

The Role of Technological Advancement in Shaping Birth Rate Trends in the United States

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EPPS 6302.001 Fall 2024

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Introduction

- The fall and rise of birth rates in the United States is a multifaceted issue shaped by a variety of social, demographic, economic, technological, and policy-related factors.
- Birth rates serve as critical indicators of population growth and societal health, as fluctuations in these rates have significant implications for the economy and public services.
- According to the National Center for Health Statistics, the number of births in the United States declined by 2% from 2022 to 2023 (National Health Statistics, 2023). This trend continues a pattern of gradual decline observed in recent years, raising questions about the factors driving these shifts and their potential long-term consequences.





Research Questions

1. Do medical technological advancements have an impact on the birth rate in the United States?

2. What other factors could be influencing birth rate trends?



Primary Hypothesis:

H0: Technological advancements such as assisted reproductive technology (ART), do not have a remarkable impact on changes in birth rates in the United States, while any changes in birth rate in the United States are related to economic conditions, policies, and cultural changes.

Ha1: Technological advancement such as assisted reproductive technology (ART), do have a significant influence on trends in birth rate in the United States either by boosting the percentage of planned pregnancies or changing demographic behaviors related to family planning.



Secondary Hypotheses:

H02: Empowerment-related factors, such as the third wave of feminism and shift in gender roles, do not have a remarkable impact on birth rate trends in the United States. Changes in social norms around parenthood and family structures do not affect fertility behavior.

Ha2: Empowerment-related factors, such as the third wave of feminism and shift in gender roles, do have a significant effect on birth rate changes in the United States by childbearing, reducing family sizes, and changing fertility preferences.



Data Sources

- Demographic data from the U.S. Census Bureau's American Community Survey (ACS) from the year 2010.
- ART Procedure data from Centers for Disease Control and Prevention (CDC) 2000 - 2022.
- U.S. Census Dataset
- Urbanization Data from World Bank (2024)



