Otago Spotlight Series

Cardiovascular Disease

Modelling Tobacco Control Interventions

Presenter: Professor Tony Blakely

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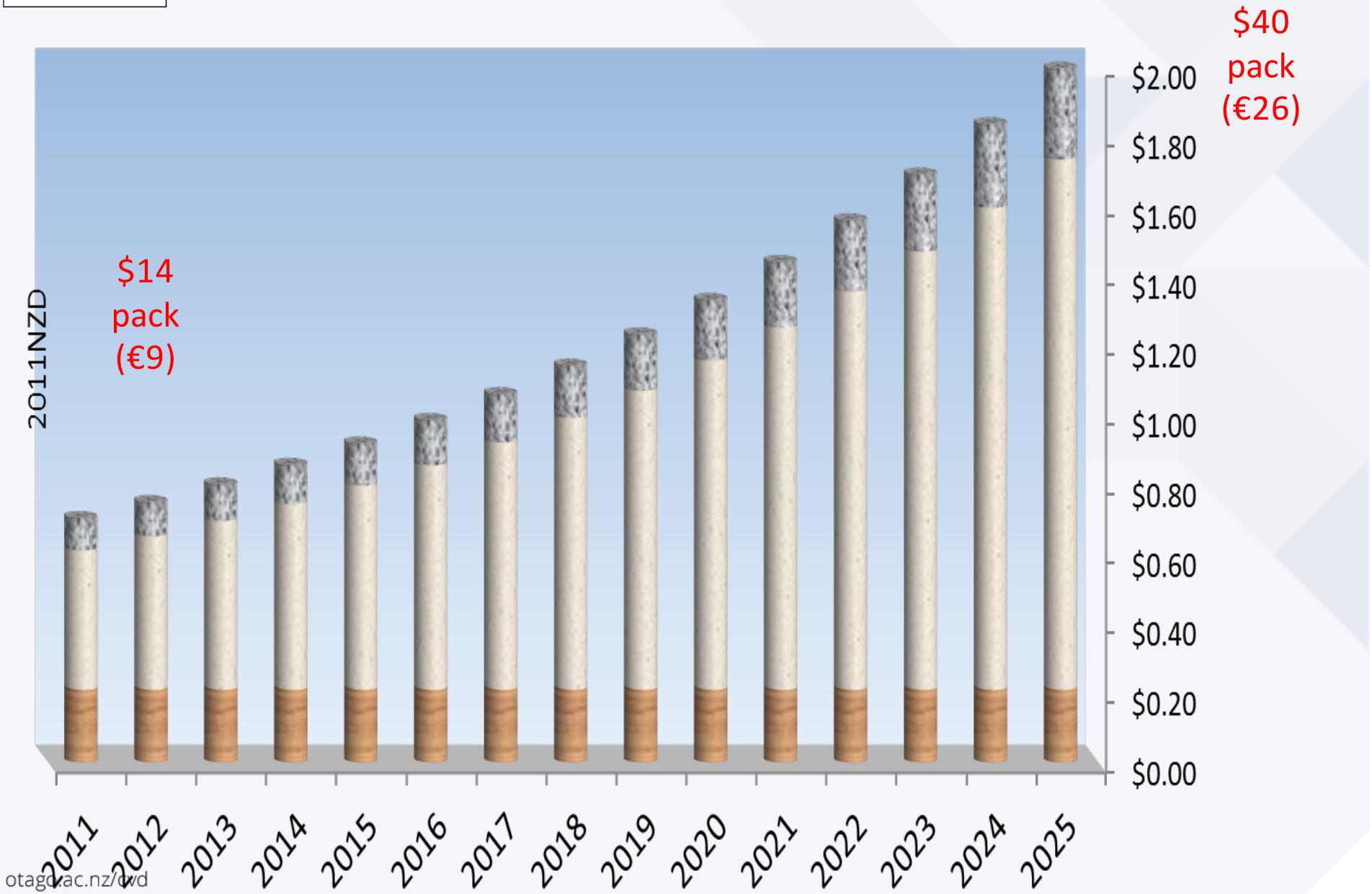
Interventions Modelled

- Tobacco tax increases
- Other tobacco endgame interventions: sinking lid on supply, outlet reduction, tobacco-free generation (& packages)
- Traditional tobacco control: Quitline/mass media campaigns

