Spatial Analysis of Crime Patterns in the Valley of Kashmir: A GIS-Based Approach

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Abstract

This research paper presents a comprehensive analysis of crime patterns in the Kashmir valley from 2016 to 2021, using geospatial data analysis techniques. The study categorizes crimes into various types and provides statistical measures such as mean, median, mode, standard deviation, range, and interquartile range to analyze the distribution of each crime type. The findings reveal that thefts, molestation, and rioting are the most commonly reported crimes in Kashmir, with 969.17, 1083.5, and 1046.5 cases per year on average, respectively. In contrast, dowry death is the least reported crime type, with an average of only 0.5 cases per year. The study highlights significant consistent rise in crime in the valley, with the exception of a slight decline in growth rate between 2017 and 2019. The district of Srinagar, Kulgam, and Shopian had the highest rate of crime in the valley on the other hand, Anantnag, Baramulla, Kupwara, and Bandipora districts all saw a considerable decrease in crime, with Bandipora having the lowest crime rate. Moreover, the differences in the frequency of certain crimes, such as rape, dacoity, and eve-teasing, between the mean and median values, indicating the presence of extreme cases. Moreover, the analysis identifies rioting and kidnapping/abduction as high variance crimes with a wide range and high interquartile range values. These findings provide valuable insights for law enforcement agencies and policymakers to develop targeted crime prevention strategies. Overall, the research underscores the importance of using geospatial data analysis techniques to better understand crime patterns and improve crime prevention measures.

Keywords; Crime patterns, GIS, Kashmir Valley, Crime statistics.

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1. INTRODUCTION

Living without violence is a basic human right that influences the quality and quantity of life. For example, violence can shorten life expectancy, create fear and anxiety, and alter behaviour to avoid crime (Soares, 2015). Hence, being safe from violence is one of the 'capabilities' that enhance the quality of life (Sen, 1987). Violence also weakens the rule of law, which lowers the trust in property rights, deters investment, and harms economic growth and public services (Mehlum et al., 2005). The socio-economic impacts of violence are more severe in developing countries, as they have less capacity to cope with the negative effects of violence (UN, 2005). The Global Peace Index 2018 report, by the Institute of Economics and Peace, showed that India was among the 27 most violent countries and lost 9% of its GDP due to violence in 2017 (IEP, 2021). An action committed or omitted, which constitutes an offence and is punishable by law, is a crime (IPC). It is an unlawful act punishable by the State or the law. In other words, anything which is injurious to public welfare is a crime, generally speaking, crime is a human conduct that society generally disapproves of. But in modern sense, crime is any act that is prohibited by the penal law in force. Crime is a universal phenomenon that surpasses geographical and temporal boundaries. Since the beginning of human civilization, the issue of criminal activities and delinquency has persisted and will continue to do so in the future (Shripati, 2013). It is improbable that any society can entirely avoid criminal incidents, as it is deeply ingrained in human nature (Ramesh, 2004). Crime has evolved and expanded in parallel with the growth and progression of human societies (R.P., 2004). The existence of crime is an indisputable reality, as long as there are social disparities and conflicts inherent in communal living (Aksoy, 2017). Across all eras and societal types, individuals have been exposed to criminal activities (Firoz, 2018). The establishment of social security is pivotal to ensuring the quality of life, and a zero-tolerance approach to crime is desirable in any democratic society (Firoz, 2018). The origins of crime can be traced back to the dawn of human society. It arises when individuals violate the social contracts that govern their behaviour, resulting in critical breaches that are classified as crimes. In such instances, society takes on the responsibility of punishing the perpetrators, as it is the duty of society to protect itself. As humans began living in groups, and later in communities and tribes, rules were established to regulate the behaviour of group members. Over time, as populations grew and these groups evolved into larger societies or nations, the rules and regulations initially implemented by tribal leaders were subsequently transferred to governments and states. Governments established

dedicated law enforcement agencies to tackle criminal activity and ensure justice is served. As members of society, individuals possess certain rights that must be safeguarded by governments and states. Geospatial technology has revolutionized the field of crime analysis by providing an efficient tool for analyzing crime patterns and trends (Chainey et al., 2013; Mohammed & Baiee, 2020). The use of geospatial technology in crime analysis has been studied in various parts of India, such as Jharkhand (Firoz et al., 2018), Haryana (Kedia, 2016), and Uttar Pradesh (Jitendra et al., 2014), to identify crime hotspots and improve law enforcement strategies. In this paper, we aim to apply similar techniques to analyse crime patterns in Kashmir, a region that has been affected by insurgency and turmoil (Manzoor et al., 2021: Hajam, L. A.et al., 2024) By utilizing geospatial technology, we hope to identify crime hotspots and understand the spatiotemporal patterns of criminal activities in the region.

