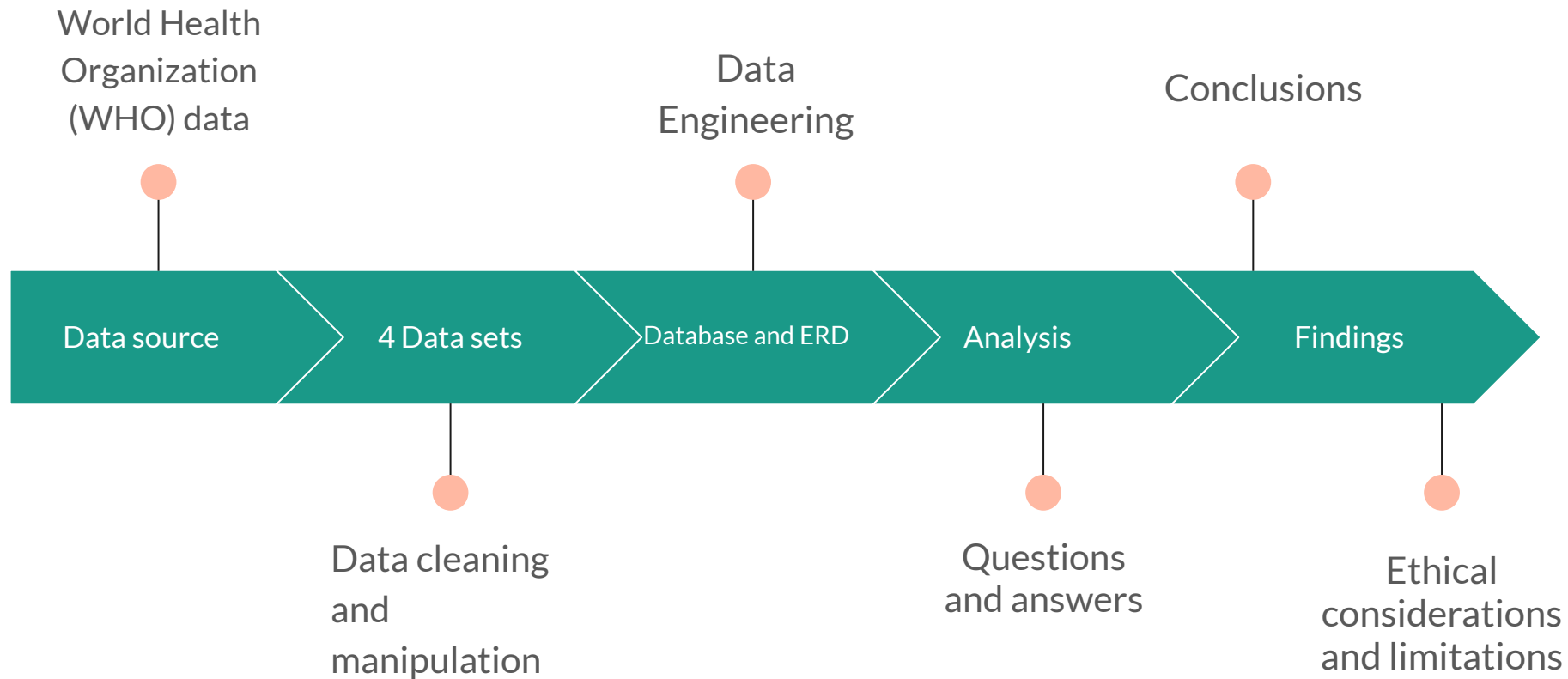




# WOMEN AND HEALTH

maternal and reproductive health

Project 3-Team-1

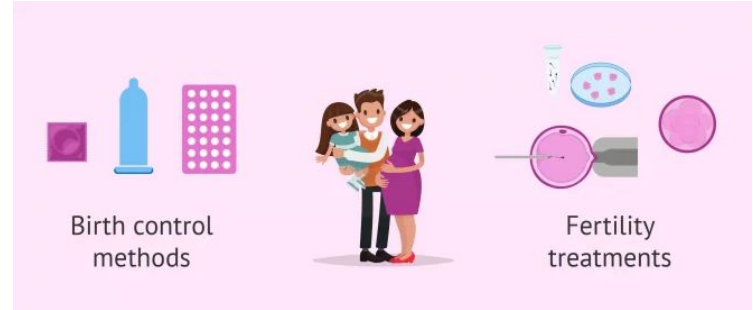


# Introduction

*How modern family planning methods impact reproductive health outcome and maternal well-being?*

