UNIVERSITY OF LIVERPOOL | INSTITUTE OF PSYCHOLOGY, HEALTH AND SOCIETY

The impact of NHS Health Check programme on cardiovascular disease burden in Liverpool

A health economics microsimulation to quantify the policy options

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With many thanks to Phil McHale, Rachael Gosling, Sophie Kelly, and Richard Jones

In my talk today...

I will

- briefly report on the existing evidence regarding the local implementation of Health Checks
- use a modelling approach to estimate the potential effectiveness, cost-effectiveness and equity of current implementation
- explore possible areas for improvement

Current Health Checks implementation

- Annual coverage: **13.8**% (target 20%)
- Annual uptake: **32.3**% (target 66%)
- Risk profile : **74.1% (low risk), 19.6% (middle risk), 6.2% (high risk)**
- Prescription rate: 9.1% (low risk), 25.8% (middle risk), 41.7% (high risk)
- Referral to smoking cessation/weight management/exercise therapy services: <4%
- Invitation cost: £5.11 (per invited individual)
- Participation cost: £13.00 - £19.00 (per participant)

Source: Jones et al. Review of the NHS Health Check Programme in Liverpool; 2016

Study aims

- Is current local implementation of Health Checks effective / cost – effective / equitable?
- Is there any room for improvement?

METHODS

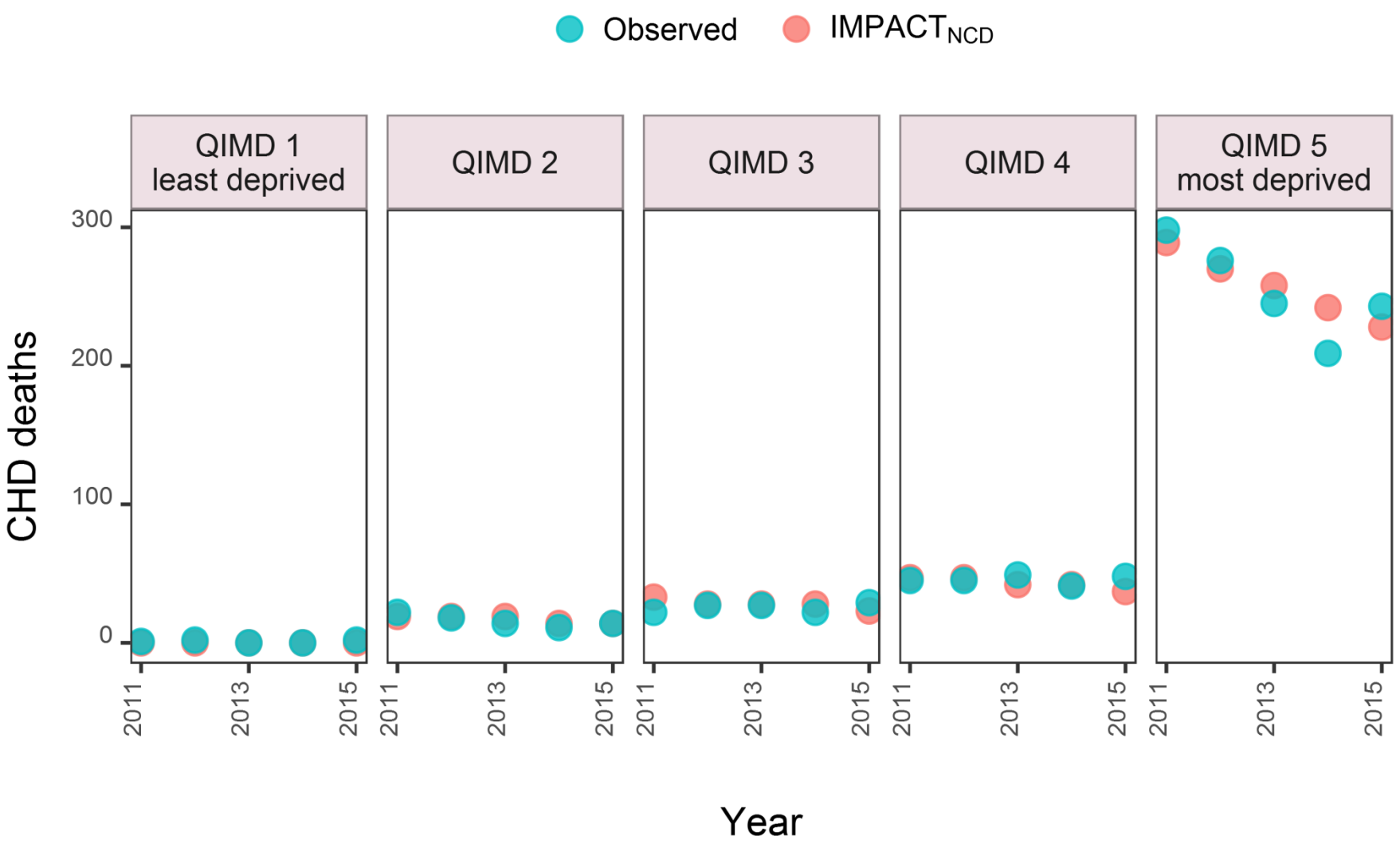
IMPACT$_{NCD}$-Liverpool

- Based on the validated IMPACT$_{NCD}$ model (BMJ;2016)
- Calibrated to local demographics, risk factor exposures, and CVD epidemiology
- Using local data about Health Checks effectiveness and costs
- With the addition of a health economics module

Cost-utility analysis

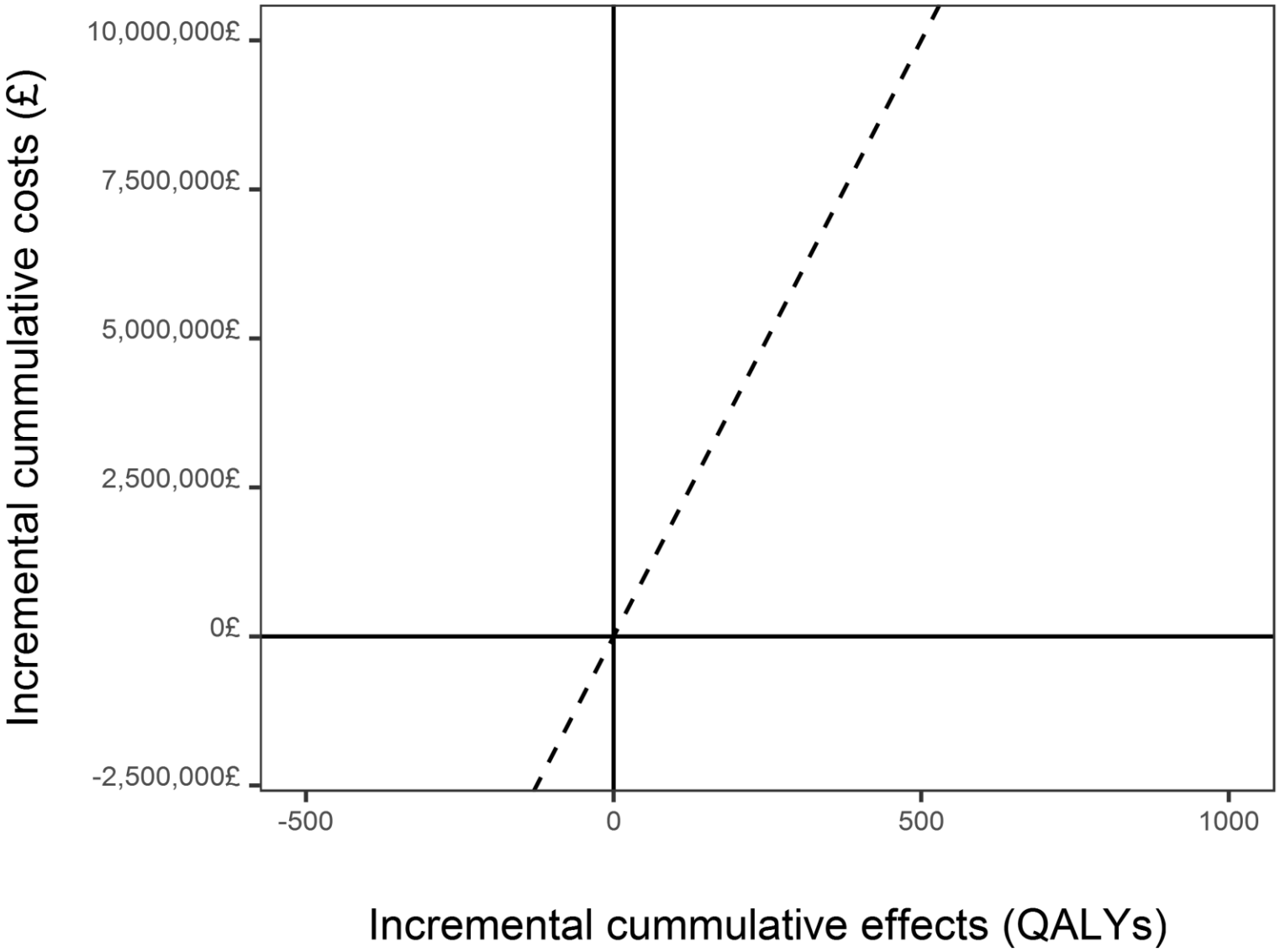
- Incremental utility of each Health Checks scenario against a 'no Health Check' scenario
  - Measured in QALYs (age, CHD, stroke, diabetes)
- Incremental cost against a 'no Health Check' scenario
  - Measured in £ (implementation/CHD/stroke/diabetes/ hypertension)
- Discount: 3.5% per year

Model validation

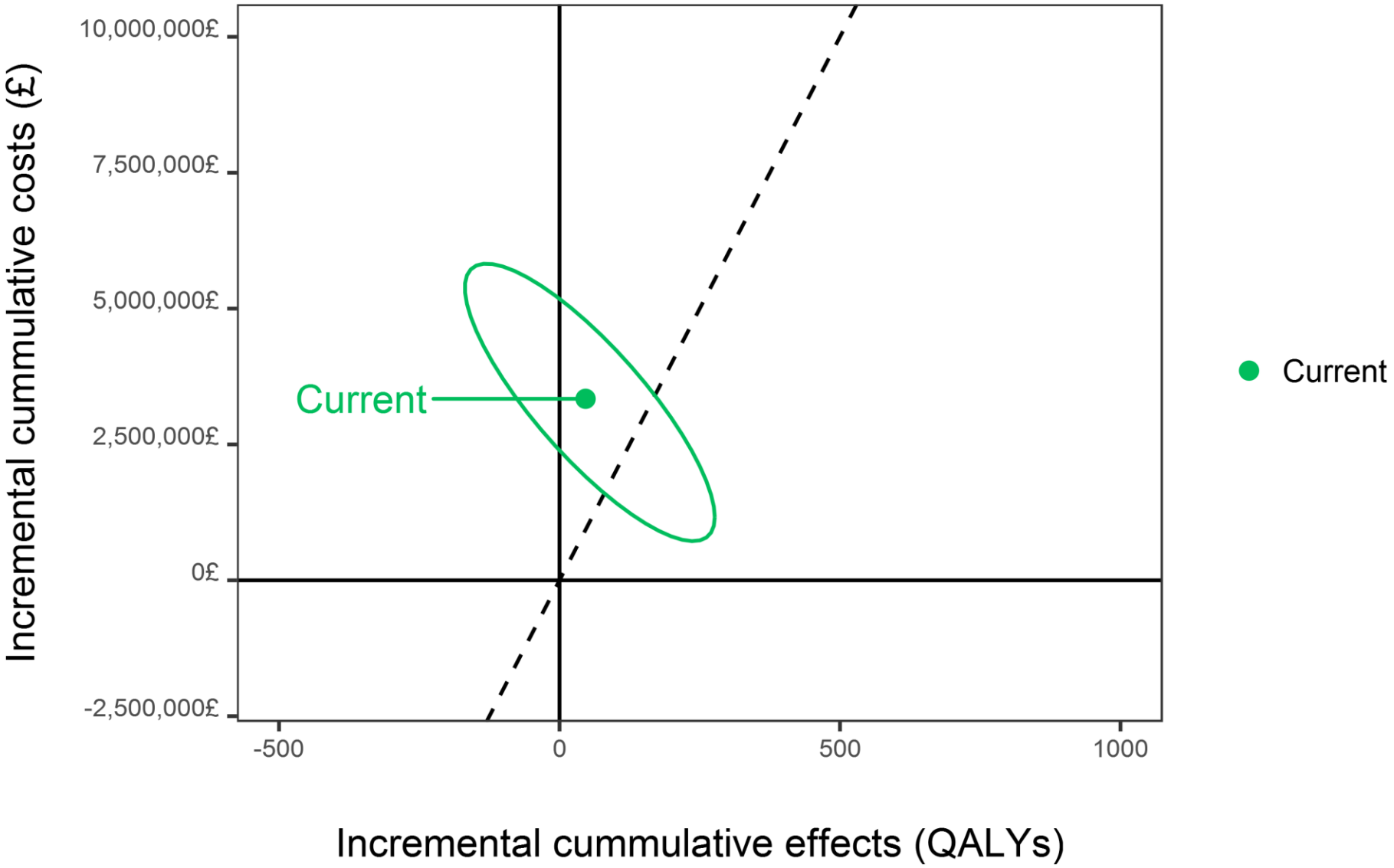


RESULTS (PRELIMINARY)

