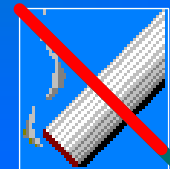


SimSmoke: A Model of Tobacco Control Policies

**A Computer-Based Model
for Simulating the Effect of Tobacco Control Policies on
Tobacco Use and Related Problems**



SimSmoke History

Funding by SAMHSA, RWJF, NCI, FAMRI, TRDRP, GSK, WHO, Rockefeller Foundation, SEATCA

Originally, computer simulation model of tobacco control policies for the US started in 1998

Models developed for Arizona, California, KY, MASS, and NY, and for Argentina, China, France, Malaysia, Poland, Taiwan, Thailand and Vietnam

Over 25 articles published on the model and 30 others on related tobacco control issues

Working toward developing models on alcohol and obesity policies

What is SimSmoke?

SimSmoke is a computer model that simulates the dynamics of tobacco use and tobacco-related problems in a State or Nation, and the effects of policies on those outcomes.

Systems model

Complex interaction of policies and effects on different demographic groups

Dynamic, changing, nonlinear

Each nation and state is different, but can learn from experiences of others

Today's Plan

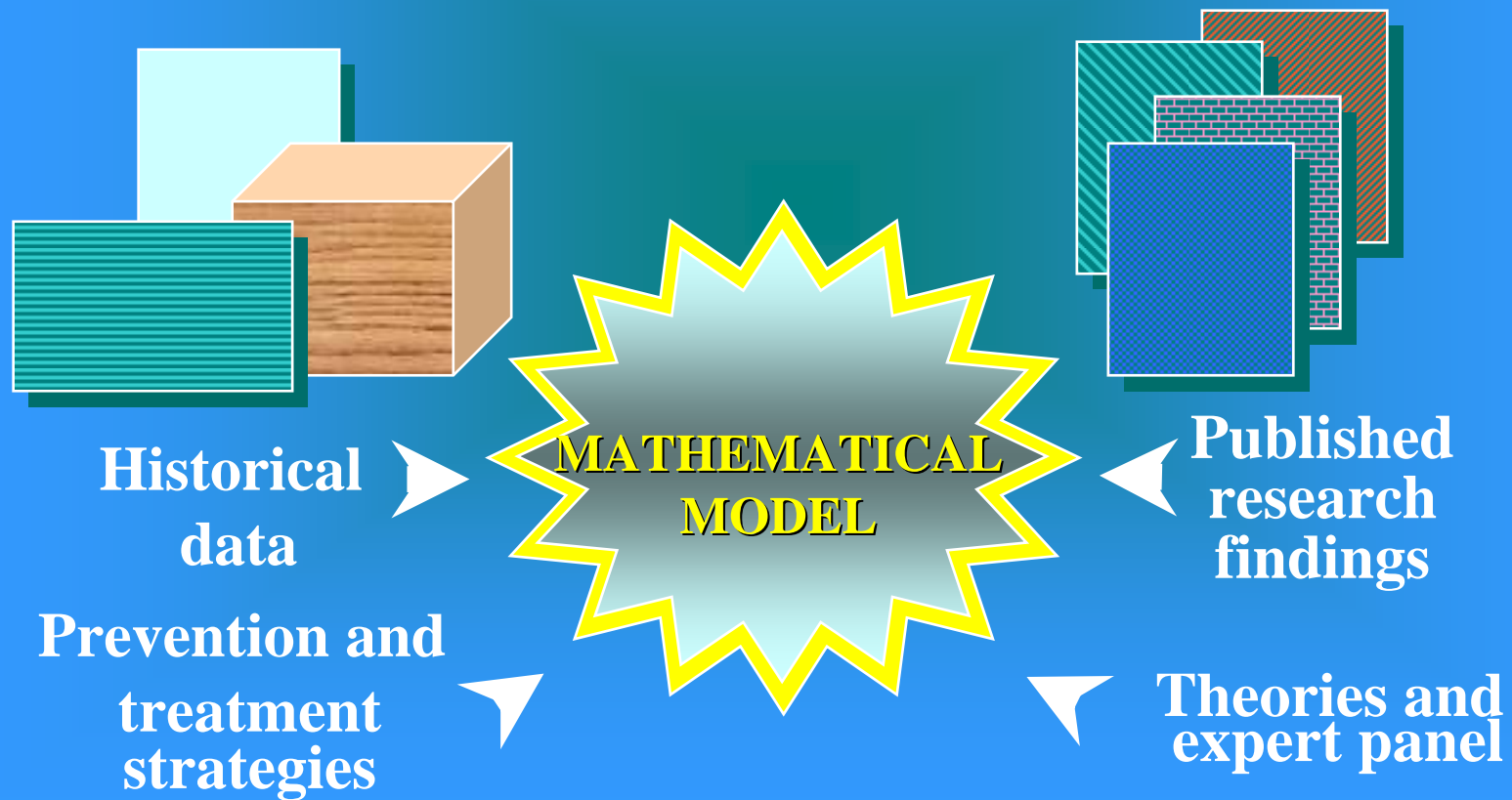
How does **SimSmoke** work?

How do you use **SimSmoke**?

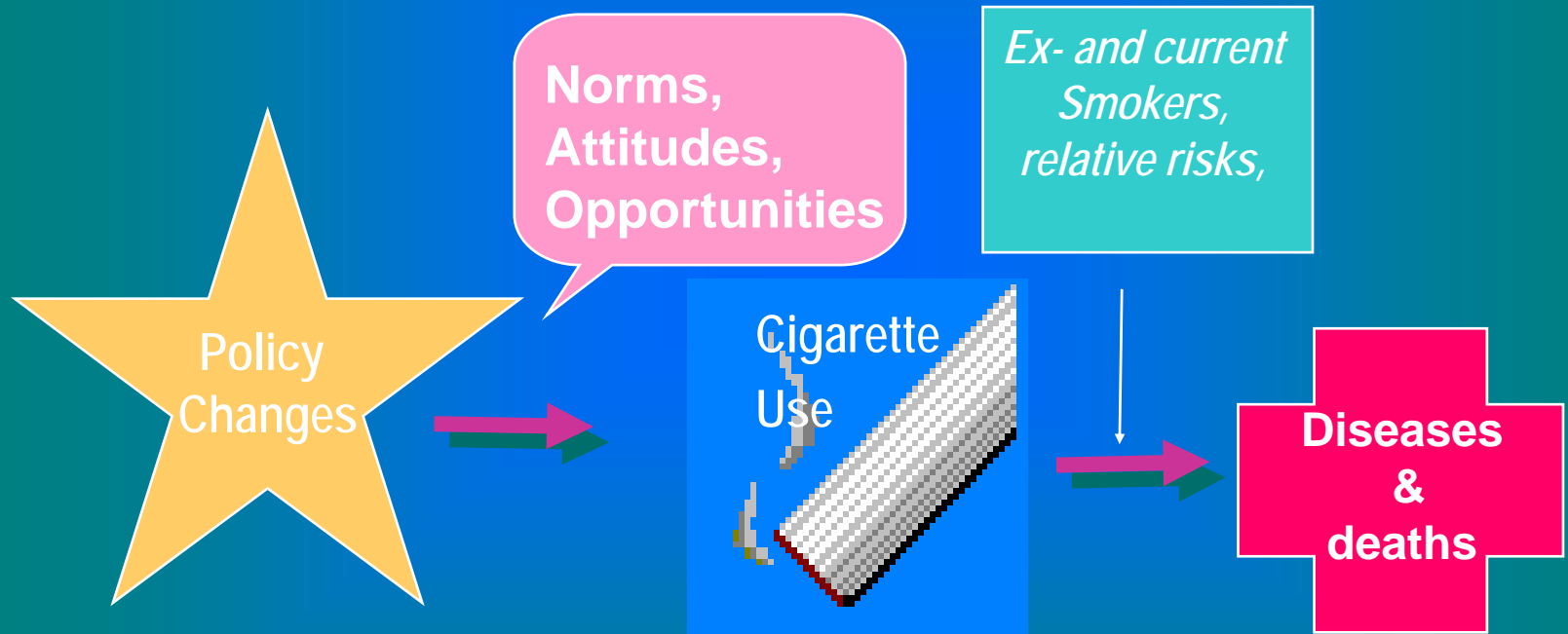
Is **SimSmoke** validated?

