CHE
Centre For Health Economics

Considering Health Inequality Impact in Decision Making: What Does it Mean for Policy Makers?

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- When making the decision about whether to fund a public health intervention, information on whether the intervention has different impacts on different population groups is important.

- However, economic evaluations that provide information on costs and health benefits in order to inform funding decisions do not tend to address whether impacts differ across population groups.

- A distributional cost-effectiveness analysis does explore differences across groups, and integrates impact on health inequality into economic evaluation.

- To do so, it brings in information on how people's behaviours, their health condition and the intervention effectiveness and uptake vary across population groups.

- We showcase the value of capturing differences between socioeconomic groups in the evaluation of how interventions impact on population overall health and health inequality.

- We also discuss how to adjust analyses to inform different decisions.

Introduction

When evaluating public health interventions, decision makers often consider how they affect population health overall, and whether they have different impacts in different population groups. Interest in how the impact of interventions vary across population groups stems from a desire to manage and reduce health inequalities. Health inequalities exist where people recognise unfair and avoidable differences in health outcomes between population groups. Local authorities in England have the responsibility of making funding decisions about public health interventions for their local population. Analysts should therefore consider how to reflect local socioeconomic patterns, and how informative analyses are to local decisions.

Combining evidence on costs and health effects in an evaluation framework that explores differences between socioeconomic groups and how these differences affect the evaluation could help decision makers. The information produced could help them identify interventions that reduce the extent of population wellbeing lost to avoidable health inequalities. Decision makers may also benefit from information about the potential value of pursuing efforts to eliminate particular socioeconomic differences in the impact of public health interventions, in order to make the interventions benefit people more fairly. An evaluative method called distributional cost effectiveness analysis (DCEA) can account for differences between specified socioeconomic groups, and in doing so describe how interventions impact on the distribution of health [1].

Methodology

We showcase the results of a DCEA approach using two models [2]. In the first model, we looked at the public funding of nicotine replacement therapy, *e-cigarette*, to help smokers quit smoking. In the second model, we looked at delivering a *screening and brief intervention (SBI)* to people when they register with a primary care practice, with the aim of reducing alcohol misuse. In both cases, the comparison is against no intervention, and therefore the public funds would instead be generally available for other activities. The information on socioeconomic differences in different factors (model inputs) which determine the intervention impacts on different groups were obtained from multiple sources.

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Economic models estimate the direct health benefits and change in healthcare costs of providing the intervention (compared to the 'no intervention' comparator in these examples). To calculate the results, costs are converted into health opportunity cost, which represents the potential health benefits from the resources if used for other healthcare activities. Results can be presented using the health equity impact plane (**Figure 1**) [3].

The vertical axis indicates the impact on overall health, that is, the net change in health benefits from the intervention (measured using quality-adjusted life years [QALYs]). To obtain the net health benefit, we subtract the health opportunity cost from the direct health benefits. If an intervention increases overall health (positive net health benefit), it will fall in the upper half of the plane. If an intervention reduces overall health (negative net health benefit), it will fall in the lower half of the plane.
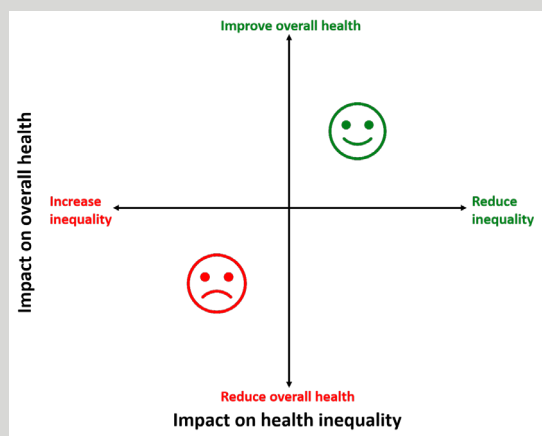

Figure 1. Health equity impact plane

The horizontal axis indicates the impact on health inequality, measured using the extent of the reduction in health inequality. A range of different measures are available to describe inequality between population groups, capturing variously absolute differences, relative differences, and in some cases reflecting how people value inequality [4]. If an intervention reduces the difference between population groups (positive change), it will fall on the right side of the plane. If an intervention increases the difference (negative change), it will fall on the left side of the plane.

