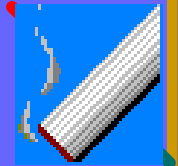# Using TUS Data for State Models:

A Discussion of how SimSmoke has been Successfully used for Evaluation and Recommendations for Future Intervention

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Tobacco Use Supplement to the Current Population Survey
(TUS-CPS)

- NCI-sponsored tobacco use survey administered as part of the US Census Bureau's Current Population Survey in: 1992/93; 1995/96; 1998/99; 2000; 2001/02; 2003

- Co-sponsored with CDC since 2001/02

- TUS-CPS Survey Population:
  - ✓ Civilian, non-institutionalized population
  - ✓ Ages 15 years and older

TUS-CPS Survey Data and the KY SimSmoke Model

The Kentucky SimSmoke Model uses TUS-CPS data to:

- Obtain smoking population data from a large nationally-representative sample for a policy simulation model.

- Monitor tobacco control progress with various policy options implemented based on projected data for smoking in Kentucky.

- Evaluate tobacco control programs based on smoking prevalence over time in Kentucky.

What is SimSmoke?

SimSmoke: is a computer model that simulates cigarette use and smoking related deaths over time in a State or Nation, and the effects of policies on those outcomes.

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

Systems model:
 Complex interaction of policies and effects on individuals
 Distinguishes population by age
 Dynamic, changing, nonlinear systems

Dynamic model:
 Shows results over time
 Modifications as new data become available

SimSmoke Models*

SimSmoke Models have been developed for the following U.S. states: AZ, CA, MA, NY, and most recently Kentucky.

SimSmoke Models have been developed at the national level for the United States, Argentina, China, France, Malaysia, Poland, Taiwan, and Vietnam.

The SimSmoke Model divides the population into three categories of smokers:
- Never Smokers
- Former Smokers
- Current Smokers

SimSmoke Models

Tracking Model:

■ Starts from the earliest year with data available = 1993 (using TUS-CPS data) and continues to the most recent (previous) year = 2006.

Future Projection Model:

■ Examines the effect of policies from the current year forward, starting from 2007.

■ Kentucky SimSmoke projects forward through year 2026.

Policy Options:

■ There are past and future policy options that can be used in the models.

■ Can implement one policy next year and a second policy the following year.

■ Can examine the effect of a policy implemented, then terminated.

SimSmoke: Basic Structure

■ This population model begins with initial year population and moves through time with births and deaths (Markov Model).

■ The smoking model distinguishes population in never smokers, smokers, and ex-smokers, and moves through time with initiation, cessation, and relapse (Markov Model).

■ Smoking-attributable deaths depend on smoking rates and relative risks.

■ There are individual policy modules with independent effects on smoking rates.

■ Data are input sequentially for population, smoking, relative risks, and policies.

■ Policy modules include: Cigarette taxes; Smoke-free air laws; Mass media; Youth access policies; Cessation treatment.
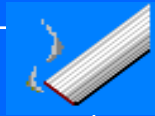
SimSmoke and Kentucky

SimSmoke is loaded with data for the entire Kentucky population for 1993. It allows the population to grow and change using fertility and mortality rates. It recognizes different segments of the population—by age.

The model uses smoking data for Kentucky for 1993 based on large scale survey (TUS-CPS and BRFSS).

To relate the model to Kentucky, adjustments have been made in the policy effects. The model also includes policies in Kentucky from 1993 to 2006.