How can policymakers use **SimSmoke** and what are
your intended uses?

How does SimSmoke work?



General Flow of the Model



SimSmoke Structure

SimSmoke is loaded with data for the base year. It allows the population to grow and change using fertility and mortality rates. It recognizes different segments of the population—by age and sex



The model uses smoking data by age gender distinguishing smokers, ex-smokers, and never smokers. For US models, uses CPS-TUS

Policies are tracked over some period and affect smoking rates and cessation

Smoking-attributable deaths depend on relative risks and smoking rates



Over time cigarette use is the central issue. It changes through:



Most persons start smoking before age 28.

Rate of smoking initiation

Rate of smoking cessation

I have stopped smoking for more than 3 + months

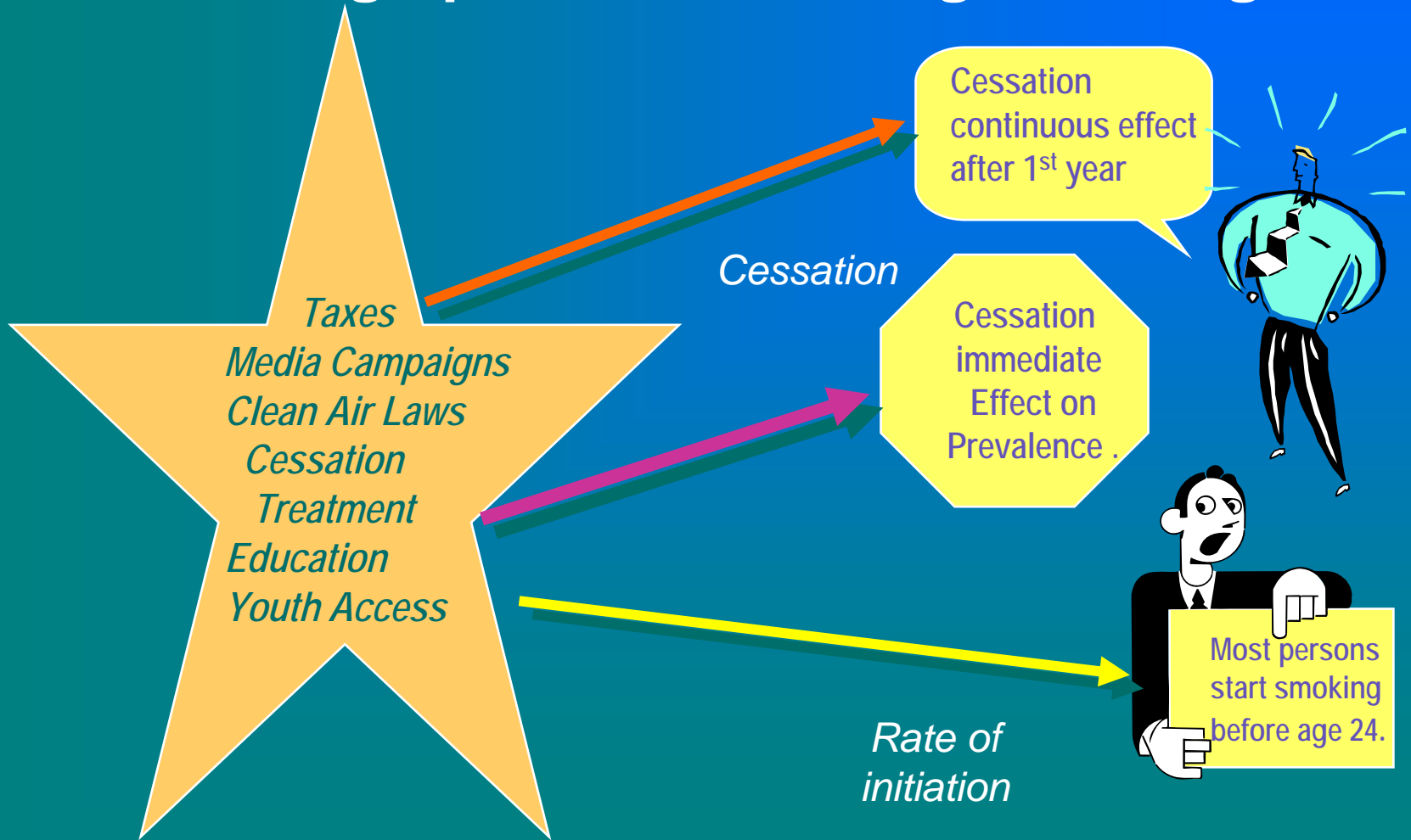


Rate of relapse

An ex-smoker becomes a current smoker again.



