Supplemental Material for Infanticide

## Model detail and diagnostic for moratlity ~ age at death

Here we used a multinomial model of mortality source as a function of age at death to understand the contribution of different mortality sources to overall mortality. This model was initialized with weak, uninformative priors, and three chains were run for 15000 iterations each (7500 warmup).

#### Model summary

# Priors  
prior\_summary(fit)

## prior class coef group resp dpar nlpar bound  
## 1 normal(0,3) b muhuman   
## 2 b age\_at\_death muhuman   
## 3 normal(0,3) b mulion   
## 4 b age\_at\_death mulion   
## 5 normal(0,3) b muother   
## 6 b age\_at\_death muother   
## 7 normal(0,3) b musiblicide   
## 8 b age\_at\_death musiblicide   
## 9 normal(0,3) b mustarvation   
## 10 b age\_at\_death mustarvation   
## 11 normal(0,3) Intercept muhuman   
## 12 normal(0,3) Intercept mulion   
## 13 normal(0,3) Intercept muother   
## 14 normal(0,3) Intercept musiblicide   
## 15 normal(0,3) Intercept mustarvation

summary(fit)

## Family: multinomial   
## Links: mustarvation = logit; mulion = logit; musiblicide = logit; muhuman = logit; muother = logit   
## Formula: y | trials(1) ~ 1 + age\_at\_death   
## Data: known.mortality.mom.alive (Number of observations: 66)   
## Samples: 3 chains, each with iter = 30000; warmup = 15000; thin = 1;  
## total post-warmup samples = 45000  
##   
## Population-Level Effects:   
## Estimate Est.Error l-95% CI u-95% CI Rhat Bulk\_ESS  
## mustarvation\_Intercept -2.85 0.89 -4.73 -1.26 1.00 38262  
## mulion\_Intercept -3.99 1.03 -6.19 -2.15 1.00 34432  
## musiblicide\_Intercept -0.12 0.72 -1.54 1.29 1.00 34963  
## muhuman\_Intercept -5.15 1.39 -8.16 -2.74 1.00 32591  
## muother\_Intercept -1.02 0.68 -2.38 0.27 1.00 37563  
## mustarvation\_age\_at\_death 0.61 0.22 0.21 1.08 1.00 20878  
## mulion\_age\_at\_death 0.93 0.23 0.52 1.42 1.00 20616  
## musiblicide\_age\_at\_death -0.51 0.38 -1.32 0.17 1.00 25259  
## muhuman\_age\_at\_death 0.95 0.26 0.48 1.51 1.00 21524  
## muother\_age\_at\_death 0.10 0.25 -0.41 0.57 1.00 21669  
## Tail\_ESS  
## mustarvation\_Intercept 29034  
## mulion\_Intercept 27991  
## musiblicide\_Intercept 33294  
## muhuman\_Intercept 27662  
## muother\_Intercept 34389  
## mustarvation\_age\_at\_death 22266  
## mulion\_age\_at\_death 22013  
## musiblicide\_age\_at\_death 23893  
## muhuman\_age\_at\_death 24061  
## muother\_age\_at\_death 27479  
##   
## Samples were drawn using sampling(NUTS). For each parameter, Bulk\_ESS  
## and Tail\_ESS are effective sample size measures, and Rhat is the potential  
## scale reduction factor on split chains (at convergence, Rhat = 1).

