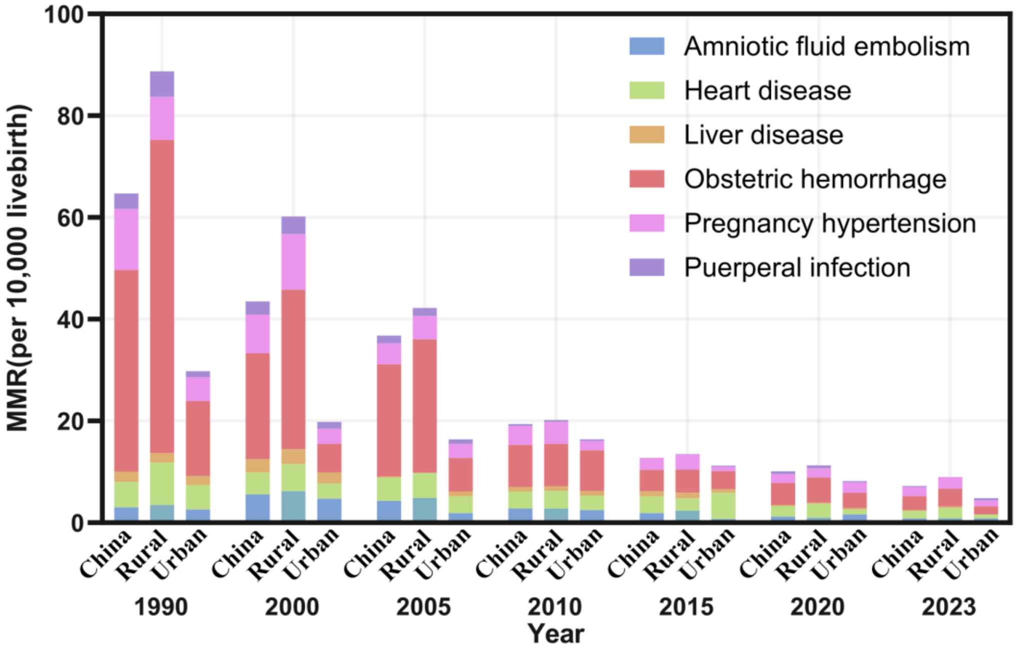

Figure S1. National, rural, and urban trends in major causes of MMR in China, 1990–2023. Data are sourced from the National Maternal Mortality Surveillance System (NMMSS).

