HUMAN–TIGER CONFLICT DURING MAHUA (*Madhuca longifolia*) FLOWER COLLECTION IN CHANDRAPUR FOREST CIRCLE, CENTRAL INDIA

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Abstract

Human–tiger conflict in Chandrapur forest circle, Maharashtra state of central India, has intensified in recent years, particularly during mahua (Madhuca longifolia) flower collection—a seasonal livelihood activity for forest-dependent communities. This study examines tiger-related human fatalities associated with mahua collection between 2013 and 2023, using official records obtained through Right to Information requests from the Chandrapur Forest Department. A total of 15 human fatalities were documented, with women accounting for 53.3% of victims (n = 8) and most victims belonging to middle-aged (40-54 years) and elderly (≥55 years) age groups (mean age 54.1 ± 8.8 years). The majority of incidents (n = 10, 66.6%) occurred during early morning hours (06:00–09:00 hrs), coinciding with peak mahua collection activity and periods of high tiger movement. The majority of incidents (n = 13, 87%) occurred in April, coinciding with the peak flowering period of mahua. Spatially, the Bramhapuri Forest Division emerged as the primary hotspot with nine fatalities (60%), reflecting substantial overlap between human forest use and tiger habitats. These patterns are indicative and reflect activity-specific risk rather than population-level inference. The findings suggest that increasing tiger populations, combined with strong livelihood dependence on forest resources and habitat fragmentation, have elevated the risk of human–tiger conflict. By integrating ecological and socio-economic perspectives, this study provides evidence-based guidance for improving human safety while supporting tiger conservation in conflict-prone landscapes.

Keywords: *Chandrapur, Human-wildlife coexistence, Human–tiger conflict, Mahua flower collection, Tiger conservation*

Introduction

Human–wildlife conflict has emerged as a critical challenge for biodiversity conservation and human safety in many parts of the world, particularly in regions experiencing rapid land-use change and increasing dependence on natural resources. Habitat loss, prey depletion, and expansion of human activities into forested landscapes have intensified interactions between people and wildlife, often resulting in injury, economic loss, and fatalities (IUCN, 2023). Large carnivores such as the Bengal tiger (*Panthera tigris tigris*) are especially prone to conflict due to their extensive

spatial requirements and reliance on large prey, which frequently brings them into contact with human-dominated landscapes (Karanth and Gopal, 2005; Jhala *et al.*, 2021).

India supports the largest global population of tigers, estimated at 3,682 individuals; accounting for nearly 75% of the world's remaining wild tigers. While this represents a major conservation success, the spatial concentration of tiger populations in central Indian states - including Madhya Pradesh (785), Karnataka (563), Uttarakhand (560), and Maharashtra (444) - has increased the frequency of human–tiger interactions along forest edges and buffer zones. Maharashtra alone harbours approximately 444 tigers, with Chandrapur district supporting one of the highest densities in the state (n = 250 according to the 2022 tiger census) (Choudhari and Ali, 2025).

Previous studies from India and elsewhere indicate that human–tiger conflict is closely linked to forest dependence, livestock grazing, and the collection of non-timber forest products (NTFPs) (Goodrich, 2010; Gurung *et al.*,2008; Linkie *et al.*, 2006; Dhanwatey *et al.*, 2013). In central India, activities such as grazing, fuelwood extraction, and tendu (*Diospyros melanoxylon*) leaf collection have been identified as key drivers of conflict (Banerjee *et al.*, 2013; Karanth and Gopal, 2005). The socio-economic vulnerability also increases conflict costs (Nyhus and Tilson, 2010).

Human–wildlife conflict in Maharashtra is a major conservation and public-safety concern involving tigers, leopards, elephants, sloth bears, and other species, and frequently results in human injuries and fatalities. Maharashtra state-wide data (Fig. 1) show that between 2014–15 and 2021–22, annual injuries generally ranged from 100 to 450 cases, while fatalities remained relatively low (20–60 deaths per year), indicating frequent encounters but limited fatal outcomes. However, a sharp escalation is evident from 2022–23 onward, with injury cases exceeding 1,300 in 2023 - 24 and remaining above 1,000 in 2024 - 25, alongside a rise in fatalities to approximately 102 deaths in 2023–24. Overall, Maharashtra recorded 564 human deaths and more than 5,400 injuries between 2014 - 15 and 2025 - 26 in human-wildlife conflict.

This marked intensification of conflict reflects increasing human–wildlife overlap driven by habitat modification, settlement expansion, and wildlife movement into multi-use landscapes. Importantly, large carnivores - particularly tigers and leopards - account for a substantial proportion of severe incidents, underscoring the need for species-specific analyses. Within this broader context, examining activity-linked risks, such as tiger attacks during non-timber forest produce collection, is essential for identifying high-risk groups, critical time windows, and targeted mitigation strategies that cannot be captured by aggregated, multi-species conflict statistics.

