

Abortion Rates in the United States from 2000-2017

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Abstract

The conclusion of Roe v. Wade (1973) ultimately gave people the right to access abortion legally across the country (Planned Parenthood 2021). Since then, restrictions and other state legislation have challenged this right. A national data set containing abortion rates for various age groups in the United States from 2000-2017 was analyzed to conclude if abortion bans and other restrictions played a role in the number of abortions per year. R and SAS programs were used to analyze data and create graphics of trends in the five U.S. regions. Once analyzed, the data revealed that there was a decreasing trend in abortion rates for all age groups in the United States. Even though analysis pointed to a decreasing trend in abortions over that 17-year period, there was not enough evidence to conclude that state abortion regulations were responsible for this trend. There are many other factors that could have caused this. Overall, this study looks at abortion restrictions and state legislation throughout the 17-year period. It evaluates if legislation could have played a role in the trends seen and what else could be responsible if not for state abortion restrictions.

Introduction

On January 22, 1973, the case *Roe v. Wade* ultimately concluded that the U.S. constitution protects a woman's decision to terminate her pregnancy (Shimabukuro 2021). However, ever since this Supreme court decision, the topic of abortion has been up for constant debate. Abortion is essential health care that ensures that people have control over their own bodies and their lives. Additionally, it ensures that abortions are done medically safe. Currently, 37 states require an abortion to be performed by a physician and 19 states require an abortion to be performed in a hospital (Guttmacher Institute 2021). There are also 18 states that require individuals to go through counseling before an abortion is performed, so that they are aware of risks including the possibility that there is a link between breast cancer and abortion (there is no substantial evidence to support this claim), the possibility that the fetus would feel pain, and the mental health consequences for the individual. From 2011 to 2020 alone, there have been 480 abortion restrictions created within states. The goal is to punish and pressure those seeking an abortion. Unfortunately, 2021 has been the most devastating in terms of state legislation for abortion rights (Spitzer & Ellmann 2021). Restrictions in place mainly affect those seeking an abortion but prove to be very problematic for those who live in poverty or rural areas. TRAP (targeted restrictions on abortion providers) makes it difficult for people to access abortion by either having intense requirements for hospitals where abortions take place or forcing providers to be a certain distance from hospitals and schools. Our project aims to study abortion rates in various states and regions from the years 2000 to 2017 with the goal of evaluating if state abortion restrictions play a role in the abortion rate over time.

Background

For the dataset, a national dataset containing pregnancies, births, and abortions in the United States was used. This dataset was created by Isaac Maddow-Zimet, Kathryn Kost, and Sean Finn. It depicts national and state trends by age and ranges from years 1988-2017. The authors are a part of Guttmacher institute where they have a report that is updated based on most recent data. The last update done on the report was in March of 2021. This report depicts graphs and other visuals that can be adapted to look at specific age groups and states to see how pregnancies, births, and abortions have changed over the four decades. The focus of this article was mainly on birth rates between the different age groups in the data set. This study looks more closely at abortion rates as they were not closely looked at in the original report. Due to lack of consistency in the data obtained on the full dataset, only the years 2000-2017 were analyzed. Additionally, since this project focuses on abortion rates, only variables “abortionrate2024”, “abortionrate2529”, “abortionrate3034”, “abortionrate3539”, and “abortionrate40plus” were used. The analysis looks to recreate the abortion rate graphs and create a predictive model for future use as there was no predictive models explored in the original report. This study also expands the analysis to look and see if abortion rates have been affected by abortion laws. Overall, this analysis plans to recreate and add to the original report.

Methods

Using RStudio and SAS, variables were selected and filtered to what was essential for this study. The 50 states were also arranged into five regions of the United States: West, Southwest, Midwest, Northeast, and Southeast. These were determined by a U.S. geography image provided by Ducksters. RStudio was used for the recreation of the trends from the original report and for the creation of predictive models used to describe the trends seen in the graphs. SAS was used to visualize the relationships between abortion rates and restrictive legislation from in each state to see if there was a trend.

The package used in R was library(tidyverse). Tidyverse is a core package that includes many different packages that are likely to be used in data analysis (Tidyverse n.d.). Once tidyverse was loaded it made it easier to load in the dataset and manipulate the data to only include the relevant information used to create the visualizations and models. Also, it was necessary to create a data frame that contained the assigned regions for each of the states. The created data frame and the loaded data were then merged to create the data set that was used for the rest of the project. Having each state assigned to a region in the data set was important, so that it was easier to filter the data for each of the graphics created. Once the data set was finalized, line graphs were created to show the trend of abortion rates from 2000 to 2017 in each region for each of the five age groups. This process was repeated for each region. Simple linear regression plots were then created for each age group in each region. This was done to create a model for each region.

After all the RStudio data tables and graphics were created, research on state abortion legislation was gathered for years 2000-2017 with the main resource being Guttmacher Institute, known for tracking state-level abortion legislation. Then SAS was used to look at all 50 states for each of the five age groups in the year 2014 to see if state legislation regarding abortion influenced the abortion rates for the state. The year 2014 was used because that was the most recent year with updated legislation for all states. After this information was found, each state

was assigned a number 1, 2, or 3 depending on if their laws were considered not hostile, hostile, or extremely hostile respectively. After these numbers were assigned, the data was grouped by age group and the number associated. From these groupings, boxplots were created to compare the rates for each of the age groups and rank of legislation restrictions. The average means for each of the groups and law rank was also obtained.

Results

The results of the RStudio analysis can be seen in figures 1-5 of the appendix. It was clear to see that there was a decreasing trend in abortion rates for each region. The Southwest region as seen in figure 1 had a large drop in the 20–24-year-old age group, a large but slightly smaller drop in the 25–29-year-old age group, and even smaller decrease for the 30-40+ age groups. The analysis also gave a linear model for the Southwest region. The model that was given in RStudio was slightly different from a normal linear model. The model doesn't give separate equations for each age group. Instead, one model is given for all the age groups. The model for the Southwest region was $Abortion\ rate = 999 - 0.485(year) - 6.15(abortionrate2529) - 12.7(abortionrate3034) - 17.3(abortionrate3539) - 21.3(abortionrate40plus)$. This model does not seem to include the 20-24 age group. How this model works depends on what age group is looked at. A one or zero is placed in the age group sections. For example, if the abortion rate for the 30-34 age group for the year 2010 was chosen, the model would look like this: $Abortion\ rate = 999 - 0.485(2010) - 6.15(0) - 12.7(1) - 17.3(0) - 21.3(0)$. This would result in an abortion rate of 11.45. If the 20-24 age group was focused on, a zero would be put in each of the other age groups. The year of focus would be plugged in for its respective place in the model. Each age group of interest would be computed this way for this model.