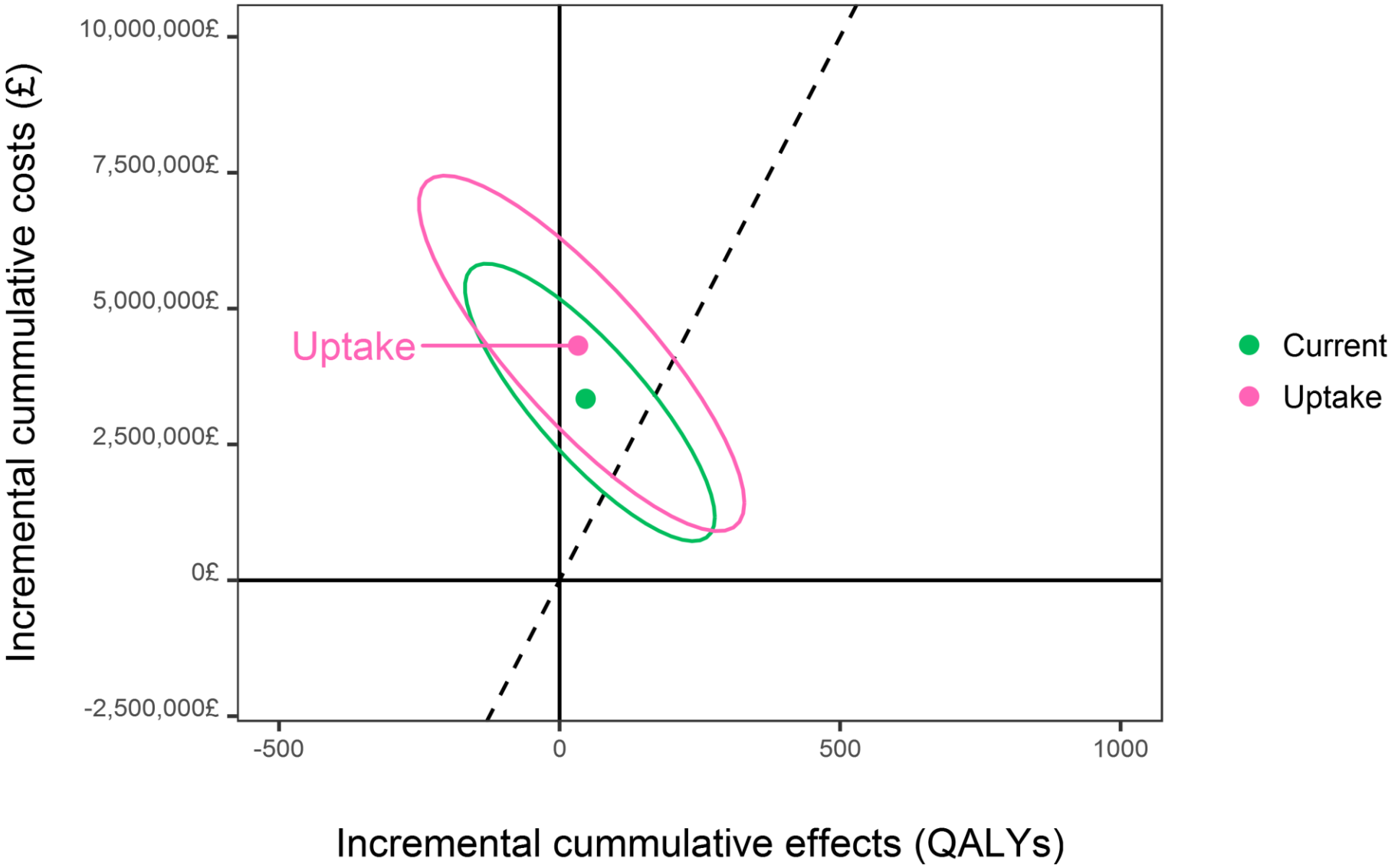
Current implementation (by 2030)



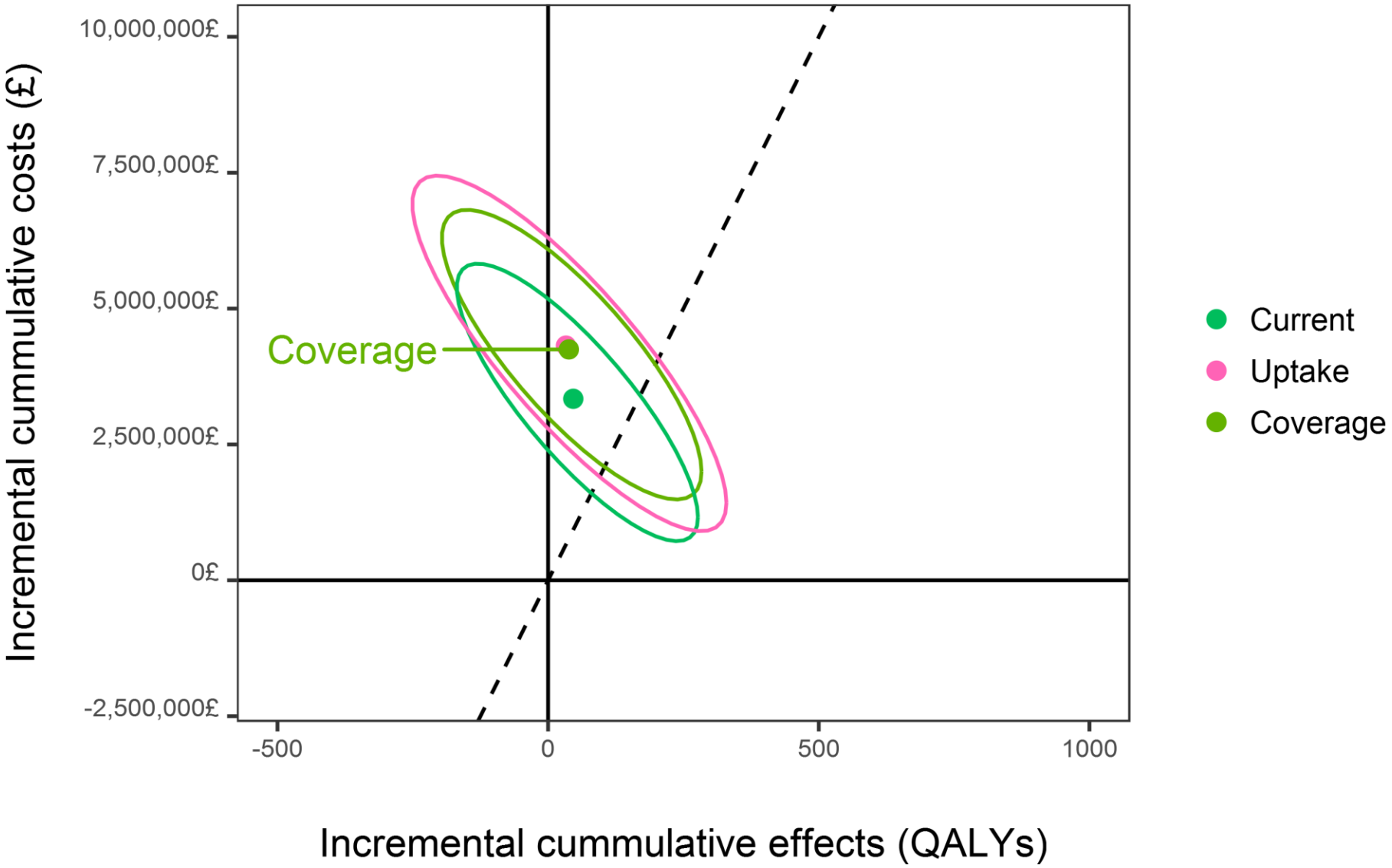
Current implementation (by 2030)