Despite its widespread importance as a livelihood activity, mahua (*Madhuca longifolia*, Sapotaceae (L.) J.F. Macbr.) flower collection has received limited attention as a distinct driver of fatal human–tiger encounters. Mahua flower collection is a seasonal activity undertaken primarily between March and April by tribal and rural households in Chandrapur district of Maharashtra state. Collectors typically enter forest areas during early morning hours to gather

fallen flowers, which are later dried and sold for use in food products, traditional beverages, and medicinal preparations. While economically and culturally significant, this activity increases human presence in tiger habitats during periods when tigers are actively moving or returning to resting cover, thereby elevating the risk of encounters.

Although human–tiger conflict has been widely studied in India, the specific role of mahua flower collection—a major seasonal livelihood activity—remains poorly documented. Chandrapur district, with high tiger numbers and recurrent fatalities, offers a critical context for examining this gap. This study uses official records to identify activity-specific risk patterns and inform targeted, livelihood-sensitive conflict mitigation strategies. The study aims to identify high-risk months, locations, and vulnerable genders, and to propose evidence-based recommendations for mitigating conflict while supporting sustainable forest-dependent livelihoods and coexistence.
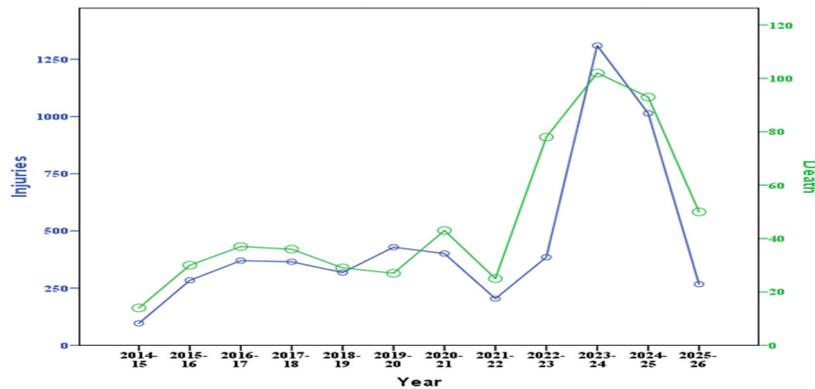

Fig. 1: Annual trends in human injuries and deaths resulting from man–animal conflict in Maharashtra

Study Area

Chandrapur district (19°25′–20°45′ N, 78°50′–80°10′ E), located in eastern Maharashtra, represents one of India's most conflict-prone human–tiger landscapes (Fig. 2). The district has a population of approximately 2.2 million, predominantly rural (Census of India, 2011), and experiences a tropical monsoon climate characterized by hot summers (May, temperatures exceeding 46°C), moderate to high monsoon rainfall (1,200–1,400 mm), and mild winters (December, temperature 7°C).
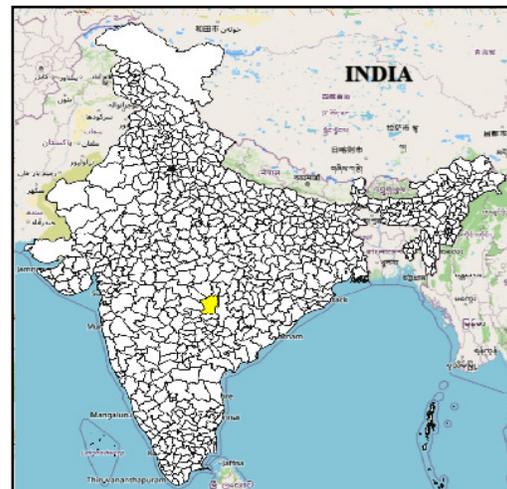

Fig. 2: Location of Chandrapur District in India (highlighted in yellow)

