DIDA 325 Final Paper - Various Risk Factors Contributing to Rising Femicide Rates Around the World

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May 7, 2024

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1 Introduction

As global femicide rates continue to rise, it is clear that reducing these rates remains a great challenge. Femicide, simply defined as the murder of women because of their gender, is a popular topic of study due to the fact that it differs from other types of murders. Unlike other motivations for murders, the root motive of femicide is "related to the general position of women in the society, discrimination against women, gender roles, unequal distribution of power between men and women, habitual gender stereotypes, [and] prejudices and violence against women" ("A Femicide Factsheet: Global Stats & Calls to Action," 2022). As a result, in order to prevent femicide, drastic changes to our patriarchal systems are necessary ("A Femicide Factsheet: Global Stats & Calls to Action," 2022). However, dismantling the patriarchy requires communal effort worldwide, and is not a simple task. Therefore, a great amount of femicide research focuses on specific factors that may be associated with increased femicide rates, with the goal of preventing a larger issue, specifically femicide, through targeting other issues. In this report, a Kaggle dataset investigating trends between femicide rates and various factors was analyzed in order to answer the question: what factors are associated–positively or negatively–with rates of femicide? In order to answer this research question, we examined economic indicators, such as GDP and unemployment, religion rates, specific years, and specific regions and countries. By doing so, we were able to determine specific risk factors for femicide. Studying these risk factors allows us to predict femicide more accurately, which assists in the goal of ultimately preventing femicide.

2 Research Background

As mentioned previously, femicide is a growing concern around the world. It has been estimated that every hour, six women around the world are killed by men, and in 2021, 81,000

women and girls were killed. Interestingly, many of these killings are done by family members or intimate partners ("A Femicide Factsheet: Global Stats & Calls to Action," 2022). However, the relationship of the victim and perpetrator is only one component that may increase the likelihood of femicide. Previous research has suggested that economic factors, religion, year, and location may also play a role.

2.1 Economics

Previous research has suggested that the economic state of a country is important to consider when examining femicide rates. In a study focusing on intimate partner femicide, researchers found that low-medium socioeconomic status was associated with perpetrating this violence (Garcia-Vergara et. al., 2022). Similarly, the association was greater if the perpetrators were unemployed and did not receive unemployment benefits or a pension (Garcia-Vergara et. al., 2022). Although this report does not focus on immigration, Garcia-Vergara et. al. found that immigration is often associated with intimate partner femicide, likely due to the fact that "in some cases, this condition entails several risk factors such as…unemployment, lack of economic resources, low socio-economic status, [and] low education" (2022). These findings support the idea that economic factors play a large role in violence against women. However, Garcia et al. analyzed several reports to determine associations. Through this, there is no sure way to determine how strong the association is between specific risk factors and femicide. Therefore, in our report, we aimed to mathematically determine if there is a correlation between economic factors, like gross domestic product (GDP) and unemployment, and if so, how strong those correlations are.

2.2 Religion

Religion has been a controversial topic regarding its relation to femicide rates. Certain scholars believe that religion may play a factor, particularly linking Islam and femicide (Korteweg & Yurdakul, 2010). Islam is the dominant religion in geographic areas, such as the Middle East, where honor killings are most reported and prevalent. Honor killing is a form of femicide, describing the murder of a young girl or woman due to bringing shame or dishonor within her family. Typically, the perpetrator of this type of femicide is a male family member. However, critics of this ideology suggest that honor killings are highly present within Latin America and India, whose predominant religions are Catholicism and Hinduism; therefore, Islam cannot be outed as being the sole religion associated with femicide (Korteweg & Yurdakul, 2010). Additionally, critics point out that Christians within Middle Eastern countries participate in honor killings as well, suggesting another factor is at play (Korteweg & Yurdakul, 2010). For example, those opposed to religion being a risk factor suggested patriarchal influence as a greater predictor of femicide (Korteweg & Yurdakul, 2010). Objectively, it is a known commonality that countries experiencing high reports of honor killings have a strong religious presence, regardless of the specific religion (Korteweg & Yurdakul, 2010). Consequently, our goal in this study was to investigate if a greater religious influence will be correlated with higher rates of femicide and evaluate the validity of these arguments in regards to this particular dataset.

