# Distributive equity in the real world: would targeting NHS Healthchecks to deprived groups be more cost effective? A modelling study using real world data from a deprived northern city

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## Background

## The effectiveness of the English National Health Service Health Check (HC) programme remains uncertain. We therefore modelled the cost-effectiveness and distributive equity impact using real-world data from Liverpool, a deprived city in the UK with high incidence of cardiovascular disease.

## Methods

## We built a dynamic, stochastic microsimulation model in R, extending our previously validated IMPACTNCD model, populated with a synthetic population mirroring the Liverpool population demographics and cardiovascular disease risk factors. Outcomes included stroke and coronary heart disease prevalence, mortality, quality-adjusted life-years (QALYs), and health and social care costs. Annualised costs and QALYs were derived from a range of sources from year 2000–11 on the basis of a pragmatic review of previous models. We compared three scenarios against a no health checks baseline scenario: current HC implementation; HC with increased rates of attendances, prescribing, and lifestyle advice; and HC targeted to the most deprived quintile of the population. The changes happened from 2017, and we measured the time until each scenario became cost effective. We used deprivation-adjusted and unadjusted opportunity costs (reflecting how a greater share of displaced health benefits may fall to deprived groups), and different health production costs (£633, £13000, £20 000) from the research literature.

## Findings

## Each scenario modelled a population of 258000 people aged 30–84 years. Scenarios did not become cost effective until after 2030. The overall cumulative incremental cost-effectiveness ratio per QALY compared with no Health Checks over the 30 years from 2011 to 2040 was about £17600 for the current scenario, £13000 for the increased scenario, and £3000 for the targeted scenario. In a probabilistic sensitivity analysis, the 95% uncertainty intervals for each scenario crossed over from being dominant to dominated, indicating uncertain cost-effectiveness. Health inequalities would increase under the current scenario but would decrease under the targeted scenario. The equity gradient of the increased scenario changed from 0·19 to –0·05 when health production costs were adjusted for deprivation. All scenarios were sensitive to the choice of health production cost.

## Interpretation

## The current implementation of the NHS Health Check programme in Liverpool will probably increase health inequalities whereas a targeted approach may be more cost-effective and reduce inequalities.

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