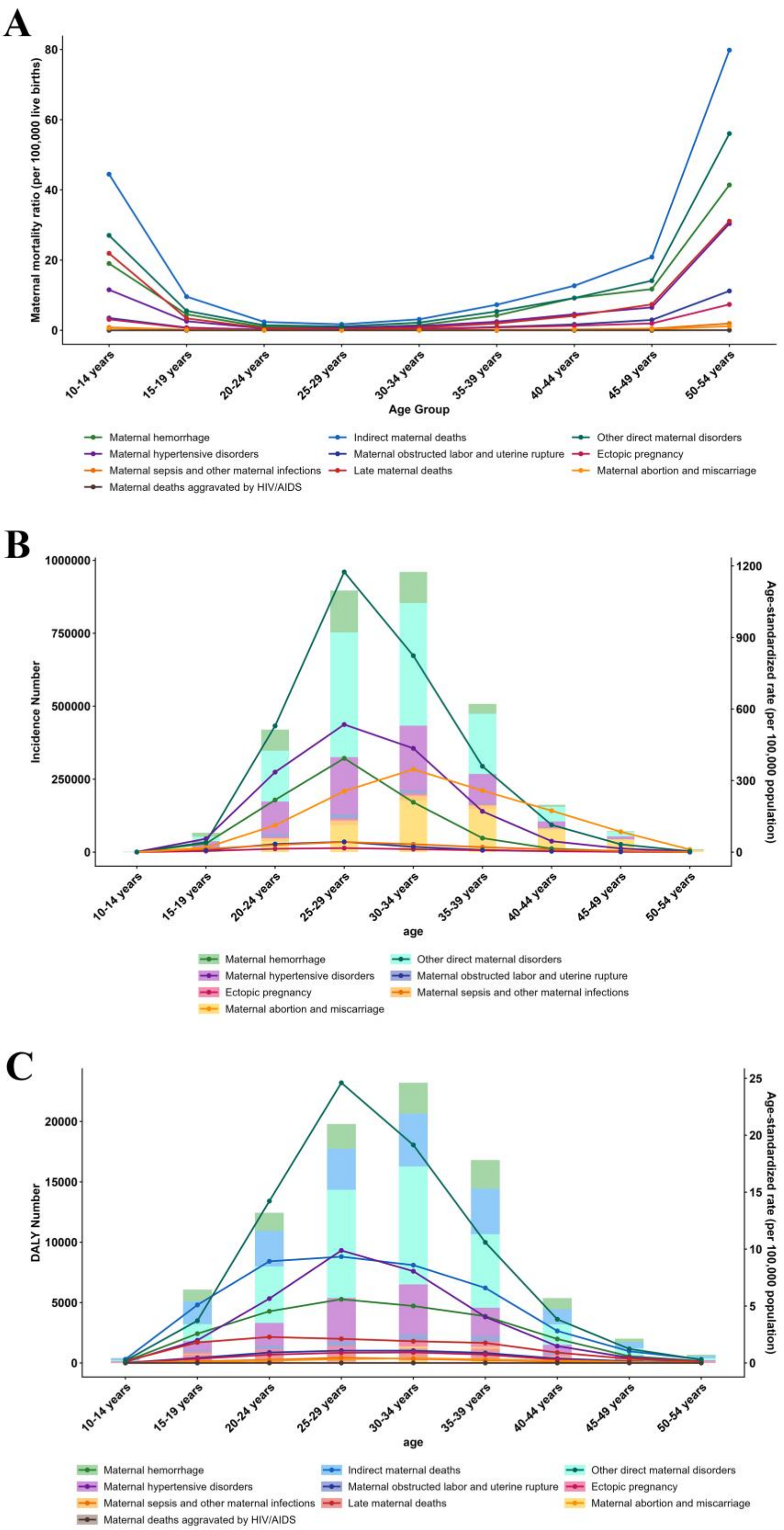

Figure S2. The disease burden of various maternal conditions in China across different age groups in 2023. (A) MMR, **(B**) Incidence, and **(C)** DALYs. The bar chart and left Y-axis represent the number, and the line chart and right Y-axis represent the age-standardized rate. Data are sourced from the GBD 2023.

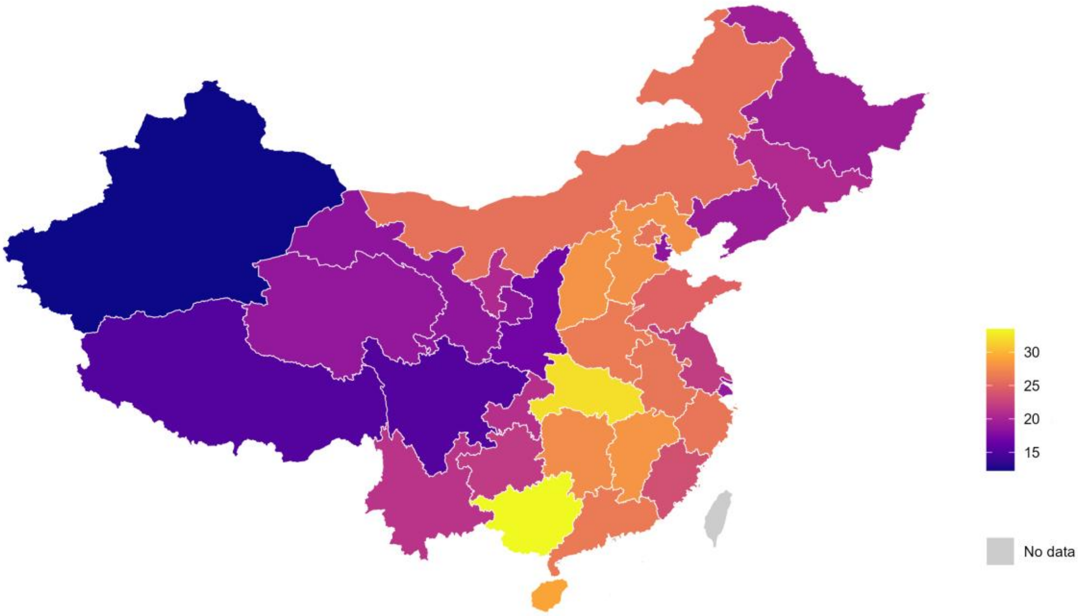

Figure S3. The density of obstetricians per 100,000 women in China, 2023. Data are sourced from the NMMSS.

