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A Geographical Appraisal of Particularly Vulnerable Tribal Groups (PVTGs) of Jharkhand and their Susceptibility to Environmental Hazards

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Abstract
Since time immemorial, tribes and nature have evolved in symbiosis. Any disturbance in nature affects these communities immensely. Environmental risks have become increasingly common over the world, causing tremendous concern for society due to its high level of susceptibility. India, due to its unique climatic and socio-economic conditions, is vulnerable, to various disasters. Though, environmental hazards affect all, its impact is more severe on Particularly Vulnerable Tribal Groups (PVTGs). Measuring sensitivity to environmental threats is a huge challenge for disaster relief efforts worldwide. It is vital to measure the level of vulnerability in order to apply vulnerability reduction and mitigation actions effectively. The aim of the study is to analyze spatial distribution of PVTGs and their susceptibility to environmental hazards of Jharkhand. The study's main finding revealed that two-third concentration of PVTGs are residing in the north-eastern part of the state. The largest concentration was found in Santhal Pargana and north-eastern part of the Jharkhand. Among all the tribes, Mal Pahariya constituted the largest group of vulnerable tribes followed by Sauria Paharia and Korwa. Birhor community was observed to be scattered in the region. Pakur district was known to have highest PVTG community. A district wise environmental susceptibility revealed that lightning, earthquakes, exposure to heat/stroke and cold had intimidated these tribes due to least socio-economic development. Lack of district wise data have inculcated the inconsistencies in the result. To mitigate the vulnerabilities of PVTGs, disaster risk reduction strategies must be tailored to their specific needs. The development of indigenous knowledge along with techno how can prove worth for community specific resilience towards environmental hazards.

Keywords: Tribes, PVTGs, Environmental hazards, Susceptibility, Lightning

1. Introduction

The term "environmental hazard" refers to "events that occur in and are transmitted through natural and constructed environments, and result in human deaths, economic damage, and other losses that exceed a predetermined threshold of loss" (Smith, 2013). Vulnerability to environmental hazards implies the possibility of loss. Because losses vary geographically, throughout time, and among different social

groupings, vulnerability varies as well. Depending on the study direction and perspective, vulnerability has several distinct connotations in the risk literature (Dow, 1992; Cutter, 1996, 2001a). PVTGs represent the most vulnerable and marginalized among indigenous populations globally. These groups are characterized by their small populations, geographically isolated habitats, and distinct cultural practices that have evolved over centuries (Nayak, 2014). The United Nations estimates that there are over 370 million indigenous people in the world, residing in 90 countries, and they constitute 5% of the global population (Bodeker et al., 2020). Among these indigenous groups, Primitive tribes are found primarily in South Asia, Southeast Asia, Africa, and Latin America (Almond et al., 2015). They often face extreme social, economic, and political marginalization, making them susceptible to various forms of vulnerability, including environmental hazards (Thomas et al., 2019). In the context of India, PVTGs are officially recognized as a distinct category of indigenous communities. The Indian government has identified 75 such groups based on criteria that include pre-agricultural levels of technology, low literacy rates, and stagnant or declining populations (Annual report, 2021-22). The Constitution of India recognizes the special status of indigenous communities and provides for their protection and welfare through various legislative measures. Despite these protections, PVTGs in India continue to grapple with issues such as land dispossession, displacement, poverty, lack of access to education and healthcare, and the loss of traditional knowledge systems. Moreover, they face grave environmental challenges, often arising from unsustainable development practices and exploitation of natural resources in their traditional territories (Mhaiske et al., 2016). Jharkhand, a mineral-rich state in eastern India, is home to several PVTGs, including the Asur, Birhor, and Paharia communities. These groups have been living in the forested regions of Jharkhand for centuries, relying on traditional subsistence practices such as shifting cultivation, hunting, and gathering. However, rapid industrialization, mining activities, deforestation, and infrastructure development have significantly altered the landscape of Jharkhand, posing severe threats to the traditional livelihoods, cultures, and environments of PVTGs. Their susceptibility to environmental hazards in this region is amplified due to their deep connection to the land and its resources. Environmental hazards in Jharkhand, such as land degradation, lightning and drought have a disproportionate impact on PVTGs due to their close proximity to these hazards and their reliance on the environment for sustenance. For instance, mining operations in the state have resulted in the displacement of indigenous communities from their ancestral lands, leading to loss of livelihoods and social disintegration. The use of hazardous chemicals and improper waste disposal practices by industries further exacerbate environmental contamination, affecting the health and well-being of PVTGs. Moreover, the changing climate patterns in the region have disrupted traditional agricultural practices, making PVTGs more vulnerable to food insecurity and poverty.

Several scholarly works have explored the unique vulnerabilities and environmental challenges faced by Particularly Vulnerable Tribal Groups (PVTGs) in various regions of India. These studies provide valuable insights into the socio-cultural context and environmental susceptibility of indigenous communities in India. Jharkhand is a land of diverse cultures where a large number of tribal groups coexist (Kumar, 2023). The tribal groups have varied culture, ethnicity, language, tradition, religious beliefs and occupational practices but share the common auspices of drawing their livelihood, belief and culture and tradition from Mother Nature. The tribals have their own set of legislation, religious and livelihood practices which makes them all the more vulnerable (Sahu, 2019).

Further among the tribal communities there are groups which are more isolated both geographically as well as socially, economically backward, archaic and vulnerable. They have witnessed declining

population, economic deprivation, low levels of literacy, poor health and living conditions and have practiced primitive agriculture. They have been identified as Particularly Vulnerable Tribal Groups (PVTGs). These communities have not made any progress in terms of social and economic development and continue to live in isolated villages with minimal or no infrastructure and government support (Ota & Mohanty, 2015). This has led to the necessity of implementing specific central programs aimed at improving the conditions of Particularly Vulnerable Tribal Groups (PVTGs). To identify these PVTGs, certain guidelines had to be established. These guidelines were developed based on recommendations from various sources (Sahu, 2019). The initial step in addressing the challenges faced by PVTGs involved legally recognizing their existence. This recognition was granted in 1961 by the Dhebar Commission, which categorized PVTGs (formerly known as PTGs) as the most marginalized groups within tribal society. Subsequently, the Shilu Ao team conducted workshops on Primitive Tribal Communities in 1969, followed by the Conference of Tribal Commissioners in 1975. Since the 5th Five Year Plan, the central government has been providing support for their planned development (Annual report, 2021-22). The primary criteria for identifying PVTGs include (i) engagement in pre-agricultural activities, (ii) very low levels of literacy, and (iii) either stagnant or declining population. Identifying these groups is crucial because addressing their development issues requires a comprehensive approach. As a result, it has become a significant topic of discussion among policymakers across the spectrum. It's worth noting that Primitive Tribal Groups were officially renamed as Primitive Vulnerable Tribal Groups (PVTGs) in 2006 (Sahu, 2019). This study aims to analyze the spatial distribution of PVTGs in the study area, assess various environmental hazards, and examine their impact on PVTGs.