The West region can be seen in figure 2 of the appendix. The 20-24 age group had another steep drop in abortion rates. The 25-29 age group and the 30-34 age group had a significant drop as well. The 30-34 age group seemed to drop more in the West region than it did in any other region. Additionally, the 35-40+ groups dropped slightly, but by much less than any of the other groups. The model for this region was $Abortion\ rates = 998 - 1.483(year) - 7.02(abortionrate2529) - 14.0(abortionrate3034) - 18.7(abortionrate3539) - 23.4(abortionrate40plus)$. This model was also very consistent with the downward trend of the abortion rates throughout the years.

The next region was the Midwest, which can be seen in figure 3 of the appendix. This region also had a drastic drop in the abortion rate for the 20-24 age group, a slightly less drop in the 25-29 age group, and the 30-40+ age groups seemed to have a consistent rate over time. The 20-24 age group seemed to have dropped to about the same rate as the 25-29 age group by the year 2017. It would be interesting to see future data to see if this trend continues or if the 20-24 age group even drops below the 24-29 group. The model for this region was $Abortion\ rate = 585 - 0.281(year) - 3.88(abortionrate2529) - 9.73(abortionrate3034) - 13.7(abortionrate3539) - 17.4(abortionrate40plus)$. This model also supported previous findings that the rate decreased throughout over time.

The Northeast region can be seen in figure 4 of the appendix. The Northeast region had a very steep drop in the 20-24 age group, which seemed to drop to a similar rate as the 25-29 age group. The 25-29 and 30-34 age groups had a different trend than the rest of the groups; they seemed to decline and then increased a little around 2013. The increase was not by much, but it was a different trend than the rest of the regions. The 35-39 group and the 40+ group appeared to

stay consistent over the period of interest. The model for the Northeast region was $Abortion\ rate = 920 - 0.438(year) - 8.22(abortionrate2529) - 19.8(abortionrate3034) - 28.1(abortionrate3539) - 35.2(abortionrate40plus)$.

The final region was the Southeast region, which can be seen in figure 5 of the appendix. This region had a large decline in abortion rates for the 20-24 age group, which was consistent with the rest of the regions. The 30-40+ groups all appeared to be consistent over the 17-year period. The final model for the Southeast region was $Abortion\ rate = 569 - 0.271(year) - 5.15(abortionrate2529) - 12.4(abortionrate3034) - 17.9(abortionrate3539) - 22.3(abortionrate40plus)$. Overall, in the RStudio analysis, it was found that as time went on, abortion rates decreased in all five regions with the most drastic decrease occurring among 20–24-year-olds and the 40+ year old age group had the most consistent rate across all five regions.

The results from the SAS analysis were consistent across all the age groups, which can be seen in the appendix. All the states that had a rank of 1(not hostile states) had an abortion rate statistically significantly higher than the states ranked at 3 (extremely hostile states). This is based on a Bonferroni multiple comparison test which was run for each age group as seen in figures 11-15 in the appendix. For the age group 20-24 seen in figure 6, the average abortion rate for states ranked not hostile was 26.07, for states ranked as hostile the average abortion rate was 21.6, and for states ranked as extremely hostile the average abortion rate was 16.06. For 25-29 age group seen in figure 7, the average abortion rate was 22.01 for states ranked as not hostile, for states ranked as hostile the average abortion rate was 18.5, and for states ranked as extremely hostile the average abortion rate was 14.03. For the 30–34-year-old age group seen in figure 8, the average abortion rate for states ranked as not hostile was 14.17, for states ranked as hostile the average abortion rate was 12.04, and for states ranked as extremely hostile the average abortion rate was 8.82. In the 35-39 age group seen in figure 9, the average abortion rate for states ranked not hostile was 8.62, for states ranked hostile the average abortion rate was 7.14, and for states ranked extremely hostile the average abortion rate was 5.36. Finally, for the age group 40+ seen in figure 10, the average abortion rate for states ranked not hostile was 3.23, for states ranked as hostile the average abortion rate was 2.35, and for states ranked extremely hostile the average abortion rate was 1.88. Overall, there were consistent findings across all age groups and was expected.

Discussion

Over the course of 17 years, abortion rates decreased in all 50 states for ages 20-40 plus. This decrease can be seen in the graphics provided. Numerous research has been done to evaluate state abortion legislation throughout that time. In the year 2000, 13 states had abortion restrictions with 31% of women of reproductive age living in those states. These states included Utah, Texas, Louisiana, South Carolina, Missouri, Mississippi, Kentucky, Ohio, Michigan, Pennsylvania, Virginia, Rhode Island, and North Dakota (Nash & Gold 2015). By 2010, that number had risen to 22 states with Idaho, South Dakota, Nebraska, Oklahoma, Arkansas, Indiana, Alabama, Georgia, and Florida being added to the mix. By 2014, that number had risen to 27 states total and 57% of women at reproductive age were living in a state that was considered hostile to abortion rights. By the end of the year, 15 states had enacted 26 new abortion restrictions with no state having a first trimester ban (Nash & Gold 2015). In a study done by the Guttmacher Institute about characteristics of U.S. abortion patients in 2014 and changes since 2008, they found that abortion rates declined by nearly 13% between 2008 and

2011 with states enacting 288 new abortion restrictions between 2009 and 2014. Despite this information, the Guttmacher Institute believes that this was not enough evidence to conclude that state abortion regulations were responsible for the decreasing rates in abortion (Jerman, Jones, & Onda 2016). In 2012, Alabama, Indiana, Idaho, Kansas, and Oklahoma enacted provisions to ban abortion at or beyond 20 weeks post-fertilization. These states joined Nebraska, which had this ban in effect in 2010 (Guttmacher Institute 2012). In 2016, 43 years since *Roe v. Wade*, states had enacted nearly 1,074 abortion restrictions. Of those restrictions, 27% have been enacted since 2010 (Guttmacher 2016). Overall, the entire South is an opponent to abortion rights along with much of the Midwest. However, within our data analysis, every region has experienced a decrease in abortion rates for each age group studied.

