Session 3: Assessing cost-effectiveness of population level interventions

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Basic elements of modelling
(same as previous session)

- Interventions to be evaluated, their effect size and costs
- Flow and outcomes
- Model construction
- Populating the model (data)
- Validation
- Presentation of results

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Population level interventions

Aim = **Prevention and cessation**

- reduce smoking initiation
- increase smoking cessation
- reduce exposure to secondhand smoke

Usually achieved through **Policy or Strategies** that affect everyone in a jurisdiction or defined area

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Types of interventions

- Taxation and price increase
- Smokefree laws
- Bans on sales to minor and advertising bans
- Plain packaging of tobacco products
- Mass media campaign
- School-based/community-based /workplace –based interventions

Modelling issues

- Different considerations from individual-level interventions
  - Effect size → quit rates vs. relative reduction in prevalence
  - Unit costs versus per capita expenditure on the programme
  - Static vs. dynamic effect
  - Net vs. combined effects

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Modelling issues

- Good model = best prediction
- Evidence base on effect size of population-based interventions is usually not robust
  - Challenges in attributing effect to a single intervention in a multiple intervention context
  - Pragmatic difficulties in conducting RCTs
  - Sources of variation- level, degree of enforcement

Example – SIMSMOKE model

- Projects smoking rates and deaths attributable to smoking (in total and for lung cancer, COPD, heart, and stroke).
- Examines the effect of tobacco control policies on those outcomes.
- Examines the effect of policies individually and in combination on different ages and other demographic groups

(Example based on publicly available docs – see bibliography)

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SIMSMOKE model structure

- **Population** model begins with initial year population (by age and gender) and moves through time (by year) with births and deaths
- Includes never smokers, smokers, and ex-smokers with initiation, cessation and relapse (**Markov**)
- Mortality and RRs define smoking-attributable outcomes
- One intervention with interdependent effects on smoking rates

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Model structure

- States – never smokers, smokers, ex-smokers (by year since quit)

Smokers = 100 cigarettes in lifetime, smoked more or all days

- Transition – initiation, cessation, relapse
  - Change in prevalence before age 24 (initiation)
  - Quit in last year (cessation)
  - Start to smoke again in last year (relapse)

- Subgroups – age and gender

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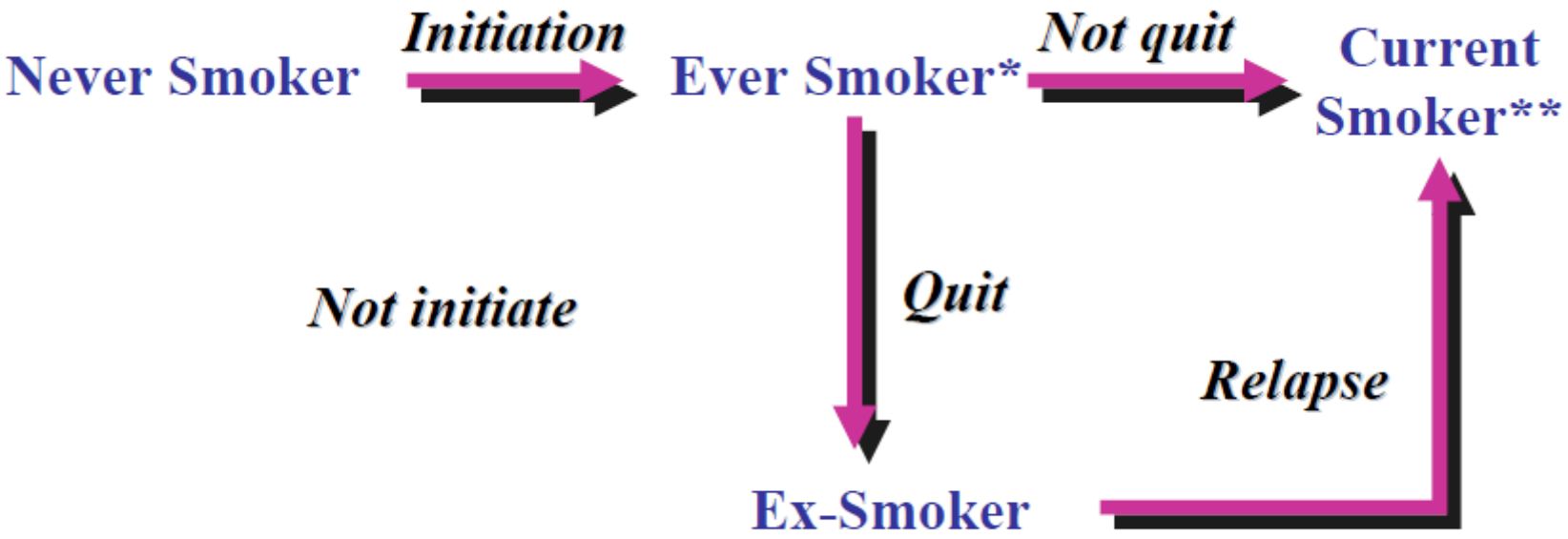
Model structure transitions



