

# At Large: Determination of Crime Patterns in the Municipalities of Nueva Vizcaya

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## Abstract

This research determined the crime pattern in the municipalities of Nueva Vizcaya from 2020-2023. Using descriptive research design through a documentary analysis, patterns of crimes committed in the municipalities of Nueva Vizcaya were described using statistical methods. Frequency count and weighted mean were used in finding out the pattern of crimes committed. Further, to show the significant differences of the crime according to year and months and municipality, Analysis of Variance (ANOVA) was utilized. Meanwhile, to distinguish the difference between the crime categories, t-test was applied. Results showed that there is a downward trend of crime rates from 2020-2023. Year 2020 recorded the highest incidents in most of the months peaking in April. In terms of total number of cases per month, June noted the highest, while September. The rate of non-index crimes is significantly higher than the index crimes across all years. Furthermore, there is a significant difference between the volumes of crimes committed according to year, municipality, and crime category, while there is no significant difference on volumes of crimes in terms of months.

**Keywords:** *Crime pattern, year, month, index crime, non-index crime, frequency count, weighted mean, ANOVA*



## I. INTRODUCTION

Crime has been identified as a significant issue and is a prevalent feature of modern cultures. Crime as a social issue might limit people's ability to participate freely in the community. It can cause a great deal of worry in the community, more so than worries about jobs, national security, living expenses, poverty, and health.

By determining the location, time, and cause of specific crimes, crime pattern analysis reveals the underlying interacting mechanism between crime events. Early research revealed that criminal activity tends to follow patterns rather than being scattered randomly (Yang, B. et al. 2020).

Around the World, in 2006–2019 showed that African and Latin American countries suffer from the highest levels of various types of crime across the board, followed by countries in Asia. It was concluded that dimensions of governance emerged as powerful determinants of levels of all types of crime. Important determinants of common crime besides governance were poverty, inequality, and proportion of youth (Dijk et al. 2021).

The Philippines has a moderately high rate of crime, violence, and terrorism. In 2021, the country was on the bottom five of the order and security index ranking across the region. Crime rates were particularly high in poorer neighborhoods and areas with larger populations and higher unemployment (Statistica Research Department, 2022).

Further, Nueva Vizcaya is a province in the Philippines situated in the Cagayan Valley region occupying the northeastern section of Luzon. It is composed of 15 municipalities. According to PhilAtlas, its population as determined by the 2020 Census was 497,432.

As peace and order is seen as a crucial factor that dictates the progress of a particular community, the researcher opted to find out the crime pattern on a provincial scale. The results of this study will lead to further understanding of the certain rate or volume of crimes in an identified area. Subsequently, this study aims to determine the crime pattern among the municipalities of Nueva Vizcaya Province from 2020-2023. Also, it intends to identify the crime map that can be used to describe the crimes committed among the municipalities of the said province.

### **Objectives of the study**

This study generally aimed to determine the crime pattern in the municipalities of Nueva Vizcaya from 2020-2023. Specifically, this study answered the following:

1. What is the pattern of crimes in the municipalities of Nueva Vizcaya according to
  - 1.1. Year and Month Committed?
  - 1.2. Crime Category (Index or Non-index)?
2. Is there a significant difference between the volumes of crimes committed according to:



- 2.1. Year and Month Committed?
- 2.2. Crime Category (Index or Non-index)?
- 3. Is there a significant difference between the volumes of crimes committed according to municipality?

