

## Crime scenario of North-Eastern India: An assessment through GIS approach

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### Abstract

Crime is a social menace which stands in alarming level in our North-Eastern states especially against women. Some of such crimes mentioned may be rape, murder, molestation, extortion, kidnapping, burglary, theft, dacoity, robbery, cheating, trafficking. Here, in this study an attempt is made to understand the crime scenario of various crimes occurred in between 2017-2020 in Northeastern region of India. The state of Assam has found to be ranked highest in numbers of rape, child crime (incidence and victim), murder, human trafficking and kidnapping and abduction cases among other northeastern states of India during the period 2017-2020. Further from the study is observed that among all the crime categories kidnapping and abduction was highest (33189) in the respective period.

**Keywords:** Crime; GIS; Northeast; mapping; Assam.

### 1 Introduction

North-Eastern region is rich in its natural habitats, biodiversity, different ethnic culture among tribes and their personalities. Such prevalent scenario nowadays gradually changed towards modernism and thereby ethnic behaviour have been changing last two decades. As a result, several persons came to this region for education purpose, doing business and service etc. Some of them return to their place and others residing in this region for a long time. These persons have much contribution towards increasing different types of crimes against the original inhabitants of this region. Crime is described as a human phenomenon that violates laws and is punishable under various sections of the Indian Penal Code (IPC). This establishes the legal framework within which crime is addressed in India [1]. Crime is a social menace which stands in alarming level in our North-Eastern states especially against women. Some of such crimes mentioned may be rape, murder, molestation, extortion, kidnapping, burglary, theft, dacoity, robbery, cheating, trafficking. Besides, some criminal behavior prevalent in different North Indian states gradually has also been seen in the North-Eastern region. The application of Geographic Information Systems (GIS) and remote sensing in crime mapping in Northeast India has shown significant potential for enhancing public safety and law enforcement strategies. Various studies highlight the effectiveness of these technologies in analyzing crime patterns and optimizing police responses. A case study in Shillong utilized GIS to assess crime scenarios, generating service areas for police stations and identifying optimal routes to crime locations [2].

This approach aids in predicting probable crime hotspots, which is crucial for effective policing and resource allocation. The integration of GIS and remote sensing in crime mapping not only enhances situational awareness but also supports strategic planning in law enforcement across the Northeast region [3][4]. Remote sensing technologies have been employed to monitor environmental factors that may correlate with crime rates, such as urban development and forest degradation [5]. These insights can inform law enforcement about potential crime influences, allowing for proactive measures. The present study has tried to represent the scenario of various crimes occurred in between 2017-2020 in Northeastern region of India. It has used GIS and remote sensing technology for mapping the crime picture that has been prevailed in the region.

The study has considered all possible criteria of crimes irrespective of gender and age. The study period in this research work has tried to consider pandemic covid-19 period as well. The later section of the paper is divided into methodology, results and conclusion.

## 2 Research Methodology

### 2.1. Data

The data for the study were secondary in nature. It consists of different crimes such as rape, child (incidence and victim), murder, human trafficking and kidnapping and abduction occurred in north-eastern region of India during 2017-2020. The data were collected from national crime record bureau (NCRB) open government data platform [12]. For the analysis, geographical information system (GIS) techniques were used. A brief discussion of GIS and remote sensing techniques is discussed below:

#### • Geographical Information System

Advanced tools for the gathering, organising, processing, and displaying of geographic information are known as geographic information systems, or GIS. To support decision-making in a variety of domains, including public health, environmental management, and urban planning, they blend people, hardware, and software. In order to enhance sustainable management practices, GIS is utilised to visualise and analyse environmental data [6]. Users can create intelligent digital maps for analysis and presentation with ease thanks to a graphical user interface (GUI) [7]. Remote sensing is an innovative technology that uses a variety of sensors on satellites, aeroplanes, and drones to allow for the remote observation and study of the Earth's surface. This area of study has wide-ranging implications for many academic fields, with particular effects on agriculture, disaster relief, and environmental monitoring. Using electromagnetic radiation, such as visible light and infrared, remote sensing collects data [8]. In agriculture, remote sensing aids in monitoring crop health, estimating yields, and optimizing irrigation schedules [9]. It is also pivotal in disaster management, providing real-time data for effective response strategies [10]

