##BAPC预测#######

library(easyGBDR)

#版本配置

GBD\_edition(edition = 2021)#2019/2021

setwd("C:/Users/14278/Desktop/Stroke/预测")

df1 <- GBDread(folder=T,foldername ="C:/Users/14278/Desktop/Stroke/预测")

#####Low temperature-Death########

#查看数据

bapc\_results1 <- GBDbapc\_prediction(

 data = df1,#数据及以下参数填写要求均同Nordpred

 measure\_name = "Deaths",

 cause\_name = "Ischemic stroke",

 location\_name = "Global",

 rei\_name = "Low temperature",

 By\_sex = F,

 predyear = 2050,

 full\_age\_adjusted = T,

 rate\_lessen = NULL,

 pop\_predict = "WHO"

)

str(bapc\_results1)

# 加载必要的包（如果还没安装，需要先安装）

library(ggsci) # NEJM配色

# 提取所需数据

number\_data <- bapc\_results1$all\_age\_projection

asr\_data <- bapc\_results1$ASR

# 合并数据并整理

combined\_data <- rbind(

 data.frame(

 year = number\_data$year,

 value = number\_data$pred\_val,

 type = "Number",

 sex = number\_data$sex,

 lower = number\_data$pred\_low,

 upper = number\_data$pred\_up

 ),

 data.frame(

 year = asr\_data$year,

 value = asr\_data$pred\_val,

 type = "ASR",

 sex = asr\_data$sex,

 lower = asr\_data$pred\_low,

 upper = asr\_data$pred\_up

 )

)

# 创建双轴图

p1 <- ggplot() +

 # 添加柱状图 (Number)

 geom\_bar(data = subset(combined\_data, type == "Number" & year <= 2036),

 aes(x = year, y = value, fill = sex),

 stat = "identity", position = "dodge", alpha = 0.8, width = 0.7) +

 # 添加线图 (ASR)

 geom\_line(data = subset(combined\_data, type == "ASR" & year <= 2036),

 aes(x = year, y = value \* max(subset(combined\_data, type == "Number" & year <= 2036)$value) /

 max(subset(combined\_data, type == "ASR" & year <= 2036)$value),

 color = sex, linetype = sex), size = 1) +

 # 添加置信区间

 geom\_ribbon(data = subset(combined\_data, type == "ASR" & year <= 2036),

 aes(x = year,

 ymin = lower \* max(subset(combined\_data, type == "Number" & year <= 2036)$value) /

 max(subset(combined\_data, type == "ASR" & year <= 2036)$value),

 ymax = upper \* max(subset(combined\_data, type == "Number" & year <= 2036)$value) /

 max(subset(combined\_data, type == "ASR" & year <= 2036)$value),

 fill = sex), alpha = 0.1) +

 # 设置双Y轴

 scale\_y\_continuous(

 name = "Number",

 labels = scales::comma, # 添加千位分隔符

 sec.axis = sec\_axis(

 ~ . \* max(subset(combined\_data, type == "ASR" & year <= 2036)$value) /

 max(subset(combined\_data, type == "Number" & year <= 2036)$value),

 name = "Age-standardized rate (per 100,000)"

 )

 ) +

 # 使用NEJM配色

 scale\_fill\_nejm() +

 scale\_color\_nejm() +

 # 设置x轴刻度

 scale\_x\_continuous(breaks = seq(1990, 2036, by = 5)) +

 # 添加主题和标签

 theme\_minimal() +

 theme(

 axis.title.y.left = element\_text(color = "black", size = 12),

 axis.title.y.right = element\_text(color = "black", size = 12),

 axis.text = element\_text(size = 10),

 legend.position = "bottom",

 legend.title = element\_text(size = 12),

 legend.text = element\_text(size = 10),

 panel.grid.minor = element\_blank(),

 panel.grid.major.x = element\_blank(),

 panel.border = element\_rect(fill = NA, color = "black", linewidth = 0.5),

 plot.title = element\_text(size = 14, face = "bold", hjust = 0.5),

 plot.margin = margin(t = 20, r = 20, b = 20, l = 20)

