

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variable | Example | Type of Regression | R function / R function for mixed models | More Information | Bayesian Equivalent (w/ `brms`) |
| Continuous | Quality of Life, linear scales | linear | [`lm()`](https://www.rdocumentation.org/packages/stats/versions/3.6.2/topics/lm) |  | `brm(family = gaussian())` |
| [`lmer()`](https://www.rdocumentation.org/packages/lme4/versions/1.1-21/topics/lmer), [`glmmTMB()`](https://www.rdocumentation.org/packages/glmmTMB/versions/1.1.7/topics/glmmTMB) |  |
| Binary | Success yes/no | binary logistic | [`glm(family=binomial)`](https://www.rdocumentation.org/packages/stats/versions/3.6.2/topics/glm) | [UCLA](https://stats.idre.ucla.edu/r/dae/logit-regression/) | `brm(family = binomial())` |
| [`glmer(family=binomial)`](https://www.rdocumentation.org/packages/lme4/versions/1.1-21/topics/glmer), [`glmmTMB(family=binomial)`](https://www.rdocumentation.org/packages/glmmTMB/versions/1.1.7/topics/glmmTMB) |
| Trials (or proportions of \_counts\_) | 20 successes out of 30 trials | logistic | [`glm(cbind(successes, failures), family=binomial)`](https://www.rdocumentation.org/packages/stats/versions/3.6.2/topics/glm) | [Hadley’s notes](http://had.co.nz/notes/modelling/logistic-regression.html) | `brm(successes | trials(total), family = binomial())` |
| [`glmer(cbind(successes, failures), family=binomial)`](https://www.rdocumentation.org/packages/lme4/versions/1.1-21/topics/glmer), [`glmmTMB(cbind(successes, failures), family=binomial)`](https://www.rdocumentation.org/packages/glmmTMB/versions/1.1.7/topics/glmmTMB) |
| Count data | Number of usage, counts of events | Poisson | [`glm(family=poisson)`](https://www.rdocumentation.org/packages/stats/versions/3.6.2/topics/glm) | [UCLA](https://stats.idre.ucla.edu/r/dae/poisson-regression/) | `brm(family = poisson())` |
| [`glmer(family=poisson)`](https://www.rdocumentation.org/packages/lme4/versions/1.1-21/topics/glmer), [`glmmTMB(family=poisson)`](https://www.rdocumentation.org/packages/glmmTMB/versions/1.1.7/topics/glmmTMB) |
| Count data, with excess zeros or overdispersion | Number of usage, counts of events (with higher variance than mean of response) | negative binomial | [`glm.nb()`](https://www.rdocumentation.org/packages/MASS/versions/7.3-47/topics/glm.nb) | [UCLA](https://stats.idre.ucla.edu/r/dae/negative-binomial-regression/) | `brm(family = negbinomial())` |
| [`glmer.nb()`](https://www.rdocumentation.org/packages/lme4/versions/1.1-21/topics/glmer.nb), [`glmmTMB(family=nbinom)`](https://www.rdocumentation.org/packages/glmmTMB/versions/1.1.7/topics/glmmTMB) |
| Count data with very many zeros (inflation) | see count data, but response is modelled as mixture of Bernoulli & Poisson distribution (two sources of zeros) | zero-inflated | [`zeroinfl()`](https://www.rdocumentation.org/packages/pscl/versions/1.5.2/topics/zeroinfl) | [UCLA](https://stats.idre.ucla.edu/r/dae/zip/) | `brm(family = zero\_inflated\_poisson())` |
| [`glmmTMB(ziformula, family=poisson)`](https://www.rdocumentation.org/packages/glmmTMB/versions/1.1.7/topics/glmmTMB) |
| Count data, with very many zeros (inflation) and overdispersion | Number of usage, counts of events (with higher variance than mean of response) | zero-inflated negative binomial | [`zeroinfl(dist="negbin")`](https://www.rdocumentation.org/packages/pscl/versions/1.5.2/topics/zeroinfl) | [UCLA](https://stats.idre.ucla.edu/r/dae/zinb/) | `brm(family = zero\_inflated\_negbinomial())` |