## 3 Results

In this paper, we have considered five highest crimes occurred for the period of 2017 to 2020 in North-Eastern India. Following Table-1 depicted the average crime occurs in those 8 states of North-Eastern India:

**Table-1:** Category wise Crime scenario in North-Eastern States from 2017-2020 (irrespective of Gender)

	Rape Case	Child Crime (Incidence)	Child Crime (Victim)	Victims of Murder	Human Trafficking	Kidnapping and Abduction
Assam	7264	21628	23903	4790	849	33189
Meghalaya	377	1558	1609	337	55	517
Tripura	365	1118	1156	530	6	581
Arunachal Pradesh	268	570	652	272	5	447
Manipur	161	510	545	240	26	494
Sikkim	57	721	830	54	5	228
Mizoram	151	685	775	99	11	15
Nagaland	33	253	288	133	3	244

From the above table 1, it is observed that the state of Assam has highest numbers in rape, child crime (incidence and victim), murder, human trafficking and kidnapping and abduction cases among other northeastern states of India during the period 2017-2020. Further it could be observed that among all the crime categories kidnapping and abduction was highest (33,189) in the respective period.

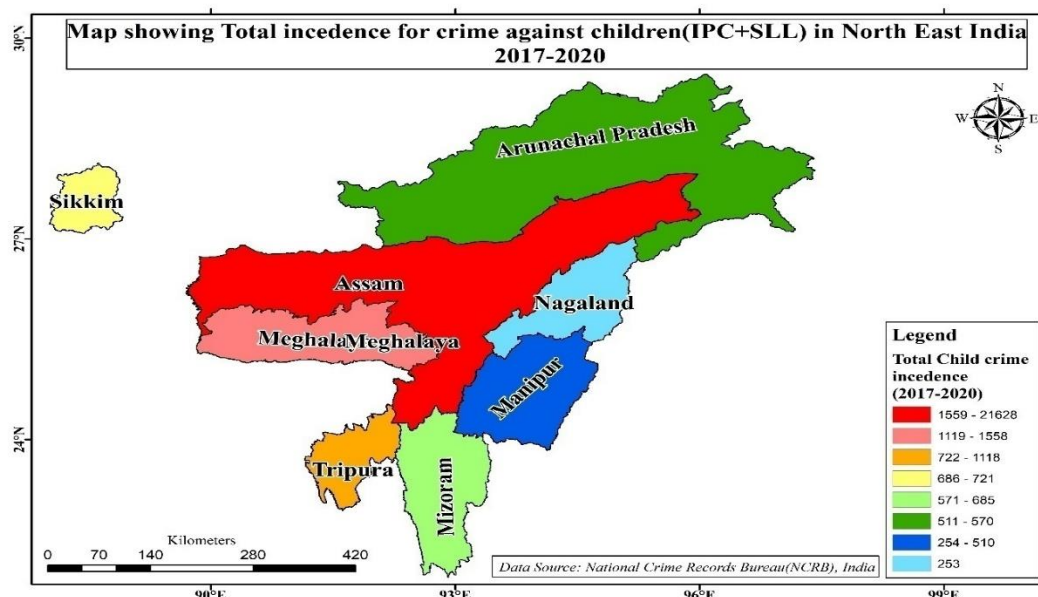
**Table-2:** Category wise Average Crimes of North-Eastern States from 2017-2020