Over time cigarette use is modified through policies. It changes through:





**How
Do You Use
SimSmoke?**

Software

- Excel model: easy to program and use, and easy to understand and modify
- Based on previously developed C++ model.
- With flexibility and constantly improving interface
- Easily Downloaded
- Uses 30MB

Index driven by types of input/output

■ Model Options

- Data entry (new user or existing user that may want to modify data)
- Demographic choices (determine the age/gender group of interest (usually adults), fertility)
- Policy modeling options
- Policy effect parameters (for calibration/sensitivity testing)

■ Outcomes

- Graphs
- Tables

■ Data Input, including policy values

■ Calculations-workings of model

Types of Models

- **Tracking Model-** starts from baseline years (= 1993 in US models), and continues to most recent year = 2006
 - Can be use to calibrate (adjust parameters) and validate (test) the model
 - Examine the role of past policies
- **Future Projection-** examine the effect of policies from current year forward, starts from 2007

Outcomes: Tables and Graphs

■ Smoking Prevalence

- Can determine prevalence and total number of smokers, ex-smokers and never smokers

■ Smoking Attributable Deaths

- Total
- By disease- currently lung

■ Per Capita Consumption

- For entire population only

■ Average Quantity Smoked per Smoker

- Distinguishes some day and every day smokers


Outcome Tables

■ Best Case

- Table on strong policies individually
- Comprehensive policy (policies together), Healthy People 2010

■ Table of Data Sources

**NOTE TABLES AND GRAPHS
DEVELOPED TO BE DOWNLOADED
TO REPORTS AND POWERPOINT**



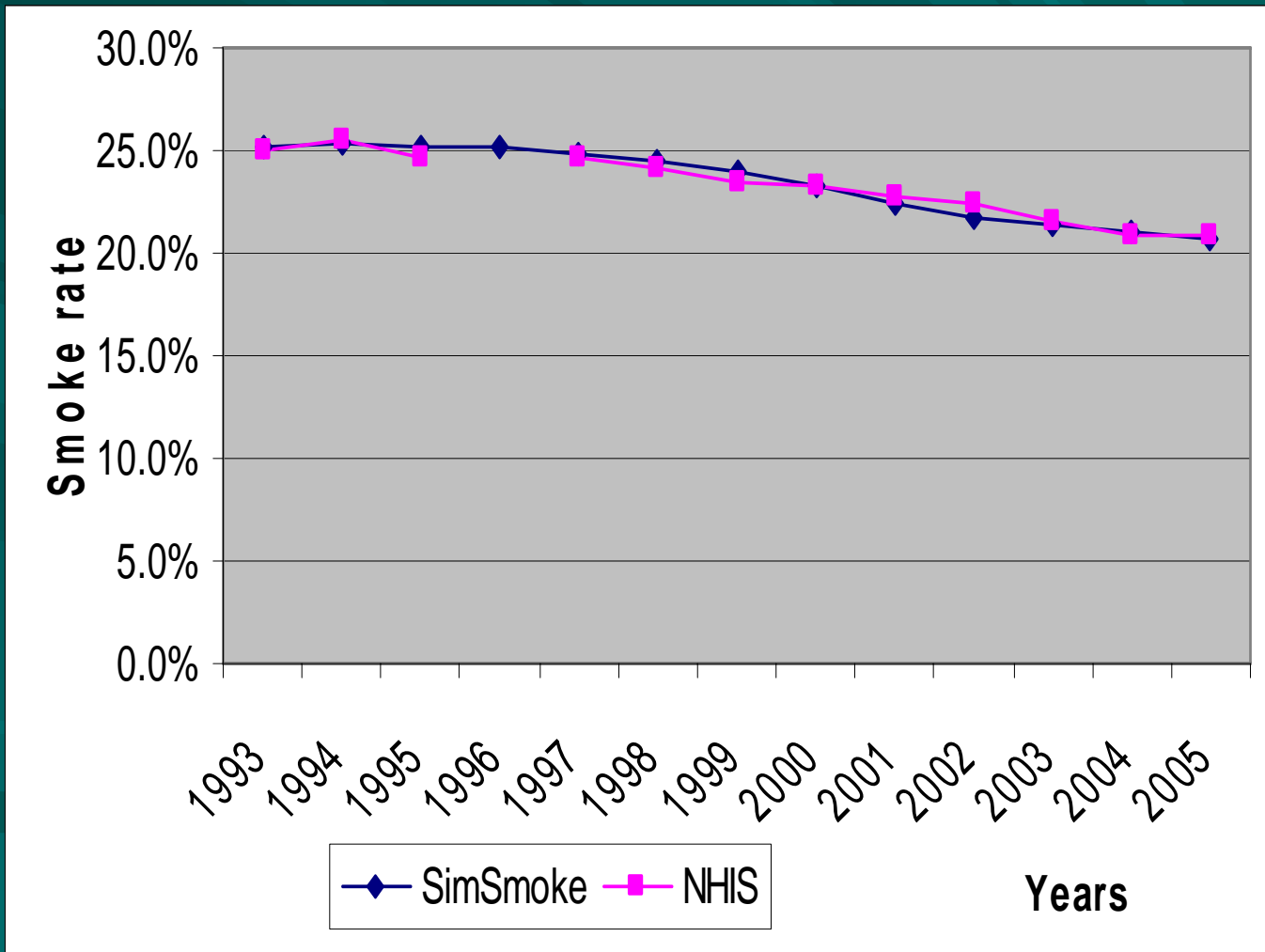
**Is SimSmoke
Validated?**

Justification for the Model

- Based on past studies and expert panel, and publication of the model in peer reviewed journals. Benchmarked policy modules to policies
- **VALIDATION OF THE MODEL**

Use caution stating the limitations of the model and conduct sensitivity analysis using bounds that represent uncertainty