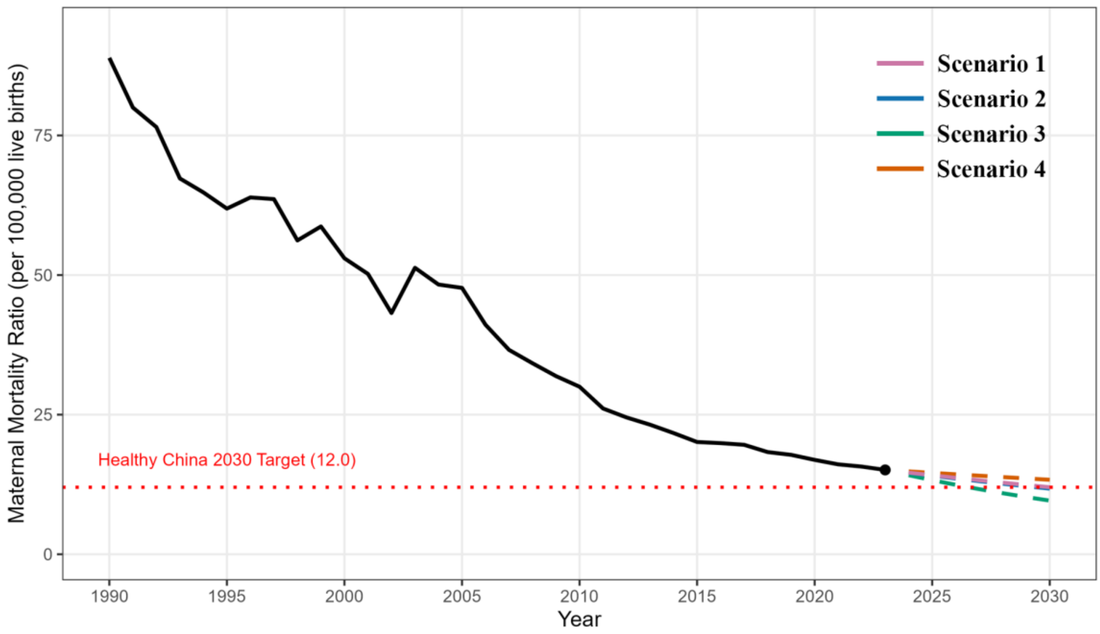

Figure S4. scenario-based projections model of MMR in China to 2030. The horizontal dotted line indicates the national target set by the "Healthy China 2030" initiative (12.0 deaths per 100,000 live births). Historical data are from the NMMSS.

Table S1. Definition of maternal disorder and the ICD-10 code in GBD 2023.

Maternal disorder	Definition	ICD-10 Code
Maternal obstructed labor and uterine rupture	Encompassing acute events of obstructed labour and uterine rupture during labour.	N82-N82.9, O64-O66.9, O70-O71.9, O83-O84.9
Ectopic pregnancy	Pregnancy that implants outside of the uterine cavity.	O00-O00.9
Maternal abortion and miscarriage	Miscarriage: spontaneous loss of pregnancy before 24 weeks of gestation and is measured on GBD as those that are clinically apparent and require medical care. Abortion: elective or medically indicated termination of pregnancy at any gestational age, regardless of symptoms or complications.	N96, O01-O08.9, O36.7-O36.73
Maternal haemorrhage	Postpartum haemorrhage (Any vaginal bleeding from any cause at or beyond 20 weeks of gestation and prior to onset of labour); Antepartum haemorrhage (defined as heavier than expected postpartum bleeding, >500 ml following vaginal delivery or >1000 ml after cesarean delivery.); Placental disorders with haemorrhage regardless of blood volume lost or timing of bleeding event.	O20-O20.9, O43.2-O43.239, O44-O44.00, O44.03O46.93, O62.2, O67-O67.9, O72-O72.3
Maternal sepsis and other maternal infections	Maternal sepsis: sepsis during pregnancy, labor, and delivery, or postpartum. Other maternal infections: other infections (without sepsis) believed to have a close epidemiological relationship with pregnancy, including genitourinary tract infections (excluding sexually transmitted diseases), obstetrical wound infections, and breast infections related to childbirth and lactation.	O23-O23.93, O41.1-O41.93, O85-O86.89, O91O91.23
Hypertensive disorders of pregnancy	gestational hypertension: new onset of hypertension in a pregnant person after 20 weeks of gestation as defined by having a blood pressure measured >140/90 on more than one occasion;	O10-O16.9

	pre-eclampsia: hypertension (>140/90 on more than one occasion) with proteinuria (≥0.3 g/L) or signs of end-organ damage; severe pre-eclampsia: preeclampsia with severe hypertension (>160/100) or signs of end organ damage (liver: low platelets, elevated liver enzymes, coagulation issues; kidney: elevated creatinine; central nervous system: headaches or visual disturbances); eclampsia: defined as hypertension and seizures, with or without proteinuria.	
Other direct maternal disorders	include a variety of different obstetric complications, the most common of which in ICD-10 coded VR mortality data include O88 (obstetric embolism), O26 (maternal care for other conditions predominantly related to pregnancy), O90 (complications of the puerperium, not elsewhere classified), O75 (other complications of labor and delivery, not elsewhere classified), C58 (malignant neoplasm of placenta), and O36 (maternal care for other fetal problems).	F53-F54, O09-O09.93, O18.0, O21-O22.93, O24.4O24.439, O25-O26.93, O28-O36.63, O36.8-O36.93, O38.4, O40-O41.03, O42-O43.199, O43.8-O43.93, O44.01-O44.02, O47-O48.1, O60-O62.1, O62.3O63.9, O68-O69.9, O73-O77.9, O80-O82.9, O87O90.9, O92-O92.79, O94-O95, O96-O97.9, O9A111 O9A513

Table S2. Definition of maternal healthcare service indicators in NMMSS.