Methods

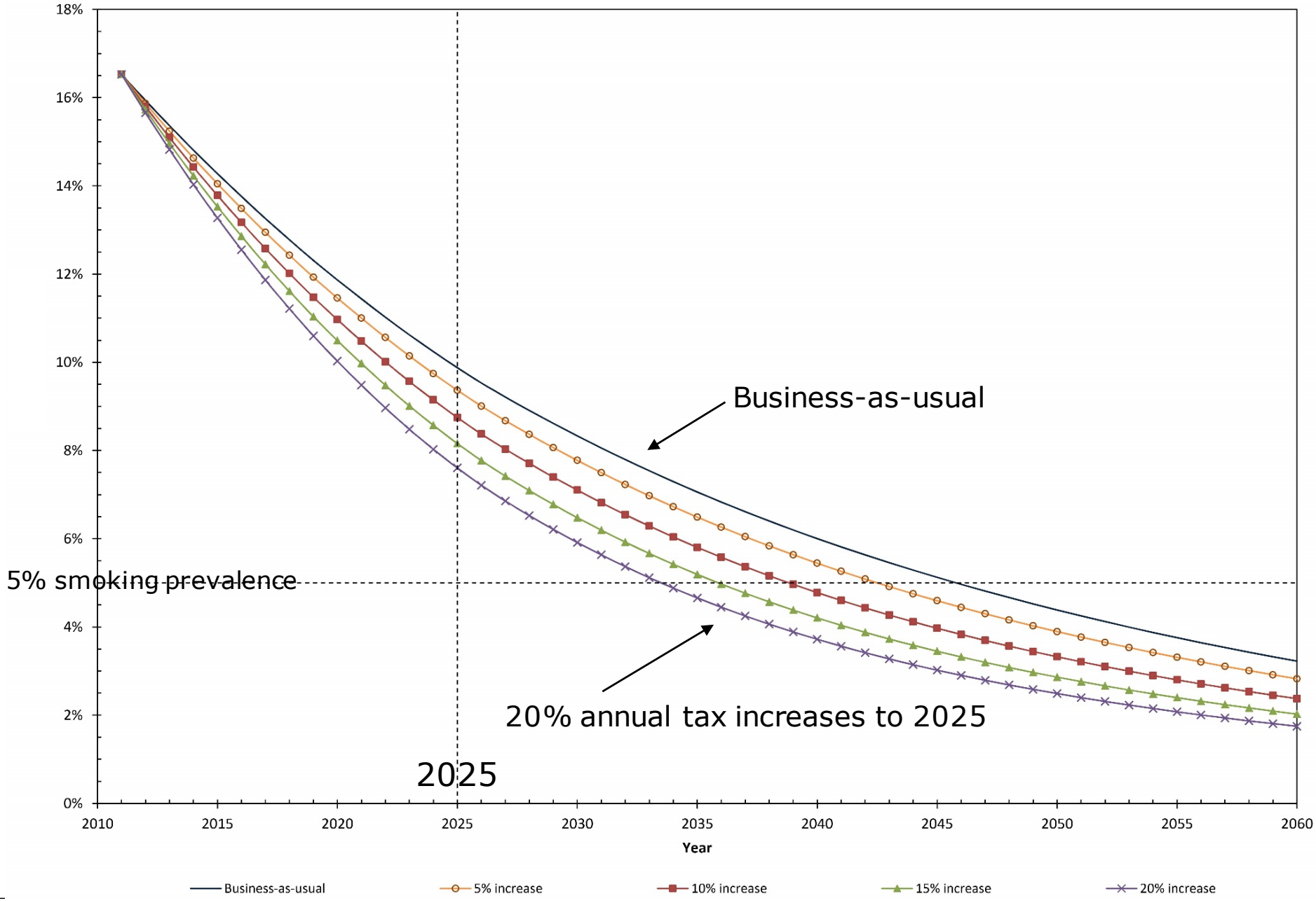
- A NZ forecasting model – adapted from Australia (Ikeda et al 2013 *Tob Control*; Updated as per: van der Deen et al 2014 *NZMJ*)
- A multi-state life-table model (Blakely et al 2015, *PLoS Medicine*)
  - 16 tobacco-related diseases
  - QALY gains (life-course)
  - Health costs from HealthTracker (Blakely et al 2015 *NZMJ*)

