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Are we willing to trade off our own health to save the planet? An exploratory discrete choice experiment

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INTRODUCTION

Anthropogenic effects on climate change are one of the greatest public health threats. The healthcare industry itself contributes to environmental damage, accounting for 4.4% of total GHG emissions in the UK. As part of the UK government net zero targets, the NHS has set an ambitious target to reach net zero by 2045. At the same time, health technology assessment (HTA) organisations such as NICE have pledged to develop approaches to incorporate environmental sustainability amongst their portfolio of work, whilst maintaining a healthcare perspective. By taking public preferences into account, decision-making can be optimised to support greater societal benefit.

The objective of this study was to determine whether it is feasible to elicit opinions from United Kingdom (UK) public citizens around trade-offs between human health and environmental outcomes.

METHODS

A sample of UK adults (≥ 18 years old) was recruited by Qualtrics. The study sample was designed to be generalised to the entire UK adult population. The online survey was conducted in August 2023. Attributes and levels for the DCE were selected using insights from a targeted literature review and the opinions of the research team. The attribute selection process focused on capturing preferences for human health, the environment, and the location of environmental impacts. The four attributes chosen were: (i) UK life expectancy, (ii) endangered species, (iii) UK annual carbon emissions, and (iv) location of environmental impacts. Before the main DCE survey, the survey was initially piloted on a focus group sample (n = 35). In the focus group, the median completion time of the survey was 17 minutes. Overall, the focus group feedback indicated that the content, layout, and number of choice tasks presented were suitable. A feedback form was shared with the focus group prior to the survey collection.

Respondents were presented with either 12 or 13 different choice tasks, and for each choice task they had to choose which of the 2 possible alternatives they preferred (Scenario A or Scenario B) described in terms of four attributes and various numbers of levels.

This DCE was constructed using a good research practices checklist, to ensure the reliability and transparency of this study's findings. A fractional factorial design was used to select a subset of all possible combinations to reduce the number of choice tasks faced by participants, thus mitigating high response inefficiencies.

In each choice task, two alternatives were presented. Respondents were asked to select their preferred scenario from the two alternatives (see Figure 1 for an example). The domains included were:

- Change in life expectancy (in years)
- Carbon emissions (percentage increase or decrease)
- Endangered species (number of species lost to or saved from extinction)

ANALYSIS

Statistical analyses were conducted using Stata 18.0. The DCE preference data was analysed using a conditional logit regression within a random utility maximisation framework. Random errors were assumed to be independently and identically distributed with a Type I extreme distribution.

The carbon emissions, endangered species and location attributes entered the model as dummy-coded categorical variables, capturing the effects of discrete changes in the levels. The reference category for carbon emissions and endangered species was 'No Change', and for the location attribute it was 'Within the UK'.

The specification of life expectancy as a continuous variable was informed by a comparison of the regression results where life expectancy was modelled as a continuous variable with the regression results where life expectancy was modelled as a categorical variable. A Wald test failed to reject the appropriateness of a linear continuous specification for life expectancy, implying that the effect of a 1-unit change was assumed to be constant. To calculate the trade-offs between different attributes, the marginal rate of substitution (MRS) was used.

Figure 1: Example question

Question 1 of 12

If you would like to refer back to the provided definitions or scenario please click here.

Please choose which of the following two scenarios you prefer:

	Scenario A	Scenario B
Impact on UK Life Expectancy	1 Year Decrease (-1.2% Decrease)	1 Year Increase (+1.2% Increase)
Impact on Endangered Species	100 Species Lost to Extinction	No Change
Impact on UK Annual Carbon Emissions	5% Reduction in Carbon Emissions (Equivalent to annual emissions of 3.2 million people)	5% Increase in Carbon Emissions (Equivalent to annual emissions of 3.2 million people)
Location of Environmental Impacts	Outside the UK	Within the UK
I prefer:	○	○

RESULTS

508 respondents completed the survey. The average age was 39.97 years, 32.5% were male, and 71.7% were economically active. 62.3% of respondents described themselves as 'environmentally conscious', 4.3% did not, and 33.4% felt neither one way nor the other. The median time to complete the survey was 6 minutes and 56 seconds.

As expected, Lower carbon emissions and saving endangered species increased utility compared with no change. Similarly, higher carbon emissions and endangered species becoming extinct decreased utility compared with no change. Utility also fell when the environmental impact occurred outside the UK, as opposed to within the UK, while higher UK life expectancy improved utility.

RESULTS (cont.)

The saving of endangered species had the largest positive impact on utility, while the extinction of endangered species had the largest negative impact, although it should be noted that these are measured on different scales. Table 1 shows the estimated MRS for each level. To have the same effect as 100 species lost to extinction, life expectancy would have to decrease by 2.9 years, whereas to have the same effect as 100 saved species from extinction, life expectancy would have to increase by 1.6 years (versus no change). Similar patterns can be seen for carbon emissions whereby an increase in carbon emissions is equivalent to a decrease in life years and vice versa, compared with no change. A compensation 0.5 years of life expectancy is acceptable to experience the same environmental impact within the UK compared to 'outside the UK'.

Table 1: Marginal rates of substitution

Attribute	Level	MRS (years of life expectancy)	Standard Error
Life expectancy	Years	N/A	N/A
Endangered species	100 species lost to extinction	-2.8856**	(0.2502)
	100 species saved from extinction	1.5576**	(0.1776)
Carbon emissions	10% increase	-1.4628**	(0.2123)
	5% increase	-1.5860 **	(0.2178)
	5% decrease	0.7502**	(0.1961)
	10% decrease	0.4777*	(0.1894)
Location of impact	Outside the UK	-0.4831**	(0.1233)

* p < 0.05 ; ** p < 0.01

CONCLUSIONS

As climate change continues to worsen and evidence grows showing the negative environmental impact of healthcare, understanding public preferences in terms of the trade-off between human health and environmental outcomes is important. This study's results indicate that such trade-offs are tolerable to the public. It also suggests that environmental policies that solely focus on carbon emissions are likely to undervalue the public's preference for the environment and may be less successful longer term than the inclusion of more holistic environmental outcomes.

This study was designed as an exploratory pilot. Whilst the study has shown that preferences for trade-offs can be quantified, it is not suggested that the values presented in the paper be used to inform policies. Given the limitations of the study, further research is required to gain a robust estimate of the true preferences for such trade-offs.

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