	Rape Case	Child Crime (Incidence)	Child Crime (Victim)	Victims of Murder	Human Trafficking	Kidnapping and Abduction
Assam	1816.00	5407.00	5975.75	1197.50	212.25	8297.25
Meghalaya	94.25	389.50	402.25	84.25	13.75	129.25
Tripura	91.25	279.50	289.00	132.50	1.50	145.25
Arunachal Pradesh	67.00	142.50	163.00	68.00	1.25	111.75
Manipur	40.25	127.50	136.25	60.00	6.50	123.50
Sikkim	14.25	180.25	207.50	13.50	1.25	57.00
Mizoram	37.75	171.25	193.75	24.75	2.75	3.75
Nagaland	8.25	63.25	72.00	33.25	0.75	61.00

Table 2 above indicates that, in comparison to other northeastern states of India, Assam has the highest average for rape, child crime (incidence and victim), murder, human trafficking, and kidnapping and abduction incidents.

Based on Table-1 following Maps are developed for the five most occurring crimes for the period of 2017-2020:

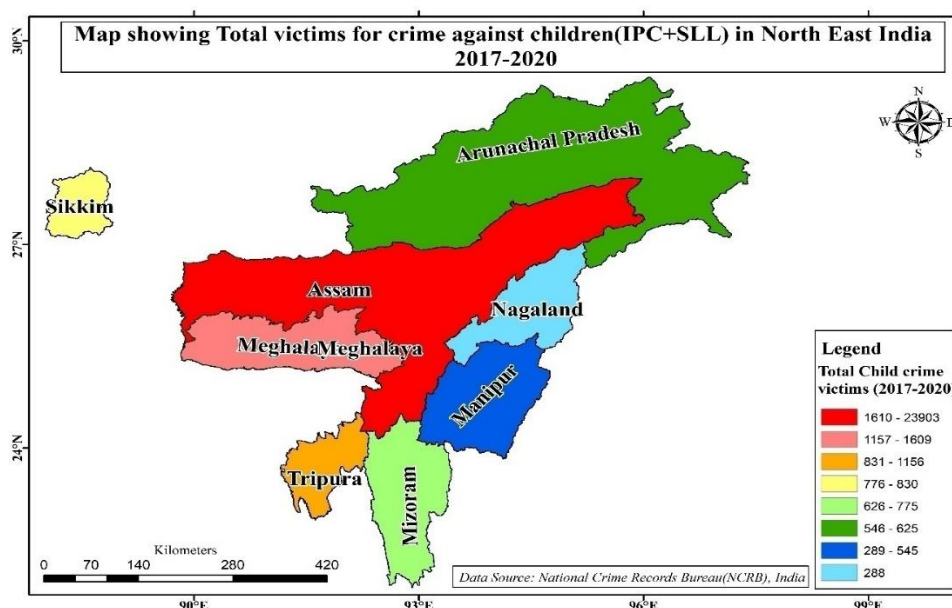
• GIS based Map of Incidence of Child crime:



**Fig-1: State wise Incidence of Child Crime for 2017 - 2020**

In the above figure-1, incidence of Child crime for the period of 2017 to 2020 has been depicted for the eight North-Eastern states. We have observed that Assam stood at the top most position among the eight states where 21,628 cases reported for the said period against the 5,415 cases comprising all the other 7 N.E. states. More elaborately, incidence of Child crime was 4,951 in 2017, 5,447 in 2018, 6,608 in 2019 and 4,622 in 2020 in Assam. On the other hand, low no. of Child incidence has been reported from the other 7 N.E. states such as 1,558 in Meghalaya, 1,118 in Tripura, 721 in Sikkim, 685 in Mizoram, 570 in Arunachal Pradesh, 510 in Manipur and 253 in Nagaland. Assam has been found highest incidence of Child crime with a yearly average of 5,407 and Nagaland is lowest with a yearly average of 63.25 for the said period.