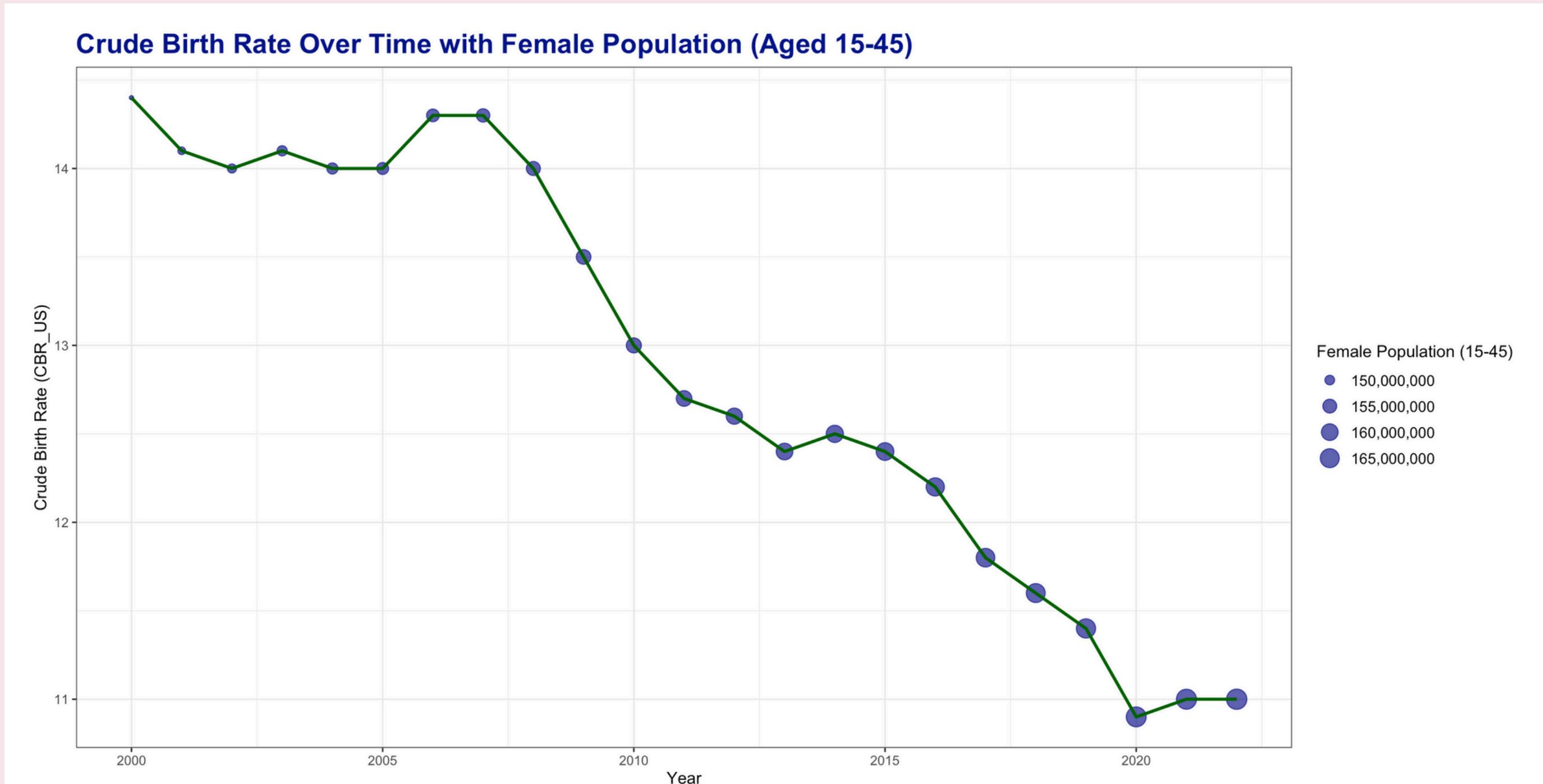


Methodologies

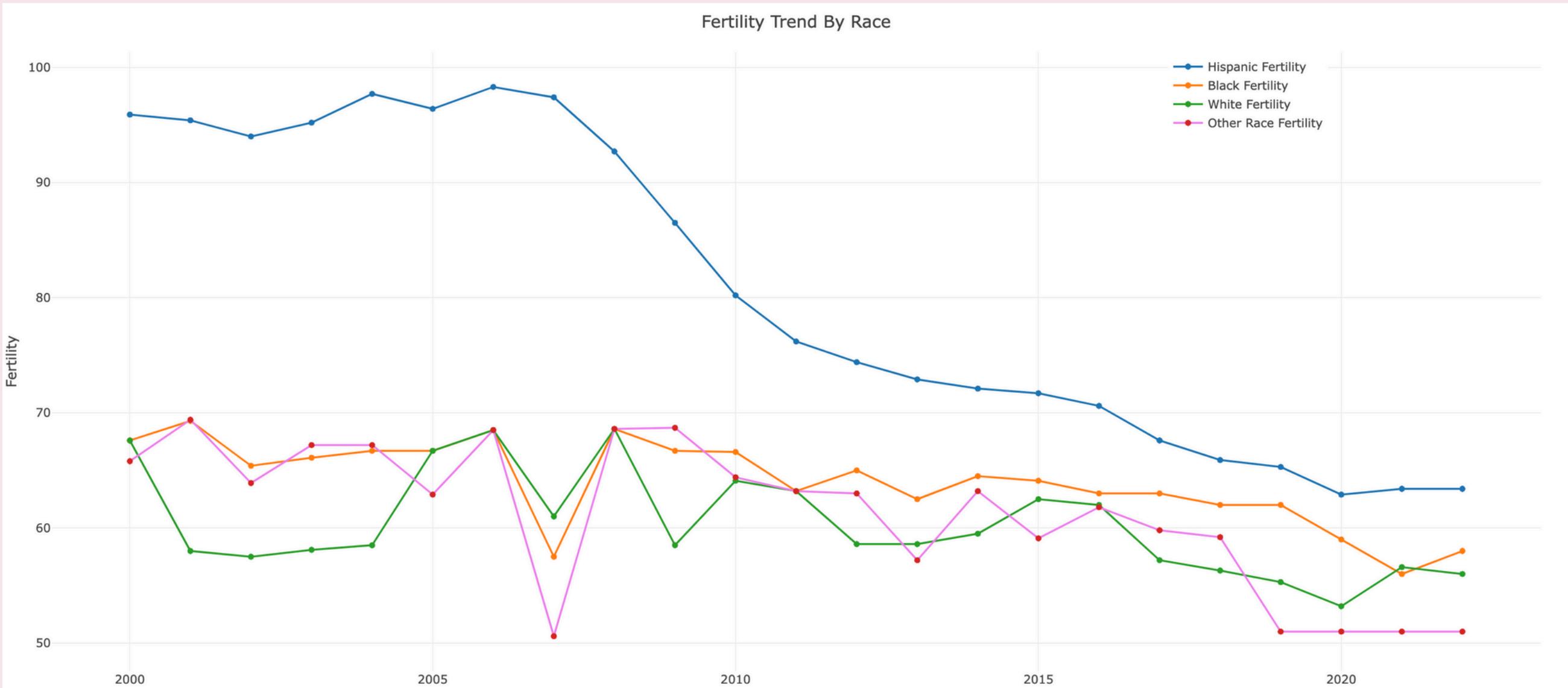
- Web scraping was one of the most effective and truly efficient techniques used in gathering relevant and necessary data for this study.
- The R script serves the purpose of extraction and evaluation of age and sex demographic data from the U.S. Census Bureau's American Community Survey (ACS) from the year 2010.
- The R script processes time series data related to birth statistics.
- To handle missing values, two interpolation methods are applied: linear interpolation using `na.approx()` and spline interpolation for smoother predictions using `na.spline()`.