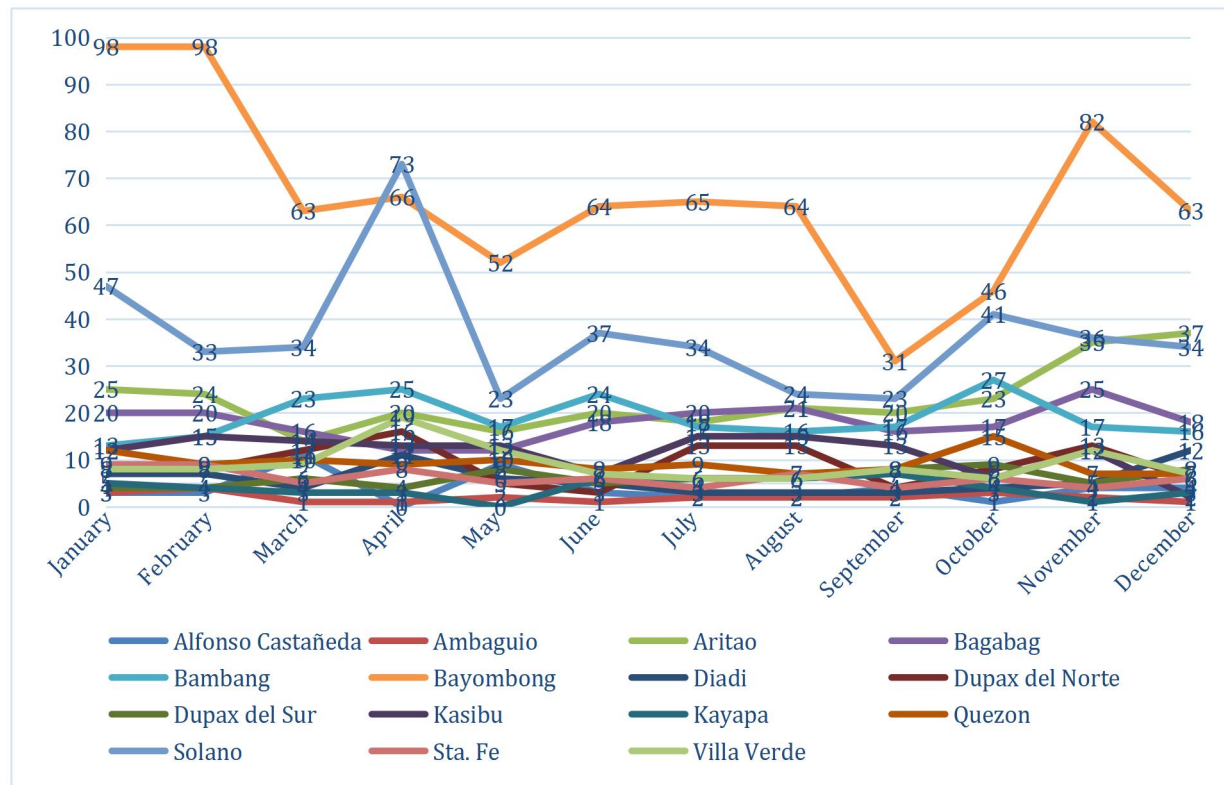
**II. METHODOLOGY**

Using descriptive research design through a documentary analysis, patterns of crimes committed in the municipalities of Nueva Vizcaya were described using statistical methods. Frequency count and weighted mean were used in determining the pattern of crimes committed in the municipalities of Nueva Vizcaya from 2020-2023. Further, to determine the significant differences of the crime according to year and months and municipality, Analysis of Variance (ANOVA) was utilized. Meanwhile, to determine the difference between the crime categories, t-test was applied.

**III. RESULTS and DISCUSSION**

1. Pattern of Crimes in the Municipalities of Nueva Vizcaya from 2020-2023 according to Month and Year.

Figure 1. Pattern of Crimes in the Municipalities of Nueva Vizcaya per Month in 2020.