• GIS Map of Victims of Child crime:



**Fig-2: State wise Victims of Child Crime for 2017 - 2020**

In the above figure-2, victims of Child crime for the period of 2017 to 2020 has been depicted for the eight North-Eastern states. It has been clearly observed that there is many no. of cases occurred in state of Assam as compared to the other 7 N.E. states. In the said period, 23,903 child victims have been reported from Assam and 5,855 such cases reported

from other 7 N.E. states. More elaborately, victims of Child crime were 5,762 in 2017, 5,831 in 2018, 7,058 in 2019 and 5,252 in 2020 in Assam. On the other hand, low no. of Child victims have been reported from the other 7 N.E. states such as 1,609 in Meghalaya, 1,156 in Tripura, 830 in Sikkim, 775 in Mizoram, 652 in Arunachal Pradesh, 545 in Manipur and 288 in Nagaland. Assam has been found highest victims of Child crime with a yearly average of 5,975.75 and Nagaland is lowest with a yearly average of 72.00 for the said period.

• GIS based Map of Rape Cases:

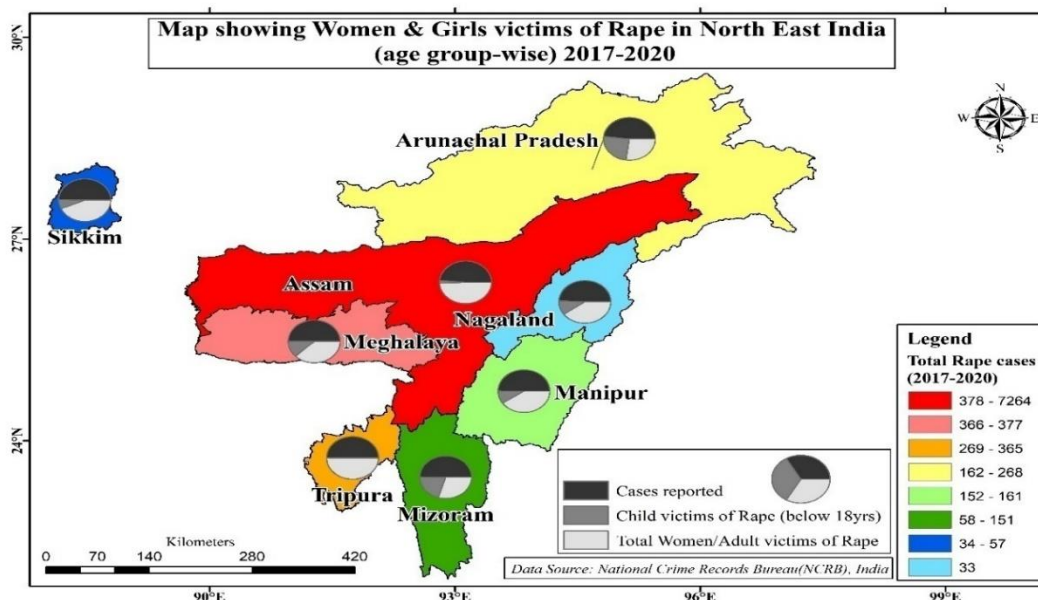


Fig-3: State wise Rape cases for 2017 - 2020

In the above figure-3, rape cases occurred for the period of 2017 to 2020 has been depicted for the eight North-Eastern states. It has been seen that a large no. of cases reported from the state of Assam as compared to the other 7 N.E. states. In the above period, 7,264 rape cases have been reported from Assam and only 1,412 such cases have been reported from other 7 N.E. states. More elaborately, a decreasing pattern of rape cases have been seen in Assam as 2,048 in 2017, 1,767 in 2018, 1,791 in 2019 and 1,658 in 2020. On the other hand, low no. of rape cases have been reported from the other 7 N.E. states such as 377 in Meghalaya, 365 in Tripura, 268 in Arunachal Pradesh, 161 in Manipur, 151 in Mizoram, 57 in Sikkim and 33 in Nagaland. Highest rape cases occurred in Assam with a yearly average of 1,816.00 and Nagaland is lowest with an yearly average of 8.25 for the said period.