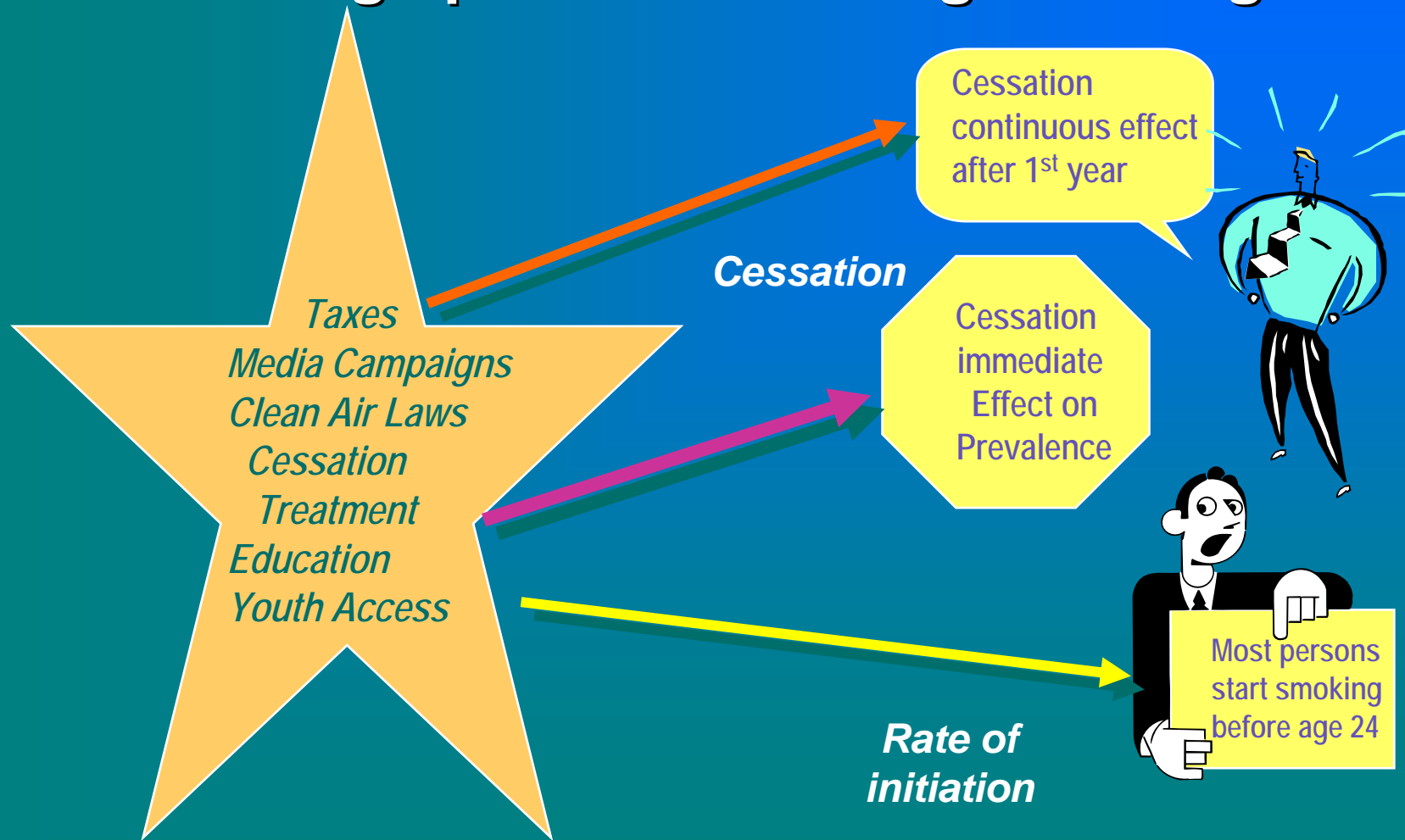# Smoking measures from TUS-CPS-1

- Smoker, ex-smoker and never smoker prevalence based on having smoked 100 cigs. Lifetime = established smokers, as desired by model. Only available from ages 15 and above, we supplement with other data sources , e.g., TAPS.

- Smokers, and to some extent ex-smokers, can be distinguished by some day vs. every day smokers, and by quantity smoked- currently used in model.

