

# EFFECTIVENESS AND COST-EFFECTIVENESS OF TOBACCO CONTROL MASS MEDIA CAMPAIGNS

A population level analysis in Scotland

**ISPOR**

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## What are Mass Media Campaigns (MMCs)?

- **Mass media:** radio, television, billboards, newspapers, social media, etc.
- Inform **vast majority of the population**
- Successful as social marketing tool
  - anti-drugs, violence, smoking cessation
- **Goal of smoking MMCs:** encouraging quit attempt
  - adults & teenagers





- MMCs – public health intervention
- MMCs – prevent uptake of smoking & promote cessation  
(Wakefield *et al.*(2008), Durkin *et al.* (2012), Davis *et al.* (2008))
- TV-based MMCs – key tobacco control strategy in most high income countries (Sowden *et al.* ,1998)
- WHO recommends high income countries spend 1/4 of tobacco control budget on MMCs (2011)
- **But**, MMCs are extremely expensive (e.g. R&D, production costs, media buying)
- Pressure on public health expenditure in many countries
- In 2010, UK government froze spending on TV MMCs

### Is public spending on MMCs worthwhile in Scotland?

- Examine the potential effectiveness of TV MMCs, i.e. anti-tobacco TV advertising (reduction in smoking prevalence)
- Assess cost-effectiveness of TV MMC at population level



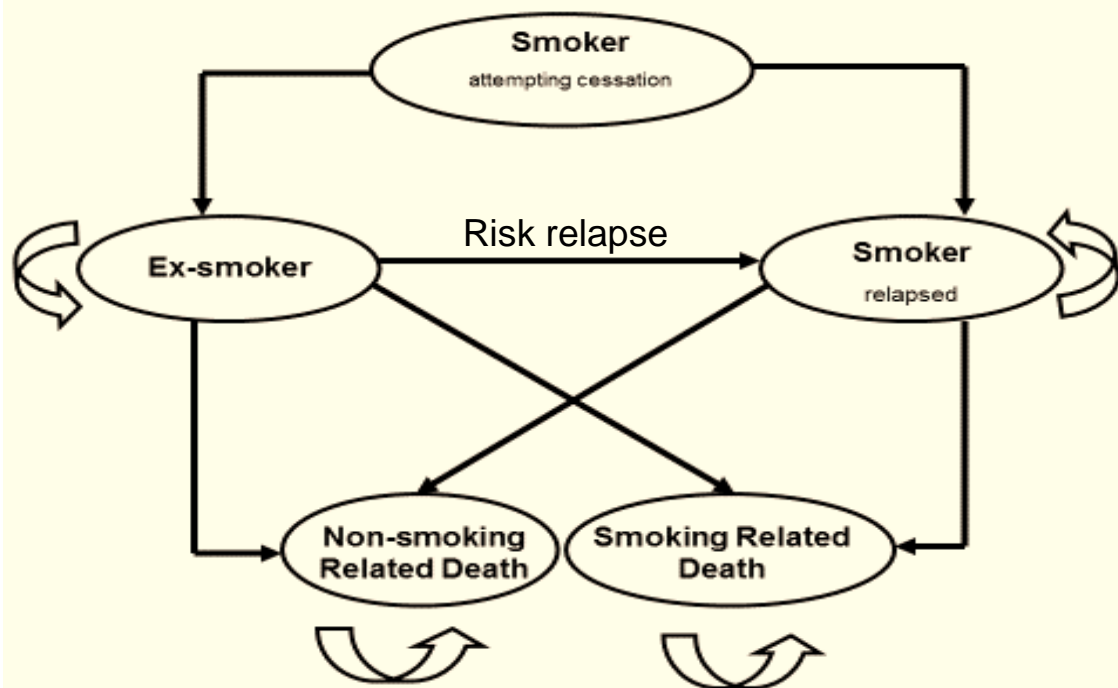
- **Economic evaluation alongside natural experiment and extrapolation to lifetime horizon**
- **Population:** Scottish adult smokers aged 16 and over
- **Intervention:**
  - TV MMCs intervention includes 3 campaigns broadcast between 2003 and 2009
  - Adult (cessation); Teens (prevent uptake); Second hand smoking (both)
- **Comparator:** No TV MMCs
- **Data:**
  - Smoking prevalence from Scottish Household Survey (SHoS)
  - Television Viewing Rate (TVR) from Mediacom
  - Resources and Costs from the Scottish Government