Indicators	Definition
Prenatal screening rate	Proportion of pregnant women undergoing prenatal screening for birth defects in a given region over a specific period relative to the total number of local births.
Postnatal care visit rate	The ratio of the number of mothers who received one or more postpartum visits within 28 days after delivery in a given region during a specific period to the number of live births.
Hospital delivery rate	The ratio of live births in hospital to live births in a certain area in a certain period of time.
Systematic management rate	The ratio of the number of women receiving systematic maternal care in a given region over a specific period to the local number of live births. The number of women receiving systematic maternal care is defined as those who, during the reporting period, underwent early prenatal screening, at least five prenatal visits, delivery by skilled birth attendants, and postpartum follow-up visits in accordance with systematic maternal care protocols from pregnancy through 28 days postpartum.

Table S3. The MMR of maternal disorders with EAPCs from 1990 to 2023 in China and Global.

	China			Global		
Cause	**1990**	**2023**	**EAPC, 1990-2023**	**1990**	**2023**	**EAPC, 1990-2023**
Maternal disorders	121.9(100.6-149.4)	10.7(8.8-12.6)	-9.1(-9.8--8.3)	320.5(281.1-374.0)	190.5(165.1-222.5)	-2.0(-2.2--2.0)
Ectopic pregnancy	2.0(1.3-2.9)	0.3(0.2-0.5)	-7.0(-7.9--6.1)	6.7(4.4-9.7)	10.1(6.7-14.1)	1.0(0.9-1.0)
Indirect maternal deaths	17.1(10.5-25.2)	3.5(2.5-4.7)	-6.8(-7.8--5.9)	28.0(18.3-42.1)	18.3(13.0-26.0)	-1.2(-1.8--1.2)
Late maternal deaths	2.1(1.4-3.0)	0.9(0.7-1.3)	-3.9(-4.5--3.3)	5.4(4.3-6.8)	6.4(5.4-7.8)	0.3(0.1-0.3)
Maternal abortion and miscarriage	1.2(0.7-1.9)	0.0(0.0-0.1)	-11.2(-12.2--10.2)	34.1(22.0-50.3)	15.6(9.7-24.5)	-3.1(-3.4--3.1)
Maternal deaths aggravated by HIV/AIDS	0.0(0.0-0.0)	0.0(0.0-0.0)	-3.6(-5.2--2.0)	0.9(0.6-1.3)	1.3(0.8-1.8)	-0.5(-1.2--0.5)
Maternal hemorrhage	55.9(41.3-72.3)	1.8(1.1-2.5)	-12.1(-12.9--11.3)	115.7(83.3-149.8)	41.3(28.4-55.6)	-3.6(-3.8--3.6)
Maternal hypertensive disorders	18.1(13.0-24.2)	1.2(0.9-1.6)	-9.5(-10.2--8.8)	53.4(41.2-66.6)	38.3(29.6-47.6)	-1.3(-1.4--1.3)
Maternal obstructed labor and uterine rupture	8.4(4.8-13.6)	0.4(0.2-0.6)	-11.4(-12.4--10.4)	21.4(12.9-32.9)	9.7(6.0-14.6)	-2.9(-3.1--2.9)
Maternal sepsis and other maternal infections	8.9(5.8-12.8)	0.1(0.0-0.1)	-16.0(-16.9--15.2)	31.9(21.3-43.3)	21.2(15.1-29.5)	-1.6(-1.9--1.6)
Other direct maternal disorders	8.3(4.5-12.7)	2.4(1.4-3.5)	-5.3(-6.1--4.5)	23.2(14.2-35.8)	28.4(20.0-41.1)	0.2(0.0-0.2)

Table S4. Differences in China's maternal mortality rate between GBD 2023 and NMMSS.

