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# Interrupted Time Series Regression Models for Hurricane Matthew, exploratory models

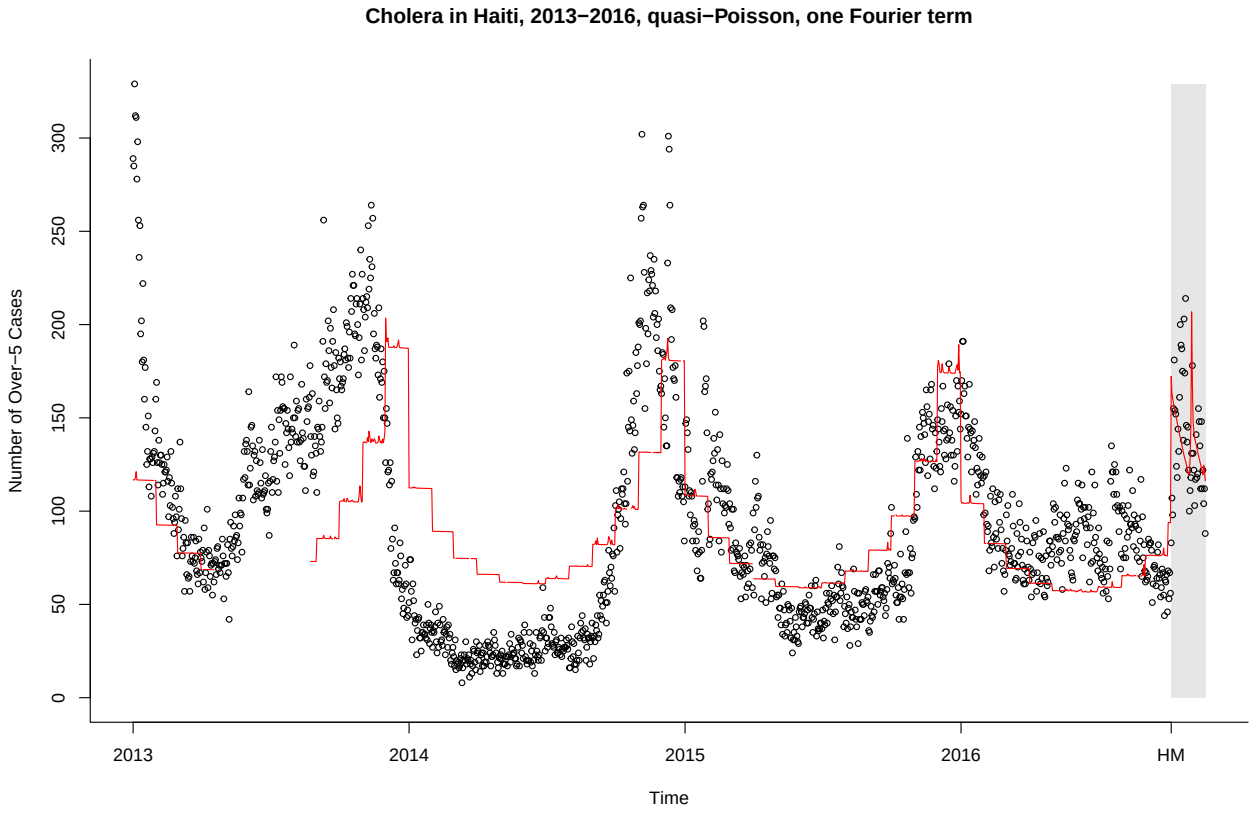
*18 September 2018*

**Summary Statistics**

## National interrupted time series regression model controlling for rainfall and seasonality, with a level only and slope-and-level change, using quasi-Poisson regression with 1 Fourier Term

```
## [1] 1419
```