Source: World Health Organization (4 datasets)

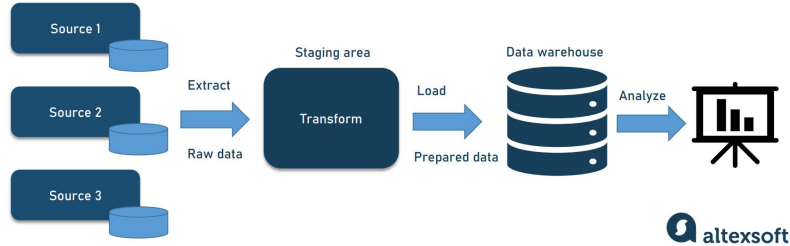
- **Mental health** (psychological well-being such as depression, stress, anxiety)
- **Skilled birth attendance** (count with doctors, nurses and midwives support)



- **Postpartum support** (health care for mothers within the first months)
  - Women at reproductive age (15-49 years old)

# Data Engineering - Data Pipeline Architecture

ETL PIPELINE



Step 1: Data Collection , Relational database

Step 2: Data Cleaning

Step 3: Data Transformation

Step 4: Data Normalization

Step 5: Data Modeling - ERD and Connections

Step 6: Exploratory Data Analysis

Step 7: Data Visualization

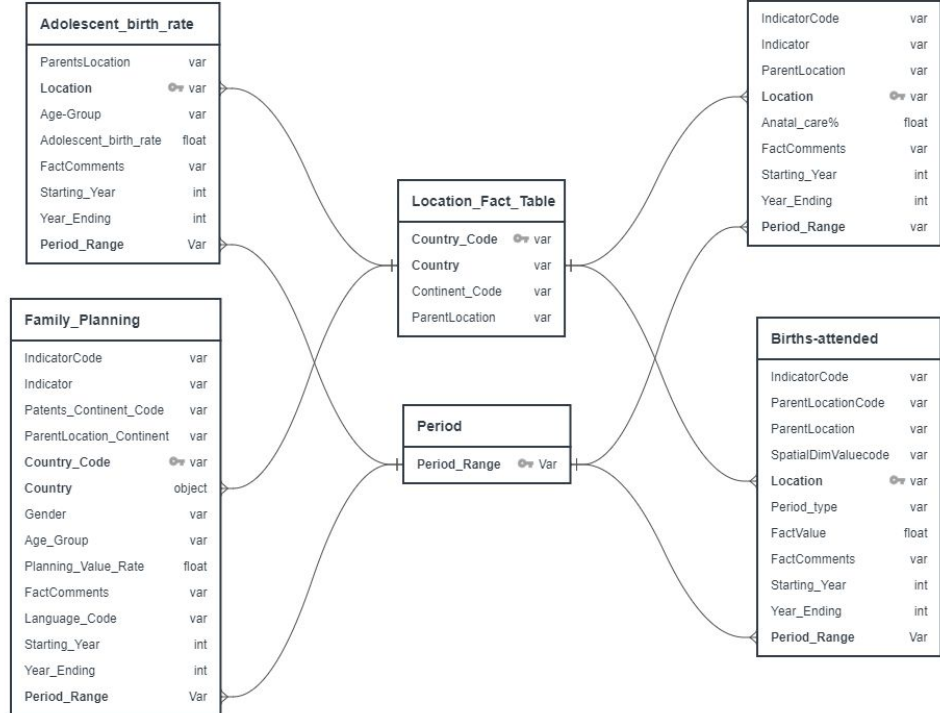


```

#Import dependencies
import csv
import os
import matplotlib as plt
import pandas as pd
from pathlib import Path
import matplotlib.pyplot as plt
import numpy as np
  