Cigarette price projections with 10% tax

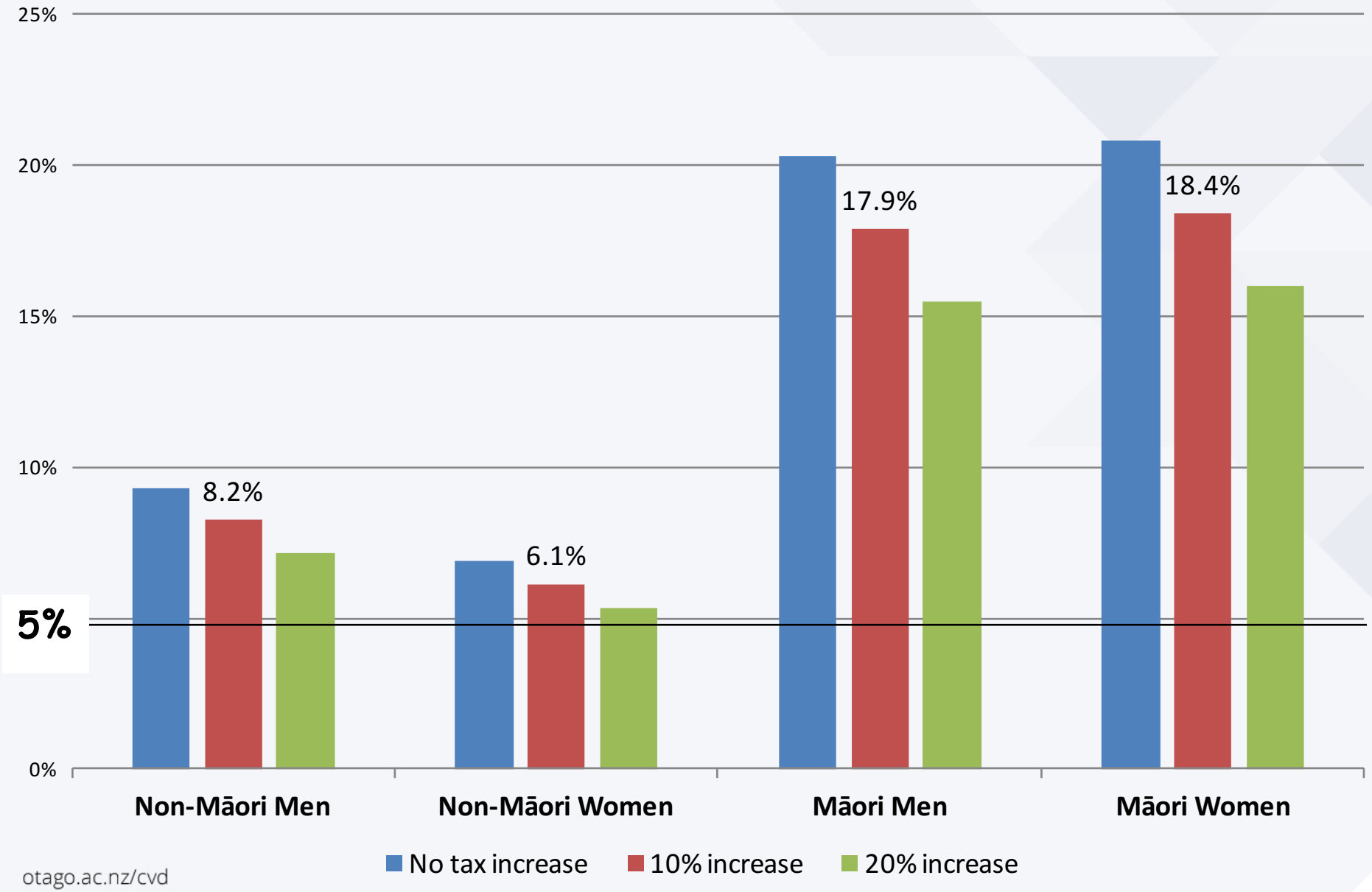


Tax helps: but not enough to achieve Smokefree 2025

(Cobiac et al 2015, *Tob Control*)



Smoking prevalence in 2025 with tax increases



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Pause, reflect – what did we assume?

- That price elasticities apply for future higher prices:
  - Price elasticities on other high addictive substances (cocaine, heroin) similar and appear not to change with price
  - **But** one might expect response to price increases to steepen, as smoker still has other fixed costs (housing, food, etc) and a limited income
- That tax affects cessation rates only in the year of the tax rise:
  - Which is what other models do
  - And accords with short- and long-run price elasticities being similar
- BAU continues as usual …

Which begs all these questions….

- Will NZ achieve the smokefree goal (5%) by 2025 with ongoing 10% per annum increases in excise tax?
- **And what will be the impact, and timing, of such ongoing tobacco tax increases on:**
  - **Health gains in QALYs?**
  - **Mortality inequalities?**
  - **Health system costs?**

(Should be generalizable qualitatively at least to other countries, with health inequalities in due to tobacco.)