U.S. Model Validation

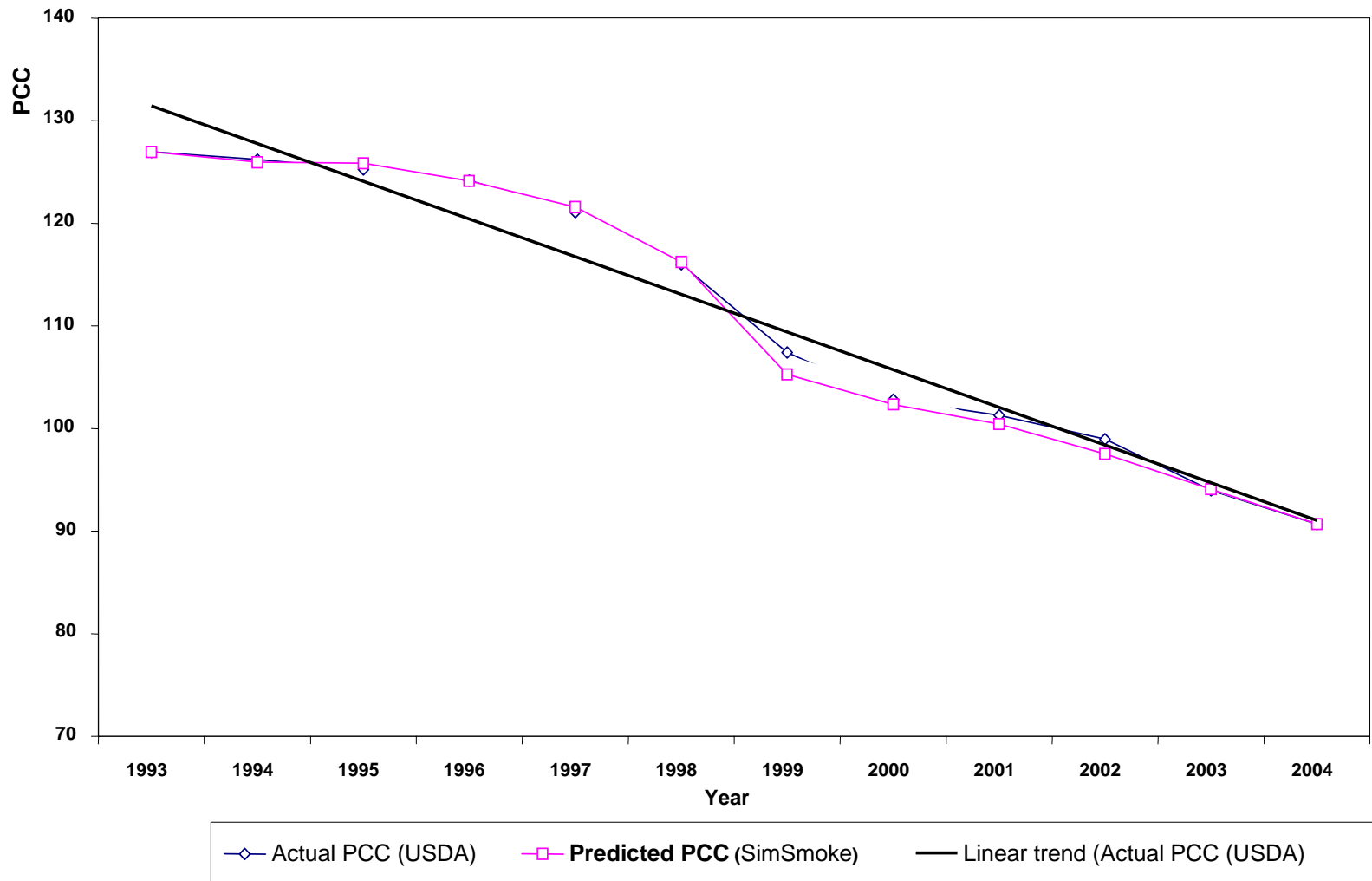


Model Validation

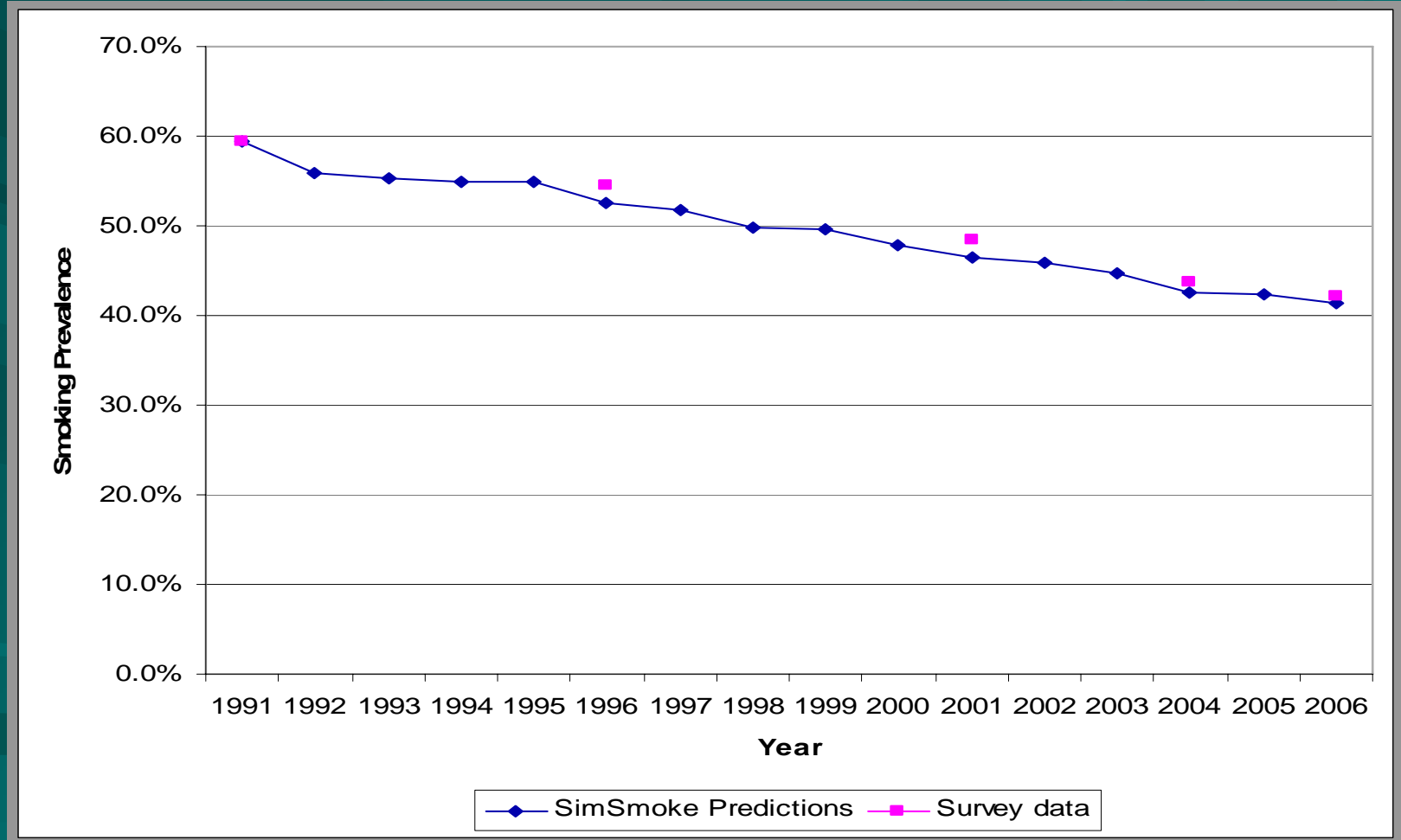
- For overall adult smoking prevalence, predicts long term downward trend (in absolute and relative terms) and changes in trend well
- Does less well for some age groups, especially 18-24 year olds and seniors, under-predicts increase in youth smoking rates (1993-97) and decline since 1997

Other potentially important issue is the role of reductions in quantity smoked per smoker (especially someday trend)