```

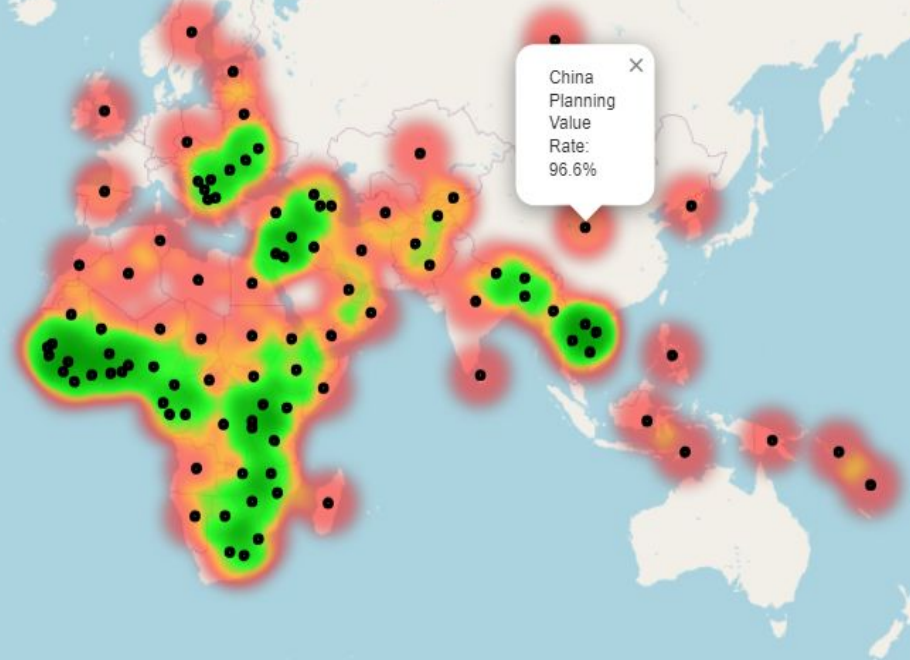
```

from importlib import resources
import seaborn as sns
import geopandas as gpd
import folium
from folium.plugins import HeatMap
import time
from selenium import webdriver
from IPython.display import Image
  
```



	ParentLocation_Continent	mean_planning_value_rate
1	Americas	72.736000
4	South-East Asia	71.116667
3	Europe	57.339130
5	Western Pacific	56.946667
0	Africa	50.541304
2	Eastern Mediterranean	50.250000

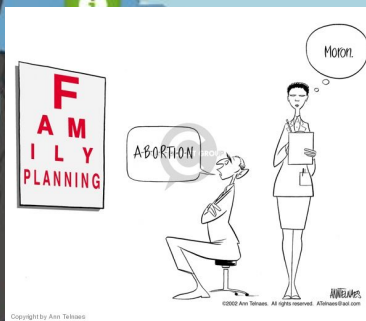
## Geographical Analysis - Family Planning Data set





# Top Three Countries within each Continent - Family Planning Data set

ParentLocation_Continent	Country	mean_planning_value_rate
0 Western Pacific	China	96.6
1 Western Pacific	Marshall Islands	80.5
2 Western Pacific	Lao People's Democratic Republic	72.3
3 South-East Asia	Democratic People's Republic of Korea	89.6
4 South-East Asia	Thailand	88.2
5 South-East Asia	Bhutan	84.6
6 Europe	France	95.5
7 Europe	Sweden	86.7
8 Europe	United Kingdom of Great Britain and Northern I...	86.5
9 Eastern Mediterranean	Egypt	80.0
10 Eastern Mediterranean	Morocco	72.0
11 Eastern Mediterranean	Qatar	68.9
12 Americas	Nicaragua	89.8
13 Americas	Brazil	89.3
14 Americas	Cuba	86.9
15 Africa	Zimbabwe	84.8
16 Africa	Eswatini	82.9
17 Africa	Lesotho	82.8