Forests cover approximately 40–45% of the district's geographical area and include a mosaic of reserve, protected, and unclassified forests interspersed with agricultural land, mining areas, and expanding settlements. Chandrapur encompasses the Tadoba–Andhari Tiger Reserve (TATR), covering about 1,727 square kilometres, along with the surrounding Chandrapur, Bramhapuri, and Central Chanda forest divisions (Fig. 3). These contiguous forests support one of the highest tiger densities in central India (Jhala *et al.*, 2021).
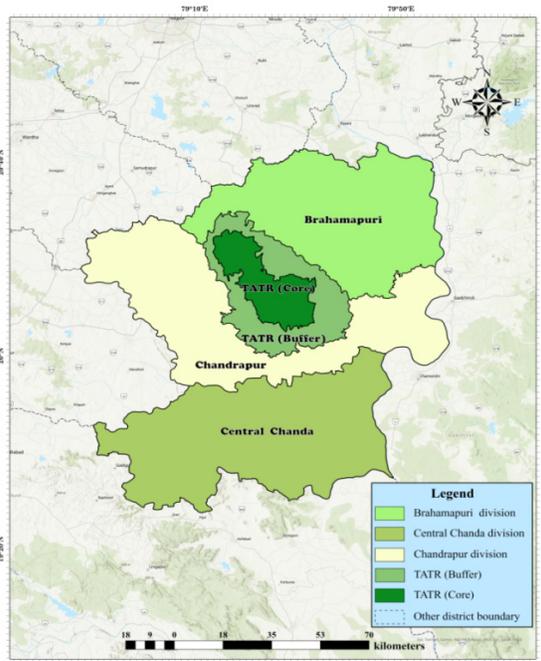

Fig. 3: Chandrapur forest divisions and TATR zones

Local communities, including Gond and Kolam tribes, depend heavily on forest resources for agriculture, livestock grazing, fuelwood, fodder, and NTFPs such as mahua flowers and tendu leaves. This high degree of forest dependence, combined with increasing tiger populations and fragmented habitats, contributes to frequent human–tiger interactions, particularly in TATR buffer zones and territorial forests.

Tiger Population

According to the 2022 tiger census, the Chandrapur Forest Circle supports a substantial tiger population distributed across multiple forest divisions (Table 1). The TATR (core and buffer areas) harbours approximately 95 tigers, while Bramhapuri, Chandrapur, and Central Chanda forest divisions support 66, 52, and 36 tigers, respectively. Collectively, Chandrapur district accounts for nearly 5% of the global tiger population (n = 250). In addition to adult tigers included in official census estimates, the region supports a considerable number of cubs and sub-adults (~100) that are excluded due to variable survival rates (Choudhari and Ali, 2025). The presence of breeding populations across both protected and non-protected forest areas increases tiger movement beyond reserve boundaries, thereby elevating the potential for encounters with forest-dependent communities.

Table 1: Tiger population in Chandrapur forest circle

Forest division	Tiger population (as of the 2022 census)	Geographical area	Reserve forest	Protected forest	Unclassified forest	Total area	Percent of forest
Tadoba Andhari Tiger Reserve (TATR) (core and buffer)	95	1727.17	1165.20	145.56	14.93	1325.69	13.43
Bramhapuri forest division	66	3863.54	802.22	437.30	11.92	1251.44	32.39
Chandrapur forest division	52	3252.50	227.59	116.80	17.64	362.23	11.14
Central Chanda forest division	36	2754.64	862.87	195.75	58.20	1116.82	40.54

(Area in square kilometres) (Updated from Dudhpachare, 2013).

Material and Methods
Data Sources and Collection

Data on human fatalities caused by tiger attacks during mahua flower collection between January 2013 and December 2023 were obtained through a formal Right to Information (RTI) application submitted to the Office of the Chief Conservator of Forests, Chandrapur Forest Circle. The dataset comprised officially recorded fatal incidents in which mahua collection was identified as the primary activity at the time of the attack.

For each incident, the variables were extracted from Forest Department records, viz., date of incident, time of attack, location (village/range), forest division, gender of the victim, and age of the victim (where available). Supplementary data on tiger population size, forest cover, administrative boundaries, and division-wise forest characteristics were compiled from published sources, including the All India Tiger Estimation reports (Jhala *et al*., 2021), Maharashtra Forest Department records (2022), and district-level forest management documents.

Data Processing and Classification

Incident times were standardised to a 24-hour format and categorised into three temporal classes based on local forest-use practices, viz., early morning (06:00–09:00 hrs), Mid-morning (09:01–12:00 hrs), and atypical timing (after 12:00 hrs). Victim ages were grouped into middle-aged (40–54 years) and elderly (≥55 years) categories to examine age-related vulnerability patterns. One incident with missing age information was excluded from age-specific analyses but retained for all other assessments. Forest divisions were used as the primary spatial unit of analysis to allow comparison between protected areas, buffer zones, and territorial forests.

Temporal and Cluster Analysis

Temporal patterns were examined using descriptive statistics to identify seasonal and diurnal trends in fatal incidents. To further assess clustering of incidents by time of occurrence, hierarchical cluster analysis was performed using Ward's minimum variance method with squared Euclidean distance as the similarity measure. Time of incident (in hours) was used as the sole clustering variable to evaluate whether fatal encounters formed distinct temporal groupings. The resulting dendrogram was interpreted qualitatively to identify high-risk time windows rather than to infer statistical significance. This approach allowed classification of incidents into early-morning, mid-morning, and atypical-timing groups, corresponding to routine mahua collection hours and non-routine forest use periods. Given the limited number of observations (n = 15), cluster analysis results are presented as indicative patterns and are used to support descriptive interpretation of temporal risk rather than to infer causality. Cluster outputs are interpreted descriptively and do not imply statistical independence or predictive classification.