2. Study Area

Jharkhand ("The Land of Forest"), has an area of 79,714 km, was formed in 2000 by dividing Bihar's hilly and plateau regions. It is located at the coordinates 23° 21' 0" N and 85° 19' 48" E. Jharkhand is located in the eastern part of India and is enclosed by West Bengal to the eastern side, Chhattisgarh and Uttar Pradesh to the western side, Bihar to the northern part and Odisha to the southern part. It is the 15th largest state in terms of land area and the 14th largest in terms of population. The region was known as Kark Khand in the Mahabharata because of its proximity to the Kark Rekha, or Cancer Tropic. The region was known as Jharkhand throughout the Mediaeval period. Jharkhand was one of the seven Pundradesas, according to the Bhavishya Purana (1200 CE). The name ‘Jharkhand’ appears for the first time on a 13th-century copper plate at Kendrapada, Odisha, under the reign of Narasimha Deva II of the Eastern Ganga dynasty. Much of Jharkhand lies on the Chota Nagpur Plateau. Many rivers pass through the Chota Nagpur plateau. They are: Damodar, North Koel, Barakar, South Koel, Sankh and Subarnarekha rivers. Jharkhand's climate ranges from humid subtropical in the north to tropical wet and dry in the south-east. Jharkhand has a population of 32.96 million people, with 16.93 million men and 16.03 million women, according to the 2011 Indian Census. There are 947 females for every 1,000 males. The state's literacy rate was 67.63%, with Ranchi district being the most educated at 77.13% and Pakur district being the least educated at 50.17%.

3. Database and Methodology

3.1 Database

To conduct this research, we have relied on secondary data obtained from various sources. Geographic information, such as maps, was sourced from ArcGIS. Population-related data were extracted from the

2011 Census of India, District Handbook, and the Jharkhand Economic Survey for the year 2022-23. Information concerning forests was collected from the India State of Forest Report, while data pertaining to tribal communities came from the Ministry of Tribal Affairs, Government of India.

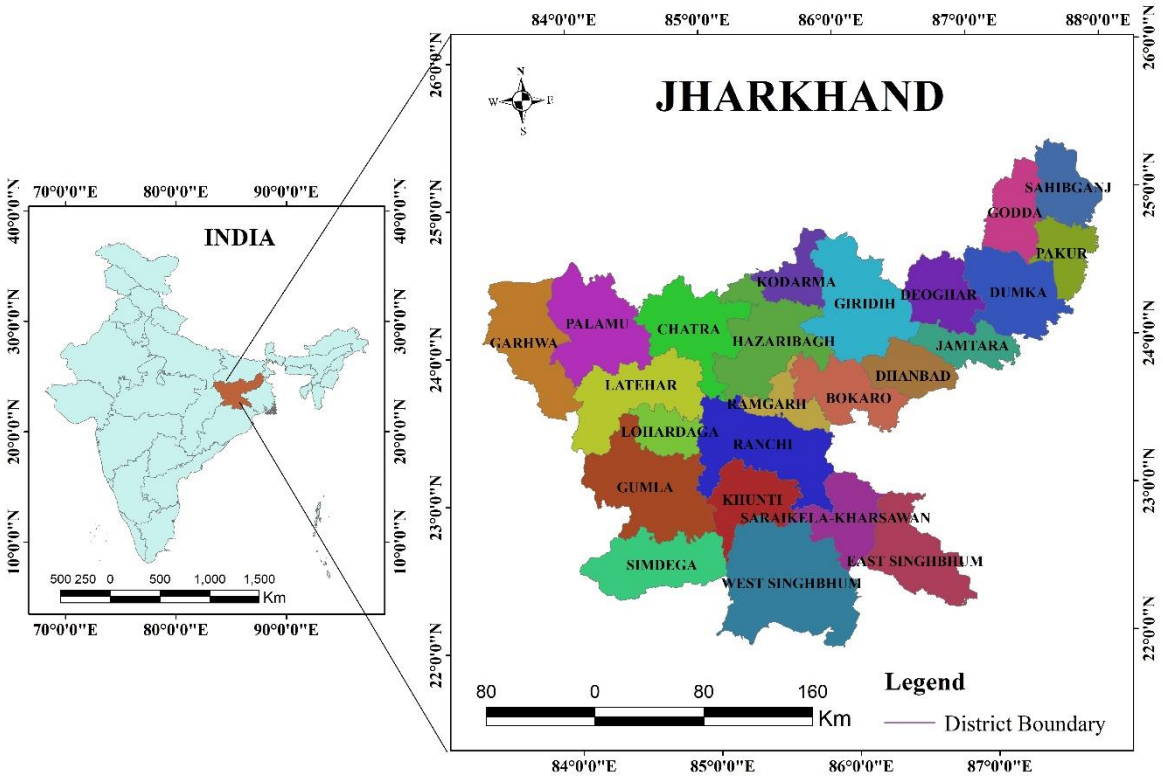

Fig. 1: Location of the Study Area

Data related to hazards were sourced from multiple organizations, including the India Meteorological Department (IMD), the National Institute of Disaster Management (NIDM), the National Disaster Management Authority (NDMA), the State Disaster Management Authority (SDMA), and the District Disaster Management Authority (DDMA). Furthermore, data regarding fatalities resulting from natural disasters were extracted from the "Accidental Deaths & Suicide in India" (ADSI) report published by the National Crime Records Bureau.

3.2 Methodology

Based on secondary data, the population of different tribes have been plotted using Chloropleth map in ArcGIS. With the help of MS Excel software various diagrams & charts have been utilize to display the data for further processing of information.

4. Result

In tribal societies that are not only remote geographically but also socially isolated, there exists significant economic underdevelopment and vulnerability. These communities have encountered population decline, economic hardship, low levels of literacy, substandard health and living conditions, and a reliance on primitive agriculture. According to the 2011 Census, there are 75 distinct Particularly Vulnerable Tribal Groups (PVTGs) in India, and Jharkhand is home to eight of them: Asur, Birhor, Birjia, Korwa, Mal Paharia, Paharia, Sauria Paharia, and Savar. Among the state's population, which comprises 32 different

tribal groups, these eight PVTGs represent 3.4%, as reported in the Jharkhand Economic Survey for the year 2022-23.