We first estimate the intervention impacts on overall health and health inequality for all the adults in England as our '**base case**' estimates. We then look at how the estimated impacts would change if:

a) we ignore evidence on socioeconomic differences in some or all model inputs, i.e., treat the information as if it is not available and assume the same impact for all groups;

b) some socioeconomic differences are eliminated (in theory possible by modifying the intervention itself or the way in which it is delivered), i.e., we examine the value of levelling up the impact of interventions so that each group receives the most beneficial effect;

c) we use local evidence on socioeconomic differences for a specific local authority rather than national population level information. To do this, we select two local authorities for each model that have different population distributions by socioeconomic status (York and Sheffield for the smoking model; Liverpool and Trafford for the alcohol model).

In each scenario, we plot the results in the health equity impact plane and compare these with the 'base case' estimates. If the result moves upward, the change resulted in a higher estimated impact on overall health; if it moves to the right, the change resulted in a higher estimate of the reduction in health inequality (**Figure 1**).

Findings

The 'base case' estimates of both interventions for all adults in England are shown in **Table 1** and **Figure 2**. Compared to no intervention, providing e-cigarette to help quit smoking is estimated to increase overall health but also to increase inequality (**Table 1**) and is located in the top-left quadrant of the health equity impact plane (**Figure 2a**). Some of this increase in overall health arises because provision of smoking cessation is cost saving for the NHS, releasing resources that are used for other health improving services. The SBI strategy to reduce alcohol misuse is estimated to increase overall health and to reduce inequality (**Table 1**) and is located in the top-right quadrant of the plane (**Figure 2b**).

Table 1. Intervention impacts on population overall health and health inequality

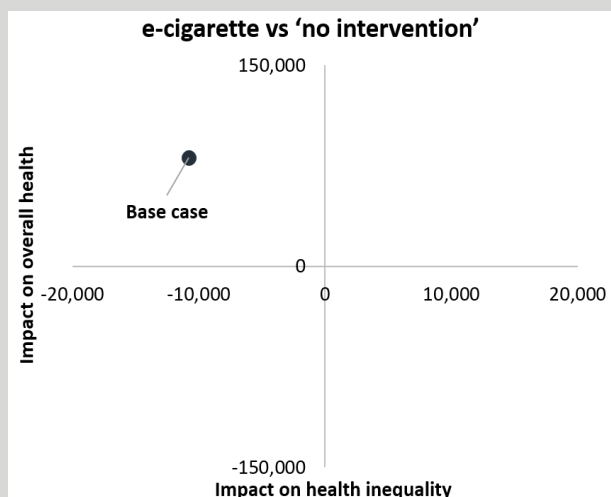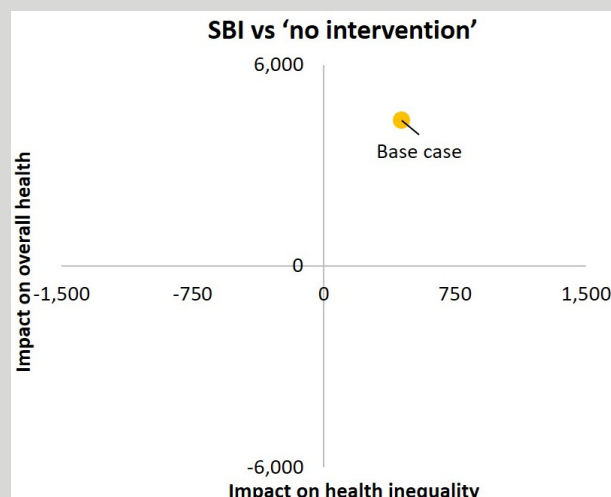|	e-cigarette	screening and brief (SBI)
Impact on overall health	80,782 QALYs	4336 QALYs
Impact on health inequality	-10,780 QALYs	444 QALYs

Figure 2a. Smoking model

Figure 2b. Alcohol model

Figure 2. Health equity impact plane showing the base case results

(a) Evidence on socioeconomic differences in some or all model inputs is not available

When evidence on socioeconomic differences is not available and each group is assigned the same 'average' impact, there is minimal change in the estimates of how interventions impact overall health compared to the base case (**Figure 3**). However, as might be expected, the estimated impact on health inequality changes to a much larger degree.

