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## BACKGROUND

The prevalence of co-morbidities increases with age but preference-based utilities are generally obtained from cohorts who have a single condition. This can cause problems when populating health states in economic models which represent more than one condition. Analysts use the mean utility from the cohorts with the single conditions to estimate the mean utility for a cohort with co-morbidities. There is currently no consensus on which is the most appropriate method to combine these data and the different techniques can produce very different results.

## OBJECTIVE

We review the literature to gain an understanding for the differences in the conclusions drawn and to identify where additional research is required.

## METHODS

A systematic literature search was conducted to identify studies that evaluated methods used to estimate mean utilities for co-morbidities using mean values from cohorts with the corresponding single conditions. We extracted the preference-based utility measure used, the number and range of utility values, the baseline used to value the utility decrements, the statistics used to compare estimates, and the conclusions drawn by the authors.

## RESULTS

Author	Instrument	n	Range actual	Add	Min	Mult	ADE	OLS	Authors' conclusion
<b>BASELINE = PERFECT HEALTH</b>									
Hu	EQ-5D (US)	760	0.62 to 0.90	X	X	X	X	X	ADE generates unbiased estimates
Fu	EQ-5D (US)	760	0.61 to 0.742	X	X	X			None give unbiased estimates, minimum outperforms others
Ara (a)	EQ-5D (UK)	91	0.36 to 0.92	X	X	X	X	X	OLS gave the best results but some substantial errors
<b>BASELINE = ADJUSTED</b>									
Flanagan	HUI3	>278	-0.01 to 1.00	X					Favours multiplicative
Janssen	EQ-5D (US)	211	0.594 to 0.798	X	X				Multiplicative shows better fit
Fu	EQ-5D (US)	760	0.61 to 0.742	X	X	X			None give unbiased estimates, minimum outperforms others
Ara (a)	EQ-5D (UK)	91	0.36 to 0.92	X	X	X	X	X	OLS gave best results, adjusted baseline improves accuracy
Ara (b)	SF-6D	32	0.465 to 0.607	X	X	X	X	X	OLS gave the best results but some substantial errors

Additive (Add); Minimum (Min), Multiplicative (Mult), Adjusted decrement estimator (ADE), ordinary least square regression (OLS)  
X= methods compared

- Four of the six studies used EQ-5D data, one used SF-6D & one used HUI3
- One presented the multiplicative method, one compared the additive & multiplicative, four compared the additive, multiplicative, minimum with results predicted from linear models obtained using OLS regressions
- The number of mean values estimated ranged from 32 to 760
- The range of actual mean values ranged from 0.465 to 0.607 (SF-6D), to (-0.01 to 1 for HUI3)
- Systematic errors were observed in the values estimated using all methods
- Using an adjusted baseline to calculate decrements, improved the accuracy of the estimations
- The conclusions drawn were influenced by the baseline used and the range of actual utilities estimated
- While the simple linear models produced the most accurate results these require validation
- Of the other three, on average the multiplicative method estimated the most accurate values across the full range of actual utilities assessed

## CONCLUSIONS

Based on the limited evidence available, we would recommend the multiplicative method is used to estimate utilities for comorbidities. While the results from the OLS regressions are promising, these findings require validation in external datasets.

## REFERENCES

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