**TITLE???**

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**Abstract**

**Background** The Bayesian metaregression tool DisMod-MR produces age-specific prevalence estimates for the nonfatal outcomes of a variety of diseases, injuries, and risk factors for the Global Burden of Disease, Injuries, and Risk Factors Study 2010 (GBD 2010 Study). Results of systematic reviews for the GBD 2010 Study are often very sparse and noisy, meaing that DisMod-MR must use age fixed effects, fixed effects to capture variation across countries and studies using covariates, and random effects for superregions, regions, and countries to make predictions of prevalence for all regions of the world. With such sparse and noisy data, the robustness of the metaregression framework is tested with the negative binomial, binomial, normal, lognormal, and offset lognormal rate models.

**Methods** Using disease and injury models from the GBD 2010 Study with more than 4 prevalence data points in the GDB 2010 Study geographic region of Western Europe, holdout cross validation predictive validity measured the bias, root mean squared error (RMSE), median absolute error (MAE), coverage probability, and computation time. These performance statistics were calculated with for the negative binomial, binomial, normal, lognormal, and offset lognormal rate models.

**Findings** With quality of available data, DisMod-MR is not sensitive to rate model choice. However, with different rate models, different computation times may be achieved. Computation time is also dependent on the number of data points and geographic areas used for the random effects.

**Interpretation** The results highlight many research areas where more data collection is needed. Careful selection of rate model choice can lead to faster computation times.

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