 ) +

 labs(

 x = "Year",

 title = "Death-Low temperature",

 subtitle = " ",

 fill = "Sex",

 color = "Sex"

 )

# 保存图片

ggsave("Deaths-Low temperature.pdf", p1, width = 8, height = 6, dpi = 300, device = cairo\_pdf)

#####Low temperature-DALYs########

#查看数据

bapc\_results2 <- GBDbapc\_prediction(

 data = df1,#数据及以下参数填写要求均同Nordpred

 measure\_name = "DALYs (Disability-Adjusted Life Years)",

 cause\_name = "Ischemic stroke",

 location\_name = "Global",

 rei\_name = "Low temperature",

 By\_sex = F,

 predyear = 2050,

 full\_age\_adjusted = T,

 rate\_lessen = NULL,

 pop\_predict = "WHO"

)

# 加载必要的包（如果还没安装，需要先安装）

library(ggsci) # NEJM配色

# 提取所需数据

number\_data <- bapc\_results2$all\_age\_projection

asr\_data <- bapc\_results2$ASR

# 合并数据并整理

combined\_data <- rbind(

 data.frame(

 year = number\_data$year,

 value = number\_data$pred\_val,

 type = "Number",

 sex = number\_data$sex,

 lower = number\_data$pred\_low,

 upper = number\_data$pred\_up

 ),

 data.frame(

 year = asr\_data$year,

 value = asr\_data$pred\_val,

 type = "ASR",

 sex = asr\_data$sex,

 lower = asr\_data$pred\_low,

 upper = asr\_data$pred\_up

 )

)

# 创建双轴图

p2 <- ggplot() +

 # 添加柱状图 (Number)

 geom\_bar(data = subset(combined\_data, type == "Number" & year <= 2036),

 aes(x = year, y = value, fill = sex),

 stat = "identity", position = "dodge", alpha = 0.8, width = 0.7) +

 # 添加线图 (ASR)

 geom\_line(data = subset(combined\_data, type == "ASR" & year <= 2036),

 aes(x = year, y = value \* max(subset(combined\_data, type == "Number" & year <= 2036)$value) /

 max(subset(combined\_data, type == "ASR" & year <= 2036)$value),

 color = sex, linetype = sex), size = 1) +

 # 添加置信区间

 geom\_ribbon(data = subset(combined\_data, type == "ASR" & year <= 2036),

 aes(x = year,

 ymin = lower \* max(subset(combined\_data, type == "Number" & year <= 2036)$value) /

 max(subset(combined\_data, type == "ASR" & year <= 2036)$value),

 ymax = upper \* max(subset(combined\_data, type == "Number" & year <= 2036)$value) /

 max(subset(combined\_data, type == "ASR" & year <= 2036)$value),

 fill = sex), alpha = 0.1) +

 # 设置双Y轴

 scale\_y\_continuous(

 name = "Number",

 labels = scales::comma, # 添加千位分隔符

 sec.axis = sec\_axis(

 ~ . \* max(subset(combined\_data, type == "ASR" & year <= 2036)$value) /

 max(subset(combined\_data, type == "Number" & year <= 2036)$value),

 name = "Age-standardized rate (per 100,000)"

 )

 ) +

 # 使用NEJM配色

 scale\_fill\_nejm() +

 scale\_color\_nejm() +

 # 设置x轴刻度

 scale\_x\_continuous(breaks = seq(1990, 2036, by = 5)) +

 # 添加主题和标签

 theme\_minimal() +

 theme(

 axis.title.y.left = element\_text(color = "black", size = 12),

 axis.title.y.right = element\_text(color = "black", size = 12),

 axis.text = element\_text(size = 10),

 legend.position = "bottom",

 legend.title = element\_text(size = 12),

 legend.text = element\_text(size = 10),

 panel.grid.minor = element\_blank(),

 panel.grid.major.x = element\_blank(),

 panel.border = element\_rect(fill = NA, color = "black", linewidth = 0.5),

 plot.title = element\_text(size = 14, face = "bold", hjust = 0.5),

 plot.margin = margin(t = 20, r = 20, b = 20, l = 20)