2.3 Location

This paper planned to establish which region has the highest rate of femicide (per 100,000 population) according to the Kaggle dataset. Prior to exploring the dataset, we have gathered evidence that may or may not support our findings later on. In general, evidence

surrounding femicide is difficult, because the motive must be related to their gender, as established previously in “A Femicide Factsheet: Global Stats & Calls to Action” (2022). Contrary to popular belief, femicide is not only an issue in low-income countries, as demonstrated by the fact that nearly three women are killed by an intimate partner daily in the United States (“When Men Murder Women,” 2018). One meta-analysis found that in South Africa, although femicide has in general decreased from 1999-2017, it still has one of the highest rates of femicide recorded globally (Abrahams et al., 2024). In addition, many Latin American and Caribbean countries are high relative to other countries, such as El Salvador with a rate of 13.9/100,000 or Jamaica with 11/100,000 (UNFPA, 2022).

2.4 Year

Studies have shown that the year 2014 appears to have marked a significant turning point in femicide rates, specifically in the United States, with the indication of a 24 percent increase in femicide incidences between 2014 and 2020. This significant increase coincides with the rise in intimate partner violence during the COVID-19 pandemic, with an 8 percent increase. Accordingly, these statistics may be due to the accessibility of firearms, social and cultural factors — intensified gender inequality, misogyny, and dehumanization of women — and underreported and misclassification of femicide (“Femicide is up”, n.d.). Specifically during the COVID-19 pandemic, it’s been reported that femicide rates have increased due to the lockdowns and isolation measures implemented that have led to a surge in domestic violence. With the closure of women’s shelters and the diversion of resources to combat the pandemic, the situation has worsened, which has left women and children at risk. Various countries, like Spain, Argentina, Turkey, and the United Kingdom, have indicated an increase in femicide cases during the pandemic. In Argentina, 86 femicides have been reported since the beginning of 2020, with

24 occurring during the COVID-19 outbreak, and in Turkey, 18 women were killed, with a majority of cases occurring in their homes. Additionally in the United Kingdom, nearly three times as many women were murdered by men in March 2020 (Weil, 2021).

3 Description of Data and Methods

For this research, a Kaggle dataset, titled "Gender_Based_Crimes/Economic_Indicators," was used. The dataset includes data from various sources and was created with the goal of investigating femicide rates and trends. It is composed of over 100,000 rows of data and includes the following columns: Country, Region, Subregion, Indicator Dimension, Category, Sex, Age, Year, Unit of Measurement, Value, GDP, Unemployment Rate, and Religion rates. The "Region" category is divided into the Americas, Europe, Asia, Oceania, and Africa. The "Indicator" column states if the person was arrested for intentional homicide, or if they are a victim of intentional homicide. The columns focused on religion note the percentage of a country's population that is Christian, Buddhist, Muslim, Hindu, Folk, or unaffiliated. The Value column stated the number of femicides that occurred.

The dataset was filtered to remove both women who were arrested for intentional homicide and men who were victims of intentional homicide. By doing so, only women who were victims of intentional homicide remained, and we were able to focus solely on female victims. Additionally, any rows with missing data, or N/As, were removed. Both were filtered using the filter function, which is part of the dplyr package, in R.

First, we examined the relationship between economic indicators, including GDP and unemployment rates, and femicide. To do so, all unnecessary columns were removed using the select function in the dplyr package, leaving only: Indicator, Dimension, Category, Sex, Age, Year, Unit of Measurement, Value, GDP, and Unemployment Rate. This new dataset was

renamed “Econ,” and was used to create each plot. Then, two correlation tests were run to calculate an R value, in order to determine the strength and direction of the relationship between GDP and femicide and unemployment rates and femicide. Using the ggplot2 package, two scatterplots showing the relationship between both GDP and unemployment rates and number of femicides were created. For each scatterplot, the general code is as follows: ggscatter(Econ, x = “[variable of interest]”, y = “VALUE”), where Econ is the renamed dataset, x is either “Unemployment Rate” or “GDP”, and y is the number of femicides. Again, for each scatterplot, the Pearson correlation coefficient was added by placing “cor.coef = TRUE, cor.coef.args = list(method = “pearson’, label.x.npc = “middle”, label.y.npc = “top”)” in the code. Additionally, using the ggcorrplot package in R, a correlation plot was created to represent these correlations. First, a correlation matrix was computed with the code: corr←round(cor(Econ), 1). Then, a correlation of p-values was computed with the code: p.mat←cor_pmat(Econ). Lastly, the correlation plot was created and the code is as follows: ggcorrplot(corr, lab = “TRUE”, type = “lower”, colors = c(“purple”, “pink”, “orange”)).