The north-eastern & north-western part of the state showing the highest concentration of PVTGs as shown in Fig 2. Majority of the population resides in 10 districts of the state. District namely, Pakur, Sahebganj, Dumka, Garhwa, Godda, Gumla, Latehar, Palamu, Deoghar & East Singhbhum have 90.91% of the PVTGs of the state. Pakur district had the highest population with 16.89% population of PVTGs. Pakur, Sahebganj, Dumka, Garhwa & Godda districts shared about two-third of total PVTGs. Districts with high population were Gumla, Latehar, Palamu, Deoghar & East Singhbhum altogether comprise one-fourth PVTGs of the state. In north-eastern part Pakur, Sahebganj and Dumka district have the high population, while in north-western part Garhwa district shows highest concentration of PVTGs population. Apart from these, Godda, Deoghar, Palamu, Latehar, Gumla and Latehar districts also have significant number of PVTGs. Districts such as Giridih, Dhanbad, Khunti, West Singhbhum and East Singhbhum has least number of PVTGs.

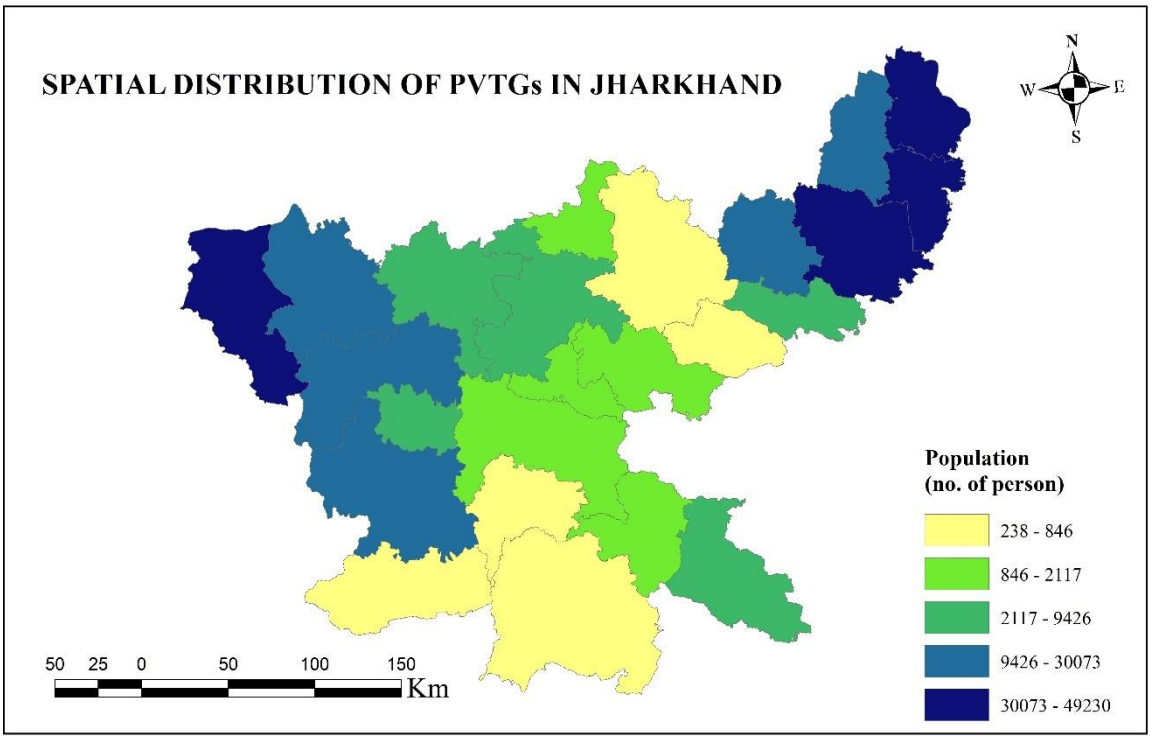

Fig. 2: Spatial Distribution of PVTGs in Jharkhand (Source: Census of India, 2011)

When we examined the distribution of Particularly Vulnerable Tribal Groups (PVTGs) by divisions, we find that the Santhal Pargana division, comprising six districts (Pakur, Sahebganj, Dumka, Godda, Deoghar and Jamtara), accounted for a substantial 61.65% of the total PVTG population in the state. Among these groups, the Mal Paharia (as shown in Fig. 4) community was the most numerous, representing approximately 46% of the PVTG population in the state, followed by the Sauria Paharia community, which constituted about 16%. On the other hand, the Birjia, Savar, and Birhor communities were the smallest PVTGs in the state, making up approximately two, three, and four percent of the total PVTG population, respectively. The Sauria and Mal Paharia communities were primarily concentrated in the Santhal Pargana region of the state, with Pakur, Godda, and Sahebganj districts being home to

approximately 98% of the Sauria Paharia population and 56% of the Mal Paharia population. Palamu district housed the majority of the Korwa and Parhaiya communities, accounting for a significant portion of these groups (about 88% of Korwa and 93% of Parhaiya) in the state. While the Birhor community was more scattered compared to the other PVTGs, a majority of them were found in Hazaribagh, Chatra, Gumla, and West Singhbhum districts.