Like previously stated, this trend may not solely be due to state abortion regulations. There are more factors that play a role in the decreasing abortion rates than just abortion legislation. In 2010, the Affordable Care Act (ACA) was signed into a law and in 2013, the ACA was fully implemented. This act reduced the number of women of reproductive age who are uninsured and included the contraceptive coverage guarantee which sought to give women access to the contraceptive method of their choice with no cost sharing (Nash & Gold 2015). With ACA implemented, the out-of-pocket cost for all reversible contraceptives decreased sharply and the amount of insertions increased significantly (Snyder, Weisman, Liu, Leslie, & Chuang 2018). Could an increase of sex education in schools be responsible for the trend? Yes, if schools had implemented sex education into a student's normal education. In 2014, the CDC's School Health Policies and Practices study found that high school courses requested that 6.2 total hours of instruction be on human sexuality and around 4 hours on HIV, STIs, and pregnancy prevention information. However, 69% of high schools notified parents/guardians before students received such instruction and 87% of schools that sent out notifications allowed parents/guardians to exclude their children from that instruction. Additionally, many states still preach abstinence, which has no evidence of being effective. The federal government has also been known to support an Abstinence Only Until Marriage (AOUM) program, which was still receiving funding as of 2016 (Hall, McDermott Sales, Komro, & Santelli 2016). However, the declines in formal sex education from 2006-2013 have coincided with declines in adolescent birth rates and improved rates of contraceptive use in the U.S.

To gain more evidence on why abortion rates are decreasing, there needs to be more research done in sex education and contraceptive use. How are people receiving information regarding sex education? What are they doing to prevent unwanted pregnancies? Surveys could be conducted in high schools asking where/how kids are receiving most of this information. Additionally, data could be collected on women's health clinics and other institutions that provide birth control to see if those rates have increased over time. The CDC provides data on different types of contraceptives used in the United States. To gain a better understanding of why the abortion rates are decreasing, it's important to look at multiple factors. Overall, this study cannot solely base the decreasing trends on state abortion legislation.

Conclusion

When evaluating if state abortion restrictions/legislation play a role in abortion rate trends, it was found that there was some evidence of this being true when using Bonferroni in SAS. Based on ranking not hostile, hostile, and extremely hostile states, it was found that extremely hostile states have a statistically significant higher abortion rate compared to those

states ranked as not hostile. Overall, graphics produced with R demonstrated a decreasing trend for abortion rates throughout the United States for the 2000-2017. These findings are consistent with what was found in the original report. The main difference between this study and the original study was that regional areas of the United States were focused on rather than states. Many articles and papers regarding state abortion legislation over time were evaluated. Despite there being a decreasing trend, it cannot be concluded that this legislation was the sole reason for the trend. When determining what causes a decrease in abortion rates, there are other variables to consider. The Affordable Care Act provided women with affordable contraceptives and insured many uninsured women. Additionally, sex education is taught through different outlets, which may reach the target audience before/when reaching reproductive age. To determine the cause in decreasing trends, more research needs to be done outside of abortion legislation. For future research, a dataset containing more information about other factors that affect abortion rates would be more useful to gain a better understanding of the causes of decreased abortion rates. Much more data would need to be collected to truly get a full picture on what has caused the drastic drop in these rates for specific age groups.