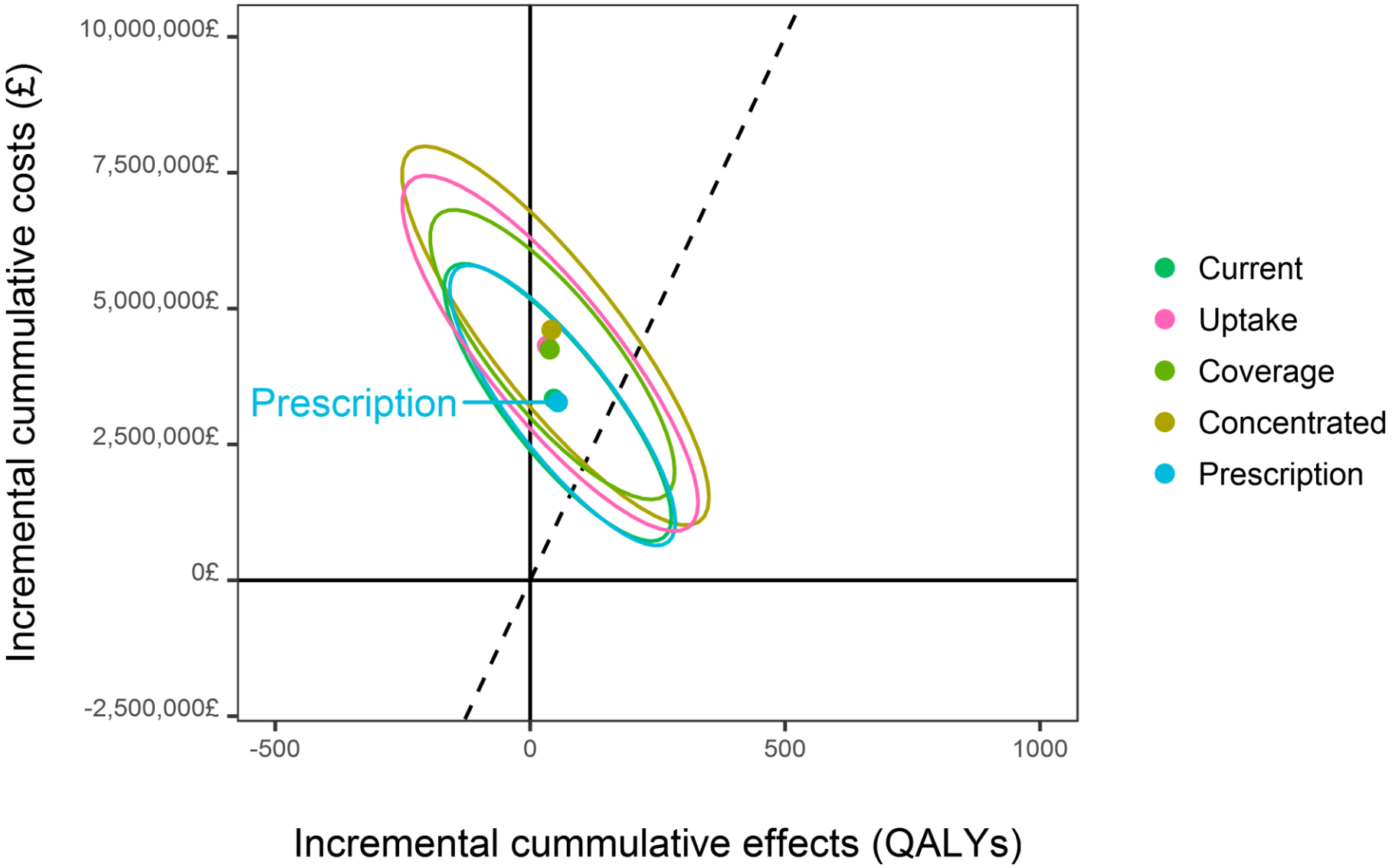
Uptake to 66%, participation cost £15



Coverage to 20% per year



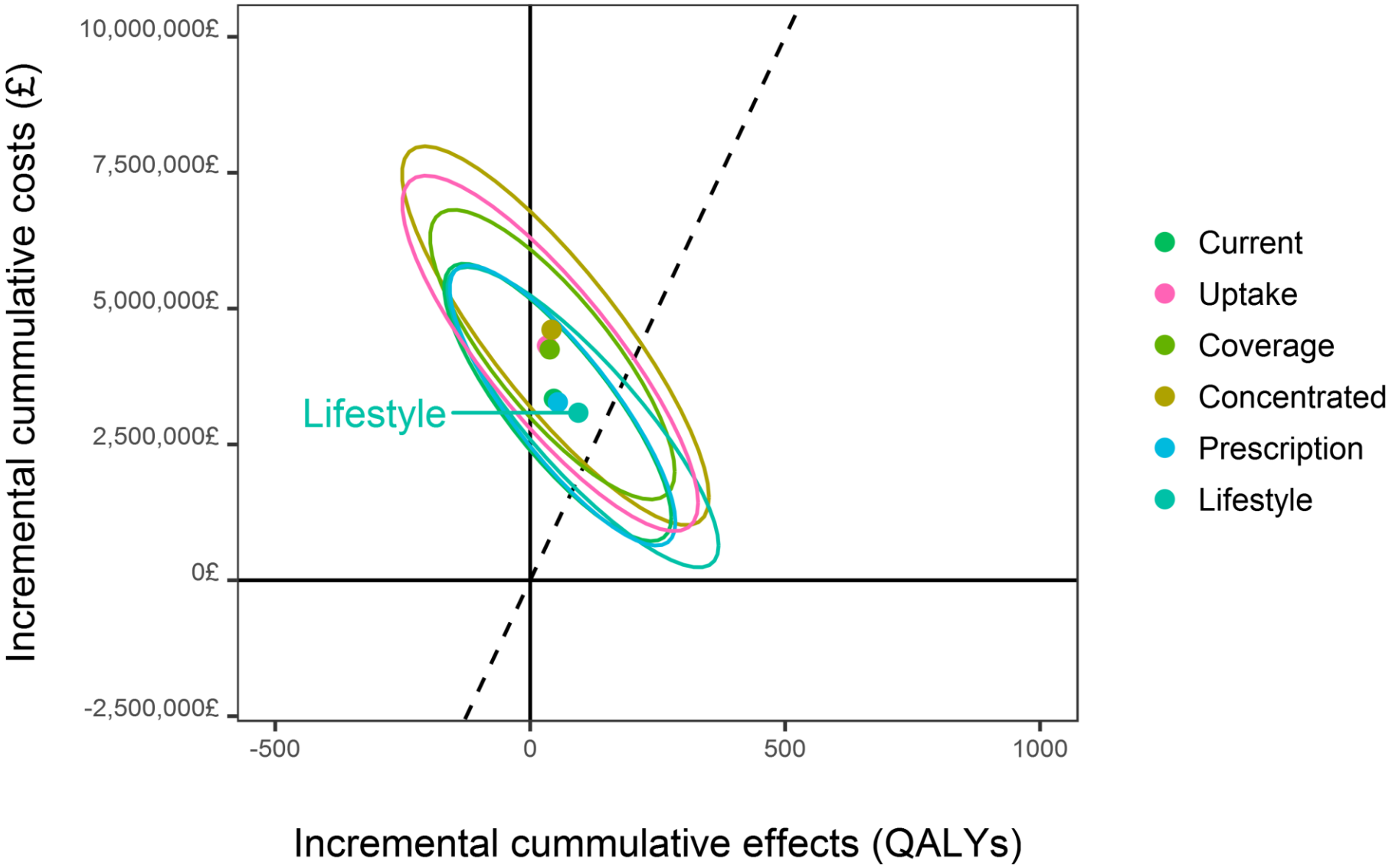
Prescription rate to 80% (mid-high risk)



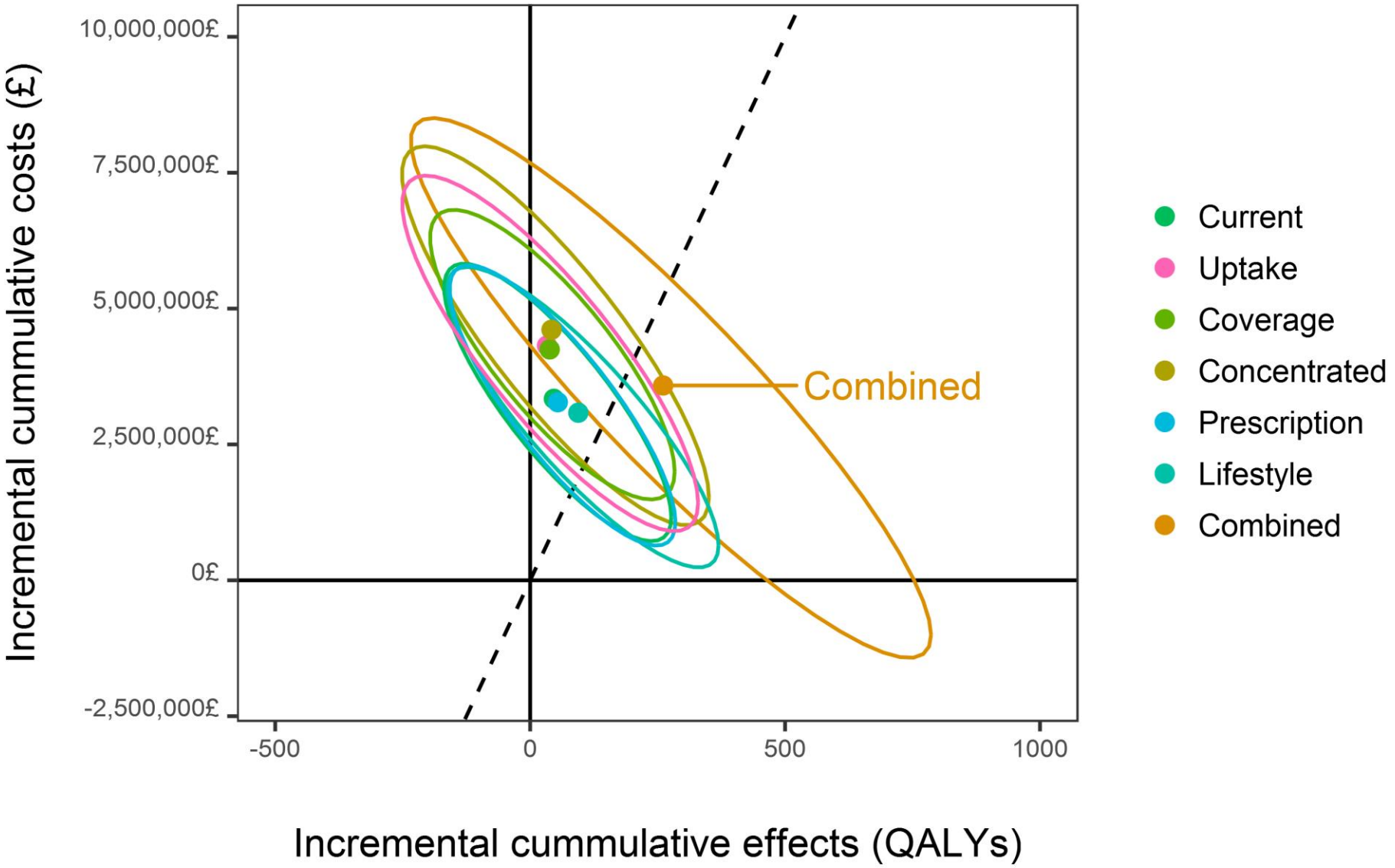
Long-term healthier lifestyle

- 50% of middle and high-risk participants (QRISK > 10) increase their F&V consumption by 1 portion,
- their physical activity by 1 active day per week,
- and they decrease their BMI by 1%.
- Those with BMI >50 kg/m^2 have bariatric surgery and reduce their BMI to 30% kg/m^2
- 10% of smokers will achieve long term smoking cessation.