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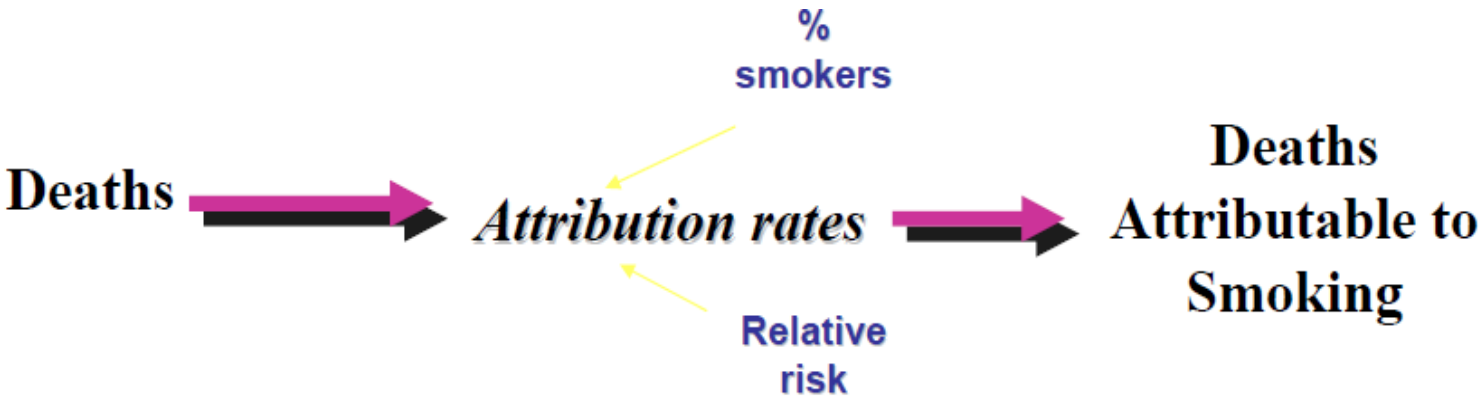
Smoking attributable mortality



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Interventions

- Cigarette taxes
- Smokefree laws
- Mass media
- Bans on sales to minors
- Advertising bans
- Warning labels
- *Cessation treatment*