Smoking measures from TUS-CPS-2

- Initiation measured by change in prevalence between ages in base year:
  - Check against "When did you first start smoking?"
- Cessation- use those who quit in the last year and not the last 3 months (from Burns 2000), currently extending to consider:
  - quit attempts
  - treatment use (available on 2003 data set)
- Relapse data from other sources, need longitudinal data.
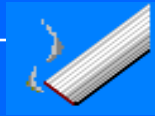
Over time cigarette use is modified through policies. It changes through:

Taxes
Media Campaigns
Clean Air Laws
Cessation
Treatment
Education
Youth Access

Cessation

Cessation continuous effect after 1st year

Cessation immediate Effect on Prevalence

Rate of initiation

Most persons start smoking before age 24

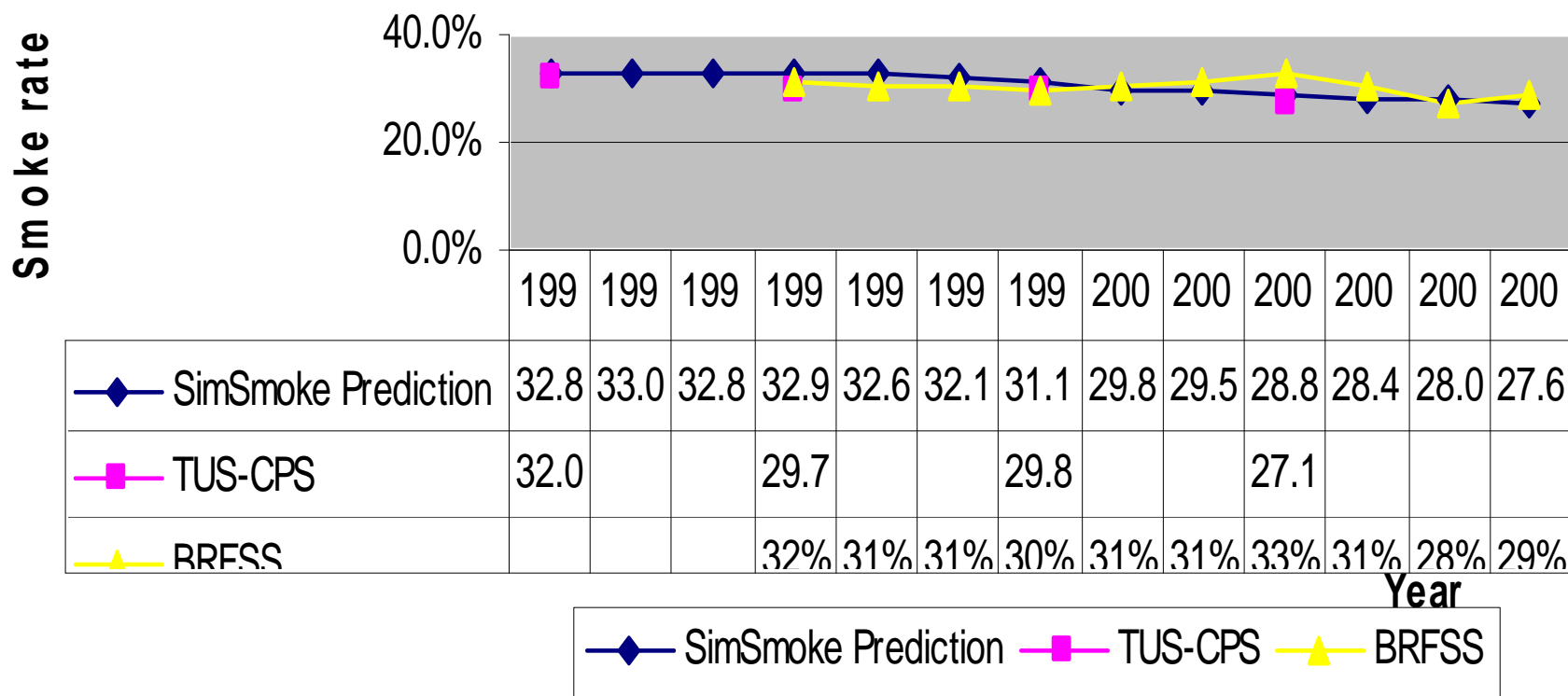# Using TUS-CPS data to validate the Kentucky SimSmoke Model

- To validate the model, we compared predictions from SimSmoke that take into account all policies implemented during 1993 to 2005 vs. actual levels and trends in smoking rates.