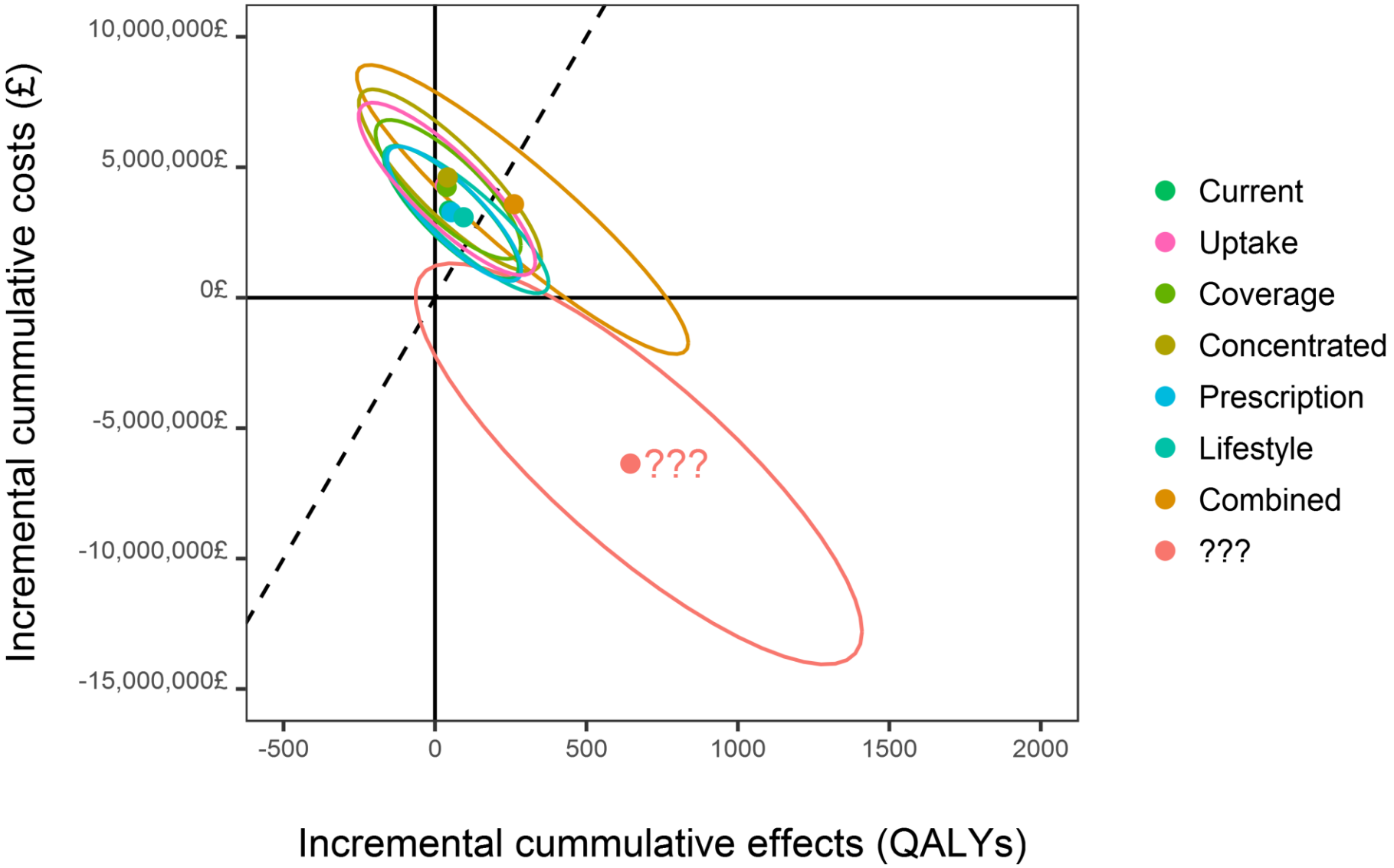
Long-term healthier lifestyle



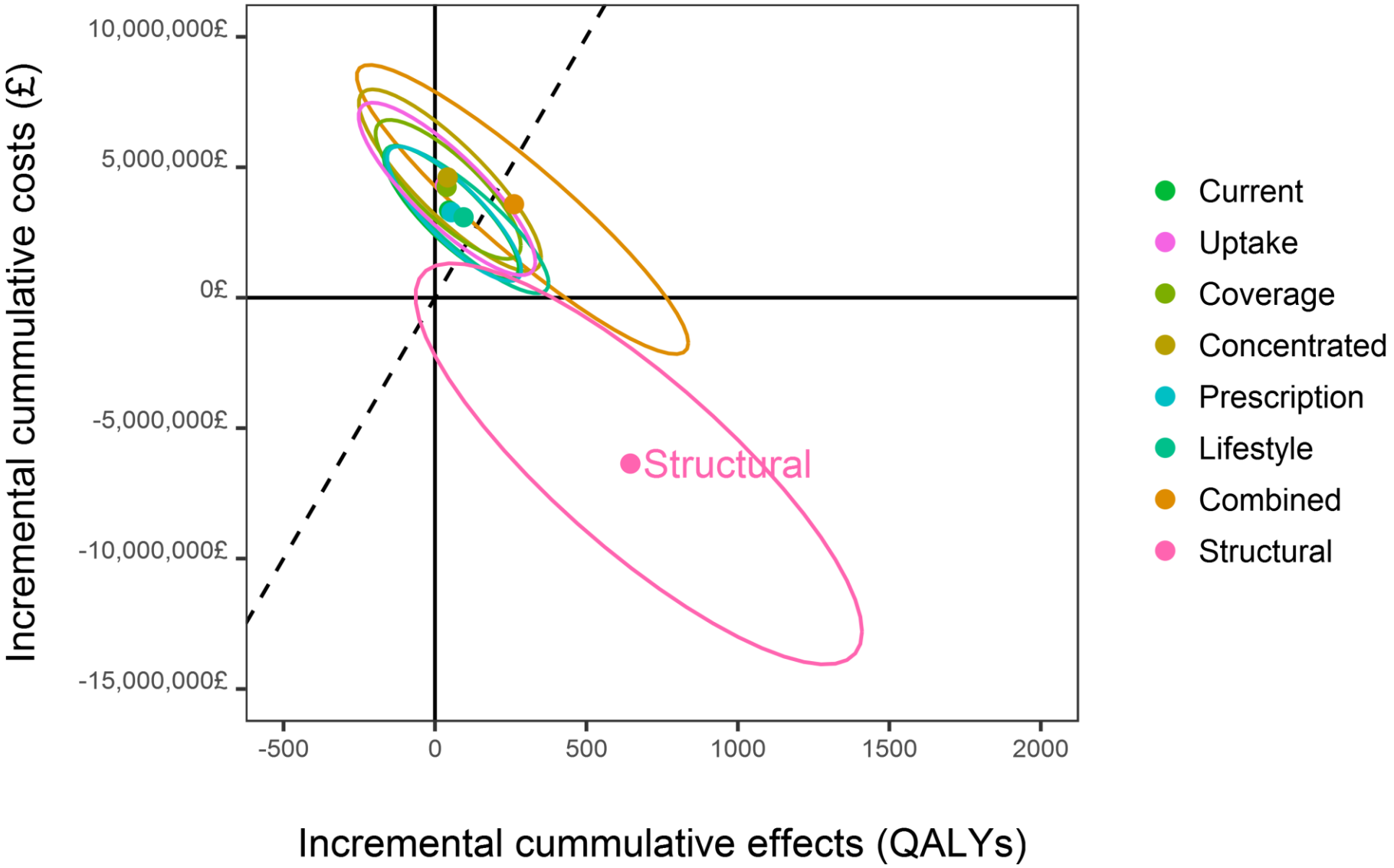
Combined improvement



Put things in perspective



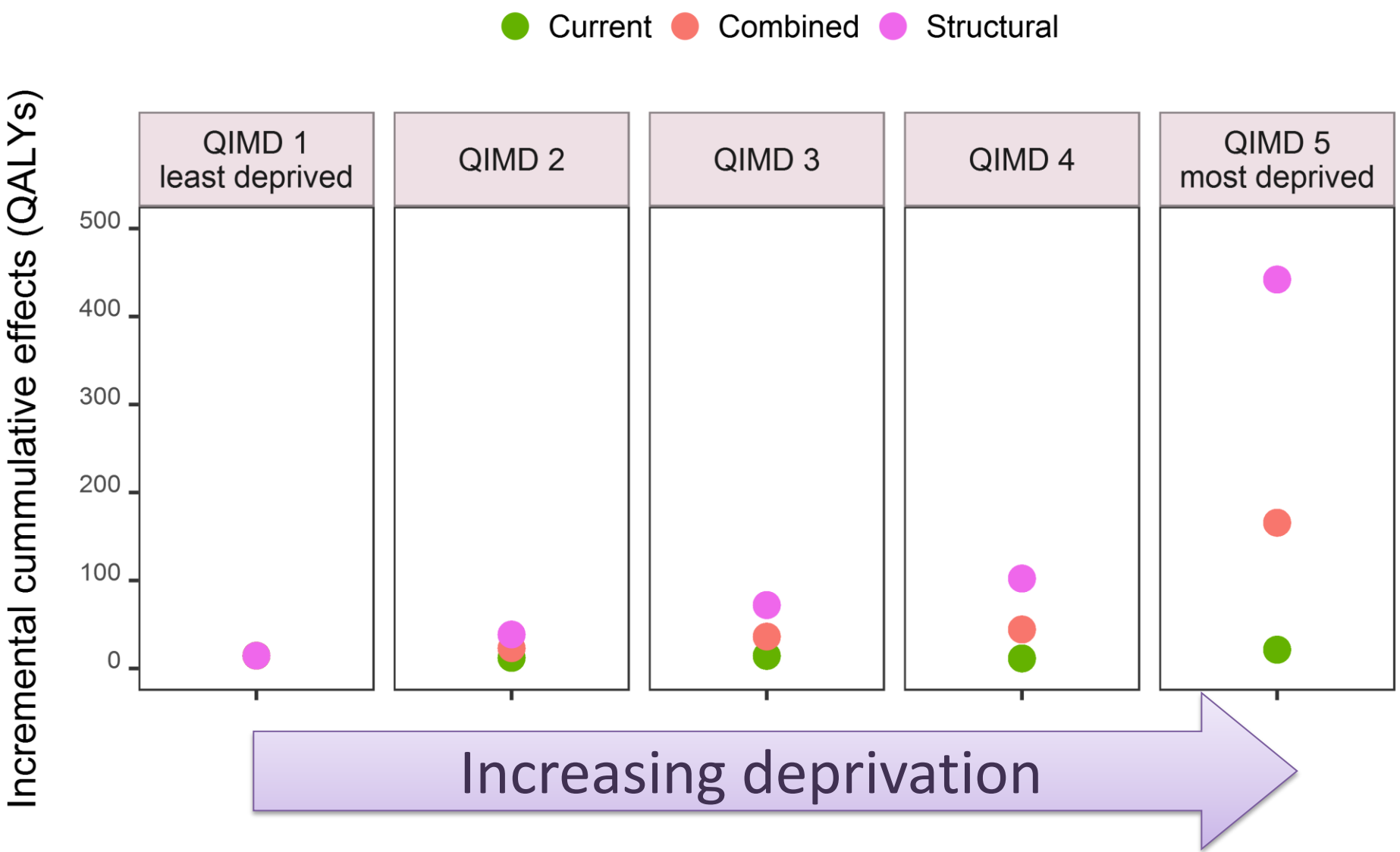
Reduce BMI 1% and SBP 0.8 mmHg



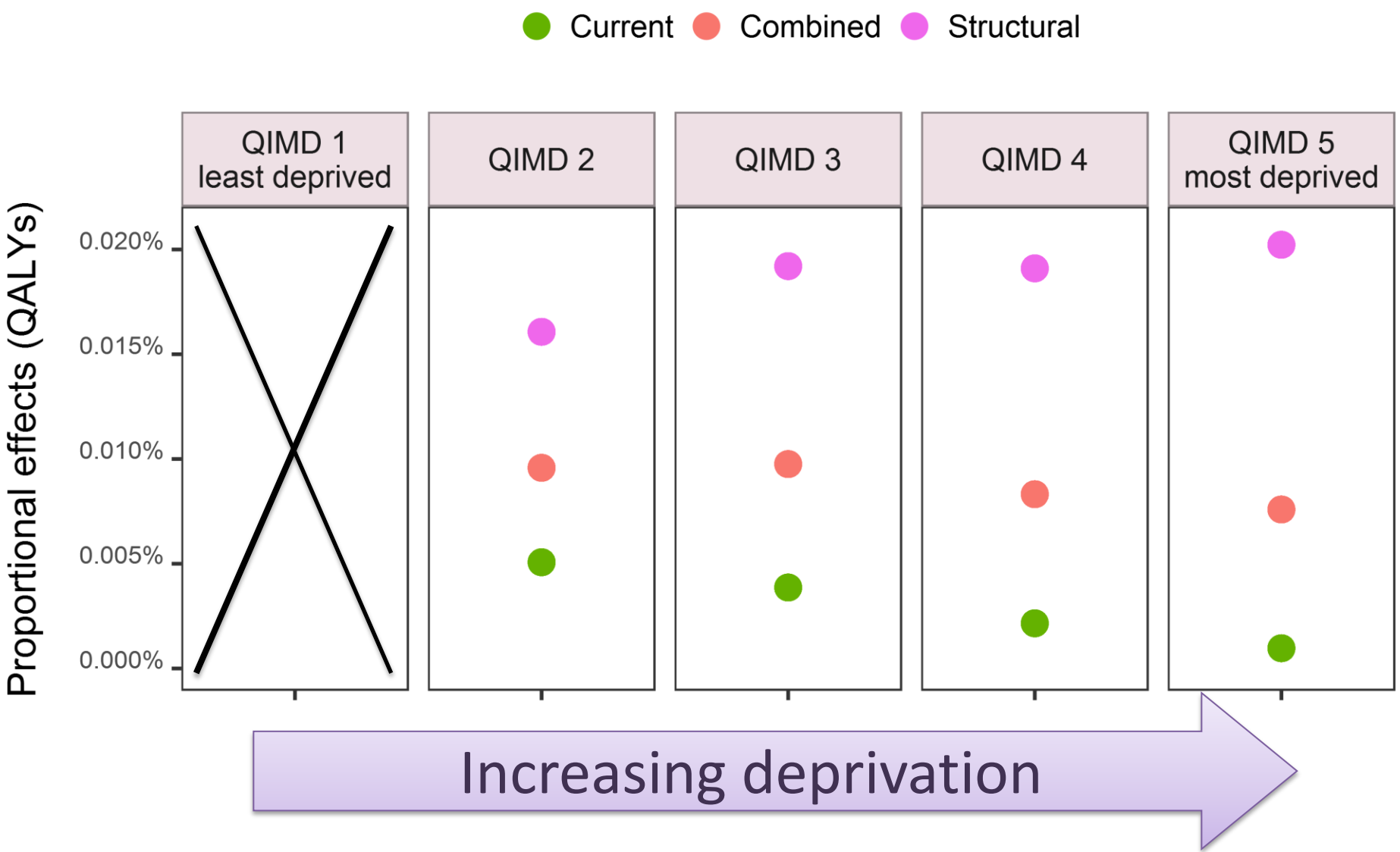
Results

EQUITY

Absolute equity



Relative equity



Conclusions

- Current local implementation of Health Checks is likely not cost-effective and is likely to increase relative health inequalities
- Achieving maximum optimisation (combined scenario), Health Checks is likely to become cost-effective but may still increase relative health inequalities
