SQUEAC Coverage Estimate Calculator

New functions in BayesSQUEAC version 3.01

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Introduction

A new version of the SQUEAC Coverage Estimate Calculator (BayesSQUEAC) has been released. This article describes this version (v3.01) which adds a sample size calculator and a formal test for prior-likelihood conflicts.

Sample size calculation

A new slider control has been added that allows you to specify the desired precision (i.e. width of the 95% credible interval) for the posterior coverage estimate. A sample size for the likelihood survey is suggested. This is based on the specified precision and an equal strength prior and likelihood. It is calculated using the methods detailed in the SQUEAC / SLEAC Technical Reference. A finite population correction is also applied based on the (conservative) assumption of an overall population of 120,000 with 20% aged between 6 and 59 months and a SAM prevalence of 2%. *Figure 1* shows the sample size suggested for a likelihood survey with a *Beta*(29, 13) prior and a desired precision of ± 10 percentage points on the posterior coverage estimate. Two sample sizes are calculated: One for the specified precision corrected for a finite SAM population and the other for an equal strength prior and likelihood. The largest of these is the suggested sample size.

If you are trying to estimate the coverage of broader programs such as a supplementary feeding program (SFP) for children with MAM then the finite population correction will not apply and the suggested sample size should be increased by about twenty percent.

Test for a prior-likelihood conflict

The new calculator adds a formal test for a prior-likelihood conflict. This tests whether the difference between a specified prior and the observed likelihood could reasonably be ascribed to chance. The calculator displays the *z-statistic* and a significance level (*p-value*). The p-value is interpreted in the usual manner:

$p < 0.05$	Some evidence for a prior-likelihood conflict
$p < 0.025$	Moderately strong evidence for a prior-likelihood conflict
$p < 0.01$	Strong evidence for a prior-likelihood conflict
$p < 0.001$	Very strong evidence for a prior-likelihood conflict

At $p < 0.05$ you should consider rejecting the conjugate analysis. At $p < 0.025$ you should reject the conjugate analysis. If you reject the conjugate analysis then you can estimate coverage using the data from the likelihood survey alone. This estimate will have reduced precision compared to an estimate from a conjugate analysis with a well-specified prior.

Figure 2 shows a conjugate analysis with no prior-likelihood conflict ($p = 0.7458$). *Figure 3* shows a conjugate analysis with moderately strong evidence of a prior likelihood conflict ($p < 0.025$). The conjugate analysis shown in *Figure 3* would be rejected.

Availability

The new version of the SQUEAC Coverage Estimate Calculator (BayesSQUEAC) is available for Windows, Macintosh OS-X, Linux and UNIX systems. It is free to download from:

`http://www.brixtonhealth.com/bayessqueac.html`

Figure 1 : Suggested sample size for a likelihood survey with a *Beta*(29, 13) prior and a desired precision of ± 10 percentage points on the posterior coverage estimate