Statistical Considerations

Given the small sample size (n = 15), analyses were primarily descriptive. No predictive or multivariate statistical models were applied. Associations between tiger population trends and human fatalities were examined using temporal comparison rather than formal correlation testing. Pearson's correlation coefficient was employed to assess the strength and direction of the relationship between tiger numbers and human fatalities during mahua flower collection. Statistical significance was evaluated using a two-tailed test at the 0.05

significance level. Correlation analysis was exploratory and intended to illustrate directionality rather than infer causation. All analyses were performed using the Statistical Package for Social Sciences software (SPSS, version 16.0).

Ethical Considerations

All data used in this study were secondary and obtained from official government records. No direct interaction with human participants or wildlife occurred. Personal identifiers were not included, and confidentiality of victims and their families was maintained in accordance with administrative guidelines.

Results and Discussion
Spatio-Temporal Patterns of Human-Tiger Conflict

A total of 15 fatal tiger-attack incidents associated with mahua flower collection were recorded in the Chandrapur Forest Circle between 2013 and 2023 (Table 2). Spatial analysis revealed that the Bramhapuri Forest Division accounted for the majority of fatalities (n = 9; 60%), followed by the Chandrapur Forest Division (n = 5; 33.3%) and Central Chanda (n = 1; 6.7%). This spatial concentration reflects high overlap between human settlements, forest use areas, and tiger movement corridors. Women constituted a slight majority of victims (n = 8; 53.3%), highlighting gendered vulnerability linked to their prominent role in mahua collection. Victim ages ranged from 40 to 65 years, with fatalities concentrated among middle-aged (40-54 years) and elderly (≥55 years) individuals, suggesting increased risk among older collectors. Temporally, most incidents occurred during early morning hours between 06:00 and 09:00 hrs (n = 10;

66.6%), coinciding with peak mahua collection activity. All recorded fatalities occurred during March (n = 2, 13.33%) and April (n = 13, 86.66%), corresponding to the peak flowering season.

Hierarchical cluster analysis further demonstrated that early morning incidents (06:00-09:00 hrs) formed a distinct high-risk cluster, with fewer cases occurring during mid-morning or atypical afternoon hours. The findings indicate that human–tiger conflict related to mahua collection is a predictable and seasonally constrained phenomenon. The overlap between early morning forest use and tiger movement or resting behaviour likely increases human-tiger encounters. Similar patterns have been reported for other NTFP-related conflicts in central India (Dhanwatey *et al*., 2013).

The highest number of human-tiger fatal incidents was recorded in the Bramhapuri forest division, which accounted for nine of the 15 deaths (60%), followed by the Chandrapur forest division (n = 5; 33.33%), while the Central Chanda forest division recorded the fewest fatalities (n = 1; 6.66%). Pearson's correlation analysis indicated a positive association between tiger numbers and human fatalities occurring during mahua flower collection across these three forest divisions of the Chandrapur Forest Circle (r = 0.999, *p* = 0.024, two-tailed). The relationship was significant at the 0.05 level, suggesting that higher tiger abundance was closely associated with increased human fatalities. Given the limited number of spatial units (n = 3 forest divisions), correlation results are interpreted as descriptive indicators rather than inferential evidence.

The Bramhapuri division has a high density of both human settlements and tigers (n = 66), and it functions as an

ecological corridor linking the TATR with the smaller forest patches of Gadchiroli and Gondpipri. A spatial overlap analysis indicates that many attacks took place in unfenced buffer zones rather than within the core protected area, highlighting the vulnerability of individuals who enter forests during seasonal livelihood activities such as mahua and tendu collection.

The results suggest that the man–tiger conflict associated with non-timber forest product collection is a recurring and predictable seasonal phenomenon in Chandrapur forest circle. The increase in tiger numbers in Chandrapur forest division (n =250, as per the 2022 census in Chandrapur forest circle), while a conservation success, has amplified the risk of human–tiger encounters in

peripheral habitats (Ali, 2015; India Mongabay, 2023). The tiger population size and human fatalities imply that population increase of apex predators must be accompanied by proactive human–tiger coexistence planning. Traditional livelihood practices, such as mahua collection, bring forest-dependent populations - particularly women - into direct conflict with tigers during specific times of year. Field reports (Hitavada, 2025; Kharade, 2025) confirm that many of these incidents occur near village boundaries, where dense undergrowth and waterholes attract both humans and tigers. The behavioural ecology of tigers— returning to resting cover during early morning hours—overlaps temporally with villagers' foraging times, increasing the probability of encounters.