Appendix

Fig. 1

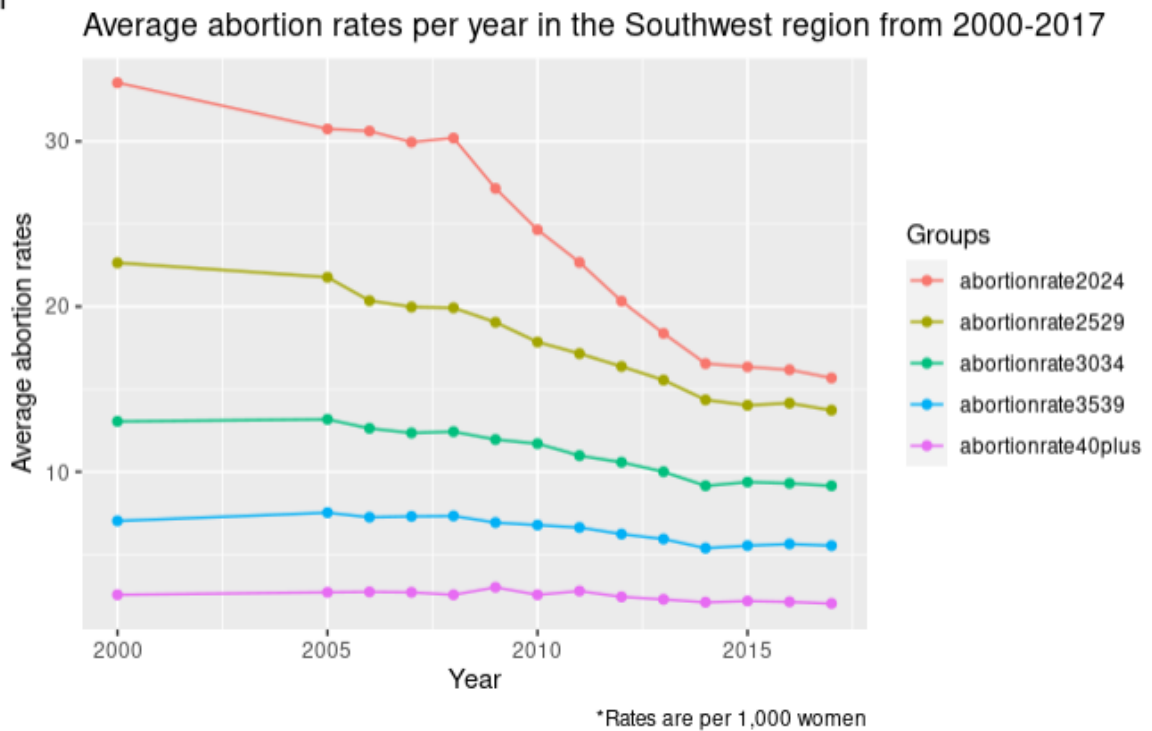


Fig. 2

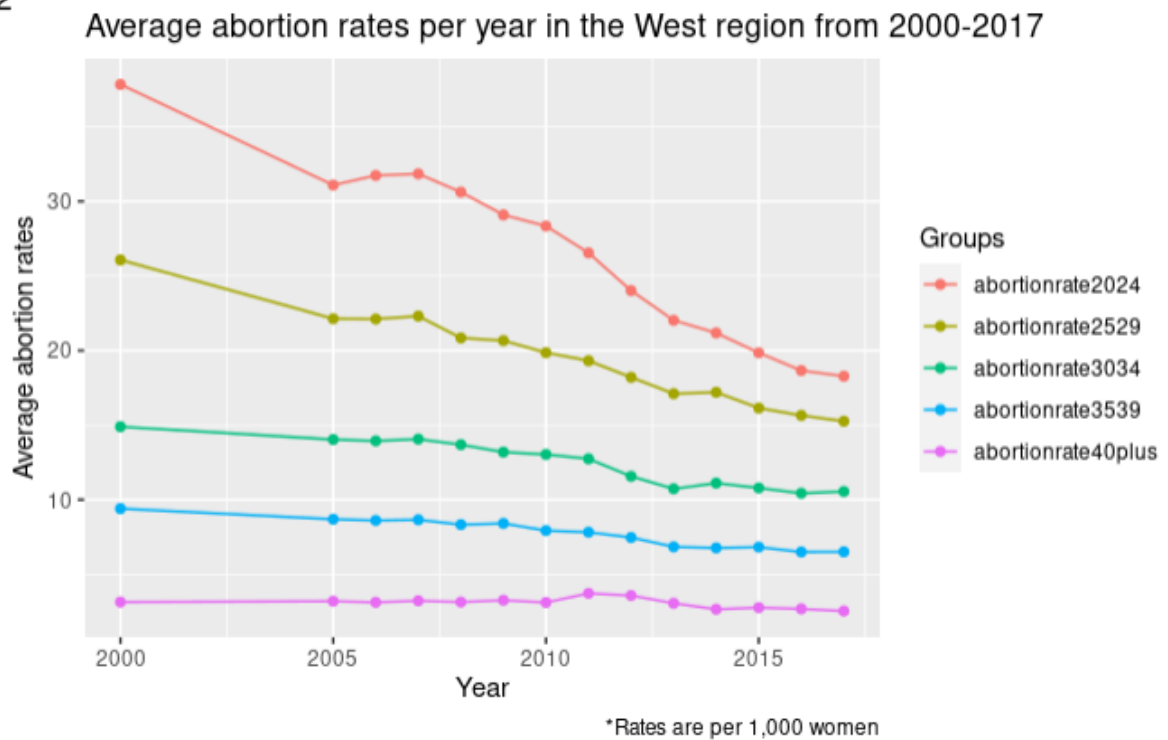


Fig. 3

Average abortion rates per year in the Midwest region from 2000-2017

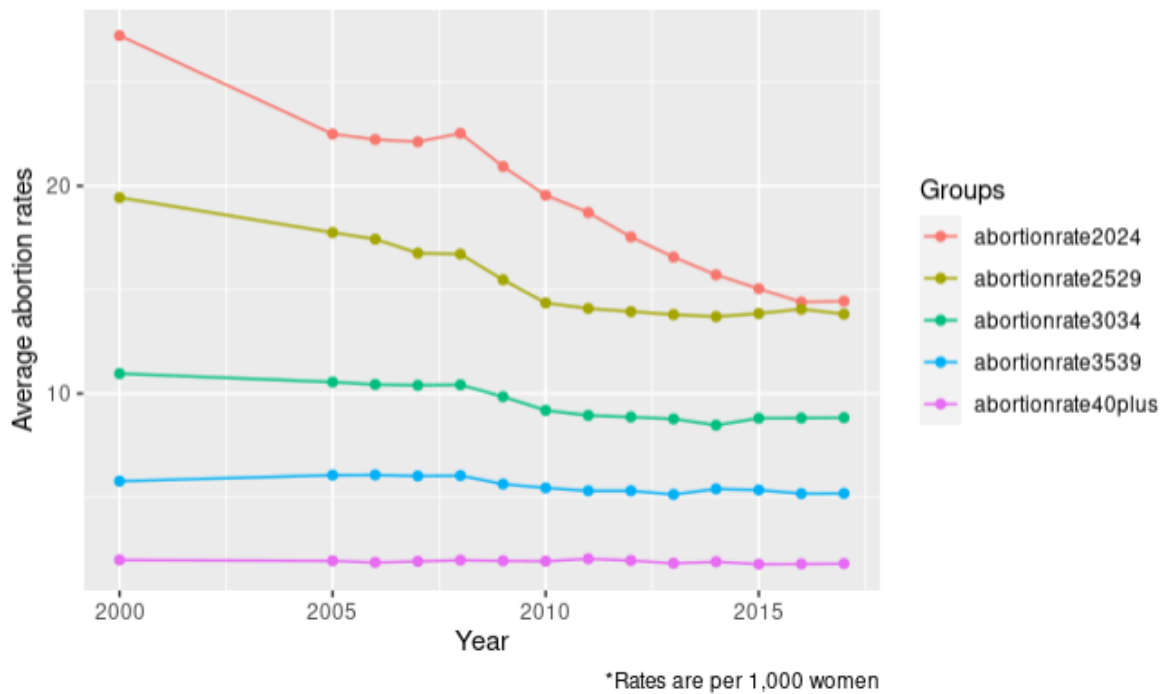