In order to examine the relationship between religion and femicides, the data set needed to be condensed to only show the religion ratio, the dominant religion it pertains to, and the amount of femicides per 100,000 population. Every column, except Country, was removed. At this point, the data was condensed enough to be manipulated in preparation for a multilinear regression model. The functions group_by and summarize eres used to average out the ratios within each religious category and the Value among each country. The Value column was then deleted in order to be able to use the pivot_longer function, which was used to create another dataframe to figure out the maximum ratio. This allowed the usage of the inner_join function, combining the two dataframes by matching similar columns (Fraction and Country). Lastly,

another inner_join function was used to combine the country and the value of the from the original dataframe. This final dataframe was used to create the multilinear regression model and scatter plot.

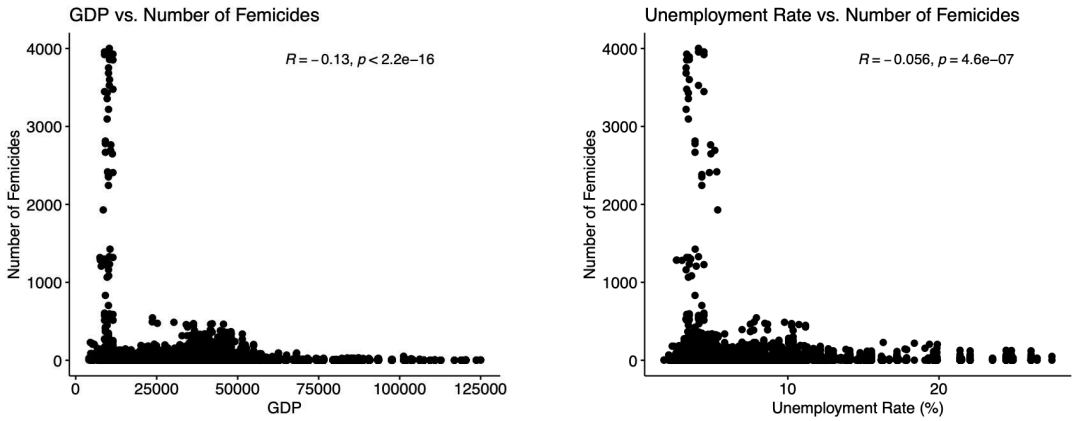
In order to create a map visually demonstrating the distribution of femicide in different subregions of the dataset, first the dataset was modified using select to only include Country, Region, Subregion, Indication, Unit.of.Measurement (as Rate per 100,000 population, since Count would create a population issue), and Sex. We then further specified the dataset using filter to only include female victims of intentional homicide. In general, we had to bind world coordinations to the countries of each subregion. There were 17 subregions: Australia and New Zealand, Central Asia, Northern America, Eastern Asia, Southern Asia, Southeastern Asia, Western Asia, Latin American and the Caribbean, Eastern Europe, Northern Europe, Western Europe, Southern Europe, Sub-Saharan Africa, Northern Africa, Polynesia, Micronesia, and Melanesia. For each subregion, a data frame was created with a list of all the countries in the given region, then coordinates were created using inner_join to join the world_coordinates dataset and subregion countries. For each subregion, we removed the data frame of the country list and number of victims, in order to not pollute the environment and since all information would be in a new dataframe with the coordinates. Some issues were ensuring each subregion was colored with the countries in it; some names were different from our dataset and the world_coordinates dataset, therefore, we had to go back and check. Lastly, all the subregions coordinates and countries were bound and ggplot was used with geom_map to create a world map with varying shades of pink to represent the rates of femicide. A lighter pink represents a higher rate as indicated by the legend also included in the visual representation.

To analyze the impact that year had on femicide rates, we first looked at the broader regions: Americas, Europe, Oceania, and Asia — Africa had no data so the region was left out of all data that analyzed the year. The total femicide rates for each region from 2000 to 2022 were calculated. This was done by grouping the data by region and year using the group_by function, then summing the "VALUE" (recorded number of femicides) for each year using the summarize function. This process was repeated for each region, resulting in four separate datasets that contained the total femicide rates for each region over time. The bind_rows function was then used to combine the four datasets into a single dataset that contained the total femicide rates for all regions. This combined dataset was then used to create a line graph using the ggplot function from the ggplot2 package. The line graph visualizes the trends in femicide rates for each region from 2000 to 2022, allowing for a comparison of femicide rates across different regions over time. Through this line graph and a bar graph created, which totaled all femicide rates through all 22 years for each region, the Americas indicated the highest femicide rates recorded. Specifically, there was a notable increase in femicide rates in the Americas in 2014. To delve deeper into this trend, we conducted an analysis of femicide categories in the Americas from 2014 to 2022. These categories included total categories, foreign citizens, interpersonal homicide, (total) intimate partner or family member, family member, intimate partner, national citizens, organized criminal groups or gangs, other criminal activities, other perpetrator known to the victim, perpetrator to victim relationship unknown, perpetrator unknown to the victim, socio-political homicide, terrorist offenses, and unknown types of homicide. These specific categories were analyzed by filtering the data to include only the relevant categories and years, then we calculated the total femicide rates for each category using the same grouping and summarizing process described previously. Multiple line graphs were created to visualize the

trends in femicide rates for each category in the Americas from 2014 to 2022. Lastly, to determine the comparison of total femicide and total homicide rates in the Americas from 2000 to 2022, a line graph was created using datasets created to only include total femicide in the Americas and total homicides in the Americas between the years. Using the same bind_rows and summarize function, a geom_line was created.