Year	GBD, per 100,000 live births	NMMSS, per 100,000 live births	Absolute Difference (GBD-NMMSS), per 100,000 live births	Percentage difference ([GBD-NMMSS]/NMMSS), %
1990	121.89	88.90	32.99	37.11
1991	116.83	80.00	36.83	46.04
1992	113.95	76.50	37.45	48.95
1993	109.03	67.30	41.73	62.01
1994	107.71	64.80	42.91	66.22
1995	98.12	61.90	36.22	58.51
1996	96.60	63.90	32.70	51.17
1997	99.03	63.60	35.43	55.71
1998	90.18	56.20	33.98	60.46
1999	90.83	58.70	32.13	54.74
2000	81.89	53.00	28.89	54.51
2001	77.78	50.20	27.58	54.94
2002	67.92	43.20	24.72	57.22
2003	72.68	51.30	21.38	41.68
2004	65.25	48.30	16.95	35.09
2005	58.95	47.70	11.25	23.58
2006	46.35	41.10	5.25	12.77
2007	44.22	36.60	7.62	20.82
2008	34.52	34.20	0.32	0.94
2009	29.00	31.90	-2.90	-9.09
2010	24.68	30.00	-5.32	-17.73

2011	19.74	26.10	-6.36	-24.37
2012	16.73	24.50	-7.77	-31.71
2013	13.57	23.20	-9.63	-41.51
2014	14.05	21.70	-7.65	-35.25
2015	11.15	20.10	-8.95	-44.53
2016	10.85	19.90	-9.05	-45.48
2017	10.67	19.60	-8.93	-45.56
2018	9.90	18.30	-8.40	-45.90
2019	9.89	17.80	-7.91	-44.44
2020	9.68	16.90	-7.22	-42.72
2021	9.47	16.10	-6.63	-41.18
2022	10.61	15.70	-5.09	-32.42
2023	10.66	15.10	-4.44	-29.40

Table S5. Regional distribution of maternal health personnel and service institutions in China in 2023.

Region	Obstetrician, per 100,000 women	Midwife, per 100,000 women	Prenatal Diagnosis Specialist, per 100,000 women	Midwifery service institution, per 1000,000 women	Prenatal Diagnostic Service, per 1000,000 women
Beijing	25.95	15.46	2.50	10.00	0.89
Tianjin	18.55	24.70	0.81	10.40	0.57
Hebei	27.83	25.70	1.13	24.93	0.46
Shanxi	27.98	23.87	0.94	28.83	0.50
Nei Mongol	25.81	22.66	2.36	25.92	1.14
Liaoning	19.30	13.16	2.61	12.98	1.12
Jilin	20.76	13.43	2.04	12.48	0.65
Heilongjiang	19.52	12.11	0.85	18.41	0.50
Shanghai	18.90	13.64	3.86	6.97	1.03
Jiangsu	22.09	16.04	1.26	12.88	0.52
Zhejiang	26.09	30.03	2.81	13.19	0.66
Anhui	26.06	19.73	6.64	41.10	0.86
Fujian	23.48	45.07	3.85	27.66	0.99
Jiangxi	28.11	26.91	1.82	43.78	0.65
Shandong	24.85	15.36	3.14	13.69	0.76
Henan	26.48	25.16	1.60	21.83	0.60
Hubei	32.07	32.86	2.19	34.97	1.23
Hunan	27.58	18.49	2.59	22.56	0.86
Guangdong	26.41	28.95	3.70	26.00	1.29
Guangxi	33.45	50.46	4.30	49.56	1.21
Hainan	29.10	42.41	1.75	36.88	1.16
Chongqing	21.14	17.03	1.38	23.60	0.28

Sichuan	15.24	13.67	2.39	17.51	0.49
Guizhou	21.94	35.85	2.73	38.47	0.80
Yunnan	21.43	35.65	1.64	39.81	0.49
Tibet (Xizang)	15.29	17.44	0.70	33.24	0.95
Shaanxi	16.93	11.93	0.50	14.19	0.22
Gansu	18.52	29.34	1.62	26.05	0.25
Qinghai	18.77	18.73	4.06	51.60	5.16
Ningxia	20.64	26.82	0.46	18.59	0.84
Xinjiang	12.27	13.76	1.46	20.87	1.38

Table S6. Model performance metrics for BAPC predictions by age group.

	Incidence			Deaths			DALYs		
Age group	**MAE**	**RMSE**	**MAPE (%)**	**MAE**	**RMSE**	**MAPE (%)**	**MAE**	**RMSE**	**MAPE (%)**
50–54	2.78	3.36	0.047	2.48	3.94	5.36	7.55	10.23	0.51
45–49	2.57	3.19	0.004	4.83	7.08	3.2	9.63	12.33	0.16
40–44	2.21	2.94	0.002	6.66	8.42	1.76	6.97	8.72	0.04
35–39	3.19	3.86	0.001	8.53	10.47	1.14	8.4	9.96	0.02
30–34	2.36	2.87	0.0002	9.9	11.55	1.08	9.38	12.47	0.01
25–29	3.05	3.45	0.0002	8.63	10.84	0.92	8.28	11.18	0.009
20–24	6.54	7.02	0.0006	13.14	15.41	1.96	17.69	19.03	0.04
15–19	5.32	5.83	0.007	8.66	10.66	5.29	8.89	11.07	0.047
10–14	3.56	4.03	0.296	1.55	1.75	15.85	9.52	11.2	1.22
Overall			0.04			4.06			0.23

MAE, mean absolute error; RMSE, root mean squared error; MAPE, mean absolute percentage error.