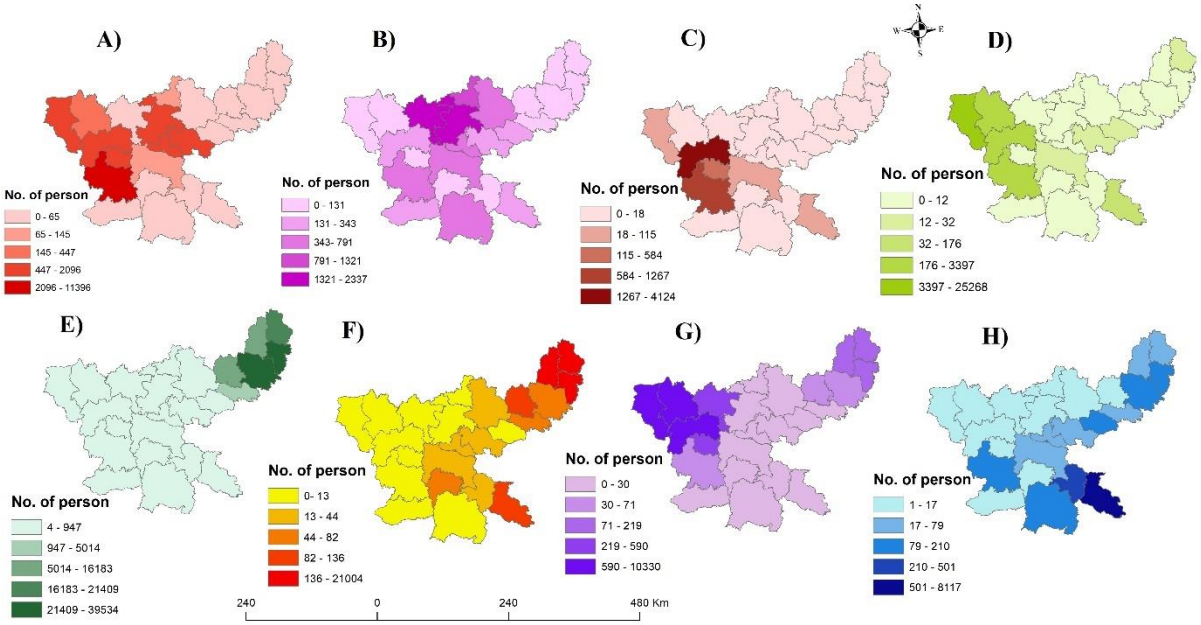

Fig. 3: Spatial Distribution of PVTGs in Jharkhand (Source: Census of India, 2011). (A)-Asur, (B)- Birhor, (C)- Birjia, (D)- Korwa, (E)- Mal Paharia, (F)- Sauria Paharia, (G)- Parhaiya & (H)- Savar

During our examination of individual tribal communities, it became evident that the Asur people were predominantly situated in the western and northwestern areas of the state. The Gumla district contained more than half of their total population, with Latehar (9.33 percent) and Lohardaga (8.92 percent) following closely behind. To be precise, Gumla, Latehar, Lohardaga, Hazaribagh, Garhwa, and Ramgarh comprised 89.61 percent of the Asur population (refer to fig. 3).

In the case of the Birhor tribes, they were primarily concentrated in the Chatra, Hazaribagh, and Koderma districts. A significant majority of the Birhor community, around 53.19 percent, resided in these three districts (see figure 3B). Latehar district had the highest Birjia tribe population (65.71 percent), with Gumla district coming next at 20.18 percent. The Birjia tribes were primarily clustered in the western part of the state.

The Korwa tribe was found across sixteen districts of the state, with a concentration in the western and northwestern regions. Garhwa had the highest proportion of Korwa tribes, making up 72.96 percent of the total Korwa population. Other districts with substantial Korwa populations included Palamu and Latehar.

Moving on to the Mal Paharia tribe, they had a significant presence in the northeastern region of the state and were the largest Particularly Vulnerable Tribal Groups (PVTGs). Dumka had the highest concentration of Mal Paharia, followed by Pakur and Sahebganj. These three districts accounted for approximately three-quarters of the total Mal Paharia population. The Santhal Pargana division,

encompassing districts like Dumka, Pakur, Sahebganj, Godda, Deoghar and Jamtara, housed 97.61 percent of the Mal Paharia population.

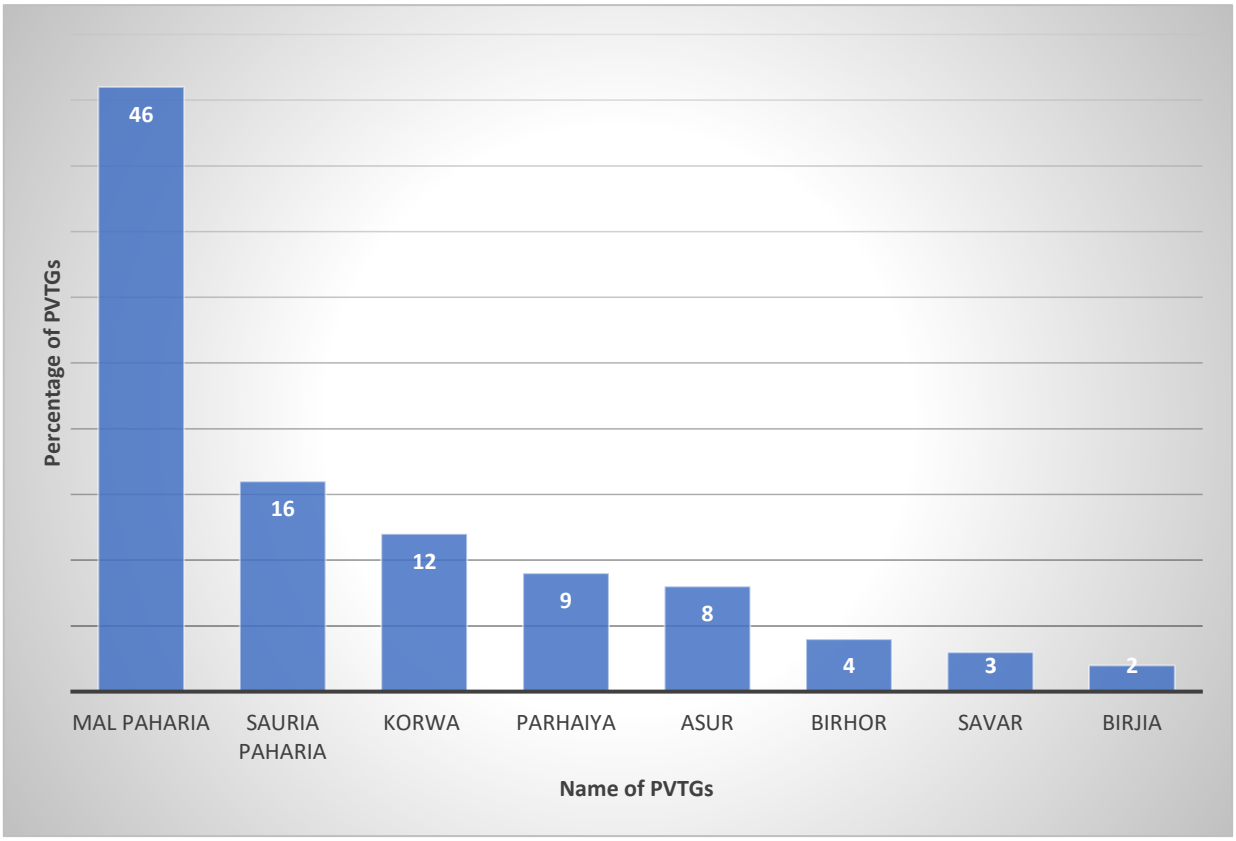

Fig. 4: Constituents of different PVTGs in the study area (sourced from Jharkhand economic survey, 2022-23, Government of Jharkhand)

