
Deriving weights for the Index of Multiple Deprivation based on societal preferences:

The application of a discrete choice experiment

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Objectives of the study

Use a discrete choice experiment (conjoint analysis) to obtain domain weights for IMD

Compare these to existing IMD domain weights*

Compare to weights obtained using other methods*

What are discrete choice experiments?

Based on Lancaster's theory of value

Establish relative importance of attributes in demand for good or service

Originating in marketing research

Applied to transportation, environmental and health economics to elicit preferences for non-market goods

Applying a discrete choice experiments

Define attributes and assign them levels

Based on attributes and levels, define all possible combinations (profiles)

Select a subset of profiles

Create choice sets from the profile

Ask respondents to choose preferred profile from each choice set

Applying DCEs to the IMD

Attributes based on the domains of IMD 2004

Corresponding levels based on indicators used for the domains

All attributes had two levels 'deprived' and 'not deprived'

Profiles given a hypothetical person perspective (adult)

Attributes and Levels

Income

“an ideal measure of income deprivation might be the proportion of household below a particular low-income threshold”

IMD 2004

Headline measure is income below 60% of median income

Too abstract difficult to compute

Income attribute has two levels:

1. a household having less than £100 per person per week
2. a household having more than £100 per person per week.

Attributes and Levels

Employment

“involuntary exclusion of the working age population from the world of work”

IMD 2004

Employment attribute has two levels

1. unemployed (not in paid employment)
2. not unemployed (employed, retired, looking after home/family)

Attributes and Levels

Health and Disability

“high rates of people dying prematurely [or] whose quality of life is impaired by poor health or who are disabled”

IMD 2004

IMD 2004 uses comparative illness and disability ratio

Correlated with 2001 census limiting long-term illness question

Health attribute considers a person has:

1. limits on their daily work or activities due to long-term illness
2. **no** limits on their daily work or activities due to long-term illness.

Attributes and Levels

Education

IMD 2004 Education, skills and training domain has two sub-domains:

- ▶ lack of attainment among children
- ▶ lack of qualification in terms of skills

DCE has hypothetical individual adult's perspective (skills sub-domain)

Education attribute defines the working age adult as:

1. no educational qualifications
2. educational qualifications

Attributes and Levels

Barriers to housing and services

IMD 2004 Barriers to housing and services domain has two sub-domains:

- ▶ geographical barriers
- ▶ wider barriers

In the DCE, capture wider barriers by 'how handy local services, such as the shops, primary school, doctor's surgery are'

Convenience of core services attribute has two levels:

1. convenient (within a short walk, drive, or bus-ride)
2. inconvenient (not within a short walk, drive, or bus-ride)

Attributes and Levels

Living environment

IMD 2004 Living environment domain has two sub-domains:

- ▶ indoors living environment
- ▶ outdoors living environment

In the DCE, capture indoors living environment with poverty and social exclusion survey's definition of decent housing (warm, damp free, and reasonably modern facilities).

Housing quality attribute has two levels:

1. decent
2. non-decent

Attributes and Levels

Crime

IMD 2004 focuses on recorded crime for

“four major crime themes - burglary, theft, criminal damage and violence”

In the DCE, focus on experience of crime.

Crime attribute has two levels:

1. victim of burglary or theft in the last four years
2. not been a victim of burglary or theft in the past four years

Profiles and choices

128 possible combinations of attributes and levels (2^7)

To create choice sets each profile paired with 'mirror image'

Ensured orthogonality, minimum overlap and level balance

The 128 choice sets were randomly split into eight groups of 16

Respondents asked for each choice which hypothetical person needs the most additional support from the government.

Example choice

	Person A	Person B
Crime	Not a victim of crime in the last 4 years	A victim of crime in the last 4 years
Employment	Not employed	Employed, retired, or looking after home or family
Income	At least £100 per adult	Less than £100 per adult
Health	No limits on daily activity and work	Limits on daily activity and work
Housing quality	Decent	Non decent
Education	No educational qualifications	Educational qualifications
Convenience of Services	Inconvenient	Convenient

Who most needs additional government support?

Data Overview

Random sample of 1000 households in England in August 2006

One week later -postcard sent to whole sample

Three weeks later -second questionnaire was sent to non-respondents

Collected the socioeconomic characteristics of respondents

Analysis

Probit Model

Observe if a respondent chooses person A or B

$$\begin{aligned} Pr(\text{choice} = A) = & \Phi\{\beta_0 + \beta_1(\text{Income}_A - \text{Income}_B) \\ & + \beta_2(\text{Employment}_A - \text{Employment}_B) \\ & + \beta_3(\text{Health}_A - \text{Health}_B) \\ & + \beta_4(\text{Education}_A - \text{Education}_B) \\ & + \beta_5(\text{CoreServices}_A - \text{CoreServices}_B) \\ & + \beta_6(\text{HouseQuality}_A - \text{HouseQuality}_B) \\ & + \beta_7(\text{Crime}_A - \text{Crime}_B)\} \end{aligned}$$

Analysis

Marginal effects: the impact of a change in an attribute on the probability that a state will be chosen

$$M_{x_i} = \frac{\partial P}{\partial x_i}$$

Calculate relative importance (weights) of the individual dimensions by rescaling marginal effects to 0-100:

$$Weight_{x_i} = \frac{M_{x_i}}{\sum_{i=1}^7 M_{x_i}} \times 100$$

Results

251 respondents returned the DCE questionnaire

Respondents are not representative of the population in England on two characteristics

- ▶ respondents under the age of 60 years -under represented.
- ▶ respondents with no or O'level qualifications -under represented.

To correct - responses are weighted for both age and education

Results

Criteria	Marginal effect	Normalised Weight
Income	-0.186**	24.22
Employment	-0.013	1.73
Health	-0.159**	20.76
Education	-0.092**	12.01
Core services	-0.069**	8.98
Housing Quality	-0.183**	23.79
Crime	-0.065**	8.49

Summary

Use domains of IMD 2004 to define attributes in DCE

Most attributes were significant (except Employment)

Housing quality has much higher weight than Living Environment in IMD 2004