Actual and Predicted Per Capita Consumption (PCC) with Trend Line,



Validate the Model: Thailand Males



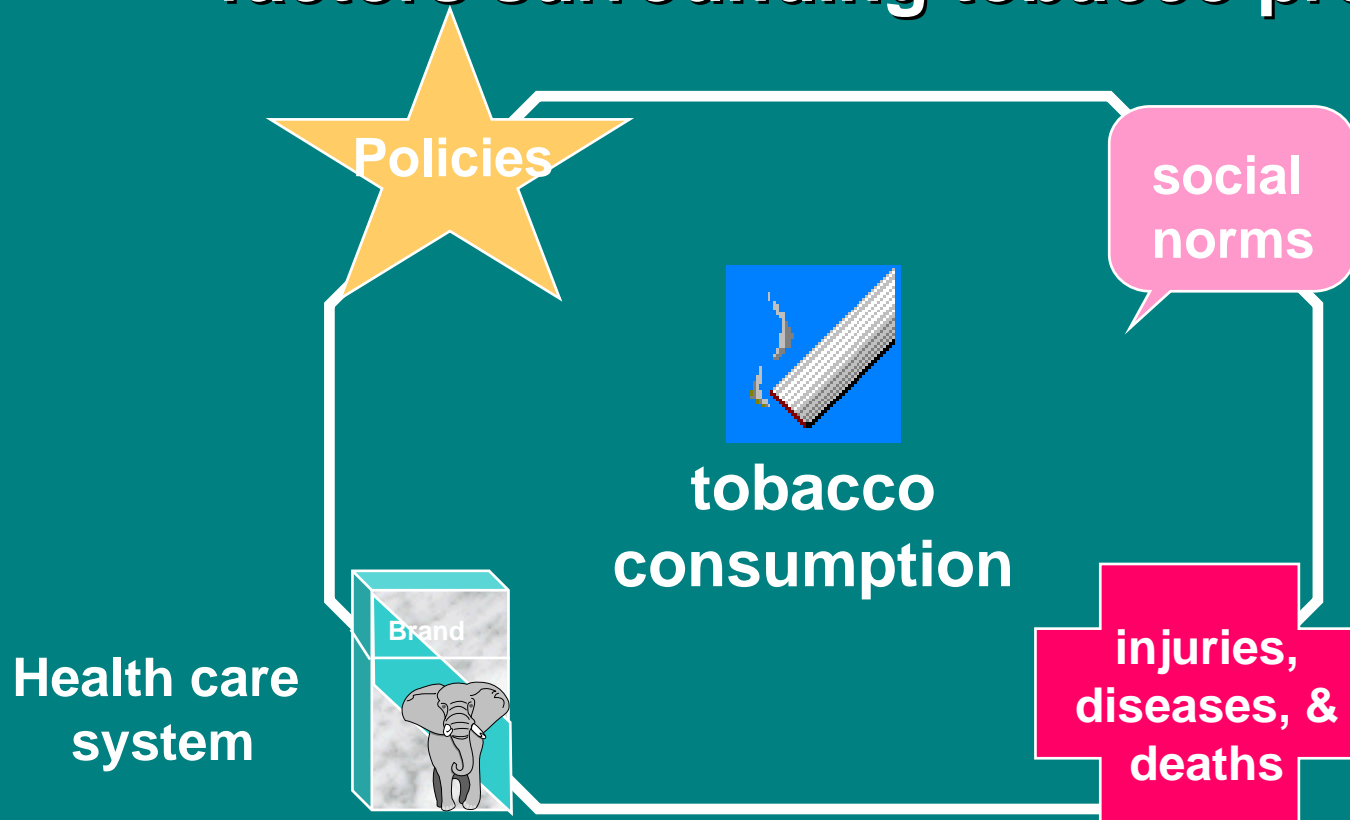


**How
can policymakers
use SimSmoke?**

1

SimSmoke: A tool for . . .

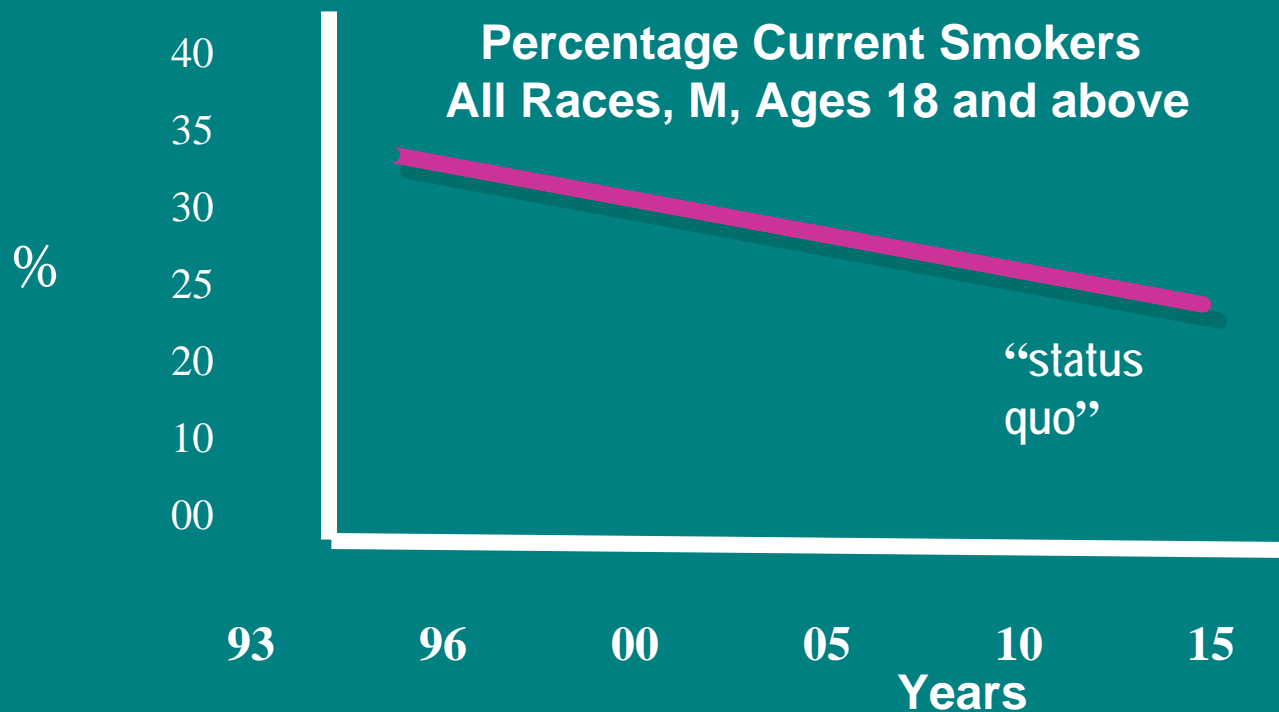
Understanding the complex network of factors surrounding tobacco problems.



2

SimSmoke: A tool for . . .