Supplementary File 1. R code for Scenario-Based Projections

```
library(tidyverse)

library(readr)

file_path <- "C:/Users/Jb231/Desktop/GBD/GBD-china maternal disorder/figure/fig6/1990-2023MMR-NBS.csv"

historical_data <- read_csv(file_path) %>%

  select(year = Year, mmr = `Nation MMR`) %>%

  arrange(year)

if (nrow(historical_data)!= 34) {

  warning(paste("Warning: Loaded data has", nrow(historical_data), "rows. Expected 34 rows for the 1990-2023 period."))

} else {

  cat(sprintf("Successfully loaded %d rows of historical MMR data from %d to %d.\n",

              nrow(historical_data), min(historical_data$year), max(historical_data$year)))

}

calculate_arr <- function(data, start_y, end_y, mmr_target = NULL) {

  mmr_start <- data %>% filter(year == start_y) %>% pull(mmr)

  if (!is.null(mmr_target)) {

    mmr_end <- mmr_target

  } else {

    mmr_end <- data %>% filter(year == end_y) %>% pull(mmr)

  }

  arr <- 1 - exp(log(mmr_end / mmr_start) / (end_y - start_y))

  return(arr)

}

arr_reference <- calculate_arr(historical_data, 2015, 2023)

arr_optimistic <- calculate_arr(historical_data, 2000, 2015)

arr_pessimistic <- arr_reference / 2

healthy_china_target <- 12.0

arr_target <- calculate_arr(historical_data, start_y = 2023, end_y = 2030, mmr_target = healthy_china_target)
```

```r
cat(sprintf("Reference ARR (2015-2023): %.4f%%\n", arr_reference * 100))
cat(sprintf("Optimistic ARR (2000-2015): %.4f%%\n", arr_optimistic * 100))
cat(sprintf("Pessimistic ARR (Stagnation): %.4f%%\n", arr_pessimistic * 100))
cat(sprintf("Target Achievement ARR (Required): %.4f%%\n", arr_target * 100))
mmr_start_projection <- historical_data %>% filter(year == 2023) %>% pull(mmr)
projection_years <- 2024:2030
projections <- tibble(year = projection_years)
projections <- projections %>%
  mutate(
    t = year - 2023,
    mmr_reference = mmr_start_projection * (1 - arr_reference)^t,
    mmr_optimistic = mmr_start_projection * (1 - arr_optimistic)^t,
    mmr_pessimistic = mmr_start_projection * (1 - arr_pessimistic)^t,
    mmr_target = mmr_start_projection * (1 - arr_target)^t    # Projection for the 4th scenario
  ) %>%
  pivot_longer(
    cols = starts_with("mmr_"),
    names_to = "scenario",
    values_to = "mmr",
    names_prefix = "mmr_"
  )
print("Projected MMR values for 2030:")
print(projections %>% filter(year == 2030))
ggplot() +
  geom_line(data = historical_data, aes(x = year, y = mmr), color = "black", linewidth = 1.2) +
  geom_point(data = historical_data %>% filter(year == 2023), aes(x = year, y = mmr), color =
"black", size = 2.5) +
  geom_line(data = projections, aes(x = year, y = mmr, color = scenario), linetype = "dashed",
linewidth = 1.2) +
```

```
  geom_hline(yintercept = healthy_china_target, linetype = "dotted", color = "red", linewidth = 1)
+
  annotate("text", x = 1995, y = healthy_china_target + 5, label = "Healthy China 2030 Target
(12.0)", color = "red", size = 4) +
  scale_color_manual(
    name = "2030 Projection Scenarios",
    values = c(
      "reference" = "#0072B2",     # Blue
      "optimistic" = "#009E73",    # Green
      "pessimistic" = "#D55E00", # Orange
      "target" = "#CC79A7"          # Pink/Purple for the target path
    ),
    labels = c(
      "reference" = "Reference (2015-2023 Trend)",
      "optimistic" = "Optimistic (2000-2015 Trend)",
      "pessimistic" = "Pessimistic (Stagnation)",
      "target" = "Required Path to 2030 Target"
    )
  ) +
  labs(
    title = "Scenario-Based Projections of Maternal Mortality Ratio in China to 2030",
    subtitle = "Projections based on historical trends from China's National Bureau of Statistics
(NBS)",
    x = "Year",
    y = "Maternal Mortality Ratio (per 100,000 live births)"
  ) +
  scale_x_continuous(breaks = seq(1990, 2030, 5), limits = c(1990, 2030)) +
  scale_y_continuous(limits = c(0, max(historical_data$mmr) * 1.05)) +
  theme_bw(base_size = 14) +
  theme(
    legend.position = "bottom",
```

```
    plot.title = element_text(face = "bold", size = 16),
    plot.subtitle = element_text(size = 12),
    panel.grid.minor = element_blank()
  )
ggsave("mmr_four_scenarios_projection_china.png", width = 10, height = 7, dpi = 300)
```