| [`glmmTMB(ziformula, family=nbinom)`](https://www.rdocumentation.org/packages/glmmTMB/versions/1.1.7/topics/glmmTMB) |
| Count data, zero-truncated | see count data, but only for positive counts (hurdle component models zero-counts) | hurdle (Poisson) | [`hurdle()`](https://www.rdocumentation.org/packages/pscl/versions/1.5.2/topics/hurdle) | [UCLA](https://stats.idre.ucla.edu/r/dae/zero-truncated-poisson/) | `brm(family = hurdle\_poisson())` |
| [`glmmTMB(family=truncated\_poisson)`](https://www.rdocumentation.org/packages/glmmTMB/versions/1.1.7/topics/glmmTMB) |
| Count data, zero-truncated and overdispersion | see “Count data, zero-truncated”, but with higher variance than mean of response | hurdle (neg. binomial) | [`vglm(family=posnegbinomial)`](https://www.rdocumentation.org/packages/VGAM/versions/1.1-2/topics/vglm) | [UCLA](https://stats.idre.ucla.edu/r/dae/zero-truncated-negative-binomial/) | `brm(family = hurdle\_negbinomial())` |
| [`glmmTMB(family=truncated\_nbinom)`](https://www.rdocumentation.org/packages/glmmTMB/versions/1.1.7/topics/glmmTMB) |
| Proportion / Ratio (without zero and one) | Percentages, proportion of \_continuous\_ data | Beta \_(see note below)\_ | [`betareg()`](https://www.rdocumentation.org/packages/betareg/versions/3.1-2/topics/betareg) | [ouR data generation]( https://www.rdatagen.net/post/binary-beta-beta-binomial/) | `brm(family = Beta())` |
| [`glmmTMB(family=beta\_family)`](https://www.rdocumentation.org/packages/glmmTMB/versions/1.1.7/topics/glmmTMB) |  |
| Proportion / Ratio (including zero and one) | Percentages, proportions of \_continuous\_ data | Beta-Binomial, zero-inflated Beta, ordered Beta \_(see note below)\_ | [`BBreg()`](https://www.rdocumentation.org/packages/HRQoL/versions/1.0/topics/BBreg), [`betabin()`](https://www.rdocumentation.org/packages/aod/versions/1.3.1/topics/betabin), [`vglm(family=betabinomial)`](https://www.rdocumentation.org/packages/VGAM/versions/1.1-2/topics/vglm), [`ordbetareg()`](https://www.rdocumentation.org/packages/ordbetareg/versions/0.2.1) | [ouR data generation]( https://www.rdatagen.net/post/binary-beta-beta-binomial/) | `brm(family = zero\_one\_inflated\_beta())` |
| [`glmmTMB(ziformula, family=beta\_family/betabinomial/ordbeta)`](https://www.rdocumentation.org/packages/glmmTMB/versions/1.1.7/topics/glmmTMB), [`ordbetareg()`](https://www.rdocumentation.org/packages/ordbetareg/versions/0.2.1) |
| Ordinal | Likert scale, worse/ok/better | ordinal, proportional odds, cumulative | [`polr()`](https://www.rdocumentation.org/packages/MASS/versions/7.3-47/topics/polr), [`clm()`](https://www.rdocumentation.org/packages/ordinal/versions/2019.4-25/topics/clm), [`bracl()`](https://www.rdocumentation.org/packages/brglm2/versions/0.6.0/topics/bracl), | [UCLA](https://stats.idre.ucla.edu/r/dae/ordinal-logistic-regression/) | `brm(family = cumulative())` |
| [`clmm()`](https://www.rdocumentation.org/packages/ordinal/versions/2019.4-25/topics/clmm), [`mixor()`](https://www.rdocumentation.org/packages/mixor/versions/1.0.4/topics/mixor), [`MCMCglmm(gamily = "ordinal")`](https://www.rdocumentation.org/packages/MCMCglmm/versions/2.29/topics/MCMCglmm) |
| Multinomial | No natural order of categories, like red/green/blue | multinomial | [`multinom()`](https://www.rdocumentation.org/packages/nnet/versions/7.3-12/topics/multinom), [`brmultinom()`](https://www.rdocumentation.org/packages/brglm2/versions/0.6.0/topics/brmultinom) | [UCLA](https://stats.idre.ucla.edu/r/dae/multinomial-logistic-regression/) | `brm(family = multinomial())` |