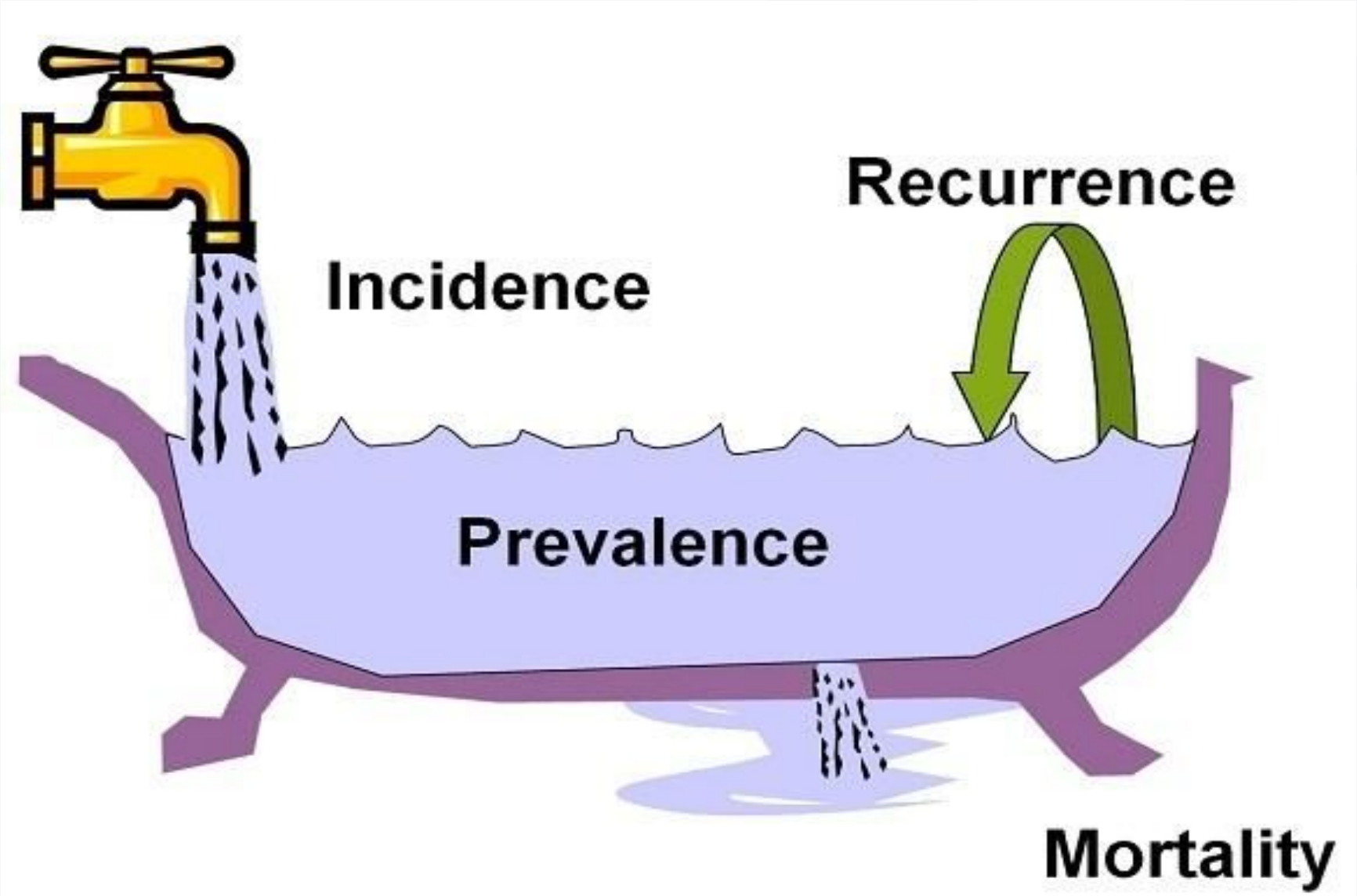
PLOS | MEDICINE

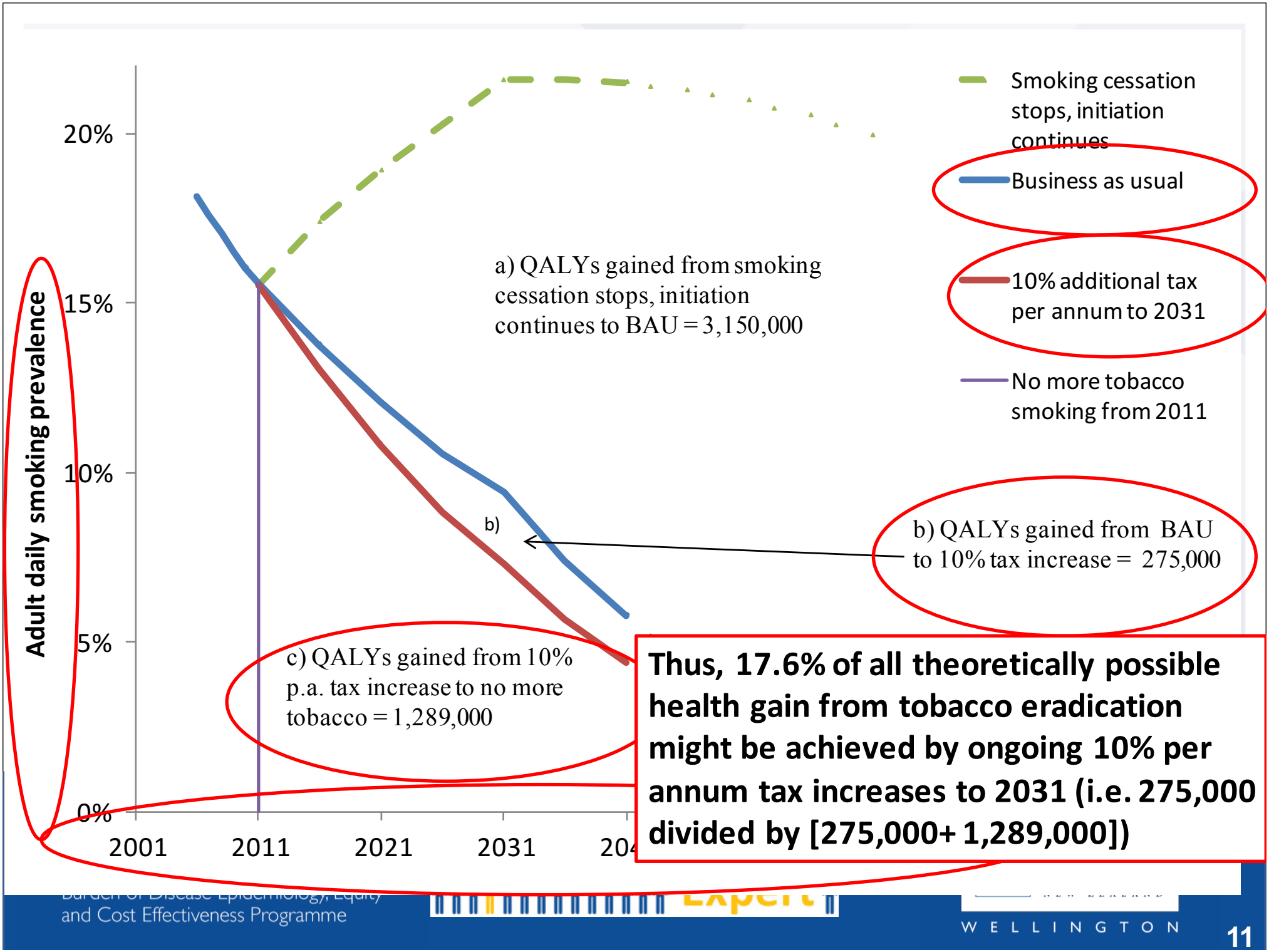
RESEARCH ARTICLE

Health, Health Inequality, and Cost Impacts of Annual Increases in Tobacco Tax: Multistate Life Table Modeling in New Zealand