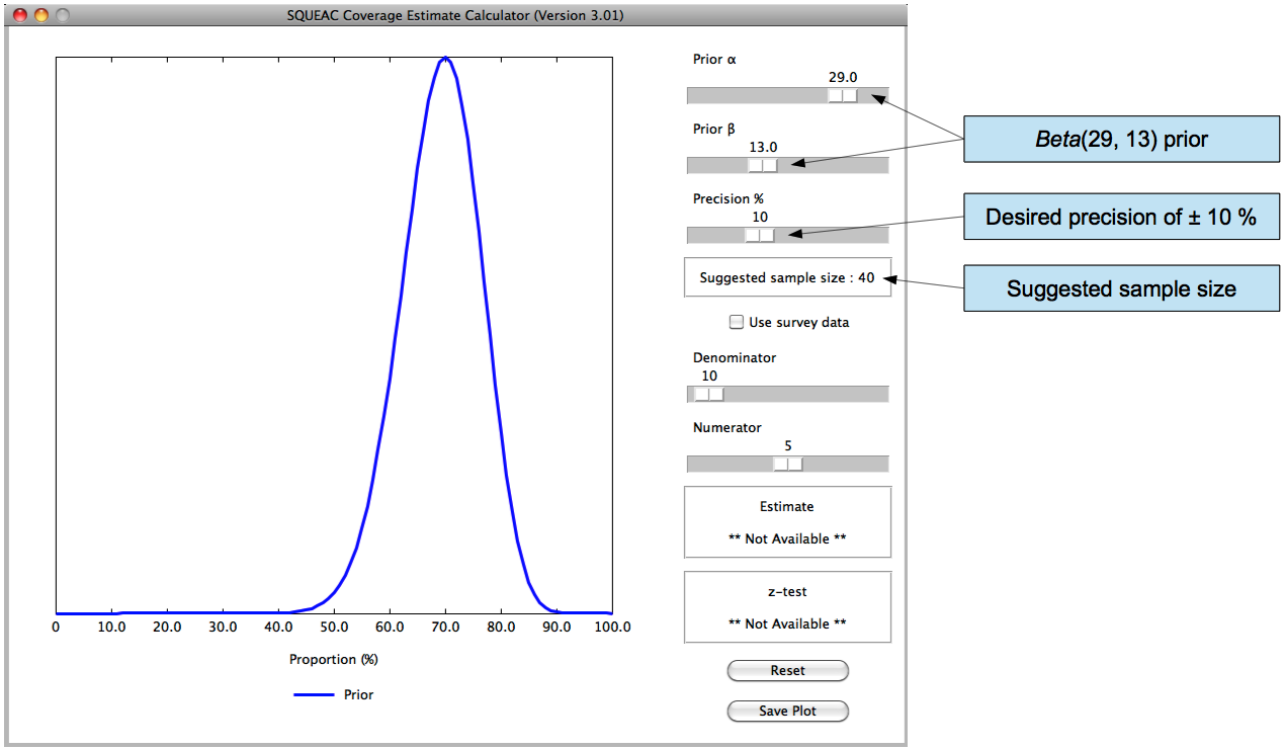

Figure 2 : A beta-binomial conjugate analysis with no prior-likelihood conflict

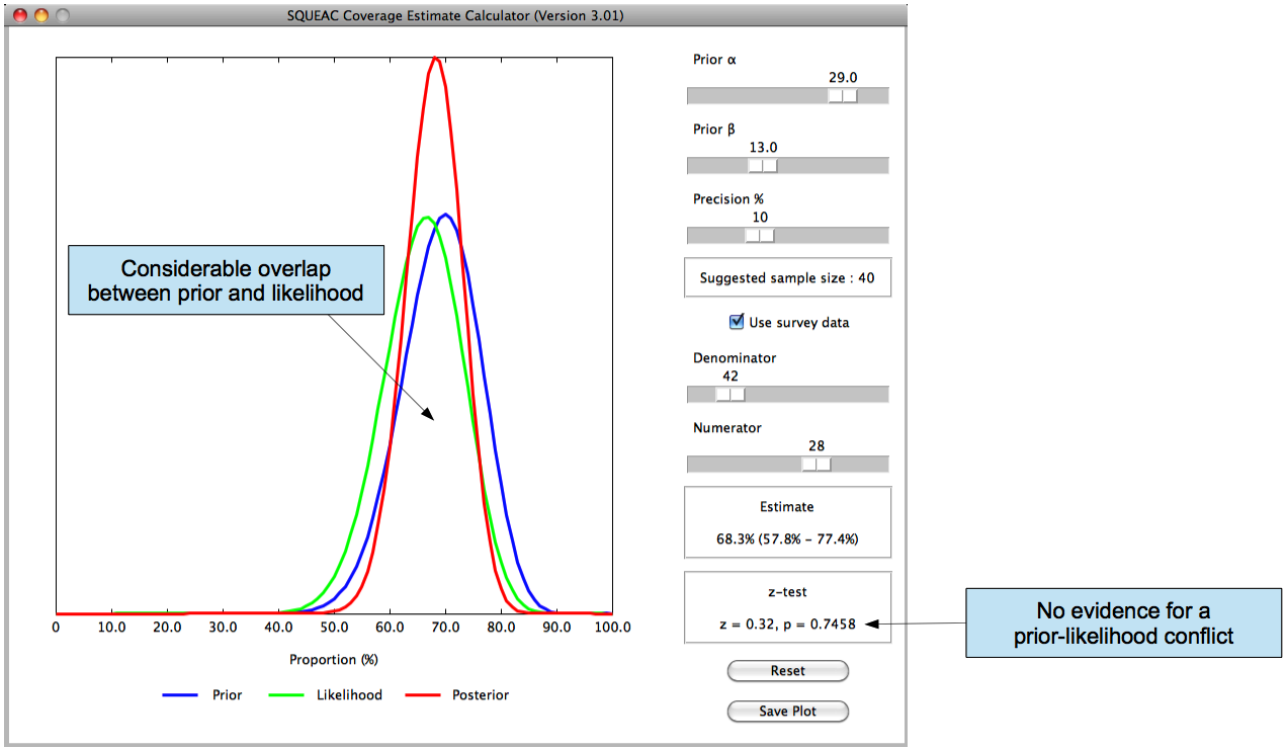

Figure 3 : A beta-binomial conjugate analysis with moderately strong evidence of a prior likelihood conflict