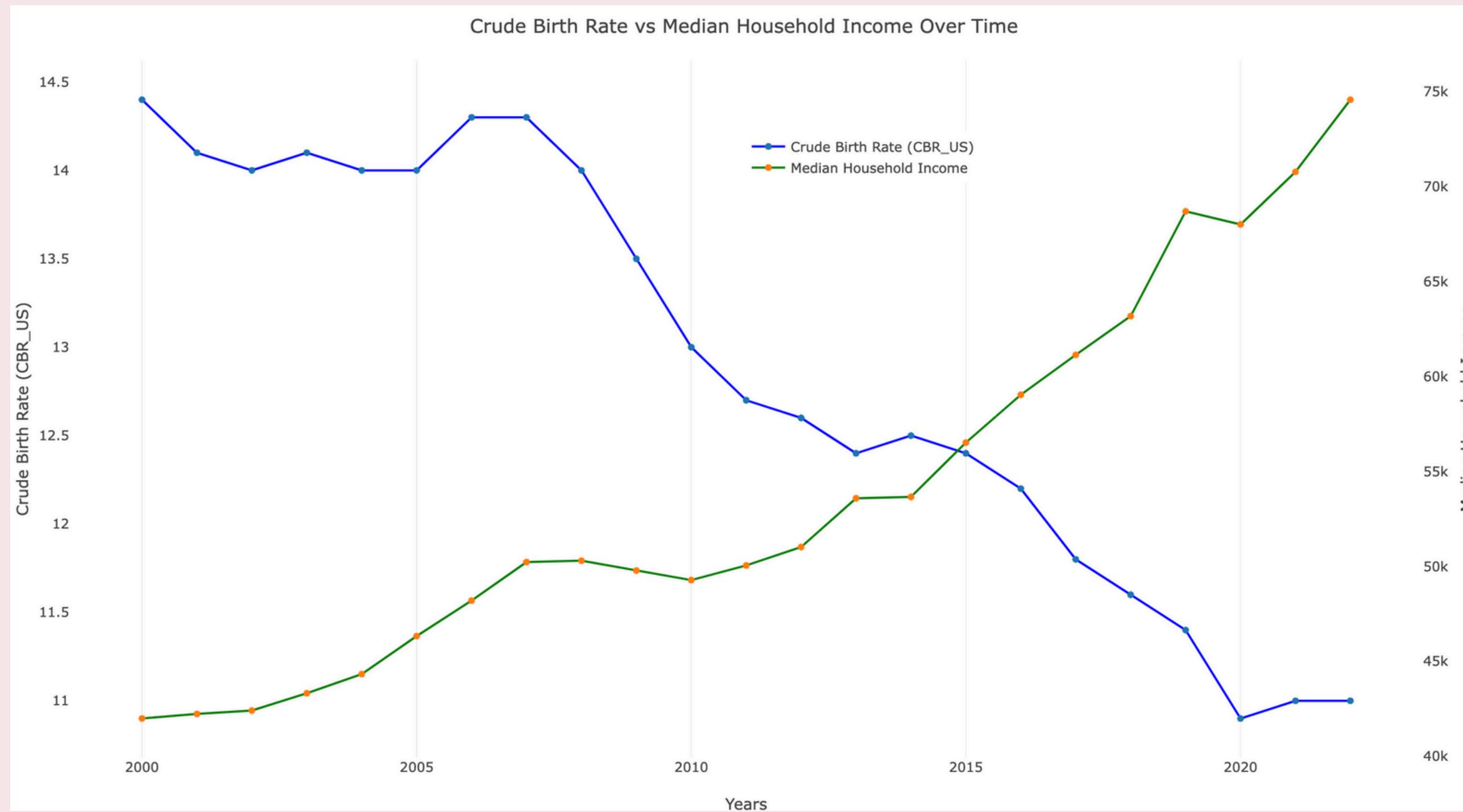
Crude Birth vs Female Population



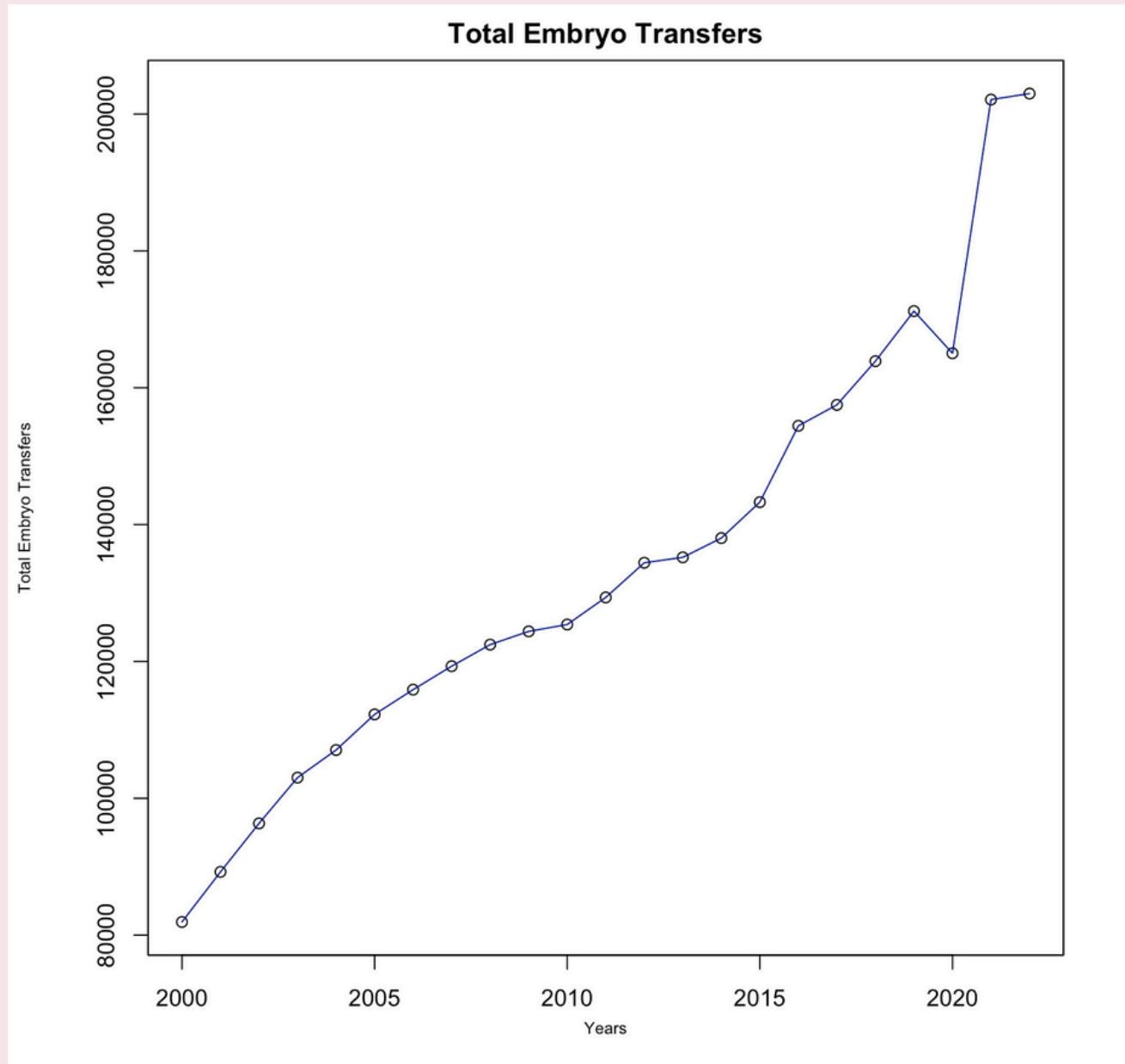
Fertility Trend By Race



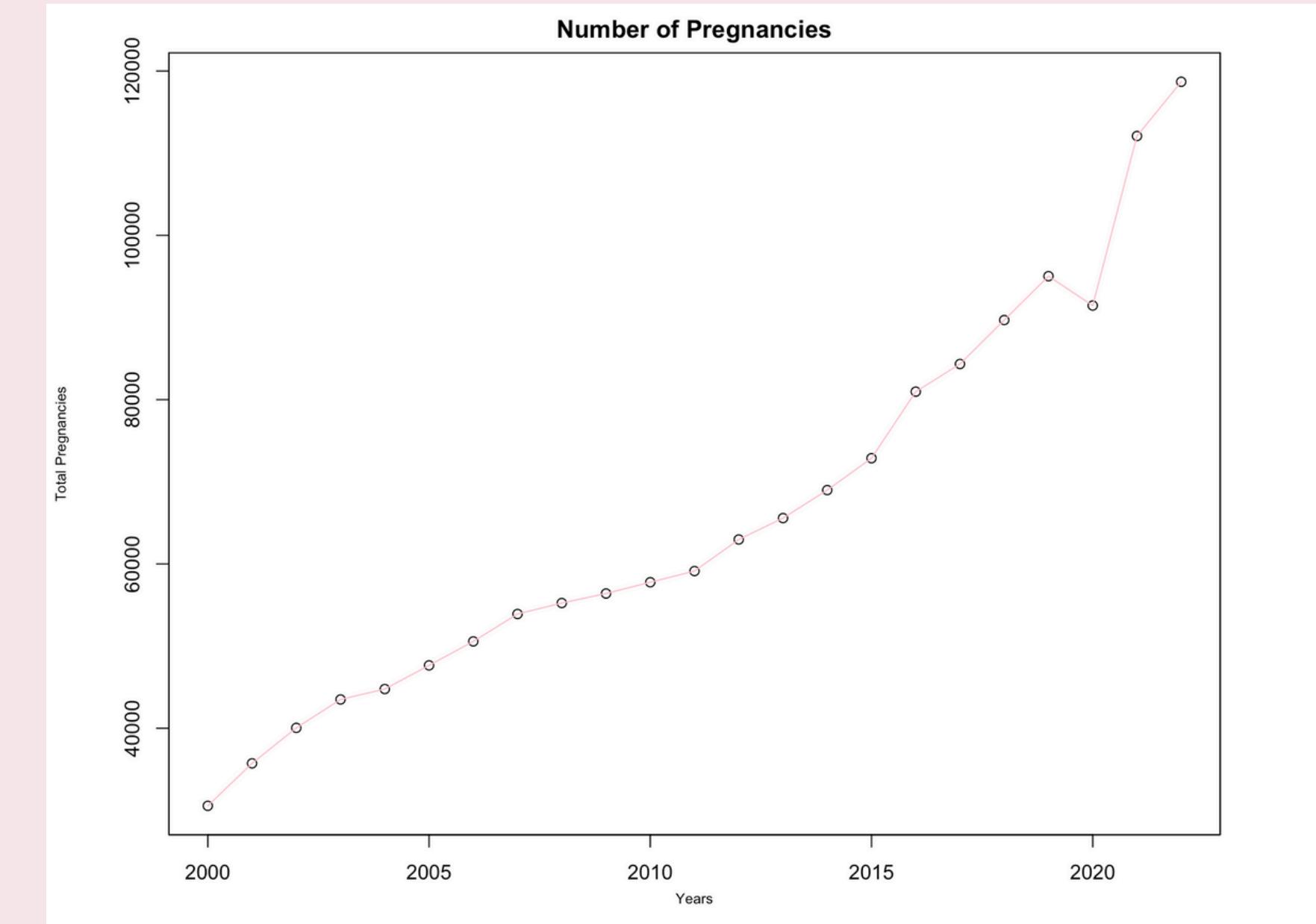