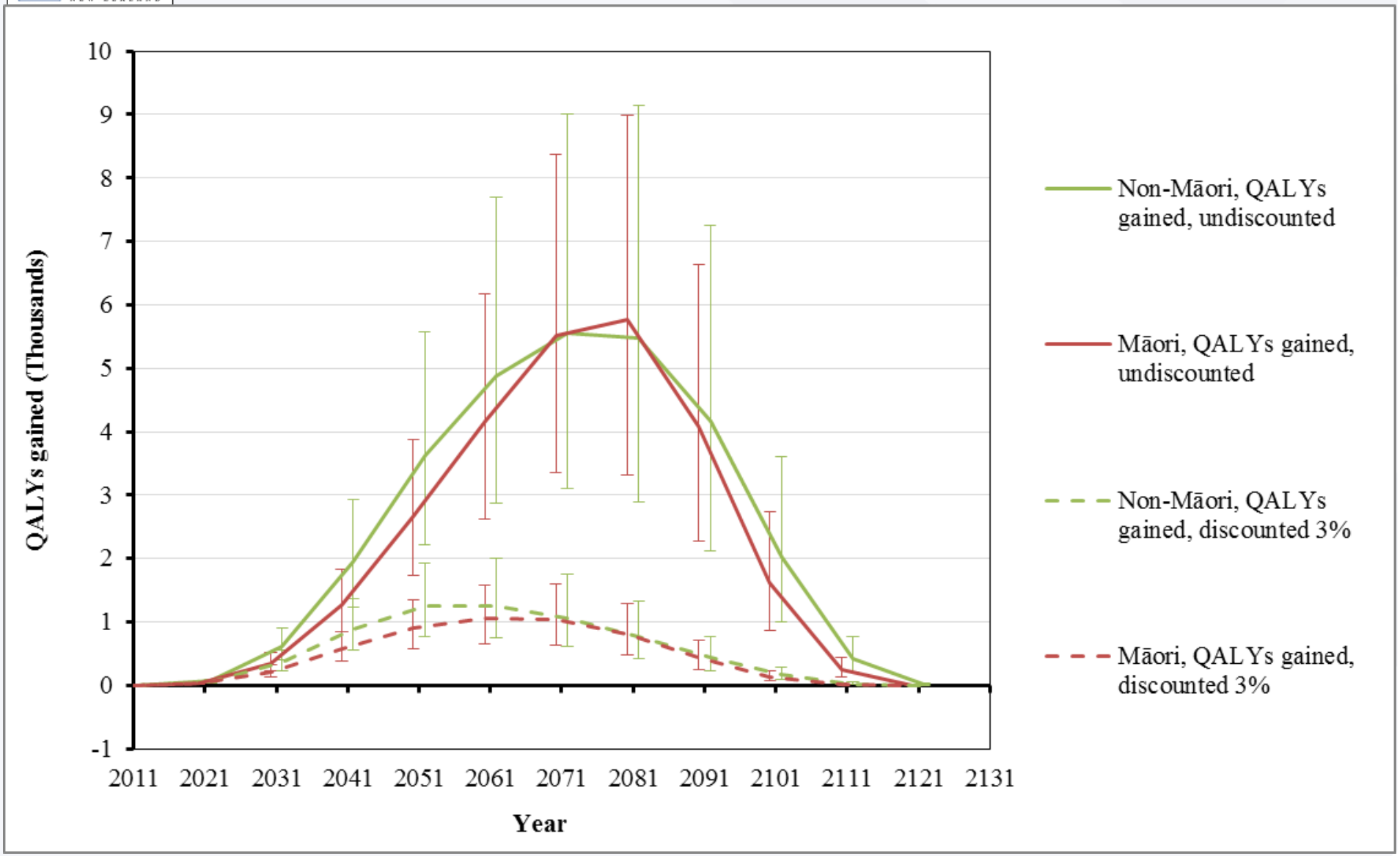
Tony Blakely[1]*, Linda J. Cobiac[1,2], Christine L. Cleghorn[1], Amber L. Pearson[1,3], Frederieke S. van der Deen[1], Giorgi Kvizhinadze[1], Nhung Nghiem[1], Melissa McLeod[1], Nick Wilson[1]