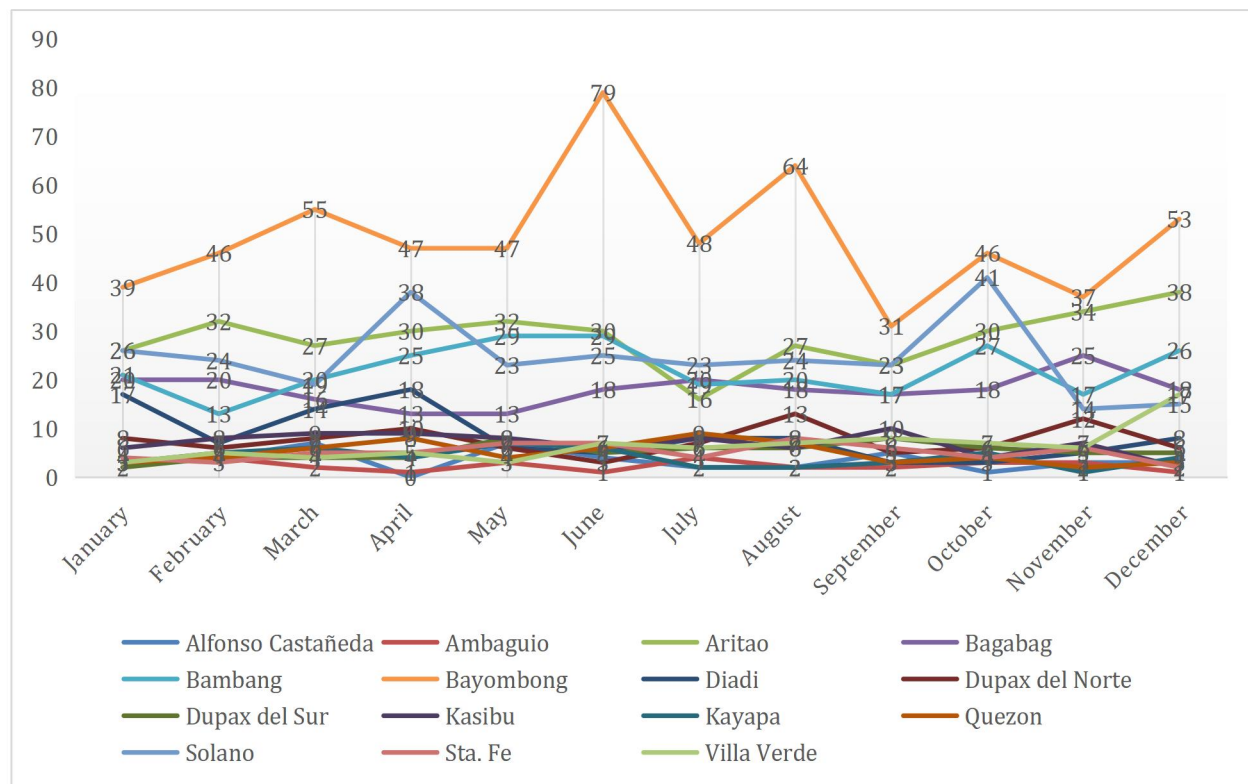




The monthly crime trend in the municipalities of Nueva Vizcaya in 2020 is shown in the preceding figure. It was recorded that the municipality of Bayombong had the most crimes in the majority of the months, followed by Solano, which had the highest in April (73 crimes), and Ambaguio, which recorded the fewest crimes in all months with its highest in February, documenting only 4 crimes. The town documented only 24 incidents which can be attributed to its geographical location being landlocked and mountainous. This implies that the geographical features as well as the urbanization level and population density of a town potentially determine its crime rate.

This is supported by the findings of Barreda (2022) that municipalities of higher crime rates are associated with number of population and geographical location.

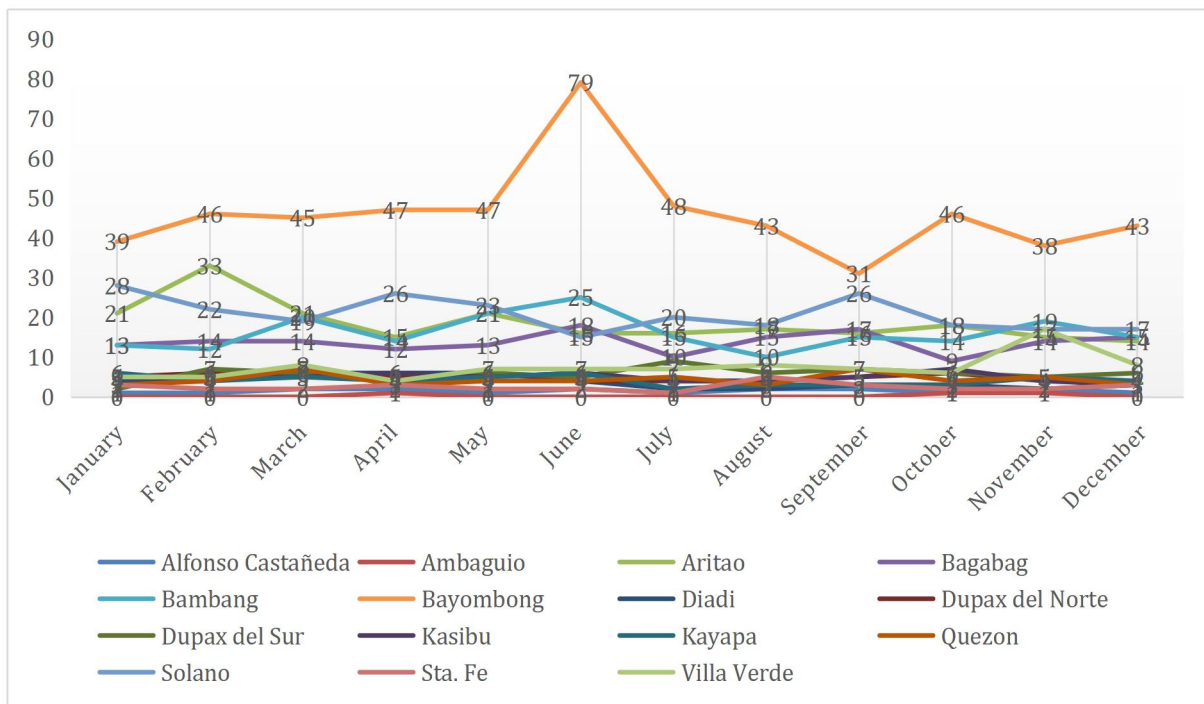
Figure 2. Pattern of Crimes in the Municipalities of Nueva Vizcaya per month in 2021.