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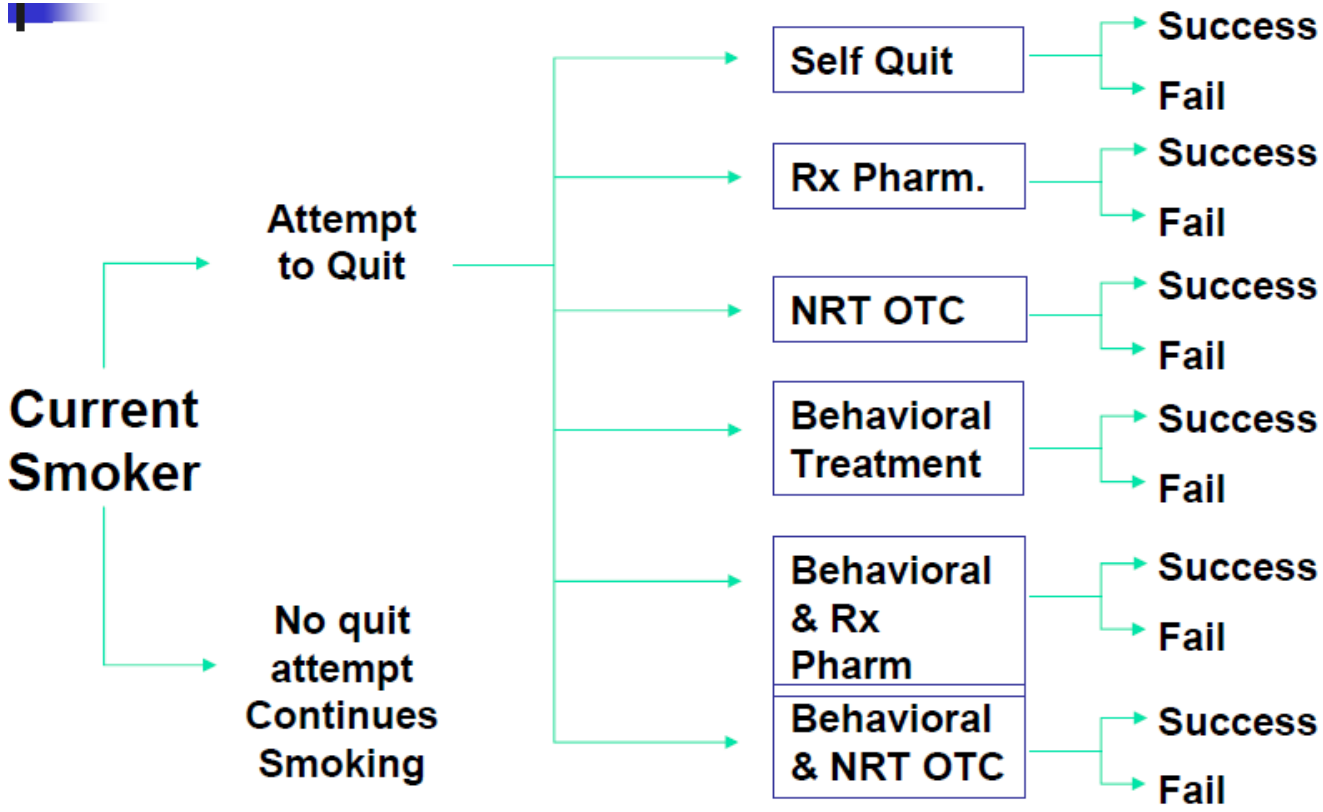
Model parameters - effects

- Policy effect is percentage reduction relative to smoking rate e.g. prevalence elasticity for taxation
- Age and gender differential in effect allowed
- How policy was implemented (i.e. Level, degree of enforcement, publicity, other concurrent policies, etc.) has an impact of effect size
- Prevalence elasticises for taxation, for instance, varies from -0.1 (35+ years) to -0.6 (15-17 years)
- Dynamic effects less understood

- Populated for several countries/ jurisdictions – USA (Arizona, California, KY, MASS, and NY), Albania, Argentina, China, France, Japan, Korea, Malaysia,Poland, Taiwan, Thailand, Vietnam

SIMSMOKE also includes individual-level intervention (similar to previous session)