• GIS based Map of Victims of Murder:

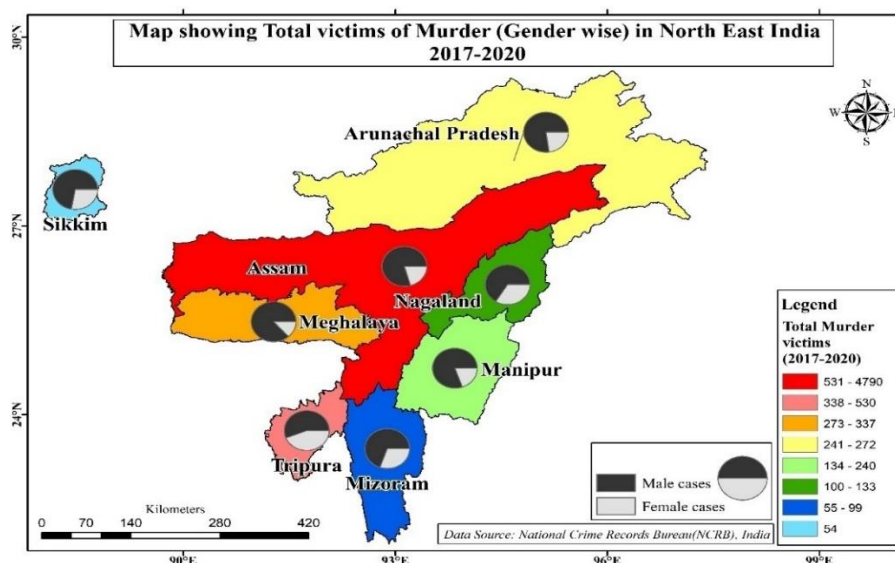
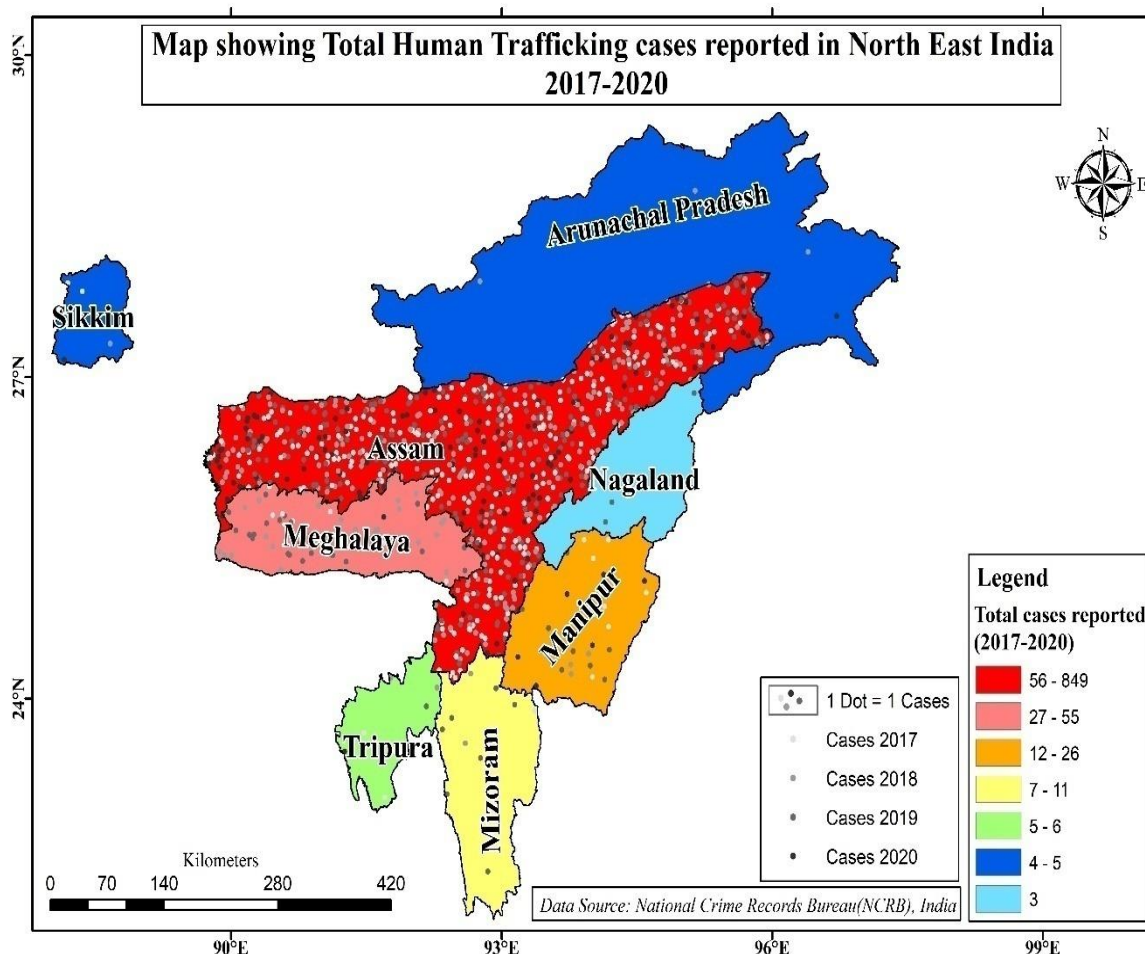