# ADOLESCENT BIRTH

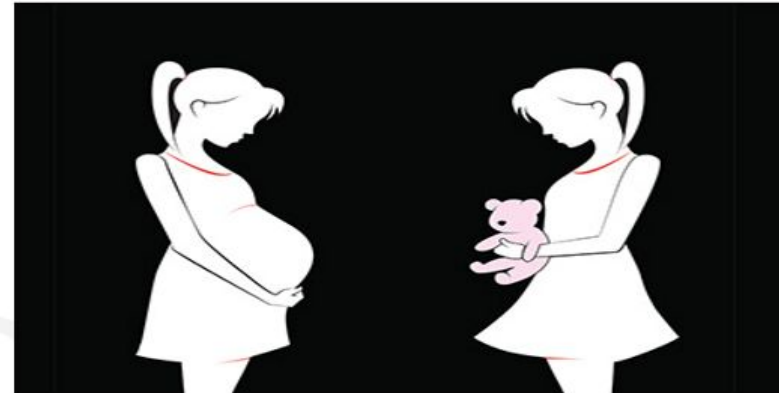
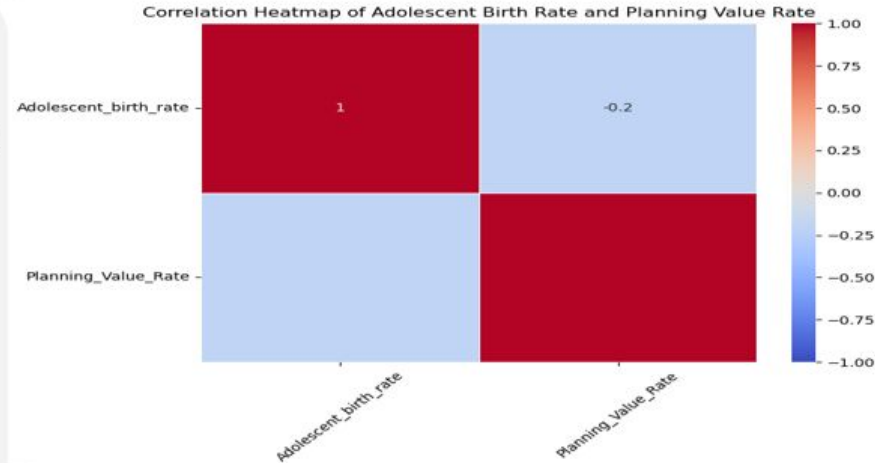
- **ADOLESCENT BIRTH RATE** is defined as the annual number of births to women aged 15-19 years per 1000 women in that age group.
- It is a key indicator of reproductive health among youth, reflecting both societal and individual health aspects.
- **AVERAGE RATE:** The global Average is 21.73 births per 1,000 girls aged 15-19.
- In recent years **ZAMBIA** has the highest rate at 68.75 births per 1,000 girls.
- **FACTORS** influencing Adolescent Birth Rates
  1. Socio-Economic Factors
  2. Education
  3. Family Planning Access

Period Range	Location	Adolescent BirthRate per 1000 girls
2009-2011	Equatorial Guinea	176.00
2018-2020	Cameroon	105.30
	Central African Republic	96.20
	Cote d'Ivoire	96.00
2021-2023	Zimbabwe	86.80
2012-2014	Angola	86.70
2021-2023	Mozambique	82.50
2006-2008	South Sudan	82.25
2012-2014	Vanuatu	81.00
	Solomon Islands	78.00



# CORRELATION BETWEEN ACCESS TO MODERN FAMILY PLANNING METHODS AND ADOLESCENT BIRTH RATES

- **STATISTICAL CORRELATION:** There is a weak negative correlation (-0.20), meaning as access to family planning increases, adolescent birth rates slightly decrease.
- **INTERPRETATION:** While better access to family planning correlates with lower birth rates, the effect is not strong.
- **FOCUS:**
  - Emphasize policies that enhance socio-economic conditions
  - Provide comprehensive sex education,
  - and improve access to modern family planning.





# Maternal Wellbeing

Correlations between family planning access and maternal healthcare seeking behavior?