Supplementary File 2. R code for BAPC Forecast model

```
setwd("C:/Users/11870/OneDrive/Desktop/GBD/To WJB_supplementary files/20251026")
library(BAPC)
library(INLA)
library(nordpred)
library(reshape2)
library(data.table)
library(tidyr)
library(tidyverse)
library(epitools)
library(ggplot2)
EC <- read.csv("C:/Users/11870/OneDrive/Desktop/GBD/To WJB_supplementary files/20251026/age-MD-IHME-GBD_2023_DATA-faf40f48-1.csv")
age_stand <- read.csv("C:/Users/11870/Downloads/GBD2021 world population age standard.csv")
ages <- c("10-14 years", "15-19 years", "20-24 years", "25-29 years", "30-34 years", "35-39 years", "40-44 years", "45-49 years", "50-54 years")
ages_2 <- c("<2 year", "2 to 4", "5 to 9", "10 to 14", "15 to 19", "20 to 24", "25 to 29", "30 to 34",
            "35 to 39", "40 to 44", "45 to 49", "50 to 54", "55 to 59", "60 to 64", "65 to 69", "70 to 74",
            "75 to 79", "80 to 84", "85 to 89", "90 to 94", "95 plus")
ages_3 <- c("10 to 14","15 to 19", "20 to 24", "25 to 29", "30 to 34", "35 to 39", "40 to 44", "45 to 49","50 to 54")
ages_4 <- c("50-54 years", "45-49 years", "40-44 years", "35-39 years", "30-34 years", "25-29 years", "20-24 years", "15-19 years", "10-14 years")
age_stand <- subset(age_stand,age %in% ages_2)
```

```
wstand <- c(age_stand$std_population[4:12] %>%
as.numeric())/sum(age_stand$std_population[1:20])

EC_Female_incidence <- subset(EC,age %in% ages &

                                      sex == 'Female' &

                                      measure == 'Incidence' &

                                      location == 'China' &

                                      metric == 'Number')[,c(4,7,8)]

setDT(EC_Female_incidence)

EC_Female_incidence_n <- dcast(data = EC_Female_incidence, year~age, value.var = "val")

row.names(EC_Female_incidence_n) <- EC_Female_incidence_n$year

EC_Female_incidence_n <- EC_Female_incidence_n[,-1]

EC_Female_incidence_n <- EC_Female_incidence_n[,c(9,8,7,6,5,4,3,2,1)]

EC_Female_incidence_n <- apply(EC_Female_incidence_n, c(1,2), as.integer) %>%
as.data.frame()

EC_Female_incidence_n <- apply(EC_Female_incidence_n, c(1,2), round) %>% as.data.frame()

rownames(EC_Female_incidence_n) <- 1990:2023

GBD_population <- read.csv("C:/Users/11870/OneDrive/Desktop/GBD/To WJB_supplementary
files/20251026/IHME-GBD_2023_DATA-f23c32d5-1.csv")

GBD_population <- subset(GBD_population, location_name == 'China')

GBD_population <- GBD_population[,c(4,6,8,11,12)]

GBD_population <- subset(GBD_population, sex_name == 'Female')

colnames(GBD_population)[colnames(GBD_population) == "sex_name"] <- "sex"

colnames(GBD_population)[colnames(GBD_population) == "age_name"] <- "age_group_name"

colnames(GBD_population)[colnames(GBD_population) == "year"] <- "year_id"


library(dplyr)

GBD_population <- GBD_population %>%

  mutate(age_group_name = case_when(

    age_group_name == "10-14 years" ~ "10 to 14",

    age_group_name == "15-19 years" ~ "15 to 19",

    age_group_name == "20-24 years" ~ "20 to 24",
```

```
    age_group_name == "25-29 years" ~ "25 to 29",
    age_group_name == "30-34 years" ~ "30 to 34",
    age_group_name == "35-39 years" ~ "35 to 39",
    age_group_name == "40-44 years" ~ "40 to 44",
    age_group_name == "45-49 years" ~ "45 to 49",
    age_group_name == "50-54 years" ~ "50 to 54",