1.1. GEOGRAPHICAL SIGNIFICANCE OF CRIME

One of the most important parts of every law enforcement agency is the examination of crimes. Crime analysis can assist police departments in lowering crime. This study aims to investigate crime trends and patterns in the Kashmir Valley, India, using geographic information systems (GIS) analysis. The study is based on secondary data that were collected from national crime bureau record of India, State Crime Records Bureau Jammu & Kashmir, police records, to investigate the spatial and temporal characteristics of crime in the region. The study highlights the importance of GIS in crime analysis and its ability to provide a comprehensive understanding of crime patterns and trends in a specific area that will be beneficial for organization to overcome these issues. The study of the geographical incidence of crime & adequacy is generally thought to have begun a century ago. The geographic phenomena are considered to influence the criminal behaviour. The phenomena include climate, topography, natural resources & geographic location. Geography plays a significant influence on the crime as the general geographic characteristics of the area like location, nature, etc, (Sheikh et al., 2017; Saleem, S.et al., 2024) Demographic characteristics of the area (like population composition, distribution and density), Economic characteristics (like economic activities of the people, market) etc., determines the nature of the crime.

Crime as we know is not spread evenly across maps. It clumps in some areas and is meagre in others. Crime mapping is the key concept to understand the spatial and temporal occurrence of

crime, but it is only the first step. The next step is the usage of geographical information system (GIS) and spatial statistics to detect the spatial temporal clustering of crime patterns for proper social and criminal precautionary measures (Kadam, 2021). Crime mapping and GIS based spatial analysis and modelling in crime is considered a powerful tool for the study and control of crime, because crime maps help police to identify/locate problems at various levels (Helbich and Arsanjani 2015), GIS database not only support geocoded thematic layers but also traditional tabular-based data, such as spreadsheets, and additional multimedia-based information, such as word processing documents, digital pictures, and video and audio recordings. More recent innovations in spatial tracking device (GPS, Cell phones, Automated License Plate Readers, Unmanned Aerial Vehicles and Radio Frequency Identification devices) have further extended the potential for law enforcement agencies to more easily apprehend offenders and prevent crime while keeping investigation officers safe. Thermal imaging technologies create an image using temperature (Asano et al., 2012; Saleem S. et al., 2021) are widely used for marijuana related growing operations (Schultz, 2008; Schreiber 2009) whereas Ground-Penetrating Radar has been used successfully by law enforcement agencies to locate a variety of forensic evidence (Schultz, 2012). Geographic Profiling, a very common examining methods and one of the more specialized approach of crime mapping and analysis which integrates the theory from criminal investigative analysis, environmental criminology, ethnographic geography and criminal geographic targeting to support law enforcement and investigating agencies in solving difficult serial crimes (Canter, 2009).The advancement in information technology and concept of digital India (initiated by Indian government) has tremendous pressure in various department including law enforcement agencies to implement it as the earliest. Although police forces have started using GIS technology which is limited to big cities, the penetration of GIS into every application is relatively low. Crime mapping basically has three major functions within the crime analysis, firstly it provides cartographical map that helps to manifest the analysis results. Secondly it facilitates the spatial pattern and its nature for visualization with statistical analysis based on crime and other types of events. Thirdly it allows the analysts to link other data sources together based on its geographical location such as census information, socioeconomic condition and historical crime data for a common area.

2.Material and Methods

2.1 STUDY AREA

The Kashmir region is Nestled between the Pir Panjal and Greater Himalayan ranges lies the valley of Kashmir, a distinctive oval plain with a length of about 134 km and a width ranging from 32 to 40 km. Located at the northernmost part of the Indian subcontinent, Kashmir has a long and complex history, marked by periods of relative stability as well as violent conflict. Kashmir consists of a total of ten districts Srinagar district is having highest population in the valley (1236829), & the least populous is Shopian district (266215). The most densely populated district is Ganderbal (1148 persons/sq. km), & the least densely district is Baramulla 238 P/km^2 (Figure 1). The literacy rate is highest in Srinagar (69.41%), & the least literacy rate is in Budgam district (56.08%). The Sex Ratio is highest in Kulgam & shopian (951 females per 1000 males). The Kashmir division is largely Muslim (96.41%) with a small Hindu (2.45%) and Sikh (0.81%) population (Hajam, F. A., et al 2024; Mushtaq. S.et al.,2024). Among Muslims, about 10% are Shias, remaining being Sunni. The majority of the population speaks Kashmiri, which is spoken by 85.50% of the population. Gojri and Pahari are also significant languages, with 6.27% and 3.86% of the population speaking them, respectively. Hindi is spoken by only a small percentage of the population, at 1.36% and, other languages make up 3.01% of the population. The population in the Kashmir valley is unevenly distributed. The spatial distribution of the population in the Kashmir valley is illustrated in Figure 2.