| [`MCMCglmm(family = "multinomial")`](https://www.rdocumentation.org/packages/MCMCglmm/versions/2.29/topics/MCMCglmm) |
| Continuous, right-skewed | Financial data, reaction times | Gamma | [`glm(family=Gamma)`](https://www.rdocumentation.org/packages/stats/versions/3.6.2/topics/glm) | [Sean Anderson]( https://seananderson.ca/2014/04/08/gamma-glms/) | `brm(family = Gamma())`,  but see also [Reaction time distributions in `brms`](https://lindeloev.github.io/shiny-rt/) |
| [`glmer()`](https://www.rdocumentation.org/packages/lme4/versions/1.1-21/topics/glmer), [`glmmTMB()`](https://www.rdocumentation.org/packages/glmmTMB/versions/1.1.7/topics/glmmTMB) |  |
| (Semi-)Continuous, (right) skewed, probably with spike at zero (zero-inlfated) | Financial data, probably exponential dispersion of variance | Tweedie | [`glm(family=tweedie)`](https://www.rdocumentation.org/packages/statmod/versions/1.4.32/topics/tweedie), [`cpglm()`](https://www.rdocumentation.org/packages/cplm/versions/0.7-8/topics/cpglm) | [Revolutions](https://blog.revolutionanalytics.com/2014/10/a-note-on-tweedie.html) |  |
| [`cpglmm()`](https://www.rdocumentation.org/packages/cplm/versions/0.7-8/topics/cpglmm), [`glmmTMB(family=tweedie)`](https://www.rdocumentation.org/packages/glmmTMB/versions/1.1.7/topics/glmmTMB) |
| (Semi-)Continuous, (right) skewed, probably with spike at zero (zero-inlfated) | Normal distribution, but negative values are censored and stacked on zero | Tobit | [`tobit()`](https://www.rdocumentation.org/packages/AER/versions/1.2-9/topics/tobit), [`censReg()`](https://www.rdocumentation.org/packages/censReg/versions/0.5-30/topics/censReg) |  | `brm(y | cens(), family = gaussian())` |
| [`semLme()`](https://www.rdocumentation.org/packages/smicd/versions/1.1.0/topics/semLme) |
| Continuous, but truncated or outliers |  | truncated | [`censReg()`](https://www.rdocumentation.org/packages/censReg/versions/0.5-22/topics/censReg), [`tobit()`](https://www.rdocumentation.org/packages/AER/versions/1.2-8/topics/tobit), [`vglm(family=tobit)`](https://www.rdocumentation.org/packages/VGAM/versions/1.1-2/topics/vglm) | [UCLA-1](https://stats.idre.ucla.edu/r/dae/tobit-models/), [UCLA-2](https://stats.idre.ucla.edu/r/dae/truncated-regression/) | `brm(y | trunc(), family = gaussian())` |
| Continuous, but exponential growth |  | log-transformed, non-linear | [`glm(family=Gaussian("log")`](https://www.rdocumentation.org/packages/stats/versions/3.6.2/topics/glm), [`nls()`](https://www.rdocumentation.org/packages/stats/versions/3.6.2/topics/nls) | [Some useful equations](https://www.statforbiology.com/nonlinearregression/usefulequations), [linear vs. non-linear regression](https://stats.stackexchange.com/a/61806/54740) |  |
| [`glmmTMB(family=Gaussian("log"))`](https://www.rdocumentation.org/packages/glmmTMB/versions/1.1.7/topics/glmmTMB), [`nlmer()`]( https://www.rdocumentation.org/packages/lme4/versions/1.1-23/topics/nlmer) |
| Proportion / Ratio with more than 2 categories | Biomass partitioning in plants (ratio of leaf, stem and root mass) | Dirichlet | [`DirichReg()`](https://www.rdocumentation.org/packages/DirichletReg/versions/0.6-3/topics/DirichReg) |  | `brm(family = dirichlet())` |
| Time-to-Event | Survival-analysis, time until event/death occurs | Cox (proportional hazards) | [`coxph`](https://www.rdocumentation.org/packages/survival/versions/3.2-7/topics/coxph) | [UCLA]( https://stats.idre.ucla.edu/r/dae/mixed-effects-cox-regression/) | `brm(family = cox())` |
| [`coxme()`](https://www.rdocumentation.org/packages/coxme/versions/2.2-16/topics/coxme) |