Crude Birth vs Median Income



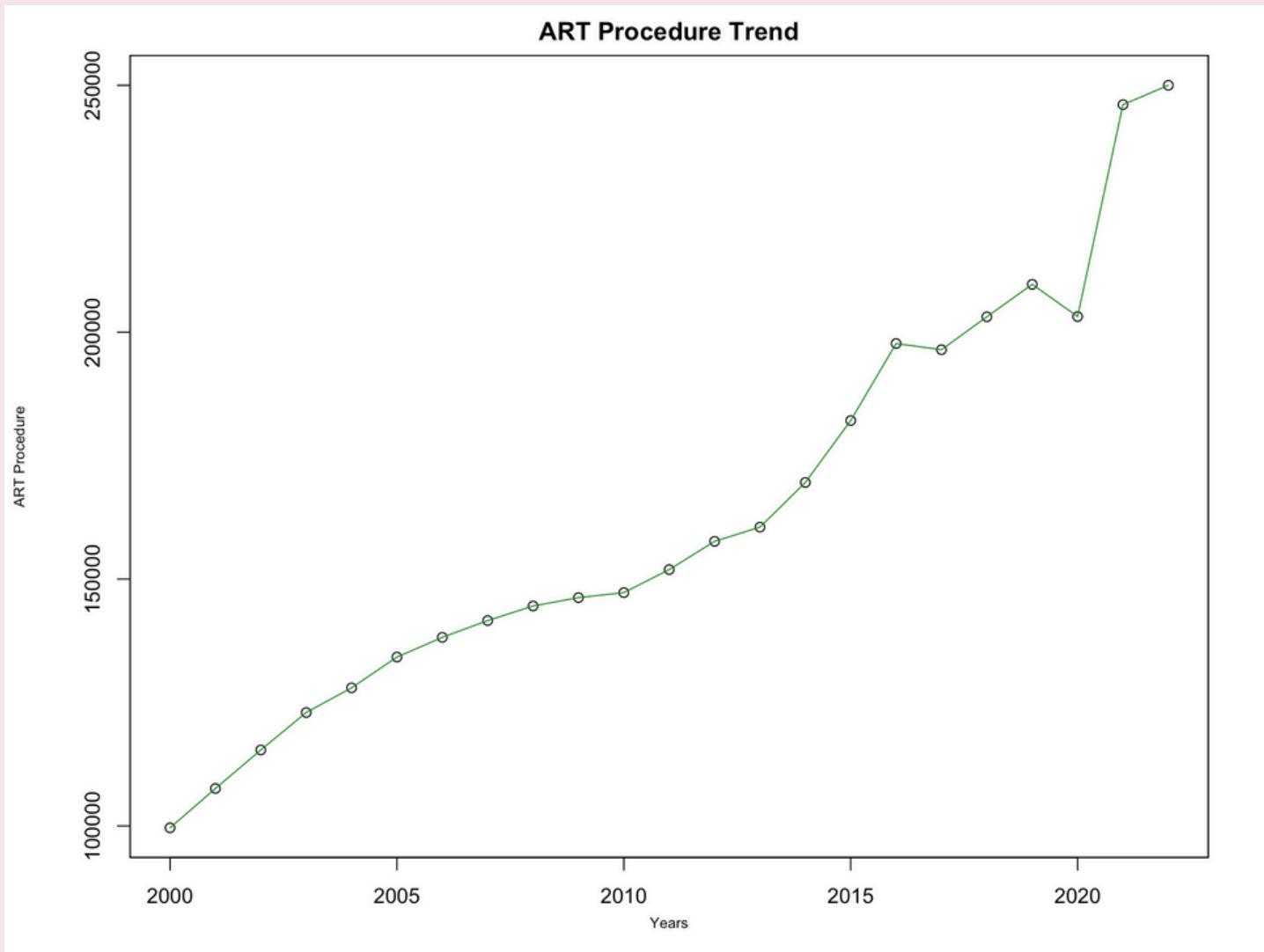
Total Embryo Transfer



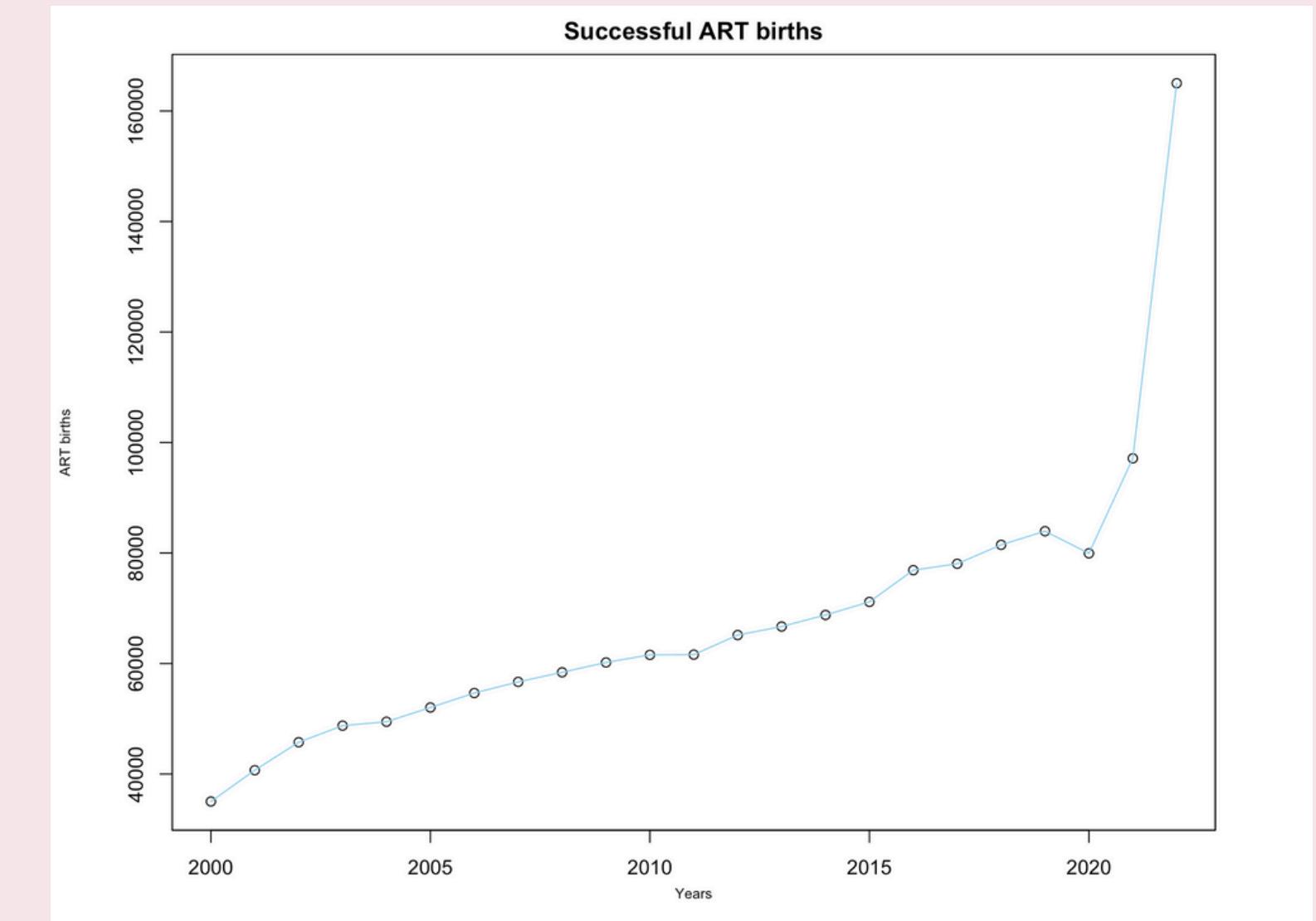
No. of Pregnancies