- The addition of structural policies to current implementation it is likely to be cost saving and reduce inequalities

Thank you!

IMPACT NCD-Liverpool

Inputs

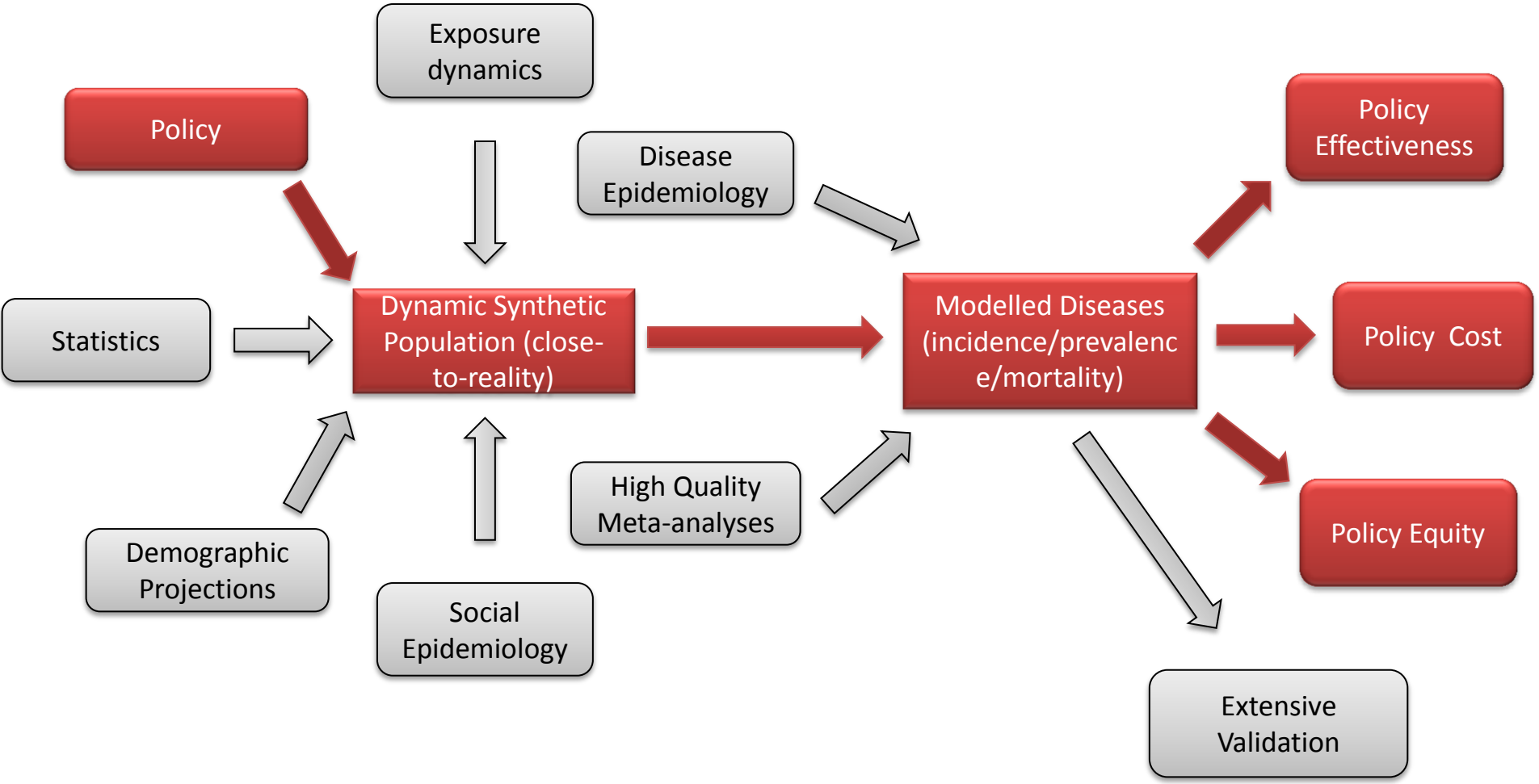
- Health Survey for England North West (exposures & their correlations)
- Population vital statistics from local authority
- Effect sizes from meta-analyses
- Scenario assumptions

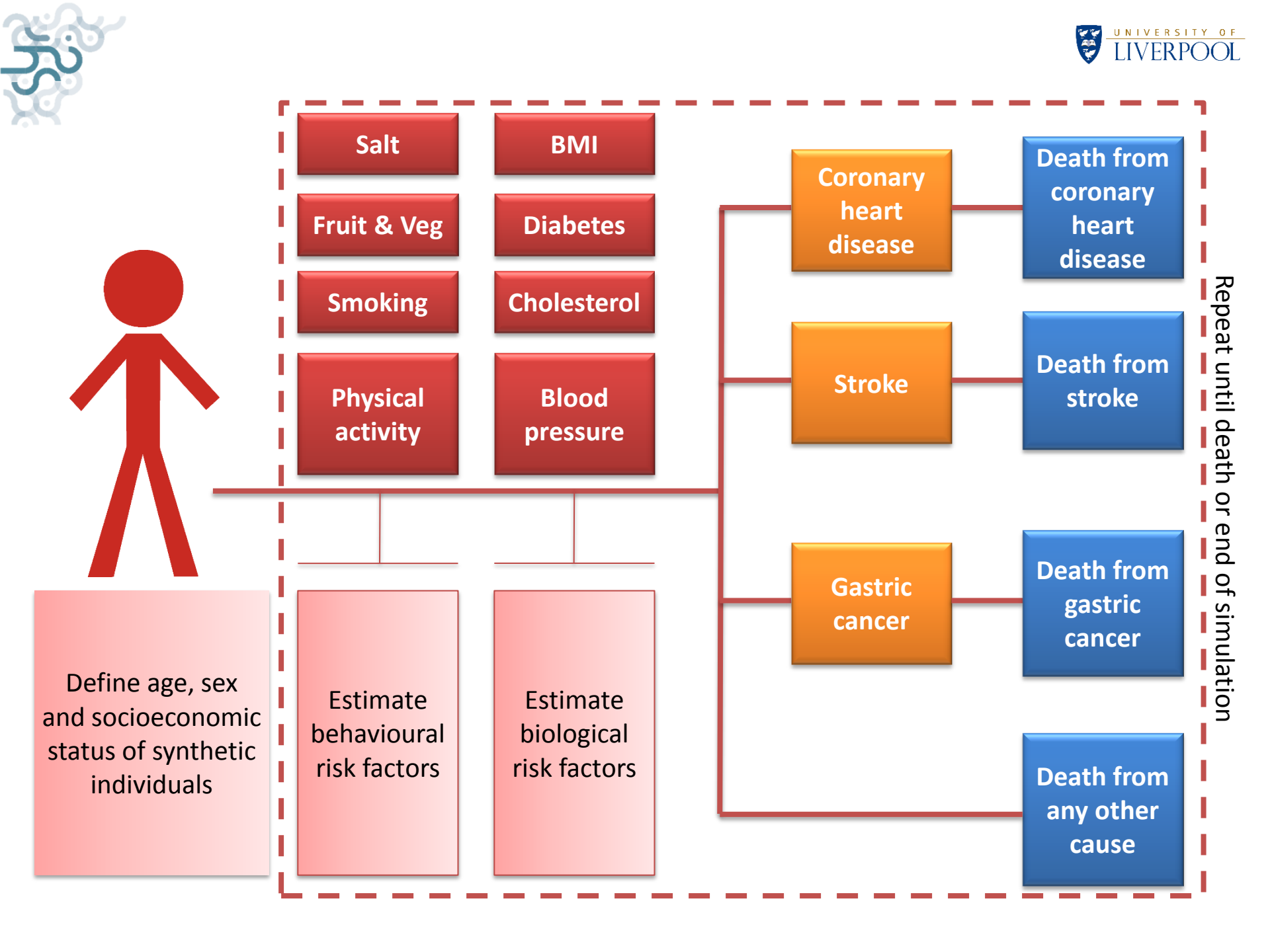
Process

- Create a close to reality synthetic population of Liverpool
- Evolve the synthetic population over time, under a set of stochastic rules grounded on epidemiological principles and using local data