- Validation focused on percent changes in smoking rates over time.

- Validation used two sources of smoking data, the TUS-CPS (including the 1992/3, 1995/6, 1998/9 and 2001/2 surveys) and the 1996-2005 Behavioral Risk Factor Surveillance System (BRFSS). (BRFSS was available for years prior to 1996, but the questions used to determine smoking were changed in 1996 to explicitly include someday smokers).

Advantages of TUS-CPS in Kentucky SimSmoke

- Primary source of reliable and consistent data on smoking rates to use for modeling over time.

- Largest national data set with state representative measures for smoking rates.

- Can begin models in 1993 and use TUS data to validate models; can use TUS data for age and gender breakdowns to validate models (although youth data are only available for ages 15-17 yrs).

- TUS contains data on worksite smoking bans, brief cessation interventions, and particularly good smoking cessation data, which can be adapted and used in SimSmoke cessation models to further explore quit attempts.

- Not subject to definition changes and changes in state practices of data collection (therefore more reliable to use for modeling over time vs. BRFSS data).

Validating Kentucky SimSmoke with 1993-2005 Smoking Data and Policies

Kentucky Smoking Prevalence, Adult, 1993-2005

	199	199	199	199	199	199	199	200	200	200	200	200	200
SimSmoke Prediction	32.8	33.0	32.8	32.9	32.6	32.1	31.1	29.8	29.5	28.8	28.4	28.0	27.6
TUS-CPS	32.0			29.7			29.8			27.1			
BRFSS				32%	31%	31%	30%	31%	31%	33%	31%	28%	29%

Smoke rate

Year

SimSmoke Prediction — TUS-CPS — BRFSS

Comprehensive Strategy

Includes:

- Tax increase of $2.00

- Full clean air (smoke-free) laws with enforcement and publicity

- High intensity media campaign

- Strong health warning with publicity

- Comprehensive youth access policy with strong enforcement and publicity

- Comprehensive cessation treatment program with health care Involvement, free access and publicized quit lines
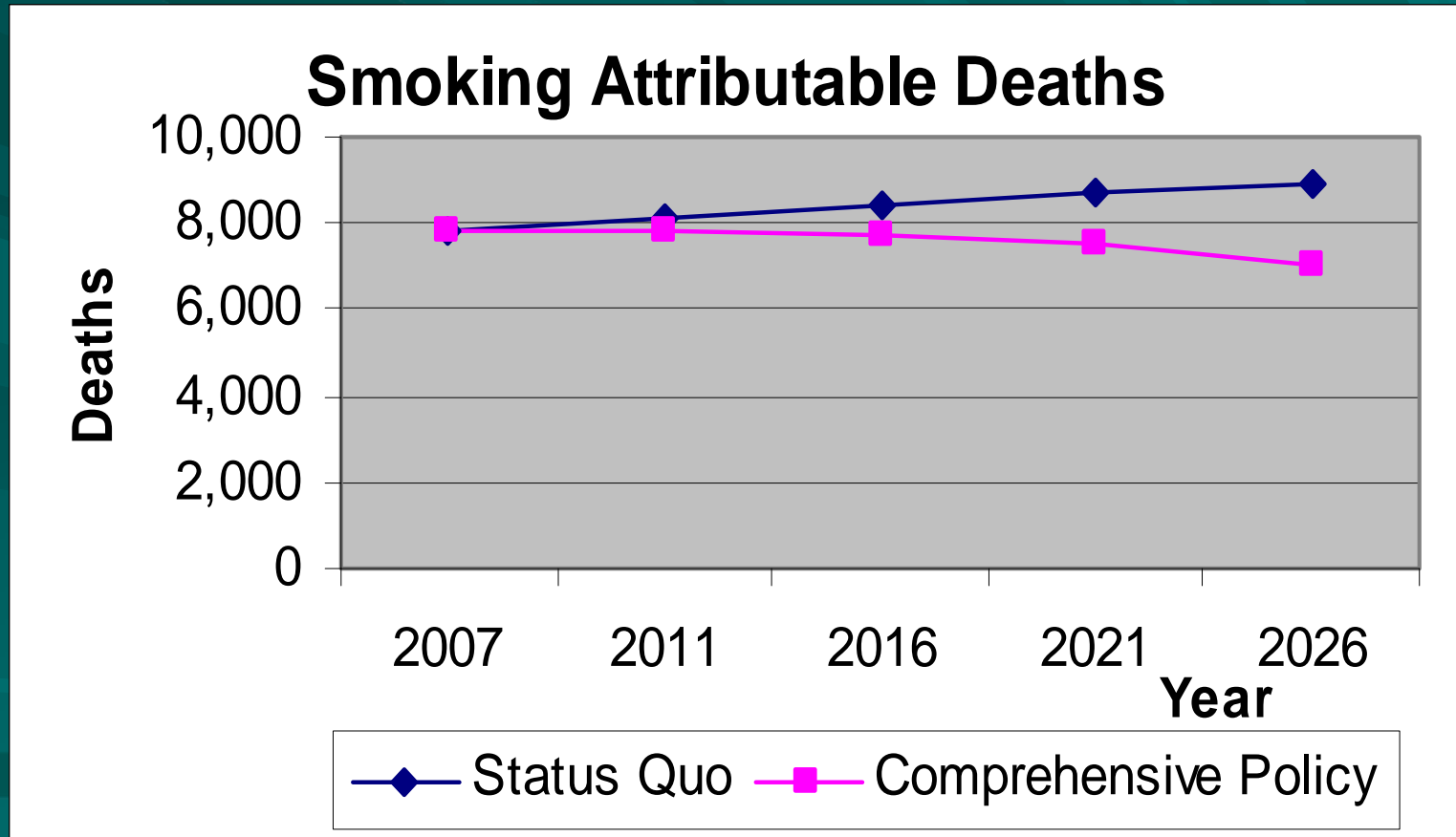
Smoking Rate over Time

Comprehensive Policy, 2007-2026
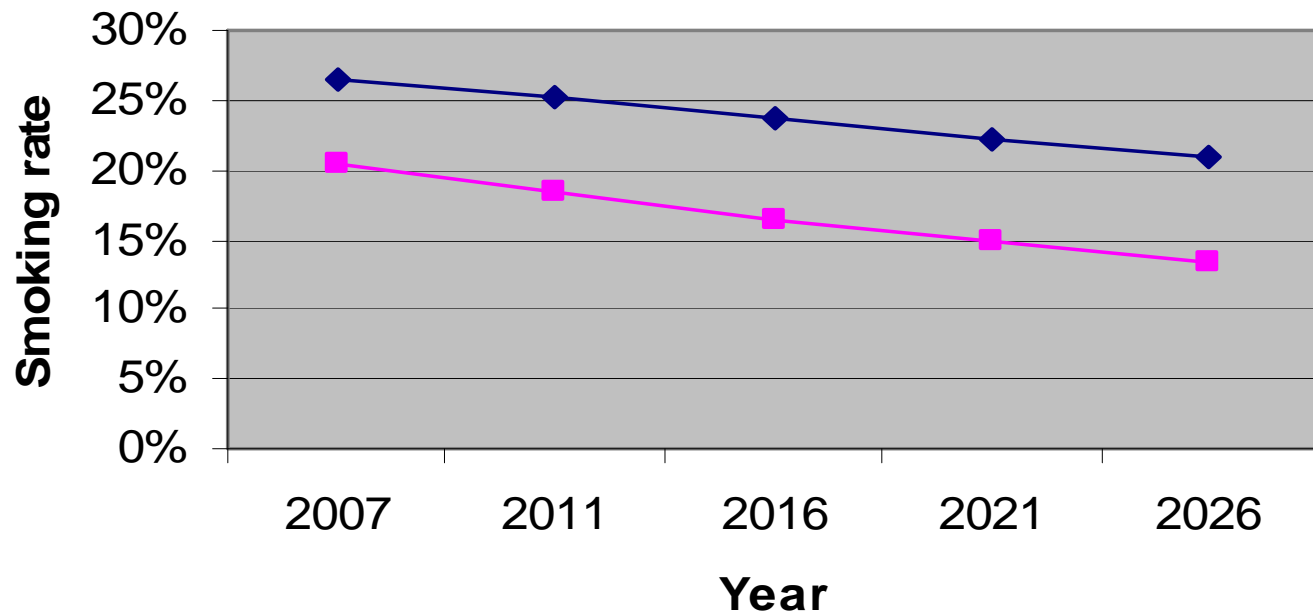
Smoking Deaths over Time

