Bayesian Evidence Synthesis for Influenza Burden Estimation from Hospitalization Surveillance data

Ivo M Foppa

May 10, 2019

Notation (observed data/assumtions in bold)

1. N**: Total FluSurv-NET (FSN) population (given stratum, e.g. age group etc.)**
2. n_H: Number of total (observed and unobserved) influenza hospitalizations with non-lethal outcome
3. n_H^***: Number of observed influenza hospitalizations with non-lethal outcome**
4. λ_H: Rate of non-lethal flu hospitalizations per population
5. n_D: Total (observed and unobserved) influenza deaths
6. n_D^***: Observed influenza deaths**
7. λ_D: Rate of lethal flu hospitalizations per population
8. p_k: Probability influenza-associated outcomes ($k = 0$: non-lethal, $k = 1$: lethal) that are correctly attributed to influenza
9. $T_{k,j}$**: Numbers tested by outcome and test type (1: PCR, 2: Rapid, 3: Other, 4: No test)**
10. ρ_k**: Prior dist. for test sensitivities (PCR, rapid; mean, SD) by outcome**
11. π: Proportion of deaths outside hospital
12. D**: Total NCHS deaths (per syndromic cause and stratum)**
13. D_H**: NCHS deaths inside hospital (per syndromic cause and stratum)**

Model

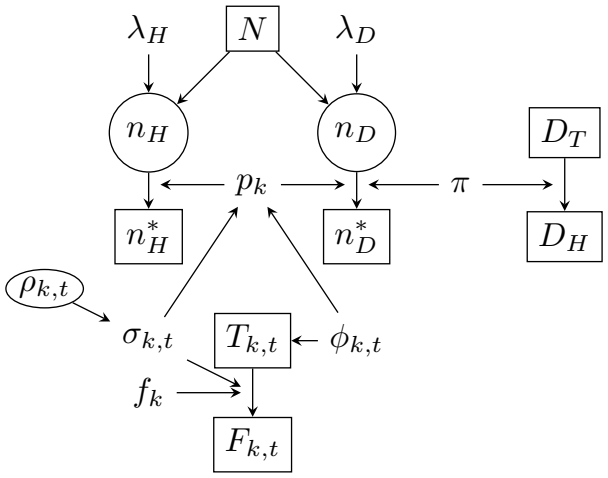

Figure 1: Model structure. Rectangles represent observed data, circles are latent variables (unobserved data)and the ellipse represents an informative prior. Vague priors were omitted.