Table 2: Human fatalities resulting from tiger attacks during mahua flower collection in Chandrapur forest circle (2013–2023)

Date	Time reported	Location, Forest Division	Gender	Age
06/04/2013	06.30 to 07.00 am	Saoli, Chandrapur	Female	60
08/04/2014	07.00 to 08.00 am	Bramhapuri	Female	NM
21/04/2014	09.00 am	Bramhapuri	Male	65
05/04/2015	08.30 am	Chichpalli, Chandrapur	Female	46
20/04/2016	06.00 to 09.00 am	Sindewahi, Bramhapuri	Female	55
01/04/2017	04.00 pm	Bhatali, Chandrapur	Male	65
06/04/2019	06.00 am	Bramhapuri	Female	65
12/04/2019	07.30 am	Parsodi, Central Chanda	Male	45
17/04/2019	11.30 am	Bramhapuri	Female	40
27/03/2019	08.30 am	Bramhapuri	Male	50
11/04/2020	06.30 am	Chichpalli, Chandrapur	Male	45
13/04/2021	02.00 pm	Bramhapuri	Female	65
31/03/2021	11.00 am	Chichpalli, Chandrapur	Female	55
19/04/2022	09.00 am	Sindewahi, Bramhapuri	Male	47
04/04/2023	03.00 pm	Nagbhid, Bramhapuri	Male	55

NM – Not mentioned. (Information Source: Chief Forest Conservator Forest Officer, under RTI Act)

Time-of-day Patterns for Tiger Attacks
Hierarchical cluster analysis using Ward's linkage method grouped fatal mahua-related tiger encounters into three

distinct clusters based on time of incident, as illustrated in the dendrogram (Fig. 4). The resulting dendrogram clearly differentiates cases occurring during early

morning (EM, 06:00 to 09:00 hrs)**,** mid-morning (MM, 09:01 to 12:00 hrs)**,** and atypical timing (AT, after 12:00 hrs) periods. The first cluster was dominated by EM incidents, representing the largest grouping. These cases clustered at low rescaled distances, indicating strong similarity in timing and reflecting the peak period of mahua flower collection. This cluster corresponds to the highest-risk time window for fatal encounters.

The second cluster comprised MM incidents, which merged with the EM cluster at moderate rescaled distances. This suggests that mid-morning encounters represent a transitional risk period, temporally adjacent to routine collection hours but with slightly reduced frequency. The third cluster, clearly separated at a higher rescaled distance, consisted of AT incidents, including events occurring during afternoon or non-routine hours. The large linkage distance indicates that these incidents are temporally distinct from routine mahua collection activities and represent exceptional or non-patterned risk events. Overall, the dendrogram demonstrates that fatal tiger encounters during mahua collection are strongly structured by time-of-day, with early morning hours forming a distinct high-risk cluster, mid-morning incidents forming an intermediate group, and atypical timing incidents constituting a separate and less frequent cluster.
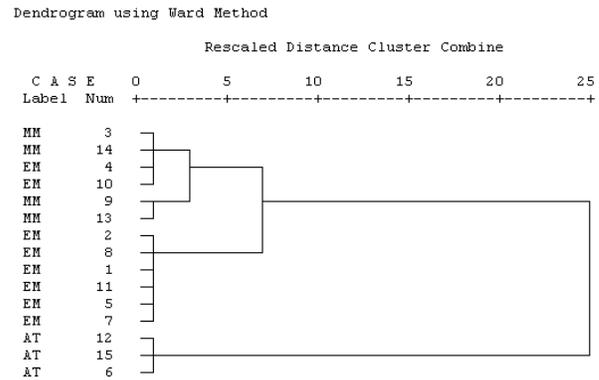