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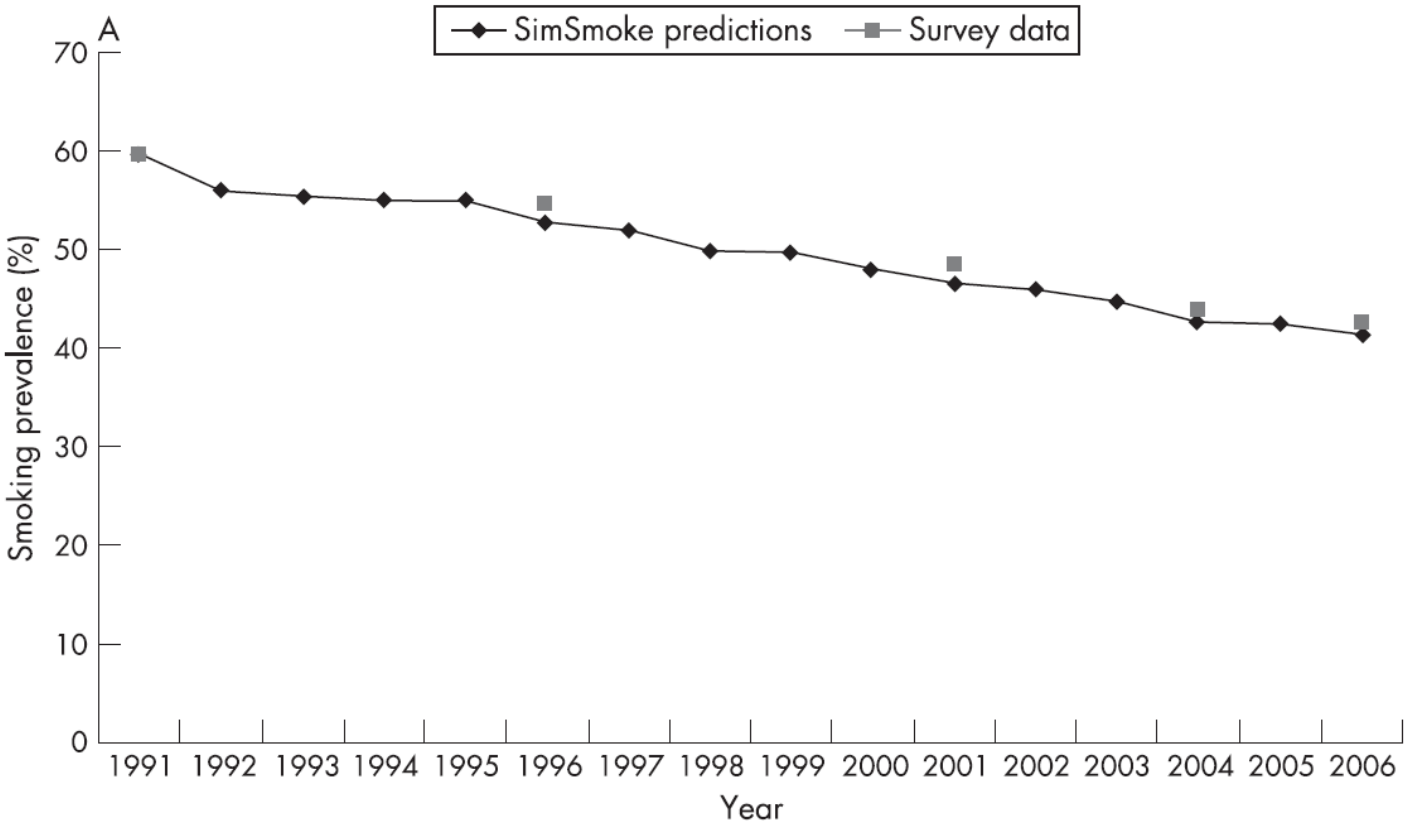
SIMSMOKE Validation - Thailand



Source: Levy et al (2008)