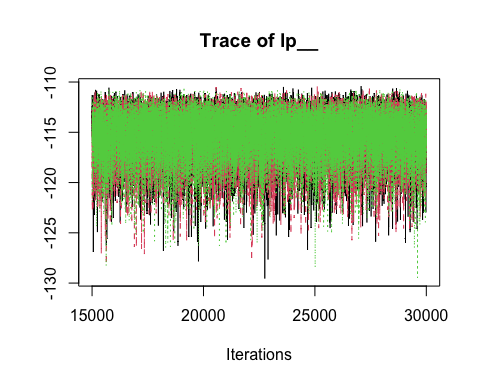
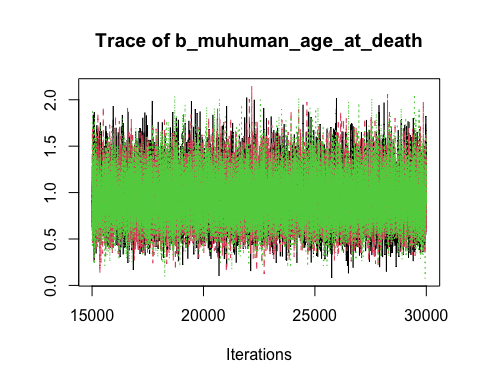
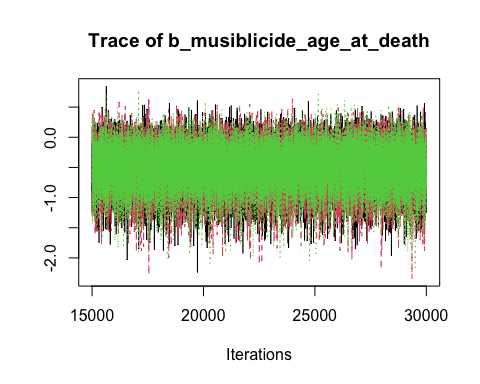
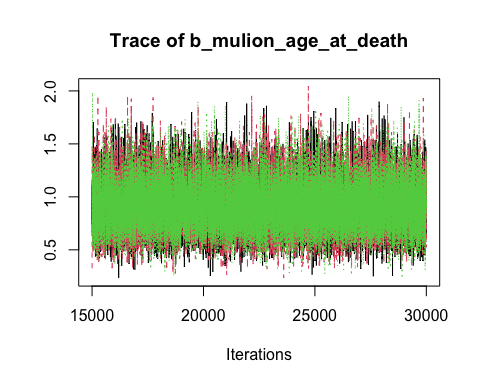
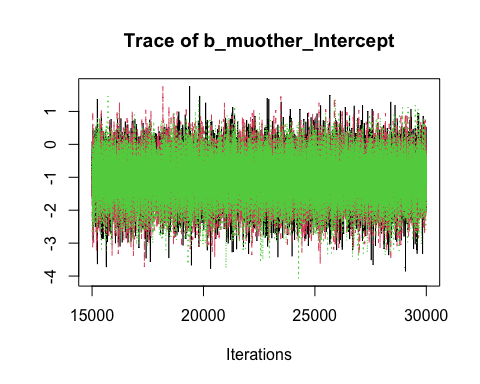
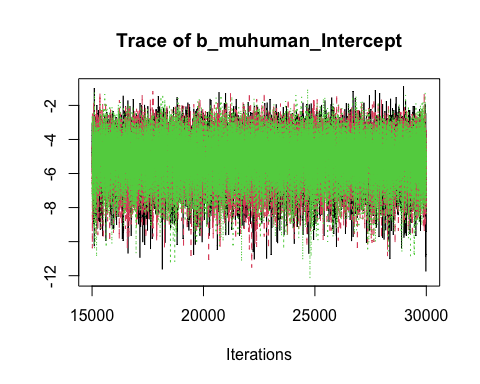
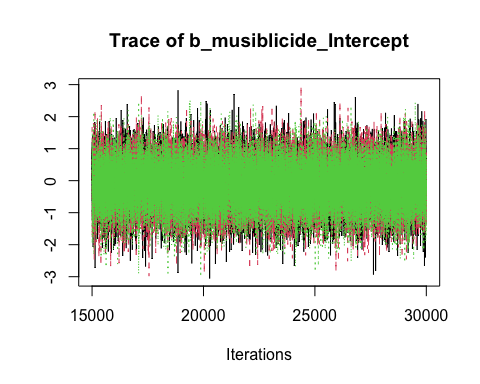
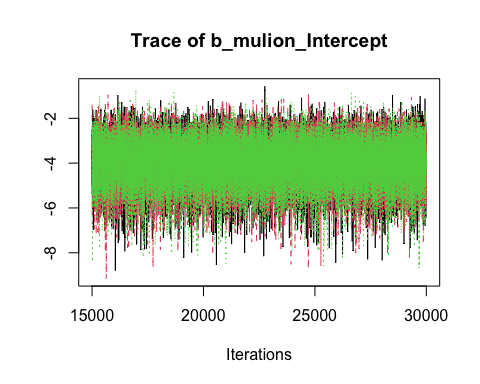
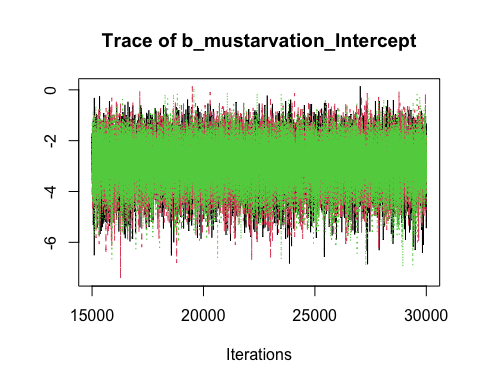
## Model diagnostics

Traceplots indicate convergence, and all R-hat values are equal to 1. Geweke’s diagnostic indicates that the chains achieved stability. Autocorrelation was minimal.