Forecasting the future dynamics of tobacco use and deaths based on historical Patterns to justify the need for policy



Justification for Tobacco Control

- Status Quo with Policies at current levels
- Shows smoking rate and health impact in the absence of policy: the trends in smoking over *time* as younger people age, and the deaths caused by smoking.
- Can also look at the effect of past policies

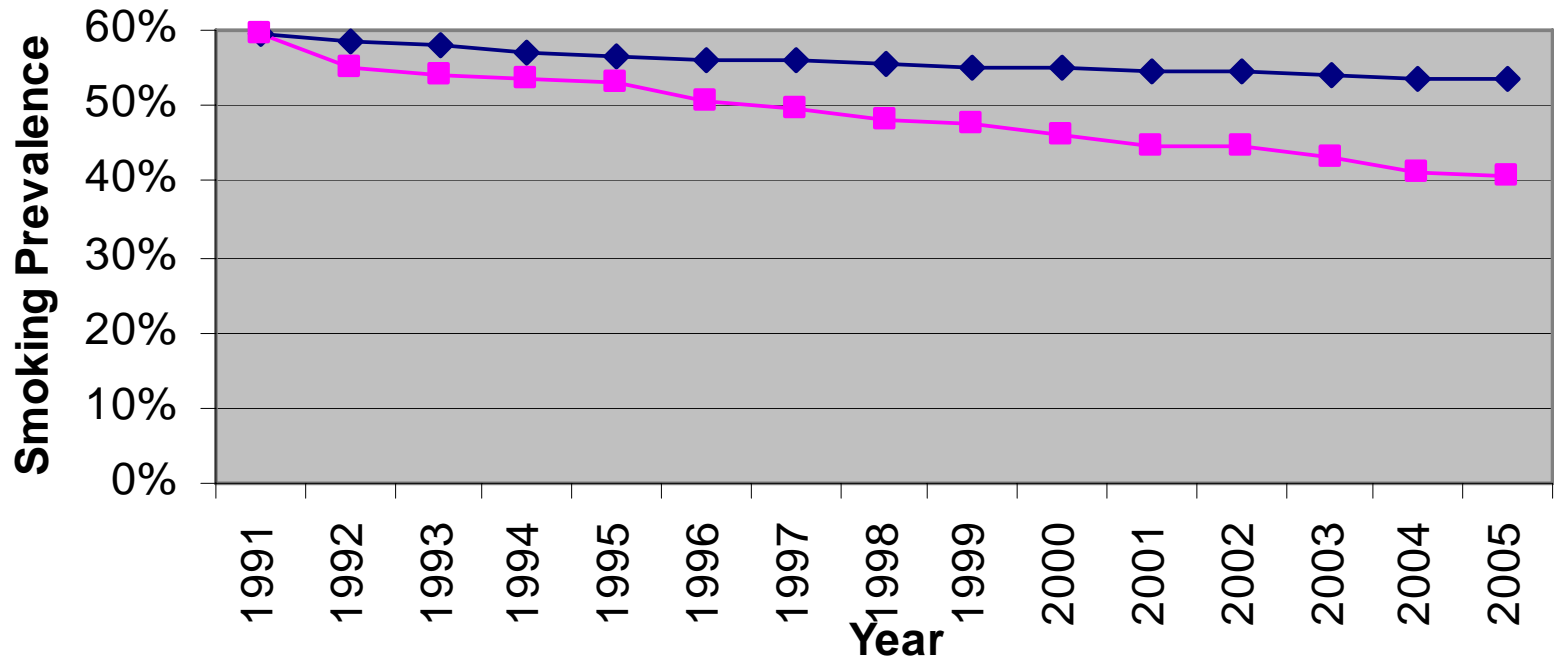
Determine the Role of Past Policies

- **Distinguishing the effect of policies empirically requires disentangling the effect of different policies from long-term trends (independent of policy)**
- **Difficult to do using statistical models, due to the lack of sufficient time series, especially to sort out the effect of different policies**
- **Simulation models combine information from different sources to distinguish the role of different policies from each other and long term trends**

Impact of past policies

- Once policies are used and model is validated, can distinguish the role of tobacco control policies by setting policies to their pre-control levels
- In California and Arizona, we were able to show the effect of state tax hikes and comprehensive campaigns. In Thailand, due primarily to price and advertising bans

Total Impact of Policies: Example Thailand Males



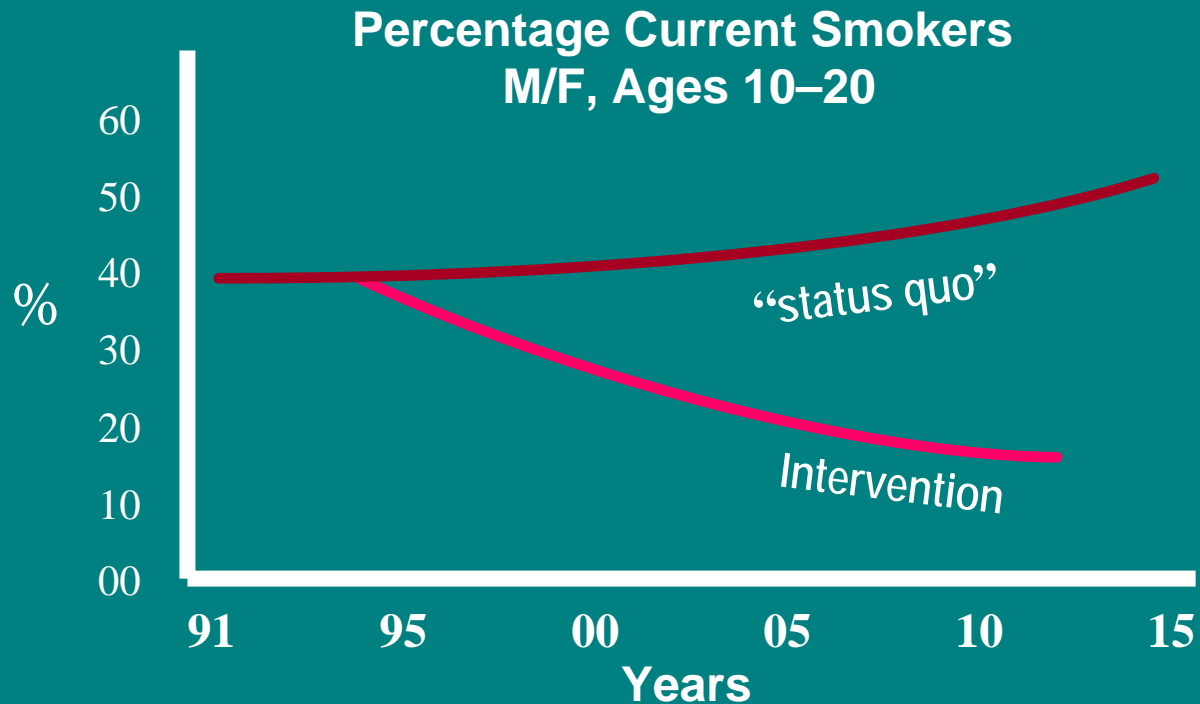
- ◆ Status quo trend with Policies Maintained at 1991 level
- Trends with policies implemented since 1991

Smoking prevalence was 25% less as a result of policies!

3

SimSmoke: A tool for . . .

Estimating the likely impact of alternative interventions in specific situations.





