

# Birth Data - Bivariate Binary Regression

February 1, 2012

First the Birth data are loaded from package "catdata".

```
> library(catdata)
> data(birth)
> attach(birth)
```

Now the original variable "Intensive" is converted into the binary variable "Intensive" indicating whether the child spent time in intensive care or not.

```
> intensive <- rep(0,length(Intensive))
> intensive[Intensive>0] <- 1
> Intensive <- intensive
```

Now "Previous" is reduced to 3 categories by merging two and more previous pregnancies to level "2".

```
> previous <- Previous
> previous[previous>1] <- 2
> Previous <- previous

> library(VGAM)
```

The data set "Birth" is built as data set containing the variables for the model but without missing values.

```
> Birth <- as.data.frame(na.omit(cbind(Intensive, Cesarean, Sex, Weight, Previous, AgeMoth
> detach(birth)
```

With that data set the model can be fitted. The option "binom2.or" is needed to fit a bivariate binary model.

```
> bivarlogit <- vglm(cbind(Intensive , Cesarean) ~ as.factor(Sex) + Weight + as.factor(Pre
> summary(bivarlogit)
```

Call:

```
vglm(formula = cbind(Intensive, Cesarean) ~ as.factor(Sex) +
  Weight + as.factor(Previous) + AgeMother, family = binom2.or(zero = NULL),
  data = Birth)
```

Pearson Residuals:

Min	1Q	Median	3Q	Max
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```

logit(mu1)  -1.1892 -0.339340 -0.24901 -0.16355 10.8180
logit(mu2)  -1.3821 -0.523377 -0.41772 -0.24756  5.9127
log(oratio) -4.1883  0.032603  0.10362  0.16753 47.6346

```

Coefficients:

	Value	Std. Error	t value
(Intercept):1	3.65190637	1.03698818	3.52165
(Intercept):2	-1.05842667	0.80533323	-1.31427
(Intercept):3	6.10129618	2.84800650	2.14230
as.factor(Sex)2:1	-0.16504791	0.24784891	-0.66592
as.factor(Sex)2:2	-0.26093035	0.19017341	-1.37207
as.factor(Sex)2:3	0.28693097	0.59900858	0.47901
Weight:1	-0.00190433	0.00021486	-8.86333
Weight:2	-0.00069100	0.00015499	-4.45840
Weight:3	-0.00051623	0.00056926	-0.90684
as.factor(Previous)1:1	-0.61120129	0.37696127	-1.62139
as.factor(Previous)1:2	-0.59240779	0.25570077	-2.31680
as.factor(Previous)1:3	1.39860448	0.90585414	1.54396
as.factor(Previous)2:1	0.51357284	0.49384286	1.03995
as.factor(Previous)2:2	-2.22655737	0.78057966	-2.85244
as.factor(Previous)2:3	4.12731711	2.15090281	1.91888
AgeMother:1	0.01181496	0.02899159	0.40753
AgeMother:2	0.07957626	0.02311412	3.44275
AgeMother:3	-0.17165437	0.07601584	-2.25814

Number of linear predictors: 3

Names of linear predictors: logit(mu1), logit(mu2), log(oratio)

Dispersion Parameter for binom2.or family: 1

Residual Deviance: 1165.207 on 2304 degrees of freedom

Log-likelihood: -582.6033 on 2304 degrees of freedom

Number of Iterations: 8