## Model checking  
## For use with coda package  
coda.model <- brms::as.mcmc(fit)  
  
## Check for adequate convergence  
gelman.diag(coda.model) ## Equals 1

## Potential scale reduction factors:  
##   
## Point est. Upper C.I.  
## b\_mustarvation\_Intercept 1 1  
## b\_mulion\_Intercept 1 1  
## b\_musiblicide\_Intercept 1 1  
## b\_muhuman\_Intercept 1 1  
## b\_muother\_Intercept 1 1  
## b\_mustarvation\_age\_at\_death 1 1  
## b\_mulion\_age\_at\_death 1 1  
## b\_musiblicide\_age\_at\_death 1 1  
## b\_muhuman\_age\_at\_death 1 1  
## b\_muother\_age\_at\_death 1 1  
## lp\_\_ 1 1  
##   
## Multivariate psrf  
##   
## 1

traceplot(coda.model) ## Traceplots indicate convergence



geweke.diag(coda.model) ## All less extreme than 1.96

## [[1]]  
##   
## Fraction in 1st window = 0.1  
## Fraction in 2nd window = 0.5   
##   
## b\_mustarvation\_Intercept b\_mulion\_Intercept   
## -0.9280 0.5275   
## b\_musiblicide\_Intercept b\_muhuman\_Intercept   
## -1.5808 -0.9898   
## b\_muother\_Intercept b\_mustarvation\_age\_at\_death   
## -1.0380 1.2239   
## b\_mulion\_age\_at\_death b\_musiblicide\_age\_at\_death   
## 0.9149 1.3921   
## b\_muhuman\_age\_at\_death b\_muother\_age\_at\_death   
## 1.4762 1.8704   
## lp\_\_   
## 0.8728   
##   
##   
## [[2]]  
##   
## Fraction in 1st window = 0.1  
## Fraction in 2nd window = 0.5   
##   
## b\_mustarvation\_Intercept b\_mulion\_Intercept   
## -1.9134 -0.6698   
## b\_musiblicide\_Intercept b\_muhuman\_Intercept   
## -0.5743 -0.6176   
## b\_muother\_Intercept b\_mustarvation\_age\_at\_death   
## -0.9247 0.6974   
## b\_mulion\_age\_at\_death b\_musiblicide\_age\_at\_death   
## 0.3511 0.3210   
## b\_muhuman\_age\_at\_death b\_muother\_age\_at\_death   
## 0.5706 0.6441   
## lp\_\_   
## -1.5650   
##   
##   
## [[3]]  
##   
## Fraction in 1st window = 0.1  
## Fraction in 2nd window = 0.5   
##   
## b\_mustarvation\_Intercept b\_mulion\_Intercept   
## 2.0308 1.5411   
## b\_musiblicide\_Intercept b\_muhuman\_Intercept   
## 0.8782 0.7854   
## b\_muother\_Intercept b\_mustarvation\_age\_at\_death   
## 1.6574 -1.7658   
## b\_mulion\_age\_at\_death b\_musiblicide\_age\_at\_death   
## -1.3877 -0.5191   
## b\_muhuman\_age\_at\_death b\_muother\_age\_at\_death   
## -1.0843 -1.1801   
## lp\_\_   
## 0.4937

heidel.diag(coda.model)

