

Multi-site Time Series Analysis

NMMAPS Tour

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NMMAPS Data

(1) Download the complete dataset (≈ 381 MB)

```
> install.packages("NMMAPSdata", contriburl =  
  "http://www.ihapss.jhsph.edu/data/NMMAPS/R/windows")
```

(2) The R package NMMAPSLite offers you the option to remotely access the dataset on the iHAPPS server.

```
> install.packages("NMMAPSLite")  
> initDB("NMMAPS") #declare local cache to store data
```

NMMAPS Data

NMMAPS contains data for 108 cities.

To find the abbreviation for each city,

```
> listAllCities(full.names = FALSE)[1:5]
[1] "akr" "albu" "anch" "arlv" "atla"
> listDBCities()
```

To load data for a city

```
> loadCity("balt")
> balt[1:5, 1:10]
```

	city	date	dow	agecat	accident	copd	cvd	death	inf	pneinf
1	balt	19870101	5	1	0	1	1	7	0	0
2	balt	19870102	6	1	0	0	3	8	0	0
3	balt	19870103	7	1	0	0	2	4	0	0
4	balt	19870104	1	1	0	0	4	9	0	0
5	balt	19870105	2	1	0	0	4	6	0	0

1 Saturday
2 Sunday

1: < 65
2: [65, 75)
3: >= 75

Influenza

NMMAPS Model

Fit an NMMAPS model:

```
> library (splines)
> fit1 <- glm(death ~ factor(dow) +
              ns(date, 7*14)*factor(agecat) +
              ns (tmpd, 6) + ns (rmtmpd, 6) +
              ns (dptp, 3) + ns (rmdptp, 3) +
              l1pm10tmean,
              data =balt, family = quasipoisson)

> results = summary (fit1)$coef

> results[ row.names (results) == "l1pm10tmean", ]
      Estimate      Std. Error      t value      Pr(>|t|)
0.0007431798 0.0003869315 1.9207010349 0.0548210711
```

NMMAPS Multi-city Analysis

Now we fit a 10-city analysis

```
cities = c("la", "ny", "chic", "det", "minn",  
"seat", "clev", "pitt", "hous", "sanj")  
  
results <- NULL  
for (city.i in cities){  
  dat.i = readCity (city.i)  
  fit1 <- glm(death ~ factor(dow) + ns(date,  
    7*14)*factor(agecat) +  
    ns (tmpd, 6) + ns (rmtmpd, 6) +  
    ns (dptp, 3) + ns (rmdptp, 3) +  
    l1pm10tmean, data =dat.i, family  
    = quasipoisson)  
  coefs = summary (fit1)$coef  
  results <- rbind(results, coefs[ row.names  
    (coefs) == "l1pm10tmean",1:2] )  
}
```

NMMAPS Multi-city Analysis

```
> results[1:3,]
      Estimate      Std. Error
[1,] 3.544003e-04 0.0001844405
[2,] 8.697249e-04 0.0002760511
[3,] 1.696977e-04 0.0000883242

> Library (tlnise)
Two-level normal independent sampling estimation
> pooled = tlnise (results[,1], (results[,2])^2)
> pooled$gamma
      est      se  est/se
0.0003103717 8.549372e-05 3.630346
```

City Information

```
> data(cities)
> cities[1:5,1:5]
  city state  statename stfips region
1  akr   OH      Ohio      39     IM
2  albu  NM New Mexico   35     SW
3  anch  AK      Alaska    2     OT
4  arlv  VA      Virginia  51     NE
5  atla  GA      Georgia   13     SE
```

MCAPS

To load the county-specific relative risks data

```
> library(MCAPS)
> initMCAPS("MCAPS")
> estimates <- getData("estimates.subset")
> names(estimates)
[1] "fips"          "CountyName"  "outcome"     "beta"
     "var"         "dfTime"     "lag"         "region7"
[9] "region4"      "regionEW"
```



```
> estimates[, c("CountyName", "outcome", "beta", "var")][1:3,]
      CountyName      outcome      beta      var
1 Jefferson, AL      injury -0.0006943051 3.799943e-06
2 Jefferson, AL cerebrovascular disease 0.0011192680 3.080890e-06
3 Jefferson, AL      peripheral vascular -0.0033530637 1.066298e-05
```

MCAPS does not provide daily time series data

Second Stage Analysis

```
>sub.est = subset(estimates, outcome ==  
  "cerebrovascular disease" & lag == "Lag 0")
```

```
>EW = sub.est$regionEW == "East"
```

```
>pooled = tlnise (sub.est$beta, sub.est$var,  
  cbind(rep(1,202), EW))
```

```
> pooled$gamma
```

	est	se	est/se
0	-0.0002202322	0.0005329139	-0.4132604
1	0.0013330661	0.0006029127	2.2110433