of effects, among others).

Acknowledgments

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Thank you!