## [[1]]  
##   
## Stationarity start p-value  
## test iteration   
## b\_mustarvation\_Intercept passed 1 0.8880   
## b\_mulion\_Intercept passed 1 0.7191   
## b\_musiblicide\_Intercept passed 1 0.7404   
## b\_muhuman\_Intercept passed 1 0.3715   
## b\_muother\_Intercept passed 1 0.5134   
## b\_mustarvation\_age\_at\_death passed 1 0.7749   
## b\_mulion\_age\_at\_death passed 1 0.7017   
## b\_musiblicide\_age\_at\_death passed 1 0.6796   
## b\_muhuman\_age\_at\_death passed 1 0.6753   
## b\_muother\_age\_at\_death passed 1 0.0931   
## lp\_\_ passed 1 0.5934   
##   
## Halfwidth Mean Halfwidth  
## test   
## b\_mustarvation\_Intercept passed -2.851 0.01624   
## b\_mulion\_Intercept passed -3.979 0.01949   
## b\_musiblicide\_Intercept failed -0.113 0.01322   
## b\_muhuman\_Intercept passed -5.145 0.02946   
## b\_muother\_Intercept passed -1.015 0.01179   
## b\_mustarvation\_age\_at\_death passed 0.611 0.00547   
## b\_mulion\_age\_at\_death passed 0.923 0.00565   
## b\_musiblicide\_age\_at\_death passed -0.513 0.00853   
## b\_muhuman\_age\_at\_death passed 0.949 0.00633   
## b\_muother\_age\_at\_death passed 0.093 0.00585   
## lp\_\_ passed -115.336 0.06130   
##   
## [[2]]  
##   
## Stationarity start p-value  
## test iteration   
## b\_mustarvation\_Intercept passed 1 0.190   
## b\_mulion\_Intercept passed 1 0.465   
## b\_musiblicide\_Intercept passed 1 0.845   
## b\_muhuman\_Intercept passed 1 0.791   
## b\_muother\_Intercept passed 1 0.941   
## b\_mustarvation\_age\_at\_death passed 1 0.951   
## b\_mulion\_age\_at\_death passed 1 0.883   
## b\_musiblicide\_age\_at\_death passed 1 0.896   
## b\_muhuman\_age\_at\_death passed 1 0.951   
## b\_muother\_age\_at\_death passed 1 0.705   
## lp\_\_ passed 1 0.403   
##   
## Halfwidth Mean Halfwidth  
## test   
## b\_mustarvation\_Intercept passed -2.8595 0.01441   
## b\_mulion\_Intercept passed -3.9842 0.01883   
## b\_musiblicide\_Intercept failed -0.1097 0.01268   
## b\_muhuman\_Intercept passed -5.1484 0.02622   
## b\_muother\_Intercept passed -1.0266 0.01172   
## b\_mustarvation\_age\_at\_death passed 0.6164 0.00513   
## b\_mulion\_age\_at\_death passed 0.9264 0.00533   
## b\_musiblicide\_age\_at\_death passed -0.5147 0.00826   
## b\_muhuman\_age\_at\_death passed 0.9518 0.00591   
## b\_muother\_age\_at\_death passed 0.0978 0.00563   
## lp\_\_ passed -115.3907 0.06070   
##   
## [[3]]  
##   
## Stationarity start p-value  
## test iteration   
## b\_mustarvation\_Intercept passed 1 0.0841   
## b\_mulion\_Intercept passed 1 0.7328   
## b\_musiblicide\_Intercept passed 1 0.2435   
## b\_muhuman\_Intercept passed 1 0.1671   
## b\_muother\_Intercept passed 1 0.1510   
## b\_mustarvation\_age\_at\_death passed 1 0.1300   
## b\_mulion\_age\_at\_death passed 1 0.5711   
## b\_musiblicide\_age\_at\_death passed 1 0.3822   
## b\_muhuman\_age\_at\_death passed 1 0.1999   
## b\_muother\_age\_at\_death passed 1 0.4674   
## lp\_\_ passed 1 0.4581   
##   
## Halfwidth Mean Halfwidth  
## test   
## b\_mustarvation\_Intercept passed -2.8538 0.01555   
## b\_mulion\_Intercept passed -3.9931 0.01921   
## b\_musiblicide\_Intercept passed -0.1301 0.01296   
## b\_muhuman\_Intercept passed -5.1653 0.02577   
## b\_muother\_Intercept passed -1.0132 0.01125   
## b\_mustarvation\_age\_at\_death passed 0.6149 0.00513   
## b\_mulion\_age\_at\_death passed 0.9265 0.00549   
## b\_musiblicide\_age\_at\_death passed -0.5015 0.00822   
## b\_muhuman\_age\_at\_death passed 0.9524 0.00594   
## b\_muother\_age\_at\_death passed 0.0952 0.00552   
## lp\_\_ passed -115.3247 0.05902

autocorr.plot(coda.model) ## Autocorrelation looks fine