A lack of information and an assumption of common impacts may therefore lead to different conclusions about whether the intervention increases or reduces health inequality. For example, if evidence on socioeconomic differences in smoking intervention uptake is lacking, e-cigarette provision is estimated to reduce inequality, whereas in the base case it is estimated to increase inequality (**Figure 3a**).
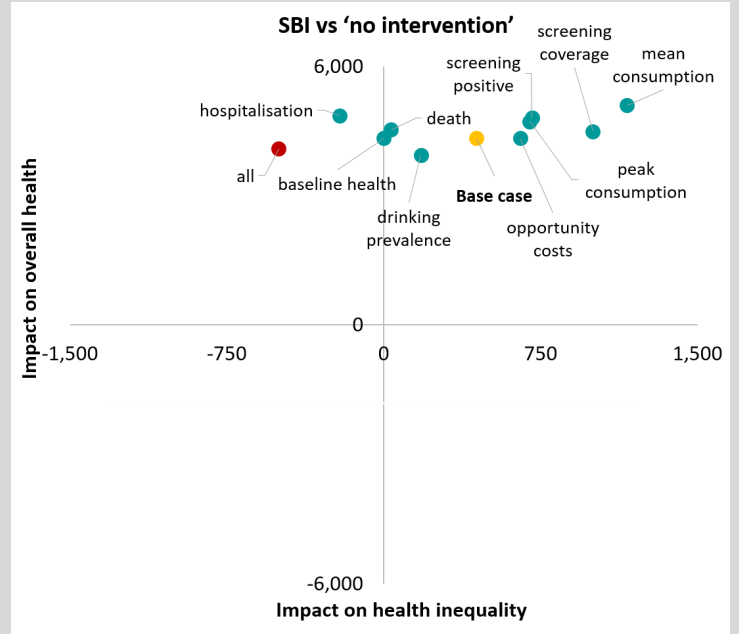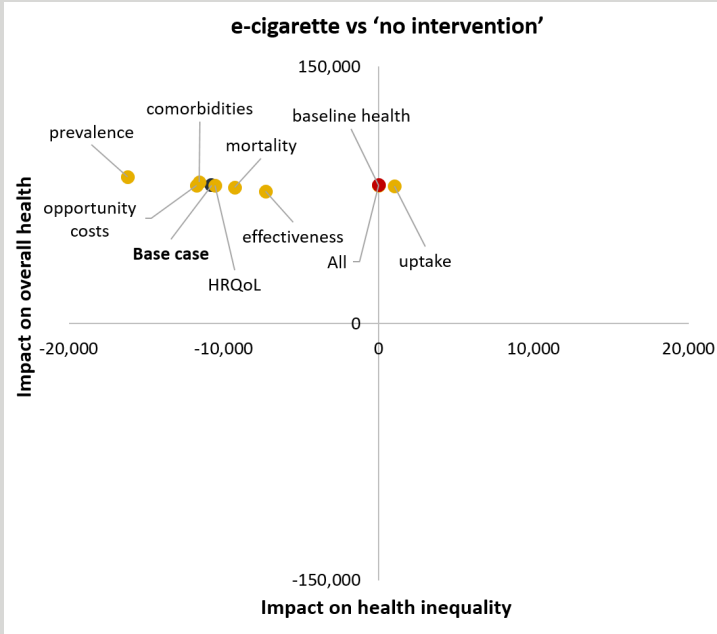

Figure 3a. Smoking model

Figure 3b. Alcohol model

Figure 3. Health equity impact plane showing results of scenario (a)

(b) Some socioeconomic differences are eliminated

In the smoking model, if we assume the e-cigarette can help all smokers quit smoking at the highest level currently achieved in any subgroup and that all smokers use the intervention with the same likelihood as those in the highest uptake group, the intervention is estimated to produce a larger improvement in overall health and a greater reduction in health inequality (**Figure 4a**).