The figure reflects that there is a noticeable increase in the rate of crimes in June and December in most of the municipalities. The municipality of Bayombong achieved the highest number of recorded crime incidents, which peaked in June with 79 crimes and 53 in December. Likewise, Villaverde surged in crimes in December with 17 crime incidents though it recorded a consistent low number in most of the months. Besides, Solano and Aritao logged relatively high crime rate in most of the months, while Ambaguio had the lowest with only a total of 29 crimes, recording 1 incident in April, June, and December.

Meanwhile, April had the highest number of crimes with 217, while September logged the lowest with only 164. This implies that there is no definite pattern on the seasonality of crimes. Supporting this, Shiode et al. (2023) stated that criminality opportunities linked to crime opportunity theory and the broader field of environment criminology may be responsible for the groupings of crimes that exhibit comparable seasonal changes. The results imply that there is no consistent seasonal pattern to criminal incidents.

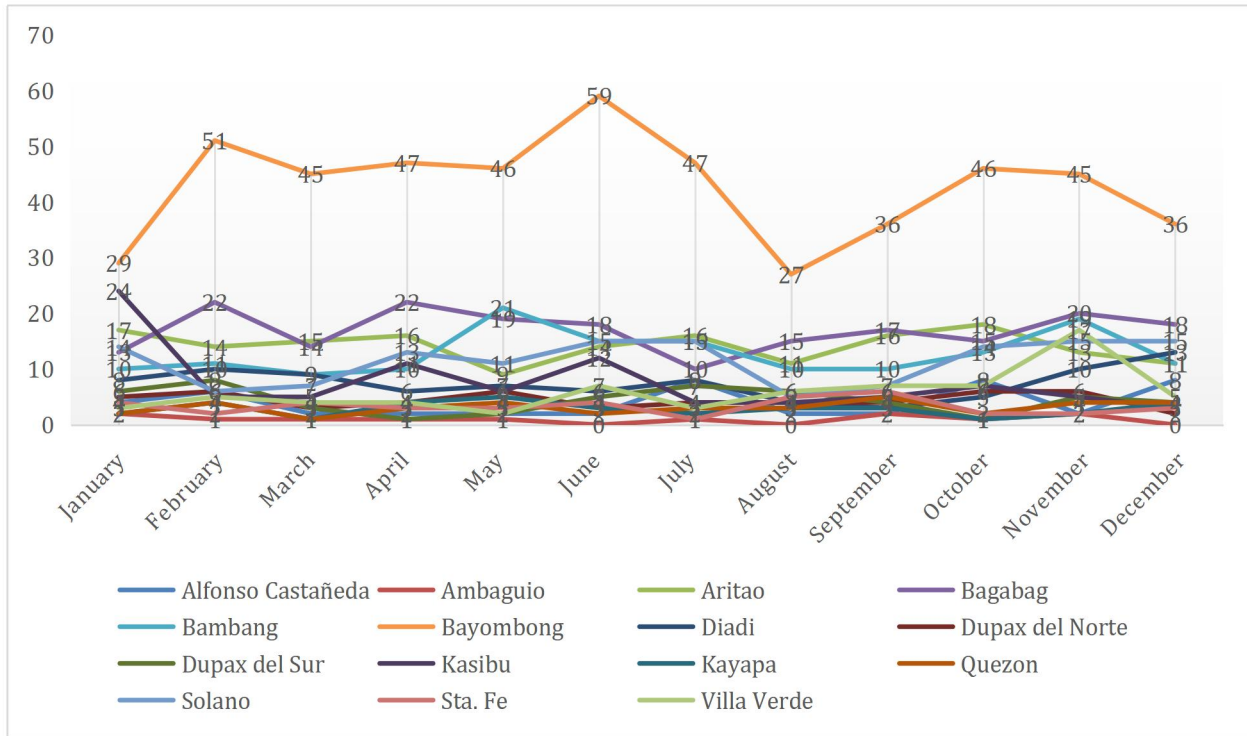
Figure 3. Pattern of Crimes in the Municipalities of Nueva Vizcaya per month in 2022.