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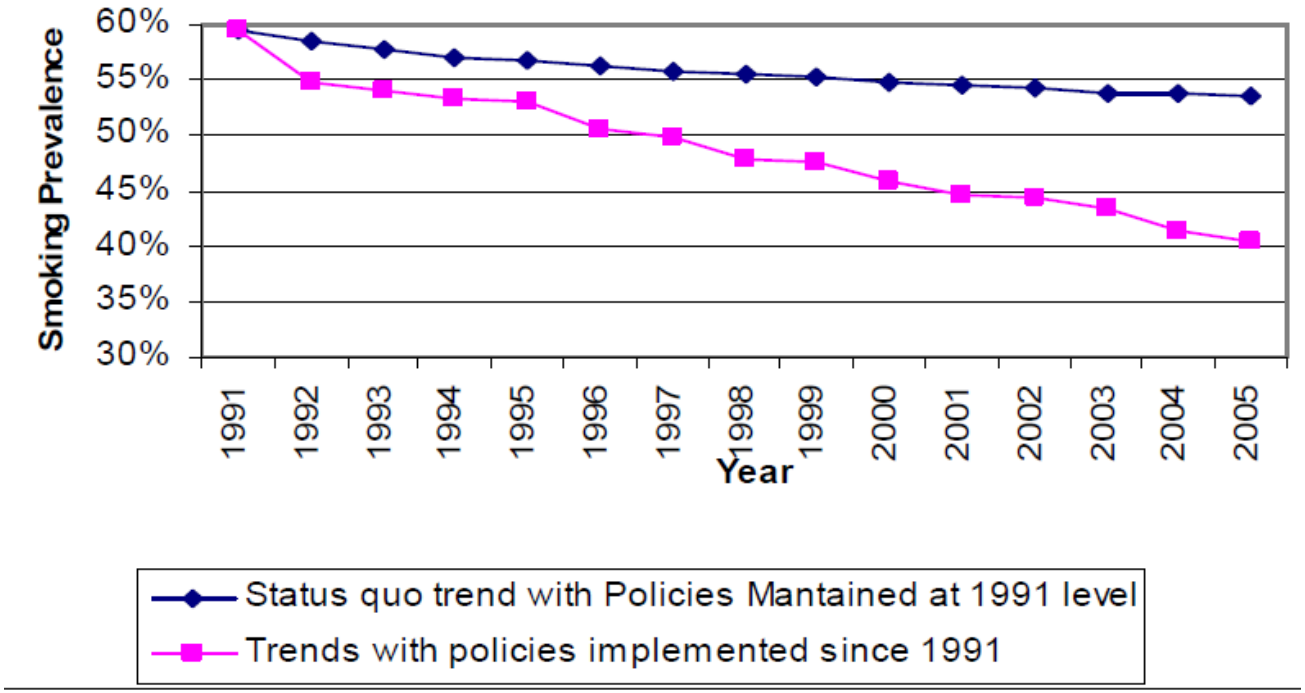
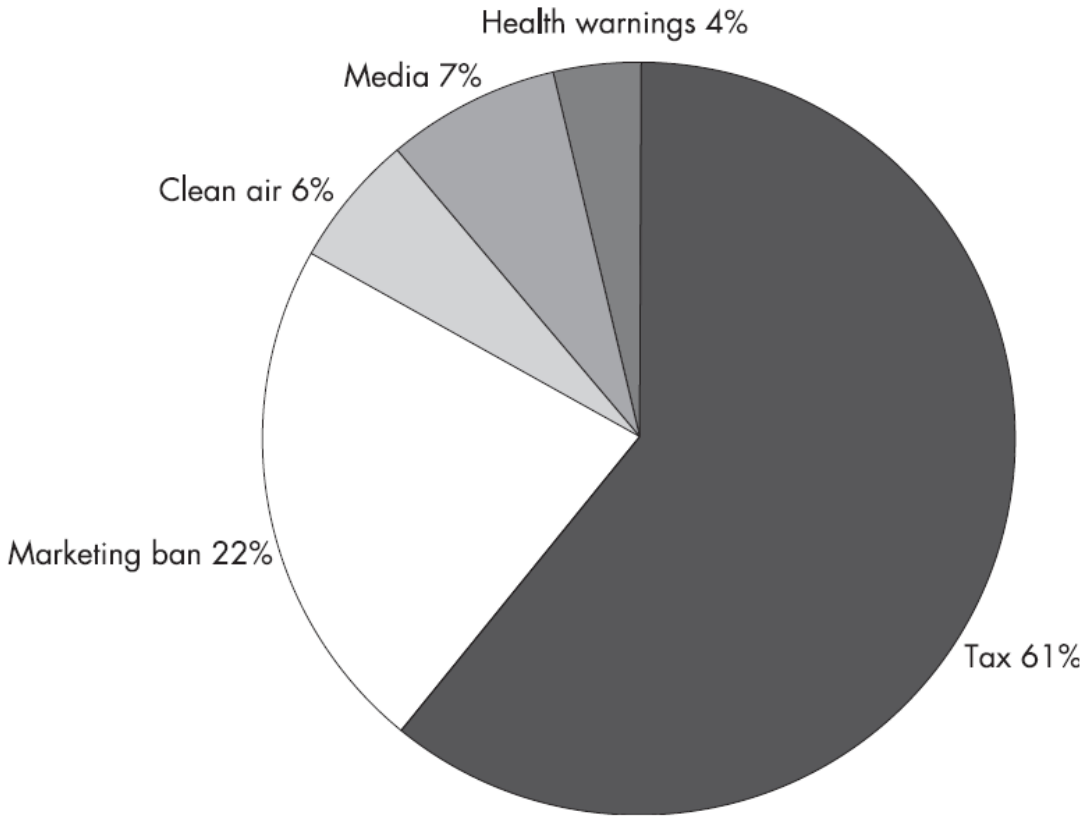
Impact of past tobacco control policies - Thailand



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

Source: Levy – Presentation to Health Economics workshop

Impact of specific policies – Thailand



Role of individual policies in reducing smoking prevalence by 2006
Source: Levy et al (2008)

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Cost-consequence vs. Cost/QALY

Though population-level policies/strategies are usually evaluated for their effect in terms of reduction in prevalence (and therefore the cost-consequence implications), the same model can be tailored to estimate costs and QALYs as discussed in the previous session.

Summary

- Much of the general model considerations are the same as individual level modelling
- However, data on effect size tends to less robust
- SIMSMOKE model has been adapted to many different population/countries
- Models can be extended and used to assess return on investment from tobacco control policies

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