By comparing the extent of health improvement and inequality reduction with each change, we find that

levelling up smoking cessation uptake appears to be more valuable than levelling up the intervention's effectiveness (as this results in both a larger overall health improvement and a reduction in inequality) (**Figure 4a**).

In the alcohol model, if we assume the coverage of the SBI strategy is increased to the age-sex specific maximum level and the population maximum level, the changes in the estimated results are similar (**Figure 4b**).
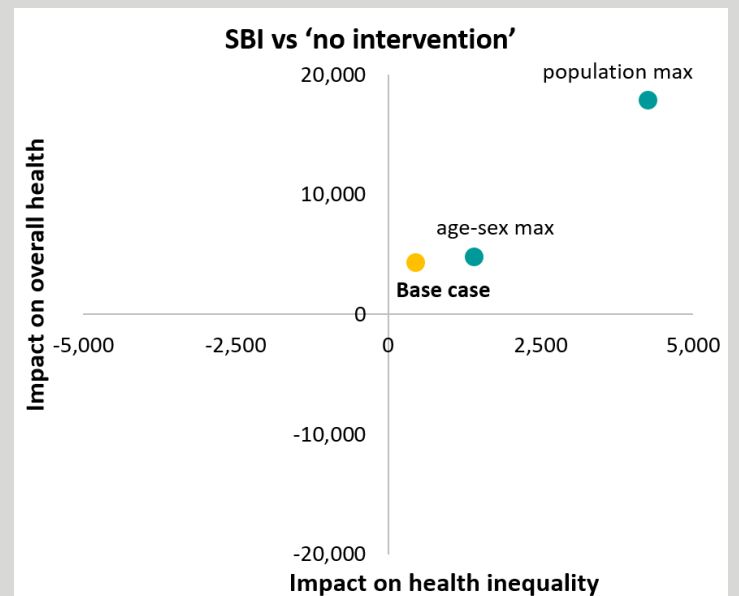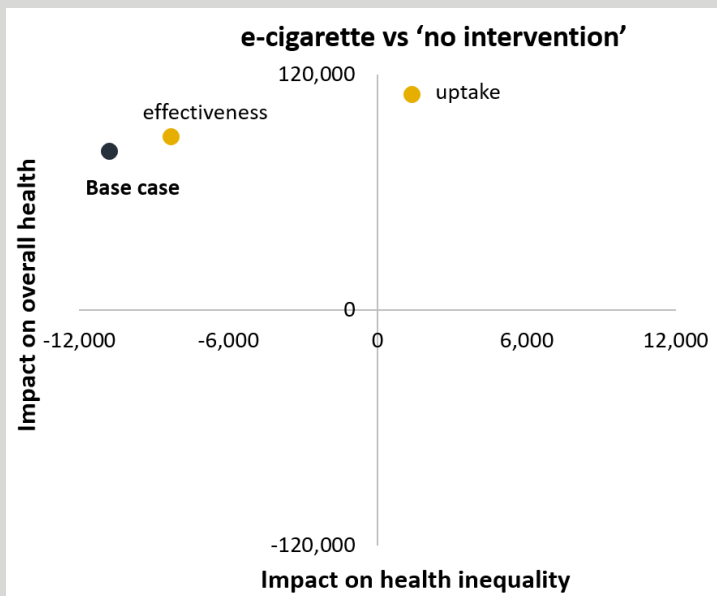

Figure 4a. Smoking model

Figure 4b. Alcohol model

Figure 4 Health equity impact plane showing results of scenario (b)

(c) Evidence on local authority level differences is used.