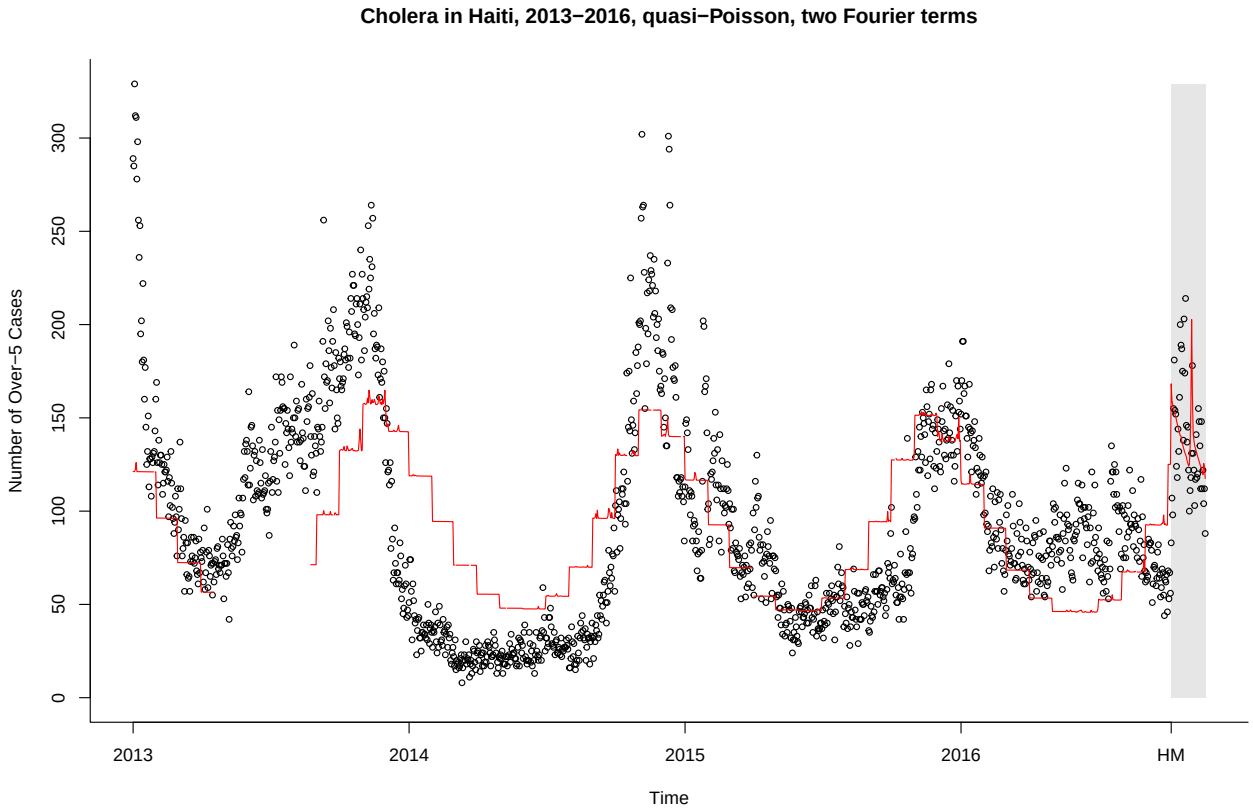
```
##                                       Estimate       95% LCI
## (Intercept)                       1.736513e+02  1.559676e+02
## t                                -1.032691e-04 -1.811696e-04
## HM                                1.962338e+01  7.297969e+00
## rain10                            1.981405e-03 -1.017957e-03
## harmonic(Month, 1, period = 365)1 -1.805041e+01 -2.009570e+01
## harmonic(Month, 1, period = 365)2 -1.848130e+02 -2.024066e+02
## t:HM                             -1.387243e-02 -2.274059e-02
##                                        95% UCI      P-Value
## (Intercept)                       1.913049e+02 1.071798e-72
## t                                -2.535932e-05 9.480800e-03
## HM                                3.198792e+01 1.863305e-03
## rain10                            4.718260e-03 1.751434e-01
## harmonic(Month, 1, period = 365)1 -1.599964e+01 3.473809e-60
## harmonic(Month, 1, period = 365)2 -1.671902e+02 2.498475e-81
## t:HM                             -5.042507e-03 2.151533e-03
```