Fig 1. Location map of the study area showing district wise population and spatial distribution of the population in Kashir valley.

It is widely believed that the traditional Kashmiri society of a century ago was, for the most part, a crime-free community. During that era, crimes were thought to be infrequent, occurring neither in an organized manner nor being widely reported by the populace. The prevailing sentiment was that the majority of individuals led peaceful and non-violent lives, with major crimes being rare occurrences. In reality, this society embraced an extreme form of non-violent social ethos, condemning any type of violent or criminal behaviour. Fast forward to the present, the landscape of Kashmir has transformed significantly, witnessing the emergence of both traditional and

modern crimes. These contemporary challenges encompass a spectrum of offenses, including murders, rapes, dacoity, arson, eve-teasing, dowry deaths, and economic crimes such as corruption, drug trafficking, smuggling, wildlife trafficking, and crimes against women and children. The contrast between the historical ethos and the present-day reality underscores the complex evolution of societal norms and the emergence of diverse criminal activities in the region.

Fig 2. Distribution of population in the Kashmir valley.

2.2 Methodology

The study utilized secondary data sources collected from Crime Branch Kashmir, J&K Police Crime Gazette, and the demographic data of the valley collected from the Census Book J&K, 2011. The collected is for the period 2016 to 2021 Data Analysis has been carried out by employing descriptive statistical techniques such as averages, percentages, and BODMAS calculations to identify and analyse the trends and patterns of crime in the Kashmir Valley. Comparative analysis between Personal crimes and Property crimes is also carried out to find out variability in different types of crimes. Geospatial Analysis: Geospatial analysis techniques such as mapping and visualization has been used to identify the spatial patterns of criminal activities in the valley. The outcomes of both the data analysis and geospatial analysis are interpreted to yield a comprehensive understanding of the crime trends and patterns in the Kashmir Valley.

Crime Rate

Crime rate is a metric that is used to measure the number of crimes occurring within a specific geographic area during a specified time period. The crime rate is typically calculated as the number of reported crimes per 100,000 people in the population. This calculation is performed by dividing the total number of crimes reported in a given area by the population of that area and then multiplying by 100,000. This formula provides a standard rate that can be used to compare crime levels across different geographic areas, regardless of population size. The crime rate can also be used to measure changes in crime levels over time. In this case, the percentage change formula can be applied. This formula calculates the percentage difference between two values, such as the number of crimes reported in one year compared to the number of crimes reported in the previous year. By using the percentage change formula, policymakers and law enforcement agencies can track trends in crime rates and adjust their strategies accordingly.

The formula for calculating crime rate is:

$$\text{Crime Rate} = (C / P) * 100{,}000$$

Where C represents the number of reported crimes in a given area or region, and P represents the population of that area or region. The crime rate is then multiplied by 100,000 to standardize the rate per 100,000 people.

3. Results and Discussion

The study analyzed crime trends and patterns in the Kashmir Valley, India, from 2016 to 2021 focusing on 17 different types of crimes. The findings show that the most frequent crimes in the region are thefts, followed by molestation and kidnapping/abduction. On the other hand, dowry deaths and dacoity were the least frequent crimes. The study also revealed that the mean number of crimes in Kashmir during the analyzed period was 1873.1, with a median of 5189 and a mode of 5696. The standard deviation was relatively high, indicating a significant degree of variability in the data. Additionally, the range of the data was quite broad, with a maximum value of 10745 and a minimum value of 0. These findings suggest that the crime rate in Kashmir fluctuates considerably from year to year. murder accounted for 1.23% of all reported crimes during the period. Attempted murder cases fluctuated over the years, with the highest number being reported in 2016 and the lowest in 2017, accounting for 4.04% of all reported crimes. On the other hand, abetment/attempt to suicide showed a steady increase throughout the years, with the highest number of cases being reported in 2021, accounting for 5.92% of all crimes reported during the period. Culpable homicide cases remained relatively stable between 2016 and 2018 but increased in 2019 and 2020 before decreasing in 2021. These findings provide valuable insights into the types and trends of crime in the region, which can be useful for policymakers, law enforcement agencies, and the general public in developing effective crime prevention strategies and improving public safety.