 ) +

 labs(

 x = "Year",

 title = "DALYs-Low temperature",

 subtitle = " ",

 fill = "Sex",

 color = "Sex"

 )

# 保存图片

ggsave("DALYs-Low temperature.pdf", p2, width = 8, height = 6, dpi = 300, device = cairo\_pdf)

#####High temperature-Death########

#查看数据

bapc\_results3 <- GBDbapc\_prediction(

 data = df1,#数据及以下参数填写要求均同Nordpred

 measure\_name = "Deaths",

 cause\_name = "Ischemic stroke",

 location\_name = "Global",

 rei\_name = "High temperature",

 By\_sex = F,

 predyear = 2050,

 full\_age\_adjusted = T,

 rate\_lessen = NULL,

 pop\_predict = "WHO"

)

library(ggsci) # NEJM配色

# 提取所需数据

number\_data <- bapc\_results3$all\_age\_projection

asr\_data <- bapc\_results3$ASR

# 合并数据并整理

combined\_data <- rbind(

 data.frame(

 year = number\_data$year,

 value = number\_data$pred\_val,

 type = "Number",

 sex = number\_data$sex,

 lower = number\_data$pred\_low,

 upper = number\_data$pred\_up

 ),

 data.frame(

 year = asr\_data$year,

 value = asr\_data$pred\_val,

 type = "ASR",

 sex = asr\_data$sex,

 lower = asr\_data$pred\_low,

 upper = asr\_data$pred\_up

 )

)

# 创建双轴图

p3 <- ggplot() +

 # 添加柱状图 (Number)

 geom\_bar(data = subset(combined\_data, type == "Number" & year <= 2036),

 aes(x = year, y = value, fill = sex),

 stat = "identity", position = "dodge", alpha = 0.8, width = 0.7) +

 # 添加线图 (ASR)

 geom\_line(data = subset(combined\_data, type == "ASR" & year <= 2036),

 aes(x = year, y = value \* max(subset(combined\_data, type == "Number" & year <= 2036)$value) /

 max(subset(combined\_data, type == "ASR" & year <= 2036)$value),

 color = sex, linetype = sex), size = 1) +

 # 添加置信区间

 geom\_ribbon(data = subset(combined\_data, type == "ASR" & year <= 2036),

 aes(x = year,

 ymin = lower \* max(subset(combined\_data, type == "Number" & year <= 2036)$value) /

 max(subset(combined\_data, type == "ASR" & year <= 2036)$value),

 ymax = upper \* max(subset(combined\_data, type == "Number" & year <= 2036)$value) /

 max(subset(combined\_data, type == "ASR" & year <= 2036)$value),

 fill = sex), alpha = 0.1) +

 # 设置双Y轴

 scale\_y\_continuous(

 name = "Number",

 labels = scales::comma, # 添加千位分隔符

 sec.axis = sec\_axis(

 ~ . \* max(subset(combined\_data, type == "ASR" & year <= 2036)$value) /

 max(subset(combined\_data, type == "Number" & year <= 2036)$value),

 name = "Age-standardized rate (per 100,000)"

 )

 ) +

 # 使用NEJM配色

 scale\_fill\_nejm() +

 scale\_color\_nejm() +

 # 设置x轴刻度

 scale\_x\_continuous(breaks = seq(1990, 2036, by = 5)) +

 # 添加主题和标签

 theme\_minimal() +

 theme(

 axis.title.y.left = element\_text(color = "black", size = 12),

 axis.title.y.right = element\_text(color = "black", size = 12),

 axis.text = element\_text(size = 10),

 legend.position = "bottom",

 legend.title = element\_text(size = 12),

 legend.text = element\_text(size = 10),

 panel.grid.minor = element\_blank(),

 panel.grid.major.x = element\_blank(),

 panel.border = element\_rect(fill = NA, color = "black", linewidth = 0.5),

 plot.title = element\_text(size = 14, face = "bold", hjust = 0.5),

 plot.margin = margin(t = 20, r = 20, b = 20, l = 20)

