

Department of Decision Sciences

Modelling health scores with the skew-normal distribution

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Abstract

Health care interventions which use quality of life or health scores often provide data which are skewed and bounded. The scores are typically formed by adding up responses to a number of questions. Different questions might have different weights, but the scores will be bounded, and are often scaled to the range 0 to 100.

If improvement in health over time is measured, scores will tend to cluster near the 'healthy' or 'good' boundary as time progresses, leading to a skew distribution. Further, some patients will drop out as time progresses, so the scores reflect a selected population.

We fit models based on the skew-normal distribution to data from a randomised controlled trial of treatments for sprained ankles, in which scores were recorded at baseline and 1, 3 and 9 months. We consider the extent to which skewness in the data can be explained by the clustering at the boundary via a comparison between a censored normal and a censored skew-normal model.

As this analysis is based on the complete data only, a formula for the distortion of the treatment effects due to informative drop-out is given. This allows us to assess under which conditions the conclusions drawn on the complete data may be either reinforced or reversed, when the informative drop-out process is taken into account.