3.1. Descriptive statistical analysis

Crime statistics in the Kashmir Valley between 2016 and 2021 reveal interesting trends in the prevalence of different crimes. Murder, which accounted for 1.23% of all reported crimes during this period, remained relatively stable between 2016 and 2018 before decreasing in 2019 and 2020

and then increasing slightly in 2021 (Table 1). Attempted murder, on the other hand, showed a fluctuating trend during the years 2016 to 2021, with the highest number of cases reported in 2016 and the lowest in 2017. It accounted for 4.04% of all reported crimes in the valley. Abetment or attempt to suicide was another crime type that showed a steady increase between 2016 and 2021, with the highest number of cases reported in 2021. This crime type accounted for 5.92% of all reported crimes during this period. In contrast, culpable homicide cases remained relatively stable between 2016 and 2018, increased in 2019 and 2020, and then decreased in 2021. Overall, it accounted for 0.24% of all reported crimes during this period. Rape cases showed a gradual increase between 2016 and 2021, with the highest number of cases reported in 2020 (Figure 3).

Fig 3. Line graphs showing variation in major crime types from 2016 to 2021.

Rape accounted for 2.13% of all reported crimes during this period. Kidnapping and abduction were another type of crime that showed a fluctuating trend during the years 2016 to 2021, with the highest number of cases reported in 2018. Kidnapping and abduction accounted for 8.52% of all reported crimes in the Kashmir Valley. Molestation cases increased steadily between 2016 and 2021, with the highest number of cases being reported in 2021. This type of crime accounted for 18.23% of all reported crimes during this period. Eve teasing cases, on the other hand, showed a declining trend during the years 2016 to 2021. Overall, eve teasing accounted for 0.65% of all reported crimes during this period Where in Dowry Death There were no cases of dowry death reported in 2016 and 2017, but one case was reported in 2018, two in 2020, and none in 2019 and 2021. Dowry death accounted for only 0.008% of all reported crimes during this period (Figure 3). Cruelty by Husband The number of cases of cruelty by husband showed a fluctuating trend during the years 2016 to 2021, with the highest number of cases being reported in 2017. Cruelty by husband accounted for 2.81% of all reported crimes during this period. Dacoity The number of dacoity cases remained relatively low during the years 2016 to 2021, with the highest number of cases being reported in 2018. Overall, dacoity accounted for only 0.06% of all reported crimes during this period. Robbery The number of robbery cases fluctuated during the years 2016 to 2021, with the highest number of cases being reported in 2016. Robbery accounted for 1.21% of all reported crimes in Kashmir Valley. Burglary The number of burglary cases showed a fluctuating trend during this entire time period of 2016-22. In 2016, the total cases registered under this crime were 642, it reached to 722 cases in 2021, with fluctuations in between

Theft seems to be the most common type of crime in Kashmir Valley, with a total of 5,815 cases reported from 2016 to 2021, representing 16.30% of all reported crimes. Rioting is the second most common type of crime, with a total of 6,279 cases reported, representing 17.60% of all reported crimes. The number of cases reported for each type of crime varied from year to year. For example, the number of murder cases reported was 63 in 2016, increased to 94 in 2017 and remained stable at 94 in 2018 before declining to 62 in 2019. It increased again to 69 in 2020 and decreased to 59 in 2021. Similarly, the number of cases of theft reported increased from 880 in 2016 to 1261 in 2021, with fluctuations in between. The proportion of each type of crime to total crime remained relatively stable over the years, with theft and rioting consistently representing the highest proportions of total crime. However, there were some exceptions, such as abetment/attempt to suicide, which increased from 3.37% in 2016 to 8.69% in 2021, and NDPS (Narcotic Drugs and Psychotropic Substances), which increased from 3.42% in 2016 to 12.67% in 2021.

Table 1. Head Wise Crimes in Kashmir Valley (2016-2021)

The table 1 and 2 presents the crime statistics in Kashmir for the years 2016-2021. The data is categorized based on the type of crime, and the table shows the mean, median, mode, standard deviation, range, and interquartile range (IQR) for each type of crime. Additionally, the total number of crimes reported during this period is presented at the bottom of the table. Observing the mean number of crimes, the top three crime types reported in Kashmir are thefts, molestation, and rioting, with 969.17, 1083.5, and 1046.5 reported cases on average per year, respectively. On the other hand, the least reported crime type is dowry death, with an average of only 0.5 cases reported each year (Table 2). The median, or the middle value of the dataset, is another measure of central tendency that can give us a better understanding of the distribution of the data. The median values for the majority of the crime types are similar to their mean values, indicating that the data is not highly skewed towards a particular value. However, for some crime types like rape, dacoity, and eve-teasing, the median values are much lower than their corresponding mean values, suggesting that there might be a few extreme cases that are significantly increasing the mean. The mode, or the most commonly occurring value in the dataset, can also provide useful information about the distribution of the data.