- **Natural Experiment Outcome-** quit attempts per month attributable to TV MMCs -- time series analysis; autoregressive integrated moving average (ARIMA) model
- **Key Variables:** Number of smokers; TV advertising (TVR)
  - TVR; a measure of exposure to tobacco control TV advertising
  - Provides an estimate of MMC exposure in Scottish population
- **Model controlled for:** Smoke-free legislation in Scotland in March 2006
- **Cost-effectiveness alongside natural experiment**
  - Costs – R&D, production, media buying
  - Effectiveness – probability of quitting (based on no. of quit attempts per month)
  - Perspective: NHS and Scottish Government
  - Time horizon: 52 weeks



## Methods: Lifetime Analysis – Markov Model

- Adapted previously used Markov model (Boyd & Briggs 2009; Boyd et al. 2016) - Extrapolate 52 week sustained quitters to lifetime
- The Markov model begins with 52 week sustained quits
- Mean age 40 years (average age for UK smoking pop)
- Time horizon: 72 years
- Annual cycles
- Discount rate 3.5%



## Time Series Regression (ARIMA model) Results

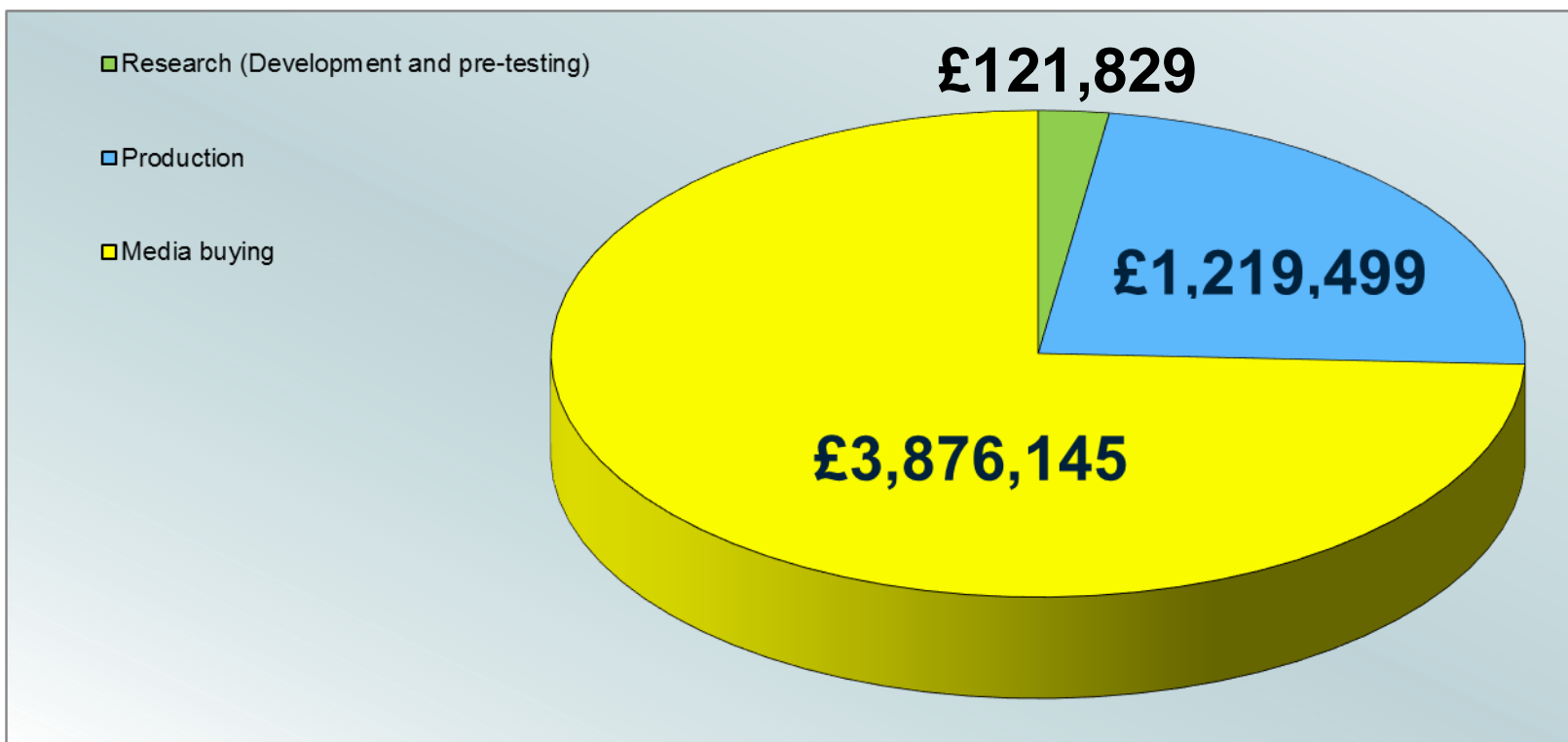
Explanatory variables	Coefficient (SE)	95% CI	P-value
Tobacco Control TV adverts (TVRs)	-20	(-83, 43)	0.53
Smoke-free legislation	-56579.7	(-103655, -9505)	0.01

