

A New Approach to Measure Effective Coverage For Assessing Health Systems Performance.

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Background

Effective coverage (EC) is a measure of health service performance. The use of EC, however, is limited by the frequent lack of information about one of its constitutive parameters: the quality of health services, understood as the fraction between observed and an optimum health gain from health interventions. We proposed a novel method that overcomes this issue.

Methods

The procedure calculated the fraction of avoidable disability (or health-state utilities) in people receiving treatment, over the disability attributable to a disease. This was done using a regression model that predicts disability at individual level, where exposure to the disease without treatment (G1), and with treatment (G2) were key variables. We compared total predicted disability in three scenarios: actual, worst ('0' coverage), and plausible (assuming quantile 90 of predicted health gain distribution was the optimum performance in G2). We demonstrated this procedure using data from 4359 individuals aged 50+ at Wave 2 (2004-2005) of the English Longitudinal Study of Ageing (ELSA). Hypertension was used as an example disease. People reporting treatment were considered covered. Disability was measured as an index score, ranging from 0-100.

Equations to calculate effective coverage and intermediary outcomes

$$\text{Health benefit} = \frac{\sum_{k=1}^m \frac{HG_{G2k}}{DA_{G2k}} W_k}{\sum_{k=1}^m W_k}; \quad \text{Quality} = \frac{\sum_{k=1}^m \frac{HG_{G2k}}{HG_{\max G2k}} W_k}{\sum_{k=1}^m W_k}$$

$$\text{Relative-EC} = \frac{\sum_{k=1}^m (HG_{G2k} W_k)}{\sum_{i=1}^n (DA_{G1i} W_i) + \sum_{k=1}^m (DA'_{G2k} W_k)}; \quad HG_{G2} = D_{G2}'' - D_{G2}$$

$$\text{Absolute-EC} = \frac{\sum_{k=1}^m (HG_{G2k} W_k)}{\sum_{h=1}^p (D_{G0h} W_h) + \sum_{i=1}^n (D_{G1i} W_i) + \sum_{k=1}^m (D'_{G2k} W_k)}$$

$$\text{Relative-EC given the optimum health gain} = \frac{\sum_{k=1}^m (HG_{G2k} W_k)}{\sum_{i=1}^n HG_{\max G1i} W_i + \sum_{k=1}^m HG_{\max G2k} W_k}$$

EC: effective coverage / **HT:** Hypertension / **G0:** people without HT / **G1:** people with HT without treatment / **G2:** people with HT with treatment / **HG:** health gain / **HGmax:** health gain maximum (quantile 90) / **W:** sample weight / **DA:** disability attributable to the disease / **DA':** Disability attributable in a counterfactual scenario / **D:** disability / **D':** disability in a counterfactual scenario [without disease] / **D'':** disability in a counterfactual scenario [without treatment].

p: total individuals **h** in G0/ **n:** total individuals **i** in G1/ **m:** total individuals **k** in G2