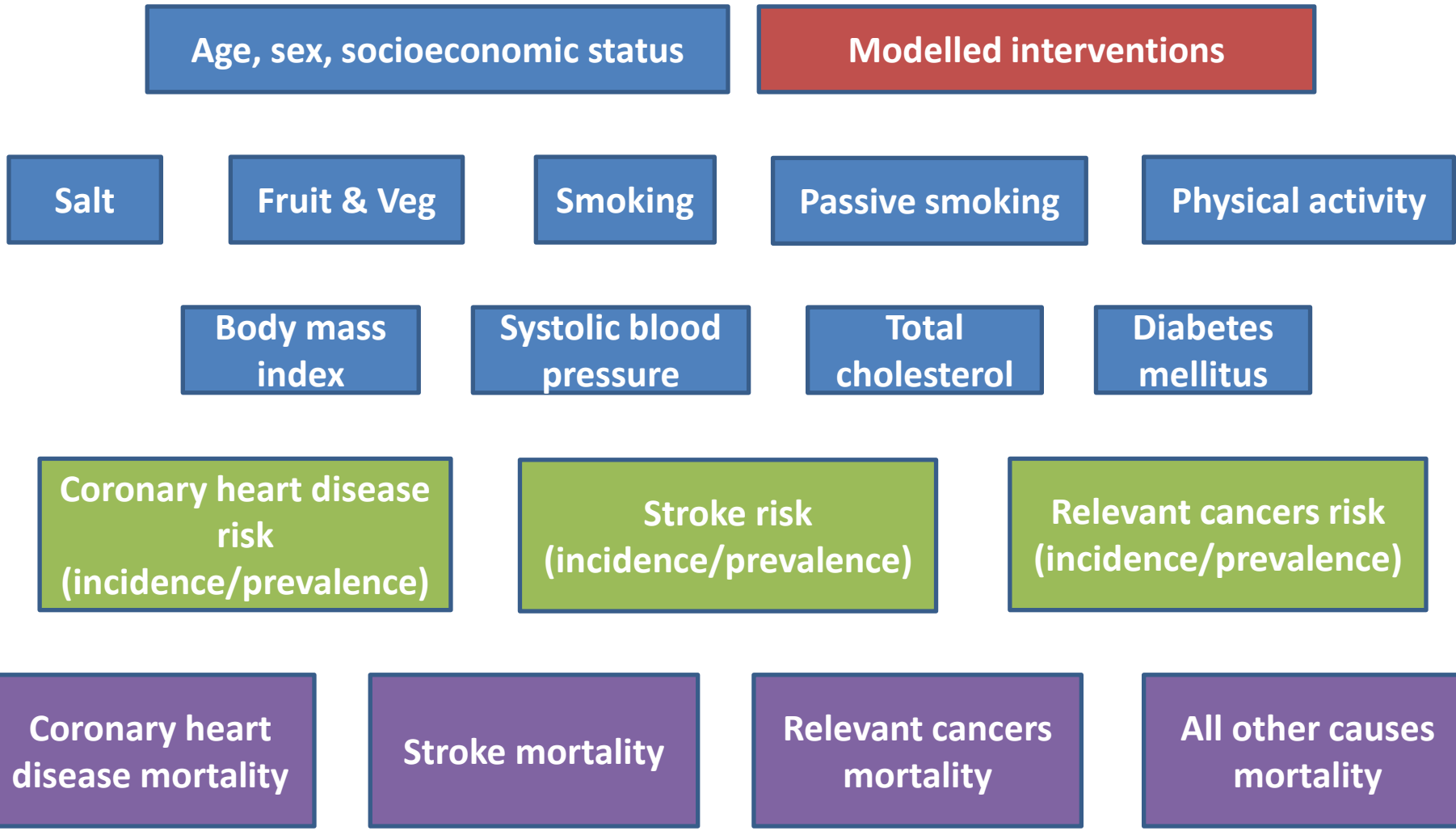
Outputs

- Utility from CHD/Stroke/Diabetes
- Costs (implementation/CHD/Stroke/Diabetes/HTN)
- Distributional nature of them (can explore impact on socioeconomic inequality)

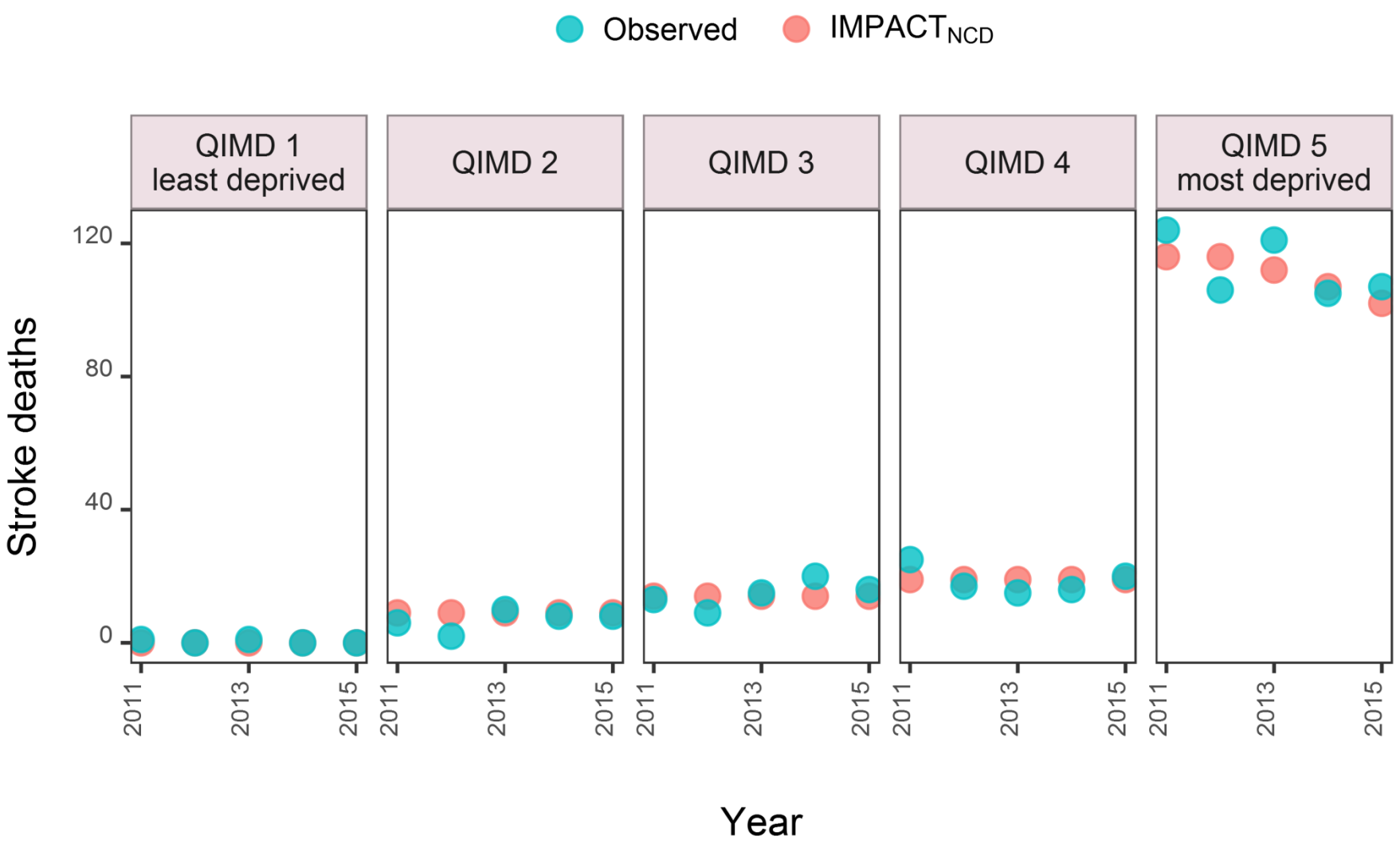

Exposure dynamics
Policy
Disease Epidemiology
Policy Effectiveness
Statistics
Dynamic Synthetic Population (close-to-reality)
Modelled Diseases (incidence/prevalence/mortality)
Policy Cost
High Quality Meta-analyses
Policy Equity
Demographic Projections
Social Epidemiology
Extensive Validation


Salt
BMI
Fruit & Veg
Diabetes
Smoking
Cholesterol
Physical activity
Blood pressure
Coronary heart disease
Stroke
Gastric cancer
Death from coronary heart disease
Death from stroke
Death from gastric cancer
Death from any other cause
Define age, sex and socioeconomic status of synthetic individuals
Estimate behavioural risk factors
Estimate biological risk factors
Repeat until death or end of simulation