    TRUE ~ age_group_name
  ))
prediction_var_name <- c("location_name","sex","age_group_name","year_id","val")
GBD_population_prediction <-
fread('IHME_POP_2017_2100_POP_REFERENCE_Y2020M05D01.csv') %>%
  select(prediction_var_name) %>%
  filter(age_group_name %in% ages_3 & year_id %in% 2024:2030)
GBD_population_prediction <- subset(GBD_population_prediction, sex=='Female'&
                                      location_name=='China')
GBD <- rbind(GBD_population,GBD_population_prediction)
GBD_Global_Female <- subset(GBD,location_name=='China' &sex=='Female')
setDT(GBD_Global_Female)
GBD_Global_Female_n <- dcast(data = GBD_Global_Female, year_id ~ age_group_name,
value.var = c("val"))
rownames(GBD_Global_Female_n) <- GBD_Global_Female_n$year_id
GBD_Global_Female_n <- GBD_Global_Female_n[,-1]
GBD_Global_Female_n <- apply(GBD_Global_Female_n, c(1,2), as.numeric) %>%
as.data.frame()
GBD_Global_Female_n <- apply(GBD_Global_Female_n, c(1,2), round) %>% as.data.frame()
colnames(GBD_Global_Female_n)[colnames(GBD_Global_Female_n) == "50 to 54"] <- "50-54
years"
colnames(GBD_Global_Female_n)[colnames(GBD_Global_Female_n) == "45 to 49"] <- "45-49
years"
colnames(GBD_Global_Female_n)[colnames(GBD_Global_Female_n) == "40 to 44"] <- "40-44
years"
colnames(GBD_Global_Female_n)[colnames(GBD_Global_Female_n) == "35 to 39"] <- "35-39
```

```
years"
colnames(GBD_Global_Female_n)[colnames(GBD_Global_Female_n) == "30 to 34"] <- "30-34 years"
colnames(GBD_Global_Female_n)[colnames(GBD_Global_Female_n) == "25 to 29"] <- "25-29 years"
colnames(GBD_Global_Female_n)[colnames(GBD_Global_Female_n) == "20 to 24"] <- "20-24 years"
colnames(GBD_Global_Female_n)[colnames(GBD_Global_Female_n) == "15 to 19"] <- "15-19 years"
colnames(GBD_Global_Female_n)[colnames(GBD_Global_Female_n) == "10 to 14"] <- "10-14 years"
GBD_Global_Female_n <- GBD_Global_Female_n[,c(9,8,7,6,5,4,3,2,1)]
rownames(GBD_Global_Female_n) <- 1990:2030
GBD_Global_Female_n <- GBD_Global_Female_n[rownames(GBD_Global_Female_n) %in% 1990:2030, ]
EC_pro <- matrix(data = NA, nrow = 2030-2023, ncol = ncol(GBD_Global_Female_n)) %>% as.data.frame()
rownames(EC_pro) <- seq(2024,2030,1)
colnames(EC_pro) <- names(EC_Female_incidence_n)
EC_Female_incidence_n <- rbind(EC_Female_incidence_n, EC_pro)
Female_MD <- APCList(EC_Female_incidence_n, GBD_Global_Female_n, gf=5)
Female_bapc_result <- BAPC(Female_MD, predict = list(npredict = 27, retro = F),
                           secondDiff = FALSE, stdweight = wstand, verbose = F)
Female_proj <- agespec.proj(x = Female_bapc_result) %>% as.data.frame()
Female_proj_mean <- Female_proj[,colnames(Female_proj) %like% 'mean']
colnames(Female_proj_mean) <- ages_4
write.csv(Female_proj_mean, file = "Female_incidence_China.csv")
Female_rate <- agespec.rate(x = Female_bapc_result) %>% as.data.frame()
Female_rate_mean <- Female_rate[,colnames(Female_proj) %like% 'mean']*100000
colnames(Female_rate_mean) <- ages_4
write.csv(Female_rate_mean, file = "Female_ASIR_China.csv")
plotBAPC(Female_bapc_result, scale=10^5, type = 'ageSpecRate', showdata = TRUE)
```

```
plotBAPC(Female_bapc_result, scale=10^5, type = 'ageStdRate', showdata = TRUE)

Female_sum_year <- apply(Female_proj_mean, 1, sum) %>% as.data.frame()

colnames(Female_sum_year) <- 'number'

Female_sum_year$year <- rownames(Female_sum_year)
```