Multistate lifetable method in cartoon



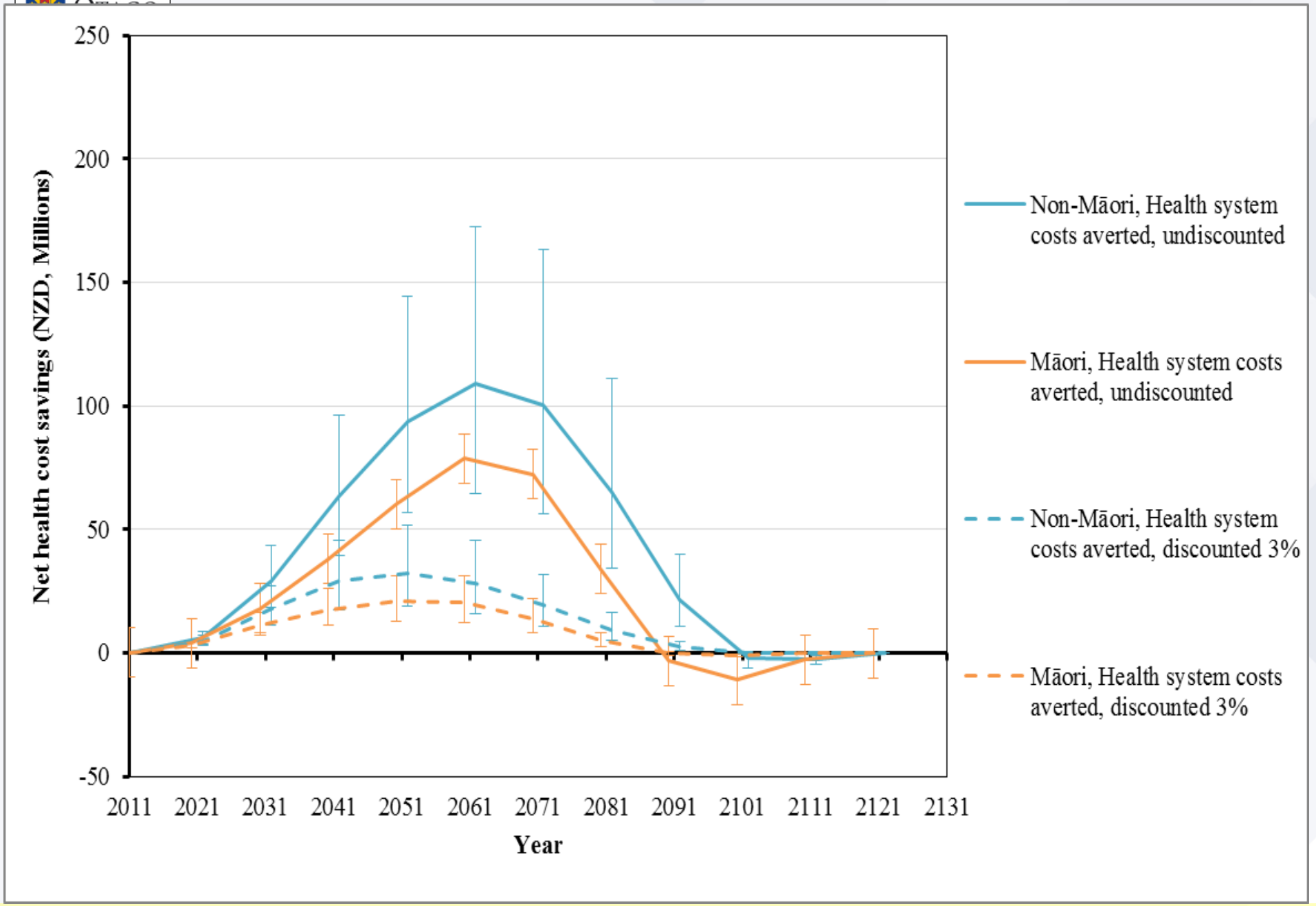

Adult daily smoking prevalence
20%
15%
10%
5%
0%
2001
2011
2021
2031
Smoking cessation stops, initiation continues
Business as usual
10% additional tax per annum to 2031
No more tobacco smoking from 2011
a) QALYs gained from smoking cessation stops, initiation continues to BAU = 3,150,000
b)
b) QALYs gained from BAU to 10% tax increase = 275,000
c) QALYs gained from 10% p.a. tax increase to no more tobacco = 1,289,000
Thus, 17.6% of all theoretically possible health gain from tobacco eradication might be achieved by ongoing 10% per annum tax increases to 2031 (i.e. 275,000 divided by [275,000+ 1,289,000])

