**ABSTRACT**

This study delves into the intricate dynamics of murder rates spanning the years 2015 to 2021, focusing on discerning trends, spatial patterns, and their correlation with socioeconomic factors. Utilizing a dataset encompassing these years, our analysis employs statistical methodologies to unearth meaningful insights.

We first scrutinize temporal trends, identifying fluctuations and patterns in murder rates over the specified period. By comparing these findings with historical data from the preceding decade, we offer a comprehensive understanding of the evolving landscape of lethal crimes.

Spatial analysis plays a pivotal role in our study, as we investigate geographical variations in murder rates. Through advanced mapping techniques, we delineate hotspots and coldspots, shedding light on the spatial distribution of violent incidents.

Furthermore, our research extends beyond mere descriptive analysis to uncover underlying correlations between murder rates and socioeconomic factors. By integrating data on poverty, education levels, and other pertinent metrics, we scrutinize the interplay between social conditions and crime prevalence. Through regression analysis and correlation studies, we aim to identify significant associations, providing valuable insights for policymakers and stakeholders.

**Introduction**

Crime is as old as human history itself. It has evolved into different forms, saw variations in it through cultural, temporal, and socio-economic changes. Through all this, the action of crime still persists in our society. Among all the crimes human commits, the crime of murder seems to be the most arrogant. Life is a precious gift to behold, regardless of its struggles, so there is little reasoning behind murder. It is a devastating act that not only ends a life but also leaves a lasting impact on families, communities, and society as a whole. Understanding the motives behind murders is crucial in addressing this serious issue and working towards creating safer communities.

This project delves into the motives behind murders in India over the past 7 years. By analyzing available data on murder cases and their motives, we aim to uncover insights that can inform strategies for crime prevention and intervention. Murders often stem from a variety of factors, including personal disputes, socio-economic inequalities, and systemic issues. By studying these motives, we hope to gain a deeper understanding of the root causes of violent crime and identify ways to address them effectively.

Our analysis will explore patterns and trends in murder motives, examining how they have evolved over time and vary across different regions and demographic groups. By examining the underlying factors contributing to homicides, we aim to provide actionable insights for law enforcement agencies, policymakers, and community organizations. Ultimately, our goal is to contribute to efforts aimed at reducing violent crime and promoting safety and well-being in Indian society.

Analysis on the murder counts in

years (2015-2021)

We have the data of total murder counts of the year 2015-2021, so we look to plot them taking the years in the abscissa and the murder counts in the ordinate axis. We obtain the plot in Fig 1.1

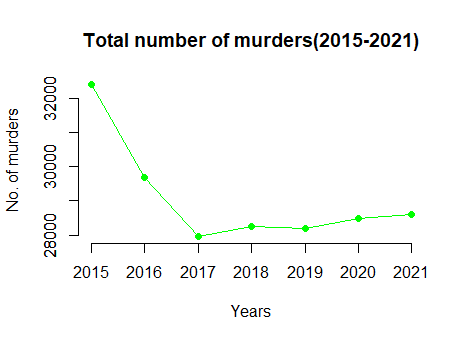


Fig1.1 The time series plot of the murder counts

Through a cursory glance we see that the murder counts have seen a sharp decline in the period of 2015-2017 and saw its minimum at 2017. After 2017, the murder counts picked up but at a more humble rate than its previous decline in the former mentioned period. Now, we look to find a trend line to this time series plot.

**1.2 Fitting a trend line**

The most common trend line fitting is the linear one but the graph hints us to model it with a less common trend model but still a famous one. It would be really intuitive to model the trend of the murder counts of the period 2017-2021 with an exponential trend model to be specific the inverse exponential trend model. The trend model fitting of the linear type, the exponential type are shown in Fig 1.2.1.

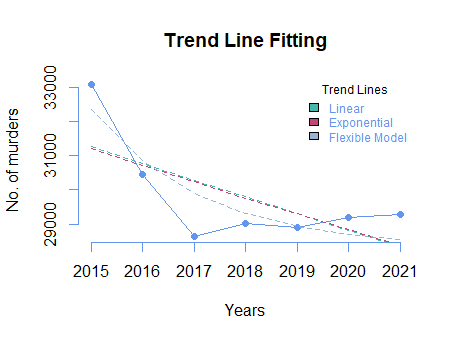


Fig 1.2.1 Fitting the linear, exponential and the inverse exponential trend models

We see that the linear trend line tries to give a representation of the trend but is not that useful, the exponential doesn’t improve the situation either. Now a more flexible model is used to capture the underlying trend. The form of the fitted model is provided below:

The estimates of and are calculated using the least squares method. The estimates along with the actual fitted equation is given below:

= 27580 and = 1012

So the model becomes,

Here the years variable used is the standardized version so as to obtain a non-zero estimate of . This model, however, quite efficient in capturing the trend has a huge downside to it, it is not interpretable. The coefficients in the model and doesn’t have an interpretable meaning. This is an example of the trade-off between prediction accuracy and model interpretability.

The linear trend equation is

And the exponential trend equation is