The population size differs between local authorities, so we estimated the impacts per 100,000 adults for England overall and the local authorities considered (**Figure 5**) to enable comparison across settings. Both interventions are estimated to improve overall health in all settings, and the SBI strategy is estimated to reduce health inequality in all settings, although the magnitude of the impacts differs (**Figure 5b**). However, the conclusion on whether providing e-cigarette increases or reduces health inequality is not consistent across settings; it is estimated to reduce inequality in York while increase inequality in England as a whole and Sheffield (**Figure 5a**). This inconsistency might be because York is a relatively less deprived city. Providing e-cigarette in York could free more funds for other activities, which favours the more deprived. Consequently, people in the more deprived groups tend to have higher net health benefits than those less deprived, resulting in less inequality.
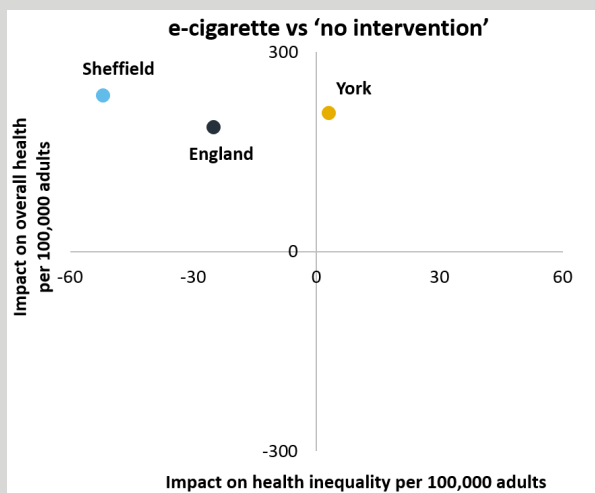
e-cigarette vs 'no intervention'
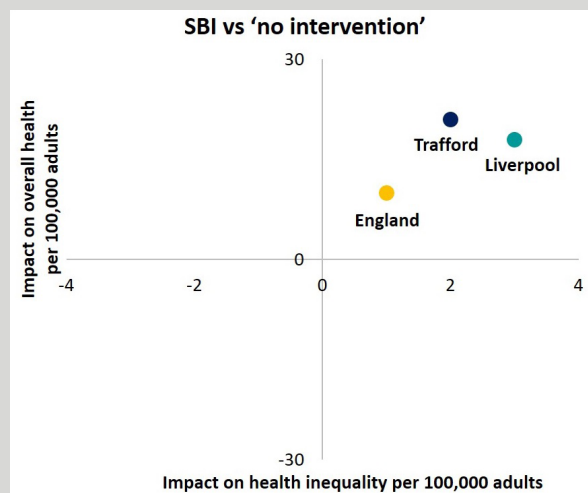
Figure: health equity impact plane. X-axis "Impact on health inequality per 100,000 adults" ranging -60 to 60; Y-axis "Impact on overall health per 100,000 adults" ranging -300 to 300. Points: Sheffield, York, England.

Figure 5a. Smoking model

SBI vs 'no intervention'

Figure: health equity impact plane. X-axis "Impact on health inequality per 100,000 adults" ranging -4 to 4; Y-axis "Impact on overall health per 100,000 adults" ranging -30 to 30. Points: Trafford, Liverpool, England.

Figure 5b. Alcohol model

Figure 5 Health equity impact plane showing results of scenario (c)

Policy Implications
How important is the evidence on socioeconomic differences?

In the evaluation of how public health interventions impact across population groups, we need evidence on how model inputs should differ across socioeconomic groups. Without this evidence, the wrong conclusion may be drawn about whether the intervention increases or reduces health inequality. The two case studies did not suggest any clear pattern in terms of the most influential socioeconomic differences in model inputs. This means that in the absence of evidence, the direction in which the results may be wrong is hard to predict.

How can better information to support decisions be provided?

For the same intervention, there may be differences in impacts at national level compared to local authorities, and between local authorities. As such the conclusion on whether it increases or reduces health inequality may also differ.

Local public health decision making could be better supported by conducting and reporting analyses that reflect setting-specific differences.

Is there anything that can be done to eliminate socioeconomic differences when implementing the interventions?

Eliminating the differences between socioeconomic groups so that all groups receive the most beneficial effect would result in positive impacts, i.e., more health improvement and less inequality.

Decision makers may consider actions to reduce or eliminate the socioeconomic differences during the delivery of the interventions, e.g., increase the uptake rate, to make them benefit people more fairly. However, the benefits of which need to be considered against the cost of doing so.

References
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