Interventions

Taxation

**Price is an important predictor of tobacco use.
Considerable evidence across countries/states
and time**

**Uses prevalence and conditional elasticities,
higher elasticities for youth**

Uses actual prices during tracking period

**Changing the future price of tobacco is accomplished
through taxation corresponding to the size of tax**



Interventions

Clean air laws:
Work site, restaurant
and enforcement

Many studies of private worksite and clean air laws indicating initial effects on quantity and later effects on prevalence

Studies for high income nation and states, but we tailor effects to consider less outdoor (more rural) and labor participation rates in Kentucky.

Works through decreased opportunities to smoke and changes in attitudes and norms (need publicity)

Need media
campaign
and
publicity from
other policies

Interventions

General Information Interventions

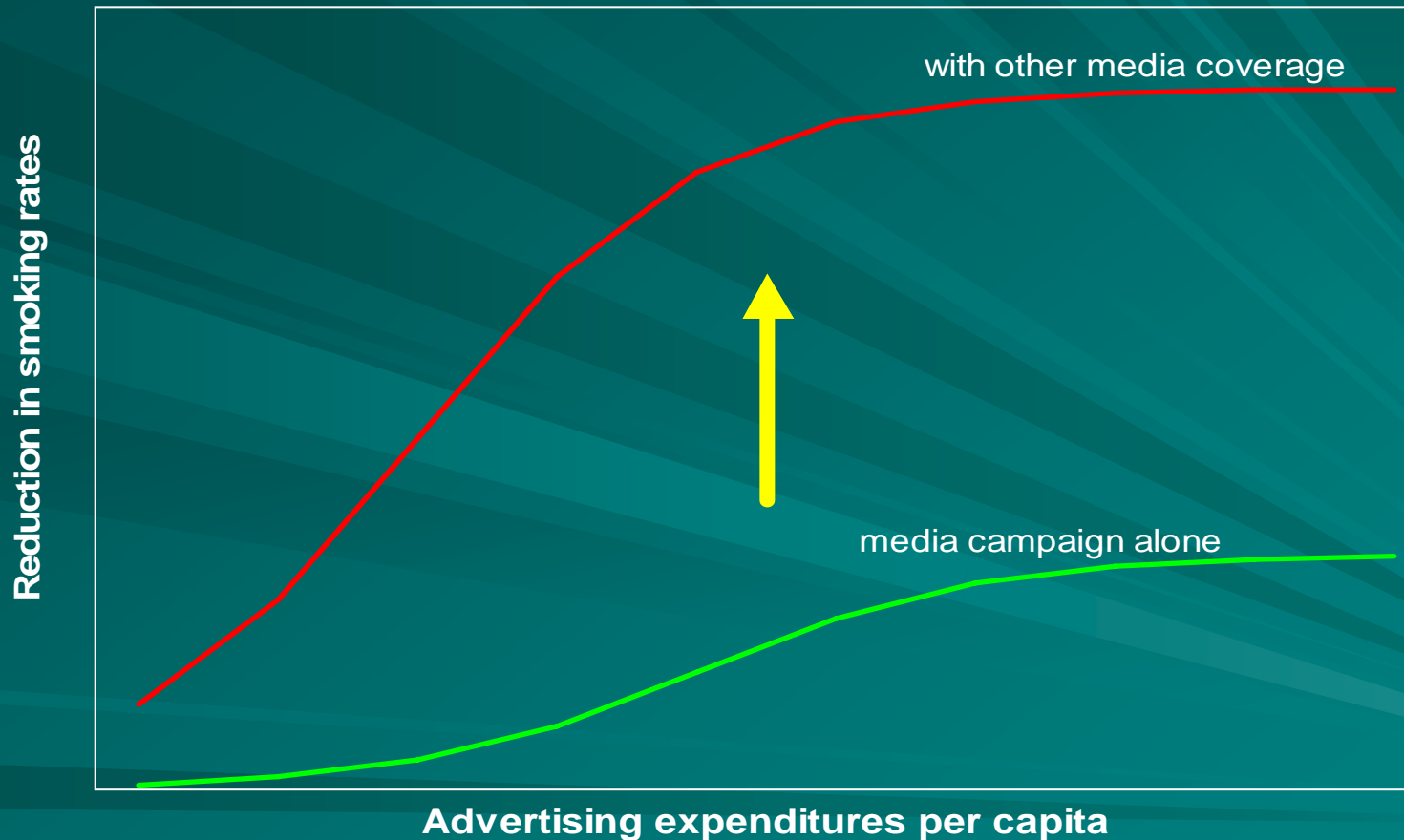
Education, public awareness, news, and other forms of communication

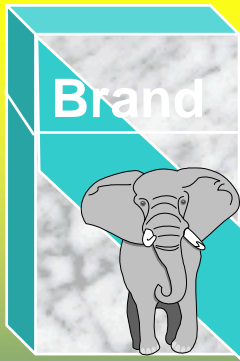
Examples:

- **High intensity campaign reaching all smokers on a continuous basis in media with strong reach**
- **Health Warnings**
- **A school prevention program for teenagers and youth community programs/media**

Effects based on high income, but some low income nation and states

Effect of media campaigns are nonlinear and depend on other policies





Interventions

Youth Access Enforcement

Studies on effects mixed but more consistent for very strong enforcement, model depends on extent of enforcement (non-linear) and social sources

Availability of cigarettes can be affected through changing

- **Number of self-service displays**
- **Number of vending machines**
- **Number of licensed retail outlets**
- **Level of merchant awareness**
- **Level of enforcement of laws banning sales to youth**
- **Severity of penalties for noncompliant retailers**

**Affects youth buying behavior and just youth rates
(small initial impact on adult prevalence)**



Interventions

Cessation Treatment Policies

Cessation treatments, such as pharmacotherapies and behavioral treatments have been proven effective in increasing cessation. However, need to lower cost, make more readily available and publicize programs

Policies to accomplish these ends include

Provision of brief interventions by health care workers

Provision of low or no cost treatments

Highly publicized and active quit lines with provision of NRT

Medium level of evidence, but mostly for the treatments themselves

Focuses on Public Policies

- **ACCESS:** payment or mandatory coverage for cessation treatments
 - Prescription pharmacotherapies alone
 - Any pharmacotherapy (Rx or OTC) .
 - Behavioral treatment alone .
 - Pharmaco. only when used with behavioral treatments (i.e., “comprehensive approach”).
 - Any pharmacotherapies and/or behavioral ("flexible approach").
- **BRIEF INTERVENTIONS:** delivered by health care provider, focuses on decision to quit
- **QUITLINES:** delivered by health care provider or government, aids in decision to quit, may include free NRT

Systems Model of Cessation Treatment Policies

- Considers the impact of policies on quit attempts and quit success through a decision theoretic model
- Incorporates the role of reach, need for training, and other real world factors, such as diminishing effects in non-RCTs
- Examines interactions of policies, e.g., quit lines with free NRT, including synergies (BIs with free access)