Fig. 4: Hierarchical cluster analysis of mahua-related tiger attacks

Temporal Patterns of Human-Tiger Conflict

The month-wise human-tiger conflict in Chandrapur forest division is presented in Fig. 5. From the figure, it can be seen that the number of human–tiger incidents occurring during mahua flower collection is restricted in March and April across three forest divisions. In the Bramhapuri forest division, incidents rise sharply from one (6.66%) case in March to eight (53.33%) cases in April, indicating that peak mahua collection in April coincides with maximum conflict. Central Chanda records no incidents in March and only one in April, suggesting comparatively lower interaction between people and tigers during this period. In Chandrapur division, incidents increase from one (6.66%) in March to four (26.66%) in April, again reflecting higher conflict intensity in the main mahua collection month. These seasonal peaks in April are consistent with reports that mahua collection draws large numbers of villagers into tiger habitats at the end of the dry season, elevating encounter risk.
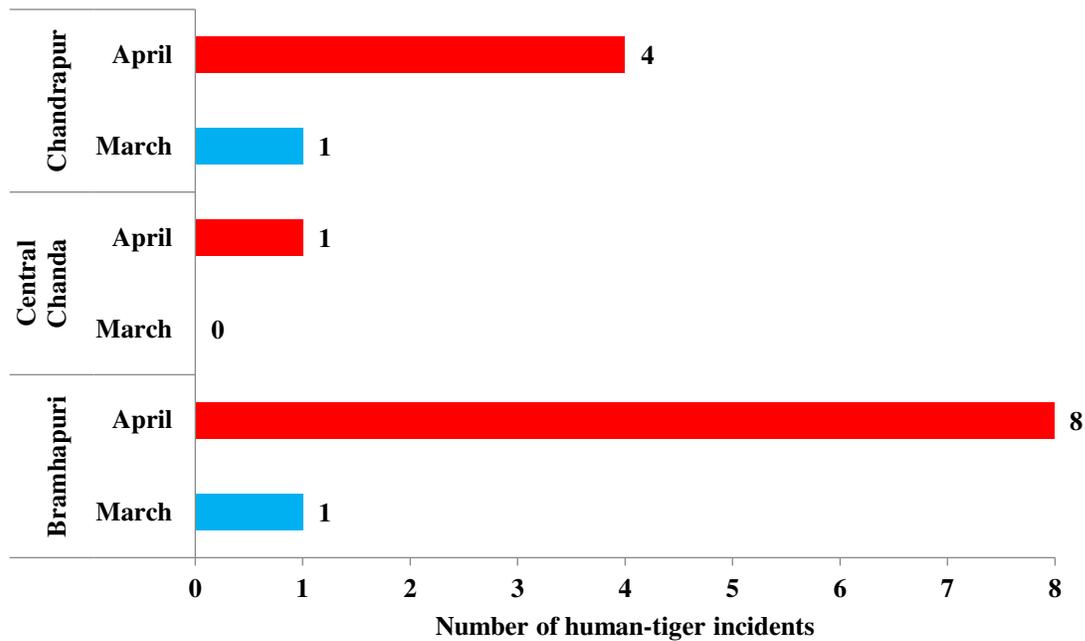
Fig. 5: Monthly distribution of fatal human–tiger conflict incidents during mahua flower collection, showing pronounced seasonal clustering in April

Human–tiger conflict incidents exhibited pronounced seasonal clustering, with the highest occurrence in April (n = 13; 86.66%) and the lowest in March (n = 2; 13.33%). April corresponds to the peak flowering period of mahua, which intensifies early-morning human presence in forest interiors and edge habitats. Concurrently, the dry pre-monsoon season is characterised by reduced water availability and altered prey movement, prompting tigers to increase spatial use of forest fringes and human-modified landscapes. Additionally, elevated temperatures during this period influence tiger thermoregulatory behaviour, with individuals frequently resting in shaded or vegetated patches near human access routes during early morning hours. The ecological convergence of intensified human resource extraction, seasonal prey redistribution, and tiger behavioural ecology substantially elevates encounter probability, thereby increasing conflict risk during April in the Chandrapur landscape.

Gender Patterns in Human-Tiger Conflict

The Fig.6 depicts the number of inhabitants killed in human–tiger conflict during mahua flower collection, disaggregated by gender and forest division. In the Bramhapuri forest division, tiger attacks during mahua flower collection claimed four male and five female lives, indicating the highest mortality (n = 9) burden among all sites and a slightly greater risk for women collectors. Similar but lower numbers are seen in the Chandrapur forest division, where two males and three females were killed, again showing female predominance among victims. In contrast, the Central Chanda forest division records only one male death and no female fatalities, suggesting comparatively fewer