Fig. 4

Average abortion rates per year in the Northeast region from 2000-2017

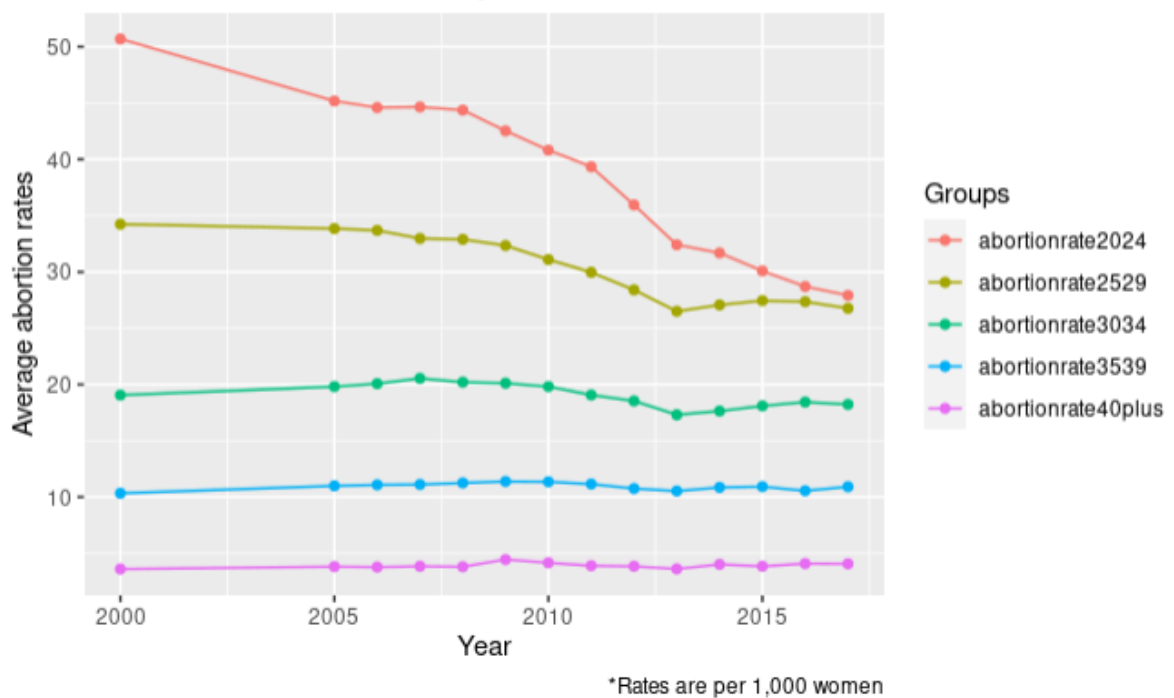


Fig. 5

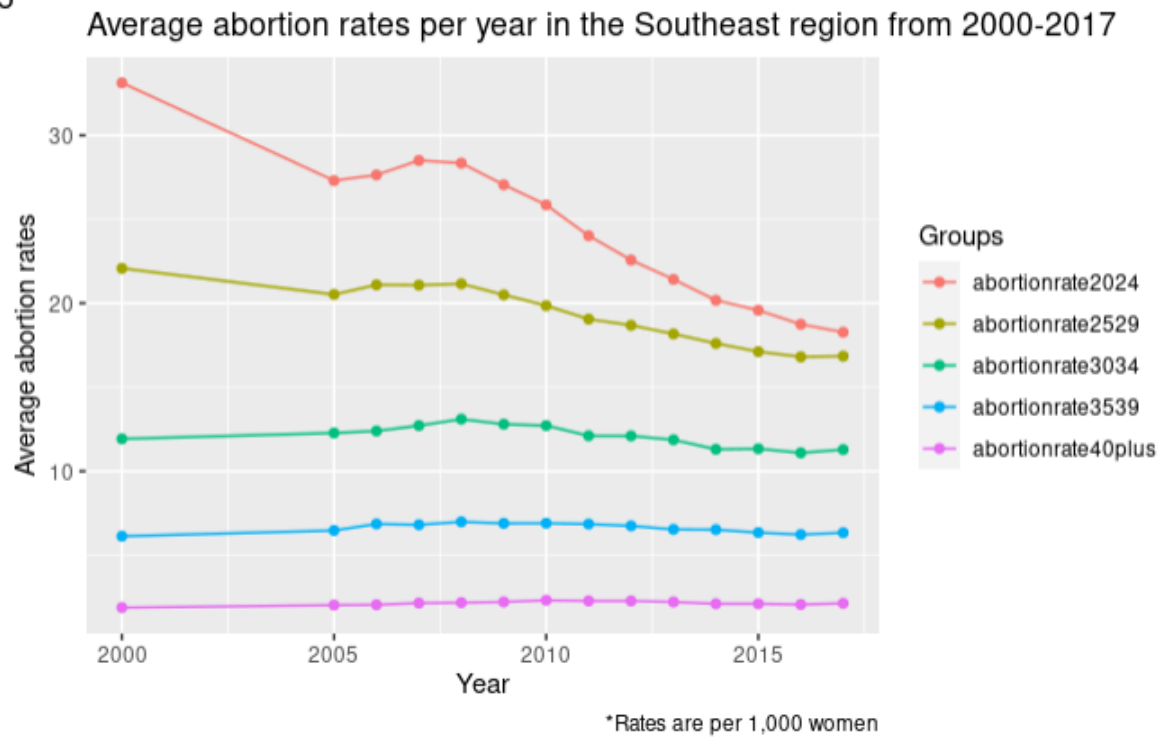


Figure 6.

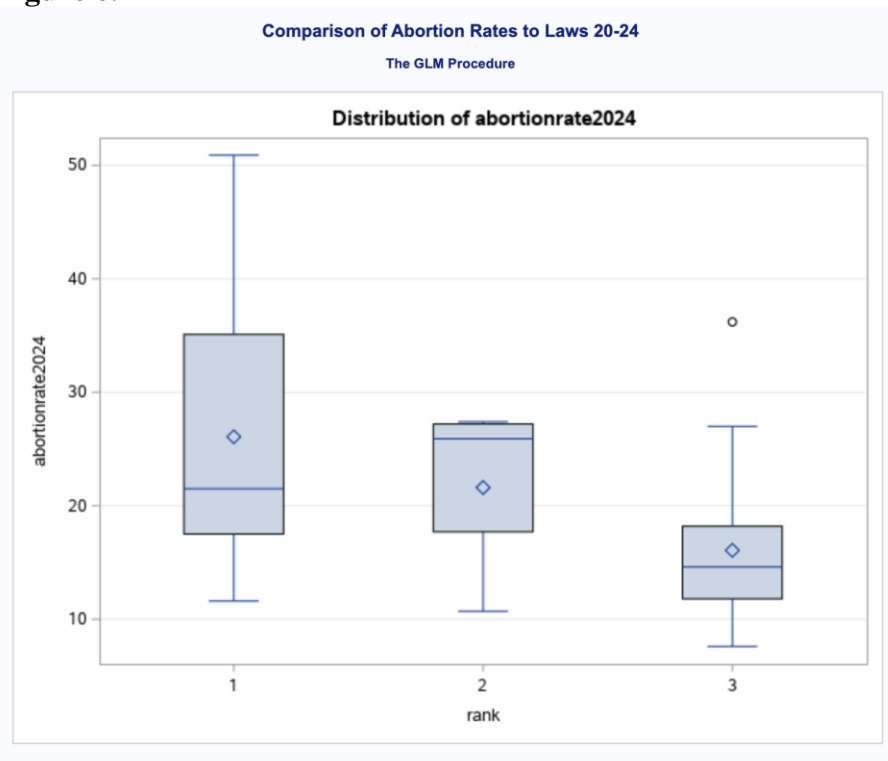


Figure 7.