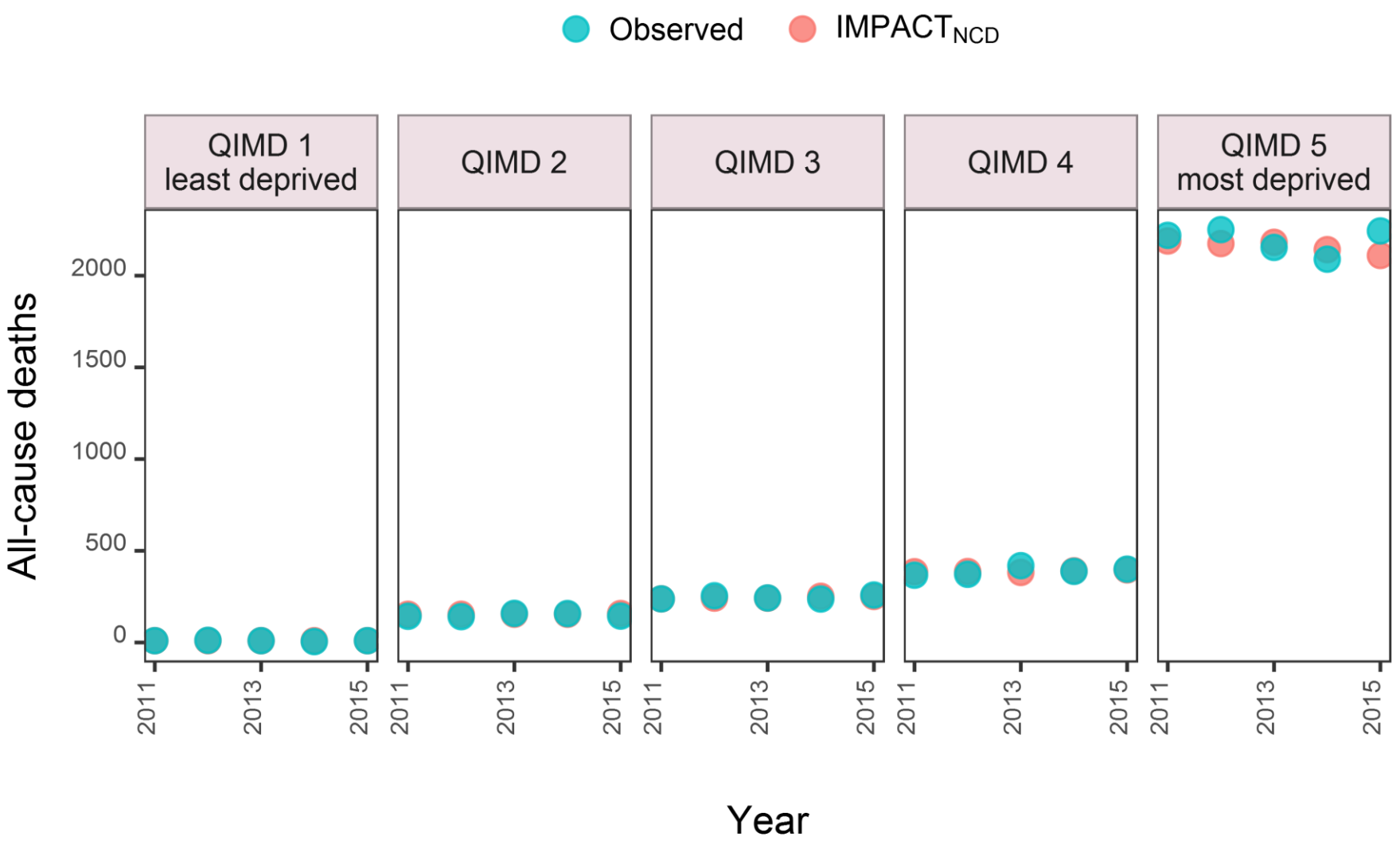
IMPACT$_{NCD}$ hierarchical engine



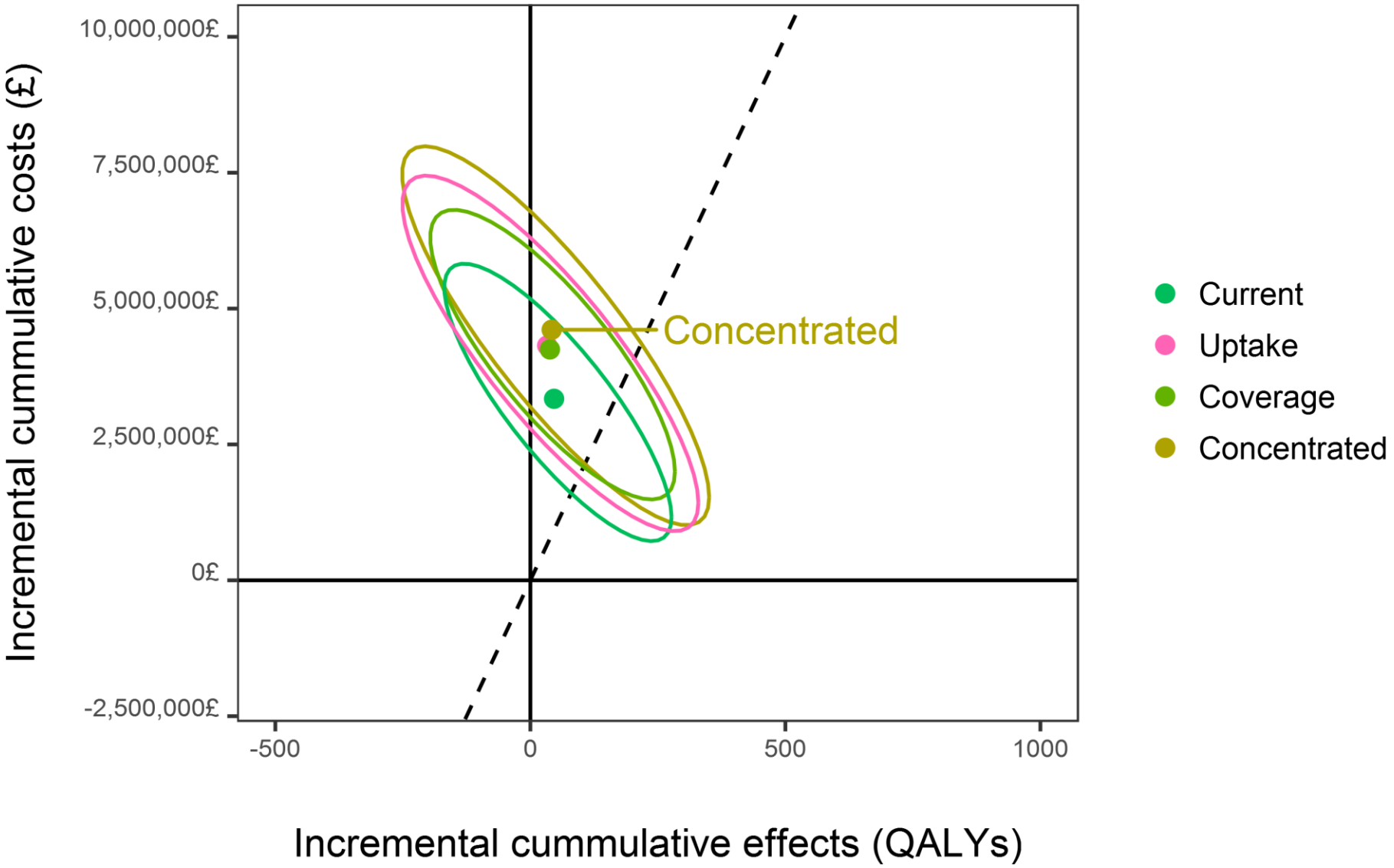
Model validation 2



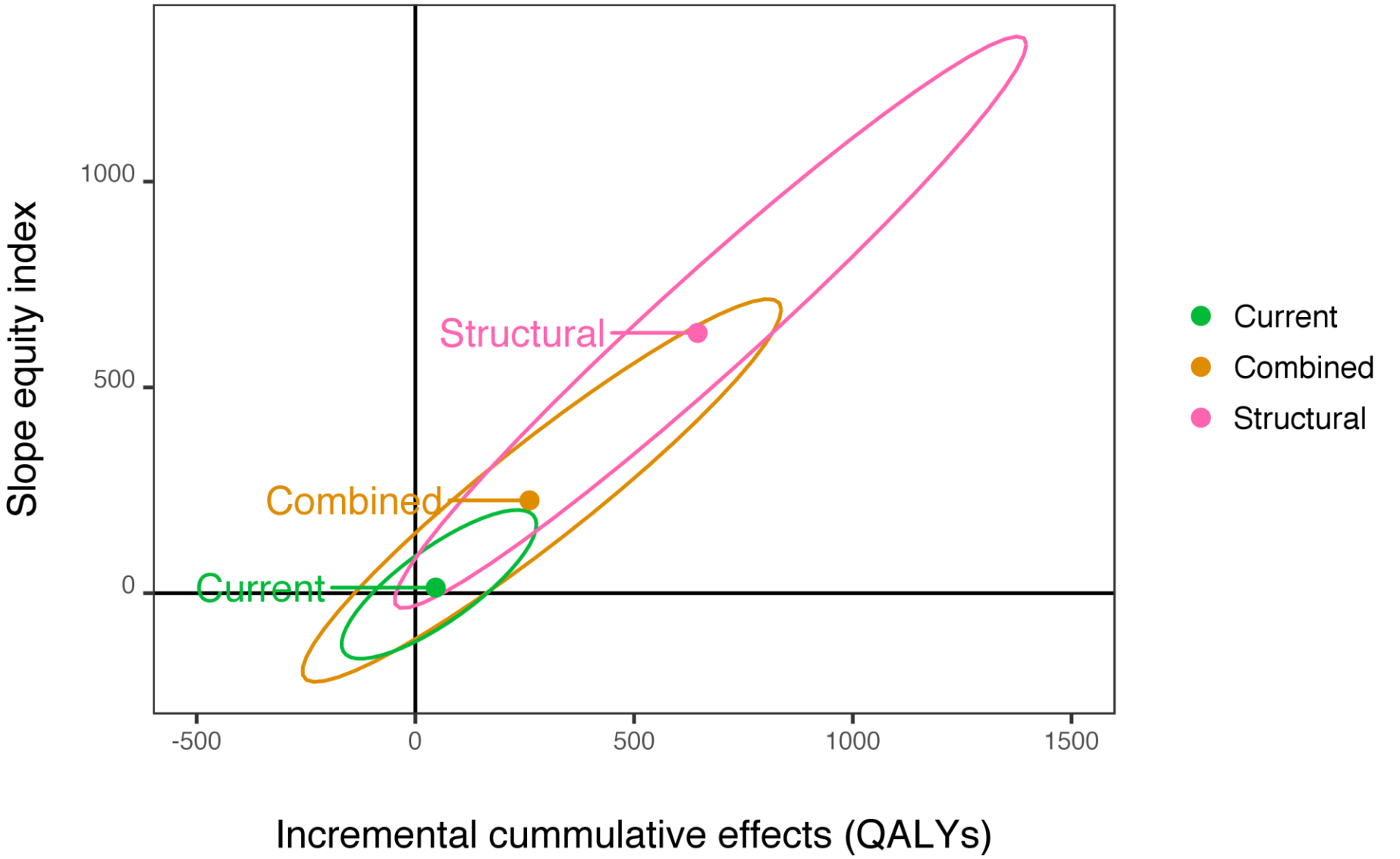
Model validation 3



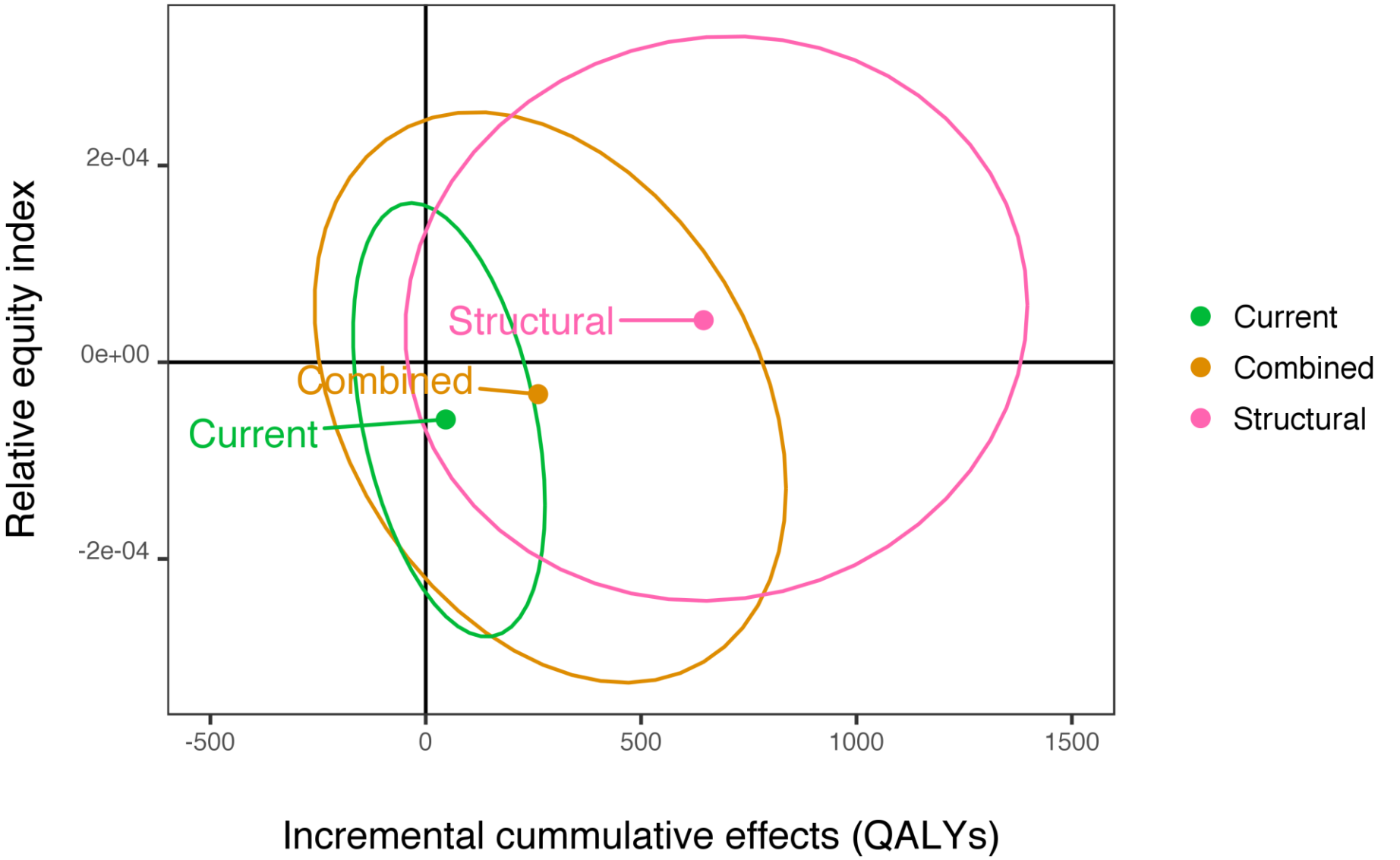
Uptake to 66%, coverage to 20%, participation cost £15. Concentrated to the most deprived quintile.