Sauria Paharias were also prevalent in the Santhal Pargana division, specifically in districts such as Pakur, Sahebganj, and Godda, which collectively housed around 98 percent of the Sauria Paharia community. The Parhaiya tribe was primarily concentrated in the northwestern corner of the state, with Palamu, Latehar, and Garhwa being the most populous districts for this group. They could also be found in districts like Chatra and Lohardaga. East Singhbhum had the highest proportion of Savar tribes (83.78 percent), with additional distribution in Saraikela-Kharsawan, Dumka, and West Singhbhum (see figure 3H).
Though, Jharkhand had eight Particularly Vulnerable Tribal Groups (PVTGs), but their distribution across the state was uneven. Two-thirds of these PVTGs were concentrated in the Santhal Pargana Division of Jharkhand. Pakur district had the largest PVTG population, with around fifty thousand PVTG members residing there, followed by Sahebganj and Dumka, while districts like Khunti, Simdega, Giridih, and Dhanbad had smaller numbers.

4.1 Major Characteristic of PVTGs

The following table displayed the characteristic of PVTGs:

Table 1: Characteristics of PVTGs in study area

Sl. No.	Name of the tribe	Characteristics
1.	Asur	Asur is one of the Jharkhand's oldest ethnic groups and regarded as the founder of Indus civilization. From pre-Vedic period to Vedic period, Asuras have been mentioned as a powerful, respectable and prestigious community in the text like Rigveda, Upanishads etc. They claim to be the descendants of the people who were connected with working in melts and were the producers of metal artefacts found at the Chotanagpur Asur sites (Minz & Hansda, 2010).
2.	Birhor	Birhor in Jharkhand are of Proto-Australoid heritage; linguistically, they are of the Austro-Asian group. Birhor tribe of Jharkhand considers themselves to be Sun descendants (Roy, 1925). The Birhors are thought to be linked to the Kharwar tribe, who are likewise considered to be descended from the Sun (Minz & Hansda, 2010).
3.	Birjia	They think they descended from scarecrows and claim to have migrated from Madhya Pradesh's Surguja district to the Chotanagpur plateau. Birjias in Jharkhand live in small homes built of bamboo, wood, or mud that are located in the hills or plains adjacent to the hills. They live in triangular or rectangular homes built of bamboo, wood, or mud. It goes without saying that they have a rural society in which agriculture and forestry play an important socio-economic role. As a result, the Birjia economy is centred on agricultural output, as well as hunting, fishing, and labour. The 'Baiga,' who supervises social laws and customs, is the head of the Birjia society (Minz & Hansda, 2010).
4.	Korwa	According to Agarwal et al. (2013) Korwa belongs to proto-astroloid group. Language belongs to Korwa Austro- Asiatic language family. Korwa tribe is mainly found in mountainous areas of Garhwa, Palamu and Latehar. Paharia Korwa living on the mountain. Dihariya Korwa live in the village below. Occupation-Agriculture, hunting, animal husbandry, craft making etc.
5.	Mal Paharia	In terms of species, the Mal Paharia is placed in the proto-astroloid group. Their language is called Malto, which is considered the language of Dravidian family. They also do Jhoom or Kurva farming. In Mal Paharia there is a practice of giving Pon as a bride-price. Cash is called ‘pon taka’ or ‘pon’ and baggage as Bandi. Gotra is not found in Mal Paharia. Ancestor worship is the main focal point of the religion of Mal Paharia. Because of their rugged habitat and forest-bound nature, as well as their constant internal battles, the Rajmahal hills' Mal Paharia maintained virtual independence during the Musalman supremacy in Bengal. The hills included in the subordinate fiscal division were subject to one or more divisional headmen known as sardars, to whom the village headmen (manjhis) were subordinate (Paharia,2003).

Sl. No.	Name of the tribe	Characteristics
6.	Sauria Paharia	The second branch of Paharia tribe is known as Sauria Paharia. They call themselves 'Maler'. From a racial perspective, they are placed in the proto-astroloid category. The villages of the Sauria Paharia are located on the peaks of the hills and the forested hills. Their residence is called 'Adda'. Their economy is dependent on agriculture and forest. They also perform transferred agriculture (Verma, 2017). Apart from this, they also do langal farming or oudding and sawai farming. The people on the slope cultivate by cultivating tillage, which is called 'Bhitha' or 'Dhami'. Gotra is not found among them. There is an important place of ancestor worship in the religious life of Sauria Paharia (Ekka, 2011).
7.	Parhaiya	Parhaiya arrived at their current location via Mirzapur from Surguja. There is no connection between the Parhaiya in areas of Bihar and the Purulia district of West Bengal (Chandra Sekhar,2016). Parhaiya tribe belongs to proto-astroloid class of species. They do not have Gotra. They have been living in the hills of Palamu since generations. Parhaiya folktales indicates that they are descendants of Shiva. They are mainly concentrated in Latehar and Palamau districts of Jharkhand. Parhaiyas continue to lag behind in most critical development metrics such as health, education, and income (Kumar, 2015).
8.	Savar	According to folklore, the Parhaiya arrived at their current location via Mirzapur from Surguja. There is no connection between the Parhaiya in areas of Bihar and the Purulia district of West Bengal (Chandra Sekhar,2016). Parhaiya tribe belongs to proto-astroloid class of species. They do not have Gotra. They have been living in the hills of Palamu since generations. Parhaiya folktales indicates that they are descendants of Shiva. They are mainly concentrated in Latehar and Palamau districts of Jharkhand. Parhaiyas continue to lag behind in most critical development metrics such as health, education, and income (Kumar, 2015).

4.2 Susceptibility to Environmental hazards

A perusal of the Table 2 revealed that lightning, drought, cold wave had a dominance in affecting the approximately each district. Earthquake susceptibility varied as district fell under Zone II to IV seismic zone. Flood had been observed in Sahebganj, Garwah, chatra, Ramgarh and Gumla only out of 24 districts. In recent years, there has been an increase in the number of deaths and property damage caused by lightning in Jharkhand from 2012 to 2021 as shown in Fig 5. The impact from heat/sun stroke had been significantly observed whereas impact from flood had not been significantly observed. The exposure to forest fire had a significant impact on the PVTG population which can be seen in Table 3. Since last six years, Jharkhand has been contributing more than 10 per cent of deaths in India due to 'Exposure to cold'.