- **20: Estimate of Monthly Number of Adult Smokers who attempt to quit due to TV MMC in Scotland, 2003 – 2009**
- One increase in TVR/TV adverts per month results in a decrease of 20 quit attempts per month
- Based on average (244) TVR per month in Scotland; equivalent to 4,870 extra quit attempts per month
- Average quit attempts per month is converted in probability of quitting, accounting for relapse at 4 weeks and at 52 weeks



## Results: Cost of TV MMCs

- Three main cost categories for TV advertising MMCs



**Total cost of MMCs over 7 years = £5,217,473**

**Average cost of MMCs per annum = £745,353**

- **Cost-effectiveness at 1 Year**

	<b>One Year alongside Natural Experiment</b>	
<b>Intervention</b>	<b>Mean Cost*</b>	<b>Prob sustained quit</b>
<b>TV</b>	£0.66	0.013
<b>No TV</b>	£0.00	0.010
<b>Difference</b>	£0.66	0.003
<b>95% CI</b>		(0.0012, 0.034)
<b>ICER</b>	<b>£204 per quitter</b>	
* Mean annual cost per person in adult smoking population		

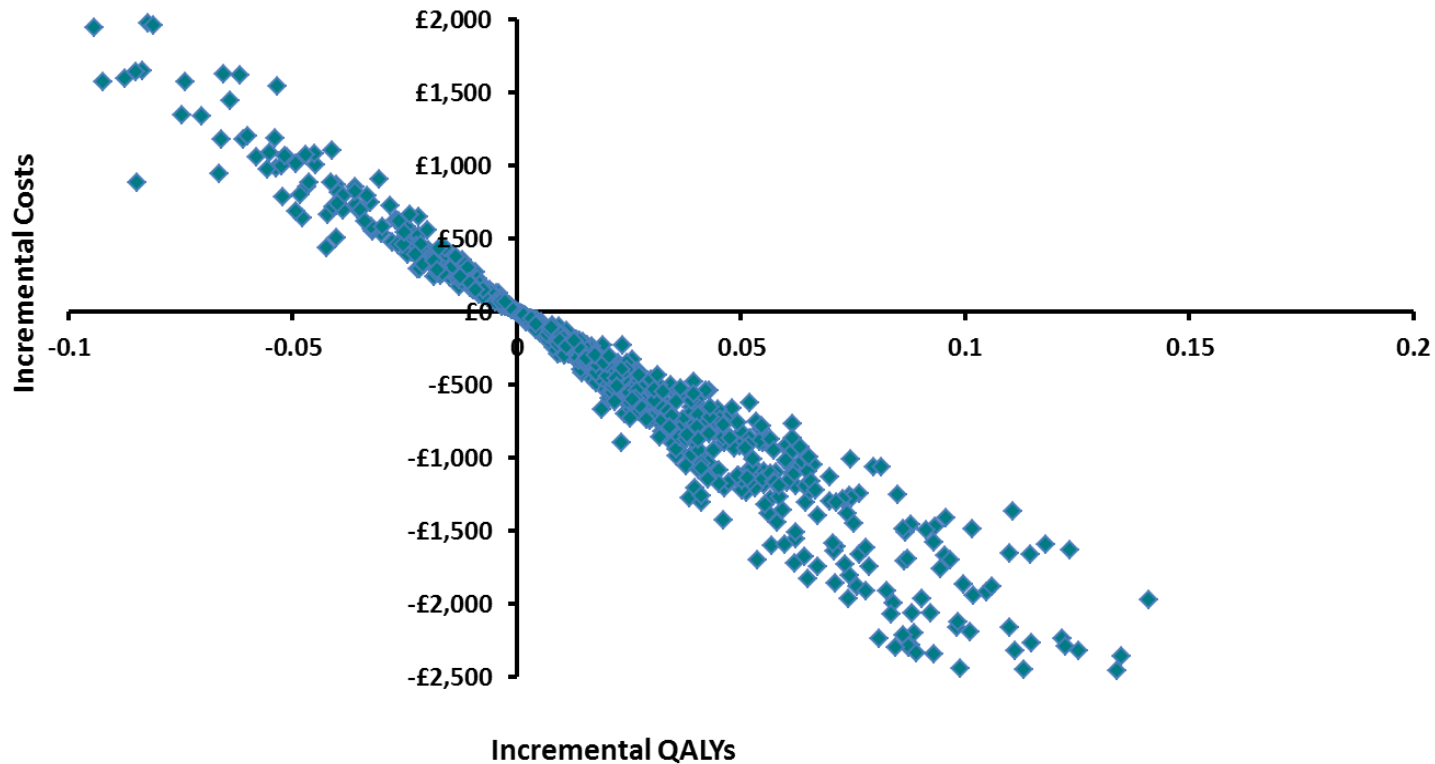
- Cost-effectiveness Lifetime**

	One Year alongside Natural Experiment		Lifetime Model (Discounted 3.5%)	
Intervention	Mean Cost*	Prob sustained quit	Lifetime Mean Cost	Lifetime QALY gained
<b>TV</b>	£0.66	0.013	£45,623	15.47
<b>No TV</b>	£0.00	0.010	£45,998	15.45
<b>Difference</b>	£0.66	0.003	-£374.9	0.018
<b>95% CI</b>		(0.0012, 0.034)	(£-2357, £1104)	(-0.058, 0.118)
<b>ICER</b>	<b>£204 per quitter</b>		<b>TV dominates</b>	

\* Mean annual cost per person in adult smoking population



- **Cost-effectiveness Plane: TV MMCs vs NO TV MMCs**





## Conclusions

- **Tobacco control TV MMCs can increase quit attempts**
  - 1 TVRs = 20 quit attempts (95% CI: -83.4, 43.1) = 4870 extra quit attempts per month in Scotland
- **Potentially cost-effective ICER for a 52-week quitter -- £204**
  - 0.003 quits per annum compared to no TV MMCs, with an additional cost of £0.66 per quit attempt in the Scottish population
- **Lifetime analysis -- TV MMCs dominated**
  - Cost saving of £375 per person (95% CI: -£2357.2, £1104.2) with 0.018 QALYs (95% CI: -0.058, 0.118)
- **Their continued use TV MMCs as part of a comprehensive TC strategy should be strongly recommended.**