 ) +

 labs(

 x = "Year",

 title = "death-High temperature",

 subtitle = " ",

 fill = "Sex",

 color = "Sex"

 )

# 保存图片

ggsave("death-High temperature.pdf", p3, width = 8, height = 6, dpi = 300, device = cairo\_pdf)

#####High temperature-DALYs########

#查看数据

bapc\_results4 <- GBDbapc\_prediction(

 data = df1,#数据及以下参数填写要求均同Nordpred

 measure\_name = "DALYs (Disability-Adjusted Life Years)",

 cause\_name = "Ischemic stroke",

 location\_name = "Global",

 rei\_name = "High temperature",

 By\_sex = F,

 predyear = 2050,

 full\_age\_adjusted = T,

 rate\_lessen = NULL,

 pop\_predict = "WHO"

)

# 加载必要的包（如果还没安装，需要先安装）

library(ggsci) # NEJM配色

# 提取所需数据

number\_data <- bapc\_results4$all\_age\_projection

asr\_data <- bapc\_results4$ASR

# 合并数据并整理

combined\_data <- rbind(

 data.frame(

 year = number\_data$year,

 value = number\_data$pred\_val,

 type = "Number",

 sex = number\_data$sex,

 lower = number\_data$pred\_low,

 upper = number\_data$pred\_up

 ),

 data.frame(

 year = asr\_data$year,

 value = asr\_data$pred\_val,

 type = "ASR",

 sex = asr\_data$sex,

 lower = asr\_data$pred\_low,

 upper = asr\_data$pred\_up

 )

)

# 创建双轴图

p4 <- ggplot() +

 # 添加柱状图 (Number)

 geom\_bar(data = subset(combined\_data, type == "Number" & year <= 2036),

 aes(x = year, y = value, fill = sex),

 stat = "identity", position = "dodge", alpha = 0.8, width = 0.7) +

 # 添加线图 (ASR)

 geom\_line(data = subset(combined\_data, type == "ASR" & year <= 2036),

 aes(x = year, y = value \* max(subset(combined\_data, type == "Number" & year <= 2036)$value) /

 max(subset(combined\_data, type == "ASR" & year <= 2036)$value),

 color = sex, linetype = sex), size = 1) +

 # 添加置信区间

 geom\_ribbon(data = subset(combined\_data, type == "ASR" & year <= 2036),

 aes(x = year,

 ymin = lower \* max(subset(combined\_data, type == "Number" & year <= 2036)$value) /

 max(subset(combined\_data, type == "ASR" & year <= 2036)$value),

 ymax = upper \* max(subset(combined\_data, type == "Number" & year <= 2036)$value) /

 max(subset(combined\_data, type == "ASR" & year <= 2036)$value),

 fill = sex), alpha = 0.1) +

 # 设置双Y轴

 scale\_y\_continuous(

 name = "Number",

 labels = scales::comma, # 添加千位分隔符

 sec.axis = sec\_axis(

 ~ . \* max(subset(combined\_data, type == "ASR" & year <= 2036)$value) /

 max(subset(combined\_data, type == "Number" & year <= 2036)$value),

 name = "Age-standardized rate (per 100,000)"

 )

 ) +

 # 使用NEJM配色

 scale\_fill\_nejm() +

 scale\_color\_nejm() +

 # 设置x轴刻度

 scale\_x\_continuous(breaks = seq(1990, 2036, by = 5)) +

 # 添加主题和标签

 theme\_minimal() +

 theme(

 axis.title.y.left = element\_text(color = "black", size = 12),

 axis.title.y.right = element\_text(color = "black", size = 12),

 axis.text = element\_text(size = 10),

 legend.position = "bottom",

 legend.title = element\_text(size = 12),

 legend.text = element\_text(size = 10),

 panel.grid.minor = element\_blank(),

 panel.grid.major.x = element\_blank(),

 panel.border = element\_rect(fill = NA, color = "black", linewidth = 0.5),

 plot.title = element\_text(size = 14, face = "bold", hjust = 0.5),

 plot.margin = margin(t = 20, r = 20, b = 20, l = 20)