high-risk encounters during mahua collection in this forest division. These patterns mirror reports from Vidarbha, where repeated tiger attacks on mahua collectors around Bramhapuri and neighbouring forest areas have been documented in recent years.
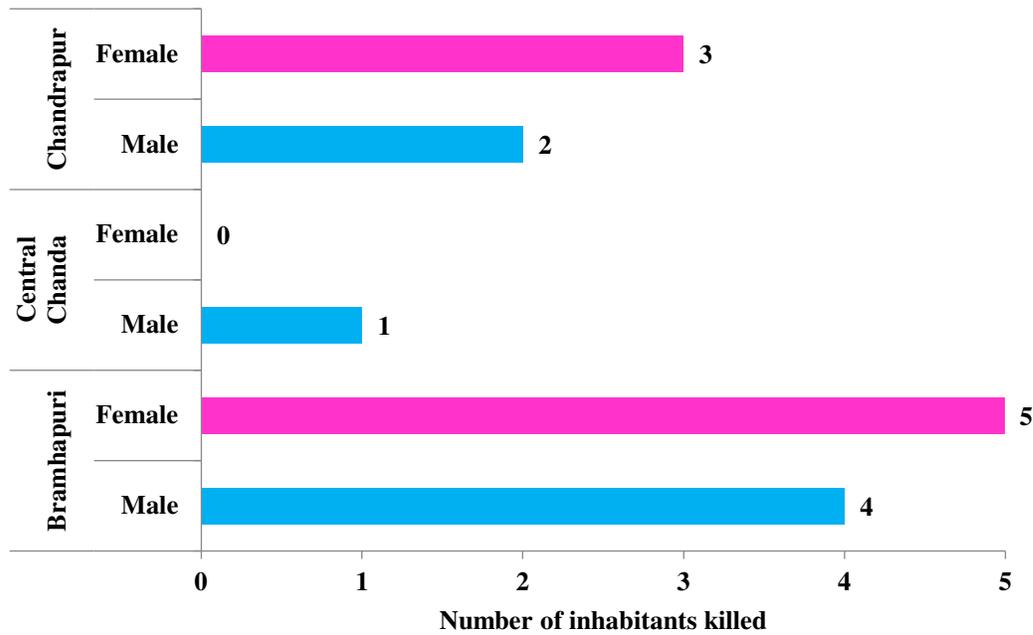

Fig. 6: Gender distribution of inhabitants killed in human–tiger conflict during mahua flower collection across forest divisions of Chandrapur forest circle

The gendered pattern of fatalities observed during mahua flower collection is best explained by differential exposure arising from livelihood roles rather than biological susceptibility. In the study landscape, the collection of mahua flowers is predominantly undertaken by women, reflecting a gendered division of labour within forest-dependent households. This activity requires early morning forest entry (typically 06:00–09:00 hrs) to collect freshly fallen flowers, a time window that overlaps closely with peak tiger movement and the use of dense vegetation and ground cover as tigers return to resting sites following nocturnal activity. Furthermore, mahua collection involves prolonged ground-level foraging, often carried out individually or in small groups, which reduces situational awareness and increases the likelihood of sudden close-range encounters. Together, the gendered allocation of forest-based labour, temporally concentrated exposure during high-risk hours, and ground-focused collection practices create a predictable risk pathway that disproportionately affects women, particularly older individuals, during the mahua flowering season.

Ex-gratia Compensation Trends Associated with Human–Wildlife Conflict

In cases of fatal human–tiger conflict, the Forest Department provides immediate ex-gratia compensation to the victim's family, a mechanism similarly applied to incidents involving other

wildlife species. Between 2014–15 and 2025–26, the Government of Maharashtra disbursed approximately Rs. 690.12 crore (USD 76.84 million) as compensation for human–wildlife conflict, covering human fatalities (n = 564), injuries (n = 5,400), and extensive crop damage (Fig. 7). In Maharashtra, the ex-gratia compensation framework for human casualties resulting from wild animal attacks provides Rs. 25 lakh (approximately USD 27,775) for

fatalities. Compensation for permanent disability is set at Rs. 7.5 lakh (USD 8,333), while victims sustaining major injuries are eligible for Rs. 5 lakh (USD 5,556). This compensation mechanism is intended to provide immediate financial relief to affected families; however, it functions primarily as a post-incident corrective measure rather than a preventive intervention.
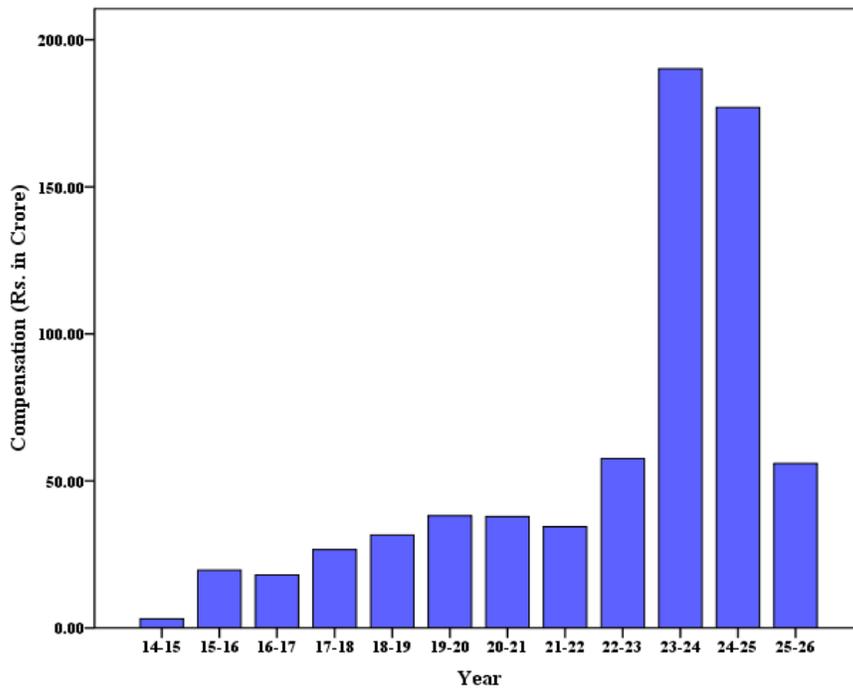

