1 Cesarean section and transmission of HIV

To evaluate the relation between elective cesarean section and vertical (mother-to-child) transmission of human immunodeficiency virus type 1 (HIV-1), the authors performed a meta-analysis using data on individual patients from 15 prospective cohort studies.

$$OR_{MH} = \frac{\sum_i \frac{a_i d_i}{T_i}}{\sum_i \frac{b_i c_i}{T_i}}$$

$$RR_{MH} = \frac{\sum_i \frac{a_i N_{0i}}{T_i}}{\sum_i \frac{b_i N_{1i}}{T_i}}$$

Mode of Delivery	Covariate			No. of Mother–Child Pairs	No. of HIV-1–Infected Children
	No. of periods of antiretroviral therapy	Advanced maternal disease	Low birth weight of infant (<2500 g)		
Elective cesarean	0	No	No	372	30
Other	0	No	No	3850	652
Elective cesarean	0	Yes	No	28	5
Other	0	Yes	No	303	74
Elective cesarean	0	No	Yes	110	17
Other	0	No	Yes	767	196
Elective cesarean	0	Yes	Yes	27	4
Other	0	Yes	Yes	114	40
Elective cesarean	1 or 2	No	No	41	0
Other	1 or 2	No	No	441	49
Elective cesarean	1 or 2	Yes	No	23	3
Other	1 or 2	Yes	No	186	33
Elective cesarean	1 or 2	No	Yes	7	0
Other	1 or 2	No	Yes	83	22
Elective cesarean	1 or 2	Yes	Yes	10	3
Other	1 or 2	Yes	Yes	54	19
Elective cesarean	3	No	No	124	2
Other	3	No	No	878	49
Elective cesarean	3	Yes	No	34	1
Other	3	Yes	No	208	24
Elective cesarean	3	No	Yes	25	0
Other	3	No	Yes	109	11
Elective cesarean	3	Yes	Yes	8	1
Other	3	Yes	Yes	38	6

	Exposed	Unexposed	Total
Cases	a_i	b_i	M_{1i}
Controls	c_i	d_i	M_{0i}
Total	N_{1i}	N_{0i}	T_i

```
## Call:
## glm(formula = cbind(n.hivpos, n.hivneg) ~ 1, family = binomial(link = logit),
##     data = ds)
##
## Coefficients:
##             Estimate Std. Error z value Pr(>|z|)
## (Intercept)   -1.671      0.031     -54   <2e-16
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 293.95  on 23  degrees of freedom
## Residual deviance: 293.95  on 23  degrees of freedom
## AIC: 387.8
##
## Number of Fisher Scoring iterations: 4
```

```
## Call:
## glm(formula = cbind(n.hivpos, n.hivneg) ~ caesarian, family = binomial(link = logit),
##     data = ds)
##
## Coefficients:
##             Estimate Std. Error z value Pr(>|z|)
## (Intercept)   -1.606      0.032   -50.2   <2e-16
## caesarian     -0.815      0.132    -6.2    7e-10
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 293.95  on 23  degrees of freedom
## Residual deviance: 247.78  on 22  degrees of freedom
## AIC: 343.7
##
## Number of Fisher Scoring iterations: 4
```

```
## Call:
## glm(formula = cbind(n.hivpos, ds$n.hivneg) ~ caesarian + ART1or2 +
##     ART3 + m.advancedHIV + c.LBW, family = binomial(link = logit),
##     data = ds)
##
## Coefficients:
##               Estimate Std. Error z value Pr(>|z|)
## (Intercept)     -1.608      0.041   -39.6   <2e-16
## caesarian       -0.852      0.134    -6.3    2e-10
## ART1or2         -0.362      0.106    -3.4    6e-04
## ART3            -1.178      0.114   -10.3   <2e-16
## m.advancedHIV    0.535      0.090     6.0    3e-09
## c.LBW            0.581      0.075     7.8    9e-15
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 293.945  on 23  degrees of freedom
## Residual deviance:  18.393  on 18  degrees of freedom
## AIC: 122.3
##
## Number of Fisher Scoring iterations: 4

## Call:
## glm(formula = cbind(n.hivpos, ds$n.hivneg) ~ caesarian + ART1or2 +
##     ART3 + m.advancedHIV + c.LBW, family = binomial(link = log),
##     data = ds)
##
## Coefficients:
##               Estimate Std. Error z value Pr(>|z|)
## (Intercept)     -1.793      0.034   -53.2   <2e-16
## caesarian       -0.720      0.119    -6.0    2e-09
## ART1or2         -0.278      0.087    -3.2    0.001
## ART3            -1.016      0.104    -9.8   <2e-16
## m.advancedHIV    0.409      0.068     6.0    2e-09
## c.LBW            0.453      0.057     7.9    2e-15
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 293.945  on 23  degrees of freedom
## Residual deviance:  21.295  on 18  degrees of freedom
## AIC: 125.2
##
## Number of Fisher Scoring iterations: 5
```

2 Smoking among women in Whickham, UK

Consider the following *age stratified* mortality data (Rothman, Table 1-2) from a study that looked at smoking habits of residents of Whickham, England, in the period 1972-1974 and then tracked the survival over the next 20 years of those who were interviewed.

		Smoking		
Age	Vital Status	Yes	No	Total
18-24	Dead	2	1	3
	Alive	53	61	114
	Risk	0.04	0.02	0.03
25-34	Dead	3	5	8
	Alive	121	152	273
	Risk	0.02	0.03	0.03
35-44	Dead	14	7	21
	Alive	95	114	209
	Risk	0.13	0.06	0.09
45-54	Dead	27	12	39
	Alive	103	66	169
	Risk	0.21	0.15	0.19
55-64	Dead	51	40	91
	Alive	64	81	145
	Risk	0.44	0.33	0.39
65-74	Dead	29	101	130
	Alive	7	28	35
	Risk	0.81	0.78	0.79
75+	Dead	13	64	77
	Alive	0	0	0
	Risk	1.00	1.00	1.00