Between 2021-2023:

## Skilled care attendance rate

Global average was around **85%**, with substantial regional variations. **Africa** and **South-East Asia** have some of the **lowest skilled care** attendance rates

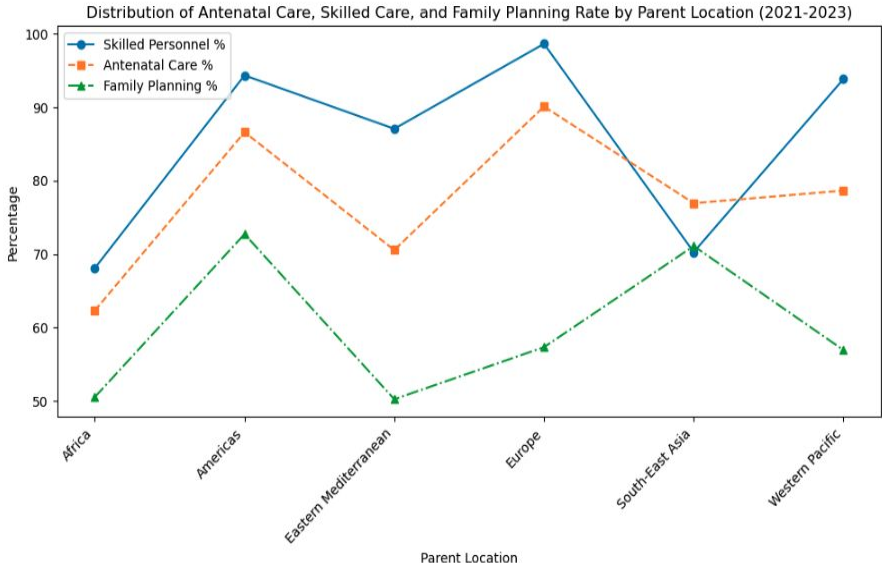
## Antenatal care rate

Global average was around **77%**, with substantial regional variations. **Africa** and **East Mediterranean** have some of the **lowest antenatal care** attendance rates

## Family planning rate

Global average was around **60%**, with substantial regional variations. **Africa** and **East Mediterranean** have some of the **lowest family planning rates**, highlighting the need for targeted interventions in these regions.

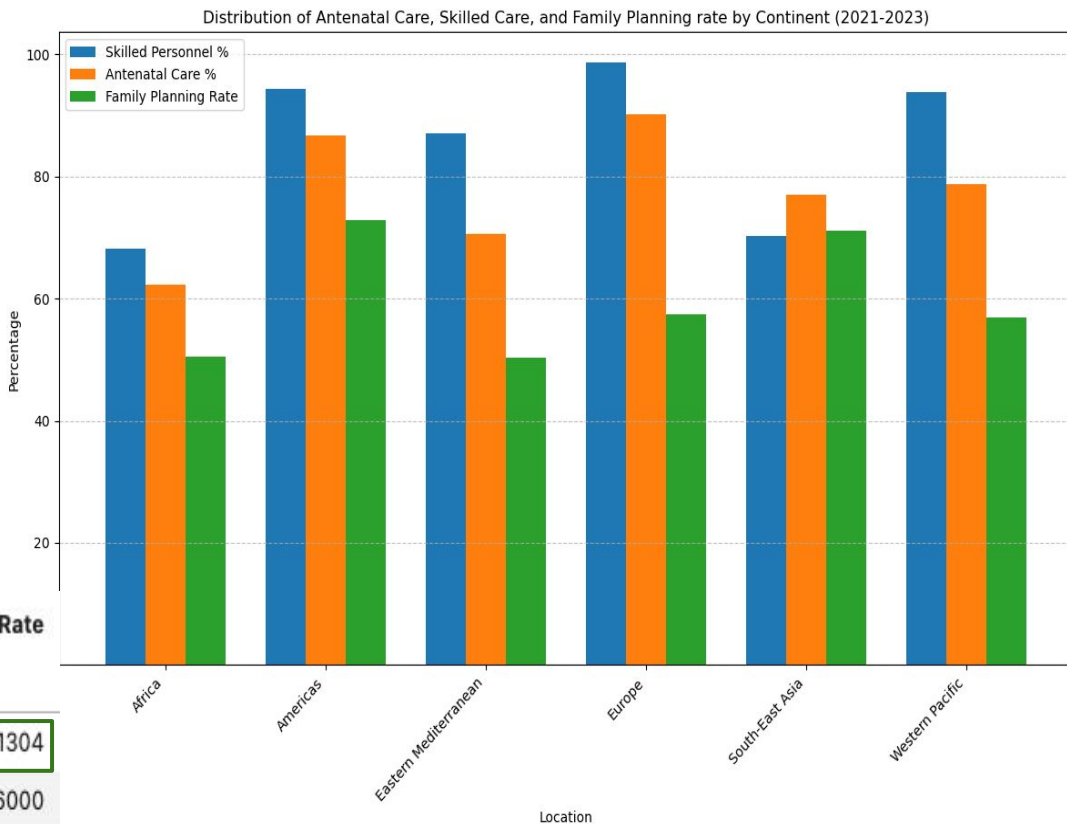
ParentLocation	skilled_personnel%	Anatal_care%	Planning_Value_Rate	Period_Range_x
Africa	68.099313	62.326531	50.541304	2021-2023
Americas	94.357270	86.622857	72.736000	2021-2023
Eastern Mediterranean	87.081481	70.566667	50.250000	2021-2023
Europe	98.651609	90.111211	57.339130	2021-2023
South-East Asia	70.286813	76.945455	71.116667	2021-2023
Western Pacific	93.851903	78.666667	56.946667	2021-2023