4 Data Analyzation

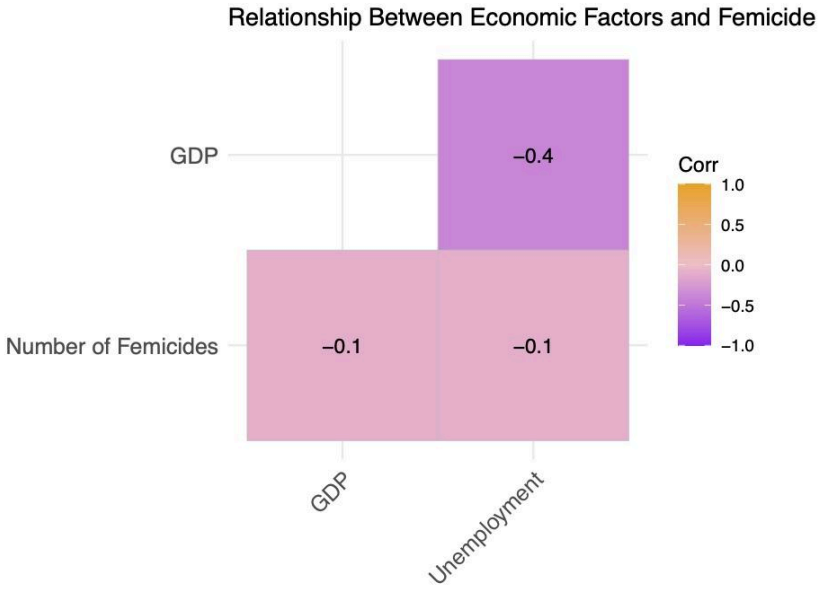
4.1 Figure 01. GDP and Unemployment Rates vs. Number of Femicides



These two figures display the relationship between GDP and the number of femicides, as well as the unemployment rate and the number of femicides. For these graphs, year and country were disregarded, as we only aimed to determine the general relationship between the variables. Based on the GDP graph, we can conclude that there is a very weak, negative relationship between GDP and the number of femicides (r = -.13). If the hypothesis was supported, we would expect to see a negative correlation, which we do, but would expect the correlation to be much stronger and appear linear, with a greater number of femicides when GDP is low, and a lower number of femicides when GDP is high. Therefore, the hypothesis is not supported. When looking at the unemployment rate graph, we can conclude that there is also a very weak, negative

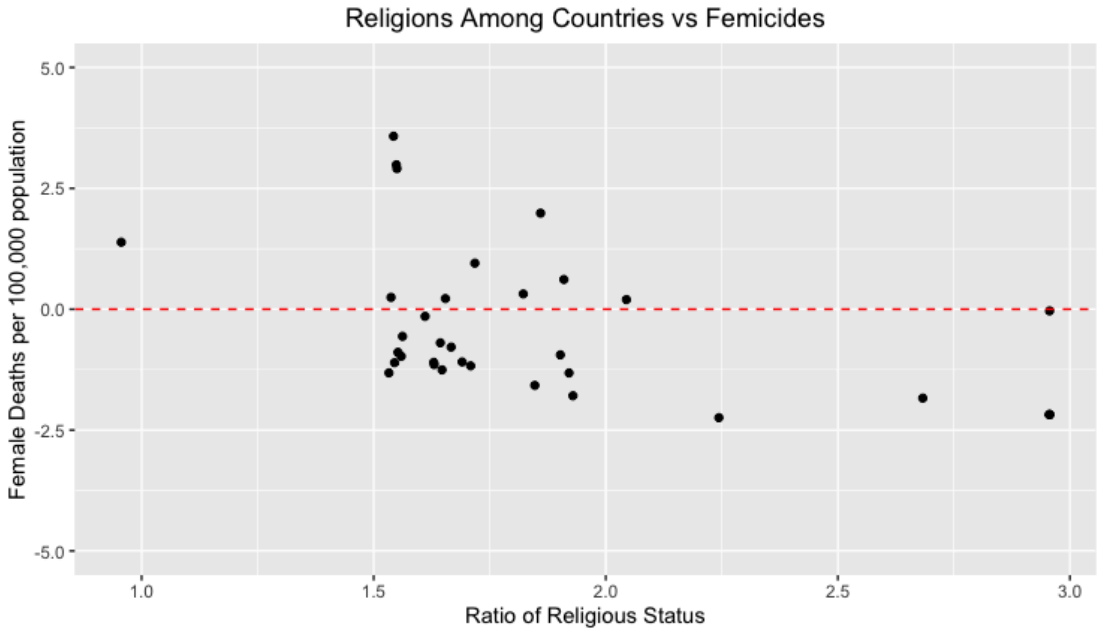
relationship between the two variables (r = -.056). If the hypothesis was supported, we would expect to see a positive correlation, as well as a much stronger correlation, with a lower number of femicides when the unemployment rate is low, and a greater number of femicides when the unemployment rate is high. Therefore, again, the hypothesis is not supported.