Fig-4: State wise Victims of Murder for 2017 – 2020



In the above figure-4, victims of murder for the period of 2017 to 2020 have been depicted for the eight North-Eastern states where a large no. of cases reported from the state of Assam as compared to the other 7 N.E. states. In the above period, 4,790 victims of murder have been reported from Assam and only 1,665 such cases have been reported from the other 7 N.E. states. More elaborately, there were 1,162 victims of murder in 2017, 1,246 in 2018, 1,243 in 2019 and 1,139 in 2020 reported from the state of Assam. On the other hand, victims of murder have been found very low in the other 7 N.E. states such as 530 in Tripura, 337 in Meghalaya, 272 in Arunachal Pradesh, 240 in Manipur, 133 in Nagaland, 99 in Mizoram and 54 in Sikkim. Highest victims of murder occurred in Assam with a yearly average of 1,197.50 and Sikkim is lowest with a yearly average of 13.50 for the said period.

• GIS based Map of Human Trafficking:



**Fig-5: State wise Human Trafficking cases for 2017 - 2020**

In the above figure-5, Human Trafficking cases for the period of 2017 to 2020 have been depicted for the eight North-Eastern states where a large no. of cases reported from the state of Assam as compared to the other 7 N.E. states. In the above period, 849 victims of human trafficking have been reported from Assam and only 111 such cases have been reported from the other 7 N.E. states.

More elaborately, there were 262 such cases occurred for the period of 2017 and 2018, 201 in 2019 and 124 in 2020 in the state of Assam. On the other hand, human trafficking cases have been found very low in the other 7 N.E. states such as 55 in Meghalaya, 26 in Manipur, 11 in Mizoram, 6 in Tripura, 5 each from Arunachal Pradesh and only 3 from Nagaland. Highest human trafficking cases occurred in Assam with a yearly average of 212.50 and all the 7 N.E. states have been found less than 14.00 for the said period.

• GIS based Map of Kidnapping and Abduction:

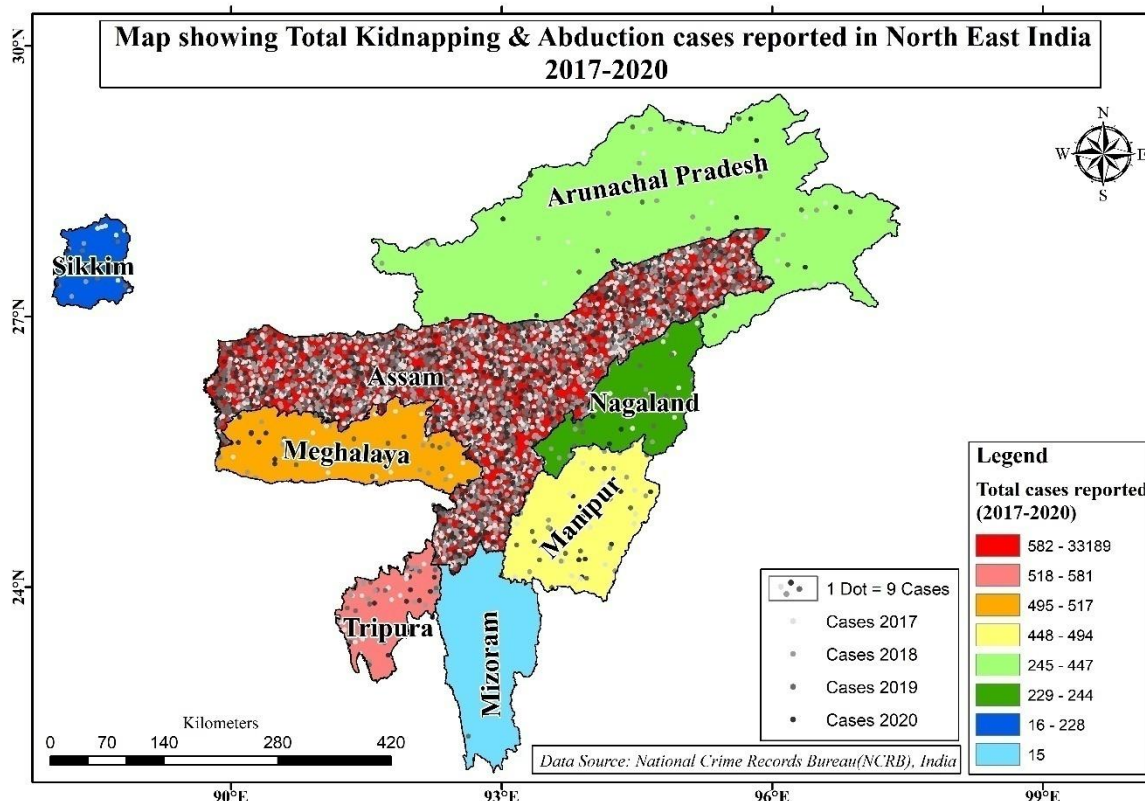


Fig-6: State wise Kidnapping and Abduction cases for 2017 - 2020

In the above figure-6, Kidnapping and Abduction cases for the period of 2017 to 2020 has been depicted for the eight North-Eastern states where a large no. of cases reported from the state of Assam as compared to the other 7 N.E. states. In the above period, 33,189 Kidnapping and Abduction cases have been reported from Assam and only 2,526 such cases have been reported from the other 7 N.E. states. More elaborately, there were 7,857 Kidnapping and Abduction cases occurred in 2017, 8,966 in 2018, 9,432 in 2019 and 6,934 in 2020 in the state of Assam. On the other hand, Kidnapping and Abduction cases have been found very low in the other 7 N.E. states such as 581 in Tripura, 517 in Meghalaya, 494 in Manipur, 447 in Arunachal Pradesh, 244 in Nagaland, 228 in Sikkim and only 15 such cases occurred in Mizoram. Highest Kidnapping and Abduction cases reported in Assam with a yearly average of 8,297.50 and Mizoram is lowest with an yearly average of 3.75 for the said period.

#### 4 Conclusion

The above results depicted in table 1 and 2 could be used to understand the crime scenario which has been prevailed in North-eastern region of India in between 2017 and 2020. The state Assam has ranked first in different classes of crimes followed by other states of Northeast. The average number of different crimes for the state Assam is found to be highest among other states. From figure 1 to 6, the mapping of different crimes also showed the occurrence in states of Northeast during 2017-2020. Though the study has considered different groups of crimes irrespective of gender, it is further observed that crimes related to women were high in numbers. Socio-economic factors, cultural norms, insurgency, and weak governance contribute to women's vulnerability. Building awareness, improving the legal framework, law enforcement, and supporting grassroots initiatives are crucial steps for effectively addressing and reducing crime against women in these states

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