Large QALY gains – but peaks in 2070s



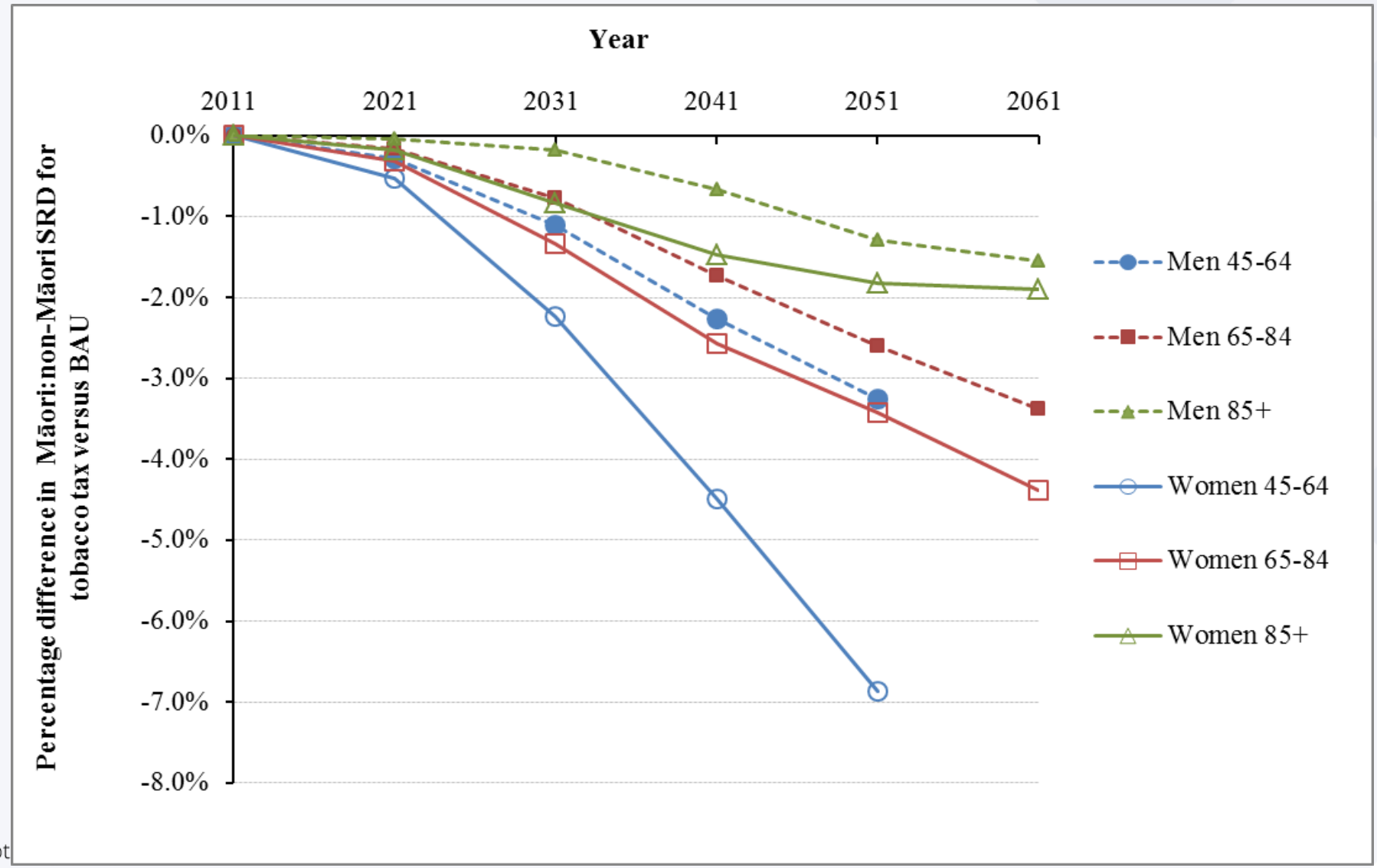
Slightly modified from Blakely et al 2015 *PLoS Medicine*

Large cost savings – but delayed peak



Slightly modified from Blakely et al 2015 *PLoS Medicine*

Reduction in Māori:non-Māori mortality inequalities for 10% p.a. tax increases



Modified from Plos Med paper

Summary: tobacco tax impacts

- major health gains (premature death & disability – especially via COPD)
- greater gains for Māori: pro-equity
- large cost savings for health system
- Modelling work informed government policy development (2016 budget)

Photo: *Radio NZ*

And other endgame strategies exist:

A) **Sinking lid** on tobacco supply (14 years: 2011 to 2025)

B) **Tobacco-free generation** (TFG)

- No more sales to customers born in 1993 or thereafter

C) Substantial **outlet reduction** strategy (similar to Pearson et al 2015 *Tob Control*; Pearson et al [in press, *Tob Control*])