As can be seen from above figure, municipality of Bayombong recorded the most crimes in all months. Ambaguio recorded the lowest crime incidents with only 1 case in April, October, and November and zero in the remaining months, while the towns of Solano, Aritao, Diadi, and Bagabag recorded a reasonably high number of crimes.

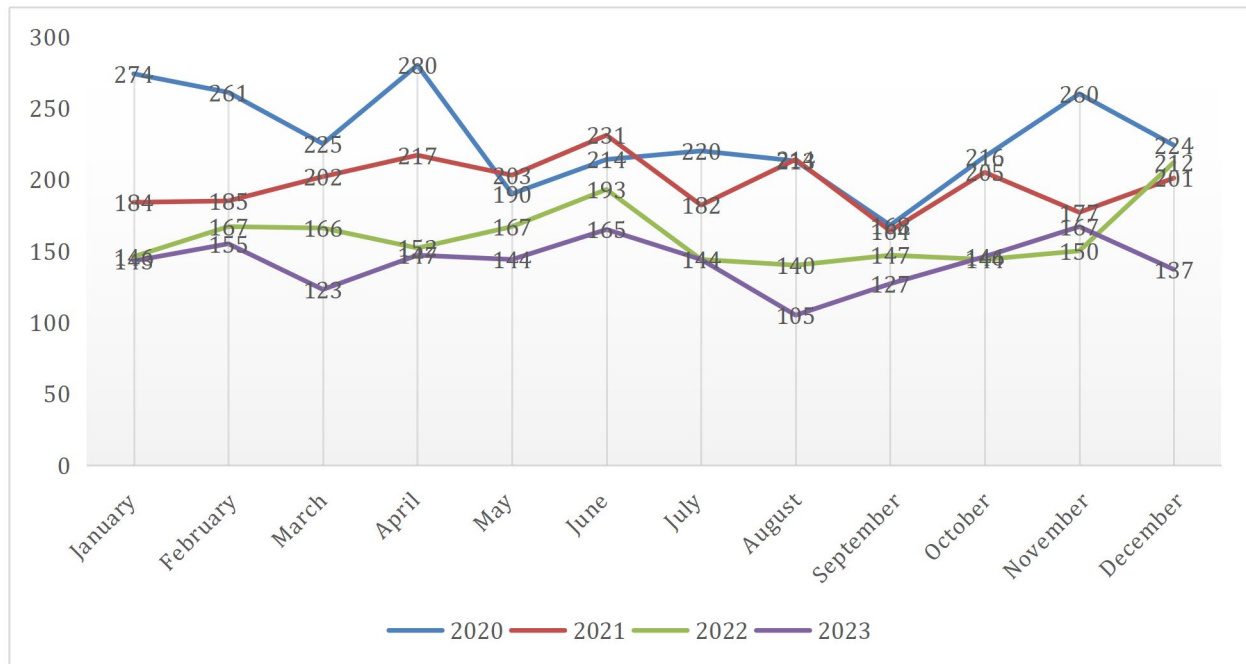
The highest total number of offenses per month was recorded in December (212), which may be linked to seasonal influences as the named month is packed with holidays where gatherings, travels and celebrations are significantly increasing. In support with this, Balahadia et al. (2020) concluded that date, time, and location factors are the best predictors of crime occurrence based on the patterns generated from the criminal records data set. This suggests that crime occurrence may be dictated by temporal and locational factors like holidays, gatherings, and increased mobility.

Figure 4. Pattern of Crimes in the Municipalities of Nueva Vizcaya per month in 2023.



