#R code to calculate Fusion RR based on input parameters

#read input parameters from two file – this example is for IHD>25

setwd ("C:/Fusion Calculation")

dataparm<- read.csv("Fusion Parameters.csv", header = T)

gamma=as.numeric(dataparm[2:1001,109])

mu=as.numeric(dataparm[2:1001,110])

rho=as.numeric(dataparm[2:1001,111])

datatheta<- read.csv("LL Parameters theta eq 97.5.csv", header = T)

theta=as.numeric(datatheta[3,5])

betaLL=as.numeric(datatheta[1,3])

lambda=(theta-mu)/(theta\*(1-rho))

maxx=300 #set maximum concentration of interest

#calculate Fusion RR (FUS) without cf

#define sequence of concentrations from 0 to T by 0.1 units

xind=seq(0, theta, 0.1)

#calculate integral

nsim=length(gamma)

G=matrix(0, nsim, length(xind))

for (j in 1:nsim){

G[j,]=1/(1+((1-rho[j])/rho[j])\*(ifelse(xind<mu[j], 0, xind- mu[j])/(theta- mu[j]))^lambda[j])}

INT=matrix(0, nsim, length(xind))

for (j in 1:nsim) {

for (k in 1:length(xind)){

INT[j,k]=0.1\*(sum(G[j,1:k])-G[j,1])

}}

#define sequence of concentrations from T to max concentration

xup= seq(theta+0.1, maxx, 0.1)

xxx=c(xind[1:dim(INT)[2]], xup)

endind=dim(INT)[2]

#calculate Fusion RR nsim times

nsim=1000

len= length(xxx)

FUS=matrix(0, nsim, len)

for (j in 1:nsim) {

for (k in 1:len) {

if (xxx[k]<theta) {FUS[j,k]=gamma[j]\*(INT[j,k])}

if (xxx[k]>=theta) {FUS[j,k]=gamma[j]\*(INT[j,endind]+theta\*log(max(xxx[k],theta)/theta)\*rho[j])}

}}

meanFUS=matrix(0, length(xxx), 1)

lclFUS=matrix(0, length(xxx), 1)

uclFUS=matrix(0, length(xxx), 1)

for (k in 1:length(xxx)) {

meanFUS[k]=exp(mean(FUS[,k]))

lclFUS[k]=exp(quantile(FUS[,k], 0.025))

uclFUS[k]= exp(quantile(FUS[,k], 0.975))

}