In this dataset, the mode values for most of the crime types are the same as their median values, indicating that there is not a large variation in the frequency of crimes reported. The standard deviation is a measure of the spread or variability of the data, and it tells us how much the values deviate from the mean. For most of the crime types, the standard deviation values are moderate, indicating that the data is not highly dispersed around the mean. However, for some crime types like rioting and kidnapping/abduction, the standard deviation values are high, suggesting that there is a large variation in the frequency of these crimes reported. The range, which is the difference between the maximum and minimum values in the dataset, gives us an idea of the spread of the data. In this dataset, the range values vary widely across different crime types, with rioting having the highest range of 1838 and dowry death having the lowest range of 2. The IQR is a measure of variability that gives us an idea of how much the middle 50% of the data deviates from the median. The IQR values for most of the crime types are moderate, except for rioting, which has a very high IQR value of 470, indicating that the middle 50% of the data is highly dispersed Overall, the crime statistics in Kashmir suggest that thefts, molestation, and rioting are the most reported crime types, while dowry death is the least reported. Additionally, while the majority of the crime types have moderate mean, median, and standard deviation values, some crime types like rioting and kidnapping/abduction have high values, suggesting that these crimes are reported at varying frequencies.

Table 2. show the descriptive statistics of crime data (2016-2021)

3.2 District-Level Analysis of Crime Trends in Kashmir

The utilization of geo-spatial techniques to analyze the intensity of crimes in the Kashmir division during the years 2016-21 has revealed that the Kashmir division compromising ten administrative districts spanning over an area of 15948 sq. kms. The district Baramulla is the largest one with an area of 4243 sq. kms while Ganderbal is the smallest, covering an area of 259 sq. kms (Rather J et al., 2017; Saleem. H. et al., 2024). The largest district in terms of population is Srinagar with a population of 12.69 lakh, while Shopian is the smallest with 2.65 lakh people. Ganderbal has the highest population density with 1151 persons per sq. km, and Baramulla has the least with 305 persons per sq. km. As per the data provided in Table 3, the highest number of police stations are in Srinagar (28 P/S) and the least in Shopian (3 P/S). The police station in Anantnag district covers

the highest average population with 118904 people, while Ganderbal district has the police station covering the least average population with 42429 people (see Table 3).

Table 3. Demographic profile of all the ten District of Kashmir valley

Based on Figure 4, district Srinagar has consistently reported the highest number of registered crime cases every year from 2016-21, followed by Baramulla, Kupwara, and Anantnag (Figure 4). The year 2016 saw the registration of 1401 cases in Srinagar, and the least number of cases were reported in Bandipora district (268 cases). In 2018, Srinagar had 1487 registered cases, and the least number of cases was reported again in Bandipora district (206 cases). In 2021, the total number of cases in Srinagar slightly reduced to 1366 cases, yet it was still the highest in the valley, followed by Baramulla, Kupwara, and Anantnag. The least number of cases were again reported in the district of Bandipora with 278 cases. Overall, all the districts witnessed an increase in the number of registered crime cases with slight fluctuations, particularly in the case of Srinagar.

Fig 4. District Wise Annual & Average Crime Rate in Kashmir (2016-21)

A thorough summary of all the criminal cases that have been reported in the Kashmir Valley's several districts between 2006 and 2020 is given in Figure 4. An analysis of the data indicates clear trends and variations in the rates of crime in various districts during the given time frame. Interestingly, Anantnag's crime rate varies and will significantly decline in 2020. Baramulla is showing a trend of fluctuation, with a notable peak in 2016 and a subsequent rise in 2020 (Figure 5). Crime cases in Budgam show some consistency with sporadic variations, with a marked uptick in 2016. Crime rates in Kupwara are not constant, peaking in the year 2016. Pulwama demonstrates variances, with a decline in crime in 2020. Srinagar, a well-known district, exhibits fluctuation, with a discernible decline in 2020. The crime rate in Ganderbal varies, reaching a peak in 2016. Kulgam is characterized by volatility, as seen by a notable surge in crime rates in 2020. Shopian shows fluctuations in the number of criminal cases, with a notable rise in 2020. Finally, Bandipora exhibits significant variability, with a noteworthy decline in crime rates in 2020 (Figure 5). This analysis highlights the dynamic nature of crime patterns in the Kashmir Valley, highlighting the need for effective law enforcement and crime prevention initiatives to be based on a comprehensive understanding of local causes and trends. The observed variations could be caused by a variety of factors, including demographic shifts, socioeconomic situations, and law

enforcement tactics. This emphasises the need for targeted interventions based on district-specific dynamics.

Fig 5. District wise prevalence of crime in Kashmir valley from 2006 to 2020.