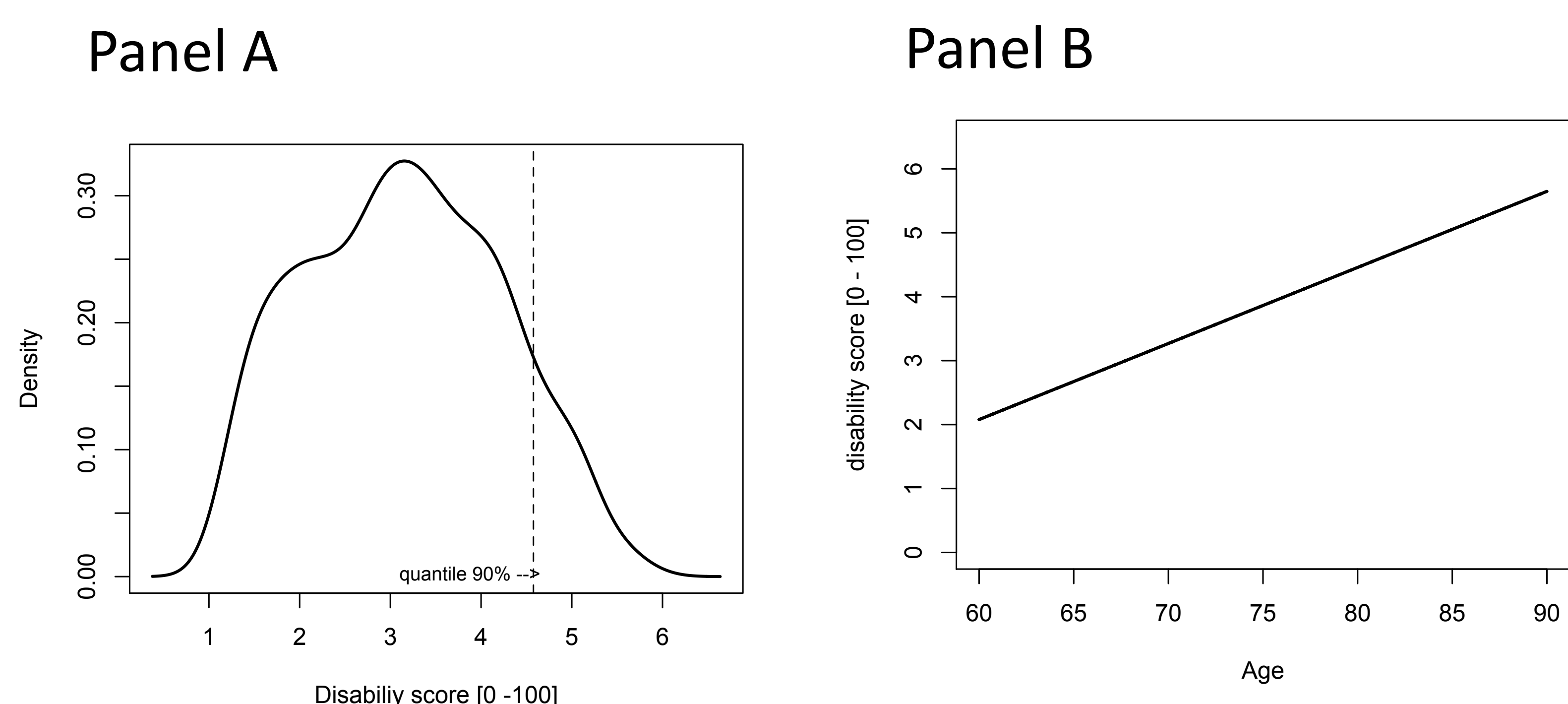
Results

The prevalence of hypertension was 25.3% [23.9-26.5] and accounted for 1.9% [1.9-1.9] of total disability in the population. The coverage of treatment was 80.5% [78.2-82.9]. In people with hypertension, given current coverage, 48.8% [47.5-50.1] of the predicted disability in the worst scenario would have been avoided (i.e. relative-EC), and 2.0% [2.0-2.1] in the whole population (i.e. absolute-EC). The average health gain in people with treatment was 54.0% [52.9-55.0] (i.e. health benefit), while the avoidable disability against the optimum health gain was 68.6% [67.1-70.2] (i.e. quality). Effective coverage given the optimum health gain was 54.9% [53.6-56.1].

Table. Prevalence of Hypertension, Coverage of treatment, and outcomes of effective coverage estimation. ELSA 2004-2005; n=4,359.

	%	Uncertainty Intervals
Prevalence of hypertension	25.2	[23.9 – 26.5]
Coverage of treatment	80.5	[78.2 – 82.9]
Burden of disability	1.9	[1.9 – 1.9]
Health benefit of the treatment	54.0	[52.9 – 55.0]
Quality of the treatment	68.6	[67.1 – 70.2]
Relative-EC	48.8	[47.5 – 50.1]
Relative-EC given the optimum health gain	54.9	[53.6 – 56.1]
Absolute-EC	2.0	[2.0 – 2.1]

Figure. Distribution of Health Gain associated to the treatment in people with hypertension receiving treatment (panel A); and according to age (panel B). ELSA 2004-2005; n=4,359.



Conclusions

We developed a pragmatic way to estimate EC, which overcame the issue of the lack of information about health service quality.