4.2 Figure 02. Correlation Between Economic Factors and Femicide



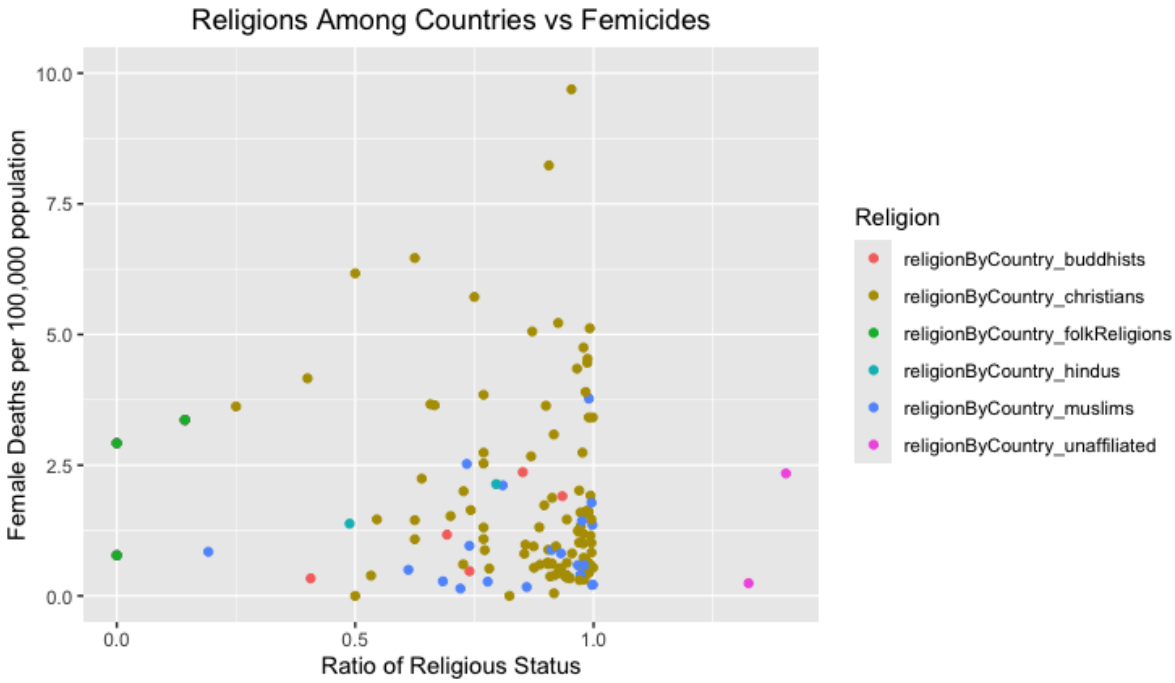
This figure shows an alternative method to displaying the correlations between GDP and number of femicides and unemployment rate and number of femicides. In this plot, the r-values are rounded to one decimal place. We can see that both correlations have an r-value of -.1, which indicates both are weak, negative correlations.