## National interrupted time series regression model controlling for rainfall and seasonality, with a level only and slope-and-level change, using quasi-Poisson regression with 2 Fourier Terms

```
## [1] 1419
```

```
##                                        Estimate       95% LCI
## (Intercept)                        -8.282418e+04 -1.034199e+05
## t                                  -5.205876e-05 -1.259173e-04
## HM                                  1.547366e+01  3.747818e+00
## rain10                              2.110822e-03 -7.230737e-04
## harmonic(Month, 2, period = 365)1   1.080846e+04  7.720457e+03
## harmonic(Month, 2, period = 365)2  -5.401748e+03 -6.940171e+03
## harmonic(Month, 2, period = 365)3   1.100506e+05  8.276208e+04
## harmonic(Month, 2, period = 365)4  -2.723779e+04 -3.395309e+04
## t:HM                               -1.108025e-02 -1.951637e-02
##                                           95% UCI      P-Value
## (Intercept)                        -6.224511e+04 6.747637e-15
## t                                   2.179134e-05 1.673384e-01
## HM                                  2.723725e+01 9.881248e-03
## rain10                              4.709553e-03 1.273336e-01
## harmonic(Month, 2, period = 365)1   1.389760e+04 1.082102e-11
## harmonic(Month, 2, period = 365)2  -3.863899e+03 9.184823e-12
## harmonic(Month, 2, period = 365)3   1.373614e+05 5.971946e-15
## harmonic(Month, 2, period = 365)4  -2.052808e+04 4.006566e-15
## t:HM                               -2.680264e-03 9.951410e-03
```



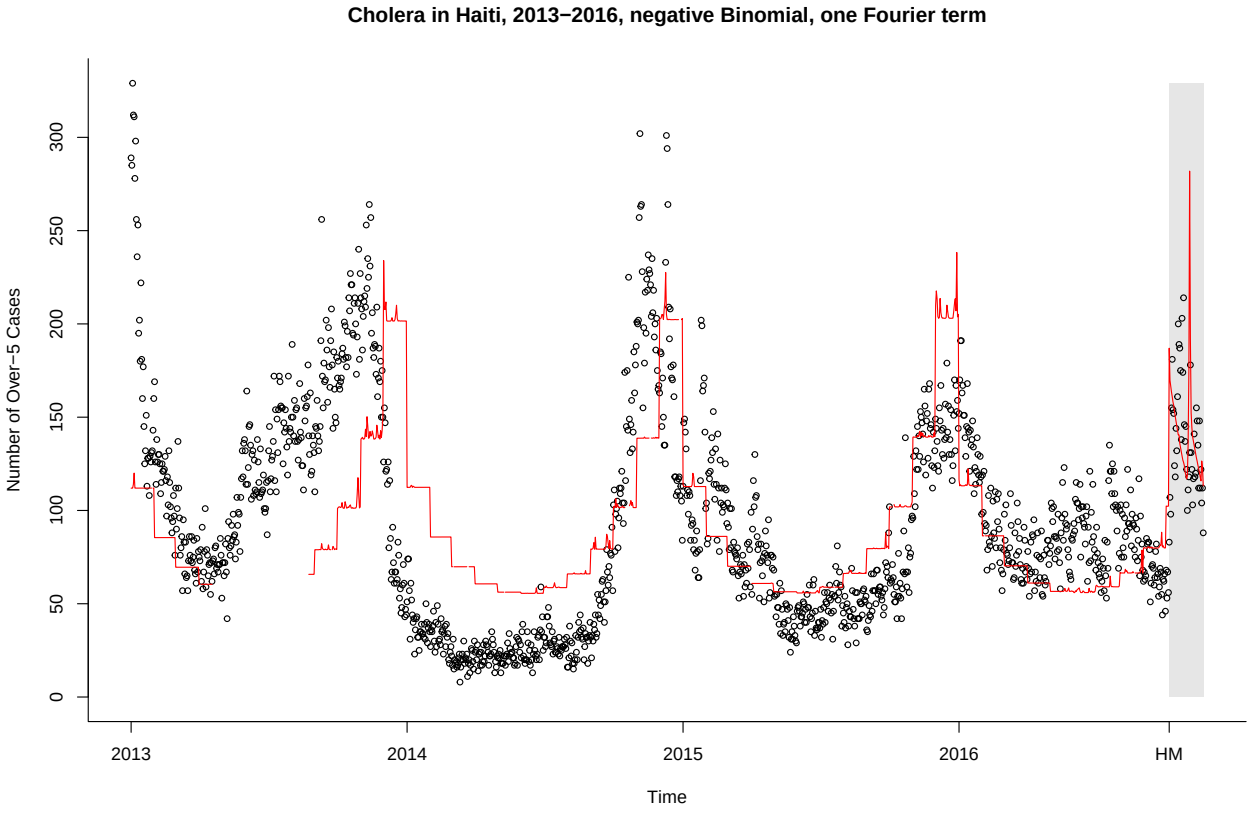

```
## Analysis of Deviance Table
##
## Model 1: CasesOver5 ~ offset(log(POP)) + t * HM + rain10 + harmonic(Month,
##     1, period = 365)
## Model 2: CasesOver5 ~ offset(log(POP)) + t * HM + rain10 + harmonic(Month,
##     2, period = 365)
##   Resid. Df Resid. Dev Df Deviance  Pr(>Chi)
## 1      1262      28810
## 2      1260      25655  2   3154.6 < 2.2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

## National interrupted time series regression model controlling for rainfall and seasonality, with a level only and slope-and-level change, using Negative Binomial regression with 1 Fourier Term

