What happens if we run a logistic regression when the variable ***Population*** is measured in # of people:

Call:

glm(formula = Hospital ~ Population + NearbyHospital + Urban, family = "binomial", data = mydata)

Deviance Residuals:

Min 1Q Median 3Q Max

-2.1628 -0.5767 0.0621 0.3695 3.5460

Coefficients:

Estimate Std. Error z value Pr(>|z|)

(Intercept) -7.5220538 0.8579836 -8.767 <2e-16 \*\*\*

# Population 0.0013654 0.0001561 8.744 <2e-16 \*\*\*

NearbyHospital1 0.5609031 0.3417056 1.641 0.101

Urban1 -0.2282038 0.3386455 -0.674 0.500

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

(Dispersion parameter for binomial family taken to be 1)

Null deviance: 415.77 on 299 degrees of freedom

Residual deviance: 223.39 on 296 degrees of freedom

AIC: 231.39

When it comes to the Odds Ratios, we see that the odds ratio for the variable ***Population*** is

OR 2.5 % 97.5 %

(Intercept) 0.0005410203 8.892718e-05 0.002601356

**Population 1.0013663324 1.001083e+00 1.001697394**

NearbyHospital1 1.7522541838 9.023922e-01 3.465815366

Urban1 0.7959619879 4.075035e-01 1.545952439

What happens if we run a logistic regression when population is measured in 1000’s of people (here, ***Pop1000*** = ***Population***/1000)?

You can see that the coefficient and the standard error of the ***Pop1000*** variable are 1000 times that of the ***Population*** variable in the regression above. The z-statistic (Wald Score) and the p-value remain the same. The coefficients for other variables don’t change, nor does the model AIC (or other model diagnostics).

Call:

glm(formula = Hospital ~ Pop1000 + NearbyHospital + Urban, family = "binomial", data = mydata)

Deviance Residuals:

Min 1Q Median 3Q Max

-2.1628 -0.5767 0.0621 0.3695 3.5460

Coefficients:

Estimate Std. Error z value Pr(>|z|)

(Intercept) -7.5221 0.8580 -8.767 <2e-16 \*\*\*

**Pop1000 1.3654 0.1561 8.744 <2e-16 \*\*\***

NearbyHospital1 0.5609 0.3417 1.641 0.101

Urban1 -0.2282 0.3386 -0.674 0.500

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Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

(Dispersion parameter for binomial family taken to be 1)

Null deviance: 415.77 on 299 degrees of freedom

Residual deviance: 223.39 on 296 degrees of freedom

AIC: 231.39

When it comes to the Odds Ratios, we see that the odds ratio for the variable ***Pop1000*** is .

|  |
| --- |
| OR 2.5 % 97.5 %  (Intercept) 0.0005410203 8.892718e-05 0.002601356 Pop1000 3.9172889006 2.950661e+00 5.451851120 NearbyHospital1 1.7522541838 9.023922e-01 3.465815366  Urban1 0.7959619879 4.075035e-01 1.545952439 |
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