Figures 6 and 7 demonstrate the intensity of crime in the Kashmir Valley. Over the period of 2016-2021, Srinagar, Kulgam, and Shopian districts consistently displayed the highest intensity of crimes compared to other districts in the Valley, with some slight fluctuations. Srinagar, with the highest population in the Valley (1269751) and the greatest population density (703 p/sq. km), has the highest number of police stations (28 p/s). With each police station covering a smaller area and population than other districts in the Valley (on average, 70 sq. km and 45348 population), more attention is given to crime events and more cases may be registered (Kedia 2016). Additionally, people in urban areas tend to be more active and have less fear of registering cases. As a result, the high intensity of crimes in Srinagar can be attributed to these factors.

Kulgam and Shopian are the leading apple producers in the Valley, which may explain why theft-related crimes are more common in these districts. Moreover, these districts were noted as riot-prone areas. According to the Crime Branch Kashmir report, theft and rioting were the most concentrated crimes in these districts every year, accounting for about 50% of crimes. Population density is another factor contributing to the high intensity (Pratap, B.R. 2022) of crimes in these districts (925 and 852 persons per sq. km, respectively). The intensity of crimes drops significantly in other districts like Anantnag, Baramulla, Kupwara, and Bandipora, with Bandipora showing the least intensity. The low density of population in these districts (375, 305, and 368 p/sq. km, respectively) and the geographic and social backwardness of these areas, where most of the population is rural and less exposed to police and justice-related matters, could be the primary reasons for the decrease in crime intensity. The pattern of the average intensity of crimes in the Valley over the period of 2016-2021 is consistent with the annual intensity maps, with Shopian, Kulgam, and Srinagar showing the highest intensity of crimes, followed by Ganderbal and Budgam with moderate to high intensity.

Fig 6. Incidence of Crimes in Kashmir Valley (2016-21).

Fig 7. Spatial distribution of average crime rate in Kashmir valley from 2016 to 2021.

3.3. DRIVERS OF CRIME IN THE KASHMIR VALLEY

The crime patterns in the Kashmir Valley from 2016 to 2021 show different trends, with thefts, molestation, and rioting being the most regularly recorded crimes, averaging 969.17, 1083.5, and 1046.5 occurrences per year, respectively. Dowry death is the least documented crime type, accounting for about 0.5 incidents per year on average. Statistical study reveals considerable discrepancies between mean and median values for crimes such as rape, dacoity, and eve-teasing, implying the presence of extreme incidents. Notably, crimes like rioting and kidnapping/abduction have considerable variance, with a broad range and increased interquartile range values. While the complex reasons of crime in the Kashmir Valley are numerous, socioeconomic issues, political upheaval, and regional tensions are likely to contribute to the occurrence of specific crimes. The major drivers of crime in the study area are discussed below: -

a) Socioeconomic cause

High levels of poverty, unemployment, and limited access to education can create an environment in which people face tremendous obstacles (Adenike, 2021). Economic inequities can exacerbate feelings of anger, hopelessness, and desperation, prompting some to turn to criminal activity as a way of survival (Mir 2013; Burrell et al., 2021; Prilleltensky and Prilleltensky, 2021). Addressing socioeconomic challenges entails implementing policies that increase job opportunities, alleviate poverty, and promote access to high-quality education. Social welfare programmes can help to lift impoverished communities and break the cycle of crime that stems from economic distress.

b) Drug Abuse

The link between substance misuse and criminal behaviour is well established. Individuals struggling with addiction may resort to criminal acts to maintain their habits (Devi 2023; Maseko 2023). Combating drug misuse necessitates a comprehensive strategy that includes prevention, treatment, and rehabilitation programmes (Thompson et al., 2020). Investing in mental health services, educating people about the risks of substance dependence, and executing effective law enforcement measures to dismantle drug trafficking networks are all critical components (Park et al., 2020; Jhonson et al., 2022). Community support and a knowledge of the root causes of addiction are critical for building compassionate and successful remedies.

c) Political Unrest

The ongoing conflict in the Kashmir Valley has significantly increased the prevalence of crime in the region (Mir 2013). Protracted political and territorial disputes, along with a history of upheaval, have created an atmosphere fraught with social tension and economic volatility. The ongoing violence has caused a breakdown of established social structures, aggravating socioeconomic issues and contributing to increased discontent and despair among the population. The presence of uncertainty, as well as the influence of conflict-related trauma on individuals' mental well-being, may contribute to the development of some criminal acts (Bove et al., 2022).

d) Social Disintegration

Breakdowns in social structures and community ties can lead to a rise in crime (Errol 2021). Urbanisation, migration, and the erosion of traditional values are all potential causes of social collapse (Awasthi 2021). Rebuilding community relationships entails instilling a sense of belonging and shared responsibility (Lalani et al., 2021). Community outreach programmes, neighbourhood watch activities, and efforts to strengthen family structures can all contribute to prevent societal disintegration. Encouraging community members to interact with one another creates a friendly environment that inhibits criminal behaviour.

e) Moral and Ethical Values

A deterioration in moral and ethical standards in society can have serious consequences for human behaviour (Carnegie et al., 2021). Educational programmes emphasising moral growth, character education in schools, and active involvement of religious institutions can all help to restore and maintain these ideals. Moral and ethical education should emphasise empathy, compassion, and a sense of responsibility, emphasising the notion that respect for others is essential to a peaceful society.