# Maternal WellBeing

Are there correlations between family planning access and maternal healthcare seeking behavior, such as antenatal care attendance and skilled birth attendance?

	skilled_personnel%	Anatal_care%	Planning_Value_Rate
ParentLocation			
Africa	68.099313	62.326531	50.541304
Americas	94.357270	86.622857	72.736000
Eastern Mediterranean	87.081481	70.566667	50.250000
Europe	98.651609	90.111211	57.339130
South-East Asia	70.286813	76.945455	71.116667
Western Pacific	93.851903	78.666667	56.946667



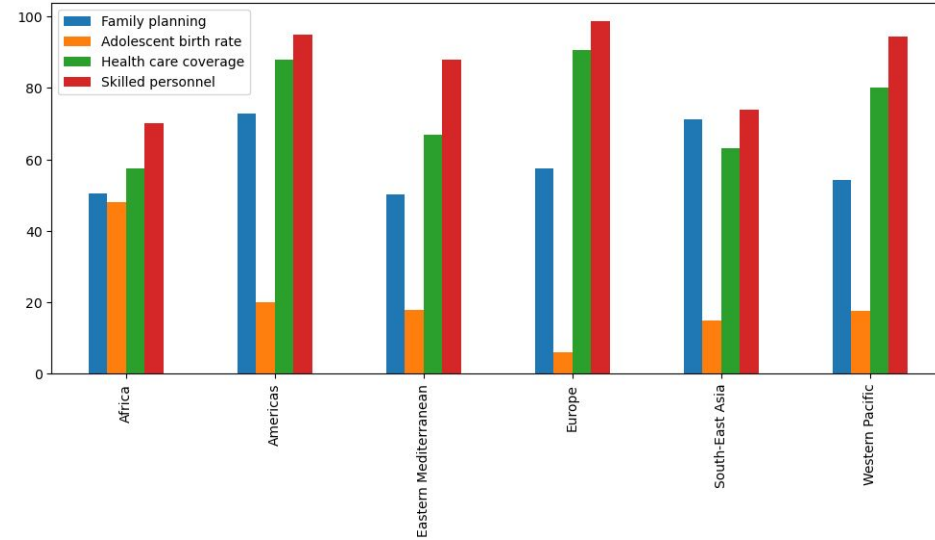
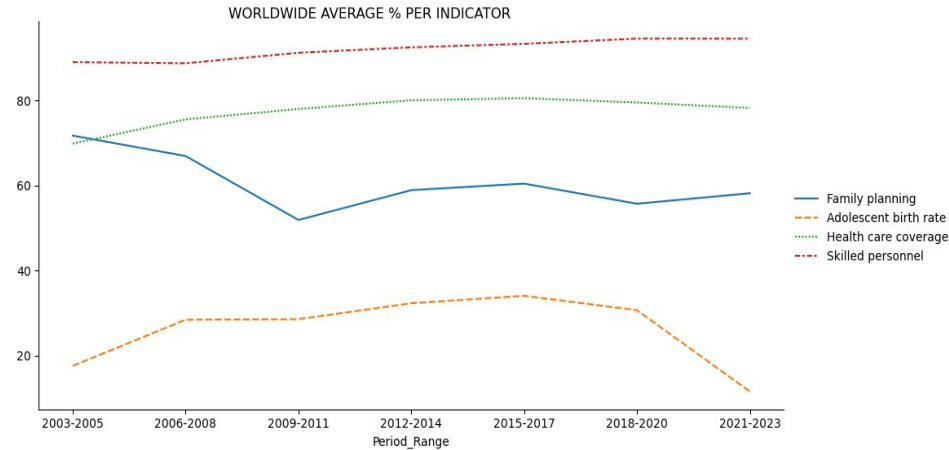
There are correlations between access to family planning and maternal healthcare-seeking behaviors such as antenatal care (ANC) rates and skilled care attendance rates (e.g. Africa) though disparities exist (e.g. South-east Asia)