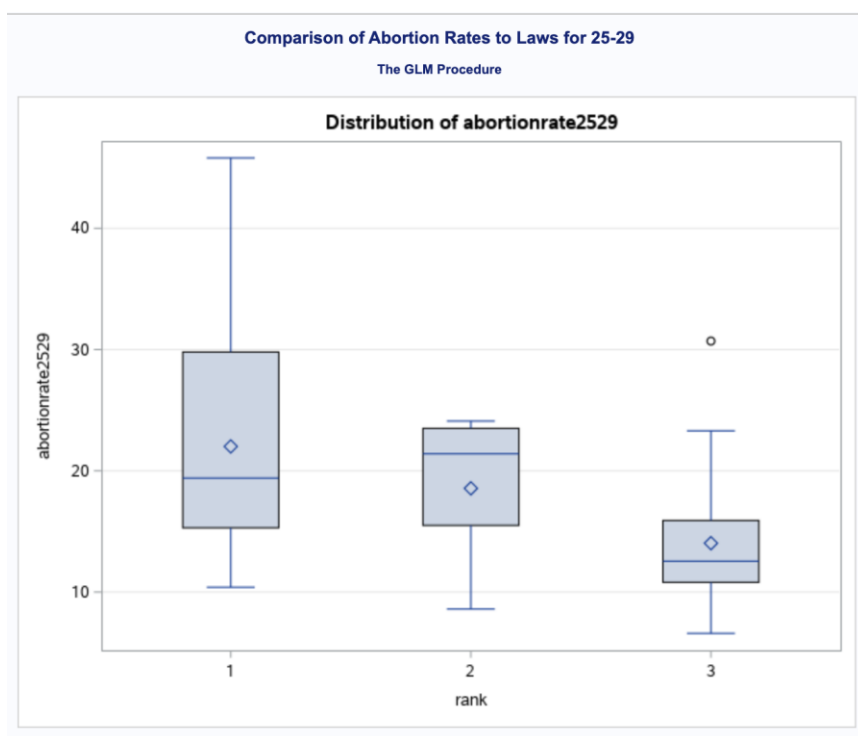


Figure 8.

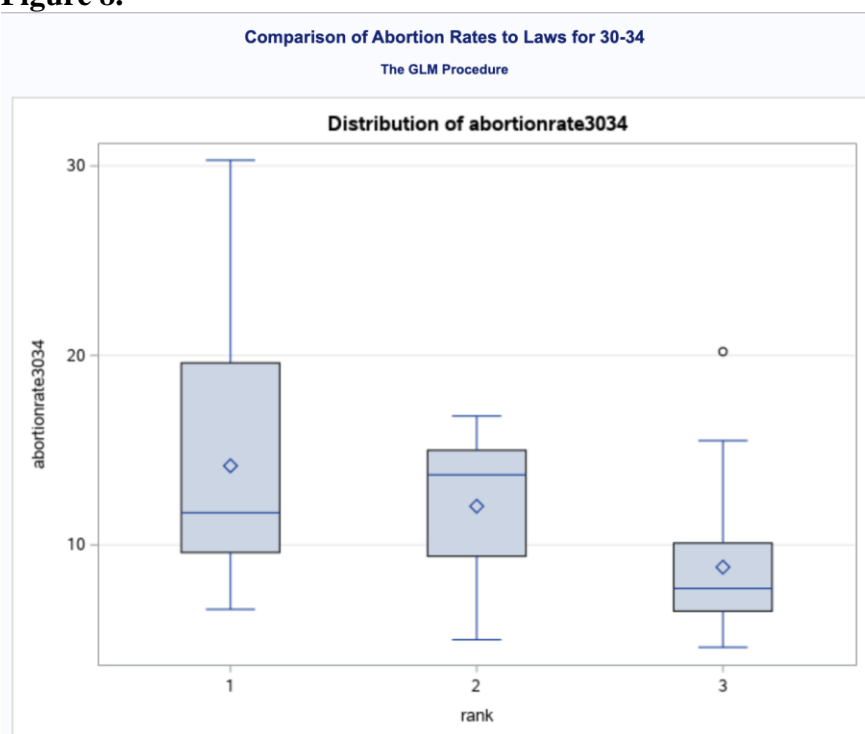


Figure 9.

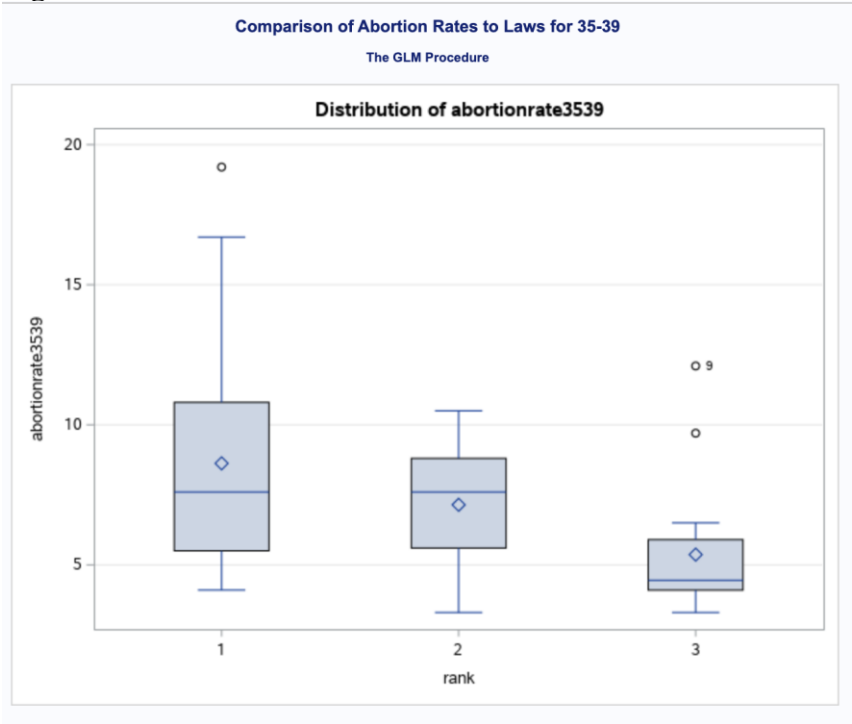


Figure 10.

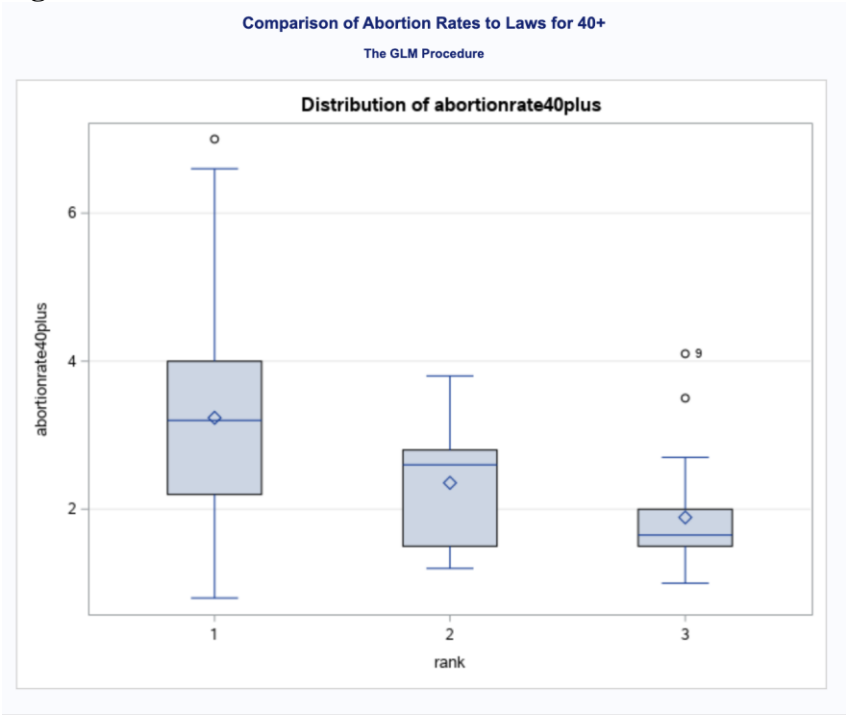


Figure 11.