4.3 Figure 03. Multilinear Regression Model: Relationship between Femicides, Religion, and Religion Ratio



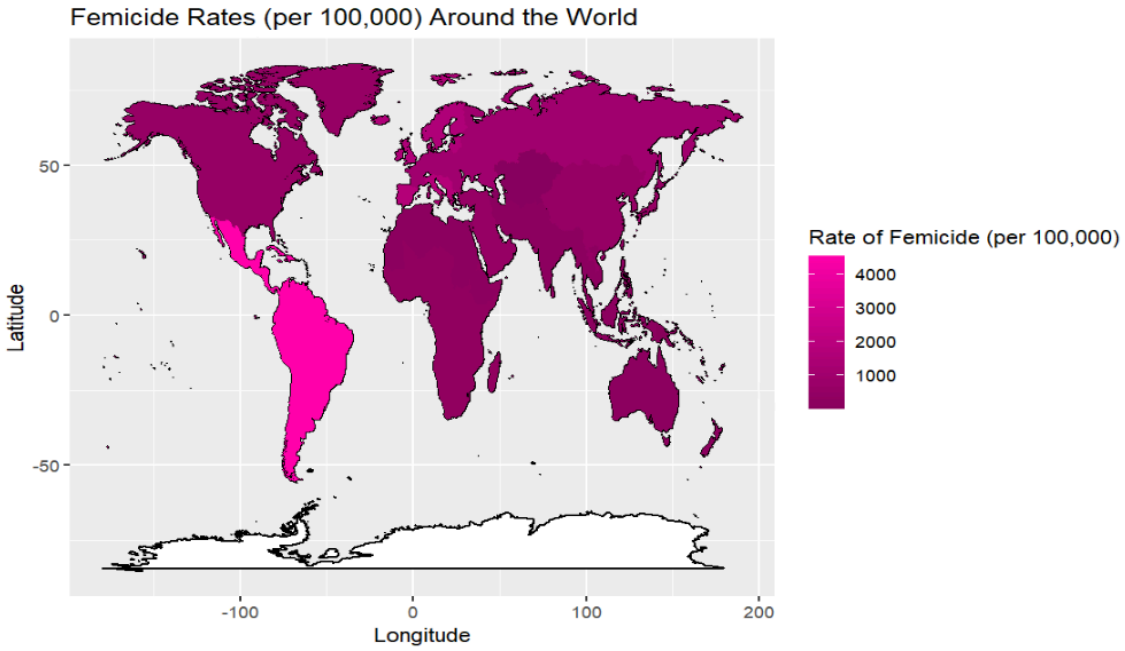
This graph showcases the relationship between three variables: the highest religious ratio within a country, the corresponding religion, and femicide rate residuals. Residuals are the difference between the expected value, predicted by the model, and observed value. Most of the data is clustered together, randomly falling above and below the zero intercept line. As a result, there is no observable trend to indicate that these variables have a correlation with one another.

4.4 Figure 04. Scatterplot: Distribution of Femicides and Ratio of Religion



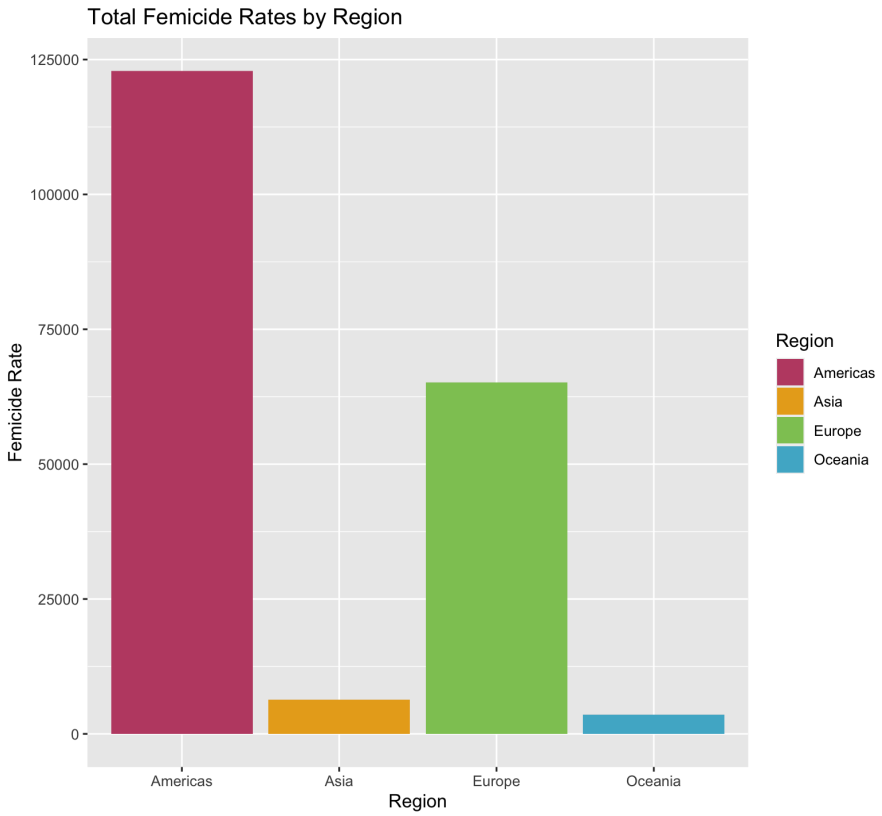
This graph demonstrates the relationship against the highest religious ratio within a country, in addition to the corresponding religion, and femicide rate. Most of the data points lie randomly scattered within the 0.5 to 1.0 range. This further illustrates no trend, indicating neither a high nor low religious presence is correlated with higher femicide rates.