The preceding figure illustrates that the municipality of Bayombong topped as to number of offenses committed across all months, peaking in June with 59 cases, and with its lowest in August with 27 incidents. As to the overall crime rate per month, November saw the highest with 167 followed by June with 165 cases, while August had the lowest number with only 105. Meanwhile, Ambaguio remained to be the town with the lowest cases with only 12 crimes, while Kayapa, Quezon, and Sta. Fe maintained a relatively low crime rate. This data implies that tight-knit communities with small populations have lower possibilities of recording criminal incidents. These results are supported in the Crime Pattern Theory that crimes do not happen at random; rather, they follow patterns that may be related to social, geographical factors (Robielos, 2020).

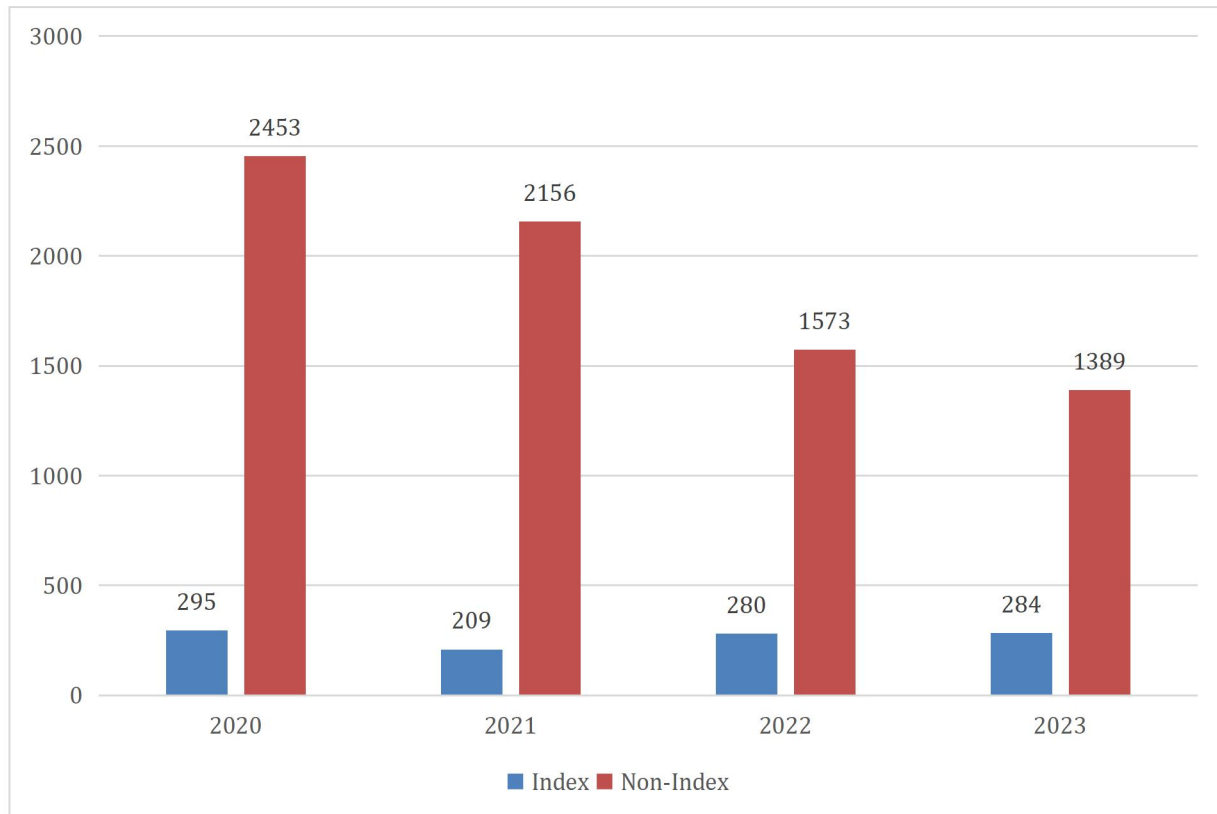
Figure 5. Overall Pattern of Crimes in the Municipality of Nueva Vizcaya in the year 2020-2023



It can be gleaned from the data presented that there is a downward trend of crime rates among the years. It is noticeable that the year 2020 recorded the highest incidents in most of the months peaking in April (280) followed by 2021 with June having the highest number of offenses. Meanwhile, 2023 had the lowest number of cases with only 167 as its maximum recorded in November. In terms of total number of cases per month, June noted the highest with 803, while October had the lowest recording with only 606.