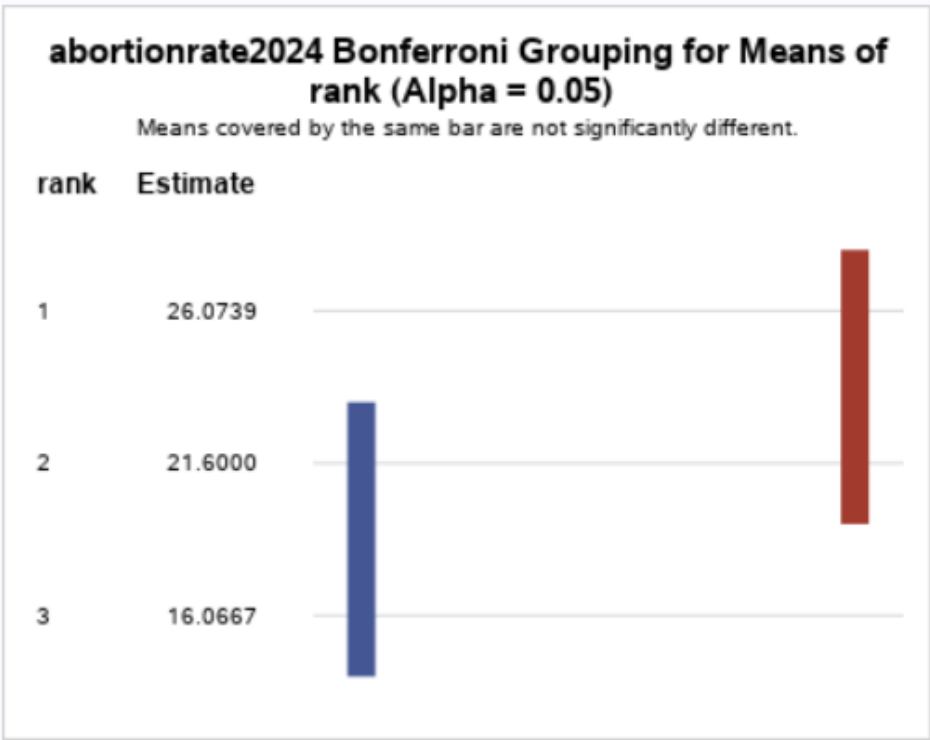


Figure12.

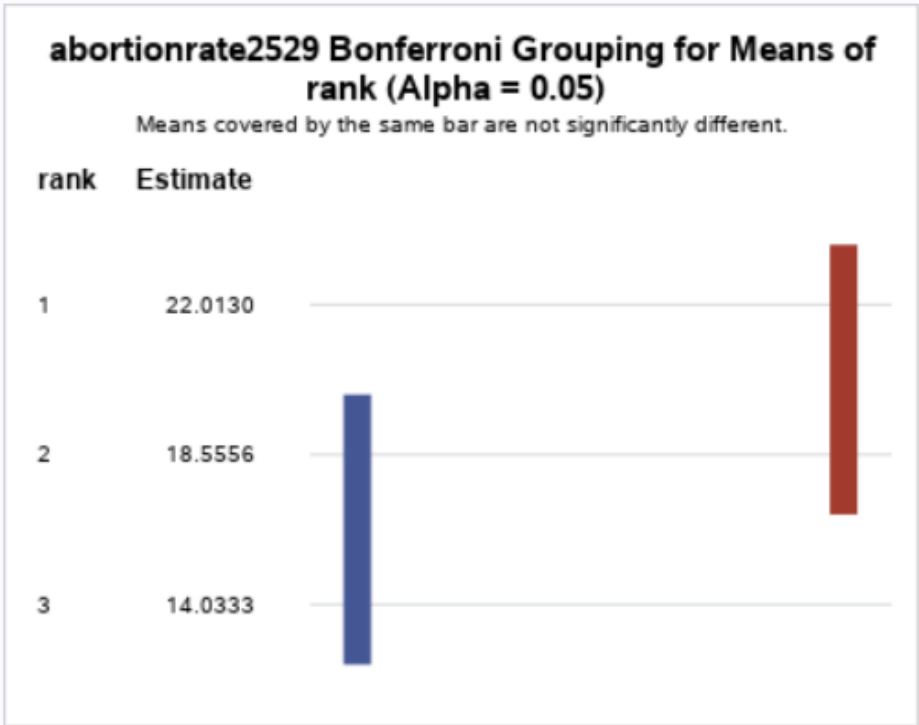


Figure13.