Studies have shown that women who use contraception are more likely to attend antenatal care visits and seek skilled care during childbirth.

# Conclusions

- 19% reduction on family planning methods from 2003-2005, compared to 2009-2011.
- Unintended pregnancies can be influenced by lack of health care coverage but also by socio-economic factors (87% gap between Europe and Africa)
- Strong relation between antenatal health care coverage and pregnancies assisted with skilled personnel.
- Healthier pregnancy spacing (Better choices)
- Improve maternal health - not being able to conclude on it. Health care coverage will include mental health (?)

Africa: 49, Americas: 49, Eastern-Mediterranean: 22, Europe: 55, South-East Asia: 11, Western-Pacific: 34.



# Limitations and ethical considerations

## Ethical considerations:

**Privacy Protection:** Implement stringent measures to protect the confidentiality and security of personal and health-related data. Adhere to international standards and regulations such as GDPR (General Data Protection Regulation) or other relevant data protection laws.

**Informed Consent:** Obtain informed consent from users regarding the collection, use, and disclosure of their data. Clearly explain how their data will be used by WHO and any third parties involved.



## Limitations:

- ❖ Period data not standardized across datasets
- ❖ Not all countries are considered in data collection process
- ❖ Only 4 indicators analyzed
- ❖ Other socio-economic factors not considered for the study (wars, pandemic, different country laws in abortion, etc)

We adhere to key ethical principles to ensure responsible use. We **accurately represent** and **interpret** the data without alteration or bias, ensuring its integrity. All data is **properly attributed** to the WHO. We maintain **transparency** by clearly describing our analytical methods and disclosing any limitations of the data. We also respect **data privacy**, ensuring any data used is appropriately anonymized and handled sensitively. Compliance with the WHO's **terms of use** is strictly followed, avoiding any unauthorized or commercial use. Our analysis aims to contribute positively to **Educational Purpose**, avoiding misuse or harm.

# Sources:

- <https://kofirm.com/contract-negotiation-101-the-importance-of-limitations-of-liability>
- <https://www.invitra.com/en/family-planning-methods/>

## Other references:

	Period_Range	Family planning	Adolescent birth rate	Health care coverage	Skilled personnel
0	2003-2005	71.73	17.60	69.85	89.00
1	2006-2008	66.93	28.45	75.55	88.73
2	2009-2011	51.90	28.58	77.99	91.20
3	2012-2014	58.91	32.32	80.03	92.48
4	2015-2017	60.45	34.07	80.52	93.30
5	2018-2020	55.71	30.68	79.51	94.53
6	2021-2023	58.18	11.58	78.23	94.52

	Family planning	Adolescent birth rate	Health care coverage	Skilled personnel
Africa	50.54	48.01	57.56	70.20
Americas	72.74	20.14	87.86	94.97
Eastern Mediterranean	50.25	17.97	66.83	87.77
Europe	57.34	6.02	90.46	98.72
South-East Asia	71.12	14.79	63.05	73.83
Western Pacific	54.11	17.53	80.03	94.39