 ) +

 labs(

 x = "Year",

 title = "DALYs-High temperature",

 subtitle = " ",

 fill = "Sex",

 color = "Sex"

 )

# 保存图片

ggsave("DALYs-High temperature.pdf", p4, width = 8, height = 6, dpi = 300, device = cairo\_pdf)

library(ggplot2)

library(ggsci)

library(cowplot)

library(dplyr)

library(patchwork)

# 合并图片并将legend放在底部

combined\_plot <- (p1 + p2) / (p3 + p4) +

 plot\_layout(guides = "collect") &

 theme(legend.position = "bottom")

# 保存图片

ggsave("combined\_predictions.pdf",

 combined\_plot,

 width = 300,

 height = 250,

 units = "mm",

 dpi = 300)

str(bapc\_results2)

# 为每个数据框创建CSV文件

write.csv(bapc\_results1$all\_age\_projection,

 "all\_age\_projection.csv",

 row.names = FALSE)

write.csv(bapc\_results1$crude\_rate,

 "crude\_rate.csv",

 row.names = FALSE)

write.csv(bapc\_results1$ASR,

 "ASR.csv",

 row.names = FALSE)

write.csv(bapc\_results1$Age\_standardized\_projection,

 "Age\_standardized\_projection.csv",

 row.names = FALSE)

write.csv(bapc\_results1$age\_specific\_rate,

 "age\_specific\_rate.csv",

 row.names = FALSE)

write.csv(bapc\_results1$age\_specific\_projection,

 "age\_specific\_projection.csv",

 row.names = FALSE)

str(bapc\_results2)

write.csv(bapc\_results2$all\_age\_projection,

 "all\_age\_projection.csv",

 row.names = FALSE)

write.csv(bapc\_results2$crude\_rate,

 "crude\_rate.csv",

 row.names = FALSE)

write.csv(bapc\_results2$ASR,

 "ASR.csv",

 row.names = FALSE)

write.csv(bapc\_results2$Age\_standardized\_projection,

 "Age\_standardized\_projection.csv",

 row.names = FALSE)

write.csv(bapc\_results2$age\_specific\_rate,

 "age\_specific\_rate.csv",

 row.names = FALSE)

write.csv(bapc\_results2$age\_specific\_projection,

 "age\_specific\_projection.csv",

 row.names = FALSE)

str(bapc\_results3)

write.csv(bapc\_results3$all\_age\_projection,

 "all\_age\_projection.csv",

 row.names = FALSE)

write.csv(bapc\_results3$crude\_rate,

 "crude\_rate.csv",

 row.names = FALSE)

write.csv(bapc\_results3$ASR,

 "ASR.csv",

 row.names = FALSE)

write.csv(bapc\_results3$Age\_standardized\_projection,

 "Age\_standardized\_projection.csv",

 row.names = FALSE)

write.csv(bapc\_results3$age\_specific\_rate,

 "age\_specific\_rate.csv",

 row.names = FALSE)

write.csv(bapc\_results3$age\_specific\_projection,

 "age\_specific\_projection.csv",

 row.names = FALSE)

str(bapc\_results4)

write.csv(bapc\_results4$all\_age\_projection,

 "all\_age\_projection.csv",

 row.names = FALSE)

write.csv(bapc\_results4$crude\_rate,

 "crude\_rate.csv",

 row.names = FALSE)

write.csv(bapc\_results4$ASR,

 "ASR.csv",

 row.names = FALSE)

write.csv(bapc\_results4$Age\_standardized\_projection,

 "Age\_standardized\_projection.csv",

 row.names = FALSE)

write.csv(bapc\_results4$age\_specific\_rate,

 "age\_specific\_rate.csv",

 row.names = FALSE)

write.csv(bapc\_results4$age\_specific\_projection,

 "age\_specific\_projection.csv",

 row.names = FALSE)