Table 2: Districts affected by environmental hazards

S.no.	Name of District	Environmental hazards
1	Deoghar	Lightning, Drought, Earthquake (zone III), Cold Wave

S.no.	Name of District	Environmental hazards
2	Dumka	Lightning, Drought, Earthquake (zone III), Cold Wave
3	Godda	Lightning, Drought, Earthquake (zone IV), Cold Wave
4	Jamtara	Lightning, Drought, Earthquake (zone III), Cold Wave
5	Pakur	Lightning, Drought, Earthquake (zone III), Flood, Mine Related Disaster, Cold Wave
6	Sahebganj	Lightning, Drought, Earthquake (zone IV), Flood, Cold Wave
7	Garhwa	Lightning, Drought, Earthquake (zone III), Flood, Mine Related Disaster, Forest Fire, Cold wave
8	Latehar	Lightning, Drought, Forest Fire, Mining Related Disaster, Cold Wave
9	Palamu	Lightning, Drought, Earthquake (zone III), Forest Dire, Mining Related Disaster, Cold Wave
10	Bokaro	Lightning, Drought, Earthquake (zone III), Mining Related Disaster, Flood, Cold Wave
11	Chatra	Lightning, Drought, Earthquake (zone III), Flood, Cold Wave
12	Dhanbad	Lightning, Drought, Earthquake (zone III), Mining Related Disaster, Flood, Cold Wave
13	Giridih	Lightning, Drought, Earthquake (zone III), Cold Wave
14	Hazaribagh	Lightning, Drought, Earthquake (zone III), Forest Fire, Mining Related Disaster, Cold Wave
15	Koderma	Lightning, Drought, Earthquake (zone III), Mining Related Disaster, Cold Wave
16	Ramgarh	Lightning, Drought, Earthquake (zone II), Flood, Mining Related Disaster, Cold Wave
17	Gumla	Lightning, Drought, Earthquake (zone II), Flood, Cold Wave
18	Khunti	Lightning, Drought, Earthquake (zone II), Cold Wave
19	Lohardaga	Lightning, Drought, Earthquake (zone II), Mine Related Disaster, Cold Wave
20	Ranchi	Lightning, Drought, Earthquake (zone II), Mine Related Disaster, Cold Wave
21	Simdega	Lightning, Drought, Forest Fire, Cold Wave
22	East Singhbhum	Lightning, Drought, Earthquake (zone II), Flood, Mine Related Disaster, Forest Fire, Cold Wave
23	West Singhbhum	Lightning, Drought, Earthquake (zone II), Flood, Forest Fire, Mining Related Disaster, Cold Wave
24	Saraikela-Kharsawan	Lightning, Drought, Earthquake (zone III), Mining Related Disaster, Forest Fire, Flood¸ Cold Wave

Source: Compiled by author based on Disaster Management Department (DMP) Jharkhand, 2021

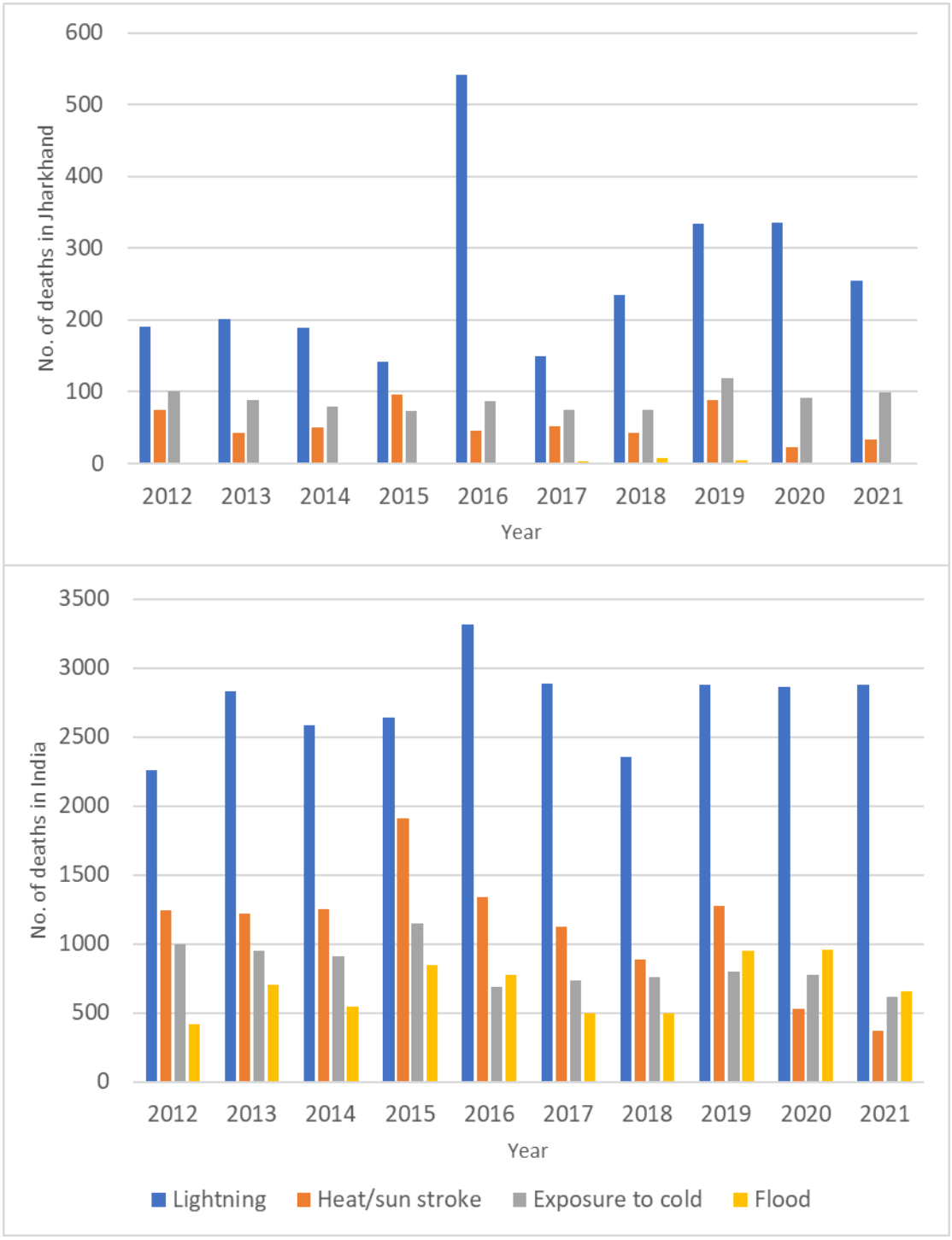

Fig 5: Number of deaths due to disaster in Jharkhand and India (Sourced from ADSI Report, NCRB)