```
## [1] 1419
```

```
##                                        Estimate       95% LCI
## (Intercept)                        2.065069e+02  1.859436e+02
## t                                  1.006569e-05 -6.396075e-05
## HM                                 2.366381e+01  7.058823e+00
## rain10                             3.722410e-03 -6.011426e-04
## harmonic(Month, 1, period = 365)1 -2.134736e+01 -2.363057e+01
## harmonic(Month, 1, period = 365)2 -2.176589e+02 -2.382870e+02
## t:HM                              -1.684432e-02 -2.867512e-02
```

```
##                                              95% UCI       P-Value
## (Intercept)                                2.272009e+02  7.385902e-97
## t                                          8.395119e-05  8.059772e-01
## HM                                         4.019083e+01  3.344897e-03
## rain10                                     8.552128e-03  6.408166e-02
## harmonic(Month, 1, period = 365)1 -1.907810e+01  2.867513e-81
## harmonic(Month, 1, period = 365)2 -1.971604e+02 3.987022e-108
## t:HM                                      -4.942547e-03  3.550116e-03
```

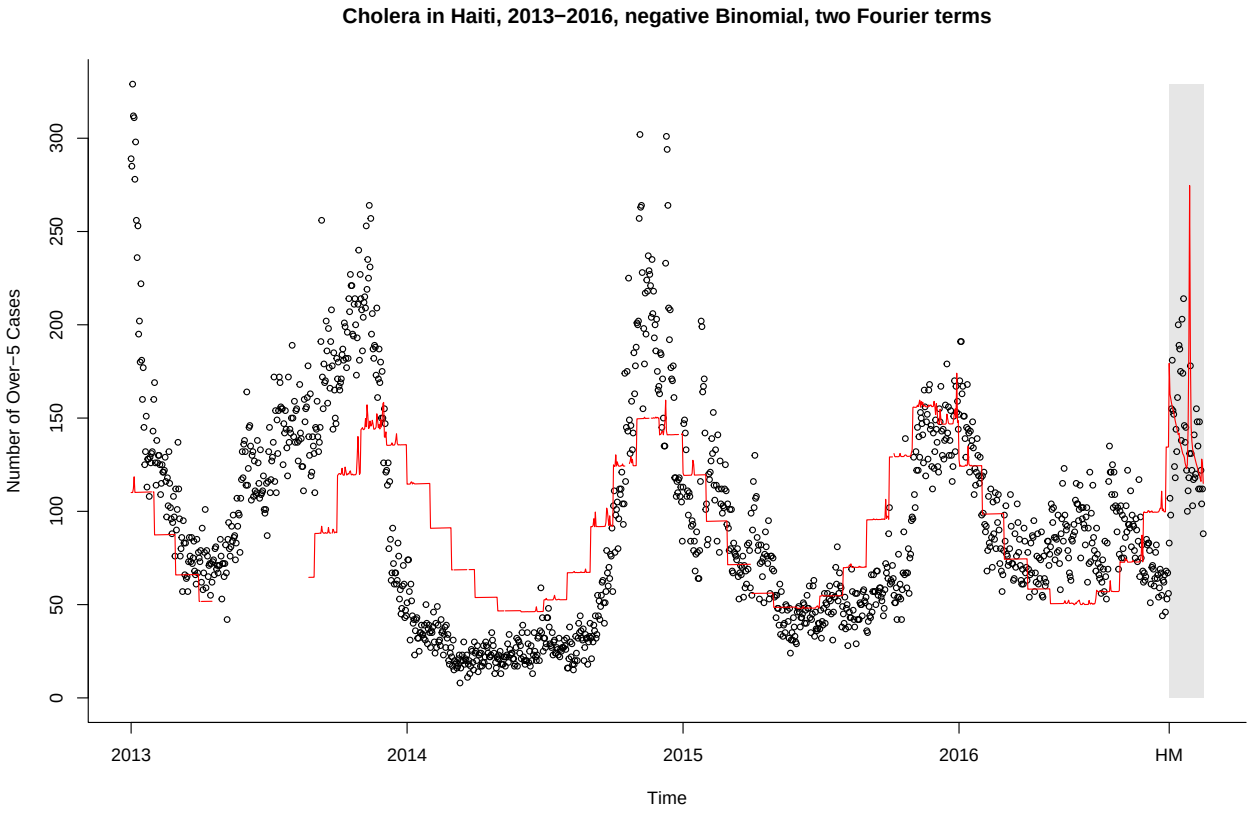



## National interrupted time series regression model controlling for rainfall and seasonality, with a level only and slope-and-level change, using Negative Binomial regression with 2 Fourier Terms

```
## [1] 1419
```

```
