**Sample R code for analysis**

###### GLM ###########

load("H:/thesis/Health.RData")

dat<-matrix(NA,1826,12)

dat<-as.data.frame(dat)

dat=health

dat$p1pm25=c(NA,dat$pm25[-1826])

dat$p2pm25=c(NA,dat$p1pm25[-1826])

dat$p3pm25=c(NA,dat$p2pm25[-1826])

dat$avpm25=(dat$p1pm25+dat$p2pm25+dat$p3pm25)/3

dat$Temp1=c(NA,dat$Temp[-1826])

dat$Temp2=c(NA,dat$Temp1[-1826])

dat$Temp3=c(NA,dat$Temp2[-1826])

dat$avTemp=(dat$Temp1+dat$Temp2+dat$Temp3)/3

dat$DpTemp1=c(NA,dat$DpTemp[-1826])

dat$DpTemp2=c(NA,dat$DpTemp[-1826])

dat$DpTemp3=c(NA,dat$DpTemp[-1826])

dat$avDpTemp=(dat$DpTemp1+dat$DpTemp2+dat$DpTemp3)/3

dat=na.omit(dat)

dat$date=dat$date-11322

library(splines)

library(mgcv)

fit1=glm(alldeaths~avpm25+ns(Temp,6)+ns(avTemp,6)+ns(DpTemp,3)+ns(avDpTemp,3)+ns(date,40)+factor(dow),data=dat,family=poisson)

summary(fit1)

plot(fit1)

hist(dat$alldeaths)

plot(log(dat$alldeaths)~dat$avpm25,cex=0.2, pch =16, xlab = "pm2.5", ylab = "log(mortality)")

########## Poisson part of the dataset #########

X=model.matrix(alldeaths~avpm25+ns(DpTemp,3),data=dat,family=poisson)[1:100,]

beta=coef(fit1)[c(1,2,15:17)]

Y=dat$alldeaths[1:100]

library (R2WinBUGS)

dat.test = list (X=X, Y=Y)

bugs.data (data = dat.test, dir = "H:/thesis/", data.file = "file3.txt")

#RUN WINBUGS using R

inits = list ( list (beta=beta))

fit = bugs (dat.test, inits, c("beta"),

model.file = "H:/thesis/simulation thesis 1.txt", n.chains = 1, n.iter = 20000, n.burnin = 10000,

bugs.directory = "H:/My Documents/winbugs14/WinBUGS14/",

working.director = "H:/thesis" )

print(fit)

save(fit,file="H:/thesis/ddd.RData")

####### Poisson full dataset #######

X=model.matrix(alldeaths~avpm25+ns(Temp,6)+ns(avTemp,6)+ns(DpTemp,3)+ns(avDpTemp,3)+ns(date,40)+factor(dow),data=dat,family=poisson)

beta=coef(fit1)

Y=dat$alldeaths

library (R2WinBUGS)

dat.test = list (X=X, Y=Y)

bugs.data (data = dat.test, dir = "H:/thesis/", data.file = "file4.txt")

#RUN WINBUGS using R

inits = list ( list (beta=beta))

fit = bugs (dat.test, inits, c("beta"),

model.file = "H:/thesis/simulation thesis 2.txt", n.chains = 1, n.iter = 20000, n.burnin = 10000,

bugs.directory = "H:/My Documents/winbugs14/WinBUGS14/",

working.director = "H:/thesis" )

print(fit)

######## negative binomial part of data ########

X=model.matrix(alldeaths~avpm25+ns(Temp,6)+ns(avTemp,6)+ns(DpTemp,3)+ns(avDpTemp,3)+ns(date,40)+factor(dow),data=dat,family=poisson)

X=model.matrix(alldeaths~avpm25+ns(DpTemp,3),data=dat,family=poisson)[1:100,]

beta=coef(fit1)[c(1,2,15:17)]

Y=dat$alldeaths[1:100]

library (R2WinBUGS)

dat.test = list (X=X, Y=Y)

bugs.data (data = dat.test, dir = "H:/thesis/", data.file = "file3.txt")

#RUN WINBUGS using R

inits = list ( list (beta=beta,logalpha=0))

fit1 = bugs (dat.test, inits, c("beta","logalpha"),

model.file = "H:/thesis/simulation thesis nb.txt", n.chains = 1, n.iter = 20000, n.burnin = 10000,

bugs.directory = "H:/My Documents/winbugs14/WinBUGS14/",

working.director = "H:/thesis")

print(fit1)

save(fit1,file="H:/thesis/ddd.RData")

########## negative binomial full dataset #######

X=model.matrix(alldeaths~avpm25+ns(Temp,6)+ns(avTemp,6)+ns(DpTemp,3)+ns(avDpTemp,3)+ns(date,40)+factor(dow),data=dat,family=poisson)

beta=coef(fit1)

Y=dat$alldeaths

library (R2WinBUGS)

dat.test = list (X=X, Y=Y)

bugs.data (data = dat.test, dir = "H:/thesis/", data.file = "file4.txt")

#RUN WINBUGS using R

inits = list ( list (beta=beta,logalpha=0))

fit2 = bugs (dat.test, inits, c("beta","logalpha"),

model.file = "H:/thesis/simulation thesis nb 2.txt", n.chains = 1, n.iter = 20000, n.burnin = 10000,

bugs.directory = "H:/My Documents/winbugs14/WinBUGS14/",

working.director = "H:/thesis" )

print(fit2)

save(fit2,file="H:/thesis/res\_nb.RData")