The downward trend of offenses from 2020-2023 implies that there were crime prevention efforts in place and that these crime deterrent mechanisms work effectively. In line with this, Dijk (2021) concluded that the levels of all forms of crime were found to be significantly influenced by aspects of governance. Important drivers of common crime besides governance were poverty, inequality, and proportion of youth.

Figure 6. Pattern of Crimes in the Municipalities of Nueva Vizcaya according to the Crime category from 2020-2023.



It is evident that the rate of non-index crimes is significantly higher than the index crimes across all years. It is also noticeable that there is a downward trend on the number of non-index crimes from 2020 through 2023. This result is associated with the findings of Balita (2023) that the number of crimes committed in the Philippines significantly dropped in 2021 compared to the previous year, which can still be attributed to the lockdown restrictions implemented due to the COVID-19 pandemic in the beginning of the year.

## 2. Difference between the Volumes of Crimes Committed

Table 1. Difference between the Volumes of Crimes Committed according to Year

	Sum of Squares	df	Mean Square	F	p
Year	53698	3	17899	31.1	<.001
Residuals	25353	44	576		

It can be decided based on the data presented in the preceding table, there is a significant difference between the volumes of crimes committed according to year. To determine which pair of years shows statistically significant comparison, post hoc test was employed and further showed that crimes committed in 2020 differ significantly to 2021, 2022, and 2023. Similar decisions are found to 2021 which revealed significant variation when paired to 2022 and 2023. The decision implies that there is a considerable discrepancy in the number of crimes committed in Nueva Vizcaya according to year.

Result indicates evolving socio-economic conditions among the residents of the municipalities of Nueva Vizcaya and also the changing law enforcement mechanisms employed by the different governance levels.

Table 2. Difference between the Volumes of Crimes Committed according to Month

	Sum of Squares	Df	Mean Square	F	p
Month	8868	11	806	0.414	0.940
Residuals	70182	36	1950		

It can be inferred from the data presented that there is no significant difference in volumes of crimes in terms of months among the municipalities of Nueva Vizcaya. This result implies that the crimes committed per month are relatively of the same rate.

Table 3. Difference between the Volumes of Crimes Committed according to Crime Categories (Index vs Non-index)

		Statistic	df	p
Crimes Committed in 2020	Student's t	-3.03 <sup>a</sup>	28.0	0.005
Crimes Committed in 2021	Student's t	-3.35 <sup>a</sup>	28.0	0.002
Crimes Committed in 2022	Student's t	-2.55 <sup>a</sup>	28.0	0.017
Crimes Committed in 2023	Student's t	-2.59 <sup>a</sup>	28.0	0.015

Data presented showed a significant difference between index and non-index crimes in Nueva Vizcaya from 2020-2023. This implies that non-index crimes are more prevalent in the province.

### 3. Difference between the Volumes of Crimes Committed according to Municipality

Table 4. Difference between the Volumes of Crimes Committed according to Municipality

	Sum of Squares	df	Mean Square	F	p
Municipalities	1.31e+6	14	93915	31.1	<.001
Residuals	135904	45	3020		

It is shown in the table that there is a significant difference on the volumes of crimes committed according to municipality. This data implies that the varying law enforcement practices and socio-economic conditions among municipalities. The level of urbanization is also another factor contributing to the difference in the rate of crimes committed among municipalities.

## IV. CONCLUSION

Based on results and findings of the study, several meaningful conclusions were drawn that help deepen our understanding of the crime situation in Nueva Vizcaya. Overall, crime rates steadily declined from 2020 to 2023, suggesting that preventive measures and community-based initiatives may have contributed positively to safer local environments. The year 2020 stood out as having the highest number of recorded incidents in most months, likely influenced by pandemic-related disruptions and social challenges during that period. When comparing monthly



crime occurrences, June emerged as the month with the highest number of cases at 803, while September recorded the lowest with only 606 incidents, reflecting noticeable fluctuations in crime activities throughout the year.

Across all four years, non-index crimes consistently exceeded the number of index crimes, which may indicate that violations such as regulatory or administrative offenses remain more common than serious criminal acts. Encouragingly, the volume of non-index crimes also showed a continuous decline from 2020 to 2023. The study further revealed significant differences in crime volumes when assessed across the variables of year, municipality, and type of crime, emphasizing the unique characteristics and challenges faced by each locality. However, when crime data were examined by month, no significant differences were found, suggesting that while crime occurs throughout the year, its distribution does not drastically shift from one month to another.

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