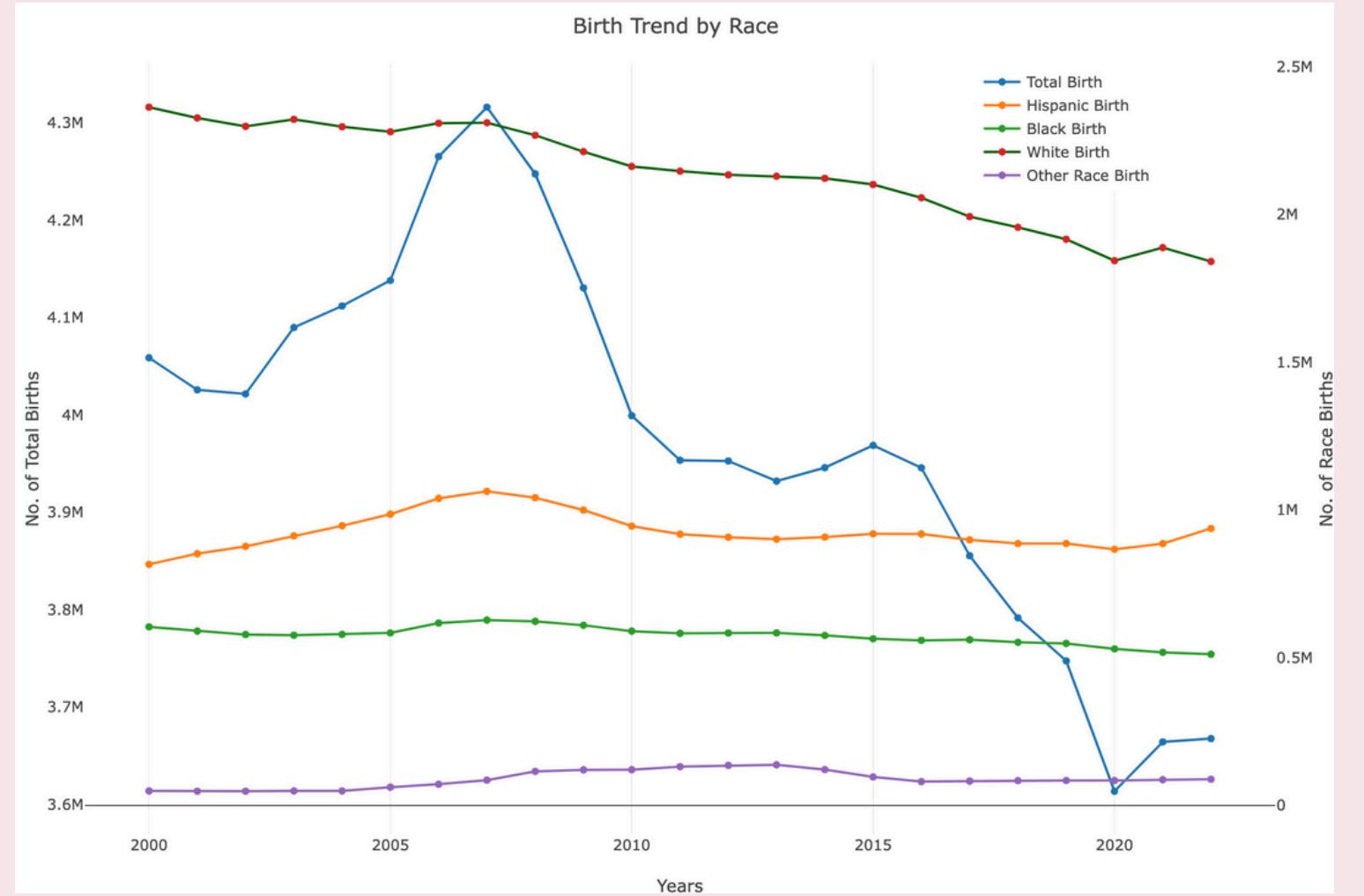
ART Procedures



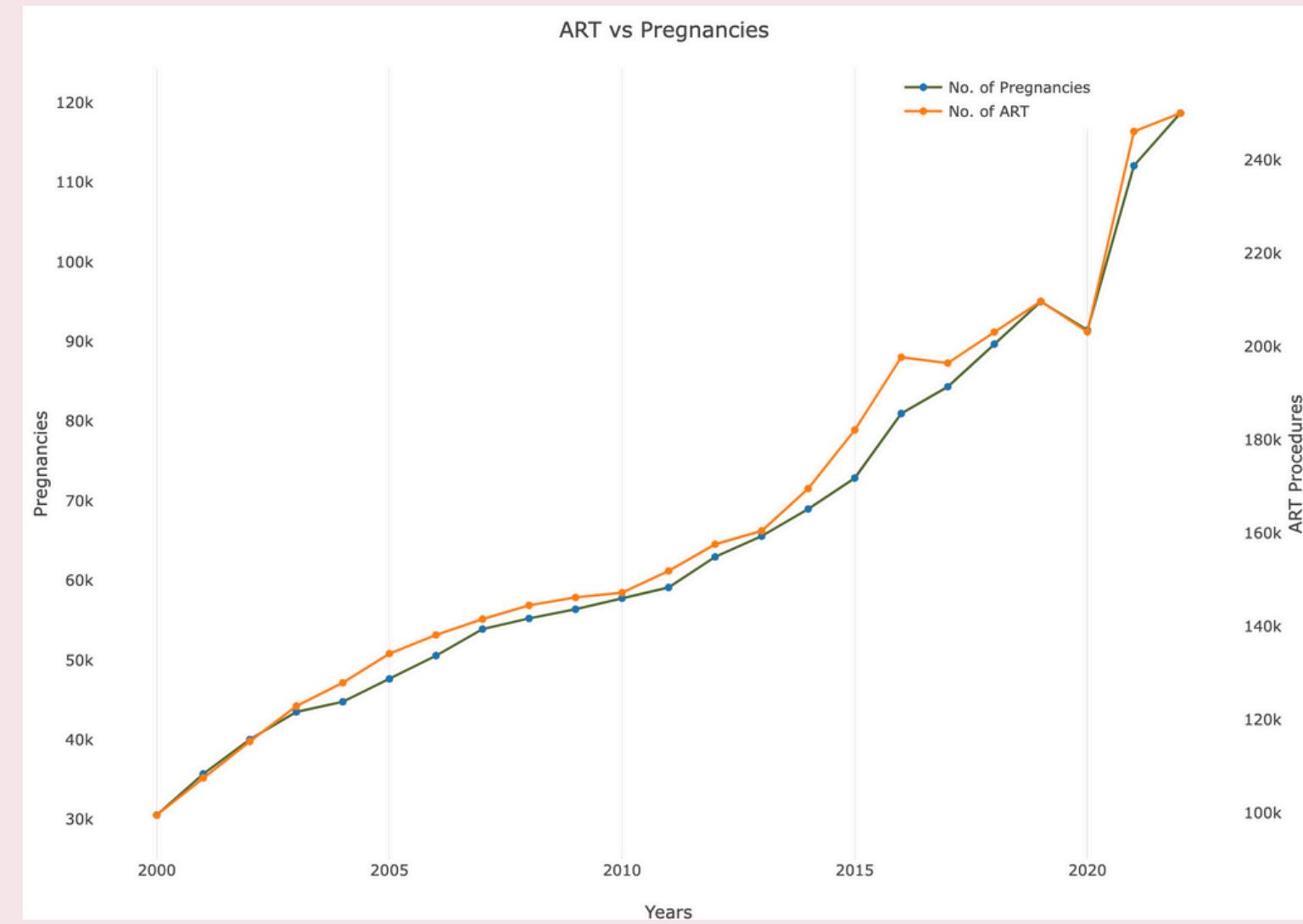
Successful ART Births



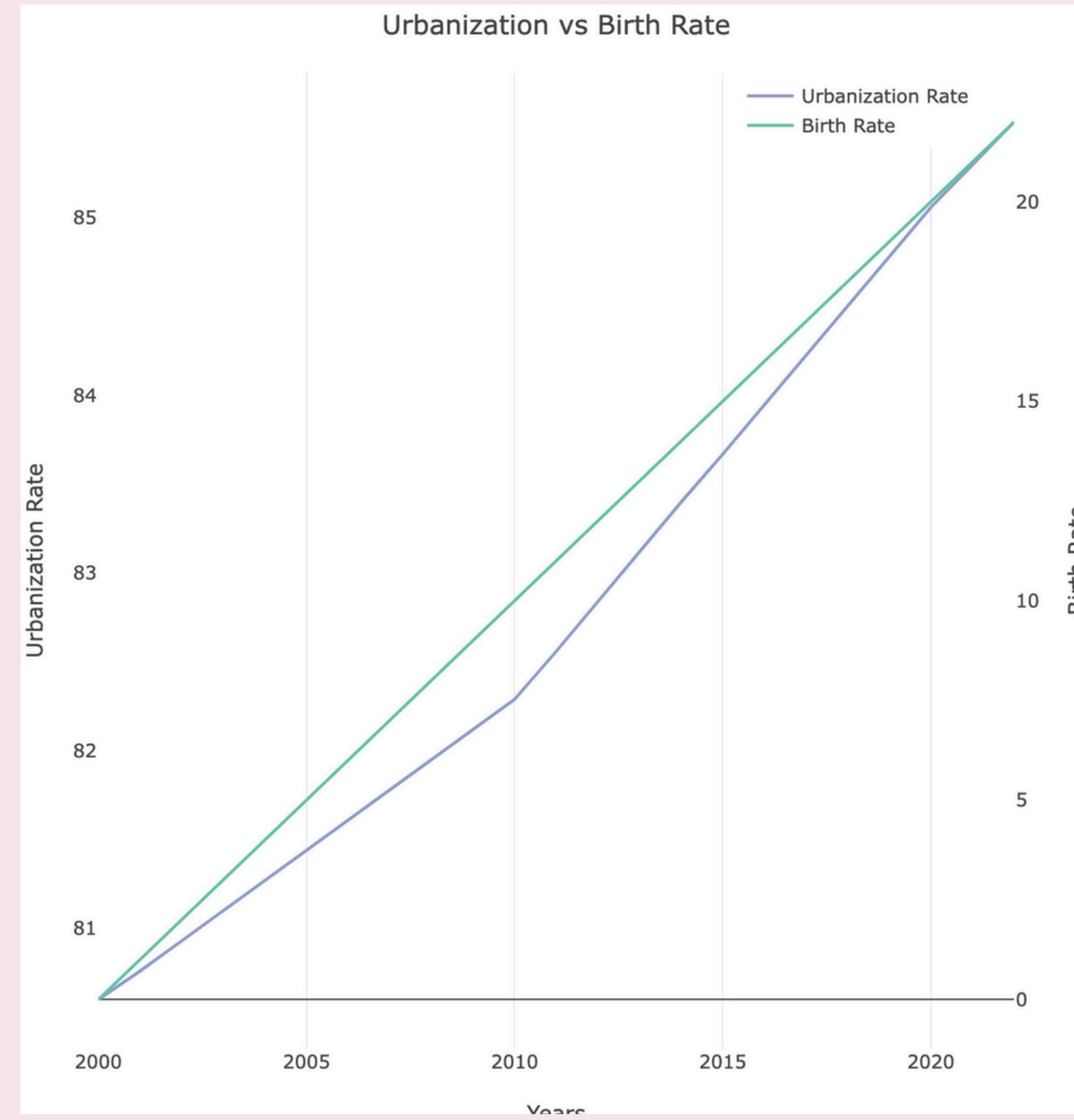
Birth Trend By Race



ART vs Pregnancies



Urbanization vs ART Birth Rate





Conclusion

Our research identifies

- A positive increase in ART procedures, along with successful results from technological treatments and procedures.
- Fertility trends by race show a constant decline across all race group
- The crude birth rate also has persistently declined
- Urbanization has shown lower fertility rates caused by career priorities, higher living costs, and delayed family planning.



References

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