##                                            Estimate       95% LCI
## (Intercept)                              -7.845080e+04 -1.011367e+05
## t                                         1.093969e-04  3.408071e-05
## HM                                        1.771200e+01  1.729801e+00
## rain10                                    3.927867e-03 -2.656847e-04
## harmonic(Month, 2, period = 365)1         1.027324e+04  6.918496e+03
## harmonic(Month, 2, period = 365)2 -5.134857e+03 -6.805419e+03
## harmonic(Month, 2, period = 365)3         1.042396e+05  7.414062e+04
## harmonic(Month, 2, period = 365)4 -2.580026e+04 -3.320126e+04
## t:HM                                     -1.274543e-02 -2.414286e-02
##                                              95% UCI      P-Value
```

```
## (Intercept)                          -5.575563e+04 3.320944e-12
## t                                     1.846556e-04 6.339261e-03
## HM                                    3.363643e+01 2.346400e-02
## rain10                                8.596264e-03 4.320102e-02
## harmonic(Month, 2, period = 365)1     1.362757e+04 8.435314e-10
## harmonic(Month, 2, period = 365)2    -3.464093e+03 7.314225e-10
## harmonic(Month, 2, period = 365)3     1.343262e+05 3.015271e-12
## harmonic(Month, 2, period = 365)4    -1.839615e+04 2.194864e-12
## t:HM                                 -1.292549e-03 2.282468e-02
```




```
## Vuong Non-Nested Hypothesis Test-Statistic:
## (test-statistic is asymptotically distributed N(0,1) under the
##  null that the models are indistinguishible)
## -------------------------------------------------------------
##                Vuong z-statistic             H_A    p-value
## Raw                   -5.126751 model2 > model1 1.4739e-07
## AIC-corrected         -4.897885 model2 > model1 4.8437e-07
## BIC-corrected         -4.309013 model2 > model1 8.1992e-06
```