Smoking Attributable Deaths

The Arizona SimSmoke Model

■ The SimSmoke Model was also applied to Arizona, which implemented one of the strongest and most comprehensive tobacco control policies of any state, known as the Tobacco Education and Prevention Program (TEPP).

■ This included a tax hike of $0.40 in 1994, with funds earmarked to policies that included mass media campaigns, cessation programs linked with the mass media campaign, youth programs, community-based local projects, and pilot programs (directed at infants, women and youth).

■ Policy Modules:
  – Taxes
  – Smoke Free Air laws
  – Advertising Bans
  – Mass Media
  – Youth Access Policies

Policy Change ➤ **Cigarette Use** ➤ **Cigarette-Related Deaths**

Summary of Effects on Smoking Prevalence Rate: AZ SimSmoke Model

Year	With Actual Policies	With Policies at their 1994 level	With price changes only	With clean air laws only	With only media policies	With only youth access policies
1993	22.5%	22.5%	22.5%	22.5%	22.5%	22.5%
1994	23.2%	23.2%	23.2%	23.2%	23.2%	23.2%
1995	21.7%	23.0%	21.7%	23.0%	23.0%	23.0%
1996	21.2%	22.7%	21.4%	22.7%	22.6%	22.7%
1997	20.1%	22.5%	20.9%	22.4%	21.7%	22.5%
1998	18.9%	22.2%	20.4%	22.1%	20.7%	22.2%
1999	17.9%	21.9%	19.4%	21.8%	20.4%	21.9%
2000	16.7%	21.6%	18.1%	21.5%	20.1%	21.6%
2005	14.7%	19.9%	16.3%	18.5%	17.3%	18.5%
2010	13.1%	18.5%	14.8%	17.2%	15.9%	17.0%
2020	10.4%	15.6%	12.0%	14.4%	13.3%	14.2%

Prioritizing Goals:

- Large tax increase, strong smoke-free air laws give the largest effect, followed by cessation treatment and media campaigns.

- Youth access and education policies have important long-run effects, but less immediate impact.

Planning:

- Can show how the model depends on policy implementation, e.g., partial smoke-free air bans are much less effective and media campaigns need to be a certain scale.

- Can look at the demographic groups affected (age now, but could be expanded later to consider urban/rural, socio-economic status, and gender).

- Can later develop local/community level models, scale of effects similar, but number of people affected will be less, will require reasonably accurate smoking rate data by age.

Heuristic Function

- Better understanding of tobacco control policies through a systems perspective.
- Gaps in the model have led us to empirical analyses to better understand relationships.
- TUS-CPS data have been used in most of these analyses.

Examples of Studies using TUS-CPS that came out of SimSmoke

- Home bans and work bans as related to taxes, clean air laws, and media (TC, 2004).
- Home bans (AJPM).
- Someday Smokers (AJPH, 2003).
- Cessation (NTR, 2005).
- Smokeless Tobacco (NTR, 2005 and TC 2006).
- Demand study by socio-economic status in JECH 2006, further papers on demand under submission.
- Now working on cessation and treatment use, using new questions in 2003 TUS-CPS.