4.5 Figure 05. Visual Distribution of Femicide Rates in Different Subregions



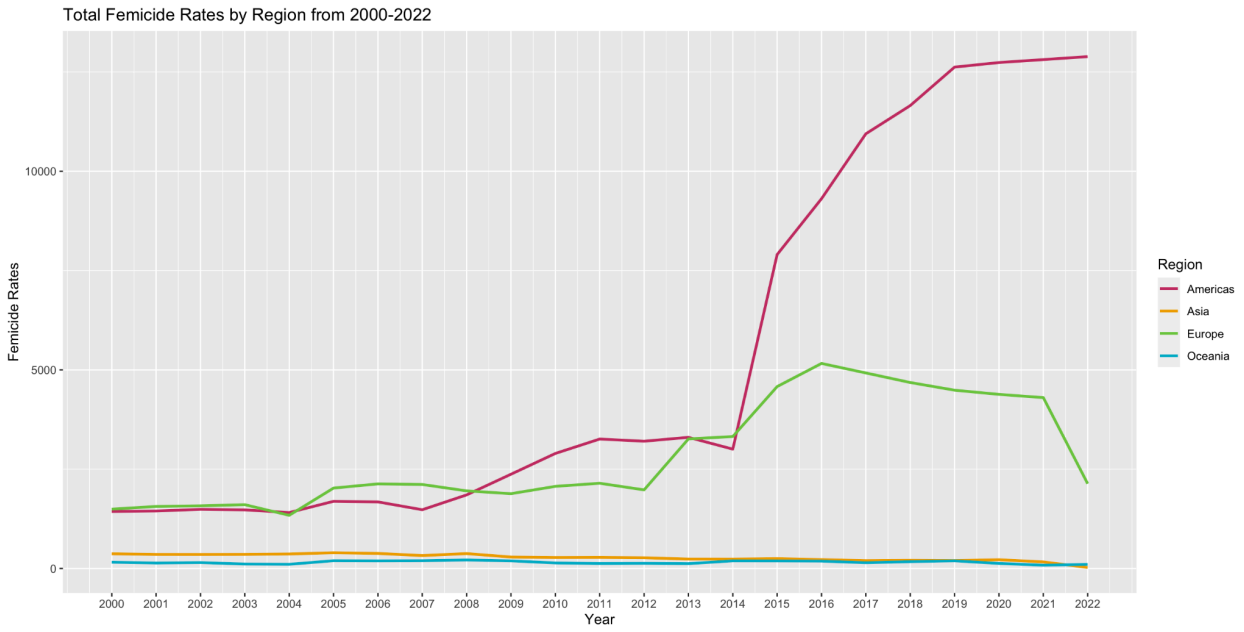
This figure clearly shows that the Latin American and Caribbean subregion of the dataset has the highest rate of femicide per a population of 100,000. Even though some may say that there are many countries in this region that may create this pattern, the sub-Saharan region of Africa has a comparable number of countries and does not reflect the same pattern.