Effective governance and law enforcement are vital to preserving law and order. Governments must fight corruption, improve the efficiency of legal systems, and guarantee that law enforcement agencies are properly equipped and trained. Fair and open legal processes are vital for instilling public trust in the justice system. Community policing projects can bridge the divide between law enforcement and the general public, building confidence and cooperation in crime prevention efforts. Education has a significant impact on moulding values and behaviour (Khawar and

Sarwar, 2021). School programmes, community workshops, and public awareness campaigns can all help to raise awareness and educate people about the consequences of crime and drug usage (Chang and Coppel, 2020). Curriculum additions that incorporate teachings on morals, ethics, and the repercussions of criminal behaviour help to create a culture that values law and personal responsibility. Civil society organisations, religious leaders, and community members play critical roles in tackling social challenges. These groups can actively participate in raising awareness, assisting vulnerable individuals, and pushing for good change. Collaboration among community organisations, government agencies, and law enforcement improves the effectiveness of crime prevention activities (Nanes 2020; Blair et al., 2021). Encouraging community people to actively participate in decision-making processes ensures that different points of view are considered when developing methods to address social concerns.

4. Conclusion

In conclusion, this study examined the trends and patterns of crimes in Kashmir Valley with a focus on thefts, corruption, and NDPS crimes using secondary sources of data and geo-spatial techniques. The study revealed that crime in the valley has been steadily increasing, with a slight fluctuation in between in the years 2017 and 2019, where a negative growth rate was noted. The crimes with the highest concentration were molestation, rioting, thefts, and burglary, with an average crime rate of 86.13 crimes per lakh of population. The study also found that the district of Srinagar, Kulgam, and Shopian had the highest intensity of crimes in the valley. The reasons for high intensity of crimes were population density, high population, and the number of police stations. Conversely, the crime intensity was seen dropping significantly in the districts of Anantnag, Baramulla, Kupwara, and Bandipora, with Bandipora having the lowest crime intensity. The reasons for low intensity of crimes in these districts were low population density, geographical, and social backwardness. While the moderate to high intensity was observed in Ganderbal and Budgam. Although the study was limited by the use of secondary sources, the findings reveal the importance of addressing crime in the region and the need for effective crime prevention strategies. Moreover, there is need for further research to validate its findings on crime trends in Kashmir Valley. Future research could use primary data collection methods, explore the impact of socio-economic factors on crime rates, examine the effectiveness of crime prevention

strategies, and identify ways to address the impact of political situations on crime rates in the region.

Funding: No funding was received to conduct this study.

Ethical Approval: All the ethical standards of research publishing were taken care of during this study.

Conflict of Interest: The authors hereby declare no known conflict of interest in the research work reported in the manuscript.

Acknowledgement: The authors are very much thankful to the United States Geological Survey for providing free satellite data used in this study.

Consent to participate: Not applicable

Consent to Publish: Not applicable

Availability of data and materials: Not applicable

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Table 1. Head Wise Crimes in Kashmir Valley (2016-2021)

NAME OF THE CRIME	**2016 (% share)**	**2017 (% share)**	**2018 (% share)**	**2019 (% share)**	**2020 (% share)**	**2021 (% share)**	**TOTAL (%)**
Murder	63 (0.99)	94 (1.65)	94 (1.60)	62 (1.19)	69 (1.20)	59 (0.86)	**441 (1.23)**
Attempt to murder	293 (4.64)	195 (3.42)	252 (4.30)	212 (4.08)	238 (4.14)	252 (3.67)	**1442 (4.04)**
Abetment/Attempt to Suicide	213 (3.37)	251 (4.40)	345 (5.89)	279 (5.37)	430 (7.48)	596 (8.69)	**2114 (5.92)**
Culpable Homicide	15 (0.23)	11 (0.19)	14 (0.23)	12 (0.23)	15 (0.26)	20 (0.29)	**87 (0.24)**
Rape	81 (1.28)	109 (1.91)	140 (2.39)	97 (1.86_	193 (3.35)	140 (2.04)	**760 (2.13)**
Kidnapping/Abduction	405 (6.41)	555 (9.74)	623 (10.63)	474 (9.13)	455 (7.91)	527 (7.68)	**3039 (8.52)**
Molestation	768 (12.16)	988 (17.34)	1118 (19.08)	1038 (20.00)	1235 (21.48)	1354 (19.74)	**6501 (18.23)**
Eve Teasing	67 (1.06)	51 (0.89)	34 (0.58)	31 (0.59)	26 (0.45)	24 (0.35)	**233 (0.65)**
Dowry Death	0 (0.00)	0 (0.00)	1 (0.01)	0 (0.00)	2 (0.03)	0 (0.00)	**3 (0.008)**