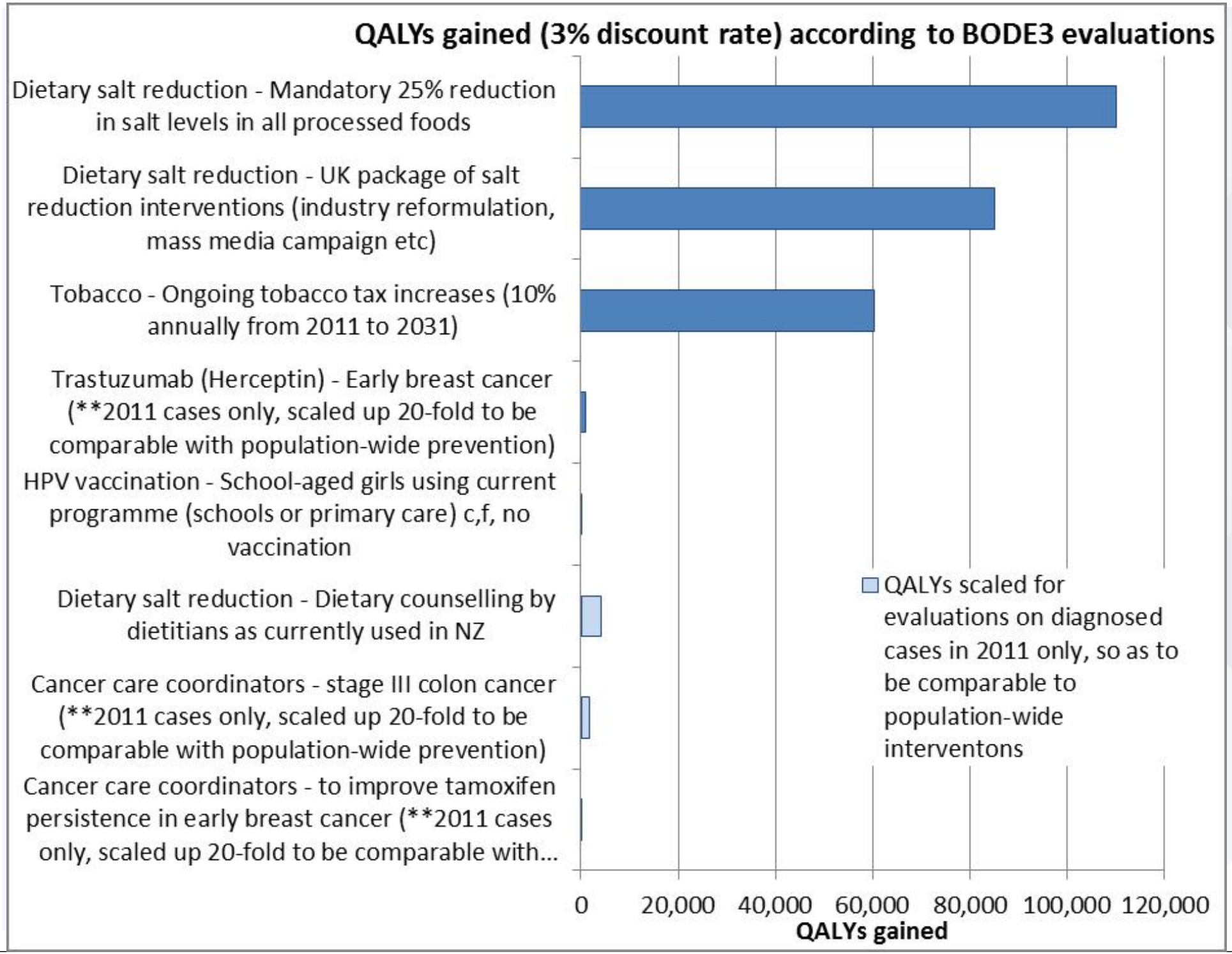
- Phased in over 14 years: 2011 to 2025
- Approx. 6000 outlets down to 18 (1 outlet per TLA with pop dens > 50,000)
- Changes in travel costs are treated as an increase in the price of tobacco

D) **Mixed** tobacco endgame strategy

- 10% tax increases + [B] + [C]

Limitations with structured quantitative speculation

- Tax increases – very strong evidence base, but unclear elasticities at high prices (possibly they increase)
- Sinking lid – only ever applied in other sectors (eg, fisheries)
- Tobacco free generation – assumes retailer compliance
- Outlet reduction – differences between indirect costs (fuel, time) and upfront costs
- Mixed strategy – assumes independence, but might be synergies
- All interventions – ignore synergies from denormalisation; potential intensified tobacco industry fightback


QALYs gained (3% discount rate) according to BODE3 evaluations
Dietary salt reduction - Mandatory 25% reduction in salt levels in all processed foods
Dietary salt reduction - UK package of salt reduction interventions (industry reformulation, mass media campaign etc)
Tobacco - Ongoing tobacco tax increases (10% annually from 2011 to 2031)
Trastuzumab (Herceptin) - Early breast cancer (**2011 cases only, scaled up 20-fold to be comparable with population-wide prevention)
HPV vaccination - School-aged girls using current programme (schools or primary care) c,f, no vaccination
Dietary salt reduction - Dietary counselling by dietitians as currently used in NZ
Cancer care coordinators - stage III colon cancer (**2011 cases only, scaled up 20-fold to be comparable with population-wide prevention)
Cancer care coordinators - to improve tamoxifen persistence in early breast cancer (**2011 cases only, scaled up 20-fold to be comparable with...
QALYs scaled for evaluations on diagnosed cases in 2011 only, so as to be comparable to population-wide interventons
0
20,000
40,000
60,000
80,000
100,000
120,000
QALYs gained

Overall conclusions

- Modelling suggests, to get to Smokefree 2025:
  - BAU insufficient
  - Tax helps – but 20% pa still insufficient
  - Package of 10% tax + outlets + TFG (yes for non-Māori, not for Māori until 2032)
- All interventions: large QALY gains & large health system cost savings
  - Immediate gains, but peak benefits in 2070s
  - All interventions higher per capita gain for Māori, especially TFG → tobacco control is pro-equity

BODE^3 Team Members