Table No. 3: Forest Cover Area Under Different Fire Prone Classes

Sl. No.	Forest Fire Prone Class	Forest Cover Area (in Km^2)	Percentage of Total Forest Cover
1	Extremely Fire Prone	47	0.21
2	High Fire Prone	488	2.18
3	Fire Prone	2048	9.16

4	Moderately Fire Prone	4370	19.54
5	Less Fire Prone	15414	68.91

Source: The India State of Forest Report, 2019

5. Discussion

5.1 Susceptibility of Particularly Vulnerable Tribal Groups (PVTGs) to Environment Hazards

This study is unique, which has established inter-relation between the PVTGs population distributed in the study area with the environmental hazards occurring there. No earlier studies had ever taken care of that threatening issue, which affects the vulnerable society the most. This study came out with the conclusion that environmental hazards though affect all communities, but their impact is more negative on Particularly Vulnerable Tribal Groups, who have already locational, social and economic disadvantages. Earlier studies were more focus on individual aspect than looking towards wholistic approach to study the PVTGs. After analyzing their spatial distribution of the tribes in the study area, vulnerability profile of the study area has been depicted with help of data from Census of India.

Jharkhand, one of India's states, houses several Particularly Vulnerable Tribal Groups (PVTGs) that confront distinctive challenges and susceptibilities in the context of disasters. These communities, owing to their remote geographical settings, distinct cultures, and constrained access to resources and information, face increased vulnerability during natural catastrophes. Acknowledging the necessity for comprehensive disaster risk reduction approaches, various initiatives have been put into action to bolster the resilience of PVTGs and mitigate the adverse effects of disasters on their well-being and means of sustenance. This article explores the disaster risk reduction initiatives specifically tailored for PVTGs in Jharkhand, elucidating examples and measures that address their vulnerabilities and promote sustainable development. Tribes such as the Birhor, Asur, Savar, and Korwa communities, face several vulnerabilities during disasters. These vulnerabilities are rooted in their socio-economic, cultural, and geographical contexts. For instance, the lack of awareness and access to early warning systems, inadequate infrastructure, and dependence on forest resources can significantly amplify the impact of disasters on PVTGs.

Jharkhand has experienced various hazards such as lightning strikes, droughts, forest fires, sunstroke, and extreme cold, and these hazards have had a profound impact on tribal communities, especially the Particularly Vulnerable Tribal Groups (PVTGs). The districts where these hazards are frequently observed are predominantly inhabited by PVTGs. In terms of lightning-related fatalities, Jharkhand has consistently ranked among the top five states in the country. Exposure to cold has also contributing largely in number of death. Since last six years Jharkhand has been contributing more than 10 per cent of deaths in India due to ‘Exposure to cold’ (Figure 5).

Data suggest that districts with a high concentration of PVTGs are vulnerable to a variety of environmental concerns (fig.2 & Table 2). Gumla, Latehar, and Lohardaga districts, for example, which are primarily populated by Asur tribes, are extremely vulnerable to forest fires, drought, and lightning. The same hazards affect Birhor concentrated areas such as Chatra, Hazaribagh, Koderma, and so on. Latehar, Gumla, and Lohardaga, which house the largest Birjia community, faces same threats. Lightning, drought, forest fires, floods, and other natural disasters affect the Korwa tribe, which is dominant in the districts of Garhwa, Palamu, and Latehar. Lightning, drought and cold waves have harmed Mal Paharia and Sauria Paharia, which are strongly concentrated in the state's northeastern portion.

5.2 Disaster Risk Reduction Strategies for PVTGs

Disaster risk reduction (DRR) strategies for Particularly Vulnerable Tribal Groups (PVTGs) have gained increasing attention in recent years due to the growing recognition of the unique vulnerabilities these communities face in the context of environmental hazards. While specific studies on DRR strategies tailored to PVTGs may be limited, research on disaster risk reduction in indigenous and marginalized communities offers valuable insights. For instance, a research done by Wang et al. (2019) highlighted the importance of incorporating indigenous knowledge systems into DRR initiatives, as local knowledge can provide early warning signals and adaptive strategies that are often more effective in the context of PVTGs' traditional practices. This aligns with our findings, as our research in Jharkhand revealed that PVTGs possess valuable knowledge about their local environment, which can be harnessed for community-based DRR efforts.

Furthermore, the study done by Sharma et al. (2022) underscores the significance of community participation in designing and implementing DRR strategies. Their research on disaster resilience in indigenous communities in the Himalayan region emphasizes the role of self-governance and community-driven decision-making processes. In line with these findings, our research in Jharkhand suggests that involving PVTGs in the planning and execution of DRR initiatives not only empowers them but also results in more contextually relevant and sustainable strategies. Our study reveals that PVTGs are often excluded from mainstream DRR efforts, and their specific vulnerabilities are not adequately addressed. Therefore, it is imperative to adapt DRR strategies to the unique needs and circumstances of PVTGs to enhance their resilience to environmental hazards.

Additionally, a study of Samui and Sethi (2022) highlights the importance of livelihood diversification as a DRR strategy for indigenous communities. Their study in the northeastern region of India demonstrates that alternative income sources can help reduce the economic vulnerabilities of these communities during and after disasters. Our research in Jharkhand aligns with this perspective, as we found that PVTGs' traditional livelihoods are highly susceptible to environmental hazards, necessitating the development of alternative income-generating activities as part of DRR strategies. Our results emphasize the need for targeted interventions to enhance the economic resilience of PVTGs in Jharkhand, which can be informed by the experiences of other indigenous communities in India.

In brief, while research specifically focused on disaster risk reduction strategies for PVTGs may be limited, existing studies on disaster resilience in indigenous and marginalized communities offer valuable insights that can be applied to the context of PVTGs. Incorporating indigenous knowledge, community participation, and livelihood diversification into DRR initiatives are essential components for enhancing the resilience of PVTGs in the face of environmental hazards. Our research in Jharkhand reinforces the importance of these principles and underscores the urgency of developing context-specific DRR strategies that address the unique vulnerabilities of PVTGs in the region.