Cruelty by Husband	118 (1.86)	170 (2.98)	146 (2.49)	172 (3.31)	172 (2.99)	226 (3.29)	**1004 (2.81)**
Dacoity	4 (0.06)	4 (0.07)	8 (0.13)	4 (0.07)	2 (0.03)	1 (0.01)	**23 (0.06)**
Robbery	91 (1.44)	56 (0.98)	69 (1.17)	64 (1.23)	58 (1.00)	94 (1.37)	**432 (1.21)**
Burglary	642 (10.16)	769 (13.50)	698 (11.91)	625 (12.04)	565 (9.83)	722 (10.53)	**4021 (11.27)**
Thefts	880 (13.93)	918 (16.11)	851 (14.52)	859 (16.55)	1046 (18.20)	1261 (18.39)	**5815 (16.30)**
Timber Smuggling	76 (1.20)	84 (1.47)	85 (1.45)	92 (1.77)	72 (1.25)	129 (1.88)	**538 (1.50)**
Rioting	2360 (37.37)	1111 (19.50)	992 (16.93)	746 (14.37)	552 (9.60)	518 (7.55)	**6279 (17.60)**
Corruptions	22 (0.34)	29 (0.50)	38 (0.64)	36 (0.69)	38 (0.66)	64 (0.93)	**227 (0.63)**
NDPS	216 (3.42)	301 (5.28)	349 (5.95)	386 (7.43)	579 (10.07)	869 (12.67)	**2700 (7.57)**
TOTAL	**6314 (100)**	**5696 (100)**	**5857 (100)**	**5189 (100)**	**5747 (100)**	**6856 (100)**	**35659 (100)**

Table 2. show the descriptive statistics of crime data (2016-2021)

Crime Type	Mean	Median	Mode	Standard Deviation	Range	IQR
Murder	73.5	69	94	16.15	35	25.5
Attempt to murder	240.3	238	252	33.18	97	47
Abetment/Attempt to Suicide	352.3	279	596	141.83	366	136
Culpable Homicide	14.5	15	15	2.49	5	1.75
Rape	126.5	97	140	38.35	96	43
Kidnapping/Abduction	506.5	474	555	64.01	169	149
Molestation	1083.5	1038	140	202.22	616	116
Eve Teasing	35.5	31	24	18.97	43	22
Dowry Death	0.5	0	0	1.04	2	0.25
Cruelty by Husband	167	172	172	33.35	54	24.5
Dacoity	4	4	4	2.07	6	4
Robbery	71.33	64	58	15.27	36	13.75
Burglary	803.5	625	698	63.66	154	71.5
Thefts	969.17	859	918	146.82	187	181.25
Timber Smuggling	87.33	85	76	20.82	53	13
Rioting	1046.5	746	518	636.99	1838	470

Corruptions	34.17	36	38	14.21	16	7
NDPS	450.0	386	301	237.33	568	163.5
TOTAL	1873.1	5189	5696	1434.24	10745	1181

Table 3. Demographic profile of all the ten District of Kashmir valley

Districts Name	**Population Size (%age share)**	**Population Density (Per sq. km)**	**Total Police Stations (P/S)**	**Average Pop. Covered under each P/S**	**District Area & Average P/S Area sq. kms.**
Srinagar	1269751 (18.38)	703	28	45348	1979 (70)
Anantnag	1070144 (15.49)	375	9	118904	3574 (397)
Baramulla	1015503 (14.70)	305	11	92318	4243 (385)
Kupwara	875564 (12.67)	368	17	51503	2389 (140)
Budgam	735753 (10.65)	537	8	91969	1371 (171)
Pulwama	570060 (8.25)	598	5	114012	1090 (279)
Kulgam	422786 (6.12)	925	6	70464	1067 (177)
Bandipora	385099 (5.57)	1117	10	48137	398 (50)
Ganderbal	297003 (4.29)	1151	7	42429	259 (37)
Shopian	265960 (3.85)	852	6	44326.66	613 (102)
TOTAL	**6907623**		**102**	**76373.7**	**15948 (191)**