**Slide 1: Title Slide**

Good morning everyone. Today, I will be presenting the results of my project titled 'Data Science for Health Systems: Analysis of Maternal Mortality.' This project involves an exploratory analysis of maternal mortality data sourced from the World Health Organization. My name is Dimopoulou Sevasti, and I am an undergraduate student at the University of Thessaly."

**Slide 2: Introduction**

Maternal mortality is a critical issue where women die during pregnancy, childbirth, or within 42 days of the termination of pregnancy.It is a critical public health issue that reflects the quality of healthcare systems and socio-economic conditions in a region. The objective of this project is to analyze maternal mortality data from the WHO to understand its distribution, trends, and contributing factors. By identifying regions needing intervention, we can help formulate policies to improve maternal health outcomes.

**Slide 3: Dataset Overview**

The dataset used in this analysis is sourced from the World Health Organization and contains information on maternal deaths from various countries over multiple years. Key variables include the country code, observation period, observed maternal deaths, proportional mortality, and environmental factors related to maternal health.

**Slide 4: Data Preparation**

Data preparation involved cleaning the data by removing rows with missing values and duplicate entries. I also transformed the data by converting categorical data to factors and numerical data to appropriate types. Outliers were managed by capping them at the 99th percentile to prevent skewing the results.

**Slide 5: Exploratory Data Analysis (EDA)**

My EDA involved using various methods to clean and visualize the data. Histograms were used to analyze the distribution of key variables, line plots to observe temporal trends, and boxplots to compare maternal deaths across different countries.

**Slide 6: Distribution of Observed Maternal Deaths**

This histogram shows the distribution of observed maternal deaths across countries. The right-skewed distribution indicates that most countries have relatively low numbers of observed maternal deaths, but a few countries experience significantly higher numbers. This highlights disparities in maternal health outcomes.

**Slide 7: Proportional Mortality Distribution**

Here we see the distribution of proportional mortality rates. Most countries have low proportional mortality rates, with higher rates being less common but significant in certain regions. This suggests that while maternal deaths constitute a small proportion of total deaths in many countries, they are a substantial percentage in a few, indicating areas for potential health policy interventions.

**Slide 8: Environmental Factors (Total and Maternal)**

These histograms show the distribution of environmental factors total and environmental factors related to maternal health. Both distributions are right-skewed, indicating that while most countries have low environmental contributions to maternal mortality, a few experience much higher values. Addressing these environmental issues could lead to significant improvements in maternal health outcomes in the affected areas.

**Slide 9: Temporal Trends in Maternal Deaths**

This line plot shows the trend of total maternal deaths over the years. There is a noticeable decline starting around 2010, suggesting that interventions and improvements in maternal healthcare during this period have been successful. However, the fluctuations highlight the need for continuous monitoring and intervention.

**Slide 10: Proportional Mortality Over Time**

The line plot indicates a steady decline in average proportional mortality from 1990 to 2020. This consistent decline reflects improvements in maternal health and better management of factors contributing to maternal mortality, suggesting that efforts to reduce maternal deaths relative to total deaths have been effective over time.

**Slide 11: Country-Specific Analysis**

This boxplot shows significant variation in maternal deaths among the top 10 countries, with Brazil having the highest median and upper range of maternal deaths. The presence of outliers suggests specific years or incidents with unusually high maternal deaths, highlighting the need for country-specific strategies to address maternal mortality.

**Slide 12: Regional Analysis (South America)**

The plot for South America reveals that Brazil experienced a significant increase in maternal deaths starting around 1995, with a subsequent decline around 2015. Chile and Ecuador show relatively stable trends with lower maternal deaths compared to Brazil, suggesting that Brazil’s maternal health policies and interventions during these periods had a substantial impact.

**Slide 13: Multiple Countries Analysis**

These line plots highlight significant regional differences in maternal mortality trends. Kazakhstan shows a sharp peak around 2000, while South Korea and Malaysia display declining trends over time. The United States shows a noticeable peak around 2010, with Australia and the UK showing relatively stable and low maternal deaths. Understanding the causes of these peaks and declines can help inform targeted interventions.

**Slide 14: Proportional Mortality Trend**

This scatter plot with a trend line shows a clear decline in proportional mortality over time, indicating overall improvement in maternal health relative to total mortality rates. Despite the scatter, the downward trend is evident, suggesting sustained efforts to reduce maternal mortality have been effective.

**Slide 15: Conclusion**

In conclusion, the analysis reveals several key insights into maternal mortality. Significant disparities exist in maternal mortality rates across different countries, with some experiencing much higher maternal deaths. There is a general improvement in maternal health over the years, with declining trends in both total maternal deaths and proportional mortality. Environmental factors play a significant role in maternal mortality, especially in certain countries, highlighting the need for addressing these issues.

**Slide 16: Recommendations**

To improve maternal health outcomes, we should focus on addressing environmental factors and high mortality regions. Continued efforts are necessary to maintain and further reduce maternal mortality rates. Targeted interventions in specific regions and periods, such as in Brazil and the USA, are crucial.