4.6 Figure 06. Bar Graph Depicting Total Femicide Rates Combined from 2000-2022 by Region



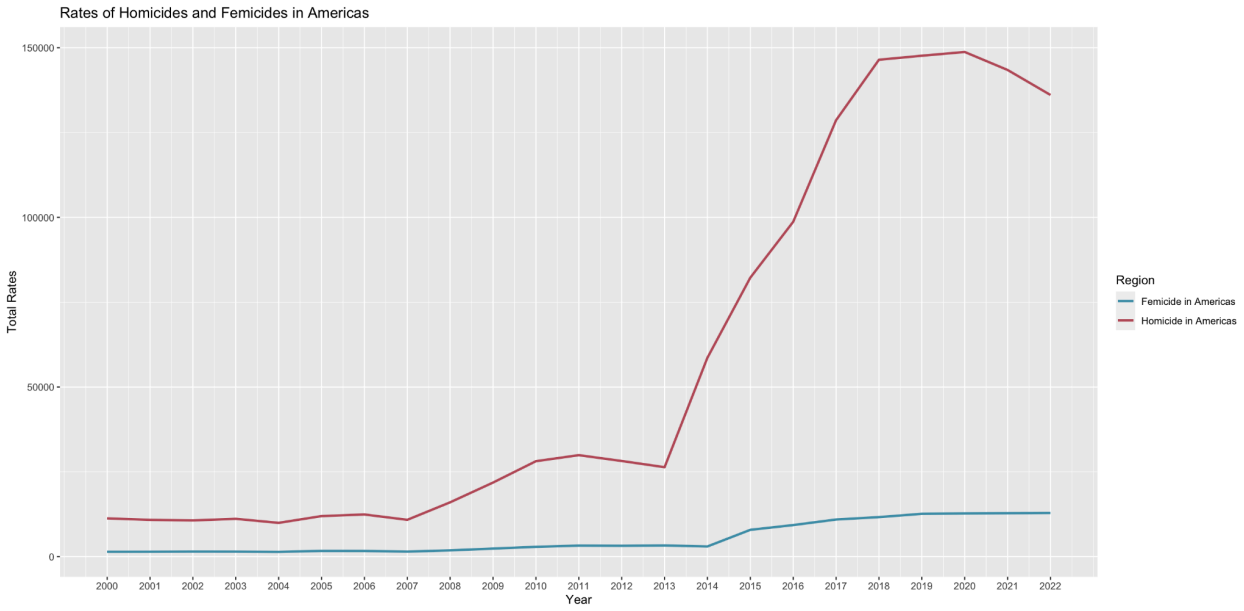
This bar graph illustrates the total number of femicides reported between the years 2000 and 2022 in the Americas, Asia, Europe, and Oceania. The data reveals a stark contrast in reported femicides, with the Americas showing nearly double the number compared to Europe and five times more than Asia and Oceania.

4.7 Figure 07. Line Graph Visualization of Total Femicide Rates by Region Each Year from 2000-2022



This figure examines the correlation between the year and reported femicides in the Americas, Asia, Europe, and Oceania. The various lines plotted depict the fluctuations and peaks in reports over the years. While Asia and Oceania show relatively stable rates, the Americas and Europe exhibit more dynamic trends that should be further analyzed. In Europe, there are two major points of increase which are from 2012 to 2014 and 2014 to 2015, followed by a gradual decline from 2016 to 2021 and a significant drop from 2021 to 2022. In contrast, the Americas faced a sharp increase from 2014 to 2015, followed by consistent rises in femicide rates.

4.8 Figure 08. Line Graph Depicting the Rates of Homicide and Femicide in Americas Throughout the Years 2000-2022



This line graph illustrates the rates of reported homicide and femicides in the Americas. The purpose is to analyze whether the increase in reported femicides is directly correlated with rising homicide rates. This analysis challenges whether femicide rates are increasing independently. When examining the figure, it can be seen that after 2013, homicide rates spiked until 2019 with a threefold increase. This trend suggests a possible correlation between the increase in homicide rates and femicide rates, which indicates that femicide rates are increasing in dependence on the overall trend of rising homicides.

5 Conclusion

5.1 Limitations

The reliability and validity of the dataset used come into question, as no metadata was available. This would show how this data was obtained, who was behind the data collection, and background information on the specifics within the data. For this reason, a major assumption was

made, such as the GDP in US dollars, that this conversion was accurate. Additionally, there was a significant amount of data that was removed. There was an extreme amount of NA's that most likely affected the graphs created, leaving many countries not represented who could have had an effect on the overall interpretations of the graphs. Particularly, the NA's were mainly from countries within the African continent, which highly affected how the region would be represented in regards to femicide rates. Only a select few religions were present within the dataset, leaving out other religions that may provide additional perspective concerning femicides. The high femicide rates during COVID-19 may be a result of the overall increase in rates throughout the years and not necessarily due to COVID-19 — raising the possibility that the observed spike in femicides could be part of a broader trend of the direct consequences of the pandemic.

5.2 Summary

Most of the findings led to conflicting results that went against our hypotheses and previous research. The state of a country's economy, religion, and year did not demonstrate that they were major factors in femicide rates, which goes against our hypotheses. Our hypothesis for the region proved to be accurate; most of the femicide is occurring within Latin America, as illustrated in Figure 5. There appears to be other factors that are likely contributing to higher rates of femicide in certain geographic areas. A country's history, culture, patriarchal influence, and educational status may be greater predictors of assessing femicide risk factors. Femicide is a multifactorial phenomenon, making it a difficult task to tackle for future interventions, especially for factors that are not measurable. Future research should be focused on gathering reliable and detailed data among countries, especially those with fewer data collection resources, such as African countries. This must be done in order to accurately assess the risk factors of femicide

within all regions of the world, and this in turn will aid in determining what proper intervention programs will do best to reduce the number of femicides around the world.

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