Policy Concepts

- **Interdependence of policies:** Some policies may encourage others, e.g., brief interventions or quitlines may encourage more effective treatment use, e.g. quitlines with free NRT
- **Substitution:** Policies are assumed to about double use, but some new users of a treatment or combination of treatments formerly use a different treatment or combination of treatments
- **Diminishing returns:** New users who pay a lower price or previous users may have a lower likelihood of successful treatment
 - lower inclination to quit
 - less suited to the treatment
 - More hard core



Interventions

Comprehensive Strategy

Includes:

- Tax increase to \$2.00
- Full clean air (smoke-free) laws with enforcement and publicity
- High intensity media campaign and school education
- Strong health warning with publicity
- Comprehensive cessation treatment program with health care involvement, free access and publicized quit lines

Policy effect on smoking prevalence under different policy scenarios, U.S. Adults, 2005-2025

Policy/ YEAR	2005	2006	2010	% change	2015	2025	% change
Status Quo	20.4%	20.2%	19.3%		18.2%	16.2%	
\$2.00 tax increase	20.4%	19.0%	17.9%	-7.1%	16.7%	14.5%	-10.8%
Clean Air Laws	20.4%	19.3%	18.4%	-4.9%	17.3%	15.3%	-5.8%
Media/comprehen sive campaign	20.4%	19.1%	18.2%	-5.7%	17.1%	15.1%	-6.7%
Cessation treatment	20.4%	19.6%	18.2%	-5.6%	16.9%	14.6%	-9.7%
School ed/media	20.4%	20.2%	19.2%	-0.4%	17.8%	15.3%	-5.4%
Youth Access Policy	20.4%	20.2%	19.2%	-0.7%	17.9%	15.7%	-3.2%
Comprehensive Strategy	20.4%	16.6%	14.9%	-2.6%	13.1%	10.4%	-36.1%

4

SimSmoke: A tool for . . .

Assessing intervention effectiveness for reaching goals *prior to* the commitment of resources.

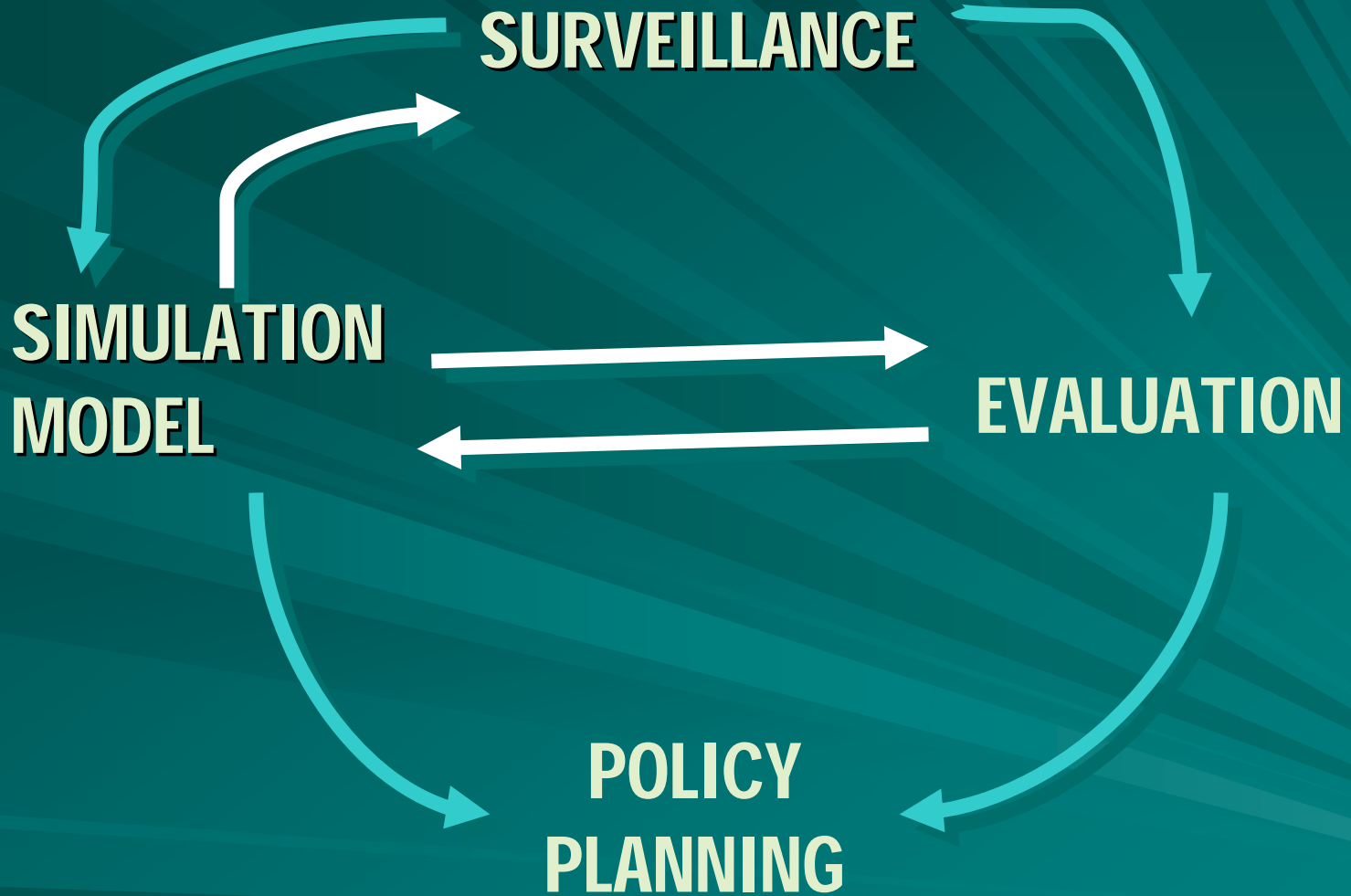
- ☀ What are the goals?
(target outcomes)
- ☀ What policies can we change to achieve these goals?
- ☀ How will we implement interventions to change Target outcomes?

Prioritizing Goals

- Large tax increase, strong clean air laws give the largest effect, followed by cessation treatment and media campaigns
- In middle to low income nations, advertising bans and health warning may be important, and clean air laws less important
- Youth access and education policies are relatively cheap and still important because they have long-run effects

Planning

- Can show how the model depends on how the policy is implemented, e.g., partial clean air bans much less effective and media campaigns need to be a certain scale
- Can look at the demographic groups affected (age and gender now, but could be expanded later to consider urban/rural, socio-economic status)
- Can incorporate new data and studies over time, and re-validate





Summary

Policymakers can use SimSmoke to:

- **Understand the complex network of factors surrounding tobacco problems.**
- **Forecast the future dynamics of tobacco problems based on historical patterns.**
- **Estimate the likely impact of alternative interventions in specific situations.**
- **Assess strategies for reaching goals prior to commitment of resources.**
- **Lead to more systematic surveillance and evaluation network**

Interventions

Future Components

Product regulation, currently have LNSLT model

May also consider medical cost savings and costs of intervention.

Possibly second hand smoke, home ban policy may be included