

Supplementary Online Content

Rasmussen SG, Ogburn EL, McCormack M, et al. Association between unconventional natural gas development in the Marcellus Shale and asthma exacerbations. *JAMA Intern Med*. Published online July 18, 2016.
doi:10.1001/jamainternmed.2016.2436.

eFigure 1. Statistical model

eFigure 2. Locations of cases and controls by quartile of spud activity metric

This supplementary material has been provided by the authors to give readers additional information about their work.

eFigure 1. Statistical Model

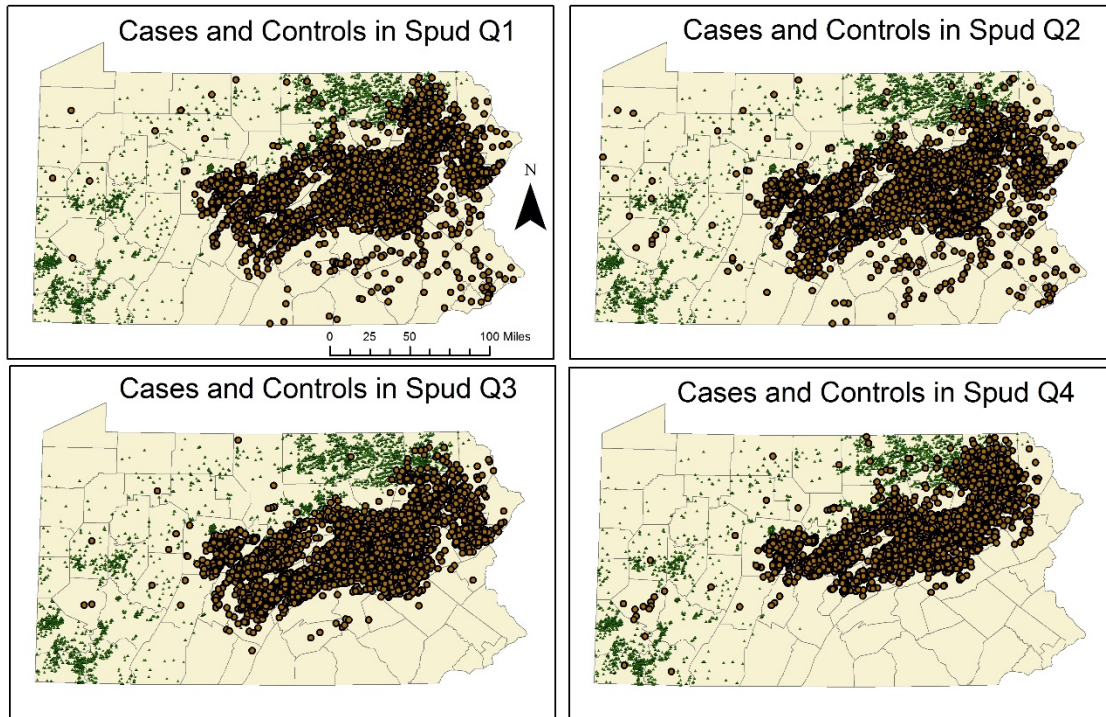
$$\text{Logit}(Y_{ijk}) = \beta_0 + \beta_1(\text{UNGD}^a \text{ Q}^b)_{ijk} + \beta_2(\text{UNGD Q3})_{ijk} + \beta_3(\text{UNGD Q4})_{ijk} + \beta_4(\text{age category 13-18})_{ijk} + \beta_5(\text{age category 19-44})_{ijk} + \beta_6(\text{age category 45-61})_{ijk} + \beta_7(\text{age category 62-74})_{ijk} + \beta_8(\text{age category 75+})_{ijk} + \beta_9(\text{male sex})_{ij} + \beta_{10}(\text{race/ethnicity, black})_{ij} + \beta_{11}(\text{race/ethnicity, Hispanic})_{ij} + \beta_{12}(\text{race/ethnicity, other/missing})_{ij} + \beta_{13}(\text{family history of asthma})_{ij} + \beta_{14}(\text{smoking status, current})_{ijk} + \beta_{15}(\text{smoking status, former})_{ijk} + \beta_{16}(\text{smoking status, missing})_{ijk} + \beta_{17}(\text{season, summer})_{ijk} + \beta_{18}(\text{season, fall})_{ijk} + \beta_{19}(\text{season, winter})_{ijk} + \beta_{20}(\text{Medical Assistance})_{ijk} + \beta_{21}(\text{overweight/obesity, overweight})_{ijk} + \beta_{22}(\text{overweight/obesity, obese})_{ijk} + \beta_{23}(\text{overweight/obesity, BMI missing})_{ijk} + \beta_{24}(\text{type 2 diabetes})_{ijk} + \beta_{25}(\text{community socioeconomic deprivation Q2})_i + \beta_{26}(\text{community socioeconomic deprivation Q3})_i + \beta_{27}(\text{community socioeconomic deprivation Q4})_i + \beta_{28}(\text{distance to nearest major road})_{ij} + \beta_{29}(\text{distance to nearest major road squared})_{ij} + \beta_{30}(\text{distance to nearest minor road})_{ij} + \beta_{31}(\text{distance to nearest minor road squared})_{ij} + \beta_{32}(\text{maximum temperature on the day prior to event})_{ij} + \beta_{33}(\text{maximum temperature on the day prior to event squared})_{ij} + u_{_i} + u_{_ij}$$

where i =community, j =person, k =index date and $(u_{_i}, u_{_ij})$ are independent normally distributed random effects with mean 0 and separate variances.

^a unconventional natural gas development activity metric

^b quartile

eFigure 2. Locations of cases and controls by quartile of spud activity metric.



Legend

- Asthma case or control
- Spudded wells^a

^a Asthma patients in New York (n = 72) not shown.