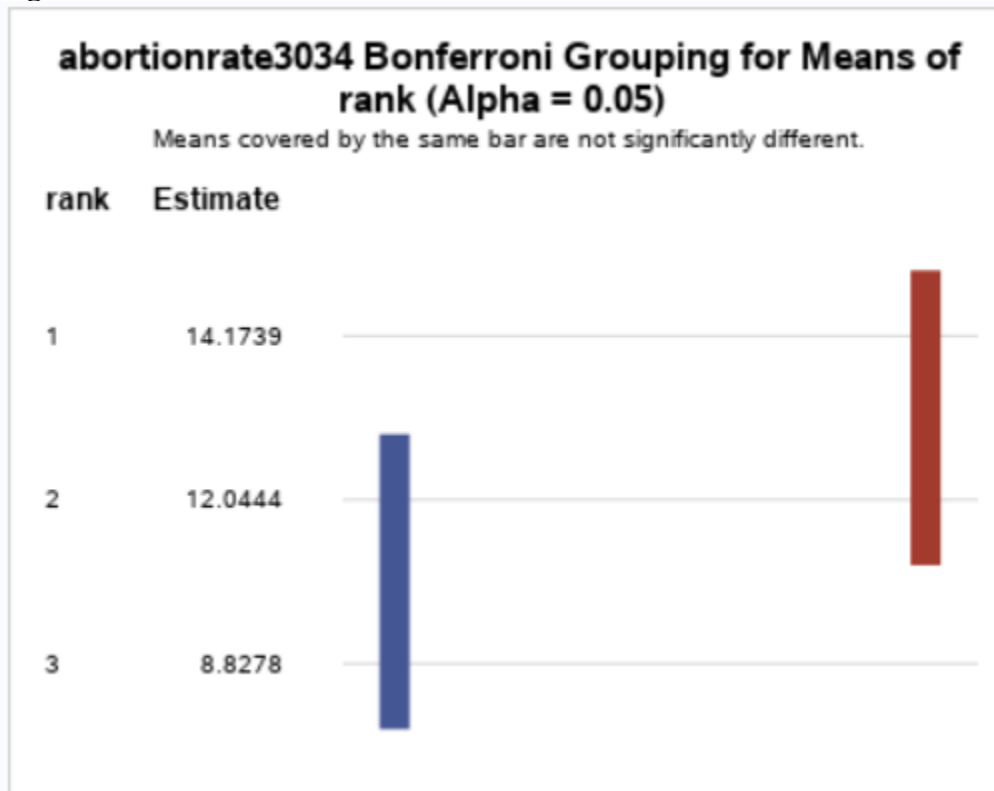


Figure14.

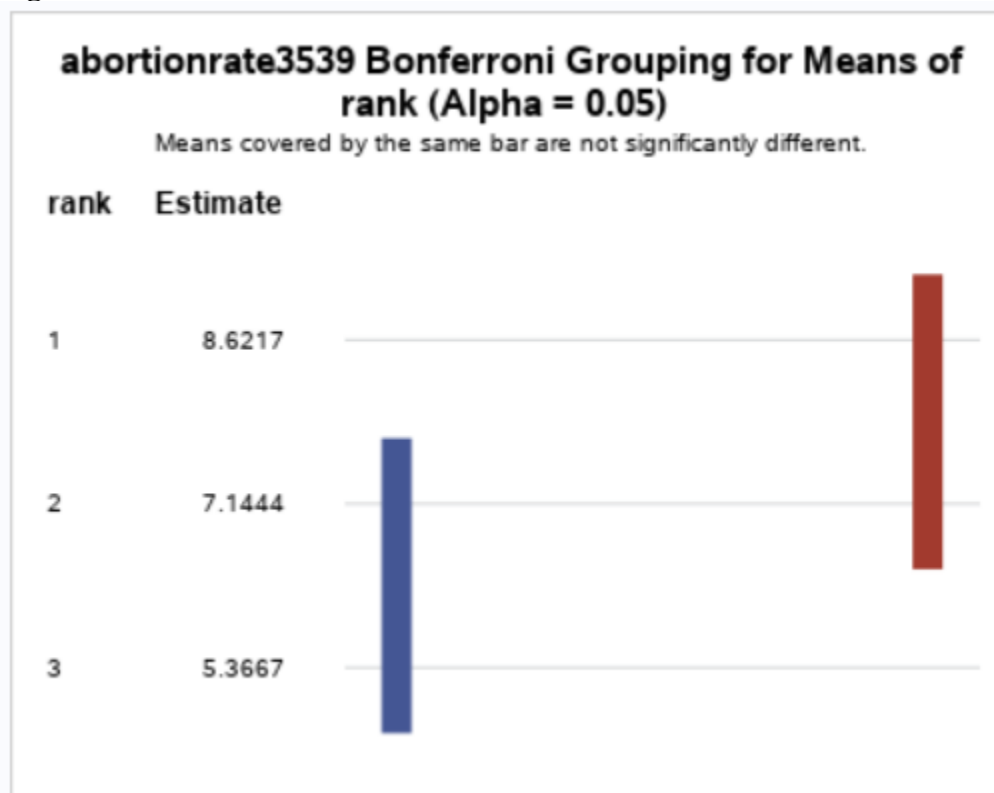
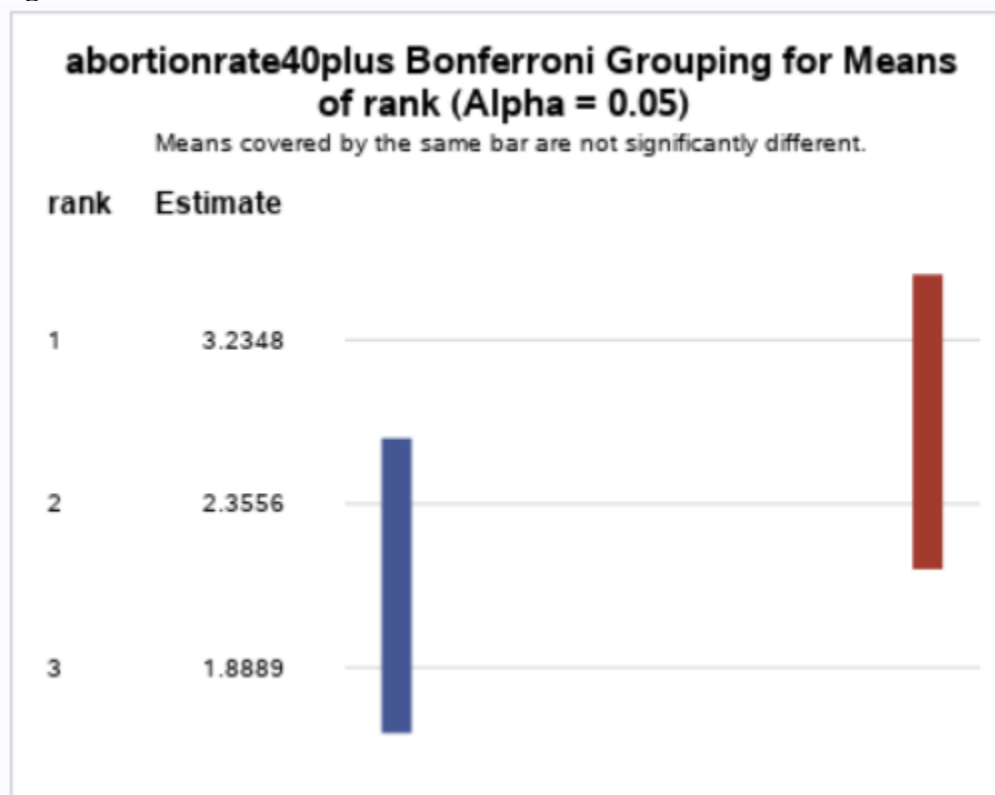


Figure15.



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