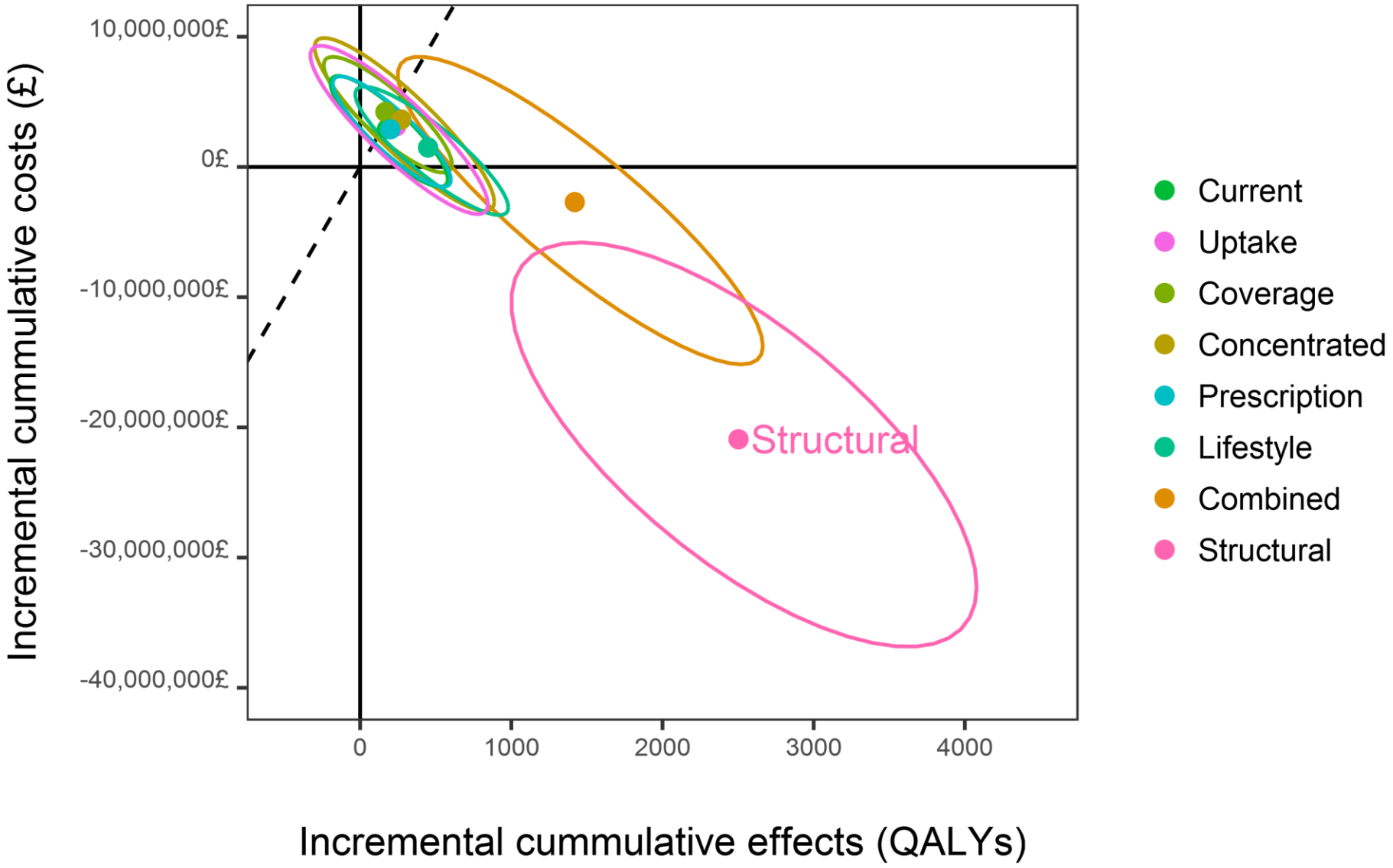
Absolute equity

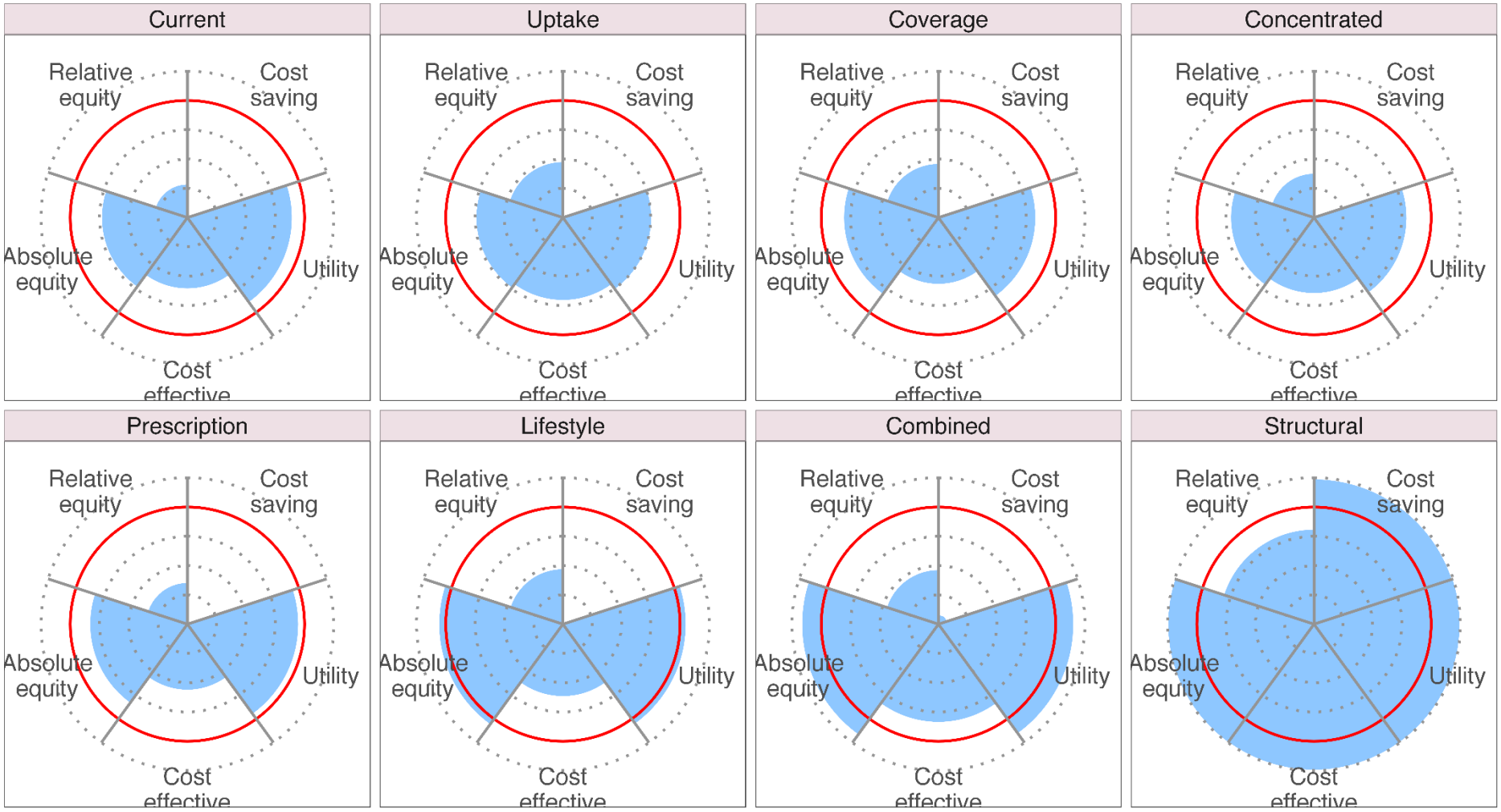


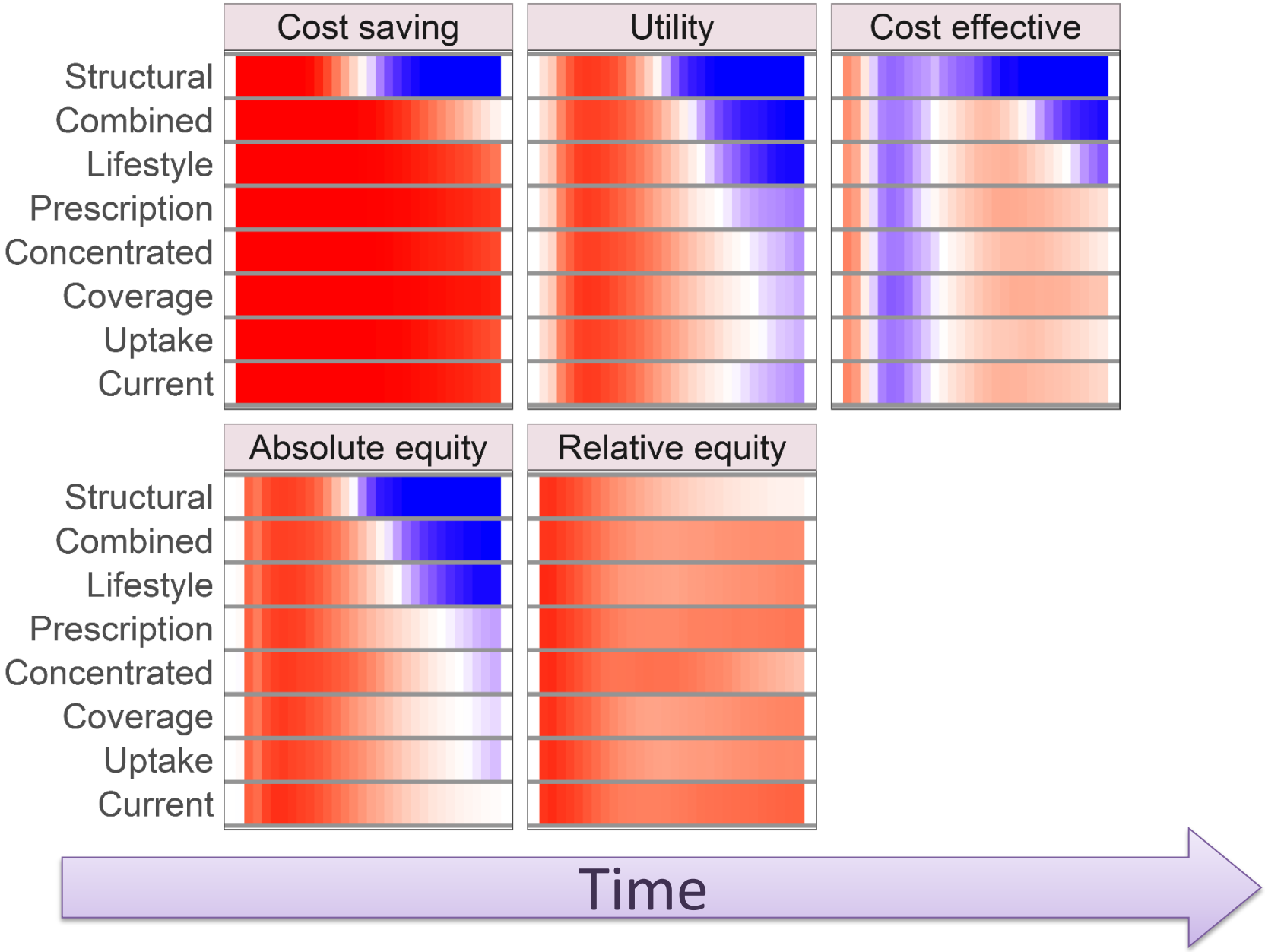
Relative equity



Year 2040


10,000,000£
0£
-10,000,000£
-20,000,000£
-30,000,000£
-40,000,000£
Incremental cummulative costs (£)
0
1000
2000
3000
4000
Incremental cummulative effects (QALYs)
Structural
Current
Uptake
Coverage
Concentrated
Prescription
Lifestyle
Combined
Structural


Current
Relative equity
Cost saving
Absolute equity
Utility
Cost effective
Uptake
Relative equity
Cost saving
Absolute equity
Utility
Cost effective
Coverage
Relative equity
Cost saving
Absolute equity
Utility
Cost effective
Concentrated
Relative equity
Cost saving
Absolute equity
Utility
Cost effective
Prescription
Relative equity
Cost saving
Absolute equity
Utility
Cost effective
Lifestyle
Relative equity
Cost saving
Absolute equity
Utility
Cost effective
Combined
Relative equity
Cost saving
Absolute equity
Utility
Cost effective
Structural
Relative equity
Cost saving
Absolute equity
Utility
Cost effective


Cost saving
Utility
Cost effective
Structural
Combined
Lifestyle
Prescription
Concentrated
Coverage
Uptake
Current
Absolute equity
Relative equity
Structural
Combined
Lifestyle
Prescription
Concentrated
Coverage
Uptake
Current
Time