# THANK YOU!

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No. of quitters per month per TV ad.	20	L2 (Reduction in no. of smokers per month) = 20 (no of quitters)
No. of quitters per month in Scottish population	4,870	E4 (No. of quitters per month per TVR in Scot pop) = 20* 244 (av. TVR per month in Scot pop) = 4,870)
4-week relapse rate	0.75	
No. of quit attempts per month in Scottish population per TV ad. (sustained quitter for 4-week)	1,217.5	E5 = effect (no of quit attempts per TVR per month in Scot pop) = E4* 0.25 (75% relapse rate) = 1,217.5
52-week relapse rate	0.75	
No. of quit attempt per annum in Scottish population per TV ad. (sustained quitter for 52-week)	3,652.6	E6= annual effect (no of quit attempt per annum in Scot pop) = E5*12=3,652.6
Mean cost per quit attempt	£745,146	
No. of quit attempt per annum	7488	
ICER 52-week sustained quitter	£99.5	

### Life-time model parameter inputs

Parameters	Mean Value	SE	Distribution
<b>Effect</b>			
TVR per month	20	32.3	
Mean TVR viewing per month	243.5	33.03	
Scottish smoking population	1125533		
Inc attempted quits per month Scot (n)	0.004		
Inc attempted quits per year Scot (n)	0.051		
Relapse rate attempt to 4 week sustained	0.75	0.15	Beta
Relapse rate attempt to 52 week sustained	0.75	0.15	Beta
Inc annual Sustained 4 week quit	0.012		
Inc annual Sustained 52 week quitters	0.003		
Background quit rate 52 weeks	0.01	0.008	Beta
<b>Cost</b>			
Tc- TV arm	£0.66		
Tc- control	£0.00		
cSmokeRelDiseases	£30,703.4	£6,141	Gamma
<b>Utilities</b>			
uSmoker	age adjusted		Beta
uEx-smoker	age adjusted		Beta
<b>Markov Parameters</b>			
Cycle	1		
Average age (yrs)	40	5.93	
model lifetime (yrs)	72		
cDR (%)	0.035		
oDR (%)	0.035		

## Methods: Cost of TV MMCs

- Three main cost categories for TV advertising MMCs.

Cost items	Cost value (£)	Sources
Research (Development and pre-testing)	£121,829	SG, Cloudline, Scott Porter Associates
Production	£1,219,499	SG and expert opinion from NHS Scotland
Media buying	£3,876,145	Neilson
<b>Total cost of MMCs over 7 years</b>	<b>£5,217,473</b>	
Average cost of MMCs per annum	£745,353	