The major limitation of the study is the unavailability of the data at district level which can produce the feasible results. The comparison of the distribution of PVTGs and distribution of the hazard is still lacking which provide the further scope of the study. The potential of the study lies in the preparation of multi-hazard that need to be compared with PVTG distribution map.

6. Conclusion

Jharkhand has been affected by different environment hazards like lightning, drought, forest fires, sunstroke, exposure to cold, flood etc., the intensity of lightning deaths in the state is very severe. Its

impact on tribal population particularly on PVTGs are more intensive than any other communities'. Locational disadvantages, economically week position and socially vulnerable make them more vulnerable to the environmental hazards. The western and north-western are the most vulnerable, whereas the eastern and middle section of the state have moderate susceptibility. As a result, the regional vulnerability approach provides insights and contributes to enhancing development strategy, responses, and policymaking for addressing climate change risks, consequences, and concerns throughout the region. Two-third population of PVTGs are residing in the north-eastern part of the state, where drought, lightning and forest fires are predominant hazards. To mitigate the vulnerabilities of PVTGs, disaster risk reduction strategies must be tailored to their specific needs. Several measures have been implemented to enhance their resilience and ensure their active participation in the disaster management process.

References

1. Agarwal, R., Pruthi, M., Lodhi, P., & Kumar, P. (2013). Sustainable livelihood options for primitive tribal groups in Jharkhand: CSR initiatives by Tata Steel. AIMA Journal of Management & Research, 7(1/4).
2. Annual report, 2021-22. Ministry of Tribal affairs. Retrieved from https://tribal.nic.in/downloads/Statistics/AnnualReport/AREnglish2122.pdf/
3. Chandra Sekhar, A. (2016). Monograph Series, Parhaiya, Volume-I, Study No-23.
4. Cutter, S. L., Boruff, B. J., & Shirley, W. L. (2012). Social vulnerability to environmental hazards. In Hazards vulnerability and environmental justice (pp. 143-160). Routledge.
5. DMP, 2021. Vulnerability Profile of Jharkhand. Retrieved from http://disaster.jharkhand.gov.in/profile_jh.php/
6. Ekka, A. (2011). Status of Adivasi s/indigenous peoples, land series-4. Jharkhand.
7. Jharkhand Economic Survey,2022-23, Government of Jharkhand.
8. Kumar, A. (2023, April). Techno-Social Approach to Ecological Risk Reduction and Resilience Building Learning from Tribes of Jharkhand. In Fifth World Congress on Disaster Management: Volume V: Proceedings of the International Conference on Disaster Management, November 24-27, 2021, New Delhi, India. Taylor & Francis.
9. Kumar, R. K. (2015). Status of development of parhaiyas of Jharkhand. Man in India, 95(3), 449-461.
10. Minz, D., & Hansda, D. M. (2010). Encyclopaedia of Scheduled Tribes in Jharkhand. Gyan Publishing House
11. Ota And Mohanty (Eds). 2015. Particularly Vulnerable Tribal Groups (PTGs) of Odisha, Volume I (Ethnography). Scheduled Castes and Scheduled Tribes Research and Training Institute (SCSTRTI), Bhubaneswar (Publisher). ISBN 978-93-80705-40-8.
12. Paharia, A. (2003). SAURIA PAHARIYA. Encyclopedia of Primitive Tribes in India, 560.
13. Roy, S.C. 1925. The Birhors : Little known Forest tribe of Chotanagpur ; Mission press. Ranchi.
14. Sahu, S. (2019). Demographic trends and occupational structure of particularly vulnerable tribal groups of Jharkhand. International Journal of Reviews and Research in Social Sciences, 7(2), 316-322.
15. Smith, K. (2013). Environmental hazards: assessing risk and reducing disaster. Routledge.
16. Tribes Of Jharkhand | Tribal Welfare Research Institute Jharkhand (trijharkhand.in)
17. TRIBES OF JHARKHAND STATE, retrieved from www.jharenvis.nic.in
18. Verma, D. N. 2017. The malers'(sauria paharias) demography in contemporary India colonial legacy. In Proceedings of the Indian History Congress (Vol. 78, pp. 1178-1185). Indian History Congress.

19. Giri, M., Bista, G., Singh, P. K., & Pandey, R. (2021). Climate change vulnerability assessment of urban informal settlers in Nepal, a least developed country. Journal of Cleaner Production, 307, 127213.
20. Rajani, K., Ranjan, T., Kumar, R. R., Patil, G., Kumar, M., Kumar, J., & Kumar, M. (2018). Traditional knowledge and its promotion through providing legal rights. In The Role of Intellectual Property Rights in Agriculture and Allied Sciences (pp. 151-180). Apple Academic Press.
21. Nayak, J. K. (2014). The problem of survival of surviving mankirdias: A case study of particularly vulnerable tribal group (PVTG) of Odisha.
22. Bodeker, G., & Kariippanon, K. (2020). Traditional medicine and indigenous health in indigenous hands. In Oxford Research Encyclopedia of Global Public Health.Almond, G. A., & Coleman, J. S. (Eds.). (2015). The politics of the developing areas. Princeton University Press.
23. Mhaiske, V. M., Patil, V. K., & Narkhede, S. S. (2016). Forest tribology and anthropology. Scientific Publishers.
24. Fresnoza, E. P. (2021). Reaching the intersection of Indigenous and modern: A critical analysis of disaster risk management modernization in Ivatan Indigenous communities (Doctoral dissertation, Royal Roads University (Canada)).
25. Sharma, S., & Kumar, V. (2022). Community approach toward disaster resilience. In Cognitive Data Models for Sustainable Environment (pp. 125-161). Academic Press.
26. Wang, Z., Liu, J., Xu, N., Fan, C., Fan, Y., He, S., ... & Ma, N. (2019). The role of indigenous knowledge in integrating scientific and indigenous knowledge for community-based disaster risk reduction: A case of Haikou Village in Ningxia, China. International Journal of Disaster Risk Reduction, 41, 101309.
27. Samui, S., & Sethi, N. (2022). Social vulnerability assessment of Glacial Lake Outburst Flood in a Northeastern state in India. International Journal of Disaster Risk Reduction, 74, 102907.
28. Thomas, K., Hardy, R. D., Lazrus, H., Mendez, M., Orlove, B., Rivera-Collazo, I., ... & Winthrop, R. (2019). Explaining differential vulnerability to climate change: A social science review. Wiley Interdisciplinary Reviews: Climate Change, 10(2), e565.
29. Almond, G. A., & Coleman, J. S. (Eds.). (2015). The politics of the developing areas. Princeton University Press.