Fig. 7: Year-wise compensation (in crore rupees) paid for losses due to human–wildlife conflict in Maharashtra

Although these state-level data are aggregated and do not disaggregate incidents by species, activity, or location, the findings of the present study demonstrate that a substantial proportion of fatal incidents are both species- and livelihood-specific. This contrast underscores the limitations of generalised compensation records and highlights the importance of fine-scale, activity-linked data to inform targeted prevention

measures. Redirecting even a fraction of compensation expenditure toward preventive interventions—such as safer mahua collection practices, seasonal risk management, and community-based early warning systems—could reduce both human fatalities and the long-term financial burden on the state, while supporting coexistence objectives in tiger-dominated landscapes.

Landscape Connectivity and Spillover Patterns of Mahua-Related Human–Tiger Conflict

The solitary fatal human–tiger conflict incident recorded in the neighbouring Gadchiroli district during the study period provides important contextual insight into the spatial dynamics of conflict in the wider landscape. Although Gadchiroli reported only one mahua-related fatality between 2013 and 2023, its occurrence in the Wadsa Forest Division—adjacent to and ecologically connected with the Bramhapuri Forest Division of the Chandrapur Forest Circle—highlights the role of functional corridors in facilitating tiger movement beyond administrative boundaries. The incident, involving a 49-year-old male during early morning hours in April 2020, mirrors the temporal and seasonal patterns observed in Chandrapur, reinforcing the association between mahua flower collection and elevated conflict risk.

This case suggests that increasing tiger abundance in Chandrapur may be driving dispersal and territorial expansion into adjoining forest divisions with suitable habitat conditions. Such landscape-level spillover effects underscore the limitations of district-centric conflict assessments and emphasise the need for corridor-based, inter-district management approaches. The Gadchiroli incident, therefore, supports the broader conclusion that human–tiger conflict during mahua collection is not confined to administrative units with high tiger densities but can emerge in connected landscapes where human livelihoods and tiger movement overlap.

Conclusion

This study demonstrates that human–tiger conflict in the Chandrapur landscape is closely linked to seasonal livelihood-driven forest use, particularly mahua flower collection. Fatal encounters are temporally and spatially predictable, with elderly women in the Bramhapuri Forest Division facing the highest risk during early morning hours in April. These findings identify mahua collection as a critical conflict trigger within this multiple-use forest landscape.

While increasing tiger populations represent a major conservation achievement, they also necessitate proactive, people-centred conflict mitigation strategies. Current responses remain largely reactive and compensation-driven, placing increasing financial pressure on state agencies without addressing underlying risk factors.

The study underscores the need to shift toward preventive approaches, including safer collection practices, adjusted collection timing, community-based alert systems, targeted awareness programmes, and livelihood diversification during high-risk periods. Integrating such measures within local forest management and conservation planning frameworks is essential for reducing fatalities while sustaining both human livelihoods and tiger conservation outcomes.

This study shows that mahua-related human–tiger conflict is temporally and spatially predictable, enabling targeted preventive policy action. Forest departments can reduce fatalities by focusing interventions during early morning hours in March–April and in high-risk divisions such as Bramhapuri. Policies promoting adjusted collection timings, group-based collection, and short-term livelihood support during peak risk periods are likely to be effective. The findings also underscore the need for gender-sensitive measures, as women

collectors face higher exposure. Redirecting resources from compensation toward prevention can improve long-term coexistence outcomes.

This study is limited by a small sample size (n = 15), restricting inferential statistical analysis and generalisation beyond the study area. The reliance on officially reported fatalities likely under-represents non-fatal encounters and near-miss events associated with mahua collection. Spatial analysis was constrained to forest-division and village or range scales, preventing fine-scale assessment of microhabitat risk factors and collector behaviour. Future research should incorporate non-fatal incidents, fine-scale spatial and behavioural data, and longitudinal evaluation of preventive interventions, including altered collection timings, group-based practices, and alternative livelihood strategies.

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